Description of document:	National Oceanic and Atmospheric Administration (NOAA) Responses to Congressional Questions for the Record (QFRs) 2017-2020
Requested date:	02-June-2022
Release date:	28-September-2022
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Source of document:	Freedom of Information Request National Oceanic and Atmospheric Administration Public Reference Facility (SOU1000) 1315 East-West Highway (SSMC3) Room 9719 Silver Spring, Maryland 20910 FOIAonline

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of the Chief Information Officer
High Performance Computing and Communications

September 28, 2022

Re: Request No. DOC-NOAA-2020-001311

This letter is in response to your Freedom of Information Act (FOIA) request which was received by our office on June 2, 2020 in which you requested:

- A copy of the Questions For the Record (QFR) and agency QFR responses to Congress responding to QFRs during calendar years 2017, 2018, 2019 and 2020 to date, for NOAA. These records are likely found in the NOAA office that handles legislative affairs/congressional relations. This is an individual noncommercial request.

We have located 36 records responsive to your request. 27 of these documents are being released to you in their entirety.

9 documents responsive to your request are exempt under 5 U.S.C. 552 (b)(5), which prohibits from disclosure records of attorney work product, attorney-client privilege, and deliberative process.

Although we do not consider this to be a denial of your request, you have the right to file an administrative appeal if you are not satisfied with our response to your FOIA request. All appeals should include a statement of the reasons why you believe the FOIA response was not satisfactory. An appeal based on documents in this release must be received within 90 calendar days of the date of this response letter at the following address:

Assistant General Counsel for Employment, Litigation, and Information
U.S. Department of Commerce
Office of General Counsel
Room 5896
14th and Constitution Avenue, N.W.
Washington, D.C. 20230

An appeal may also be sent by e-mail to FOIAAppeals@doc.gov, or by FOIAonline at https://foiaonline.regulations.gov/foia/action/public/home#.

For your appeal to be complete, it must include the following items:

- a copy of the original request,
- our response to your request,

- a statement explaining why the withheld records should be made available, and why the denial of the records was in error.
- “Freedom of Information Act Appeal” must appear on your appeal letter. It should also be written on your envelope, email subject line, or your fax cover sheet.

FOIA appeals posted to the email box, FOIAonline, or Office after normal business hours will be deemed received on the next business day. If the 90th calendar day for submitting an appeal fallson a Saturday, Sunday or legal public holiday, an appeal received by 5:00 p.m., Eastern Time, the next business day will be deemed timely.

FOIA grants requesters the right to challenge an agency's final action in federal court. Before doing so, an adjudication of an administrative appeal is ordinarily required. The Office of Government Information Services (OGIS), an office created within the National Archives and Records Administration, offers free mediation services to FOIA requesters. Theymay be contacted in any of the following ways:

Office of Government Information Services
National Archives and Records Administration
Room 2510
8601 Adelphi Road
College Park, MD 20740-6001

Email: ogis@nara.gov

Phone: 301-837-1996
Fax: 301-837-0348
Toll-free: 1-877-684-6448

If you have questions regarding this correspondence please contact Mark Graff at foia@noaa.gov or the NOAA FOIA Public Liaison Tony LaVoi at (843) 740-1274.

Please refer to your FOIA requesttracking number DOC-NOAA-2020-001311 when contacting us.

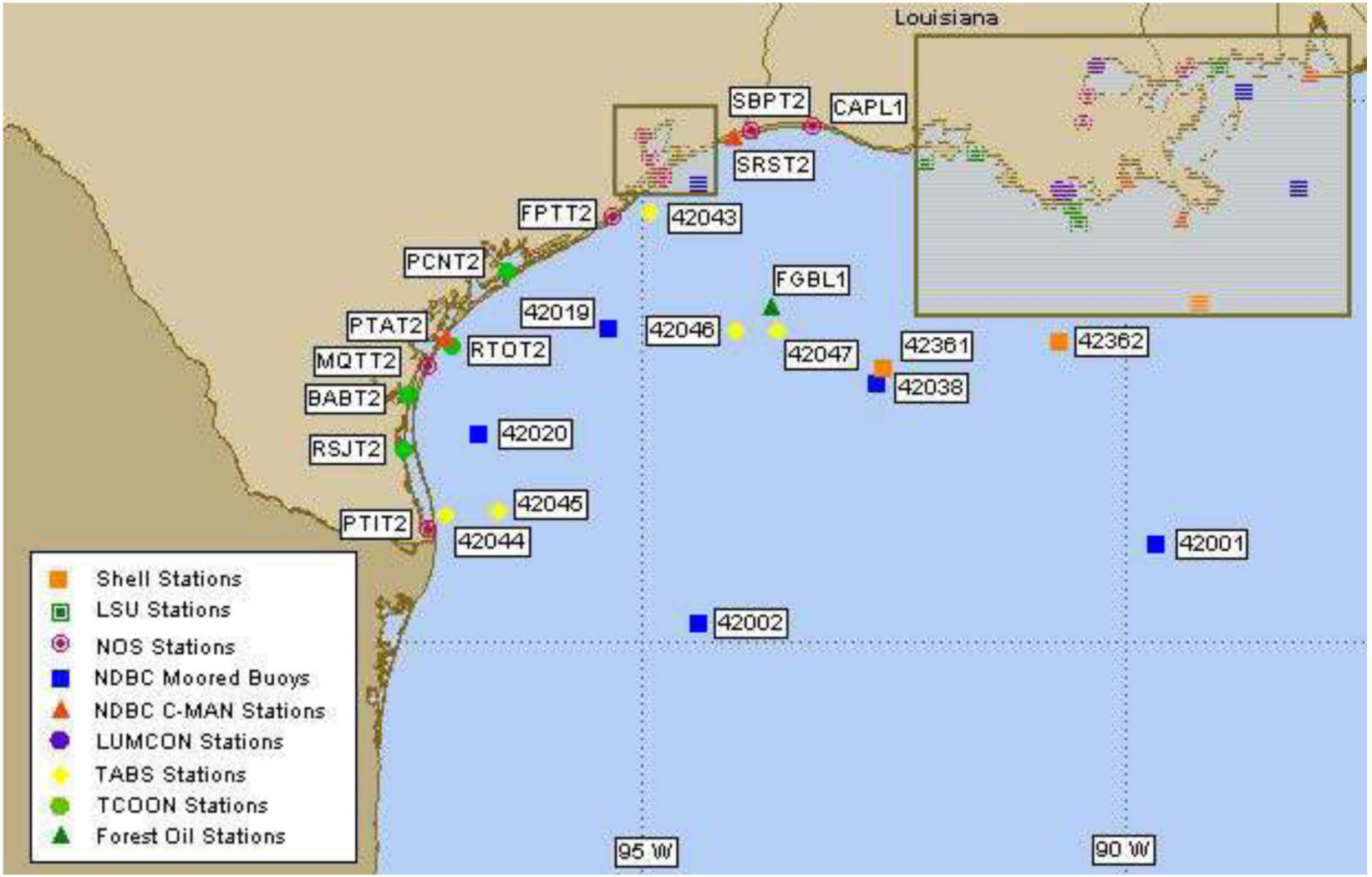
Sincerely,

GRAFF.MARK.HYRUM.1514447892

Digitally signed by GRAFF.MARK.HYRUM.1514447892
Date: 2022.09.28 14:47:34 -04'00'

Mark H. Graff
FOIA Officer/Bureau Chief Privacy Officer
National Oceanic and Atmospheric Administration

Data Buoys

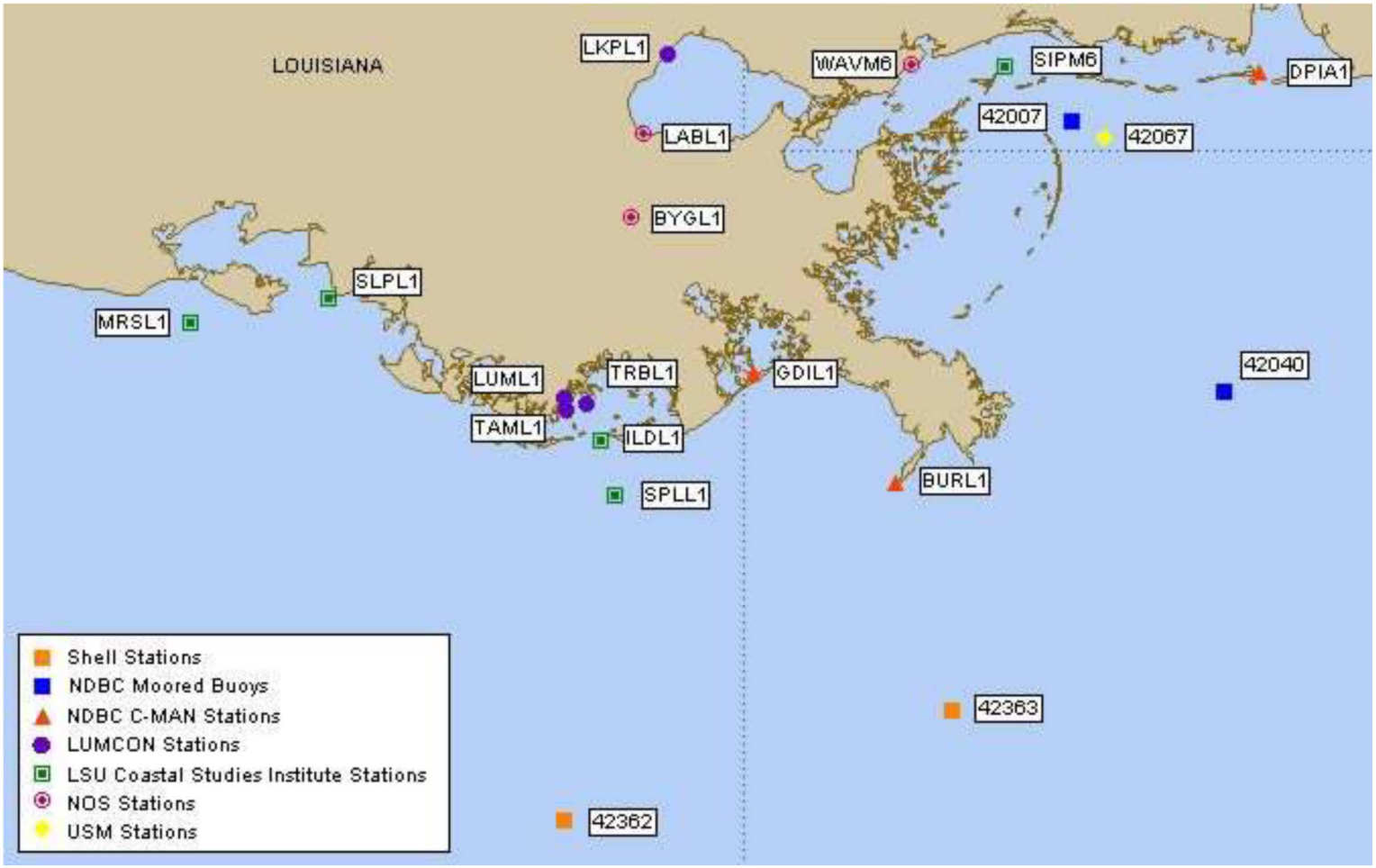


Louisiana Universities Marine Consortium (LUMCON)

Texas Automated Buoy System (TABS)

Texas Coastal Ocean Observation Network (TCOON)

Data Buoys



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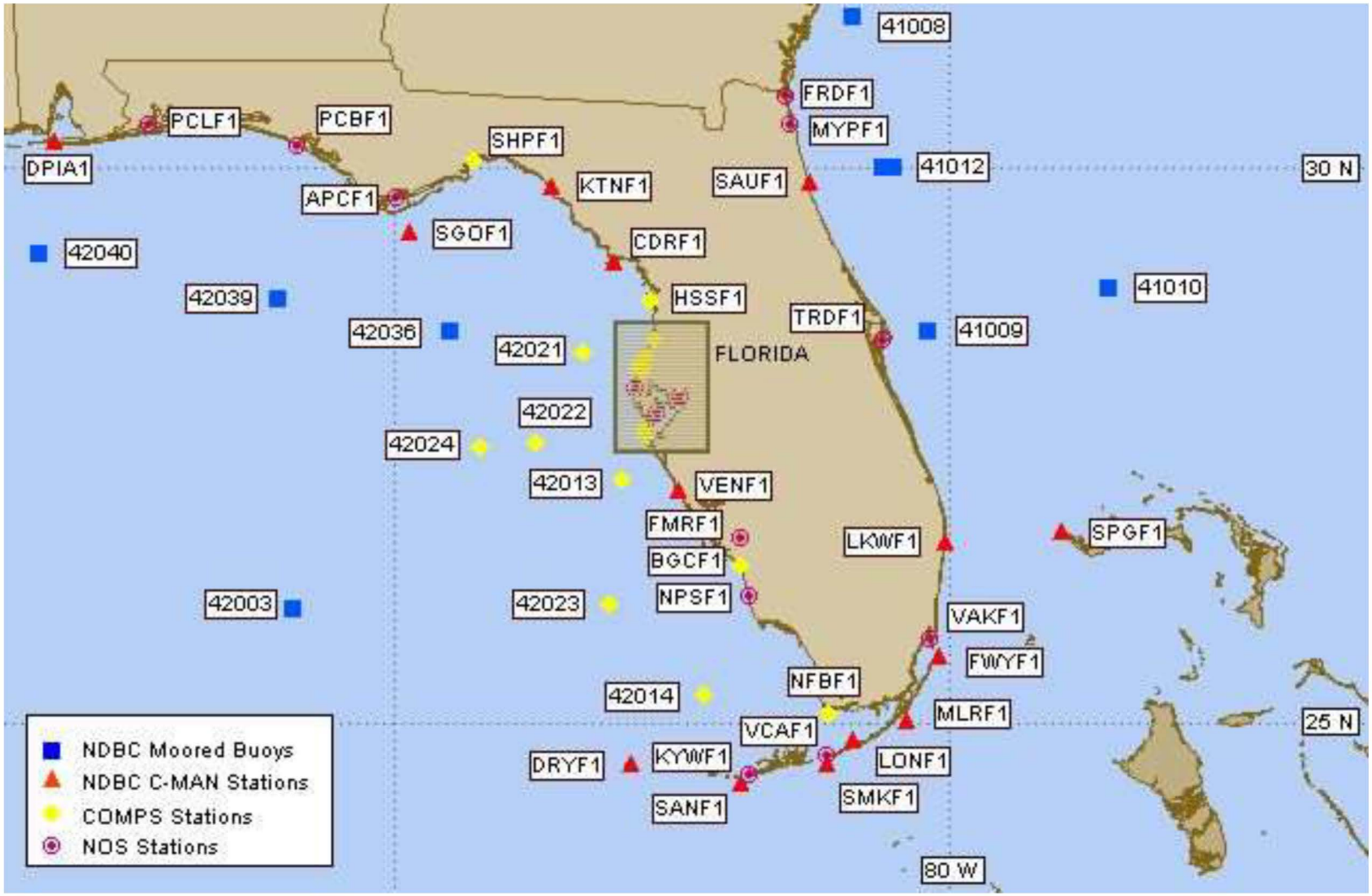
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NDBC Moored Buoys
NDBC C-MAN Stations
COMPS Stations
NOS Stations

Data Buoys

Coastal Ocean Monitoring and Prediction System (COMPS

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

NOAA Hurricane Forecasting
October 7, 2005
10:00 a.m. to 12:00 p.m.
2318 Rayburn House Office Building

QUESTIONS FOR THE RECORD FOR GENERAL D. L. JOHNSON

QUESTIONS SUBMITTED BY THE MAJORITY:

1. **What are the various notification systems the National Weather Service uses to disseminate weather warnings and information? For each notification system, please explain how Federal, State and local government officials receive the information. For each level of government (Federal, State and local), please explain how the National Weather Service (including its local weather forecast offices) confirms that government officials received emergency messages. Do these procedures change in case of an "incident of national significance" declared by the Department of Homeland Security?**

Answer: National Weather Service (NWS) warnings are distributed through a vast dissemination network. These systems include NOAA Weather Radio All Hazards (NWR), which can reach anyone in the area who has a NWR receiver; NOAA Weather Wire Service; Emergency Managers Weather Information Network (EMWIN); Internet; local paging systems to emergency managers; high-speed direct communications with users of large volumes of weather data (i.e., commercial meteorological firms) connected by landlines (Family of Services), by satellite broadcasts (NOAAPORT), or both. The media uses one or more of these feeds to receive the information and then rebroadcast it. Federal, state, and local officials typically receive weather warnings and information from different combinations of the above systems. Some officials also obtain information from the private sector.

These dissemination systems do not have a mechanism in place to verify the user received the message. However, each state emergency operations center has a direct feed from the NOAA Weather Wire Service, paid for by the NWS, to help ensure NWS warnings and other information are received by emergency managers. The state emergency managers then redistribute the data and information, as appropriate, to local emergency managers. Government officials also typically receive messages from several systems (listed above). During major weather situations, many NWS offices or regional headquarters send a meteorologist to state emergency operations centers, or place phone calls to these centers to ensure emergency managers have the most current information and interpretation possible.

These procedures do not change for an "incident of national significance."

2. **For each notification system described in the answer to question one, please explain how often the National Weather Service and its local forecast offices test the systems to make sure they are working. Are the notification systems redundant to such a degree that no significant communications capability would be lost if any one of the notification systems fails to function during a severe weather event?**

Answer: Each local weather forecast office tests the NOAA Weather Radio All Hazards (NWR) Network in its local area once a week to ensure the system is operating. Other dissemination systems are monitored continuously at the National Weather Service Telecommunication Gateway and any communications outages are addressed immediately.

If a NWR transmitter becomes inoperable, messages are not transmitted to the NWR receivers. NOAA is working to further increase the reliability of NOAA Weather Radio All Hazards (NWR) transmitters to allow operation in adverse conditions, when normal communications systems can fail. Nearly $5M in funding provided to NOAA in the FY 2006 hurricane supplemental will be used to provide backup electrical power for NOAA Weather Radios and Automated Surface Observing Sites in coastal areas. Not only is NWR network reliability important, increasing the number of individuals who own NWR receivers is also critical. NOAA works with the private sector to promote the use of NWR receivers and recently worked with FEMA and the Department of Education to distribute 16,000 NOAA Weather Radios to public schools across the country. Also, with $1M in additional funding provided in the supplemental, NOAA will expand the NWS Weather Wire Satellite Communication System to improve communications capability at coastal Weather Forecast Offices for timely transmission of weather warnings to the public and the media.

One benefit of having multiple dissemination systems is redundancy. If one method is non-operational, others still disseminate important information. However, this strategy is successful only when recipients have access to multiple dissemination systems. Redundancy is one of the items stressed in the National Weather Service StormReady program, to ensure communities and emergency managers can receive warnings and information different ways. Communities can receive NWS and emergency messages through NWS dissemination systems which include NOAA Weather Radio All Hazards (NWR), which can reach anyone in the area who has a NWR receiver; NOAA Weather Wire Service; Emergency Managers Weather Information Network (EMWIN); Internet; local paging systems to emergency managers; and via commercial meteorological or communication (e.g. phone) companies.

3. **What are NOAA's back-up procedures during severe storms if a radar, buoy, or entire local weather forecast office is destroyed or cannot communicate? Please explain the circumstances that would trigger back-up procedures. Were any**

back-up procedures triggered during Hurricanes Katrina or Rita? If so, please explain what happened and what NOAA is doing to fix any damage.

Answer: The National Weather Service (NWS) has robust backup procedures in place to ensure continuity of operations. The NWS radar network was designed to provide radar coverage for the contiguous United States to ensure radar coverage for severe weather, including hurricanes. Should a radar fail, adjacent radar stations and other observation systems provide sufficient coverage. Other observation systems, such as satellites and surface observation stations, provide a sufficient level of coverage to assist meteorologists in the forecast and warning function. NOAA operated WSR-88D radars have an operational availability of 99.1%.

NOAA/NWS recently added connection to four Federal Aviation Administration Terminal Doppler Weather Radars -- Orlando, FL; West Palm Beach, FL; New Orleans, LA; and Houston, TX -- in hurricane-prone areas as another mechanism to ensure weather radar data are available to forecasters. During both Hurricanes Katrina and Rita all radars remained operational, providing data to the local weather forecast offices.

NOAA/NWS buoys have redundant wind sensors and barometers that provide data if the primary instrument fails. Several of the large buoys, including three in the Gulf of Mexico and the seven new buoys deployed with FY04 Hurricane Supplemental funds have a complete second operational system on board that serves as a back-up. Should a buoy suffer catastrophic damage, which rarely occurs, NOAA maintains a network of large buoys which provide some overlapping coverage. Further, other weather observation systems (for example satellites and hurricane reconnaissance flights) also provide coverage. Repairing buoys is a high priority but depends on ship availability. NOAA fixes damaged buoys within the Atlantic Hurricane Basin as quickly as possible, usually within a few months. NOAA/NWS can also provide manual backup should an automated surface observing system fail at a Weather Forecast Office (WFO) or major airport.

During Hurricane Katrina, the NWS implemented backup coverage for the New Orleans, Louisiana; Lake Charles, Louisiana; and Jackson, Mississippi offices when communications to and from the offices were lost due to an MCI/communications backbone failure. The FY2006 Hurricane Katrina/Rita Emergency Supplemental provides NOAA $1M to improve (harden) hurricane-prone WFOs communication capabilities via backup satellite communications. The NWS offices in Mobile, Alabama; Houston, Texas; and Huntsville, Alabama assumed forecast and warning responsibility for the area normally covered by the New Orleans, Lake Charles, and Jackson offices, respectively. During Hurricane Rita, the NWS implemented backup operations for the Lake Charles, Louisiana WFO when the office lost its communications just after landfall. The backup service was provided by the WFO in Houston, Texas.

4. In your testimony you mentioned that at the end of each hurricane season NOAA leads a "hotwash" to review all of its hurricane procedures with

emergency managers and weather forecasters. Please provide the following information about the annual hotwash:

a. **Who from Federal, State, and local government agencies participates in the annual hotwash? Who from the private sector participates? Do you solicit input and/or participation from non-governmental organizations and the public?**
b. **What is the process for selecting participants?**
c. **What is the process for reviewing and prioritizing recommendations that result from the hotwash?**
d. **What is the process for providing resources, if needed, for implementing priority recommendations?**
e. **What "hotwash" recommendations were made in the last three years? Which of these recommendations have been implemented and which have not been implemented? If applicable, please explain why recommendations were not implemented.**

Answer: The "hotwash" (a colloquialism for a series of agency-directed reviews) is a review and analysis of the past hurricane season and occurs on many levels. The first is an internal NOAA examination of operations and procedures to see what went well and where improvements could be made. The second is the Interdepartmental Hurricane Conference, an internal Federal Government review, which includes NOAA, the Department of Defense, the Federal Emergency Management Agency, NASA, the National Science Foundation, and others. And finally, a National Hurricane Conference is conducted which includes all levels of government, as well as emergency managers, private sector meteorologists, and media representatives. Participation in the National Hurricane Conference is open to everyone. Local Weather Forecast Offices also conduct more informal analyses of hurricane operations and work with their local emergency management counterparts to identify best practices and where improvements in the overall hurricane program can be made.

Attached are summaries of the recommendations from the NOAA review and the Federal Government review for the past three years (included as Appendix 1 and 2, respectively). It is a high priority for NOAA and the NWS to implement as many of the recommendations as possible for the next hurricane season using existing resources and follow normal funding request procedures if necessary.

5. **Is the ability to forecast marine wave height and wind speed important for predicting storm surge and inland flooding? If so, please explain why. What are the current capabilities of NOAA to forecast marine wave height and wind speed? Does NOAA require additional observational equipment to improve wave forecasts?**

Answer: Storm surge predictions are based on the size of the storm, the strength of the winds and the bathymetry of the ocean. Predicting the size and strength of the storm remains most critical to storm surge prediction. Winds push water ahead of the storm,

causing the water level to rise along the shoreline. The stronger the wind and the larger the wind field, the larger the storm surge will be. Waves are also driven by surface wind speed. NOAA's operational numerical computer wave model (WAVEWATCH) provides predictions of wave height for NOAA forecasters to use as they prepare storm surge forecasts. Wave predictions from the WAVEWATCH model at 24 hours are accurate to within about 1 ¼ feet during the summer and about 2 ½ feet on average during the stormy winter months. The WAVEWATCH model will eventually be coupled to the Hurricane Weather Research and Forecasting Model to provide an advanced storm surge model. Battering coastal waves also push water up along the coastline. In fact, the battering waves that were on top of the storm surge were responsible for the extensive damage along North Carolina during Isabel and the catastrophic damage along the Northern Gulf of Mexico coastline during Katrina. $2.5M was provided in the FY 2006 hurricane supplemental to accelerate storm surge forecasting, which includes improvements to the Sea Lake and Overland Surges from Hurricanes (SLOSH) model.

Additional observations, such as those planned under the Global Environmental Observation System of Systems (GEOSS), will help improve model predictions. NOAA is working with the National Aeronautics and Space Administration to develop new observing technologies, such as a scanning radar altimeter. When flown on the NOAA P-3 aircraft, this new technology can provide valuable information as was demonstrated during Hurricane Rita. Data from the instrument were used to help measure significant wave height and transmit that information directly the National Hurricane Center.

Inland flooding associated with hurricanes is generally due to freshwater flooding from hurricane-related rainfall, not wind driven storm surge or waves. With funding provided in the FY 2006 hurricane supplemental ($2.5M), we are accelerating the development of new localized flood-forecast products and services for hurricane-prone states.

6. What is the status of all marine buoys in the Caribbean and Gulf of Mexico? According to an article in the *Miami Herald* on October 9, 2005, the National Hurricane Center needs 13 additional marine buoys ($250,000/buoy) to improve its hurricane forecasts. Why has NOAA not requested funding for additional buoys?

Answer: All of the marine buoys in the Caribbean and Gulf of Mexico are operational. NOAA used funding from the Military Construction Appropriations and Emergency Hurricane Supplemental Appropriations Act, 2005 (P.L. 108-324) to deploy 7 buoys in the Gulf of Mexico, Caribbean Sea and Atlantic Ocean. These buoys provided critical data to help forecasters accurately track and predict the intensity and path of hurricanes during the 2005 hurricane season. With incorporation of the eight buoys provided in the FY 2006 hurricane supplemental, NOAA believes the current configuration is adequate. Additional observations, are also being planned under the Global Earth Observation System of Systems (GEOSS) to further improve predictions.

7. According to an article in the *Miami Herald* on October 9, 2005, older dropwindsondes fail at least half the time in strong winds but it would only cost $1 million to fully upgrade to newer, more resilient dropwindsondes. What are the failure rates for old and new dropwindsondes in high winds? When will NOAA's old supply of dropwindsondes be depleted such that the agency will only rely on newer dropwindsondes? If NOAA has known that it would only take $1 million to upgrade the dropwindsondes, why didn't NOAA fix this problem sooner?

Answer: Failure of older dropsondes in high winds occurs primarily in the very lowest level winds (about 500 feet altitude), when wind speeds exceeded 100-112 miles per hour. NOAA worked with the National Center for Atmospheric Research and the Air Force Reserve Command to test an updated dropsonde in 2004 that performed more reliably in these high wind situations. These new dropsondes were mass produced by the primary vendor (Vaisala) and used for most of the 2005 hurricane season. Preliminary indications are that the new dropsondes performed in 2005 as well as they did in the tests in 2004, with no failures reported in high winds. However, we are still evaluating their performance to ascertain whether these new dropsondes have any limitations of their own. NOAA has only 220 of the older dropsondes in stock which will be used before the next hurricane season.

8. For the past five years, what is the annual number of Doppler radar failures due to lightning strikes? Where did these failures occur geographically? What is the justification for not pursuing the $3.5 million fiber optic solution for protecting Doppler radars from lightning strikes? What lightning protection projects has NOAA completed or is NOAA planning to complete in lieu of the fiber optic solution? What has been or is predicted to be the cost of those projects?

Answer: On average, 25 of 158 operational WSR-88D radar systems have been damaged, apparently due to lightning strikes, annually during the last 5 years (17 in 2005; 33 in 2004; 27 in 2003; 34 in 2002; and 12 in 2001). Radars in all areas of the contiguous United States have received lightning damage; this type of damage is not any more or less prevalent in any one geographical location. Radar towers are usually the tallest structure in the local area, making them a likely target for lightning strikes. NOAA operated WSR-88D radars have an operational availability of 99.1%. The average time to repair a radar is about 6.5 hours.

Recognizing early in the program that radars are susceptible to lightning strikes, NOAA/NWS took aggressive action to make the radars more robust. We focused on actions that would have the most immediate and largest payback. NOAA/NWS has completed several lightning mitigating projects as part of sustaining engineering and retrofit actions:

(1) Stocking lightning sensitive spare parts at field sites and in a "lightning kit" maintained at our logistics centers, to reduce radar down time due to awaiting parts delivery.

(2) A retrofit of the grounding grid at radar sites in 1993-1998 ($1.9 million) greatly reduced lightning susceptibility and reduced the number of lightning-damaged radar parts by an estimated 50%.
(3) Surge protection devices were added to the radar shelters in three different projects ($732,000).
(4) Replacement of aging copper communication lines with fiber optic communication lines which are less susceptible to lightning damage/interruption in 2004-2005 ($1.6 million).
(5) Preventative maintenance inspections have been refined to mitigate lightning impacts.
(6) Depot-level engineering visits to the occasional sites that appear to have an unusual susceptibility to lightning have corrected a number of small issues and subsequently reduced the occurrences of lightning induced damage. A visit of this type was conducted at the Miami WSR-88D last year after we noticed an anomalously high number of lightning failures. Since the engineering team visit, there have been no lightning failures.
(7) Transition power maintenance systems were installed in 1998-2003 ($45.3 million). These systems enable the "ride through" of commercial power outages until engine generator power becomes available and they condition the commercial power to eliminate "spikes" due to nearby lightning strikes. These features reduce the likelihood of lightning induced radar damage.
(8) A National Severe Storm Laboratory study in 2000 showed the current radome lightning rod configuration is the most effective design.

These initiatives have been very effective and made the radars more resilient under lightning conditions. It is important to note that it is not possible to make the radars lightning proof against a direct strike. However, we are taking all steps necessary to mitigate the effects of lightning. On those occasions when radars fail due to a direct lightning strike, the adjacent radars are positioned to provide backup coverage.

9. Please provide a funding history, including number of full-time employees, for the Hurricane Research Division for the past twenty years.

Answer: The first table below summarizes the funding history of the Hurricane Research Division for the past twenty years. Non-base support includes other NOAA support received through funded proposals to Hurricane Research Division scientists through projects such as the Joint Hurricane Testbed. Non-base support also includes extramural support from other federal agencies, including the National Aeronautics and Space Administration and the Federal Emergency Management Agency. The second table summarizes Hurricane Research Division staff history broken into FTEs and cooperative institute (CI)/contract personnel.

Year	Base ($M)	Non-base ($M)	Total ($M)
1985	2.63	0.28	2.91
1986	2.63	0.28	2.91
1987	2.63	0.28	2.91

1988	2.63	0.28	2.91
1989	2.63	0.28	2.91
1990	2.63	0.35	2.98
1991	2.63	0.31	2.94
1992	2.63	0.38	3.01
1993	2.63	0.68	3.31
1994	2.63	0.88	3.51
1995	2.63	1.58	4.21
1996	2.63	0.81	3.44
1997	2.63	0.73	3.36
1998	2.63	0.81	3.44
1999	2.63	0.82	3.45
2000	2.63	1.30	3.93
2001	2.47	1.34	3.81
2002	2.82	1.71	4.53
2003	2.84	1.55	4.39
2004	2.95	1.56	4.51
2005	3.03	2.05	5.08

Year	HRD FTE	CI/contract	total HRD staff
1985	NA	NA	NA
1986	NA	NA	NA
1987	NA	NA	NA
1988	NA	NA	NA
1989	NA	NA	NA
1990	32	11	43
1991	34	10	44
1992	31	11	42
1993	30	12	42
1994	32	12	44
1995	30	12	42
1996	31	12	43
1997	32	11	43
1998	30	11	41
1999	30	11	41
2000	27	10	37
2001	26	10	36
2002	25	10	35
2003	26	10	36
2004	25	10	35
2005	23	12	35

NOAA conducts hurricane research not only at HRD, but also at its Geophysical Fluid Dynamics Laboratory and Environmental Modeling Center. Through its hurricane research program, NOAA develops new technologies for observing hurricanes, further improves its models for predicting hurricane track and intensity, and provides critical assistance to forecasters at the National Hurricane Center. All together, these efforts resulted in the vast track improvements over the past 20 years.

10. According to an article in the *Miami Herald* on October 10, 2005, Hurricane Research Division scientists use sensors called Airborne Expendable Bathythermographs to measure the temperature of the ocean down to 1,000 feet. But, researchers can't get the data to forecasters because they need to develop software to use the data (estimated software cost is $200,000). Is this characterization accurate, and if so, why has NOAA not provided the funding for the software development?

Answer: The October 10, 2005 Miami Herald article is correct per se, in that software needs to be developed to get the data to forecasters; however the article is inaccurate in its implication that NOAA has neglected to fund software development as there is no current operational requirement for the observations/data from the ocean probes. The ocean probes used were acquired from the Navy surplus by the Hurricane Research Division (HRD) for use in research missions. The HRD maintains software to process and quality-control these data for research purposes. After these data are collected and processed for quality control, they are sent to NOAA's operational modeling center to determine utility of the data.

11. When does NOAA plan to completely upgrade all 102 stations in the weather balloon observation network? What is the failure rate for weather balloons and what could be done to reduce the failure rate?

Answer: NOAA oversees 102 upper air stations in the United States and throughout the Caribbean. Our FY 2006 operating plan supports the upgrade of 78 of those sites, which are scheduled to be upgraded by the end of Fiscal Year 2010.

During the period of October 2004 through October 2005, 98 percent of launches have reached the minimum successful height of 400 hecto Pascals* (standard is 90 percent), and 66 percent of launches have reached 10 hecto Pascals* (standard is 60 percent). The system is meeting the NWS performance requirements. (*Hecto Pascals is a standard of pressure measurement used by the National Weather Service. At 10 hecto Pascals, the balloon is at a height of approximately 100,000 feet.)

12. NOAA has acknowledged that some hurricane research software still runs on old computers because the software has not been converted to run on newer machines. Are there plans to update the software to run on newer computers? If so, when will that update be completed? If not, why not?

Answer: The Hurricane Research Division manages a 4-5 year information technology (IT) strategy to upgrade and replace all IT equipment in order to meet NOAA's IT security requirements. NOAA completed the third year of this strategy in 2005 and we have replaced or upgraded our complete network infrastructure, most of our servers, and 67 percent of our desktop computers. Our strategy calls for completion of the server and

desktop upgrades in 2006, and completing the software update in 2007. All of our processing software runs on our recently upgraded UNIX servers, and we currently are upgrading some of the software that will run on the aircraft to process and quality control observations in real time to run under LINUX (Aircraft Operations Center's preferred operating system). Last year, the Aircraft Operations Center provided a LINUX server for HRD to use and we are purchasing a new LINUX server this year to accommodate this transition. NOAA is working to streamline and upgrade the SATCOM data transfer from the aircraft to the ground as part of our strategy to provide more data from the aircraft to our operational partners. As part of this upgrade we are working to define requirements for data transfer and quality control of the data to ensure the IT infrastructure on the aircraft meet all NOAA's needs.

QUESTIONS SUBMITTED BY THE MINORITY

1. **For hurricane Katrina, the weather forecasting offices that were in the main path of the hurricane were the New Orleans forecast office in Slidell, LA; the Mobile forecast office in Mobile, AL; Jackson, MS; and Lake Charles, LA. For hurricane Rita, Houston, TX and Lake Charles, LA were in the main path of the storm.**

   According to NOAA's daily Incident Coordination Center reports for Katrina, at least four other local offices were at-the-ready or engaged to provide backup for these offices – Shreveport, LA; Huntsville, AL; Houston, TX; and Tallahassee, FL. For Rita, it appeared to be the Fort Worth, TX WFO acting as the backup office.

   The Southern Region Headquarters also provided additional personnel to the local forecast offices, the state emergency operations centers, and coordinated the backup plan and response for the offices in the hurricane path.

   It appears NWS met its goal of maintaining continuity of weather forecasting capabilities overall for the affected areas during these hurricanes even as some of the local offices were experiencing communication and other equipment failure problems. It appears NWS had a good internal preparation and response plan.

   What is your assessment of the performance of the NWS internal preparation and response plan for these storms? What changes, if any, are you considering to further improve the procedures for maintaining continuous NWS forecasting capabilities during hurricanes? What is the current status of the impacted NOAA offices and equipment damaged by these two storms?

Answer: The National Weather Service (NWS) plans for continuity of forecast and warning operations worked well during Hurricane Katrina. Our procedures worked well

but we are working to address some technical issues, such as phone line failures, to make these systems even more robust during natural disasters.

The National Data Buoy Center (NWS), the National Coastal Data Development Center (NESDIS), and the National Marine Fisheries Service (NMFS) laboratory located at John C. Stennis Space Center in Bay St. Louis, MS, sustained damage. The NWS Weather Forecast Office (WFO) in Slidell, LA, was constructed to be able to withstand a Category 3 hurricane (with an internal room able to withstand a Category 5), and sustained minimal damage from the storm. Power and communications were quickly restored to the facility. NWS WFOs in Mobile, Lake Charles, and Houston provided backup forecast and warning services while communications were compromised.

Additional NOAA facilities/equipment which sustained damages include the NMFS lab in Pascagoula, MS, and the Office of Marine and Aviation Operations (OMAO) port office and warehouse, personal offices co-located at Halter Marine, and the NOAA ship, OREGON II, all located in Pascagoula. Also, two NOAA lab facilities in Miami, FL, sustained damage and two National Water Level Observation Network (NWLON) stations are being replaced.

Ten NWS Automated Surface Observing Systems (ASOS) were impacted by Katrina, mainly by loss of communications or power. Two systems were destroyed; two systems sustained damage and continue to have intermittent communications and power problems. The Doppler radar at Slidell remained operational throughout the storm. Once communication was restored, data were available to all users. Five buoys and four Coastal Marine Automated Network (C-MAN) stations were damaged or destroyed by the two storms. The buoys and one of the C-MAN stations have been repaired. The offshore platforms containing the other three C-MAN stations were demolished, and will be repaired. The FY 2006 Hurricane Katrina Supplemental provides funding to repair or replace the ASOS and C-MAN stations that remain down. We are currently awaiting local infrastructure restoration (restoration of commercial power and communications to the area) before we can address these repairs.

2. **How does the declaration of an Incident of National Significance by the Secretary of the Department of Homeland Security (DHS) change the operations of the National Weather Service with respect to regional forecasting, participation in HLT conference calls, local forecasting or the other standard operations of NWS for a hurricane?**

   How does the flow of information between NOAA and the Homeland Security Operations Center (HSOC) at DHS change if an Incident of National Significance is declared for a hurricane?

Answer: The operations of National Weather Service (NWS) units do not change when an Incident of National Significance is declared. Our operation procedures are designed to "automatically" include incident escalation. NOAA/NWS responds to similar situations whenever a thunderstorm becomes severe or produces a tornado, or when a

strong winter storm develops. To keep up with the latest information, the NOAA Watch Desk at the Homeland Security Operations Center (HSOC) coordinates closely with the NOAA Incident Coordination Center (NOAA ICC) or the appropriate NWS Regional Operations Center. Important products such as watches, warnings and advisories – especially for significant meteorological events such as tornados, flash floods, and blizzards – are automatically routed directly from the main NWS communications center, the NWS Telecommunication Gateway, and transmitted via e-mail to the NOAA Watch Desk. Additionally, for a selected group of these products, such as tornado warnings, flash flood warnings, hurricane forecasts and statements, information is sent directly to the Department of Homeland Security Senior Watch Officer in the HSOC.

3. **The Slidell office managed to get a flash flood message out about the levee breach in New Orleans at 8:14 am Central Daylight Time the morning hurricane Katrina made landfall. The office lost its communication capability a short time later.**

   The top of the Bulletin has a line that reads: EAS Activation Requested. What action does that request set into motion?

   What systems would transmit this message and who would receive a flash flood message of this type (e.g. the Emergency Operations Center in Baton Rouge; the Region VI FEMA office; NWS Southern Regional Headquarters)? Please trace the path of this message.

Answer: Transmitting the message "EAS Activation Requested" initiates the Emergency Alert System. The Emergency Alert System (EAS) is designed to provide the President with a means to address the American people in the event of a national emergency. Through the EAS, the President would have access to thousands of broadcast stations, cable systems, and participating satellite programmers to transmit a message to the public. The EAS and its predecessors, CONELRAD and the Emergency Broadcast System (EBS), have never been activated for this purpose. But beginning in 1963, the President permitted state and local level emergency information to be transmitted using the EBS (now EAS).

Once activated, the EAS, depending on the message, generates tone alerts on radio stations, crawls or programming interruptions for television broadcasts, and immediate retransmissions by "intermediaries" (e.g. private weather companies, television stations, web-based organizations, etc.) to cell phones, email messages, Internet notifications, etc. The message is also immediately broadcast on NOAA Weather Radio All Hazards (NWR). State Emergency Operations Centers are equipped to receive these warning messages through various methods, including NWR, Internet, Emergency Managers Information Network (EMIN), and NOAA Weather Wire Service (NWWS). NOAA's responsibility is complete once the message is transmitted; we do not verify receipt of transmission.

The flash flood warning message was transmitted by the Slidell Weather Forecast Office and routed immediately onto NOAA Weather Radio. From there, the Emergency Alert System was activated, with the message and EAS activation request reaching media within seconds. The message was also transmitted through all other NWS dissemination systems, including NOAA Weather Wire Service (NWWS), Emergency Managers Weather Information Network (EMIN), NOAAPORT, Internet, Family of Services, and others.

QUESTIONS SUBMITTED BY THE HONORABLE EDDIE BERNICE JOHNSON

1. **What role does NOAA play in providing information to the Army Corps of Engineers regarding the potential and magnitude of flooding and storm surge that would factor into setting construction standards for the New Orleans levee system? How often is this information updated?**

NOAA's National Weather Service (NWS) runs the SLOSH (Sea, Lake, and Overland Surges from Hurricanes) model in simulation studies to estimate potential hurricane storm surge flooding. This work is done as part of comprehensive hurricane evacuation planning. Data from these model simulation studies are used, in addition to other relevant information, to develop evacuation plans. NOAA/NWS also runs the SLOSH model for post-storm analysis, using the exact track of the storm, to help assess storm impacts.

The U.S. Army Corps of Engineers (USACE) and FEMA are the primary Federal agencies providing funding for these SLOSH simulation studies. NOAA is responsible for running the simulations. The Atlantic and Gulf coastlines of the United States, from Texas to Maine, can be divided into 41 geographic regions, or basins. SLOSH updates are generated for each of the 41 basins, including the New Orleans area, according to a list of priorities established by the Interagency Coordinating Committee on Hurricanes (ICCOH), of which the USACE, FEMA, and NOAA are members. The ICCOH determines when the SLOSH model studies are updated, and makes the request to NOAA. These NOAA simulations are used primarily for evacuation studies and planning. NOAA conducted SLOSH model simulation studies for the New Orleans area in 1989, 1994, and 2002. These studies are not done on a scheduled basis, but when levee data or upgrades to the storm surge model physics warrant, and as resources permit. SLOSH is used primarily by the USACE to support evacuation studies and emergency response activities.

For engineering studies and flood protection structure design the USACE uses NOAA wind fields and other storm meteorological data as well as bathymetric map products to drive high resolution storm surge and wave models.

At the request of the U.S. Army Corps of Engineers, NOAA's Office of Oceanic and Atmospheric Research provides post-storm analysis of wind fields to assist USACE post-storm analysis of storm surge modeling and impact.

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

NOAA Hurricane Forecasting
October 7, 2005
10:00 a.m. to 12:00 p.m.
2318 Rayburn House Office Building

QUESTIONS FOR THE RECORD
FOR MR. MAX MAYFIELD

QUESTIONS SUBMITTED BY THE MAJORITY:

1. **In your testimony you explained that while progress has been made forecasting hurricane tracks, there is much room for improvement in forecasting hurricane intensity. Non-governmental experts have suggested that the Federal government could improve its ability to forecast hurricane intensity by conducting additional observations and research. Some of the additional activities suggested by these experts include:**
    a. **Hurricane observation flights in the upper troposphere (current flights do not go to that altitude);**
    b. **Improved numerical prediction models that include both ocean and atmospheric observations; and**
    c. **More or improved observations of hurricane cores.**

Do you agree that conducting the additional observations/research listed above would likely lead to an improved ability to forecast hurricane intensity in the short term and/or in the long term? If not, why not?

Answer: Currently NOAA is pursuing all three of these activities to improve forecasts of hurricane intensity and structure.

- The NOAA Gulfstream-IV aircraft operates a high altitude sampling of the upper troposphere surrounding hurricanes as part of operational surveillance missions. We are also conducting special research flights into the inner portion of hurricanes including the upper regions in the eye of the hurricane. NOAA has partnered with the National Aeronautics and Space Administration (NASA) on three experiments over the past seven years, the latest conducted this past summer, to obtain high altitude aircraft observations of the inner core of a number of hurricanes and tropical storms from the NASA DC-8 and ER-2 aircraft. These observations, combined with those from the NOAA P-3 aircraft, have provided numerous insights into storm intensity and structure.
- NOAA currently is developing a next generation hurricane prediction system, the Hurricane Weather and Research Forecasting system. The Hurricane Weather and Research Forecasting system consists of (1) advanced high-quality observations for both atmosphere and ocean; (2) advanced data assimilation

techniques; and (3) the next generation, coupled air-sea-land prediction system with advanced representation of physical processes. This model is in the testing stage with implementation planned for 2007.

- The NOAA P-3 aircraft operate in the core of the hurricane at altitudes between 1,000-20,000 feet. These aircraft have been used since 1976 to collect research and operational data sets to improve our forecasts and understanding of tropical cyclone track, intensity, and structure. As a result of this research, a number of new technologies, sampling strategies, and concepts have been transitioned to operational use. The most recent of these is the Stepped Frequency Microwave Radiometer (SFMR), which provides surface wind estimates that are a direct measure of the storm structure and intensity. We are in the midst of transferring a new technology into operations, the airborne Doppler radar, for use in initializing and evaluating the new operational modeling system.

In your opinion, what other areas of additional research or observations are needed to help understand and forecast hurricane intensity in the short term and in the long term?

Answer: Investing wisely in science and technology is the prudent approach toward improving hurricane understanding and prediction. Observations and research are essential for developing advanced operational numerical systems. Research and operations are linked to achieve improved understanding and prediction of hurricanes. Requirements to better understand and forecast hurricane intensity include numerical weather prediction model guidance of high resolution derived from cutting edge science and advanced data assimilation, as well as a real-time observing network of greater resolution and reliability, especially over ocean areas for forecaster analysis and short-term forecasts. The FY 2006 hurricane supplemental request included over $31M in new investments to improve hurricane warnings and forecasts. Ocean observations will be expanded by deploying 8 new buoys and re-engineering dropwindsones. The completion of the new Hurricane Weather and Research Forecasting System (HWRF) will be accelerated. The Global Forecast System (GFS) will be enhanced to improve forecasts of hurricane intensity (strength) and structure (size).

In your opinion, what are the five highest priority areas of additional research or observations needed to improve hurricane intensity forecasts and models in the short term? Similarly, what are the five highest priority areas to improve this capability in the long term? What are the estimated costs of implementing theses priority areas? Why has NOAA not implemented research or observations in these areas? Are there plans to move ahead with these activities?

Answer: NOAA is working to address its five highest priority areas for both short and long term research and observations needed to improve hurricane intensity forecasts and models. These areas include:

1. Increase computational capacity to run sophisticated high resolution numerical weather prediction models

2. Research for more detailed representation of small scale features in hurricanes and coupling of the wave and hurricane prediction models
3. Expand the current network of coastal and deep-ocean buoys
4. Develop and deploy satellite sensors on NOAA geostationary and polar-orbiting satellites that would significantly improve wind force and vector measurements of hurricanes and severe storms
5. Add additional flight hours for the high altitude NOAA Gulfstream-IV aircraft

Hurricane modeling is necessary for studying storm dynamics and for forecasting hurricane track, strength, and intensification. One of the limiting factors in hurricane modeling in both the short and long-term is computational power. The development of higher resolution models that provide more detailed representations of hurricanes is dependent on having the computational power to run these higher resolution models.

While the above list of priorities includes both short and long term research goals, additional efforts in the long term need to focus research on: the effect of upper ocean processes on hurricane intensity and structure; the role the atmospheric environment plays in hurricane intensity and structure change (e.g., how very low humidity in the lower troposphere or very strong vertical shear of the horizontal wind affect hurricane intensity and structure); improving observations of the inner core (eyewall) processes; the role of rain bands in hurricane intensity and structure change; and developing and testing of new advanced models that (1) provide a more detailed representation of the inner-core dynamics of the storm and the interactions between the storm with its environment and (2) provide an optimal forecast framework to help quantify the uncertainty in the forecasts.

Through the Joint Hurricane Testbed, funded primarily through the U.S. Weather Research Program, the National Hurricane Center has devoted considerable time identifying the most pressing needs and priorities. A complete list of program priorities can be found at http://www.aoml.noaa.gov/hrd/Landsea/jht/JHT_FFO_30June2004.pdf.

Sufficient resources for operations, research and observations have been provided. We strive to continue to improve our products and services, particularly hurricane intensity forecasting. NOAA continues to implement research to operations and programming, planning and budgeting activities have identified and include the necessary resources to keep up with this demand. We appreciate your continued support of the President's annual budget requests.

2. In developing a hurricane forecast, you use weather data collected from a variety of sources, including NOAA satellites, radar, buoys, hurricane hunters, etc. For each of these sources of weather data, please briefly describe the nature of the data you receive and what role it plays in developing a hurricane forecast. In addition, please identify any weather data that is currently available to you from only one source.

Answer: There is a tremendous amount of Federal Government (and non-Federal) data available on hurricanes. The sources and use of the data are described below.

AIRCRAFT:

NOAA Gulfstream-IV
Deploys dropwindsondes, which measure pressure, wind speed, wind direction, temperature and dewpoint, providing a vertical atmospheric profile from wherever it is dropped by aircraft to sea surface. Data are used to increase accuracy in numerical model predictions.

NOAA P-3
Deploys dropwindosondes; provides radar images, visual report of sea surface and estimated surface winds, center position and pressure, wind radii and maximum winds/intensity; Stepped Frequency Microwave Radiometer (SFMR) provides surface wind data; Expendable Bathythermograph (XBT) provides ocean temperature profiles. Some data is used by the forecasters, in numerical model predictions, and used extensively for research activities to increase accuracy and improve physical understanding of ocean and marine interface. NOAA operates 2 P-3 aircraft, and will purchase a third with funding from the FY06 hurricane supplemental.

U.S. Air Force Reserve C130-J
Deploys dropwindsondes; provides visual report of sea surface and estimated surface winds, center position and pressure, wind radii and maximum winds/intensity. Data is used by numerical models as well as forecasters. The Military Construction Appropriations and Emergency Hurricane Supplemental Appropriations Act, 2005 (P.L. 108-324) provided the U.S. Air Force $10.5 M to install SFMRs on its fleet of 10 C130-J aircraft.

SATELLITES:

GOES – Geostationary Operational Environmental Satellites
Primary data is provided by GOES-10, GOES-12, and METEOSAT-7 (VIS, IR, WV every 15-30 min). Interpretation of the satellite data provides a classification and analysis of the tropical system and helps determine the center of the storm and its intensity. Images, or "pictures," from GOES allow everyone to see what the hurricane looks like. It is these images that track the storms and are what is so prominently shown by the media.

POES – Polar Orbiting Environmental Satellite
NOAA Polar Orbiting Environmental Satellites (POES) with the advanced microwave sounding unit (AMSU) and the advanced very high radiometer (AVHRR) provide: precipitation estimates, qualitative estimates of storm intensity trends, sea surface temperatures, storm center position, convective structure and atmospheric temperature/humidity profiles.

Note: POES are not always over the storm since these satellites orbit the globe; this is in contrast to the GOES which are stationary relative to earth surface.

Other Low Earth Orbiting Satellites

- The Defense Meteorological Satellite Program, using the special sensor microwave/imagery (SSMI) suite of instruments, provides information on ocean surface wind speed, precipitation, sea surface temperatures, center position and convective structure.

- The National Aeronautics and Space Administration's (NASA's) Tropical Rainfall Mapping Mission (TRMM) satellites, using the TRMM microwave imager (TMI), provide precipitation/rain rate, center position, convective structure, ocean surface wind speed and sea surface temperatures.

- NASA's QuikSCAT, using the SeaWinds scatterometer, provides wind speed, wind direction, center location and wind radii.

- The NASA AQUA satellite mission uses the moderate resolution imaging spectroradiometer, the advanced microwave scanning radiometer and the atmospheric infrared sounder to provide precipitable water, water vapor, sea surface temperatures, center position, convective structure and atmospheric temperature/humidity profiles.

- European Research Satellite (ERS-2), using a wind scatterometer and a radar altimeter, provides the National Weather Service with wind speed and direction, storm center location, wind radii and wave heights.

RADAR:

U.S. WSR-88D – Doppler NEXRAD network provides extensive data as the storm approaches land. Wind speed data is available within 125 miles of the coast and conventional reflectivity data is available out to 250 miles away from the radar.

UPPER AIR OBSERVATIONS:

Observations from soundings of the atmosphere are available from 10 U.S. stations along the Gulf Coast and Puerto Rico. These observations (taken twice per day or every six hours when a hurricane is approaching land) provide temperature, moisture, wind speed and direction from the earth's surface to as high as 10 miles. Data is also available from other countries in the region covering Central and South America and the Caribbean nations, although this data is not available as consistently as data collected from U.S. sites.

BUOYS:

Drifting
Drifting buoys provide sea surface temperature and some wind speed and direction data.

Moored
Moored buoys provide wind speed and direction, air and sea temperature, barometric pressure, and wave height; and the newer buoys provide wave direction. These buoys provide coverage for the Gulf of Mexico, the Caribbean, and the Atlantic Coast. Specifically, NOAA operates and maintains 12 moored weather buoys in the Gulf of Mexico, 3 in the Caribbean, and 14 along the Atlantic Coast from Florida to New York, all critical to the Atlantic hurricane program. Forecasters use data from moored buoys operated and maintained by other federal, state, local and private entities as well.

LAND-BASED SURFACE OBSERVING EQUIPMENT:

Automated Surface Observing System (ASOS)
This system measures temperature, wind speed/direction, precipitation, present weather, cloud height, visibility, and barometric pressure.

Private sector wind portable wind towers
These are portable towers, mostly deployed by universities involved in hurricane research efforts. These data are used in post-storm analysis. Data are usually temperature, wind speed/direction, precipitation, present weather, and barometric pressure.

OIL PLATFORM OBSERVATION STATIONS:

Oil platform observation stations can provide data on temperature, wind speed/direction, precipitation, and surface pressure.

SHIPS:

Data collected on ships can include temperature, wind speed/direction, wave height, precipitation, present weather, cloud height, visibility, and pressure.

TIDE GAUGES:

Tide gauges provide information on the level/height of the water. This information is most useful for observing, not forecasting, storm surge.

C-MAN:

C-MAN stations provide data on barometric pressure, wind direction, speed and gust, and air temperature. Some C-MAN stations are designed to also measure sea water temperature, water level, waves, relative humidity, precipitation, and visibility.

COMPUTER MODELS:

The National Hurricane Center relies extensively on computer model output from various numerical weather prediction centers. These data provide guidance on the future track and intensity of tropical cyclones. Other computer models used by the National Hurricane Center help predict potential storm surge the storms could produce.

While some sources of data are unique, NOAA has backup or contingency plans in place to continue the stream of essential data. For example, there is overlapping WSR-88D (NEXRAD) radar coverage – if one goes down, data is provided by an adjacent site; newer models of data buoys have redundant sensors; and NOAA uses FAA Terminal Doppler Radar data at coastal sites where data are available to provide another layer of backup information.

3. If data from polar-orbiting weather satellites was not available to you, how would that affect your ability to forecast hurricanes?

Answer: Data from polar-orbiting weather satellites provides information essential to computer model forecasts. This data is the only source that provides information from over the oceans. Internal studies show that lack of polar-orbiting satellite data would have a negative impact on our forecasts, potentially reducing forecast accuracy by 15-20 percent.

4. If NOAA had a second Gulfstream jet for studying hurricanes, what improvements could be made to NOAA's hurricane forecasting capability? How long would it be before those improvements could be incorporated into operational prediction models? How much would it cost to procure a second jet and what funding would be required for annual operating costs for a second jet?

Answer: NOAA routinely operates the Gulfstream-IV (G-IV) aircraft twice a day on successive 8.5 hour missions during hurricane season. Internal studies show data provided by the current Gulfstream-IV jet have improved track prediction by about 20 percent, primarily during the hurricane watch/warning phase (when the storm is within a day or two of landfall). A second jet would allow more missions to be flown. This could be valuable during an active hurricane season when numerous hurricanes threaten the United States and data from nearly continuous flights would improve predictions.

A new Gulfstream jet, complete with essential equipment, would cost approximately $80 million, assuming the aircraft is purchased under an existing Air Force contract. We estimate that it would cost $5 million per year in operating costs for crew, maintenance, dropwindsondes and fuel.

Any single observational platform needs to be put into the proper context with all other investments in observations. Currently the most important observations needed to improve hurricane intensity and structure forecasts come from the radars flown on NOAA's P-3s. The U.S. Air Force will use funds from the FY 2005 hurricane supplemental to install these Stepped Frequency Microwave Radiometer sensors on its

fleet of 10 aircraft, the first of which will be available late in FY 2006. The FY 2006 hurricane funding supplemental provided $9M for an additional, equipped P-3 aircraft to improve observations of hurricanes.

5. **You have stated that today's average hurricane track forecast errors are only 94 nautical miles, compared with average forecast errors of 230 nautical miles in 1987. Have we reached the theoretical limit of track forecasting with the 94 nautical miles error, or could that error become smaller? If the error could be made smaller, what resources (i.e. observing equipment, computers, research funding, etc) does NOAA need to improve track forecasting and what is the estimated cost of those resources?**

Answer: While we may be nearing the theoretical limit of track prediction, we continue to work to improve our track forecasts. Track predictability depends on being able to predict larger scale atmospheric conditions and, on average, we have been successful at predicting the features that "steer" the hurricane. However, storms like Wilma (when it was in the southern Caribbean) and Ophelia (when stationary off the coast of Florida) highlight that we have room for improvement when it comes to predicting tracks for the "outlier" storms that stall or take very erratic paths.

To improve track forecasts we must continue our research efforts and computer modeling development. NOAA is currently developing a next generation hurricane prediction system, the Hurricane Weather and Research Forecasting (HWRF) system. We expect the improvements embodied in the HWRF system will lead to reduced track forecast error. Funding provided in the FY 2006 hurricane supplemental will accelerate the completion of the HWRF system. Additional observations, such as those planned under the Global Earth Observation System of Systems (GEOSS), would also help in defining the conditions for hurricane predictions.

6. **A recent article in the *Miami Herald* asserts that key countries in the Caribbean are not launching weather balloons regularly, despite an agreement with the United States to launch balloons, because the countries did not have all the equipment the U.S. had promised. Would additional funding or other actions help ensure that weather balloon equipment is provided to Caribbean countries in a timely manner and that the countries launch the balloons as needed?**

Answer: We face many different challenges when collecting meteorological data. All required equipment and supplies have been provided to the appropriate countries, in accordance with our agreements. During Hurricane Wilma, four of the sites experienced system malfunctions (hydrogen generator and/or tracking system), which have now been corrected. Releasing weather balloons, using the tracking equipment, and transmitting data back to the international data collection hubs is the responsibility of each country. Issues such as local power, communications, and maintenance are challenges that vary from country to country, which has at times made it difficult to collect meteorological data from balloon launches. While these data are important and NOAA will do all it can to ensure the data are available, dropwindsonde data from hurricane reconnaissance

flights provide similar types of data used by our hurricane forecasters and hurricane models.

7. In your opinion, if additional funding were available for hurricane forecasting, what are the five highest priority areas of where additional resources would improve operational hurricane forecasts and models?

Answer: The highest priority for hurricane forecasting is to improve our prediction of storm intensity. There are many components accompanying that element, including continued improvements in track forecasts and the prediction of the size of the windfield, as well as being able to predict when and how quickly storms will intensify and how strong they will become. Additionally, we need to develop a better understanding of the uncertainty associated with our forecasts of storm intensity (in particular rapid intensification of storms), as well as storm structure/size. These priorities can be addressed through continued research, increased development of our next generation operational hurricane models, and additional observations, such as those planned under the Global Environmental Observing System of Systems (GEOSS). With funding provided in the FY 2006 appropriation, we will add four new hurricane forecasters, who will also enhance operational hurricane forecasts.

Additional priorities are provided in Joint Hurricane Testbed Announcement of Opportunity at the following Internet site:
http://www.aoml.noaa.gov/hrd/Landsea/jht/JHT_FFO_30June2004.pdf.

8. What is the difference between data received from hurricane reconnaissance flights in NOAA's Gulfstream jet, NOAA's P-3 Orions, and the Air Force's WC-130 cargo planes? What factors determine which aircraft is flown to observe a storm? What factors determine how frequently flights are made with each type of aircraft?

Answer: The Gulfstream-IV jet is used to obtain data from the *environment surrounding the hurricane*. These data are then assimilated into NOAA's operational forecast system to better define the atmospheric conditions and steering currents that influence the future track of the hurricane. The data collected by the Gulfstream are also used to help forecasters identify general conditions for storm intensification.

In contrast, the P-3s and the WC-130s provide data from *inside the hurricane*, including windspeed, and hurricane eye positions, among other vital information. The P-3s are equipped with research instruments to help NOAA and other research scientists develop a better understanding of the inner workings of hurricanes and help to develop improved forecast capabilities, including hurricane intensity forecasts predictions. The P-3s also serve as platforms for testing new observing technologies, such as the Stepped Frequency Microwave Radiometer (SFMR), which measures over-ocean wind speed and rain rate, and Global Positioning System (GPS) dropsondes.

As outlined in the National Hurricane Operations Plan (NHOP), the National Hurricane Center (NHC) requests aircraft reconnaissance data through the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH). The CARCAH then allocates reconnaissance missions among the U.S. Air Force Reserve Command and NOAA as appropriate. Typically, most missions are carried out by the U.S. Air Force Reserve Command.

9. Do other missions for NOAA's P-3 Orions, such as air quality research, interfere with the National Hurricane Center's hurricane forecasting capabilities? If not, why not?

Answer: Flight hours for the P-3 Orions are assigned in accordance with NOAA's Marine and Aviation Operations Allocation Plan and coordinated by NOAA's Aircraft Operations Center. In situations when there are competing requests for P-3 usage, the National Hurricane Center has priority access to the P-3 flights for hurricane reconnaissance. In many cases we are able to conduct hurricane research on these reconnaissance flights. Additionally, non-hurricane research missions typically occur in areas that would allow the P-3s to be recalled to MacDill AFB within the range of one flight, so they could be redirected to conduct hurricane reconnaissance if needed. Further, the non-hurricane research missions are usually flown in the early part of hurricane season, to reduce the number of competing requests for P-3 flight time during the more active portion of the hurricane season. The FY 2006 hurricane supplemental provides NOAA with an additional P-3 aircraft; this should help ensure adequate coverage.

United States Air Force Reserves' 53rd Weather Reconnaissance Squadron maintains and operates a fleet of 10 C130-J aircraft to conduct most hurricane reconnaissance missions and provide storm location and data, including hurricane intensity. The Air Force will use funding from the Military Construction Appropriations and Emergency Hurricane Supplemental Appropriations Act, 2005 (P.L. 108-324) to outfit its "Hurricane Hunter" aircraft with Stepped Frequency Microwave Radiometer sensors beginning in late FY 2006. SFMR provides meteorologists with critical data on the hurricane surface wind field, and in particular the estimation of wind maxima, which has long been a requirement of the Tropical Prediction Center/National Hurricane Center (TPC/NHC).

10. Recent articles in the *Miami Herald* assert that "in 2004 before Hurricane Charley... weather balloon readings were missing from countries all along its path, leaving hundreds of miles of the atmosphere unmonitored…Three coastal weather-observing stations between the Florida Keys and northwest Florida were malfunctioning, denying forecasters clues about ocean temperature and wind speed." Is this assertion true and if so, why was this observation data unavailable? Also, if the assertion is true, what was the impact on forecasting Hurricane Charley?

Answer: We have encountered some difficulties in obtaining weather balloon releases within the Caribbean region from the countries with which the United States has

agreements due to issues such as local power, communications, and maintenance. These problems are being addressed. However, because there was nearly continuous aircraft reconnaissance during Hurricane Charley, we do not believe the lack of data from these sites impacted our forecasts. Our records indicate only one NOAA buoys or Coastal-Marine Automated Network (C-MAN) sites was out of service prior to the passage of Hurricane Charley. We believe lack of data from this one site did not impact our forecasts.

QUESTIONS SUBMITTED BY THE MINORITY:

1. **What role do the local offices play in distributing and refining the forecast for the hurricane prior to the storm and during the storm versus the role of the Hurricane Center?**

Answer: Local Weather Forecast Offices (WFOs) play an important role by providing more detailed forecasts for their area of responsibility. For example, the National Hurricane Center provides a broad range of values in its storm surge predictions; the WFOs refine those storm surge predictions by identifying vulnerable areas and associating particular values for the surge in those areas. Local WFOs also refine the timing of the onset of hurricane conditions in their area, including information on wind speed, storm surge, rainfall amounts and the potential for tornadoes. The WFOs also coordinate with and brief local emergency managers to ensure the managers have the latest information available to make their preparedness and evacuation decisions.

2. **The Hurricane Center participates in workshops and conferences after the hurricane season with FEMA and state and local emergency managers and other organizations. Does staff of the local forecast offices also participate in these off-season activities? Why are multiple annual workshops useful in maintaining skills in preparation and response for hurricanes?**

Answer: Time and resources permitting, local weather forecast offices participate in workshops and conferences. Multiple workshops provide the opportunity to train more individuals than a single training session. Our workshops are coordinated, to the greatest extent possible, to allow emergency managers and National Weather Service (NWS) forecasters from the same local area to attend the same session. This creates a favorable learning environment, and builds/enhances relationships in those local areas. Beginning in 2006, in partnership with the Federal Emergency Management Agency, local weather forecast offices will participate in training sessions for emergency managers on how to use NWS products and how to interpret and understand NWS predictions of storm surge. The emergency managers receiving this training will then return to their offices, where they will train their co-workers and other local officials. This method of training allows for efficient use of funding and allows us to reach more local officials than possible otherwise.

QUESTIONS SUBMITTED BY THE HONORABLE EDDIE BERNICE JOHNSON

1. **How would you characterize the participation by state and local emergency managers in the Hurricane Liaison Team conference calls?**

   The HLT process has been used for a long time now. Would you say this process has provided a good forum for information exchange between the various levels of government?

   I understand the Hurricane Center participates in a series of workshops and conferences after the end of the hurricane season. How would you characterize the feedback regarding the HLT process in the post-hurricane season from state and local government people?

Answer: The Hurricane Liaison Team (HLT) conference calls serve as an excellent coordination tool and an efficient use of time. State emergency managers from potentially impacted locations participate on the call listening to the weather briefing and then coordinating emergency management activities. The HLT briefings provide an excellent forum for the National Hurricane Center (NHC) to share meteorological information with the Federal Emergency Management Agency (FEMA) and state Emergency Operations Centers, and also for the NHC to understand the concerns of emergency managers. The National Hurricane Center has received positive feedback in its participation in the Hurricane Liaison Team, from workshops, the National Hurricane Conference, and state hurricane conferences.

The NHC is an invited participant in the HLT video teleconference briefings facilitated by FEMA. In addition to the NHC, FEMA typically includes state emergency operations centers from the potential impact areas and regional FEMA offices on the HLT briefings. The HLT briefings do not usually include local emergency managers. Local emergency managers have access to National Weather Service (NWS) warnings distributed through a vast dissemination network including NOAA Weather Radio All Hazards (NWR); NOAA Weather Wire Service; Emergency Managers Weather Information Network (EMWIN); Internet; local paging systems to emergency managers; high-speed direct communications with users of large volumes of weather data (i.e., commercial meteorological firms) connected by landlines (Family of Services), by satellite broadcasts (NOAAPORT), or both. In addition there is close coordination that occurs between the National Weather Service Weather Forecast Offices and local emergency managers.

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE

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November 7, 2005

Mr. Max Mayfield
Director
National Hurricane Center
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
14th Street & Constitution Ave, NW
Washington, DC 20230

Dear Mr. Mayfield:

On behalf of the Science Committee, I want to express my sincere appreciation for your participation in the October 7, 2005 hearing, *NOAA Hurricane Forecasting.*

I have attached a **verbatim** transcript of the hearing for your review. The Committee's rule pertaining to the printing of transcripts is as follows:

> *The transcripts...shall be published in **verbatim form**, with the material requested for the record, as appropriate. Any requests to correct any errors, other than transcription, shall be appended to the record, and the appropriate place where the change is requested will be footnoted.*

Any corrections, other than errors in transcription, must be submitted in the form of a letter. Transcript edits, if any, should be submitted no later than December 7, 2005.

I am also enclosing questions submitted for the record by Members of the Committee. These are questions that the Members were unable to pursue during the time allotted at the hearing, but felt were important to address as part of the official record. The enclosed questions should be responded to no later than December 7, 2005.

Transcript edits and responses to the enclosed questions should be faxed to Jamie Brown at 202-225-4438 or emailed to jamie.brown@mail.house.gov. If you have any further questions or concerns, please contact Jamie at (202) 225-8844.

Thank you again for your testimony.

Sincerely,

Sherwood L. Boehlert
Chairman

Enclosures: Transcript & Member Questions

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

NOAA Hurricane Forecasting
October 7, 2005
10:00 a.m. to 12:00 p.m.
2318 Rayburn House Office Building

QUESTIONS FOR THE RECORD FOR MR. MAX MAYFIELD

1. In your testimony you explained that while progress has been made forecasting hurricane tracks, there is much room for improvement in forecasting hurricane intensity. Non-governmental experts have suggested that the Federal government could improve its ability to forecast hurricane intensity by conducting additional observations and research. Some of the additional activities suggested by these experts include:
    a. Hurricane observation flights in the upper troposphere (current flights do not go to that altitude);
    b. Improved numerical prediction models that include both ocean and atmospheric observations; and
    c. More or improved observations of hurricane cores.

    Do you agree that conducting the additional observations/research listed above would likely lead to an improved ability to forecast hurricane intensity in the short term and/or in the long term? If not, why not?

    In your opinion, what other areas of additional research or observations are needed to help understand and forecast hurricane intensity in the short term and in the long term?

    In your opinion, what are the five highest priority areas of additional research or observations needed to improve hurricane intensity forecasts and models in the short term? Similarly, what are the five highest priority areas to improve this capability in the long term?

    What are the estimated costs of implementing theses priority areas? Why has NOAA not implemented research or observations in these areas? Are there plans to move ahead with these activities?

2. In developing a hurricane forecast, you use weather data collected from a variety of sources, including NOAA satellites, radar, buoys, hurricane hunters, etc. For each of these sources of weather data, please briefly describe the nature of the data you receive and what role it plays in developing a hurricane forecast. In addition, please identify any weather data that is currently available to you from only one source.

Questions for the Record
Submitted by Democratic Members
Committee on Science
Hearing on: NOAA Hurricane Forecasting

Questions for Mr. Mayfield:

1) What role do the local offices play in distributing and refining the forecast for the hurricane prior to the storm and during the storm versus the role of the Hurricane Center?

2) The Hurricane Center participates in workshops and conferences after the hurricane season with FEMA and state and local emergency managers and other organizations. Does staff of the local forecast offices also participate in these off-season activities? Why are multiple annual workshops useful in maintaining skills in preparation and response for hurricanes?

Questions Submitted by Rep. Eddie Bernice Johnson

For Mr. Mayfield:

1) How would you characterize the participation by state and local emergency managers in the Hurricane Liaison Team conference calls?

The HLT process has been used for a long time now. Would you say this process has provided a good forum for information exchange between the various levels of government?

I understand the Hurricane Center participates in a series of workshops and conferences after the end of the hurricane season. How would you characterize the feedback regarding the HLT process in the post-hurricane season from state and local government people?

QUESTIONS SUBMITTED FOR THE RECORD
TO BRIGADIER GENERAL DAVID L. JOHNSON
DIRECTOR, NATIONAL WEATHER SERVICE

FOLLOWING A HEARING BEFORE THE
SELECT BIPARTISAN COMMITTEE TO INVESTIGATE THE PREPARATION FOR AND RESPONSE TO HURRICANE KATRINA
SEPTEMBER 22, 2005

Please provide the following:

1. Any and all documents pertaining to government funded stores of data on Hurricane Katrina activity, including, but not limited to, the National Aeronautics and Science Administration Stennis Space Center and the National Environmental Satellite, Data, and Information Service. Records from ocean buoys should contain wind, wave, and water temperature data.

2. A complete inventory of instrumentation that the National Hurricane Center had at its disposal 48 hours and 24 hours in advance of Katrina, during the storm, and immediately following landfall. Please include an assessment of any damaged and/or destroyed equipment.

3. Minutes, a list of participants, and a timeline sequence from the daily Hurricane Liaison Team video/conference calls from August 24 through August 31, 2005.

4. A timeline and summary of direct contact between Dr. Mayfield and President Bush or White House officials.

5. A timeline and summary of all conversations with Louisiana Governor Kathleen Babineaux Blanco from August 25 through August 31, 2005.

6. A timeline and summary of all conversations with Mississippi Governor Haley Barbour from August 25 through August 31, 2005.

7. A timeline and summary of all conversations with Alabama Governor Robert Riley from August 25 through August 31, 2005.

8. A timeline and summary of all conversations with New Orleans Mayor Ray Nagin from August 25 through August 31, 2005.

9. A record of where the National Weather Service's New Orleans/Baton Rouge Forecast Office in Slidell, Louisiana sent their Urgent Massage on August 28 at 10:11 am.

10. Any and all information regarding the 30 feet tide prediction, as a result of hurricane activity, in Mississippi.

11. A copy of the National Weather Service's New Orleans/Baton Rouge Forecast Office flash flood warning issued on August 29, 2005 at 8:14 am.

12. A copy of all standard operating procedures used by the National Oceanic and Atmospheric Administration for storm forecasting and alerts.

13. A copy of all PowerPoint slides referred to you during your testimony.

Department of Commerce • National Oceanic & Atmospheric Administration • National Weather Service

NATIONAL WEATHER SERVICE INSTRUCTION 10-601
AUGUST 31, 2005

Operations and Services
Tropical Cyclone Weather Services Program, NWSPD 10-6

TROPICAL CYCLONE PRODUCTS

NOTICE: This publication is available at: http://www.nws.noaa.gov/directives/.

OPR: OS21 (S. Kiser) **Certified by:** OS21 (T. Pierce)
Type of Issuance: Emergency.

SUMMARY OF REVISIONS: This directive supercedes NWSI 10-601, dated May 27, 2005.

Section 6.9.2.2. Section rewritten for clarification and to correct when HPC ceases issuing TCP products.

Section 7.3.3.3. Section rewritten for clarification.

Signed by Dennis H. McCarthy August 17, 2005
Dennis H. McCarthy Date
Director, Office of Climate,
Water, and Weather Services

Tropical Cyclone Products

1. Tropical Cyclone Forecast and Advisory Products.

NOTE: Refer to appendix A for tropical cyclone product examples.

1.1 Tropical Cyclone Public Advisories (TCP). The TCP is the primary tropical cyclone information product issued to the public. The National Hurricane Center (NHC), as a part of the Tropical Prediction Center (TPC); the Central Pacific Hurricane Center (CPHC); and Weather Forecast Office (WFO) Tiyan, Guam, will issue TCPs.

1.1.1 Mission Connection. The TCP is the primary tropical cyclone product issued to the public. The TCP provides critical tropical cyclone watch, warning, and forecast information for the protection of life and property.

1.1.2 Issuance Guidelines.

1.1.2.1 Creation Software. Automated Tropical Cyclone Forecast (ATCF) system and the Advanced Weather Interactive Processing System (AWIPS).

1.1.2.2 Issuance Criteria. In the Atlantic and central Pacific, NHC and CPHC will issue TCPs
for all tropical cyclones respectively. In the eastern Pacific, NHC will issue public advisories when watches or warnings are required, or the tropical cyclone is otherwise expected to impact nearby land areas. In the western Pacific, WFO Guam will issue public advisories for all tropical cyclones expected to affect land within 48 hours. Issue the initial advisory when data confirm a tropical cyclone has developed. The title of the advisory will depend upon the intensity of the tropical cyclone as listed below.

a. A tropical depression advisory refers to a tropical cyclone with 1-minute sustained winds up to 33 knots (38 mph).

b. A tropical storm advisory will refer to tropical cyclones with 1-minute sustained surface winds 34 to 63 knots (39 to 73 mph).

c. A hurricane/typhoon advisory will refer to tropical cyclones with winds 64 knots (74 mph) or greater.

Public advisories will discontinue when the tropical cyclone:

a. Ceases to be a tropical cyclone, e.g. becomes extratropical, a remnant low, or dissipates, or

b. Is centered over land, is below tropical storm strength, is not forecast to move back over water as a tropical cyclone, and no coastal tropical cyclone watches or warnings are in effect.

1.1.2.3 Issuance Time.

a. NHC and CPHC will issue Public Advisories at 0300, 0900, 1500, and 2100 Coordinated Universal Time (UTC) with valid position times corresponding to the advisory time. WFO Guam issuance times are 0400, 1000, 1600, and 2200 UTC.

b. Issue Intermediate Public Advisories on a 2- to 3-hourly interval between scheduled advisories (see times of issuance below). Issue 3-hourly intermediate advisories whenever a tropical storm or hurricane watch/warning is in effect. Issue 2-hourly intermediates whenever tropical storm or hurricane warnings are in effect and coastal radars are able to provide responsible Tropical Cyclone Centers with a reliable hourly center position. For clarity, when issuing intermediate public advisories, include a statement at the end of the scheduled public advisory informing users when an intermediate advisory will be issued, i.e., "AN INTERMEDIATE ADVISORY WILL BE ISSUED BY THE CENTRAL PACIFIC HURRICANE CENTER AT 2 PM HST FOLLOWED BY THE NEXT COMPLETE ADVISORY ISSUANCE AT 5 PM HST."

Three hourly issuances...TPC/CPHC at 0000, 0600, 1200, and 1800 UTC. WFO Guam at 0100, 0700, 1300, and 1900 UTC.

Two hourly issuances...TPC/CPHC at 2300, 0100, 0500, 0700, 1100, 1300, 1700, and 1900 UTC. WFO Guam at 0000, 0200, 0600, 0800, 1200, 1400, 1800, and 2000 UTC.

Do not use intermediate advisories to issue tropical cyclone watches or warnings. They can be used to clear all, or parts of, a watch or warning area. Content should be similar to the scheduled advisory.

1.1.2.4 Valid Time. TCPs are valid from the time of issuance until the next scheduled issuance or update.

1.1.2.5 Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update or when the event is forecast to end.

1.1.3 Technical Description. TCPs will follow the format and content described in this section.

1.1.3.1 Universal Geographic Code (UGC) Type. Not applicable.

1.1.3.2 Mass News Disseminator (MND) Header. The TCP MND header block product type line is "(TROPICAL CYCLONE TYPE) (NAME) ADVISORY NUMBER XX."

1.1.3.3 Content. Advisories can begin with a lead statement or headline to emphasize significant aspects of the tropical cyclone. Advisories will list watches and warnings for hurricane/typhoon and tropical storm conditions immediately after the headline. Separate the headline and watch/warning section from the rest of the advisory. Include information in the rest

of the advisory in descending order of importance or urgency. At the end of the advisory, repeat the tropical cyclone position, maximum winds, minimum pressure, present movement, and provide forecast movement (if change is indicated). Provide the time and office responsible for the next advisory along with new message headers if the tropical cyclone is passed to another Center. For a tropical cyclone moving east to west across the international dateline, CPHC will insert at the end of their last advisory/forecast, 'THIS IS THE LAST BULLETIN ISSUED BY THE CENTRAL PACIFIC HURRICANE CENTER. THE NEXT BULLETIN WILL BE ISSUED BY THE RSMC TOKYO. FOR U.S. INTERESTS, SEE THE PUBLIC ADVISORIES ISSUED BY THE U.S. NWS FORECAST OFFICE GUAM AND DOD WARNINGS ISSUED BY THE JOINT TYPHOON WARNING CENTER. Finally, include the forecaster's name at the end of the message.

Do not use the term "SMALL CRAFT ADVISORY." Instead, use the phrase "SMALL CRAFT SHOULD STAY IN PORT." This is considered equivalent or even stronger when used in connection with tropical or subtropical cyclones. When discontinuing tropical cyclone warnings for a given coastal section where small craft advisories are to remain in effect, use the following statement: "SMALL CRAFT ADVISORIES REMAIN IN EFFECT FOR PORTIONS OF THE COAST. SEE LOCAL NWS COASTAL FORECASTS FOR CONDITIONS IN YOUR AREA." The NHC/CPHC advisory discontinuing tropical cyclone warnings and the following NHC/CPHC advisory, if one is issued, should contain this statement.

a. Units. Times in advisories should be local time of the affected area; however, local time and UTC should be used when noting the storm's location. All advisories will use statute miles and statute miles per hour. The Tropical Cyclone Center (TPC and CPHC) and WFO Guam, at their discretion, may use nautical miles/knots in parentheses immediately following statute miles/mph. Advisories should include the metric units of kilometers and kilometers per hour following the equivalent English units except when the United States is the only country threatened.

b. Tropical Storm/Hurricane/typhoon Watches and Warnings. NHC, CPHC and WFO Guam, will issue tropical storm/hurricane/typhoon watches if tropical storm/hurricane/typhoon conditions are possible over land areas within 36 hours, except 48 hours in the western north Pacific. Do not issue tropical storm watches if the tropical cyclone is forecast to reach hurricane/typhoon intensity within the watch period.

Issue tropical storm/hurricane/typhoon warnings when tropical storm/hurricane/typhoon conditions along the coast are expected within 24 hours. Issue tropical storm warnings at the discretion of the hurricane specialist when gale warnings, not related to the pending tropical storm, are already in place. Tropical storm warnings may be issued on either side of a hurricane/typhoon warning area.

Advisories will list all tropical cyclone watches and warnings in effect. The first advisory in which watches or warnings are mentioned should give the effective time of the watch or warning, except when it is being issued by other countries and the time is not known.

Except for tropical storms and hurricanes/typhoons forming close to land, a watch should precede a warning. Once a watch is in effect, it should either be replaced by a warning or remain in effect until the threat of the tropical cyclone conditions has passed. A hurricane/typhoon watch and a tropical storm warning can be in effect for the same section of coast at the same time. It is not advantageous to step down warnings for tropical cyclones. This approach would cause confusion for the media and public, and this is especially true for tropical cyclones whose tracks parallel the coast.

c. Location and Movement. All advisories will include the location of the center of the tropical cyclone by its latitude and longitude, and distance and direction from a well known point, preferably downstream from the tropical cyclone. If the forecaster is unsure of the exact location of a depression, the position may be given as within 50, 75, etc., miles of a map coordinate. When the center of the tropical cyclone is over land, give its position referencing the state or country in which it is located and in respect to some well known city, if appropriate.

Movement forecasts apply to the tropical cyclone's center. Give the present movement to 16 points of the compass if possible. Include a 24-hour forecast of movement in terms of a continuance or departure from the present movement and speed. This may be reduced to a 12-hour forecast. Uncertainties in either the tropical cyclone's location or movement should be explained in the advisory. An outlook beyond 24 hours (out to 72 hours when appropriate) may be included in the text of the advisory.

Make landfall forecasts of the center with caution to avoid giving the public any false sense of security. Use other forecast parameters to describe the center's landfall. When a threat to land exists, stress the tropical cyclone's effects extend well beyond the small area near the tropical cyclone's center.

d. Wind and Intensity. Give maximum observed 1-minute sustained surface wind speed rounded to the nearest 5 mph. During landfall threats, specific gust values and phrases like “briefly higher in squalls” may be used. Also include the area (or radius) of both tropical and hurricane/typhoon force winds. When warnings are in effect, give the expected times of onset of tropical storm and hurricane/typhoon force winds along the coast in general terms, such as “this afternoon” or “tonight.”

Provide intensity forecasts for 12 hours only stated as an “increase,” “decrease,” or “no change” from the present intensity. Where appropriate, use the Saffir/Simpson Hurricane Scale (SSHS) in public releases.

e. Pressure. Provide central pressure values in millibars and inches as determined by available data.

f. Storm Surge/Shoreline. Storm surge forecasts should highlight areas along the coast and within bays that are likely to experience dangerous flooding from storm surge. When

possible, timing should be estimated or should be referenced to storm position, e.g. "as the hurricane is making landfall," or "as strong winds turn to the southwest." Wave information should be included for the outer coastline (all coastlines for Pacific Region locations) when possible. Storm surge heights should be indicated as values above the normal, predicted astronomical tide level. Note should be made of abnormally high or low astronomical tides, and their times of occurrence. On a case by case basis, NHC will discuss with the affected WFOs on the hurricane hotline coordination call whether rip currents and/or dangerous surf will be referenced.

g. Rainfall. Provide 1-2 sentences regarding Quantitative Precipitation Forecasts (QPF). Identify the geographical area(s) at greatest risk. Include an estimate of the range of area-average amounts expected within the specified area(s), as well as an upper bound on the maximum spot values expected. In general, storm-total values will be used.

h. Inland Impacts. Highlight the inland impacts of tropical cyclones in advisories. This includes the threat of strong winds, heavy rainfall, flooding, and tornadoes. Include the extent and magnitude of inland winds as well as anticipated rainfall amounts and potential for flooding and tornadoes. Mention tornado and flood watches as appropriate. Mention actual occurrences of tornadoes, floods, and high winds adding a note of urgency and supporting warnings and statements from WFOs.

Action statements in advisories should be general with references to local office products for specific recommended actions. To further publicize local products, when a tropical cyclone threatens a land area, include the following statement in the TCP: "For storm information specific to your area...please monitor products issued by your local weather office." If HPC is going to issue public advisories, the last NHC TCP should carry a statement similar to..."THIS IS THE LAST PUBLIC ADVISORY ISSUED BY THE NATIONAL HURRICANE CENTER ON ALLISON. FUTURE INFORMATION ON THIS SYSTEM CAN BE FOUND IN PUBLIC ADVISORIES ISSUED BY THE HYDROMETEOROLOGICAL PREDICTION CENTER...UNDER AWIPS HEADER TCPAT(1-5) AND WMO HEADER WTNT(31-35) KWNH...BEGINNING AT 10 AM CDT."

1.1.3.4 Format. This product is available in industry standard encoding and languages, and may include, but not limited to, American Standard Code for Information Interchange (ASCII), Extensible Markup Language (XML), Wireless Markup Language (WML) and HyperText Markup Language (HMTL).

```
WTaaii CCCC DDHHMM
TCPxxx

(TROPICAL CYCLONE TYPE) (NAME) ADVISORY NUMBER XX.
(ISSUING OFFICE CITY STATE)
time am/pm time_zone day mon DD YYYY

...HEADLINE...

TEXT


$$

FORECASTER NAME
```

Figure 1. Tropical Cyclone Public Advisories Format

1.2 Tropical Cyclone Forecasts/Advisories (TCM). NHC and CPHC will prepare TCMs for all tropical cyclones within their area of responsibility.

1.2.1 Mission Connection. The TCM provides critical tropical cyclone watch, warning, and forecast information for the protection of life and property.

1.2.2 Issuance Guidelines.

1.2.2.1 Creation Software. ATCF system.

1.2.2.2 Issuance Criteria. TCM is issued any time a routine or special TCP product is issued.

1.2.2.3 Issuance Times. Issue advisories at 0300, 0900, 1500, and 2100 UTC.

1.2.2.4 Valid Time. TCMs are valid from the time of issuance until the next scheduled issuance or update.

1.2.2.5 Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update or when the event is forecast to end.

1.2.3 Technical Description. TCMs will follow the format and content described in this section.

1.2.3.1 UGC Type. Not applicable.

1.2.3.2. Mass News Disseminator Header. The TCM MND header block product type line is "(TROPICAL CYCLONE TYPE) (NAME) FORECAST/ADVISORY NUMBER XX

1.2.3.3 Content. TCMs will contain appropriate information as shown in appendix A in a standard format. All forecast advisories will contain 12-, 24-, 36-, 48-, 72-, 96- and 120 hour forecast positions and 1-minute surface wind speeds (intensity) rounded to the nearest 5 knots. Also they will include 34- and 50-knot (four-quadrant) wind speed radii through 72 hours and 64-knot wind speed radii at 12-, 24-, and 36-hours. No position or wind speed will accompany the forecast of "dissipated." A standard statement indicating the uncertainty associated with the 96- and 120-hour forecast positions and forecast wind speeds will precede those two forecasts.

NOTE: As part of the header, append a code string at the end of the line "ISSUING OFFICE CITY STATE" (Example: NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL)

Format:
where: (BS) is the basin (AL, EP or CP)
where: (NO) is the tropical cyclone number (01, 02, 03,...99)
where: (YR) is the last two digits of the year.

1.2.3.4 Format.

```
WTaa2i CCCC DDHHMM
TCMxxx

(TROPICAL CYCLONE TYPE) (NAME) FORECAST/ADVISORY NUMBER XX.
(ISSUING OFFICE) CITY STATE BSNOYR
time am/pm time_zone day mon DD YYYY

TEXT


$$

FORECASTER NAME
```

Figure 2. Tropical Cyclone Forecast/Advisories Format

1.3 Tropical Cyclone Discussions (TCD). NHC and CPHC issue TCDs to explain forecasters' reasoning behind analysis and forecast of the tropical cyclone.

1.3.1 Mission Connection. The TCD is a primary tropical cyclone product explaining forecasters' reasoning behind analysis and the forecast for a tropical cyclone. It also provides coordinated 12-, 24-, 36-, 48-, 72-, 96-, and 120-hour tropical cyclone forecast positions and maximum sustained wind speed forecasts; other meteorological decisions; and plans for watches and warnings.

1.3.2 Issuance Guidelines

1.3.2.1 Creation Software. ATCF system.

1.3.2.2 Issuance Criteria. TCD is issued any time a routine or special TCP product is issued.

1.3.2.3 Issuance Times. Issue advisories at 0300, 0900, 1500, and 2100 UTC and with all special advisories

1.3.2.4 Valid Time. TCDs are valid from the time of issuance until the next scheduled issuance or update.

1.3.2.5 Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update or when the event is forecast to end.

1.3.3 Technical Description. TCDs will follow the format and content described in this section.

1.3.3.1 UGC Type. Not applicable.

1.3.3.2. Mass News Disseminator Header. The TCD MND header block product type line is "(TROPICAL CYCLONE TYPE) (NAME) DISCUSSION NUMBER XX

1.3.3.3 Content. Discussions include prognostic reasoning; objective techniques employed; NHC, CPHC, and Hydrometeorological Prediction Center (HPC) guidance used; coordinated 12-, 24-, 36-, 48-, 72-, 96- and 120-hour tropical cyclone forecast points. No position or wind speed will accompany the forecast of "dissipated." Also provide maximum sustained wind speed forecasts for each forecast point; other meteorological decisions; and plans for watches and warnings.

1.3.3.4 Format.

```
WTaa4i CCCC DDHHMM
TCDxxx

(TROPICAL CYCLONE TYPE) (NAME) DISCUSSION NUMBER XX.
ISSUING OFFICE CITY STATE
time am/pm time_zone day mon DD YYYY

TEXT

$$

FORECASTER NAME
```

Figure 3. Tropical Cyclone Discussion Format

1.4 Tropical Cyclone Updates (TCU).

1.4.1 Mission Connection. The TCU is an event-driven product which provides users with timely, succinct information on significant changes to tropical cyclone conditions.

1.4.2 Issuance Guidelines.

1.4.2.1 Creation Software. ATCF system.

1.4.2.2 Issuance Criteria. Issued by NHC and CPHC in lieu of or preceding special advisories to inform users of unexpected changes in a tropical cyclone, or post/cancel watches and warnings.

1.4.2.3 Issuance Times. The TCUs are issued on an event-driven basis.

1.4.2.4 Valid Time. TCUs are valid at time of issuance until a subsequent TCU is issued or until the next scheduled or special TCP.

1.4.2.5 Product Expiration Time. Not applicable.

1.4.3 Technical Description. TCUs will follow the format and content described in this section.

1.4.3.1 UGC Type. Not applicable.

1.4.3.2. Mass News Disseminator Header. The TCU MND header block product type line is "(TROPICAL CYCLONE TYPE) (NAME) UPDATE"

1.4.3.3 Content. The TCU is a brief alphanumeric text product using a block paragraph format. CPHC and NHC base the information contained within the TCU on latest available data from all sources with special reliance on aircraft reconnaissance and satellite data.

1.4.3.4 Format.

```
WTaa6i CCCC DDHHMM
TCUxxx

(TROPICAL CYCLONE TYPE) (NAME) UPDATE
ISSUING OFFICE CITY STATE
time am/pm time_zone day mon DD YYYY

TEXT
```

Figure 4. Tropical Cyclone Update Format

1.5 Tropical Cyclone Position Estimates (TCE).

1.5.1 Mission Connection. This product ensures a continuous flow of information regarding the location of a tropical cyclone when it nears the coast and thus provides up to date location information to emergency managers and other public officials. The information also provides exact center locations helping the tropical cyclone center forecasters issue timely and accurate products.

1.5.2 Issuance Guidelines

1.5.2.1 Creation Software. ATCF system and AWIPS.

1.5.2.2 Issuance Criteria. Issued whenever sufficient reliable radar or appropriate satellite center fix information is available on the tropical cyclone near coasts.

1.5.2.3 Issuance Times. NHC, CPHC and WFO Guam will issue TCEs between 2-hourly intermediate public advisories. Transmit TCEs position estimates near the beginning of the hour.

1.5.2.4 Valid Time. TCEs are valid at time of issuance until a subsequent TCE is issued or until the next scheduled or special TCP.

1.5.2.5 Product Expiration Time. Not applicable.

1.5.3 Technical Description. TCUs will follow the format and content described in this section.

1.5.3.1 UGC Type. Not applicable.

1.5.3.2. Mass News Disseminator Header. The TCE MND header block product type line is "(TROPICAL CYCLONE TYPE) (NAME) POSITION ESTIMATE."

1.5.3.3 Content. The TCE is a brief alphanumeric product containing information derived from WSR-88D radar or appropriate satellite data about tropical cyclone positions near coasts in latitude/longitude coordinates, distance, and direction from a well known point. Local weather offices will use this information in all official statements.

1.5.3.4 Format.

```
WTaa5i CCCC DDHHMM
TCExxx

(TROPICAL CYCLONE TYPE) (NAME) POSITION ESTIMATE
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
time am/pm time_zone day mon DD YYYY

TEXT


$$
```

Figure 5. Tropical Cyclone Position Estimate

1.6 Strike Probabilities of Tropical Cyclone Conditions (SPF).

1.6.1 Mission Connection. The SPF conveys information to users about the risk of a tropical cyclone passing near or over various geographical locations along the coastline or over water.

1.6.2 Issuance Guidelines.

1.6.2.1 Creation Software. ATCF system.

1.6.2.2 Issuance Criteria. NHC will issue probabilities for all named storms in the Atlantic Basin when there is a 72-hour strike probability of one percent or higher at any land location, and for tropical depressions forecast to become named storms when they are a threat to land.

1.6.2.3 Issuance Times. 0300, 0900, 1500, and 2100 UTC and when special TCP's are issued.

1.6.2.4 Valid Time. SPFs are valid at time of issuance or until the next scheduled issuance or update.

1.6.2.5 Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update or when the event is forecast to end.

1.6.3 Technical Description. SPFs will follow the format and content described in this section.

1.6.3.1 UGC Type. Not applicable.

1.6.3.2. Mass News Disseminator Header. The SPF MND header block product type line is "(TROPICAL CYCLONE TYPE) (NAME) PROBABILITIES NUMBER XX."

1.6.3.3 Content. This product will describe the probability of tropical cyclone conditions in tabular form at the regularly scheduled public advisory times and when special public advisories are issued. Include maximum values over water points when a tropical cyclone is forecast to move parallel to a coastline. Two conditions in which probabilities should not be issued are: (1) the tropical cyclone/tropical storm has made landfall and is not expected to reemerge over water, and/or (2) computed probability values are not significant. At the discretion of the hurricane forecaster, probabilities need not be listed for sites where the tropical storm or hurricane would likely be over land or less than tropical storm strength at the time it would affect the site.

Compute the probabilities shortly after synoptic times for the periods 0-24, 24-36, 36-48, and 48-72 hours. Show a total probability for the next 72 hours in the last column, representing a total of all forecast periods. Indicate in the table with an "X" if the probability for a location is less than 1 percent. Indicate in the public advisory and tropical cyclone forecast/advisory if probabilities are not issued. NHC may include a brief explanation of probabilities in the advisory. Refer to Probability of Hurricane/Tropical Storm Conditions: A User's Manual for further information.

Compute probabilities for the following locations:

Brownsville, Texas
Corpus Christi, Texas
Port O'Connor, Texas
Galveston, Texas
Port Arthur, Texas
New Iberia, Louisiana
New Orleans, Louisiana
Buras, Louisiana
Gulfport, Mississippi
Mobile, Alabama
Pensacola, Florida
Panama City, Florida
Apalachicola, Florida
St. Marks, Florida
Cedar Key, Florida
Tampa, Florida
Venice, Florida
Fort Myers, Florida
Marco Island, Florida
Key West, Florida
Marathon, Florida
Miami, Florida
West Palm Beach, Florida
29N 85W
29N 87W
28N 89W
28N 91W
Ft. Pierce, Florida
Cocoa Beach, Florida
Daytona Beach, Florida
Jacksonville, Florida
Savannah, Georgia
Charleston, South Carolina
Myrtle Beach, South Carolina
Wilmington, North Carolina
Morehead City, North Carolina
Cape Hatteras, North Carolina
Norfolk, Virginia
Ocean City, Maryland
Atlantic City, New Jersey
New York, New York
Montauk Point, New York
Providence, Rhode Island
Nantucket Island, Massachusetts
Hyannis, Massachusetts
Boston, Massachusetts
Portland, Maine
Bar Harbor, Maine
Eastport, Maine
28N 93W
28N 95W
27N 96W
25N 96W

NOTE: Currently, probabilities for the west coast of the continental United States, Hawaii, Guam, American Samoa, Commonwealth of Northern Marinas or Micronesia are not issued.

1.6.3.4 Format.

```
WTNT7i KNHC DDHHMM
SPFccc

(TROPICAL CYCLONE TYPE) (NAME) PROBABILITIES NUMBER XX
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
time am/pm time_zone day mon DD YYYY

TEXT


$$
```

Figure 6. Tropical Cyclone Strike Probabilities Format

2. Subtropical Cyclone Forecast and Advisory Products.

2.1 Subtropical Cyclone Public Advisories (TCP). NHC will issue subtropical cyclone advisories. However, due to the lack of well-defined criteria for distinguishing subtropical from non-tropical lows, marginally-subtropical systems may be handled as non-tropical gale or storm centers in High Seas forecast products. Format and content of these products are similar to the public tropical cyclone advisory. (See appendix A for an example). Title the advisories "SUBTROPICAL DEPRESSION ##" and in the message body refer to the depression as "SUBTROPICAL DEPRESSION ##." If winds reach subtropical storm strength, the storm receives the next available name. Title the advisories "SUBTROPICAL STORM (name)" and in the body message refer to the storm as "SUBTROPICAL STORM (name)." List information in order of importance with a lead statement, when appropriate, followed by a summary of all coastal warnings. Use latitude and longitude coordinates to identify the center of the storm. Issue these advisories at the same scheduled times as public tropical cyclone advisories.

2.2 Subtropical Cyclone Forecast/Advisory (TCM). Issue these advisories for all subtropical cyclones for which a TCP has been issued. Write the advisory in the same format and content as the tropical cyclone forecast/advisories. Title the advisories "SUBTROPICAL DEPRESSION ##" and in the message body refer to the depression as "SUBTROPICAL DEPRESSION ##." If winds reach subtropical storm strength, the storm receives the next available name. Title the advisories "SUBTROPICAL STORM (name)" and in the body message body refer to the storm as "SUBTROPICAL STORM (name)." Issue these at the same times as scheduled tropical cyclone forecast/advisories.

3. Special Advisories. Special advisories are issued whenever an unexpected significant change has occurred or when watches or warnings are to be issued between regularly scheduled advisories. (Watches or warnings may be discontinued on intermediate public advisories.) When

a special advisory is required, the entire advisory package must be issued, including a public advisory, a forecast/advisory, a tropical cyclone discussion, strike probabilities(Atlantic basin), and an ICAO/WMO tropical cyclone advisory.

When the special advisory is issued only for a watch or warning, it will contain the track and intensity forecast from the previous regularly scheduled advisory with only the initial position and intensity updated. When the special advisory is issued for an unexpected change, the previous track and intensity forecast will be updated to reflect the unexpected change

4. Numbering and Naming Tropical and Subtropical Cyclones.

4.1 Numbering and Naming Tropical Cyclones. Tropical Cyclone Centers will number tropical depressions in their areas of responsibility. Number tropical depressions consecutively beginning each season with the spelled out number "ONE." In the north Pacific, for ease in differentiation, tropical depression numbers, assigned by NHC or CPHC, will include the suffix "E" for eastern (east of 140° west longitude) or "C," for central (180° to 140° west longitude) respectively, after the number. In both the Atlantic and Pacific, once the depression reaches tropical storm intensity, name it and drop the depression number. The depression number will not be used again until the following year. Give tropical cyclones a name in the first advisory after intensifying to 34 knots (39 mph) or greater.

The following rules apply for tropical cyclones passing from one basin to another: Retain the name if a tropical cyclone passes from one basin into another basin as a tropical cyclone, i.e. advisories are continuous. An unnamed tropical depression will also retain its number (e.g. Tropical Depression Six-E remains Tropical Depression Six-E) if it crosses into another area of responsibility. For unnamed tropical depressions moving from west to east across 180°, CPHC will use the associated Joint Typhoon Warning Center's (JTWC) number, and indicate JTWC in parentheses following the number. For named systems, CPHC will use the associated Regional Specialized Meteorological Center (RSMC) Tokyo name and provide the associated JTWC number in parentheses.

Within a basin, if the remnant of a tropical cyclone redevelops into a tropical cyclone, it is assigned its original number or name. If the remnants of a former tropical cyclone regenerate in a new basin, the regenerated tropical cyclone will be given a new designation.

If all names for a year are used and another storm requires a name, the Greek alphabet will be used (Alpha, Beta, etc.)

4.2 Numbering and Naming Subtropical Storms. A single list of numbers and names will be used for all tropical and subtropical cyclones. Therefore, numbering of subtropical depressions will follow the same procedure as tropical depressions. For example, if the first subtropical depression follows the first tropical depression, the subtropical depression will be given the designation SUBTROPICAL DEPRESSION TWO. If a subtropical depression becomes a subtropical storm, it receives the next available name in the tropical cyclone naming sequence.

5. Numbering Advisories and Tropical/Subtropical Cyclone Discussions. Number tropical and subtropical cyclone advisories and discussions in the Atlantic and the Pacific similarly. Number scheduled and special advisories and TCDs consecutively beginning with the number 1 (not spelled out) for each new tropical or subtropical cyclone, and continue through the duration of the cyclone. In situations where only TCMs and TCDs are being written (tropical cyclones in the eastern Pacific not threatening land) and at a later time a public advisory is required, the public advisory number will match the corresponding TCM. In both the Atlantic and the Pacific, intermediate advisories and TCDs will retain the advisory number of the scheduled or special advisory they update and append an alphabetic designator (i.e., "HURRICANE ALLISON INTERMEDIATE ADVISORY NUMBER 20A").

6. Other Tropical Cyclone Centers and NCEP Products.

6.1 Satellite Interpretation Message (SIM).

6.1.1 Mission Connection. The SIM locates hazardous weather areas over land and sea, to locate obscured higher terrain, to describe general meteorological conditions, and to make plans for outdoor events, and other activities.

6.1.2 Issuance Guidelines.

6.1.2.1 Creation Software. AWIPS.

6.1.2.2 Issuance Criteria. Issued routinely four times a day for the Hawaiian Islands, with updates as required.

6.1.2.3 Issuance Times. 0030, 0530, 1230, and 1830 UTC

6.1.2.4 Valid Time. SIMs are valid from the time of issuance until the next scheduled issuance or update.

6.1.2.5 Product Expiration Time. Generally 6-8 hours after the issuance time and should coincide with the next expected update.

6.1.3 Technical Description. SIMs will follow the format and content described in this section.

6.1.3.1 UGC Type. Not applicable.

6.1.3.2. Mass News Disseminator Header. The SIM MND header block product type line is "HAWAIIAN ISLANDS SATELLITE INTERPRETATION MESSAGE."

6.1.3.3 Content. The SIM is an alphanumeric product providing an interpretation of synoptic weather features, significant weather areas, and various cloud and weather phenomena based upon satellite imagery (visual, infrared, water vapor, etc.). WFO Honolulu prepares the SIM for a portion of their area of responsibility (AOR). The AORs for WFOs Honolulu vary and depend upon the program (tropical cyclone, aviation, marine, public, and satellite). For the SIM

program, WFO Honolulu's AOR is from 140W to 180W longitude between 10N and 30N latitude. The office can include a description of more distant features if these features relate to significant weather affecting or will soon affect WFO Honolulu's AOR. WFO Honolulu determined the criteria for significant cloud features based upon users inputs.

6.1.3.4 Format.

```
ATHW40 PFHO DDHHMM
SIMHI

HAWAIIAN ISLANDS SATELLITE INTERPRETATION MESSAGE
CENTRAL PACIFIC HURRICANE CENTER/WEATHER FORECAST OFFICE
HONOLULU HI
time am/pm time_zone day mon DD YYYY

TEXT


$$
```

Figure 7. Satellite Interpretation Message Format

6.2 Tropical Weather Discussion (TWD). TPC's Tropical Analysis Forecast Branch (TAFB) will issue these discussions to describe major synoptic weather features and significant areas of disturbed weather in the tropics.

6.2.1 Mission Connection. This product is intended to provide current weather information for those who need to know the current state of the atmosphere and expected trends to assist them in their decision making. The product provides significant weather features, areas of disturbed weather, expected trends, the meteorologic reasoning behind the forecast, model performance, and in some cases a degree of confidence.

6.2.2 Issuance Guidelines.

6.2.2.1 Creation Software. AWIPS.

6.2.2.2 Issuance Criteria. The product is issued routinely and updated if necessary, when significant changes occur, e.g., a tropical cyclone's intensity category is upgraded or downgraded.

6.2.2.3 Issuance Times. One TAFB discussion will cover the Gulf of Mexico, the Caribbean, and the Atlantic between the equator and 32° north latitude and be transmitted at 0605, 1205, 1805, 0005 UTC. A second TAFB message for the eastern Pacific between the equator and 32° north and east of 140° west will be transmitted at 0405, 1005, 1605, and 2205 UTC.

6.2.2.4 Valid Time. TWDs are valid from the time of issuance until the next scheduled issuance or update.

6.2.2.5 Product Expiration Time. Generally 6 hours (TAFB) after the issuance time and should coincide with the next expected update.

6.2.3 Technical Description. TWDs will follow the format and content described in this section.

6.2.3.1 UGC Type. Not applicable.

6.2.3.2. Mass News Disseminator Header. The TWD MND header block product type line is "TROPICAL WEATHER DISCUSSION."

6.2.3.3 Content. The TWD product is an alphanumeric format and contains sections on Tropical Cyclones/Tropical Waves/Disturbances, the location of the Intertropical Convergence Zone and associated convection along it, surface/middle/upper level synoptic discussion, and significant clouds/convection. The product is written in a plain language format but will contain meteorological terms such as trough, ridge, subsidence, jet stream, etc.

6.2.3.4 Format.

```
Ataaii CCCC DDHHMM
TWDxx

TROPICAL WEATHER DISCUSSION
ISSUING OFFICE CITY STATE
time am/pm time_zone day mon DD YYYY

TEXT


$$
```

Figure 8. Tropical Weather Discussion Format

6.3 Tropical Weather Outlook (TWO). NHC and CPHC will prepare the TWO during their respective tropical cyclone seasons.

6.3.1 Mission Connection. The TWO provides users with a general assessment of activity in the tropics, pertaining to tropical cyclone formation by providing to users possible areas where tropical cyclones could develop.

6.3.2 Issuance Guidelines.

6.3.2.1 Creation Software. AWIPS.

6.3.2.2 Issuance Criteria. Routinely during the tropical cyclone season.

6.3.2.3 Issuance Times. In the Atlantic, transmission times are 0530, 1130, 1730, and 2230 Eastern local time. In the eastern Pacific, transmission times are 0400, 1000, 1600, and 2200 Pacific local time; and in the central Pacific, 0200, 0800, 1400 and 2000 UTC.

6.3.2.4 Valid Time. TWOs are valid from the time of issuance until the next scheduled issuance.

6.3.2.5 Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update.

6.3.3 Technical Description. TWOs will follow the format and content described in this section.

6.3.3.1 UGC Type. Not applicable.

6.3.3.2. Mass News Disseminator Header. The TWO MND header block product type line is "TROPICAL WEATHER OUTLOOK."

6.3.3.3 Content. The outlook, a text product, covers tropical and subtropical waters and discusses areas of disturbed weather and the potential for tropical cyclone development during the next 48 hours. The outlook will mention tropical cyclones and may mention subtropical cyclones, including the system's location (in either general terms or map coordinates), status, and change in status. For the first 24 hours of a tropical cyclone, the outlook will include a statement identifying the NWS product header and WMO headers for the advisory (appendix B).

6.3.3.4 Format.

```
Ataaii CCCC DDHHMM
TWOxxx

TROPICAL WEATHER OUTLOOK
ISSUING OFFICE CITY STATE
time am/pm time_zone day mon DD YYYY

TEXT


$$
```

Figure 9. Tropical Weather Outlook Message Format

6.4 Tropical Weather Summary (TWS).

6.4.1 Mission Connection. These products are used by a variety of users for historical purpose, business (e.g. insurance) and climatological needs.

6.4.2 Issuance Guidelines.

6.4.2.1 Creation Software. ATCF.

6.4.2.2 Issuance Criteria. Monthly.

6.4.2.3 Issuance Times. NHC and CPHC issue new summaries the first day of each month from June through December. The last TWS of the tropical cyclone season (December issuance) covers activity during the entire season from June through the end of November.

6.4.2.4 Valid Time. Not applicable.

6.4.2.5 Product Expiration Time. Not applicable.

6.4.3 Technical Description. TWSs will follow the format and content described in this section.

6.4.3.1 UGC Type. Not applicable.

6.4.3.2. Mass News Disseminator Header. The TWS MND header block product type line is "TROPICAL WEATHER SUMMARY."

6.4.3.3 Content. The TWS is a monthly narrative alphanumeric product which the NHC and the CPHC issue to summarize tropical cyclone activity during the previous month. NHC issues summaries which cover tropical cyclone activity over the Atlantic and eastern north Pacific (north of the equator and east of 140W longitude) basins. CPHC issues summaries which cover tropical cyclone activity over the central North Pacific (north of the equator between 140W and 180W longitude) basin. Information contained within each TWS includes such items as description of strength, intensity, motion, impacts, and dates and times of occurrence. The TWS provides a brief summary of tropical cyclone activity during the preceding month. Monthly updates permit a timely release of tropical cyclone information. In addition to the TWS, NHC and CPHC prepare and submit a formal, detailed season summary which involves a lengthy review and publication process.

6.4.3.4 Format.

```
Ataaii CCCC DDHHMM
TWSxx

TROPICAL WEATHER SUMMARY
ISSUING OFFICE CITY STATE
time am/pm time_zone day mon DD YYYY

TEXT


$$
```

Figure 10. Tropical Weather Summary Format

6.5 Special Tropical Disturbance Statement (DSA). TPC and CPHC will issue these products providing information on strong formative, non-depression tropical systems. TPC and CPHC will coordinate with appropriate local NWS weather offices.

6.5.1 Mission Connection. The DSA provides users with timely and succinct information on the potential for severe weather primarily very heavy rainfall which could lead to flash flooding or river flooding.

6.5.2 Issuance Guidelines.

6.5.2.1 Creation Software. AWIPS.

6.5.2.2 Issuance Criteria. Event driven.

6.5.2.3 Issuance Times. Event driven as needed.

6.5.2.4 Valid Time. Not applicable.

6.5.2.5 Product Expiration Time. Not applicable.

6.5.3 Technical Description. DSAs will follow the format and content described in this section.

6.5.3.1 UGC Type. Not applicable.

6.5.3.2. Mass News Disseminator Header. The DSA MND header block product type line is "SPECIAL TROPICAL DISTURBANCE STATEMENT."

6.5.3.3 Content. CPHC and NHC base the information contained within the DSA on latest available data from all sources with special reliance on surface observations and satellite

data. The DSA is a brief alphanumeric text product using a block paragraph format and will focus on major threats of the disturbance, such as the potential for torrential rains on islands or inland areas.

6.5.3.4 Format.

```
ttaaii CCCC DDHHMM
DSAxx

SPECIAL TROPICAL DISTURBANCE STATEMENT
ISSUING OFFICE CITY STATE
time am/pm time_zone day mon DD YYYY

TEXT

$$
```

Figure 11. Special Tropical Disturbance Statement Format

6.6 Tropical Cyclone Summary - Fixes (TCS).

6.6.1 Mission Connection. This provides meteorological information to marine interests, military forecasters and national meteorological services of countries/members in the Pacific Ocean area.

6.6.2 Issuance Guidelines.

6.6.2.1 Creation Software. AWIPS.

6.6.2.2 Issuance Criteria. When a tropical cyclone is classifiable using the Dvorak technique.

6.6.2.3 Issuance Times. After the initial tropical cyclone fix, succeeding products will be done at approximately 0000, 0600, 1200, and 1800 UTC as long as the system is classifiable.

6.6.2.4 Valid Time. TCSs are valid from the time of issuance until the next scheduled issuance or update.

6.6.2.5 Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update or when the event is forecast to end.

6.6.3 Technical Description. TCSs will follow the format and content described in this section.

6.6.3.1 UGC Type. Not applicable.

6.6.3.2. Mass News Disseminator Header. The TCS header block product type line is "CENTRAL PACIFIC TROPICAL CYCLONE SUMMARY - FIXES" or "SOUTH PACIFIC TROPICAL CYCLONE SUMMARY - FIXES."

6.6.3.3 Content. TCS is an alphanumeric product provided by CPHC when there is classifiable (using the Dvorak technique) tropical cyclone activity in the north central or south Pacific. The TCS is a satellite-based estimate of tropical cyclone location, movement, and intensity with a brief remarks section. CPHC prepares TCS for a portion of their area of responsibility (AOR). The AORs for CPHC/Weather Forecast Office (WFO) Honolulu (CPHC is collocated with the Weather Forecast Office Honolulu) varies depending upon the program (tropical cyclone, aviation, marine, public, and satellite). For TCS program, CPHC's AOR is the area north of the equator between 140W - 180 longitude and from the equator to 25 S latitude between 120W to 160E.

6.6.3.4 Format.

```
TXPaii CCCC DDHHMM
TCSxxx

CENTRAL PACIFIC TROPICAL CYCLONE SUMMARY - FIXES or
SOUTH PACIFIC TROPICAL CYCLONE SUMMARY - FIXES
NWS CENTRAL PACIFIC HURRICANE CENTER HONOLULU HI
time am/pm time_zone day mon DD YYYY

TEXT


$$
```

Figure 13. Tropical Cyclone Summary - Fixes Format

6.7 Tropical Cyclone Danger Area Graphic

6.7.1 Mission Connection. The product is used to assist mariners and military agencies avoid high seas associated with tropical cyclones. Also, it provides guidance to users on possible tropical cyclone genesis.

6.7.2 Issuance Guidelines

6.7.2.1 Creation Software. N-AWIPS.

6.7.2.2 Issuance Criteria. Routinely prepared by NHC and CPHC during the tropical cyclone season for all on-going tropical cyclone activity in their respective areas of responsibility.

6.7.2.3 Issuance Times. The product is disseminated four times per day during the hurricane season within one hour after the advisory package issuance. This would be at 0400, 1000, 1600 and 2200 UTC.

6.7.2.4 Valid Time. Tropical Cyclone Danger Area graphic is valid from the time of issuance until the next scheduled issuance or update.

6.7.2.5 Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update.

6.7.3 Technical Description. The Tropical Cyclone Danger Area graphic will follow the format and content described in this section.

6.7.3.1 UGC Type. Not applicable.

6.7.3.2. Mass News Disseminator Header. Not applicable.

6.7.3.3 Content. The Tropical Cyclone Danger Area is a graphical marine product depicting a tropical cyclone's track (out to 72 hours) and shades in a danger area determined by adding 100, 200, and 300 nautical miles plus the 34 knot wind radii to the 24-, 48-, and 72- hour forecast position respectively in the Atlantic and east Pacific. In addition, areas of possible tropical cyclone genesis (out to 36 hours) are included and depicted as either a circular, rectangle, oval, or polygon shaped area. The product is prepared by the TPC and covers the entire Atlantic north of the equator and the Pacific north of the equator from the Mexican and Central America coast west to 140° west. CPHC prepares a separate chart for 140° west to the International Dateline north of the equator.

6.7.3.4 Format. Graphical product.

6.8 Aviation Tropical Cyclone Advisory (TCA).

6.8.1 Mission Connection. The TCA is intended to provide short-term tropical cyclone forecast guidance for international aviation safety and routing purposes.

6.8.2 Issuance Guidelines.

6.8.2.1 Creation Software. ATCF

6.8.2.2 Issuance Criteria. Prepared by NHC and CPHC for all on-going tropical cyclone activity
in their respective areas of responsibility. This requirement is stated in the World Meteorological Organization Region IV hurricane plan.

6.8.2.3 Issuance Times. 0300, 0900, 1500, and 2100 UTC.

6.8.2.4 Valid Times. TCAs are valid from the time of issuance until the next scheduled issuance or update.

6.8.2.5 Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update.

6.8.3 Technical Description. TCAs will follow the format and content described in this section.

6.8.3.1 UGC Type. Not applicable.

6.8.3.2 Mass News Disseminator Header. The TCA header block product type line is "(TROPICAL CYCLONE TYPE) ICAO ADVISORY #."

6.8.3.3 Content. TCAs list the current TC position, motion and intensity, and 12-, 18- and 24-hour forecast positions and intensities. It is an alphanumeric text product produced by hurricane forecasters, and consists of information extracted from the official forecasts. This forecast is produced from subjective evaluation of current meteorological and oceanographic data as well as output from numerical weather prediction models, and is coordinated with affected WFOs, the National Centers, and the Department of Defense.

6.8.3.4 Format.

```
FKaa2i CCCC DDHHMM
TCAxxx

(TROPICAL CYCLONE TYPE) (NAME)ICAO ADVISORY NUMBER ##
ISSUING OFFICE CITY STATE
time am/pm time_zone day mon DD YYYY

TEXT


$$
```

Figure 13. Aviation Tropical Cyclone Advisory Format

6.9 HPC Public Advisories (TCP).

6.9.1 Mission Connection. Provides users with meteorological information, primarily the potential of heavy rain and flash flooding, from decaying subtropical or tropical systems which have moved inland.

6.9.2 Issuance Guidelines.

6.9.2.1 Creation Software. Word Processor

6.9.2.2 Issuance Criteria. The HPC will issue public advisories after NHC discontinues its advisories on subtropical and tropical cyclones that have moved inland, but still pose a threat of heavy rain and flash floods in the conterminous United States or adjacent areas within Mexico which affect the drainage basins of NWS River Forecast Centers. The last NHC advisory will normally be issued when winds in an inland tropical cyclone drop below tropical storm strength, and the tropical depression is not forecast to regain tropical storm intensity or re-emerge over water. HPC advisories will terminate when the threat of flash flooding has ended.

6.9.2.3 Issuance Times. Advisories are issued at 0300, 0900, 1500, and 2100 UTC.

6.9.2.4 Valid Times. TCPs are valid from the time of issuance until the next scheduled issuance or update.

6.9.2.5 Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update or when the event is forecast to end.

6.9.3 Technical Description. TCPs will follow the format and content described in this section.

6.9.3.1 UGC Type. Not applicable.

6.9.3.2 Mass News Disseminator Header. The TCP MND header block product type line is "PUBLIC ADVISORY NUMBER XX FOR (TROPICAL CYCLONE TYPE) (NAME)."

6.9.3.3 Content. The TCP is an alphanumeric product. HPC will continue to be numbered in sequence with tropical cyclone advisories issued by TPC and will reference the former storm's name in the text. Content will refer to the decaying system's position, intensity, general forecast trends, highlight impacts which occurred and are expected to occur (usually in relation to heavy rain/flooding and tornadoes), and indicate when the next summary will be issued.

6.9.3.4 Format.

```
WTNT3i KWNH DDHHMM
TCPATc

PUBLIC ADVISORY NUMBER XX FOR (TROPICAL CYCLONE TYPE) (NAME)
NWS HYDROMETEOROLOGICAL PREDICTION CENTER CAMP SPRINGS MD
time am/pm time_zone day mon DD YYYY

TEXT


$$
```

Figure 14. HPC Public Advisory Product Format

6.10 Tropical Cyclone Reports (TCR).

6.10.1 Mission Connection. The TCR is the official record of each tropical cyclone within NHC's and CPHC's respective areas of responsibility and documents each storm's intensity (wind and pressure) and location throughout its lifetime. These detailed reports are used by various users for research, NWS verification and historical purposes.

6.10.2 Issuance Guidelines.

6.10.2.1 Creation Software. Word Processor

6.10.2.2 Issuance Criteria. Not applicable

6.10.2.3 Issuance Times. The report will be released no later than 90 days after the last advisory on each tropical cyclone.

6.10.2.4 Valid Times. Not applicable.

6.10.2.5 Product Expiration Time. Not applicable.

6.10.3 Technical Description. TCRs will follow the format and content described in this section.

6.10.3.1 UGC Type. Not applicable.

6.10.3.2 Mass News Disseminator Header. Not applicable. Internet product.

6.10.3.3 Content. The TCR is a post-event overview of a tropical cyclone comprised of a narrative describing the overall storm and a detailed listing of 6-hourly location and intensity data in both text and graphic format. The NHC and the CPHC prepare TCRs within 90 days of any tropical cyclone occurring within their respective Area of Responsibility (AOR). NHC issues TCRs for tropical cyclone activity in the Atlantic and eastern north Pacific (north of the equator and east of 140 degrees west longitude) basins. CPHC issues TCRs for tropical cyclone activity in the central North Pacific (north of the equator between 140W and 180 degrees west longitude) basin. The tropical cyclone report will include landfall and 6-hourly synoptic track and intensity data (i.e. the "best track"). NHC will post reports on the Internet at www.nhc.noaa.gov/pastall.html and CPHC at www.prh.noaa.gov/cphc. Any changes to the best track for the Atlantic and east Pacific will be made by NHC's Best Track Committee. Reviews at CPHC will be conducted by the director and deputy director CPHC, WFO Honolulu warning coordination meteorologist and hurricane program leader.

6.10.3.4 Format. Not applicable.

6.11 Tropical Cyclone Track and Watch/Warning Graphic.

6.11.1 Mission Connection. This product is a graphical representation of text products (TCP

and TCM) issued by NHC. It provides critical information on the forecast path of the tropical cyclone, and watches and warnings issued by NHC.

6.11.2 Issuance Guidelines.

6.11.2.1 Creation Software. N-AWIPS

6.11.2.2 Issuance Criteria. Created when routine TCPs and TCMs are issued and for special advisories.

6.11.2.3 Issuance Times. The product is available on the Internet at 0300, 0900, 1500, and 2100 UTC. The graphic is also produced for special advisories.

6.11.2.4 Valid Times. Valid from the time of issuance until the next routine issuance or by a special advisory.

6.11.2.5 Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update or when the event is forecast to end.

6.11.3 Technical Description. The graphic will follow the format and content described in this section.

6.11.3.1 UGC Type. Not applicable.

6.11.3.2 Mass News Disseminator Header. Not applicable. Internet product.

6.11.3.3 Content. The Tropical Cyclone Track and Watch/Warning graphic contains the storm's forecast track, a cone along the track based upon the average area of uncertainty for the position of the center, and watches/warnings. This product is also issued for subtropical storms. The coastal watches and warnings display shows an approximate representation of coastal areas under a hurricane warning (red), hurricane watch (pink), tropical storm warning (blue) and tropical storm watch (yellow). The orange circle indicates the current position of the center of the tropical cyclone. The black line and dots show the NHC forecast track of the center at the times indicated. The NHC forecast tracks of the center can be in error, and the white area indicates the average area of uncertainty for the position of the center.

6.11.3.4 Format. Not applicable.

7. WFO Products.

7.1 Hurricane/Typhoon Local Statements (HLS). WFOs with coastal county responsibilities and selected inland WFOs will issue these unnumbered products which are very specific and designed to inform media, local decision makers, and the public on present and anticipated storm effects in their county warning area (CWA) and adjacent coastal waters. **Keep HLSs as succinct as possible.**

7.1.1 Mission Connection. Alert the public, media, and local decision makers of potential or

actual storm effects due to tropical cyclones. The product is intended to provide information to assist in the preparation and implementation of necessary precautions for the protection of life and property, as well as to minimize the economic losses as a result of tropical cyclones.

7.1.2 Issuance Guidelines.

7.1.2.1 Creation Software. AWIPS

7.1.2.2 Issuance Criteria. The following WFOs will issue HLSs when their area of responsibility is affected by a tropical cyclone watch/warning or evacuation orders. HLSs may also be issued as needed to dispel rumors or to clarify tropical cyclone related information for their CWA. Coastal WFOs have the option to include inland counties in the HLS.

Coastal WFOs are defined as those having at least one county with significant tidal influences. Those are:

Eastern Region	Southern Region	Western Region
Caribou, ME	Brownsville, TX	San Diego, CA
Portland, ME	Corpus Christi, TX	Los Angeles/Oxnard, CA
Boston, MA	Houston/Galveston, TX	
New York City, NY	Lake Charles, LA	Pacific Region
Philadelphia, PA	New Orleans, LA	Honolulu, HI
Baltimore, MD/Washington, DC	Mobile, AL	Guam
Wakefield, VA	Tallahassee, FL	WSO Pago Pago, American Samoa
Newport/Morehead City, NC	Tampa Bay, FL	
Wilmington, NC	Miami, FL	
Charleston, SC	Key West, FL	
	Melbourne, FL	
	Jacksonville, FL	
	San Juan, PR	

Inland WFOs listed below will also issue HLSs when hurricane or tropical storm force winds are expected to impact their area of responsibility. Inland offices not issuing HLSs but expecting hurricane or tropical storm force winds may be required to issue an Inland Tropical Storm/Hurricane Wind Watches or Warnings. Reference section 7.3.

Atlanta, GA	Jackson, MS
Austin/San Antonio, TX	Lubbock, TX
Birmingham, AL	Midland, TX
Fort Worth, TX	San Angelo, TX
Huntsville, AL	

7.1.2.3 Issuance Times. The initial HLS should be issued as soon as possible following the first issuance of a tropical storm/hurricane watch/warning for your area of responsibility. When a tropical storm or hurricane is close to the coast, issue HLSs every 2 to 3 hours or more frequently as circumstances warrant. Do not release HLSs immediately before an advisory unless information is coordinated with the appropriate Tropical Cyclone Center and, for watches or warnings, the valid initiation time is specified. HLSs do not need to immediately follow the

issuance of a new hurricane advisory. Issuing HLSs midway between advisories maintains a steady flow of information to the media and the public. However, when local storm impacts are changing rapidly, or a new advisory changes the potential impact on a local area, information needs to be distributed in a fresh HLS as soon as possible. Routine HLSs may cease when the tropical cyclone is no longer a threat to an office's CWA.

7.1.2.4 Valid Time. HLSs are valid at time of issuance until a subsequent HLS is issued. HLSs are issued at least once every 6 hours

7.1.2.5 Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update or when the event is forecast to end.

7.1.3 Technical Description. HLSs will follow the format and content described in this section.

7.1.3.1 UGC Type. HLSs will use the zone (Z) form of the UGC.

7.1.3.2 Mass News Disseminator Header. The HLS MND header block product type line is "(TROPICAL CYCLONE TYPE) LOCAL STATEMENT."

7.1.3.3 Content. HLSs will add localized details to Tropical Cyclone Center's advisory releases and should not conflict with or repeat advisory information not directly applicable to the local office's CWA. Before the first HLS, use public information statements (PNS) to inform the public on routine hurricane preparedness information. The first HLS may also contain standard preparedness messages. Information may be added to the end of the HLS describing where additional storm information can be found in supporting Center's TCP and TCM as well as PNSs and NOWs (Short Term Forecast) issued by the local office.

HLSs should use tropical cyclone position estimates provided by their tropical cyclone center between advisories when appropriate. When tropical cyclones threaten the Samoas (American Samoa and Samoa), the two local offices will coordinate with RSMC Nadi, CPHC, and with each other to determine the best integrated and internally consistent forecast of conditions expected in the area.

The following table defines which products are issued via the normal suite of product headers during tropical cyclone watches/warnings and those products superceded by tropical cyclone watches/warnings and carried in a HLS.

HLS Product Table

Product	Tropical Cyclone Watch/Warning	
	HLS	**Stand-alone**
Flood watch/Warning/Statement		X
Flood Warning		X
Tornado Warning		X
Inland Tropical Storm or Inland Hurricane Watch/Warning		X
Severe Thunderstorm Warning		X[1]
Coastal Flood Watch/Warning/Statement	X[2]	X[2]
Special Marine Warning		X[3]
Severe Weather Statement		X[1]
Marine Weather Statement		X[3]
Special Weather Statement	X	
Surf Zone Forecast/Surf Forecast	X	
High Surf Advisory/Warning issued by WFO Honolulu	X	

[1] Can be issued as stand-alone products at the discretion of the WFO. However, their use should be confined to peripheral events, such as outer rainbands, prior to sustained tropical storm or hurricane strength winds.

[2] If no CFW products were issued by the WFO prior to the issuance of a tropical cyclone watch or warning and an HLS is issued, no CFW products will be issued for the duration of the tropical cyclone event.

Complications occur when a CFW product is in effect and tropical cyclone watches and/or warnings are issued. The basic premise is if the threat level of a tropical cyclone product equals or exceeds the threat level of an existing CFW, the CFW will be discontinued. Below are details.

- A CFW product is in effect for a Coastal Flood Warning and/or High Surf Warning and a tropical cyclone *watch* is issued - CFW will **continue** as standalone product along with HLS product.

- A CFW product is in effect for a Coastal Flood Warning and/or High Surf Warning and a tropical cyclone *warning* is issued - CFW will be **canceled** and users directed to the HLS for further information on coastal hazards.

- A CFW product is in effect for a Coastal Flood Advisory, Coastal Flood Watch, and/or High Surf Watch and a tropical cyclone *watch* or *warning* is issued - CFW will be **canceled** and users directed to the HLS for further information on coastal hazards.

PRODUCTS IN EFFECT	CONTINUE CFW	CANCEL CFW	ISSUE HLS
Coastal Flood ADVISORY (CFW) and Tropical Cyclone WATCH is issued		**X**	**X**
Coastal Flood ADVISORY (CFW) and Tropical Cyclone WARNING is issued		**X**	**X**
Coastal Flood WATCH (CFW) and Tropical Cyclone WATCH is issued		**X**	**X**
Coastal Flood WATCH (CFW) and Tropical Cyclone WARNING is issued		**X**	**X**
Coastal Flood WARNING (CFW) and Tropical Cyclone WATCH is issued	**X**		**X**
Coastal Flood WARNING (CFW) and Tropical Cyclone WARNING is issued		**X**	**X**
High Surf WATCH (CFW) and Tropical Cyclone WATCH is issued		**X**	**X**
High Surf WATCH (CFW) and Tropical Cyclone WARNING is issued		**X**	**X**
High Surf WARNING/ADVISORY (CFW) and Tropical Cyclone WATCH is issued	**X**		**X**
High Surf WARNING (CFW) and Tropical Cyclone WARNING is issued		**X**	**X**

[3] WFOs have the option to issue stand-alone special marine warnings (SMWs) on an as needed basis. This will primarily occur during watch situations prior to the onset of tropical storm winds impacting a marine zone. In cases of waterspouts, SMWs may be issued anytime during tropical cyclone watch/warning situations.

7.1.3.4 Format. As appropriate, product header options are "Hurricane or Typhoon Local Statement," "Tropical Storm Local Statement" or "Tropical Depression Local Statement." All HLSs will contain at least one headline. Prepare each section of the HLS by a content/topic header set off by three dots before and after each header. Prioritize and adjust the order to focus on the greatest threat and the most important information impacting the area.

Contents of Hurricane/Typhoon Local Statements:

...Headline...
A minimum of at least one concise lead sentence or headline.

...Areas Affected...
Details of which counties, parishes, or cities are included in the HLS.

...Watches/Warnings...
Watches and warnings in effect and counties or parishes to which they apply.

...Storm Information...
Present location, movement, and winds and expected time of onset of tropical storm/ hurricane/typhoon force winds. Give timing of impacts in ranges or general terms such as "afternoon," "evening," and so on. Use the tropical cyclone forecast/advisory as guidance.

...Precautionary/Preparedness Actions...
Short-term precautionary actions and times they should be completed.
This includes any evacuation recommendations as provided or stated by local authorities. Listing these actions is particularly important once a tropical cyclone watch or warning is announced.

...Storm Surge Flood and Storm Tide Impacts...
Storm surge and storm tide (storm surge plus astronomical tide) information, including times various heights are expected, present heights, and their locations. If data exists, a comparison of storm surge heights from previous tropical cyclones should be included. Storm surge information must agree with Tropical Cyclone Center forecasts as included in the advisories. Include storm tide information because local officials might not have access to tide tables. Reference storm tide forecasts to appropriate datums understood by local authorities. For many portions of the coast, this would be mean sea level although some areas use mean lower low water.

...Wind Impacts...
Present winds and expected time of onset of tropical storm or hurricane force winds. (Use the tropical cyclone forecast/advisory as guidance.) WFOs may provide information about the local impacts of the expected winds.

...Other Impacts...(Substitute appropriate header to reflect most important threat)
Any statements on potential tornado and flood/flash flood threats, rip currents, beach erosion, inland flooding, etc. Headlines would read for example: "...Inland Flooding Impacts..." or "...Tornado Impacts..."

...Probability of Hurricane/Tropical Storm Conditions...
Information on probability of hurricane/typhoon/tropical storm conditions is optional.

...New Information...
Specific new and vital information which you wish to bring to the attention of users.

...Next Update...
Time of next or final statement.

Some private sector vendors are parsing and scrolling HLS information. Format consistency of some of the HLS information is required. WFOs should still arrange the sections as they see fit with the most important first. WFOs still retain the option to use whatever headline they wish in the "Other Impact" section. Any section (including the ones the private sector are using) can be omitted if it is not appropriate for a given situation. Below are the headlines and those section headlines which require consistent formatting, e.g. ellipses, carriage returns and the exact section headline wording.

...Headline(s)...
More than one headline allowed with no blank lines in between, each section headline beginning and ending with ellipses

...Precautionary/Preparedness Actions...

...Storm Surge Flood and Storm Tide Impacts...

...Wind Impacts...

For the Headlines section, the vendor's software will key in on the singular blank line between the Time/Date line of the Mass News Dissemination Header and the three ellipses (...) at the beginning and ending of each headline. For the other three sections, the vendor's software will key on a blank line, the headline as written above, and three ellipses (before and after).

Example

HURRICANE LOCAL STATEMENT
NATIONAL WEATHER SERVICE XXXXX
1019 AM CDT TUE JUL 15 2003

...HURRICANE ZENIA MOVING ONTO THE MIDDLE TEXAS COAST
NEAR PORT O'CONNOR...
...A HURRICANE WARNING IS IN EFFECT FROM BAFFIN BAY TO HIGH
ISLAND...

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
TEXT

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
TEXT

...WIND IMPACTS...
TEXT

Wtaaii CCCC DDHHMM
HLSxxx
stZXXX-XXX>XXX-DDHHMM-
(TROPICAL CYCLONE TYPE) LOCAL STATEMENT
NATIONAL WEATHER SERVICE CITY, STATE
time am/pm time_zone day mon DD YYYY

...HEADLINE...

...Areas Affected...

...Watches/Warnings...

...Storm Information...

...Precautionary/Preparedness Actions...

...Storm Surge Flood and Storm Tide Impacts...

...Wind Impacts...

...Other Impacts...(Substitute appropriate header to reflect most important threat)

...Probability of Hurricane/Tropical Storm Conditions...

...New Information...

...Next Update...
$$

Figure 15. Hurricane Local Statement Format

7.1.4 Relationship of HLSs to the NOW. The NOW is a stand-alone product focused on conditions impacting the office's CWA for the next 0 to 6 hours. It will complement the HLS by providing critical storm information.

7.2 Tornado Warnings (TOR). WFOs should follow policy for the issuance of tornado warnings as per directive 10-511. However, for the 2005 season, the TOR product may be used for the purpose to warn the public to immediately take shelter in an interior portion of a well-built structure due to the onset of extreme tropical cyclone destructive winds.

A tornado warning for extreme tropical cyclone destructive winds may be issued when all of the following criteria are met:

Imminent or occurring onset of tropical cyclone related **sustained** winds, greater than or equal to 100 knots (115 mph).

Onset of tropical cyclone related destructive winds are expected to develop or occur within a WFOs county warning area within an hour.

The warning valid time should be two hours or less using county UGCs.

An example of the TOR for this purpose can be found in the Appendix A.

7.2.1 Mass News Disseminator Header. WFOs will use the product name TORNADO WARNING in the MND header.

7.3 Inland Tropical Storm/Hurricane Watch or Warning (NPW). Coastal and inland WFOs will issue an inland tropical storm watch or warning, or inland hurricane watch or warning, when a tropical cyclone is expected to spread tropical storm or hurricane force winds inland under the non-precipitation weather product NPW. The NPW will be exclusively used for this product's initial issuance, subsequent follow-up, and cancellation. The following WFOs are exempt from this policy and will issue NPWs for high wind watches and/or warnings if tropical storm winds move into their area of responsibility.

Albany, NY	Cleveland, OH
Binghamton, NY	Pittsburgh, PA
Buffalo, NY	State College, PA
Burlington, VT	Wilmington, OH
Charleston, WV	

7.3.1 Mission Connection. Non-precipitation watches and warnings provide our users and partners advance notice of hazardous non-precipitation weather events which have the potential to threaten life and property.

7.3.2 Issuance Guidelines.

7.3.2.1 Creation Software. Use AWIPS Graphical Hazards Generator (Watch/Warning/Advisory software) or other text editors.

7.3.2.2 Issuance Criteria. WFOs will issue Inland Tropical Storm/Hurricane Watches when tropical storm/hurricane force winds are possible within the watch area within 36 hours. WFOs will issue Inland Tropical Storm/Hurricane Warnings when tropical storm/hurricane force winds are expected within the warning area within 24 hours. For those offices issuing the inland watch/warnings, the NPW product will be updated as conditions warrant. At a minimum this should be every six hours or after the issuance of a six hourly NHC TCP advisory.

7.3.2.3 Issuance Times. Event driven.

7.3.2.4 Valid Time. Watch is valid up to 48 hours after the issuance time. The valid time (event start and end times) is described in the watch headline. A warning is valid up to 36 hours after issuance time. The valid time (event start and end times) is described in the warning headline.

7.3.2.5 Product Expiration Time. Generally 6-8 hours after the issuance time and should coincide with the next expected update or when the event is forecast to end.

7.3.3 Technical Description. NPWs will follow the format and content described in this section.

7.3.3.1 UGC Type. NPWs will use the zone (Z) form of the UGC.

7.3.3.2 Mass News Disseminator Header. Not applicable.

7.3.3.3 Content. A headline will be "Inland Tropical Storm Watch (or Warning)" or "Inland Hurricane Watch (or Warning)." To compliment TPC Tropical Cyclone Watches and Warnings that have been issued for coastal counties, inland sections of those coastal counties may be placed under WFO inland tropical storm/hurricane watches or warnings when the effects of the tropical cyclone can be clearly described to the public and not lead to confusion. Coordination will occur with all impacted offices and NHC before issuance. The appropriate forecasts and statements will highlight watches and warnings.

7.3.3.4 Format.

```
WWaaii CCCC DDHHMM
NPWxxx

URGENT - WEATHER MESSAGE
NATIONAL WEATHER SERVICE CITY, STATE
time am/pm time_zone day mon DD YYYY

...<Overview headline statement>...

.<General non-precipitation weather synopsis>

stZxxx-xxx>xxx-DDHHMM-
zone-zone-zone
INCLUDING THE CITIES OF...
time am/pm time_zone day mon dd yyyy

...HEADLINE...

TEXT


$$
```

Figure 16. Inland NPW Product Format

7.4 Inland Tropical Storm/Hurricane Watch or Warning for Subtropical Storms. WFOs will issue an inland tropical storm watch or warning, or inland hurricane watch or warning when a subtropical storm is expected to spread tropical storm or hurricane force winds inland. Use same procedures as noted in section 7.3.

7.5 Post-Tropical Cyclone Reports (PSH). All WFOs issuing HLSs will prepare post-storm reports. Inland offices issuing inland tropical storm/hurricane wind watches or warnings will also submit reports. Other offices whose CWA's experienced wind gusts greater than 33 knots, flooding, tornadoes, damage, or casualties will also submit reports.

7.5.1 Mission Connection. The PSH product is intended to provide the NHC, NWS Headquarters, media, public and emergency management officials with a record of peak tropical cyclone conditions. This data is then used to formulate other post-event reports, news articles and historical records.

7.5.2 Issuance Guidelines.

7.5.2.1 Creation Software. AWIPS

7.5.2.2 Issuance Criteria. If HLSs are issued, PSH will be issued.

7.5.2.3 Issuance Times. Transmit the reports within 5 days following the transmission of the last HLS or inland tropical storm/hurricane wind watches or warnings addressed to the appropriate Tropical Cyclone Center or National Center and a copy to Weather Service Headquarters, W/OS21. Amend reports as needed.

7.5.2.4 Valid Times. Not applicable.

7.5.2.5 Product Expiration Time. Not applicable

7.5.3 Technical Description.

7.5.3.1 UGC Type. Not applicable.

7.5.3.2 Mass News Disseminator Header. The PSH header block product type line is "POST-TROPICAL CYCLONE REPORT...(TROPICAL CYCLONE TYPE)(NAME)."

7.5.3.3 Content. Include the following items in the initial report and in any subsequent updated reports:

a. Wind data: If the observed peak gusts are greater than 33 knots, report highest sustained surface wind speed (knots) and duration (1-, 2- 8-, or 10-minute average which ever applies), peak gust (knots), and date/times of occurrence in UTC. Specify anemometer height (feet) if other than 33 feet. Report all NOAA, Department of Defense, and Federal Aviation Administration official observing sites in a NWS office's CWA

including ASOS sites, NOAA buoy/Coastal Marine Automated Network (C-MAN) stations, and National Ocean Service stations. Also report other reliable data collected by government sources or other institutions. These include reports from stations maintained by the U. S. Coast Guard; state, county, and local governments; universities; private companies; and experimental networks. List adjusted speeds corrected for instrument type and speed range if known. Data reports from the public are optional. However, NWS offices should encourage these data and include them in the PSH when considered reliable.

b. Pressure data: Report lowest sea level pressure (millibars), and date/time of occurrence (UTC). Report data from all sources given in Section a, and other stations where significant pressure observations are available. Report pressures less than 1005 mb, with pressure greater than 1005 mb reported as needed or as requested by the NHC.

c. Storm total rainfall: Report amount (inches) and duration (dates). In addition, list maximum 1-, 6-, 12-, and 24-hour amounts (inches) identifying date/time (UTC) of occurrence. Report data from all sources given in Section a, and other stations where significant rainfall observations are available. Report storm total rainfalls of 3 inches or more, with amounts under 3 inches reported as needed or as requested by the NHC.

d. Maximum storm tide heights: Reference storm tide to appropriate datums understood by local authorities. For many portions of the coast, this would be National Geodetic Vertical Datum although some areas use mean lower low water. Report storm tide in feet above the datum, and storm surge/wind waves in feet above the normal, predicted (astronomical) tide level. Identify location and date/time (UTC) of occurrence where possible. Report tides of 1 foot or greater above normal, with tides of less than 1 foot above normal reported as needed or as requested by the NHC.

e. Extent of beach erosion: As appropriate.

f. Flooding and/or flash flooding in CWA: Report to include date/times (UTC) and locations of occurrence.

g. Tornadoes in CWA: Report (times and locations).

h. Storm effects: Such as deaths, injuries, dollar damages, number of people evacuated, etc., within an office's CWA.

7.5.3.4 Format.

Ataa2i CCCC DDHHMM
PSHxxx

POST TROPICAL CYCLONE REPORT...(TROPICAL CYCLONE TYPE)
NATIONAL WEATHER SERVICE CITY STATE
time am/pm time_zone day mon DD YYYY

Wind data

Pressure data

Storm total rainfall

Maximum storm tide heights

Extent of beach erosion

Flooding and/or flash flooding in CWA

Tornadoes in CWA

Storm effects
$$

Figure 17. Post Tropical Cyclone Report Format

7.6 Information for Service Assessments. WFOs will forward a copy of media reports, especially newspaper clippings (online and printed) representative of the event and its impacts. Send reports to the appropriate regional headquarters and TPC within 7 days following the issuance of the last product concerning the storm. Reports do not have to include all interviews or radio or television spots concerning the landfall event in each local office's CWA.

7.7 Local Storm Reports (LSR). WFOs will prepare these reports in accordance with LSR instructions (Reference directive 10-517).

7.8 Storm Reports. WFOs will prepare these reports in accordance with Storm Data Preparation instruction (Reference directive 10-1605).

8. Correction Procedures. Tropical cyclone centers and WFOs should correct products using the following format:

WTNT KNHC 161441 CCA
TCDAT1

TROPICAL STORM ARTHUR DISCUSSION NUMBER 8...CORRECTED
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 AM EDT TUE JULY 16 2002

CORRECTED FOR (GIVE REASON)

TEXT FOLLOWS....

CCA - If a second correction is necessary, the "A" becomes a "B" (CCB).
"CORRECTED FOR" is optional but encouraged.

9. Procedures for Populating WFO-Generated Wind Forecast Grids for Tropical Cyclone Events. The following are short-term solutions to be followed by all impacted WFOs for populating WFO wind grids for tropical cyclones. Updates to this directive will take place as better methods for populating WFO-generated wind forecasts are integrated into the Interactive Forecast Preparation System.

9.1 Wind Speed Values Within the 34 kt Wind Radii

0-24 hours
Use wind forecast from the TCM as guidance for locating the 34-, 50- and 64-kt wind radii to maintain synoptic consistency. Apply local knowledge and mesoscale expertise to produce explicit/deterministic wind speed forecasts for all CWA/MAR grids using a full continuum of values up to the maximum sustained wind value provided by tropical cyclone centers.

25-72 hours
Use wind forecast from the TCM as guidance for locating the 34-, 50- and 64-kt wind radii to maintain synoptic consistency. Extrapolate the 64 kt radii from the 36-hour model guidance (TCMWind tool will do this). Coordinate consensus with NHC and adjacent WFOs. Apply local knowledge and mesoscale expertise to produce explicit/deterministic wind speed forecasts for all CWA/MAR grids using a full continuum of wind speeds up to 100 knots or up to the maximum sustained wind forecast by the NHC if it is less than 100 knots. For 101 kts and above use the capped value of 100 kts for grid points inside the 64 kt wind radii.

73-120 hours
Use forecast from the TCM as guidance for locating the center positions to maintain synoptic consistency. Extrapolate the 64-kt radii, the 50-kt radii and the 34-kt from model guidance (TCMWind tool will do this). Coordinate consensus with NHC and adjacent WFOs. Apply local knowledge and mesoscale expertise to produce explicit/deterministic wind speed forecasts for all CWA/MAR grids using a full continuum of wind speeds up to 64 knots or up to the maximum sustained wind forecast by the NHC if it is less than 64 knots. For 65 kts and above use the capped value of 64 kts for grid points inside the 64 kt wind radii.

121-168 hours
Use traditional guidance and WFO discretion to produce explicit/deterministic wind speed forecasts for all CWA/MAR grids using a full continuum of wind speeds up to 30 kts. The choice for 30 kts avoids potential confusion which can result from the automated rounding of 33 kts to 35 kts when generating graphical wind barbs, and with associated textual formatters which convert kts to miles per hour (then round to the nearest 5 mph).

9.2 Wind Speed Values Outside the 34 kt Wind Radii

0-120 hours
Use deterministic wind speed values.

9.3 Wind Direction Values Inside or Outside the 34 kt Wind Radii

0-168 hours
Use deterministic wind direction values.

9.4 Wind Gust Values Inside or Outside the 34 kt Wind Radii. At this time there is no requirement to produce a gust grids. As an option, if a WFO desires to produce a gust grid it will have to be created with little or no guidance.

9.5 Caveat. It is highly recommended the following caveat be placed on all text and graphical products..."Winds in and near tropical cyclones should be used with caution due to uncertainty in forecast track, size, and intensity."

Appendix A

EXAMPLES OF TROPICAL WEATHER PRODUCTS

Example: Tropical Weather Outlook

ABNT20 KNHC 100855
TWOAT

TROPICAL WEATHER OUTLOOK
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
530 AM EDT THU AUG 10 2000

FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO...

THE NATIONAL HURRICANE CENTER IS ISSUING ADVISORIES ON HURRICANE ALBERTO AND ON TROPICAL DEPRESSION FOUR.

CLOUDINESS AND SHOWERS ASSOCIATED WITH A TROPICAL WAVE ABOUT A COUPLE OF HUNDRED MILES SOUTH OF THE CAPE VERDE ISLANDS ARE MOVING WESTWARD. THERE IS SOME POTENTIAL FOR DEVELOPMENT DURING THE NEXT FEW DAYS.

A LARGE AREA OF CLOUDINESS AND THUNDERSTORMS ASSOCIATED WITH A TROPICAL WAVE HAS DEVELOPED OVER THE NORTHWESTERN CARIBBEAN SEA. THIS ACTIVITY IS EXPECTED TO SPREAD WEST-NORTHWESTWARD OVER PORTIONS OF CENTRAL AMERICA AND YUCATAN DURING THE NEXT DAY OR TWO. THERE ARE NO SIGNS OF TROPICAL CYCLONE FORMATION AT THIS TIME.

CLOUDINESS AND THUNDERSTORMS BETWEEN THE BAHAMAS AND BERMUDA ARE DECREASING AT THIS TIME. HOWEVER...SOME REDEVELOPMENT OF THE SHOWER ACTIVITY IS POSSIBLE DURING THE NEXT 24 HOURS.

ELSEWHERE...TROPICAL STORM FORMATION IS NOT EXPECTED THROUGH FRIDAY.

FORECAST/ADVISORIES ON TROPICAL DEPRESSION FOUR ARE ISSUED UNDER AWIPS HEADER TCMAT4 AND WMO HEADER WTNT24 KNHC. PUBLIC ADVISORIES ARE ISSUED UNDER AWIPS HEADER TCPAT4 AND WMO HEADER WTNT34 KNHC.

Examples: Mass News Disseminator Headers

TROPICAL DEPRESSION ONE-E ADVISORY NUMBER 1
TROPICAL STORM ALEX ADVISORY NUMBER 3
HURRICANE ALEX ADVISORY NUMBER 4
SUBTROPICAL STORM THREE ADVISORY NUMBER 1

Example: Tropical Storm Public Advisory

WTNT33 KNHC 081500
TCPAT3

BULLETIN
TROPICAL STORM FLOYD ADVISORY NUMBER 4
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 AM AST WED SEP 08 1999

...FLOYD MOVING WEST-NORTHWESTWARD IN THE TROPICAL ATLANTIC...

AT 11 AM AST...1500Z...THE CENTER OF TROPICAL STORM FLOYD WAS LOCATED NEAR LATITUDE 15.8 NORTH...LONGITUDE 50.0 WEST OR ABOUT 755 MILES...1210 KM...EAST OF THE LEEWARD ISLANDS.

FLOYD IS MOVING TOWARD THE WEST NORTHWEST NEAR 15 MPH ...24 KM/HR...AND THIS MOTION IS EXPECTED TO CONTINUE THROUGH TONIGHT.

MAXIMUM SUSTAINED WINDS ARE NEAR 45 MPH... 75 KM/HR...WITH HIGHER GUSTS...AND SOME SLOW STRENGTHENING IS EXPECTED DURING THE NEXT 24 HOURS.

TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 85 MILES...140 KM FROM THE CENTER.

ESTIMATED MINIMUM CENTRAL PRESSURE IS 1003 MB...29.62 INCHES.

REPEATING THE 11 AM AST POSITION...15.8 N... 50.0 W. MOVEMENT TOWARD...WEST NORTHWEST NEAR 15 MPH. MAXIMUM SUSTAINED WINDS... 45 MPH. MINIMUM CENTRAL PRESSURE...1003 MB.

THE NEXT ADVISORY WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 5 PM AST.

FORECASTER FRANKLIN

Example: Hurricane/Typhoon Public Advisory

WTNT33 KNHC 151500
TCPAT3

BULLETIN
HURRICANE FLOYD ADVISORY NUMBER 32
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 AM EDT WED SEP 15 1999

...FRINGES OF HURRICANE CONTINUE TO IMPACT COAST OF NORTH FLORIDA
AND GEORGIA...BUT FLOYD IS HEADING FOR THE CAROLINAS...

AT 11 AM EDT...A TROPICAL STORM WATCH IS EXTENDED NORTHWARD AND IS NOW IN EFFECT FROM NORTH OF CHINCOTEAGUE VIRGINIA TO SANDYHOOK NEW JERSEY...INCLUDING DELAWARE BAY.

A HURRICANE WARNING REMAINS IN EFFECT FROM TITUSVILLE FLORIDA TO THE NORTH CAROLINA/VIRGINIA BORDER...INCLUDING PAMLICO AND ALBEMARLE SOUNDS. AT 11 AM EDT...HURRICANE WARNINGS ARE DISCONTINUED SOUTH OF TITUSVILLE.

A HURRICANE WATCH CONTINUES IN EFFECT FROM THE NORTH CAROLINA/VIRGINIA BORDER TO CHINCOTEAGUE VIRGINIA...INCLUDING CHESAPEAKE BAY SOUTH OF SMITH POINT.

INTERESTS ALONG THE FLORIDA EAST COAST SOUTH OF TITUSVILLE SHOULD EXERCISE CAUTION UNTIL WINDS AND SEAS SUBSIDE.

AT 11 AM EDT...1500Z...THE CENTER OF HURRICANE FLOYD WAS LOCATED NEAR LATITUDE 29.9 NORTH...LONGITUDE 79.0 WEST OR ABOUT 165 MILES EAST-SOUTHEAST OF JACKSONVILLE FLORIDA. THIS POSITION IS ALSO ABOUT 260 MILES SOUTH OF MYRTLE BEACH SOUTH CAROLINA.

FLOYD IS MOVING TOWARD THE NORTH NORTHWEST NEAR 14 MPH AND A GRADUAL TURN TOWARD THE NORTH IS EXPECTED TODAY.

MAXIMUM SUSTAINED WINDS ARE NEAR 125 MPH...205 KM/HR...WITH HIGHER GUSTS. LITTLE CHANGE IN STRENGTH IS FORECAST BEFORE LANDFALL...WHICH IS EXPECTED TONIGHT NEAR THE BORDER OF SOUTH AND NORTH CAROLINA. ALL PREPARATIONS SHOULD BE RUSHED TO COMPLETION.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 140 MILES...220

KM...FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 230 MILES...370 KM.

THE LATEST MINIMUM CENTRAL PRESSURE REPORTED BY U.S. AIR FORCE HURRICANE HUNTER AIRCRAFT IS 943 MB...27.85 INCHES.

STORM SURGE FLOODING OF 10 TO 13 FEET ABOVE NORMAL TIDE LEVELS...ALONG WITH LARGE AND DANGEROUS BATTERING WAVES...ARE EXPECTED NEAR AND TO THE EAST OF WHERE THE CENTER CROSSES THE COAST. HEAVY SURF ADVISORIES ARE IN EFFECT FOR THE U.S. EAST COAST NORTHWARD TO CHATHAM MASSACHUSETTS. REFER TO STATEMENTS ISSUED BY LOCAL NATIONAL WEATHER SERVICE OFFICES FOR ADDITIONAL INFORMATION.

RAINFALL TOTALS OF 5 TO 10 INCHES ARE EXPECTED ALONG THE PATH OF THE HURRICANE.

ISOLATED TORNADOES ARE POSSIBLE OVER THE COASTAL COUNTIES OF SOUTH AND NORTH CAROLINA.

REPEATING THE 11 AM EDT POSITION...29.9 N... 79.0 W. MOVEMENT TOWARD...NORTH NORTHWEST NEAR 14 MPH. MAXIMUM SUSTAINED WINDS...125MPH. MINIMUM CENTRAL PRESSURE... 943 MB.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

INTERMEDIATE ADVISORIES WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 1 PM EDT AND 3 PM EDT FOLLOWED BY THE NEXT COMPLETE ADVISORY AT 5 PM EDT.

FORECASTER LAWRENCE

Example: Intermediate Public Advisory

WTNT33 KNHC 151900
TCPAT3

BULLETIN
HURRICANE FLOYD INTERMEDIATE ADVISORY NUMBER 32B
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
3 PM EDT WED SEP 15 1999
...FRINGES OF HURRICANE CONTINUE TO IMPACT COAST OF NORTH FLORIDA AND GEORGIA...BUT FLOYD IS HEADING FOR THE CAROLINAS...

A HURRICANE WARNING REMAINS IN EFFECT FROM NORTH OF FERNANDINA BEACH FLORIDA TO THE NORTH CAROLINA/VIRGINIA BORDER...INCLUDING PAMLICO AND ALBEMARLE SOUNDS. AT 3 PM EDT...WARNINGS ARE DISCONTINUED FROM FERNANDINA BEACH SOUTHWARD. WARNINGS WILL LIKELY BE DISCONTINUED FOR PORTIONS OF GEORGIA LATER TODAY.

A HURRICANE WATCH REMAINS IN EFFECT FROM THE NORTH CAROLINA/VIRGINIA BORDER TO CHINCOTEAGUE VIRGINIA...INCLUDING CHESAPEAKE BAY SOUTH OF SMITH POINT.

A TROPICAL STORM WATCH REMAINS IN EFFECT FROM NORTH OF CHINCOTEAGUE VIRGINIA TO MONTAUK POINT LONG ISLAND...INCLUDING DELAWARE BAY AND LONG ISLAND SOUND.

INTERESTS ALONG THE FLORIDA EAST COAST SHOULD EXERCISE CAUTION UNTIL WINDS AND SEAS SUBSIDE.

AT 3 PM EDT...1900Z...THE CENTER OF HURRICANE FLOYD WAS LOCATED NEAR LATITUDE 30.8 NORTH...LONGITUDE 79.1 WEST OR ABOUT 200 MILES SOUTH OF MYRTLE BEACH SOUTH CAROLINA.

FLOYD IS MOVING ALMOST DUE NORTHWARD AT 15 MPH AND THIS MOTION IS EXPECTED TO CONTINUE TODAY WITH A GRADUAL TURN TOWARD THE NORTH-NORTHEAST ON THURSDAY.

MAXIMUM SUSTAINED WINDS HAVE DECREASED TO NEAR 120 MPH...WITH HIGHER GUSTS. ALTHOUGH THE HURRICANE HAS BEEN SLOWLY WEAKENING...IT IS OVER THE WARM WATERS OF THE GULF STREAM COULD MAINTAIN ITS PRESENT STRENGTH UNTIL LANDFALL TONIGHT. ALL PREPARATIONS IN THE WARNING AREA SHOULD BE RUSHED TO COMPLETION.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 140 MILES...220 KM... FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 230 MILES...370 KM.

THE LATEST MINIMUM CENTRAL PRESSURE REPORTED BY U.S. AIR FORCE HURRICANE HUNTER AIRCRAFT IS 947 MB...27.96 INCHES.

STORM SURGE FLOODING OF 10 TO 13 FEET ABOVE NORMAL TIDE LEVELS...ALONG WITH LARGE AND DANGEROUS BATTERING WAVES...ARE EXPECTED NEAR AND TO THE EAST OF WHERE THE CENTER CROSSES THE COAST.

HEAVY SURF ADVISORIES ARE IN EFFECT FOR THE U.S. EAST COAST

NORTHWARD TO CHATHAM MASSACHUSETTS. REFER TO STATEMENTS ISSUED BY LOCAL NATIONAL WEATHER SERVICE OFFICES FOR ADDITIONAL INFORMATION.

RAINFALL TOTALS OF 5 TO 10 INCHES ARE EXPECTED ALONG THE PATH OF THE HURRICANE.

ISOLATED TORNADOES ARE POSSIBLE OVER THE COASTAL COUNTIES OF SOUTH AND NORTH CAROLINA.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

REPEATING THE 3 PM EDT POSITION...30.8 N... 79.1 W. MOVEMENT TOWARD...NORTH NEAR 15 MPH. MAXIMUM SUSTAINED WINDS...120 MPH. MINIMUM CENTRAL PRESSURE... 947 MB.

THE NEXT ADVISORY WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 5 PM EDT.

FORECASTER LAWRENCE

Example: Special Public Advisory

WTNT33 KNHC 241309
TCPAT3

BULLETIN
HURRICANE ANDREW SPECIAL ADVISORY NUMBER 25
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
900 AM EDT MON AUG 24 1992

...HURRICANE ANDREW MOVING INTO THE GULF OF MEXICO...

HURRICANE WARNINGS REMAIN POSTED FOR THE FLORIDA WEST COAST SOUTH OF VENICE TO FLAMINGO AND FOR LAKE OKEECHOBEE. AT 9 AM EDT A HURRICANE WATCH WILL GO INTO EFFECT FOR THE NORTHERN GULF COAST FROM MOBILE ALABAMA TO SABINE PASS TEXAS. ALL OTHER POSTED WATCHES AND WARNINGS ARE DISCONTINUED.

WIND GUSTS TO HURRICANE FORCE CONTINUE TO OCCUR ALONG THE SOUTHEAST FLORIDA COAST BUT WILL GRADUALLY DIMINISH DURING THE DAY. SMALL CRAFT ADVISORIES REMAIN IN EFFECT. RESIDENTS IN THESE AREAS SHOULD MONITOR LOCAL NWS OFFICES FOR THE LATEST FORECASTS AND CONDITIONS IN THEIR AREA.

AT 9 AM EDT THE CENTER OF HURRICANE ANDREW WAS LOCATED NEAR LATITUDE 25.6 NORTH AND LONGITUDE 81.8 WEST OR APPROXIMATELY 45 MILES SOUTH OF NAPLES FLORIDA.

HURRICANE ANDREW IS MOVING TOWARD THE WEST AT 18 MPH. THIS MOTION IS EXPECTED TO CONTINUE THIS MORNING WITH A GRADUAL TURN TO THE WEST NORTHWEST LATER TODAY.

MAXIMUM SUSTAINED WINDS ARE NEAR 140 MPH. LITTLE CHANGE IN STRENGTH IS LIKELY DURING THE NEXT 24 HOURS.

HURRICANE FORCE WINDS EXTEND OUTWARD TO 30 MILES...50 KM FROM THE CENTER WITH TROPICAL STORM FORCE WINDS EXTENDING OUTWARD TO 140 MILES. ESTIMATED MINIMUM CENTRAL PRESSURE IS 945 MB...27.91 INCHES.

STORM SURGES OF 5 TO 8 FEET ARE POSSIBLE ON THE FLORIDA WEST COAST NEAR AND TO THE SOUTH OF THE CENTER FOLLOWING PASSAGE OF THE HURRICANE. ALONG THE SOUTHEAST COAST OF FLORIDA STORM SURGE TIDES ARE DECREASING. PRELIMINARY REPORTS FROM THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT INDICATE A STORM SURGE OF 8 FEET ABOVE NORMAL WAS RECORDED IN BISCAYNE BAY NEAR HOMESTEAD FLORIDA.

RAINFALL AMOUNTS OF 5 TO 8 INCHES AND ISOLATED TORNADOES ARE POSSIBLE ACROSS SOUTHERN AND CENTRAL FLORIDA TODAY.

FOR STORM INFORMATION SPECIFIC TO YOUR AREA...PLEASE MONITOR PRODUCTS ISSUED BY YOUR LOCAL WEATHER OFFICE.

REPEATING THE 9 AM EDT POSITION...LATITUDE 25.6 NORTH AND LONGITUDE 81.8 WEST AND MOVING TOWARD THE WEST AT 18 MPH. MAXIMUM SUSTAINED WINDS NEAR 140 MPH. MINIMUM CENTRAL PRESSURE OF 945 MB...27.91 INCHES.

THE NEXT SCHEDULED ADVISORY WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 11 AM EDT MON.

Example: Public Advisory Correction

WTNT31 KNHC 240855 CCA
TCPAT3

HURRICANE ANDREW ADVISORY NUMBER 25...CORRECTED
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
500 AM EDT MON AUG 24 1992

CORRECTED FOR CENTRAL PRESSURE...

BODY OF TEXT
Example: Hurricane Forecast/Advisory

NOTE: As part of the header, a code string is appended at the end of the line "NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL"

Format: NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL BSNOYR
where: (BS) is the basin (AL, EP or CP)
where: (NO) is the tropical cyclone number (01, 02, 03,...99)
where: (YR) is four digits of the year.

WTNT25 KNHC 230300
TCMAT5

HURRICANE ISIDORE FORECAST/ADVISORY NUMBER 28
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL AL102002
0300Z MON SEP 23 2002

A HURRICANE WARNING REMAINS IN EFFECT ALONG THE GULF OF MEXICO AND CARIBBEAN COASTS OF THE YUCATAN PENINSULA FROM CAMPECHE NORTH AND EASTWARD TO TULUM...INCLUDING THE ISLAND OF COZUMEL.

HURRICANE CENTER LOCATED NEAR 20.8N 89.5W AT 23/0300Z
POSITION ACCURATE WITHIN 20 NM

PRESENT MOVEMENT TOWARD THE SOUTHWEST OR 220 DEGREES AT 4 KT

ESTIMATED MINIMUM CENTRAL PRESSURE 950 MB
MAX SUSTAINED WINDS 90 KT WITH GUSTS TO 110 KT.
64 KT..... 45NE 25SE 25SW 45NW.
50 KT..... 75NE 50SE 50SW 75NW.
34 KT.....200NE 130SE 100SW 150NW.
12 FT SEAS..300NE 200SE 150SW 300NW.

WINDS AND SEAS VARY GREATLY IN EACH QUADRANT. RADII IN NAUTICAL MILES ARE THE LARGEST RADII EXPECTED ANYWHERE IN THAT QUADRANT.

REPEAT...CENTER LOCATED NEAR 20.8N 89.5W AT 23/0300Z

AT 23/0000Z CENTER WAS LOCATED NEAR 21.0N 89.4W
FORECAST VALID 23/1200Z 20.7N 90.3W
MAX WIND 80 KT...GUSTS 100 KT.
64 KT... 40NE 20SE 25SW 40NW.
50 KT... 60NE 40SE 40SW 60NW.
34 KT...180NE 60SE 60SW 150NW.

FORECAST VALID 24/0000Z 21.0N 91.0W
MAX WIND 95 KT...GUSTS 115 KT.
64 KT... 45NE 25SE 25SW 45NW.
50 KT... 75NE 50SE 50SW 75NW.
34 KT...200NE 150SE 100SW 150NW.

FORECAST VALID 24/1200Z 21.8N 92.0W
MAX WIND 115 KT...GUSTS 140 KT.
64 KT... 60NE 45SE 45SW 60NW.
50 KT...100NE 75SE 75SW 100NW.
34 KT...200NE 150SE 125SW 180NW.

FORECAST VALID 25/0000Z 22.8N 92.5W
MAX WIND 125 KT...GUSTS 155 KT.
50 KT...100NE 100SE 75SW 100NW.
34 KT...200NE 200SE 150SW 200NW.

FORECAST VALID 26/0000Z 25.0N 93.0W
MAX WIND 125 KT...GUSTS 155 KT.
50 KT...100NE 100SE 75SW 100NW.
34 KT...200NE 200SE 150SW 200NW.

EXTENDED OUTLOOK. NOTE...ERRORS FOR TRACK HAVE AVERAGED NEAR 275 NM ON DAY 4 AND 375 NM ON DAY 5...AND FOR INTENSITY NEAR 20 KT EACH DAY

OUTLOOK VALID 27/0000Z 22.8N 92.5W
MAX WIND 100 KT...GUSTS 120 KT.

OUTLOOK VALID 28/0000Z 25.0N 93.0W
MAX WIND 90 KT...GUSTS 110 KT.

REQUEST FOR 3 HOURLY SHIP REPORTS WITHIN 300 MILES OF 20.8N 89.5W

NEXT ADVISORY AT 23/0900Z

FORECASTER PASCH

Example: Hurricane Forecast Discussion

WTNT45 KNHC 230300
TCDAT5

HURRICANE ISIDORE DISCUSSION NUMBER 28
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 PM EDT SUN SEP 22 2002

THE CENTER HAS MOVED SOUTH OF THE SHORT-TERM FORECAST TRACK...AND MOVED INLAND OVER NORTHWESTERN YUCATAN A FEW HOURS AGO. THUS THE CYCLONE IS WEAKENING...AND WILL CONTINUE TO DO SO UNTIL IT MOVES BACK OVER WATER. ASIDE FROM THE INTERACTION WITH LAND...ATMOSPHERIC AND OCEANIC CONDITIONS REMAIN QUITE FAVORABLE FOR INTENSIFICATION SO THE OFFICIAL FORECAST CALLS FOR ISIDORE TO RECOVER ITS PREVIOUS INTENSITY AND MORE...PRESUMING THAT IT RE-ENTERS THE GULF TOMORROW. THE OFFICIAL WIND SPEED FORECASTS BY DAYS 2 AND 3 ARE BACK TO THOSE SHOWN IN THE PREVIOUS ADVISORY. HOWEVER...TROPICAL CYCLONE INTENSITY FORECASTING HAS A LOT OF UNCERTAINTIES. IF THE INNER CORE STRUCTURE IS SEVERELY DISRUPTED BY THE CYCLONES TRANSIT OVER LAND...IT MAY NOT BE ABLE TO RE-INTENSIFY AS MUCH AS ANTICIPATED.

THE FORWARD SPEED APPEARS TO HAVE SLOWED AND CURRENT MOTION IS ESTIMATED TO BE A SOUTHWESTWARD DRIFT...220/4. THE MORE SOUTHERLY MOTION WAS PROBABLY THE RESULT OF MID-LEVEL RIDGING TO THE WEST-NORTHWEST OF ISIDORE. GLOBAL MODELS AND THE GFDL HURRICANE MODEL AGREE THAT THE SYSTEM WILL TURN BACK TO THE WEST AND NORTHWEST WITHIN 12 TO 24 HOURS. AFTERWARDS...A MID-TROPOSPHERIC RIDGE SHOULD BEGIN TO BUILD TO THE EAST OF ISIDORE...WHICH SHOULD INDUCE A MORE NORTHWARD MOTION. NOT MUCH INCREASE IN FORWARD SPEED IS EXPECTED UNTIL A MID-LATITUDE TROUGH BEGINS TO AFFECT THE SYSTEM...PROBABLY BEYOND THIS FORECAST PERIOD.

THE THREE-DAY FORECAST POINT IMPLIES AN EVENTUAL THREAT TO EITHER THE NORTHWEST OR NORTHERN GULF OF MEXICO COAST...HOWEVER IT IS STILL TOO EARLY TO BE MORE SPECIFIC ABOUT THE THREAT.

FORECASTER PASCH

FORECAST POSITIONS AND MAX WINDS

INITIAL	23/0300Z	20.8N	89.5W	90 KT
12HR VT	23/1200Z	20.7N	90.3W	80 KT
24HR VT	24/0000Z	21.0N	91.0W	95 KT
36HR VT	24/1200Z	21.8N	92.0W	115 KT
48HR VT	25/0000Z	22.8N	92.5W	125 KT
72HR VT	26/0000Z	25.0N	93.0W	125 KT
96HR VT	27/0000Z	27.0N	92.5W	100 KT
120HR VT	28/0000Z	29.0N	92.0W	90 KT

Example: Tropical Cyclone Update from - CPHC

WTPA61 PHFO 222000
TCUCP1

HURRICANE INIKI TROPICAL CYCLONE UPDATE
NWS CENTRAL PACIFIC HURRICANE CENTER HONOLULU HI
100 PM PST SAT AUG 22 1992

...RECONNAISSANCE AIRCRAFT INDICATE WINDS IN INIKI HAVE REACHED HURRICANE STRENGTH...

SHORTLY AFTER 1 PM PST...AIR FORCE RESERVE RECONNAISSANCE AIRCRAFT INDICATED MAXIMUM SUSTAINED WINDS IN TROPICAL STORM INIKI HAD INCREASED TO HURRICANE FORCE. DETAILS WILL FOLLOW IN A SPECIAL HURRICANE ADVISORY AT 2 PM PST.

Example: Tropical Cyclone Position Estimate

WTNT51 KNHC 190755
TCEAT1

HURRICANE HUGO...POSITION ESTIMATE
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
300 AM AST TUE SEP 19 1989

AT 3 AM AST THE CENTER OF HURRICANE HUGO WAS ESTIMATED NEAR LATITUDE 20.7 NORTH AND LONGITUDE 67.3 WEST. THIS IS APPROXIMATELY 155 MILES NORTH NORTHWEST OF SAN JUAN PUERTO RICO AND 220 MILES EAST SOUTHEAST OF GRAND TURK ISLAND OF THE BAHAMAS.

LAWRENCE

Example: Tropical Cyclone Summary - Fixes

TXPN40 PHFO 120017
TCSCP

CENTRAL PACIFIC TROPICAL CYCLONE SUMMARY - FIXES
NWS CENTRAL PACIFIC HURRICANE CENTER HONOLULU HAWAII
300 PM HST APR 12 2000

TROPICAL DISTURBANCE LOCATED NEAR 13.9N 152.2W AT 11/2330 UTC BASED ON GOES VIS DATA AND ANIMATION. POSITION ACCURATE WITHIN 45 NM. ESTIMATED MAXIMUM 1 MINUTE WIND SPEED 25 KT. MOVEMENT TOWARD 295 DEGREES AT 14 KT OVER THE PAST 6 HOURS.

T1.5/1.5/D/17.5 HOURS

REMARKS: LOW LEVEL CIRCULATION CENTER (LLCC) IS MORE THAN THREE FOURTHS OF A DEGREE FROM DENSE OVERCAST...YIELDING A DATA T OF 1.5. MET AGREES. SYSTEM NOT IDENTIFIABLE USING PATTERN T. MAIN CONVECTION IS 85 NM TO THE EAST/SOUTHEAST OF THE LLCC AND HAS WEAKENED CONSIDERABLY OVER THE PAST SIX HOURS.

Example: Strike Probabilities of Tropical Cyclone Conditions

WTNT71 KNHC 150900
SPFAT3

HURRICANE FLOYD PROBABILITIES NUMBER 31
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 AM EDT WED SEP 15 1999

PROBABILITIES FOR GUIDANCE IN HURRICANE PROTECTION PLANNING BY GOVERNMENT AND DISASTER OFFICIALS

AT 5 AM EDT...0900Z...THE CENTER OF FLOYD WAS LOCATED NEAR LATITUDE 28.8 NORTH...LONGITUDE 78.8 WEST

CHANCES OF CENTER OF THE HURRICANE PASSING WITHIN 65 NAUTICAL MILES OF LISTED LOCATIONS THROUGH 2AM EDT SAT SEP 18 1999

LOCATION A B C D E LOCATION A B C D E

33.2N 79.1W	38 2 X X 40	PROVIDENCE RI	X X 3 13 16
36.3N 78.0W	X 26 6 X 32	NANTUCKET MA	X X 2 12 14
40.0N 75.0W	X X 18 3 21	HYANNIS MA	X X 2 12 14
COCOA BEACH FL	5 X X 1 6	BOSTON MA	X X 2 13 15
DAYTONA BEACH FL	20 X X X 20	PORTLAND ME	X X 1 14 15
JACKSONVILLE FL	25 X X X 25	BAR HARBOR ME	X X X 12 12
SAVANNAH GA	36 1 X X 37	EASTPORT ME	X X X 11 11
CHARLESTON SC	41 1 X X 42	ST JOHN NB	X X X 10 10
MYRTLE BEACH SC	30 7 X X 37	MONCTON NB	X X X 9 9
WILMINGTON NC	15 17 1 X 33	YARMOUTH NS	X X X 9 9
MOREHEAD CITY NC	5 19 3 1 28	HALIFAX NS	X X X 7 7
CAPE HATTERAS NC	1 13 8 X 22	SABLE ISLAND NS	X X X 2 2
NORFOLK VA	X 11 15 X 26	SYDNEY NS	X X X 3 3
OCEAN CITY MD	X 2 19 1 22	EDDY POINT NS	X X X 4 4
ATLANTIC CITY NJ	X X 17 4 21	PTX BASQUES NFLD	X X X 3 3
NEW YORK CITY NY	X X 12 7 19	BURGEO NFLD	X X X 2 2
MONTAUK POINT NY	X X 5 11 16		

COLUMN DEFINITION PROBABILITIES IN PERCENT
A IS PROBABILITY FROM NOW TO 2AM THU
FOLLOWING ARE ADDITIONAL PROBABILITIES
B FROM 2AM THU TO 2PM THU
C FROM 2PM THU TO 2AM FRI
D FROM 2AM FRI TO 2AM SAT
E IS TOTAL PROBABILITY FROM NOW TO 2AM SAT
X MEANS LESS THAN ONE PERCENT

FORECASTER GUINEY

NOTE: Above probability table is provided as an example depicting the format. The probabilities included do no necessarily agree with the predicted forecast positions.

Example: Subtropical Cyclone Public Advisory

WTNT31 KNHC 040255
TCPAT1

BULLETIN
SUBTROPICAL DEPRESSION ONE ADVISORY NUMBER 2
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 PM EDT WED OCT 04 2000

...SUBTROPICAL DEPRESSION TURNS EAST-NORTHEAST WITH LITTLE

CHANGE IN STRENGTH...

AT 11 PM EDT...0300Z...THE CENTER OF THE SUBTROPICAL DEPRESSION WAS LOCATED NEAR LATITUDE 29.8 NORTH...LONGITUDE 79.5 WEST OR ABOUT 105 MILES...165 KM...EAST-NORTHEAST OF DAYTONA BEACH FLORIDA.

THE DEPRESSION IS MOVING TOWARD THE EAST-NORTHEAST NEAR 9 MPH ...15 KM/HR...AND THIS MOTION IS EXPECTED TO CONTINUE FOR THE NEXT 24 HOURS.

MAXIMUM SUSTAINED WINDS ARE NEAR 35 MPH... 55 KM/HR...WITH HIGHER GUSTS....MAINLY WELL TO THE EAST AND SOUTHEAST OF THE CENTER. SOME STRENGTHENING IS FORECAST DURING THE NEXT 24 HOURS.

THE LATEST MINIMUM CENTRAL PRESSURE REPORTED BY A NOAA HURRICANE HUNTER AIRCRAFT IS 1010 MB...29.83 INCHES.

REPEATING THE 11 PM EDT POSITION...29.8 N... 79.5 W. MOVEMENT TOWARD...EAST-NORTHEAST NEAR 9 MPH. MAXIMUM SUSTAINED WINDS... 35 MPH. MINIMUM CENTRAL PRESSURE...1010 MB.
THE NEXT ADVISORY WILL BE ISSUED BY THE NATIONAL HURRICANE CENTER AT 5 AM EDT...THURSDAY.

FORECASTER BEVEN

Example: Public Advisory (previously Storm Summary)

WTNT31 KWNH 291658
TCPAT1

PUBLIC ADVISORY NUMBER 58 FOR DEPRESSION GEORGES
NWS HYDROMETEOROLOGICAL PREDICTION CENTER CAMP SPRINGS MD
1200 PM CDT TUE SEP 29 1998

AT 1000 AM CDT THE CENTER OF CIRCULATION ASSOCIATED WITH "GEORGES" WAS LOCATED NEAR 31.1N 87.9W...OR ROUGHLY 35 MILES NORTH NORTHEAST OF MOBILE ALABAMA. MAXIMUM SUSTAINED WINDS WERE JUST OVER 30 MPH WITH OCCASIONAL GUSTS OVER 40 MPH..AND GRADUAL WEAKENING IS EXPECTED TO CONTINUE DURING THE NEXT 24 HOURS AS IT SLOWLY MOVES TOWARD THE NORTHEAST ACROSS SOUTH AND CENTRAL ALABAMA.

AT THE PRESENT TIME...RADAR AND SATELLITE IMAGERY IS STILL

SHOWING A WELL-DEFINED CIRCULATION WITH "GEORGES." LARGE AMOUNTS OF MOISTURE FROM THE GULF OF MEXICO ARE STREAMING NORTHWARD AROUND THE EASTERN SIDE OF THE SYSTEM. THIS MOISTURE HAS LED TO AN EXTENSIVE AREA OF HEAVY RAIN WITH EMBEDDED THUNDERSTORMS AS FAR NORTH AS NORTH GEORGIA...WHERE THE MOISTURE IS INTERACTING WITH A COLD FRONT MOVING THROUGH THE EASTERN STATES. MEANWHILE...DRY AIR BEING WRAPPED AROUND WEST SIDE OF THE CIRCULATION HAS BROUGHT AN END TO THE HEAVY RAIN OVER SOUTH AND EAST MISSISSIPPI...WHERE ONLY LIGHT SHOWERS REMAIN.

THE BIG STORY NOW WITH "GEORGES" WILL CONTINUE TO BE THE EXTREMELY HEAVY RAINFALL ALONG WITH THE THREAT OF TORNADOES ALONG ITS EAST EDGE. BANDS OF TORRENTIAL RAIN ARE CONTINUING TO MOVE RAPIDLY ACROSS THE WEST FLORIDA PANHANDLE INTO ADJACENT SOUTH ALABAMA. THIS WILL ADD TO THE VERY HIGH RAINFALL TOTALS THAT HAVE OCCURRED SINCE THE STORM MADE LANDFALL OVER SOUTH MISSISSIPPI EARLY MONDAY MORNING.

RAINFALL TOTALS OVER THE PERIOD FROM SATURDAY THROUGH MONDAY INCLUDE:

...ALABAMA...

BAY MINNETTE (BALDWIN CO) 14.55 INCHES
ALABAMA PORT (MOBILE CO) 13.66 INCHES
MOBILE AIRPORT 12.20 INCHES
AXIS (MOBILE CO) 10.00 INCHES
CHATOM (WASHINGTON CO) 9.80 INCHES
SEMINOLE 9.43 INCHES
...FLORIDA...

MUNSON (SANTA ROSA CO) 25.06 INCHES
PENSACOLA AIRPORT (ESCAMBIA CO) 10.08 INCHES
NICEVILLE (OKALOOSA CO) 10.08 INCHES

...MISSISSIPPI...

LEAKESVILLE (GREENE CO) 8.29 INCHES

SATELLITE AND RADAR ESTIMATES INDICATE SOME LOCATIONS IN SOUTHEAST MISSISSIPPI...SOUTHWEST ALABAMA...AND WEST FLORIDA PANHANDLE HAVE RECEIVED OVER 30 INCHES OF RAIN SINCE EARLY SUNDAY MORNING.

AS A RESULT OF THE EXCESSIVE RAINFALL...THERE ARE FLOOD WATCHES IN EFFECT TODAY AND TONIGHT FOR LARGE PORTIONS OF SOUTH AND CENTRAL ALABAMA...THE WEST FLORIDA PANHANDLE...AND WEST AND SOUTHWEST GEORGIA. IN ADDITION...SINCE DECAYING TROPICAL SYSTEMS FREQUENTLY PRODUCE TORNADOES AFTER MAKING LANDFALL...A TORNADO WATCH IS IN EFFECT UNTIL 700 PM CDT FOR THE FLORIDA PANHANDLE...SOUTHWEST AND WEST CENTRAL GEORGIA...SOUTHEAST ALABAMA...AND THE NEARBY COASTAL WATERS.

THE NEXT STORM SUMMARY WILL BE ISSUED BY HPC AT 600 PM CDT.

MAUSSER/FORECAST OPERATIONS BRANCH

Example: Tropical Weather Discussion

AXNT20 KNHC 141112
TWDAT

TROPICAL WEATHER DISCUSSION
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
805 AM EDT MON 14 APR 2003

TROPICAL WEATHER DISCUSSION FOR NORTH AMERICA...CENTRAL AMERICA...GULF OF MEXICO...CARIBBEAN SEA...AND ATLANTIC OCEAN TO THE AFRICAN COAST FROM THE EQUATOR TO 32N INCLUDING NORTHERN SECTIONS OF SOUTH AMERICA. THE FOLLOWING INFORMATION IS BASED ON SATELLITE IMAGERY...WEATHER OBSERVATIONS...RADAR... AND METEOROLOGICAL ANALYSIS.

BASED ON 0600 UTC SURFACE ANALYSIS AND SATELLITE IMAGERY THROUGH 1015 UTC.

SPECIAL FEATURES...
NONE.

TROPICAL WAVES/ITCZ...
AXIS OF ITCZ-RELATED CLOUDS/CONVECTION IS CENTERED ALONG 4N1W 2N15W 3N25W 1N35W 3N47W 2N51W. SCATTERED MODERATE CONVECTION FROM 1N-4N BETWEEN 7W-10W. ISOLATED MODERATE TO STRONG CONVECTION WITHIN 30 NM EITHER SIDE OF AXIS FROM 15W-35W.

MIDDLE/UPPER LEVEL SYNOPTIC FEATURES...

A MID/UPPER LEVEL LOW ALONG THE SE UNITED STATES COAST NEAR GEORGIA AND A SHORTWAVE TROUGH EXTENDING SEWD TO THE BAHAMAS REMAIN THE PRIMARY WEATHER MAKER. DIVERGENCE AHEAD OF THE SHORTWAVE TROUGH HAS INCREASED OVERNIGHT AS THE FEATURE LIFTS NEWD AND BECOMES NEGATIVELY TILTED PRODUCING SHOWERS/THUNDERSTORMS ALONG A SURFACE FRONTAL BOUNDARY FROM THE WINDWARD PASSAGE THROUGH TO 30N56W. MODERATE CONVECTION HAS DEVELOPED DURING THE LAST FEW HOURS IN THE VICINITY OF THE S BAHAMAS AS THE AFORMENTIONED SHORTWAVE TROUGH INTERACTS WITH THE ENTRANCE REGION OF A STRONG 70-120 KT UPPER JET...FROM THE BAHAMAS NEWD OVER THE ATLC E OF BERMUDA. THIS ACTIVITY SHOULD EXPAND NWD ALONG THE FRONTAL BOUNDARY DURING THE DAY AS THE SHORTWAVE/JET CONTINUE TO LIFT NEWD. TO THE WEST...MID/UPPER LEVEL RIDGING...CURRENTLY OVER E MEXICO AND THE CENTRAL UNITED STATES...CONTINUES TO EXPAND EWD OVER THE GLFMEX. CONFLUENT FLOW BETWEEN THE RIDGE AND SHORTWAVE TROUGH TO THE EAST IS PRODUCING A LARGE AREA OF MODERATE TO STRONG SUBSIDENCE AND DRY/TRANQUIL WEATHER OVER THE ENTIRE GLFMEX...NW CARIBBEAN...AND EXTREME W SUBTROPICAL ATLC W OF SHORTWAVE TROUGH....text continues....

Example: Aviation Tropical Cyclone Advisory

FKPZ21 KNHC 260215
TCAPZ1

TROPICAL DEPRESSION PATRICIA ICAO ADVISORY NUMBER 23
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
0300Z SUN OCT 26 2003

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TC ADVISORY
DTG:                      20031026/0300Z
TCAC:                     KNHC
TC:                       PATRICIA
NR:                       023
PSN:                      N1612 W11454
MOV:                      NW 05KT
C:                        1008HPA
MAX WIND:                 025KT
FCST PSN + 12 HR:         261200 N1636 W11500
FCST MAX WIND + 12 HR:    020KT
FCST PSN + 18 HR:         261800 N1654 W11506
FCST MAX WIND + 18 HR:    020KT
FCST PSN + 24 HR:         270000 N1712 W11512
FCST MAX WIND + 24 HR:    020KT
NXT MSG:                  NO MSG EXP
```

Example: Hurricane Local Statement

WTUS84 KCRP 151519
HLSCRP
TXZ230>234-241>247-151815-

HURRICANE LOCAL STATEMENT
NATIONAL WEATHER SERVICE CORPUS CHRISTI TX
1019 AM CDT TUE JUL 15 2003

...HURRICANE CLAUDETTE MOVING ONTO THE MIDDLE TEXAS COAST NEAR PORT O'CONNOR...
...A HURRICANE WARNING IS IN EFFECT FROM BAFFIN BAY TO HIGH ISLAND...

...AREAS AFFECTED...
THIS STATEMENT RECOMMENDS ACTIONS TO BE TAKEN BY RESIDENTS IN THE FOLLOWING COUNTIES OF ARANSAS...CALHOUN...KLEBERG...NUECES... REFUGIO...SAN PATRICIO...BEE...GOLIAD...LIVE OAK...MCMULLEN...JIM WELLS AND VICTORIA.

...WATCHES/WARNINGS...
A HURRICANE WARNING IS IN EFFECT FOR THE TEXAS COAST FROM BAFFIN BAY TO HIGH ISLAND. AN INLAND TROPICAL STORM WIND WARNING IS IN EFFECT FOR BEE...GOLIAD...LIVE OAK...JIM WELLS...MCMULLEN AND VICTORIA COUNTIES FOR TODAY. AN INLAND TROPICAL STORM WIND WATCH IS IN EFFECT FOR DUVAL AND LASALLE COUNTIES FOR TONIGHT. A FLASH FLOOD WATCH IS IN EFFECT FOR TODAY FOR THE COUNTIES OF ARANSAS...BEE...CALHOUN...GOLIAD...LIVE OAK...MCMULLEN...REFUGIO... SAN PATRICIO AND VICTORIA.

...STORM INFORMATION...
AT 9 AM CDT...THE CENTER OF HURRICANE CLAUDETTE WAS LOCATED NEAR LATITUDE 28.5 NORTH AND LONGITUDE 96.1 WEST...OR APPROXIMATELY 20 MILES EAST OF PORT O'CONNOR. MAXIMUM SUSTAINED WINDS ARE NEAR 80 MPH WITH HIGHER GUSTS. CLAUDETTE IS MOVING WEST-NORTHWEST NEAR 10 MPH. A CONTINUED MOVEMENT TOWARDS THE WEST-NORTHWEST IS EXPECTED TODAY. GIVEN THIS FORECAST TRACK...THE EYE OF CLAUDETTE IS EXPECTED TO MOVE ACROSS THE PORT OCONNOR TO PALACIOS AREA AROUND 11 AM. WEAKENING IS EXPECTED AFTER THE EYE OF CLAUDETTE MOVES INLAND.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
AS OF 1130 PM MONDAY EVENING...EMERGENCY MANAGEMENT OFFICIALS

RECOMMENDED EVACUATIONS OF RESIDENTS OF ARANSAS COUNTY. ALSO...EVACUATIONS HAVE BEEN RECOMMENDED FOR RESIDENTS AND NON-RESIDENTS OF PORT ARANSAS. NO OTHER EVACUATIONS HAVE BEEN REPORTED TO THE NATIONAL WEATHER SERVICE AT THIS TIME. RESIDENTS OF SOUTH TEXAS...ESPECIALLY THOSE WHO LIVE IN THE COASTAL COUNTIES FROM KLEBERG TO CALHOUN...SHOULD COMPLETE ALL NECESSARY ACTIONS TO PROTECT LIFE AND PROPERTY.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
AT 9 AM CDT...TIDES WERE APPROXIMATELY 3.5 FEET ABOVE MEAN SEA LEVEL AT BOBHALL PIER...AND 2.5 FEET ABOVE MEAN SEA LEVEL AT PORT OCONNOR. AS CLAUDETTE MOVES ACROSS THE COASTLINE...TIDES WILL CONTINUE TO INCREASE...ESPECIALLY FROM ROCKPORT NORTHWARD.

TIDES ARE EXPECTED TO RISE TO BETWEEN 3 AND 4 FEET ABOVE MEAN SEA LEVEL SOUTH OF ROCKPORT...AND 5 TO 6 FEET ABOVE MEAN SEA LEVEL BETWEEN ROCKPORT AND PORT OCONNOR BY THIS AFTERNOON.

AT 5 FEET MSL...WATER WILL FLOOD MANY STREETS IN LAMAR...ROCKPORT...INGLESIDE...FULTON...ARANSAS PASS...PORT ARANSAS AND PORT OCONNOR. WATER WILL REACH 1/4 MILE INLAND TO THE SOUTHERN PART OF ROCKPORT. PORTIONS OF HIGHWAY 35 BETWEEN ARANSAS PASS AND ROCKPORT WILL BE UNDER 1 FOOT OF WATER. ROADS WEST OUT OF ROCKPORT WILL BE UNDER WATER. BEACH AND HARBOR FACILITIES WILL BE FLOODED AT PORT ARANSAS. AT 4 FEET MSL...THE JFK CAUSEWAY WILL HAVE AROUND 1 FOOT OF WATER OVER IT. THE T-HEADS WILL BE FLOODED. FLOODING IS LIKELY ALONG HIGHWAY 35 FROM ARANSAS PASS TO ROCKPORT. SOME FLOODING IS LIKELY ALONG WATERFRONT FACILITIES AND ROADS THAT ARE NEAR THE WATER ALONG MANY COASTAL COMMUNITIES.

AT 3 FEET MSL...BEACH ROADS WILL BE FLOODED ON PADRE AND MUSTANG ISLANDS. THE JFK CAUSEWAY WILL HAVE SOME WATER OVER IT BUT NOT ENOUGH TO CLOSE IT DOWN. HIGH TIDES AT PORT ARANSAS OCCURRED AT 745 AM THIS MORNING AND WILL OCCUR AGAIN AT 817 AM ON WEDNESDAY. HIGH TIDES AT PORT OCONNOR WILL BE AT 259 PM THIS AFTERNOON AND 400 PM ON WEDNESDAY.

...WIND IMPACTS...
AT 9 AM CDT...THE COAST GUARD REPORTED WINDS OF 30 TO 40 KNOTS FROM THE NORTHWEST AT PORT O'CONNOR. A MESONET SITE IN PORT OCONNOR REPORTED A WIND GUST AT 75 MPH AT 940 AM. WINDS ACROSS THE COASTAL WATERS FROM PORT O'CONNOR AND OUT TO 60 NAUTICAL MILES EAST OF PORT OCONNOR...HAVE INCREASED TO HURRICANE FORCE THIS MORNING.

WINDS OVER INLAND LOCATIONS FROM ROCKPORT TO VICTORIA ARE NORTH-NORTHWEST AROUND 25 TO 35 MPH. AS CLAUDETTE CONTINUES TO MOVE INLAND...WINDS WILL GRADUALLY INCREASE ACROSS THE ENTIRE AREA FROM EAST TO WEST.

TROPICAL STORM FORCE WINDS ARE EXPECTED TO SPREAD ACROSS THE REMAINDER OF THE COASTAL WATERS...PRIMARILY EAST OF PORT ARANSAS...THIS MORNING. WINDS GUSTING TO HURRICANE FORCE WILL MOVE INTO REFUGIO AND ARANSAS COUNTIES AROUND 11 AM CDT. THE TROPICAL STORM FORCE WINDS WILL ADVANCE SOUTHWEST DOWN THE COAST WITH TROPICAL STORM FORCE WINDS ENTERING THE COASTAL BEND NEAR CORPUS CHRISTI AROUND NOON. WIND GUSTS TO HURRICANE FORCE COULD OCCUR THIS AFTERNOON AND EVENING NEAR CORPUS CHRISTI AND REDFISH BAYS AND THE ADJACENT LAND AREAS.

...SEAS AND RIP CURRENTS...
AT 9 AM CDT...SEAS WERE AVERAGING AROUND 8 TO 10 FEET OUT TO AROUND20 NAUTICAL MILES...14 TO 18 FEET BEYOND 20 NAUTICAL MILES. AS CLAUDETTE MAKES LANDFALL...SEAS WILL INCREASE TO 12 TO 17 FEET OUT TO 20 NAUTICAL MILES...15 TO 20 FEET BEYOND 20 NAUTICAL MILES OFFSHORE THIS MORNING. THESE LARGE SEAS WILL CONTINUE TO PRODUCE VERY ROUGH SURF AND DANGEROUS RIP CURRENTS ACROSS ALL OF THE SOUTH TEXAS BEACHES. ENTERING THE SURF IS STRONGLY DISCOURAGED THROUGH AT LEAST WEDNESDAY.

...FLOOD IMPACTS...
HEAVY RAINFALL WILL ACCOMPANY CLAUDETTE LATER THIS MORNING INTO THIS EVENING. THE GREATEST POTENTIAL FOR HEAVY RAIN SHOULD BE THIS AFTERNOON THROUGH WEDNESDAY. TOTAL RAINFALL AMOUNTS OF 5 TO 8 INCHES WILL BE POSSIBLE MAINLY TO THE NORTH OF A ROCKPORT TO ENCINAL LINE...WITH 2 TO 4 INCHES POSSIBLE TO THE SOUTH OF THIS LINE. THESE RAINFALL AMOUNTS MAY NEED TO BE REVISED IF THE FORECAST TRACK CHANGES. THIS AMOUNT OF RAINFALL WILL HAVE THE POTENTIAL TO PRODUCE FLOODING OVER THE NORTHERN PORTIONS OF THE COASTAL BEND AND RIO GRANDE PLAINS AREA.

...NEXT UPDATE...
THE NEXT SCHEDULED STATEMENT WILL BE ISSUED AROUND 1 PM.

$$

Example: Use of tornado warning for extreme destructive winds (TOR)

WFUS52 KMLB 132250
TORMLB
FLC069-095-097-132345-

BULLETIN - EAS ACTIVATION REQUESTED
TORNADO WARNING
NATIONAL WEATHER SERVICE MELBOURNE FL
645 PM EDT FRI AUG 13 2004

THE NATIONAL WEATHER SERVICE IN MELBOURNE HAS ISSUED A

* TORNADO WARNING FOR...
SOUTHERN LAKE COUNTY
ORANGE COUNTY
NORTHWESTERN OSCEOLA COUNTY
IN EAST CENTRAL FLORIDA

* UNTIL 745 PM EDT

* AT 642 PM EDT...THE NATIONAL WEATHER SERVICE HAS ISSUED A TORNADO WARNING FOR DESTRUCTIVE WINDS OVER 100 MPH IN THE EYE WALL AND INNER RAIN BANDS OF HURRICANE CHARLEY. *(Note: the product was issued prior to any policy and was the event which brought about the new TOR policy. Since this issuance, the wind speed criteria has been raised to 100 knots or about 110 mph)*

* THE LEADING EDGE OF HURRICANE CHARLEYS DESTRUCTIVE WINDS IS EXPECTED TO MOVE INTO THE KISSIMMEE AND GREATER ORLANDO AREA BY 715 PM.

THE THREAT OF DESTRUCTIVE WINDS AND TORNADOES WILL LAST THROUGH 9 PM.

PEOPLE IN THE PATH OF THIS ADVANCING STORM ARE URGED TO QUICKLY PREPARE FOR ITS APPROACH. THIS IS A DANGEROUS SITUATION! ACT NOW.

IF YOU ARE IN THE PATH OF THIS STORM...THE SAFEST PLACE IS IN A STRONG BUILDING ON THE LOWEST FLOOR. MOVE TO AN INTERIOR ROOM SUCH AS A BATHROOM OR CLOSET. KEEP AWAY FROM WINDOWS. IF NECESSARY...GET UNDER A WORKBENCH OR OTHER PIECE OF STURDY FURNITURE. USE BLANKETS OR PILLOWS TO COVER YOUR BODY. ABANDON YOUR MOBILE HOME OR RV FOR MORE SUBSTANTIAL SHELTER.

LAT...LON 2792 8210 2779 8140 2856 8117 2868 8189

$$

Example: Short Term Forecast (NOWcast)

FPUS71 KMOB 192130
NOWMOB

SHORT TERM FORECAST
NATIONAL WEATHER SERVICE MOBILE AL
430 PM CDT SAT AUG 19 1995

ALZ051>064-MSZ067-075-076-078-079-192330-

.NOW...
...HURRICANE GARY WILL MOVE ACROSS BALDWIN AND MOBILE COUNTIES BY 530 PM... SUSTAINED WINDS ABOVE 80 MPH WITH HIGHER GUSTS AND TORRENTIAL RAINFALL CAN BE EXPECTED AS THE RAIN BAND MOVES ACROSS. THE RAIN BAND SHOULD WEAKEN SLIGHTLY AS IT MOVES ACROSS CLARKE...WASHINGTON...AND GEORGE COUNTIES BY 6 PM. BUT PEOPLE IN THESE COUNTIES SHOULD EXPECT WIND GUSTS TO NEAR HURRICANE FORCE AND EXTREMELY HEAVY RAINFALL.
&&

SCATTERED AREAS OF MODERATE TO HEAVY RAINFALL WILL CONTINUE ACROSS SOUTHERN ALABAMA AND MISSISSIPPI THROUGH 6 PM. BANDS OF STRONG STORMS WILL MOVE NORTHWESTWARD ACROSS THE AREA. EAST WINDS OF 30-40 MPH AND HEAVY RAIN WILL PERSIST WITH STRONGER WINDS AND HEAVIER RAINFALL NEAR THE RAIN BANDS. TEMPERATURES ACROSS THE REGION WILL REMAIN IN THE 70S.

Example: Inland Hurricane Warning

WWUS45 KHGX 101030
NPWHOU

URGENT - WEATHER MESSAGE
NATIONAL WEATHER SERVICE HOUSTON-GALVESTON TX
600 AM CDT FRI SEP 10 1995

...AN INLAND HURRICANE WARNING IN EFFECT FOR SOUTHEAST TEXAS...

HURRICANE FRED...LOCATED 60 MILES SOUTHEAST OF GALVESTON TX AT 6 AM CDT...IS MOVING TO THE NORTH NORTHWEST AT 10 MPH AND IS EXPECTED TO MAKE LANDFALL AROUND NOON CDT ON THE UPPER TEXAS COAST. FRED IS THEN FORECAST TO CONTINUE ON A NORTH NORTHWEST COURSE MOVING ACROSS HOUSTON AND REACHING THE SAN JACINTO NATIONAL FOREST BY LATE AFTERNOON. SUSTAINED WINDS OF 100 MPH WITH GUSTS TO 120 MPH SHOULD BEGIN SWEEPING ACROSS THE UPPER TEXAS COAST BY LATE MORNING.

TXZ177>179-197>199-210>212-102200-
WALKER-SAN JACINTO-POLK-WASHINGTON-GRIMES-MONTGOMERY-
COLORADO-AUSTIN-WALLER-

...INLAND HURRICANE WARNING...

WINDS ARE EXPECTED TO RAPIDLY INCREASE TO 50 TO 60 MPH BY 12 NOON AND 80 MPH WITH GUSTS TO 100 MPH BY MID AFTERNOON. 75 MPH WINDS WITH HIGHER GUSTS ARE LIKELY AS FAR INLAND AS HUNTSVILLE...NAVASOTA...AND LAKE LIVINGSTON BY LATE AFTERNOON.

BE PREPARED FOR NUMEROUS DOWNED TREES AND WIRES. DO NOT CROSS DOWNED WIRES...WHICH MAY STILL BE LIVE.

$$

TXZ226-227-235-213-200-102200-
WHARTON-FORT BEND-JACKSON-HARRIS-LIBERTY-

...INLAND HURRICANE WARNING...
WINDS FROM WHARTON TO HOUSTON AND LIBERTY ARE EXPECTED TO INCREASE TO 50 TO 60 MPH THIS MORNING AND 90 MPH WITH GUSTS TO NEAR 110 MPH BY MIDDAY...DECREASING TO 50 TO 60 MPH LATE THIS AFTERNOON.

FLYING DEBRIS WILL POSE A MAJOR THREAT TO ALL STRUCTURES IN THE WARNED AREA...ESPECIALLY GLASS FROM HIGH-RISE BUILDINGS IN DOWNTOWN HOUSTON. PEOPLE LIVING IN MOBILE HOMES AND THOSE CONCERNED ABOUT THE ABILITY OF THEIR HOMES TO WITHSTAND HURRICANE WINDS SHOULD MOVE TO A STRONG BUILDING OR SHELTER IMMEDIATELY. BE PREPARED FOR NUMEROUS DOWNED TREES AND WIRES. TAKE SHELTER IN SMALL INTERIOR ROOMS OR REINFORCED STRUCTURES.
$$

Example: Post-Tropical Cyclone Report

ACUS71 KNEW 032226
PSHNEW
POST-TROPICAL CYCLONE REPORT HURRICANE XENIA
NATIONAL WEATHER SERVICE NEW ORLEANS LA
500 PM CDT MON SEP 3 1992

A. HIGHEST WINDS...

NEW ORLEANS INTERNATIONAL AIRPORT...
1 - MINUTE 39 KNOTS FROM 150 DEGREES 0950 UTC AUG 26 1992
PEAK GUST 72 KNOTS FROM 020 DEGREES AT 0728 UTC AUG 26 1992
P92 AMOS LOCATED AT SALT POINT, ST. MARY PARISH 19.5N 91.3W
...ETC

B. LOWEST PRESSURE...

LOWEST PRESSURE NEW ORLEANS INTERNATIONAL AIRPORT - 960.1 MB AT
0805 UTC AUG 26 1992
...ETC

C. RAINFALL...

NEW ORLEANS INTERNATIONAL AIRPORT

STORM TOTAL	5.70 IN.	AUG 25-26 1992
1 HOUR TOTAL	0.89 IN.	0800-0900 UTC 26 AUG 1992

...ETC

D. STORM TIDES...

MARINA	4.28	2100 UTC AUG 26 1992
N END OF CAUSEWAY	4.94	1100 UTC AUG 26 1992

...ETC

E. BEACH EROSION...

LEVEL OF EROSION PRESENTLY UNKNOWN
...ETC

F. FLOODING...

STORM TIDE FLOODING TO THE ENTIRE LOUISIANA COAST FROM LAKE BORGNE WEST TO VERMILION BAY...ETC

G. TORNADOES...

F3 TORNADO FROM LA PLACE TO RESERVE IN ST JOHN THE BAPTIST PARISH...ETC

H. STORM EFFECTS...

TORNADO		2 DEAD	32 INJURED
HURRICANE	4 DEAD	UNKNOWN	2 MISSING

AN ESTIMATED ONE AND ONE QUARTER MILLION PEOPLE EVACUATED ACROSS SOUTHEAST AND SOUTH CENTRAL LOUISIANA...ETC

Appendix B

TROPICAL CYCLONE ASSESSMENT AND WARNING PRODUCT IDENTIFIERS

AREA	WMO	AWIPS
Caribbean	CA	#
North Atlantic and Caribbean	NT	AT
East Pacific	PZ	EP
Central Pacific	PA	CP
West Pacific	PW	WP
North Pacific	PN	#
West North Pacific	PQ	#
South Pacific	PS	#
Indian Ocean	IO	#
South Indian Ocean	XS	#

Issuing Office	WMO CCCC
WFO HFO/CPHC - Honolulu	PHFO
WFO Guam	PGUM
JTWC - Pearl Harbor	PGTW
NHC - Miami	KNHC
HPC - Camp Springs, Maryland	KWNH
NAVPACMETOCCEN - Naval Pacific Metr. And Oceanography Center - Pearl Harbor	PHNC
Offutt AFB	KGWC

PRODUCT TITLES	WMO HEADER	PRODUCT IDENTIFIER (NNNXXX)	NWWS BACKUP HEADERS
Tropical Weather Outlook			
Atlantic Basin	ABNT20 KNHC	TWOAT	NFDTWOAT
Eastern Pacific	ABPZ20 KNHC	TWOEP	NFDTWOEP
Central Pacific	ACPN50 PHFO	TWOCP	MIATWOCP
San Juan - Spanish	ACCA62 TJSJ	TWOSPN	MIATWOSPN
Tropical Weather Discussion			
Atlantic Basin	AXNT20 KNHC	TWDAT	NFDTWDAT
Eastern Pacific	AXPZ20 KNHC	TWDEP	NFDTWDEP

PRODUCT TITLES	WMO HEADER	PRODUCT IDENTIFIER (NNNXXX)	NWWS BACKUP HEADERS
Tropical/Subtropical Cyclone Public Advisory			
Atlantic Basin	WTNT31-35 KNHC	TCPAT1-5	NFDTCPAT1-5
San Juan - Spanish	WTCA41-45 TJSJ	TCPSP1-5	
Eastern Pacific	WTPZ31-35 KNHC	TCPEP1-5	NFDTCPEP1-5
Central Pacific	WTPA31-35 PHFO	TCPCP1-5	MIATCPCP1-5
Western Pacific	WTPQ31-35 PGUM	TCPPQ1-5	N/A
Public Advisory (formally Storm Summary)			
Conterminous US - HPC issued	WTNT31-35 KWNH	TCPAT1-5	
Tropical Cyclone Strike Probabilities			
Atlantic Basin Only	WTNT71-75 KNHC	SPFAT1-5	NFDSPFAT1-5
Tropical/Subtropical Cyclone Forecast/Advisory			
Atlantic Basin	WTNT21-25 KNHC	TCMAT1-5	NFDTCMAT1-5
Eastern Pacific	WTPZ21-25 KNHC	TCMEP1-5	NFDTCMEP1-5
Central Pacific	WTPA21-25 PHFO	TCMCP1-5	MIATCMCP1-5
Tropical Cyclone Discussion			
Atlantic Basin	WTNT41-45 KNHC	TCDAT1-5	NFDTCDAT1-5
Eastern Pacific	WTPZ41-45 KNHC	TCDEP1-5	NFDTCDEP1-5
Central Pacific	WTPA41-45 PHFO	TCDCP1-5	MIATCDCP1-5
Prognostic Reasoning of Warnings for NW Pacific	WDPN31-36 PGTW	N/A	N/A
Tropical Cyclone Position Estimate			
Atlantic Basin	WTNT51-55 KNHC	TCEAT1-5	NFDTCEAT
Eastern Pacific	WTPZ51-55 KNHC	TCEEP1-5	NFDTCEEP
Central Pacific	WTPA51-55 PHFO	TCECP1-5	MIATCECP
Western North Pacific	WTPQ51-55 PGUM	TCEPQ1-5	N/A
Tropical Cyclone Position and Intensity from Satellite Data			
NW Pacific	TPPN10 PGTW	N/A	N/A
SW Pacific	TPPS10 PGTW	N/A	N/A
S central Pacific 120W-160E	TXPS40 PHFO	TCSSP	N/A
N central Pacific 140W-180	TXPN40 PHFO	TCSCP	N/A

PRODUCT TITLES	WMO HEADER	PRODUCT IDENTIFIER (NNNXXX)	NWWS BACKUP HEADERS
N Indian Ocean	TPIO10 PGTW	N/A	N/A
S Indian Ocean	TPXS10 PGTW	N/A	N/A
NW Pacific	TPPN10 KGWC		
SW Pacific	TPPS10 KGWC		
NE Pacific	TPPZ1 KGWC		
North Indian Ocean	TPIO10 KGWC		
South Indian Ocean	TPXS10 KGWC		
Atlantic	TPNT KGWC		
Tropical Cyclone Formation Alert Message			
Issued by JTWC			
Northwest Pacific	WTPN21-25 PGTW	N/A	N/A
Southwest Pacific	WTPS21-25 PGTW	N/A	N/A
North Indian Ocean	WTIO21-25 PGTW	N/A	N/A
South Indian Ocean	WTXS21-25 PGTW	N/A	N/A
Issued by NAVPACMETOCCEN			
Southeast Pacific	WTPS21-25 PHNC	N/A	N/A
Tropical Cyclone Update			
Atlantic Basin	WTNT61-65 KNHC	TCUAT1-5	NFDTCUAT
Eastern Pacific	WTPZ61-65 KNHC	TCUEP1-5	NFDTCUEP
Central Pacific	WTPA61-65 PHFO	TCUCP1-5	MIATCUCP
Tropical Cyclone Warnings			
Northwest Pacific	WTPN31-35 PGTW	TCPWP1-5	N/A
Southwest Pacific	WTPS31-35 PGTW	N/A	N/A
North Indian Ocean	WTIO31-35 PGTW	N/A	N/A
South Indian Ocean	WTXS31-35 PGTW	N/A	N/A
Special Tropical Disturbance Statement			
Atlantic Basin	WONT41 KNHC	DSAAT	NFDDSAAT
Eastern Pacific	WOPZ41 KNHC	DSAEP	NFDDSAEP
Central Pacific	ACPA80 PHFO	DSACP	MIADSACP
Western Pacific	ABPW10 PGTW	N/A	N/A
Indian Ocean	ABIO10 PGTW	N/A	N/A
Tropical Weather Summary			
Atlantic Basin	ABNT30 KNHC	TWSAT	NFDTWSAT
Eastern Pacific	ABPZ30 KNHC	TWSEP	NFDTWSEP
Central Pacific	ACPN60 PHFO	TWSCP	MIATWSCP

PRODUCT TITLES HEADERS	WMO HEADER	PRODUCT IDENTIFIER (NNNXXX)	NWWS BACKUP
Satellite Interpretation Message			
Hawaiian Islands	ATHW40 PHFO	SIMHI	N/A
Satellite-Derived Rainfall			
Eastern Caribbean	TCCA21 KNHC	STDECA	N/A
Central Caribbean	TCCA22 KNHC	STDCCA	N/A
Western Caribbean	TCCA23 KNHC	STDWCA	N/A
Aircraft Reconnaissance Messages Reports-Atlantic Basin			
Routine Report (recco)	URNT10 KNHC	REPNT0	N/A
Tropical Cyclone Report	URNT11 KNHC	REPNT1	N/A
Vortex Data Message	URNT12 KNHC	REPNT2	N/A
Dropsonde Report	UZNT13 KNHC	REPNT3	N/A
Dropsonde Report	UZNT13 KWBC	REPNT3	N/A
Supplemental Vortex data Message	URNT14 KNHC	REPNT4	N/A
Airbourne Expendable Bathythermograph	SOVX81 KNHC	OCDXBT	
MinObs	URNT40 KWBC		
Aircraft Reconnaissance Messages-Pacific Basin			
Routine Report	URPN10 KNHC	REPPN0	N/A
Tropical Cyclone Report	URPN11 KNHC	REPPN1	N/A
Vortex Data Message	URPN12 KNHC	REPPN2	N/A
Dropsonde Report	UZPN13 KNHC	REPPN3	N/A
Dropsonde Report	UZPN13 KWBC	REPPN3	N/A
Supplemental Vortex data Message	URPN14 KNHC	REPPN4	N/A
Summer/Winter Reconnaissance Schedule [Atlantic/Pacific])	NOUS42 KNHC	REPRPD	N/A
Hurricane Local Statement			
Atlantic	WTUS(81-84) KCCC	HLSNNN	N/A
San Juan	WWCA31 TJSJ	HLSSJU	
San Juan (Spanish)	WWCA39 TJSJ	HLSSPN	
Central Pacific (All Hawaiian Islands)	WTHW80 PHFO	HLSHFO	N/A
Western Pacific (Guam)	WTPQ81-85 PGUM	HLSPQ1-5	N/A

PRODUCT TITLES HEADERS	WMO HEADER		PRODUCT IDENTIFIER (NNNXXX)	NWWS BACKUP
South Pacific				
(Pago Pago, American Samoa)	WTZS81-85 NSTU		HLSZS(1-5)	
Tropical Cyclone Objective Guidance Products				
Atlantic Basin	WHXX01 KMIA		CHGHUR	N/A
Pacific Basin	WHXX01 KWBC		CHGE77	N/A
Atlantic Basin	WHXX04 KWBC		CHGQLM	N/A
Aviation Tropical Cyclone Advisory Message				
Atlantic Basin	FKNT21-25 KNHC			
East Pacific	FKPZ21-25 KNHC			
Central Pacific	FKPA21-25 PHFO			
Tropical Cyclone Summary - Fixes				
South Central Pacific 120W - 160E	TXPS40	PHFO	TCSSP	
North Central Pacific 140W - 180	TXPN40	PHFO	TCSCP	

N/A indicates currently none assigned.

Department of Commerce • National Oceanic & Atmospheric Administration • National Weather Service

NATIONAL WEATHER SERVICE INSTRUCTION 10-602
JUNE 8, 2004

Operations and Services
Tropical Cyclone Weather Services Program, NWSPD 10-6

TROPICAL CYCLONE COORDINATION AND EMERGENCY OPERATIONS

NOTICE: This publication is available at: http://www.nws.noaa.gov/directives/.

OPR: OS21 (S. Kiser) **Certified by:** OS21 (T. Pierce)
Type of Issuance: Routine.

SUMMARY OF REVISIONS: This directive supercedes NWSI 10-602, dated June 13, 2003. Title change from Coordination, Backup, and Emergency Operations to Tropical Cyclone Coordination and Emergency Operations. Section 2 deleted. This section now covered by NWSI 10-2201 and instructions in station duty manuals.

Signed by Gregory A. Mandt May 25, 2004
Gregory A. Mandt Date
Director, Office of Climate,
Water, and Weather Services

TABLE OF CONTENTS

1. Coordination.

1.1 Tropical Cyclone Forecasts and Advisories.

1.1.1 Atlantic and U.S. Mainland West Coast. National Hurricane Center (NHC), Ocean Prediction Center (OPC) and Hydrometeorological Prediction Center (HPC) will exchange forecast positions for tropical cyclones. HPC will prepare and coordinate forecast positions four times each day (0200, 0800, 1400, 2000 Coordinated Universal Time [UTC]) for all tropical cyclones with an initial position west of 60°W. OPC will do the same for all tropical cyclones north of 20°N and east of 60°W unless otherwise agreed to by the OPC lead forecaster and the NHC duty hurricane specialist. HPC and NHC will also conduct discussions each day at noon (EDT and EST) to coordinate tropical cyclone positions for days 6 and 7. NHC will provide HPC and OPC with regular 3 hourly map-time positions for use in HPC and OPC surface analysis (0000, 0300, 0600 UTC, etc.).

HPC and OPC will place on its prognostic surface charts NHC's and Central Pacific Hurricane Center's (CPHC) tropical cyclone forecast position out to 120 hours. Unnamed systems forecast to attain tropical storm or hurricane/typhoon strength during the forecast period will have their prognostic positions labeled as a tropical cyclone. For day 3 through 7 charts, HPC will use appropriate tropical cyclone symbols on the day 3 chart, and depict the storm as a low, using the symbol "L" for days 6 through 7. OPC will also depict the storm as a low on their 96-hour surface chart.

NHC, HPC, and WFOs will coordinate the issuance and discontinuance of watches and warnings, storm surge, and other storm parameters. Include HPC's National Precipitation Prediction Unit (NPPU) in coordination calls whenever NHC plans to include quantitative precipitations forecast amounts (usually 24-hour forecasts or less) for the United States mainland in tropical cyclone advisories. Make final coordination calls 1 hour before advisory time. NHC will involve all impacted regional offices, Weather Forecast Offices (WFO), and marine offshore and high seas forecast offices (OPC, Tropical Analysis Forecast Branch [TAFB]) in the coordination call with HPC. NHC will make every effort to coordinate with these offices prior to the conference call, resources permitting, if issuing or canceling watches or warnings.

1.1.2 Pacific. NHC and CPHC will coordinate whenever a tropical cyclone is between 137° and 140° west longitude. In addition, NHC will coordinate with CPHC prior to issuing a forecast/advisory when a system to the east of 140° west is expected to influence/impact Hawaii within the 120 hour forecast period. In the event of a disagreement, the Center issuing the next advisory will make the final decision.

1.2 Other Advisories. NHC and HPC will coordinate on downgrading tropical and subtropical cyclones moving inland. HPC will also coordinate with NHC if there is a reasonable possibility advisories may again be needed. This coordination will take place no later than 90 minutes before HPC's public advisory release time. HPC will coordinate with appropriate River Forecast Centers (RFC) and critical flood support office(s) regarding inland flooding threats.

1.3 Flooding. Tropical Cyclone Centers (NHC and CPHC) will include flood information in their advisories and initiate coordination calls. RFCs and local NWS forecast offices will provide input to their Tropical Cyclone Center regarding flood potential. NPPU products will be consistent with advisory issuing offices. The National Environmental Satellite, Data, and Information Satellite Satellite Analysis Branch will provide satellite estimates of rainfall to NWS offices and the NHC.

1.4 Tornadoes. Storm Prediction Center (SPC) will, for CONUS areas, be the single coordinated voice of the NWS regarding tornado threats and will issue tornado watches as required for areas affected by tropical and subtropical cyclones. SPC should coordinate with NHC and WFOs before issuing a tornado watch. To assist NHC, this coordination should be done about 2 hours before the next scheduled tropical cyclone advisory issuance time if possible. Hurricane Local Statements (HLS) will convey the level of tornadic threat forecast by SPC based upon SPC products. Tropical Cyclone Centers will include appropriate information about tornadoes in their advisories.

1.5 Military Services. The NWS is the basic source of tropical cyclone forecasts for all Department of Defense (DOD) interests in the North Pacific east of 180° and for the North Atlantic as provided by interdepartmental agreements in the National Hurricane Operations Plan (NHOP). If the DOD wish to discuss special problems concerning warnings and forecasts for the Atlantic area, they should contact the NHC Director or the NHC hurricane specialist on duty by telephone. In the Pacific, the NHC Director or the CPHC Director will provide similar services to the military.

1.6 Requesting Geophysical Fluid Dynamics Laboratory (GFDL) Model Guidance. NHC will make the decision to run the GFDL hurricane model for any tropical or subtropical storm in the Atlantic or eastern Pacific Ocean. NHC will forward its requests to the NCEP Central Operations Senior Duty Meteorologist (SDM), and the SDM executes the job run. CPHC makes requests for running the GFDL hurricane model in coordination with NHC.

2. Transfer of Responsibility for Issuing Advisories. When a tropical or subtropical cyclone approaches the line of division between Centers responsible for issuing advisories, the forecaster who is currently handling the storm will:

a. Contact the Center into whose area the storm is moving to plan for transferring responsibility after the issuance of the next advisory. When a tropical cyclone is approaching 180° longitude, CPHC will coordinate with both Regional Specialized Meteorological Center (RSMC) Tokyo (the World Meteorological Organization [WMO] designated tropical cyclone center) and Joint Typhoon Warning Center (JTWC) (the U.S. designated center for U.S. Department of Defense interests in the western Pacific) for transferring responsibilities, and

b. Add a statement to the final advisory as follows:

"THE NEXT ADVISORY ON (storm name) WILL BE ISSUED BY THE (appropriate Tropical Cyclone Center) AT (time in [UTC])."

For CPHC when a tropical cyclone is moving east to west across the International Dateline, THIS IS THE LAST BULLETIN ISSUED BY THE CENTRAL PACIFIC HURRICANE CENTER. THE NEXT BULLETIN WILL BE ISSUED BY THE RSMC TOKYO. FOR U.S. INTERESTS, SEE THE PUBLIC ADVISORIES ISSUED BY THE U.S. NWS FORECAST OFFICE GUAM AND DOD WARNINGS ISSUED BY THE JOINT TYPHOON WARNING CENTER

Include proper communication and WMO message headers used by the gaining Center in the final advisory. HPC will issue storm summaries on a subtropical cyclone or named tropical cyclone which has moved inland when advisories are no longer required. NHC will add to the last advisory an appropriate statement indicating when HPC will begin issuing summaries. NHC will coordinate with HPC to determine the time of issuance of the first storm summary.

3. Emergency Operating Instructions. National Centers and WFOs with primary and backup warning and forecast responsibilities for areas within 300 miles of the Gulf and Atlantic coasts and east or south of the Appalachian ridges, in Hawaii, Puerto Rico, Guam, on the California coast from Point Conception southward, and American Samoa in the South Pacific will prepare and keep an up-to-date local Tropical Cyclone Emergency Operations Plan. The Plan should specify actions to be taken. This includes:

a. What to do before each tropical cyclone season;

b. What to do when a tropical cyclone constitutes a possible threat to its county warning area (CWA);

c. What to do when a tropical storm, hurricane or typhoon watch, or inland tropical storm/hurricane wind watch is issued for its CWA;

d. What to do when a tropical storm, hurricane or typhoon warning, or inland tropical storm/hurricane wind warning is issued for its CWA; and

e. What to do immediately after the tropical cyclone has passed.

3.1 Emergency Warnings Exercises. Conduct practice exercises before the tropical cyclone season each year. Include the word “EXERCISE” at the beginning and end of each community exercise. Also conduct office backup and other appropriate drills.

3.2 Emergency Action When Warning Not Received or Considered Inadequate. When warnings are not received by WFO or are inadequate to cover current or imminent conditions, local NWS forecast offices should issue HLSs or warnings as needed. Whenever possible, the WFO should contact the appropriate Tropical Cyclone Center and its clearance obtained before such action is taken. However, take immediate action if communications failure prevents clearance or if the delay would jeopardize life or property. Notify the appropriate Tropical Cyclone Center as soon as possible.

Department of Commerce • National Oceanic & Atmospheric Administration • National Weather Service

NATIONAL WEATHER SERVICE INSTRUCTION 10-603
JUNE 13, 2003

Operations and Services
Tropical Cyclone Weather Services Program, NWSPD 10-6

NATIONAL HURRICANE CENTER HURRICANE LIAISON TEAM

NOTICE: This publication is available at: http://www.nws.noaa.gov/directives/.

OPR: OS21 (S. Kiser) **Certified by:** OS21 (T. Pierce)
Type of Issuance: Routine.

SUMMARY OF REVISIONS: This directive supercedes NWSI 10-603, dated June 7, 2002. This directive adds wording to the HLT section regarding continued activation should inland flooding be a potential problem - Section 1.2.

Signed by Gregory A. Mandt May 30, 2003
Gregory A. Mandt Date
Director, Office of Climate,
Water, and Weather Services

TABLE OF CONTENTS

1. National Hurricane Center (NHC) Hurricane Liaison Team (HLT).

1.1 National Weather Service (NWS) Responsibilities. The NWS supports the HLT through use of Tropical Prediction Center (TPC) meteorologists, Weather Forecast Office (WFO) personnel (typically warning coordination meteorologists and service hydrologists), and River Forecast Center (RFC) hydrologists. Eastern and Southern Region Headquarters will maintain a list of their available HLT candidates.

1.2 Activation. The HLT may be activated when a tropical cyclone in the Atlantic, Gulf of Mexico, Caribbean or eastern Pacific threatens the United States or its territories, and the Director or Deputy Director of TPC deems HLT assistance is required. TPC makes the request for activation by contacting the Federal Emergency Management Agency (FEMA) Operations Center (FOC). Upon FEMA's approval, the FOC will activate the HLT. The TPC Director or Deputy Director will contact the appropriate NWS Regional Director requesting meteorologic and/or hydrologic support. NWS personnel should arrive at TPC within 24 hours. The HLT will remain active until the hurricane threat has passed, at which time HLT operations will be terminated by FEMA. However, if the storm moves inland, and if significant rainfall is expected, the HLT may remain activated.

If the HLT is deactivated, the Hydrometeorological Prediction Center (HPC) will assume the briefing duties provided the remnants of the tropical cyclone remain a threat to inland areas. TPC and HPC will coordinate prior to the transfer. During the inland event HPC will coordinate with the appropriate WFOs and RFCs and when needed, hydrologists from the RFCs will provide hydrological briefings.

1.3 Training. Completing NWS/FEMA's distance learning training module, Community Hurricane Preparedness, is required by HLT members. The module can be taken via the Internet at: http://meted.ucar.edu/hurrican/chp/index.htm. Other training opportunities are strongly encouraged. They are: FEMA's "Introduction to Hurricane Preparedness" conducted at TPC for emergency mangers and NWS personnel, and FEMA's annual HLT training session held at TPC.

2. Meteorologic Duties. The HLT meteorologist will:

a. Establish and maintain contact with the impacted WFOs, RFCs, and the HPC.

b. Facilitate participation of the impacted NWS offices in conference calls, briefings, and in preparation and distribution of graphics.

c. Provide meteorological interpretations on National Hurricane Center advisories (NHC), WFO hurricane local statements, Hurrevac products, and storm surge forecasts for Federal, state and local agencies on request.

d. Provide storm briefings via video/audio teleconferences for Federal, state and local organizations.

e. Respond to meteorology-related incoming calls from Federal, state, and local emergency managers. Refer callers to the appropriate WFO for responses to localized special questions and issues.

3. Hydrologic Duties. The HLT hydrologist will:

a. Establish and maintain contact with the impacted local WFOs, RFCs, and the HPC.

b. Facilitate participation of the impacted NWS offices in conference calls, briefings, and in preparation and distribution of graphics.

c. Provide hydrologic interpretation on NHC advisories, WFO hurricane local statements, and WFO and RFC hydrologic products for Federal, state and local agencies on request.

d. Provide technical support for RFC lead during hydrologic portion of video teleconference. In absence of the RFC, lead the hydrologic portion of the video teleconference.

e. Respond to hydrology-related incoming calls from Federal, state, and local emergency managers. Refer callers to the appropriate WFO for responses to localized special questions and issues.

Department of Commerce • National Oceanic & Atmospheric Administration • National Weather Service

NATIONAL WEATHER SERVICE MANUAL 10-604
June 8, 2004

Operations and Services
Tropical Cyclone Weather Services Program, NWSPD 10-6

TROPICAL CYCLONE DEFINITIONS

NOTICE: This publication is available at: http://www.nws.noaa.gov/directives/.

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Type of Issuance: Routine.

SUMMARY OF REVISIONS: This directive supercedes NWSI 10-604, dated June 13, 2003. This directive deletes the definitions of "advisory" and "hurricane local statement".

Signed by Gregory A. Mandt May 25, 2004
Gregory A. Mandt Date
Director, Office of Climate,
Water, and Weather Services

DEFINITIONS

Dissipated. Used when the circulation is no longer closed.

Dissipating. Used for weakening tropical depressions which contain minimal and diminishing deep convection with no expectation for recovery.

Extratropical Cyclone. A synoptic scale low pressure system whose primary energy source is baroclinic.

Eye Wall. An organized band of cumulonimbus clouds immediately surrounding the center of the tropical cyclone.

Gale Warning. A warning of 1-minute sustained surface winds in the range 34 knots (39 mph) to 47 knots (54 mph) inclusive, either predicted or occurring not directly associated with tropical cyclones.

High Wind Warning. The high winds described here exclude those directly associated with severe local storms. A high wind warning is required when either of the following occur or are expected to occur in the near term:

- Sustained surface wind speeds (1-minute average) of 35 knots (40 mph) or greater lasting for 1 hour or longer, or

- Sustained winds or gusts of 50 knots (58 mph) or greater for any duration.

Hurricane/Typhoon. A tropical cyclone in which the maximum 1-minute sustained surface wind is 64 knots (74 mph) or greater.

Hurricane/Typhoon Eye. The relatively calm center of the tropical cyclone which is more than half surrounded by an eye wall.

Hurricane/Typhoon Season. The part of the year having a relatively high incidence of tropical cyclones. In the Atlantic, Caribbean, and Gulf of Mexico, and central North Pacific, the hurricane season is the period from June through November; in the eastern Pacific, May 15 through November 30. In the western North Pacific, the typhoon season is from July 1 to December 15. Tropical cyclones can occur year-round in any basin.

Hurricane/Typhoon Warning. A warning when 1-minute sustained surface winds of 64 knots (74 mph) or higher associated with a hurricane or typhoon are expected in a specified coastal area within 24 hours or less. A hurricane or typhoon warning can remain in effect when dangerously high water or a combination of dangerously high water and exceptionally high waves continue even though winds may be less than hurricane or typhoon force.

Hurricane/Typhoon Watch. An announcement for specific coastal areas that hurricane/typhoon conditions are possible within 36 hours, except for 48 hours in the western North Pacific.

Inland Tropical Storm/Hurricane Wind Watch or Warning. Issued when a tropical cyclone is expected to remain at tropical storm or hurricane intensity inland.

Major Hurricane. A hurricane which reaches Category 3 (sustained winds greater than 110 mph) on the Saffir/Simpson Hurricane Scale.

Maximum Sustained Surface Wind. When applied to a particular weather system, refers to the highest one-minute average wind (at an elevation of 10 meters with an unobstructed exposure) associated with that weather system at a particular point in time.

Mean Sea Level (MSL). The arithmetic mean of hourly water elevations observed over a specific 19-year tidal epoch.

Mean Low Water (MLW). The arithmetic mean of the low water heights observed over a specific 19-year tidal epoch.

Mean Lower Low Water (MLLW). The arithmetic mean of the lower low water heights of a mixed tide observed over a specific 19-year tidal epoch. Only the lower low water of each pair of low waters, or the only low water of a tidal day is included in the mean.

National Hurricane Operations Plan (NHOP). The NHOP is issued annually by the Federal Coordinator for Meteorological Services and Supporting Research. It documents interdepartmental agreements relating to tropical cyclone observing, warning, and forecasting services. National Hurricane Center (NHC), Central Pacific Hurricane Center (CPHC), and the JTWC serve as the principal offices in coordinating the day-to-day activities of the NWS in support of the Plan in their region of responsibility.

Probability of Tropical Cyclone Conditions. The probability, in percent, the cyclone center will pass within 50 nautical miles (nm) to the right or 75nm to the left of the listed location within the indicated time period when looking at the coast in the direction of the cyclone's movement. (Simplified to say within 65nm on the strike probabilities product)

Remnant Low. Used for systems no longer having convection required of a tropical cyclone (e.g., the swirls of stratocumulus in the eastern North Pacific)

Saffir/Simpson Hurricane Scale (SSHS). A scale ranging from one to five based on the hurricane's present intensity. This can be used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane. This scale may be used in public hurricane releases although the SSHS may not be applicable for all geographical areas.

In the central North Pacific (Hawaii), this scale cannot be used to provide an estimate of the potential property damage and flooding expected along the coast from a hurricane. This scale can be used in public hurricane releases and in discussions with the media to describe the hurricane’s present intensity. It must be clear it is not appropriate to estimate damage or surge/coastal flood potential. In practice, sustained wind speed (the 1-minute averaged wind at

the 10-meter elevation with an unobstructed exposure) is the parameter which determines the category.

ONE. Winds 74-95 mph. (64-82 kts.) No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.

TWO. Winds 96-110 mph. (83-95 kts.) Some roofing material, door, and window damage of buildings. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected anchorages break moorings.

THREE. Winds 111-130 mph. (96-113 kts.) Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures with larger structures damaged by floating debris. Terrain may be flooded well inland.

FOUR. Winds 131-155 mph. (114-135 kts.) More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.

FIVE. Winds greater than 155 mph. (greater than 135 kts.) Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.

Note: A "major" hurricane is one classified as a Category 3 or higher.

Modified Saffir/Simpson Hurricane Scale (SSHS) for the Western North Pacific.

For Tropical Depression and Tropical Storm:

Maximum sustained Wind (MSW): 30-49 mph (26-43 kt) and peak gusts 40-64 mph (33-56 kt)

Typical Damage - Damage done to only the flimsiest lean-to type structures. Unsecured light signs blown down. Minor damage to banana trees and near-coastal agriculture, primarily from salt spray. Some small dead limbs, ripe coconuts, and dead palm fronds blown down from trees. Some fragile and tender green leaves blown from trees such as papaya and fleshy broad leaf plants.

Coastal Inundation and Wave Action - On windward coasts, sea level rise of less than 2 feet (0.7 m) above normal in open bays and inlets due to storm surge and wind driven waves; breaking waves inside bays can reach 2-3 feet (0.7 - 1.0 m); less than 1 ft (0.3 m) over

reefs. Rough surf at reef margin with moderately strong along-shore currents (rip currents) inside reefs.

MSW: 50 - 73 mph (44-63 kt) and peak gusts 65-94 mph (57-81 kt)

Typical Damage - Minor damage to buildings of light material; major damage to huts made of thatch or loosely attached corrugated sheet metal or plywood. Unattached corrugated sheet metal and plywood may become airborne. Wooden signs not supported with guy wires are blown down. Moderate damage to banana trees, papaya trees, and most fleshy crops. Large dead limbs, ripe coconuts, many dead palm fronds, some green leaves, and small branches are blown from trees.

Coastal Inundation and Wave Action - On windward coasts, sea level rise of 2-4 ft (0.7-1.2 m) above normal in open bays and inlets due to storm surge and wind-driven waves; breaking waves inside bays can reach 4-6 ft (1.2-1.8 m); 1-2 ft (0.3-0.7 m) over reefs. Very rough surf at reef margin with strong along-shore currents (rip currents) inside reefs.

For Typhoon:

MSW: 74-95 mph (64-82 kt) and peak gusts 95-120 mph (82-105 kt)

Typical Damage - Corrugated metal and plywood stripped from poorly constructed or termite-infested structures and may become airborne. A few wooden, non-reinforced power poles tilted, and some rotten power poles broken and their attached lines down. Some damage to poorly constructed, loosely attached signs. Major damage to banana trees, papaya trees, and fleshy crops. Some young trees downed when the ground is saturated. Some palm fronds crimped and bent back through the crown of coconut palms; a few palm fronds torn from the crowns of most types of palm trees; many ripe coconuts blown from coconut palms. Less than 10 percent defoliation of shrubbery and trees; up to 10 percent defoliation of tangantangan. Some small tree limbs downed, especially from large bushy and frail trees such as mango, African tulip, poinciana, etc. Overall damage can be classified as minimal.

Coastal Inundation and Wave Action - On windward coasts, sea level rise of 4-6 ft (1.2-1.8 m) above normal in open bays and inlets due to storm surge and wind-driven waves; breaking waves inside bays can reach 5-7 ft (1.5-2.1 m) above normal; 2-3 ft (0.6-1.0 m) additional water across reef. Wind-driven waves may inundate low-lying coastal roads where reefs are narrow. Minor pier damage. Some small craft in exposed anchorages break moorings.

MSW: 96-110 mph (83-95 kt) and peak gusts 121-139 mph (106-121 kt)

Typical Damage - Several rotten wooden power poles snapped and many non-reinforced wooden power poles tilted. Some secondary power lines downed. Damage to wooden and tin roofs, and doors and windows of termite-infested or rotted wooden structures, but no major damage to well-constructed wooden, sheet metal, or concrete buildings. Considerable damage to structures made of light materials. Major damage to poorly constructed,

attached signs. Exposed banana trees and papaya trees totally destroyed; 10-20 percent defoliation of trees and shrubbery; up to 30 percent defoliation of tangantangan. Light damage to sugar cane and bamboo. Many palm fronds crimped and bent through the crown of coconut palms and several green fronds ripped from palm trees. Some green coconuts blown from trees. Some trees blown down, especially shallow rooted ones such as small acacia, mango and breadfruit when the ground becomes saturated. Overall damage can be classified as moderate.

Coastal Inundation and Wave Action - On windward coasts, sea level rise of 6-8 ft (1.8-2.4 m) above normal in open bays and inlets due to storm surge and wind-driven waves; breaking waves inside bays can reach 7-9 ft (2.1-2.7 m) above normal; water is about 3-5 ft (1.0-1.5 m) above normal across reef flats. Wind-driven waves will inundate low-lying coastal roads below 4 ft (1.2 m) on windward locations where reefs are narrow. Some erosion of beach areas, some moderate pier damage, and some large boats torn from moorings.

MSW: 111-130 mph (96-113 kt) and peak gusts 140-165 mph (122-144 kt)

Typical damage - A few non-reinforced hollow-spun concrete power poles broken or tilted and many non reinforced wooden power poles broken or blown down; many secondary power lines downed. Practically all poorly constructed signs blown down and some stand-alone steel-framed signs bent over. Some roof, window, and door damage to well-built, wooden and metal residences and utility buildings. Extensive damage to wooden structures weakened by termite infestation, wet-and-dry wood rot, and corroded roof straps (hurricane clips). Non-reinforced cinder block walls blown down. Many mobile homes and buildings made of light materials destroyed. Some glass failure due to flying debris, but only minimal glass failure due to pressure forces associated with extreme gusts. Some unsecured construction cranes blown down. Air is full of light projectiles and debris. Major damage to shrubbery and trees; up to 50 percent of palm fronds bent or blown off; numerous ripe and many green coconuts blown off coconut palms; crowns blown off of a few palm trees. Moderate damage to sugar cane and bamboo. Some large trees (palm trees), blown down when the ground becomes saturated; 30-50 percent defoliation of most trees and shrubs; up to 70 percent defoliation of tangantangan. Some very exposed panax, tangantangan, and oleander bent over. Overall damage can be classified as extensive.

Coastal Inundation and Wave Action - On windward coasts, sea level rise of 8-12 ft (2.4-3.7 m) above normal in open bays and inlets due to storm surge and wind-driven waves; breaking waves inside bays can reach 11-14 ft (3.3-4.2 m) above normal; water is about 5-8 ft (1.5-2.4 m) above normal across reef flats. Wind-driven waves will inundate low-lying coastal roads below 7 ft (2.1 m) of elevation on windward locations where reefs are narrow. Considerable beach erosion. Many large boats and some large ships torn from moorings.

MSW: 131-155 mph (114-135 kt) and peak gusts 166-197 mph (145-171 kt)

Typical Damage - Some reinforced hollow-spun concrete and many reinforced wooden power poles blown down; numerous secondary and a few primary power lines downed. Extensive damage to non-concrete roofs; complete failure of many roof structures, window

frames and doors, especially unprotected, non-reinforced ones; many well-built wooden and metal structures severely damaged or destroyed. Considerable glass failures due to flying debris and explosive pressure forces created by extreme wind gusts. Weakly reinforced cinder block walls blown down. Complete disintegration of mobile homes and other structures of lighter materials. Most small and medium-sized steel-framed signs bent over or blown down. Some secured construction cranes and gantry cranes blown down. Some fuel storage tanks may rupture. Air is full of large projectiles and debris. Shrubs and trees 50-90 percent defoliated; up to 100 percent of tangantangan defoliated. Up to 75 percent of palm fronds bent, twisted, or blown off; many crowns stripped from palm trees. Numerous green and virtually all ripe coconuts blown from trees. Severe damage to sugar cane and bamboo. Many large trees blown down (palms, breadfruit, monkeypod, mango, acacia, and Australian pine.) Considerable bark and some pulp removed from trees; most standing trees are void of all but the largest branches (severely pruned), with remaining branches stubby in appearance; numerous trunks and branches are sandblasted. Patches of panax, tangantangan, and oleander bent over or flattened. Overall damage can be classified as extreme.

Coastal Inundation and Wave Action - On windward coasts, sea level rise of 12-18 ft (3.7-5.5 m) above normal in open bays and inlets due to storm surge and wind-driven waves; breaking waves inside bays can reach 15-24 ft (4.5-7.3 m) above normal; water is about 8-12 ft (2.4-3.7 m) above normal across reef flats. Wind-driven waves will inundate coastal areas below 12 ft (3.7 m) elevation. Large boulders carried inland with waves. Severe beach erosion. Severe damage to port facilities including some loading derricks and gantry cranes. Most ships torn from moorings.

MSW: 156-194 mph (136-170 kt) and peak gusts 198-246 mph (172-216 kt)

Typical Damage - Severe damage to some solid concrete power poles, to numerous reinforced hollow-spun concrete power poles, to many steel towers, and to virtually all wooden poles; all secondary power lines and most primary power lines downed. Total failure of non-concrete reinforced roofs. Extensive or total destruction to non-concrete residences and industrial buildings. Some structural damage to concrete structures, especially from large debris, such as cars, large appliances, etc. Extensive glass failure due to impact of flying debris and explosive pressure forces during extreme gusts. Many well-constructed storm shutters ripped from structures. Some fuel storage tanks rupture. Nearly all construction cranes blown down. Air full of very large and heavy projectiles and debris. Shrubs and trees up to 100 percent defoliated; numerous large trees blown down. Up to 100 percent of palm fronds bent, twisted, or blown off; numerous crowns blown from palm trees; virtually all coconuts blown from trees. Most bark and considerable pulp removed from trees. Most standing trees are void of all but the largest branches, which are very stubby in appearance and severely sandblasted. Overall damage can be classified as catastrophic.

Coastal Inundation and Wave Action - On windward coasts, sea level rise of 18 to 30 + ft (5.5 - 9.2 + m) above normal in open bays and inlets due to storm surge and wind-driven waves; breaking waves inside bays can be >30 ft (9.2 m) above normal; water is about 12-20 + ft (3.7-6.1 + m) above normal across reef flats. Serious inundation likely for windward coastal

areas below 18 ft (5.5 m) elevation. Very large boulders carried inland with waves. Extensive beach erosion. Extensive damage to port facilities including most loading derricks and gantry cranes. Virtually all ships, regardless of size, torn from moorings.

Short Term Forecast (NOW). Issued by WFOs at frequent intervals, these products give the short-term status of events and short-term forecasts. When issued every hour or so during active weather, they are effective in conveying timely and sometimes vital information about a potential or existing hazard.

Storm Surge. An abnormal rise in sea level accompanying a tropical cyclone or other intense storm and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the storm. Storm surge is usually estimated by subtracting the normal or astronomical tide from the observed storm tide.

Storm Tide. The actual sea level resulting from the astronomical tide combined with the storm surge.

Storm Warning. A warning of 1-minute sustained surface winds of 48 knots (55 mph) or greater, either predicted or occurring, not directly associated with tropical cyclones.

Subtropical Cyclones. A non-frontal low pressure system having characteristics of both tropical and extratropical cyclones.

1. The most common type is an upper-level cold low with circulation extending to the surface layer and maximum sustained winds generally occurring at a radius of about 100 miles or more from the center. In comparison to tropical cyclones, such systems have a relatively broad zone of maximum winds that is located farther from the center, and typically have a less symmetric wind field and distribution of convection.
2. A second type of subtropical cyclone is a mesoscale low originating in or near a frontolyzing zone of horizontal wind shear, with radius of maximum sustained winds generally less than 30 miles . The entire circulation may initially have a diameter of less than 100 miles. These generally short-lived systems may be either cold core or warm core."

Subtropical Depression. A subtropical cyclone in which the maximum 1-minute sustained surface wind is 33 knots (38 mph) or less.

Subtropical Storm. A subtropical cyclone in which the maximum 1-minute sustained surface wind is 34 knots (39 mph) or more.

Super Typhoon. Typhoon having maximum sustained winds of 130 knots (150 mph) or greater.
Tropical Cyclone. A warm-core, non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters with organized deep convection and a closed surface wind circulation about a well-defined center.

Tropical Depression. A tropical cyclone in which the maximum 1-minute sustained surface wind is 33 knots (38 mph) or less.

Tropical Disturbance. A discrete tropical weather system of apparently organized convection--generally 100 to 300 mi in diameter--originating in the tropics or subtropics, having a nonfrontal migratory character and maintaining its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field.

Tropical Storm. A tropical cyclone in which the maximum 1-minute sustained surface wind ranges from 34 to 63 knots (39 to 73 mph) inclusive.

Tropical Storm Warning. A warning for tropical storm conditions, including 1-minute sustained surface winds within the range 34 to 63 kts (39 to 73 mph) expected in a specified coastal area within 24 hours.

Tropical Storm Watch. An announcement a tropical storm or tropical storm conditions pose a threat to coastal areas within 36 hours, except for the western North Pacific, where conditions may occur within 48 hours. A tropical storm watch should normally not be issued if the tropical cyclone is forecast to attain hurricane strength.

Tropical Wave (formerly known as inverted trough). A trough or cyclonic curvature maximum in the trade wind easterlies. The wave may reach maximum amplitude in the lower middle troposphere or may be the reflection of an upper tropospheric cold low or an equatorward extension of a mid-latitude trough.

Wind Radii. Found in the forecast advisory/products, wind radii is the largest radii of that wind speed found in that quadrant. Quadrants are defined as NE (0-90), SE (90-180), SW (180-270), and NW (270-0). As an example, given maximum 34 knot radii to 150 nm at 0 degrees, 90 at 120 degrees, and 40 nm at 260 degrees, the following line would be carried in the forecast/advisory: 150NE 90SE 40SW 150NW.

OFFICIAL DEFINING POINTS FOR TROPICAL CYCLONE WATCHES AND WARNINGS

La Pesca, MX..	23.76°N	97.78°W
Rio San Fernando, MX	25.00°N	97.60°W
Brownsville, TX		
Brownsville, TX	25.95°N	97.16°W
Port Mansfield, TX	26.59°N	97.29°W
Baffin Bay, TX	27.29°N	97.37°W
Corpus Christi, TX		
Baffin Bay, TX ..	27.29°N	97.37°W
Corpus Christi, TX	27.67°N	97.19°W
Port Aransas, TX	27.83°N	97.08°W
Port O'Connor, TX	28.40°N	96.39°W
Houston, TX		
Port O'Connor, TX	28.40°N	96.39°W
Matagorda, TX	28.63°N	95.93°W
Sargent, TX	28.75°N	95.60°W
Freeport, TX	28.93°N	95.33°W
San Luis Pass, TX	29.08°N	95.13°W
High Island, TX	29.57°N	94.39°W
Lake Charles, LA		
High Island, TX	29.57°N	94.39°W
Sabine Pass, TX	29.71°N	93.85°W
Cameron, LA	29.80°N	93.30°W
Intracoastal City, LA	29.62°N	92.04°W
Morgan City, LA	29.49°N	91.29°W
New Orleans, LA		
Morgan City, LA	29.49°N	91.29°W
Grand Isle, LA	29.25°N	89.96°W
Mouth of Mississippi River, LA	29.12°N	89.11°W
Mouth of Pearl River, LA	30.15°N	89.60°W
Pascagoula, MS	30.37°N	88.55°W
MS/AL Border	30.40°N	88.40°W
Mobile, AL		
MS/AL Border	30.40°N	88.40°W
AL/FL Border.	30.28°N	87.50°W
Fort Walton Beach, FL	30.41°N	86.62°W
Destin, FL	30.39°N	86.50°W
Tallahassee, FL		
Destin, FL	30.39°N	86.50°W
Panama City, FL	30.12°N	85.70°W
Indian Pass, FL	29.68°N	85.27°W
Apalachicola, FL	29.73°N	84.99°W
Ochlockonee River, FL	29.95°N	84.40°W
St. Marks, FL	30.11°N	84.21°W

Aucilla River, FL	30.05°N	83.92°W
Steinhatchee River, FL	29.70°N	83.40°W
Suwannee River, FL	29.30°N	83.17°W

Tampa Bay, FL

Suwannee River, FL	29.30°N	83.17°W
Yankeetown, FL	29.03°N	82.74°W
Bayport, FL	28.54°N	82.65°W
Anclote Key, FL	28.18°N	82.85°W
Tarpon Springs, FL	28.15°N	82.77°W
Anna Maria Island, FL	27.53°N	82.75°W
Longboat Key, FL	27.39°N	82.64°W
Englewood, FL	26.94°N	82.38°W
Boca Grande, FL	26.72°N	82.27°W
Bonita Beach, FL	26.33°N	81.85°W

Miami, FL (Gulf)

Bonita Beach, FL	26.33°N	81.85°W
Chokoloskee, FL	25.80°N	81.36°W
East Cape Sable, FL	25.15°N	81.08°W
Flamingo, FL	25.14°N	80.93°W

Key West, FL (Gulf)

Flamingo, FL	25.14°N	80.93°W
Dry Tortugas, FL	24.66°N	82.86°W
Key West, FL	24.55°N	81.81°W
Seven Mile Bridge, FL	24.70°N	81.15°W
Craig Key, FL	24.83°N	80.77°W
Key Largo, FL	25.09°N	80.44°W
Ocean Reef, FL	25.32°N	80.26°W

Miami, FL (Atlantic)

Ocean Reef, FL	25.32°N	80.26°W
Florida City, FL	25.45°N	80.33°W
Golden Beach, FL	25.97°N	80.12°W
Hallandale Beach, FL	25.99°N	80.13°W
Deerfield Beach, FL	26.32°N	80.10°W
Boca Raton, FL	26.36°N	80.07°W
Jupiter Inlet, FL	26.95°N	80.07°W

Melbourne, FL

Jupiter Inlet, FL	26.95°N	80.07°W
Stuart, FL	27.21°N	80.18°W
Fort Pierce, FL	27.46°N	80.30°W
Vero Beach, FL	27.66°N	80.37°W
Sebastian Inlet, FL	27.84°N	80.43°W
Cocoa Beach, FL	28.32°N	80.61°W
Titusville, FL	28.64°N	80.63°W
New Smyrna Beach, FL	29.03°N	80.89°W
Flagler Beach, FL	29.47°N	81.13°W

Jacksonville, FL

Flagler Beach, FL	29.47°N	81.13°W
St. Augustine, FL	29.89°N	81.31°W
Fernandina Beach, FL	30.66°N	81.45°W
Altamaha Sound, GA	31.30°N	81.29°W

Charleston, SC

Altamaha Sound, GA	31.30°N	81.29°W
Savannah River, GA	32.04°N	80.86°W
Edisto Beach, SC	32.49°N	80.32°W
South Santee River, SC	33.12°N	79.27°W

Wilmington, NC

South Santee River, SC	33.12°N	79.27°W
Murrells Inlet, SC	33.56°N	79.00°W
Little River Inlet, SC	33.85°N	78.55°W
Cape Fear, NC	33.84°N	77.96°W
Surf City, NC	34.44°N	77.50°W

Morehead City, NC

Surf City, NC	34.44°N	77.50°W
New River Inlet, NC	34.53°N	77.34°W
Bogue Inlet, NC	34.64°N	77.11°W
Cape Lookout, NC	34.58°N	76.55°W
Ocracoke Inlet, NC	35.06°N	76.00°W
Cape Hatteras, NC	35.22°N	75.52°W
Oregon Inlet, NC	35.76°N	75.50°W

(The inclusion of Pamlico and Albemarle Sounds should be on a case-by-case basis).

Currituck Beach Light, NC	36.38°N	75.83°W

Wakefield, VA

Currituck Beach Light, NC	36.38°N	75.83°W

(The inclusion of Currituck Sound, NC, should be on a case-by-case basis).

NC/VA Border	36.55°N	75.87°W
Cape Charles Light, VA	37.12°N	75.90°W
Parramore Island, VA	37.52°N	75.63°W
Chincoteague, VA	37.93°N	75.32°W
Chesapeake Bay, New Point Comfort, VA	37.30°N	76.28°W
Chesapeake Bay, Windmill Point, VA	37.61°N	76.28°W
Chesapeake Bay, Smith Point, VA	37.89°N	76.24°W

Sterling, VA

Chesapeake Bay, Smith Point, VA	37.89°N	76.24°W
Tidal Potomac, Cobb Island, MD	38.26°N	76.84°W
Tidal Potomac, Indian Head, MD	38.61°N	77.15°W
Tidal Potomac, Key Bridge, MD	38.89°N	77.07°W
Chesapeake Bay, Drum Point, MD	38.32°N	76.42°W
Chesapeake Bay, North Beach, MD	38.70°N	76.53°W
Chesapeake Bay, Sandy Point, MD	39.02°N	76.40°W
Chesapeake Bay, Pooles Island, MD	39.29°N	76.27°W

Mt. Holly, NJ

Cape Henlopen, DE	38.80°N	75.09°W
Cape May, NJ	38.93°N	74.90°W
Great Egg Inlet, NJ	39.29°N	74.54°W
Little Egg Inlet, NJ	39.49°N	74.31°W
Manasquan Inlet, NJ	40.10°N	74.03°W
Delaware Bay north/south of		
Slaughter Beach, DE to	38.91°N	75.30°W
East Point, NJ	39.19°N	75.02°W
Sandy Hook, NJ	40.46°N	74.00°W

New York City, NY

Sandy Hook, NJ	40.46°N	74.00°W
Fire Island Inlet, LI, NY	40.63°N	73.30°W
Moriches Inlet, LI, NY	40.77°N	72.75°W
Montauk Point, LI, NY	41.07°N	71.86°W
Port Jefferson Harbor, LI, NY	40.95°N	73.08°W
New Haven, CT	41.30°N	72.91°W
Watch Hill, RI	41.31°N	71.86°W

Boston, MA

Watch Hill, RI	41.31°N	71.86°W
Point Judith, RI	41.35°N	71.49°W
Westport, MA	41.45°N	71.20°W
Woods Hole, MA	41.52°N	70.69°W
Chatham, MA	41.66°N	69.95°W
Plymouth, MA	41.98°N	70.65°W
Gloucester, MA	42.57°N	70.66°W
Merrimack River, MA	42.84°N	70.82°W

Portland, ME

Merrimack River, MA	42.84°N	70.82°W
Portsmouth, NH	43.06°N	70.70°W
Portland, ME	43.64°N	70.20°W
Rockland, ME	44.10°N	69.10°W
Stonington, ME	44.16°N	68.67°W

Caribou, ME

Stonington, ME	44.16°N	68.67°W
Bar Harbor, ME	44.39°N	68.20°W
Eastport, ME	44.92°N	67.00°W

San Diego, CA

CA/Mexico Border	32.53°N	117.12°W
San Mateo Point, CA	33.38°N	117.60°W
Orange Co/Los Angeles Co, CA.	33.75°N	118.11°W

Los Angles/Oxnard, CA

Orange Co/Los Angeles Co.,CA	33.75°N	118.11°W
Point Mugu, CA	34.12°N	119.12°W
Point Conception, CA	34.45°N	120.45°W

GEOGRAPHICAL DEFINING POINTS AND PHONETIC PRONUNCIATIONS

Abaco	AB-a-KO
Abreojos	aahbray-oh-hoes
Amalie	a-MAHL-ye
Angel	aan-hel
Anguilla	ang-GWIL-a
Antigua	an-TEE-ga
Arena	aah-ray-nah
Arista	ah-ree-staa
Aruba	ah-ROO-ba
Antilles	an-TILL-leez
Azores	uh-ZOHRZ
Bahia	ba-e-yuh
Ballenas	ba-yaynas
Barahona	ba-ra-HO-na
Barbados	bar-BAY-dohz
Barbuda	bar-BOO-dah
Barra	baa-rra
Barranquilla	Bahr-rahn-KEE-yah
Basse-Terre	baha-TER
Bimini	BIM-I-ni
Bonaire	ba-NAIR
Burros	bhoorroes
Cap Haitien	kahp ah-ee-SYAN
Caracas	kah-RAH-kahs
Cardenas	car-denaass
Caribbean	kar-a-BE-an
Castries	KAS-tree
Cayman	kay-MAHN
Champerico	chaam-per-e-coe
Charlotte	
Colima	coleema
Corrientes	cor-re-ehn-tays
Cozumel	koh-soo-MEL
Curacao	koor-a-SOH
Cuyutlan	coo-yootlaan
Dominica	dom-I-NEE-ka
Eleuthera	el-OO-thera
Escondido	es-cond-dee-dow
Eugenia	ayuh-hen-yuh
Exuma	ek-SOO-ma
Flores	FLO-rish
Fort de France	for-de-FRAHCS
Galera	gaa-lehra
Grenada	gre-NAY-dah
Guadaloupe	GWAH-deh-loop
Guasave	gwaa-saa-ve
Guaymas	gwhy-maahs
Huatulco	whaa-tool-coe
Islas	eeslas
Jalisco	ha-lee-sco
Juanico	whaa-nee-coe
Lazaro	laasa-roe
Loreto	lo-ae-toe
Leeward	LEE-werd
Manzanillo	manza-nee-oh
Maracaibo	mar-a-KYE-boh
Maracay	mah-rah-KYE
Marigot	ma-ree-GOH
Mateo	muh-ta-yo
Mayaguez	may-yah-GWAYS
Medano	may-daa-no
Melaque	may-laa-kay
Merida	MAY-re-thah
Mochis	mo-chees
Montego	mon-TEE-go
Montserrat	mont-se-RAT
Mugu	muhgu
Mulege	moo-lay-hay
Nicaragua	nik-a-RAH-gwah
Ocho Rios	OH-cho REE-os
Oranjestad	o-RAHN-yuh-stat
Paramaribo	par-a-MAR-I-boh
Parguera	par-GWER-a

Penasco	pen-yaas-co
Pointe-a-Pitre	pwan-ta-PEE-tr
Ponce	PON-sa
Port-au-Prince	port-oh-PRINS
Punta	poota
Revillagigedo	ray-veeaheehaydo
Saba	SAH-ba
Sao Miguel	soun ME-gel
Sipacate	see-paa-caa-tay
St Croix	ST croy
St Lucia	ST LOO-she-a
Soufriere	soo-free-AR
Surinam	SOOR-I-nam
Tampico	tam-PEE-ko
Tehuantepec	te-whaan-te-pec
Tela	TAY-lah
Tobago	to-BAY-go
Todos	todohs
Tomas	tow-maas
Tonala	ton-aahla
Tosca	toesca
Vallarta	vah-yar-ta
Yavaros	yaa-vaa-roce
Yucatan	yoo-ka-TAN
Zihuatanejo	zeeh-whaa-tanay-ho

TROPICAL CYCLONE NAMES AND PRONUNCIATION GUIDE

ATLANTIC

2005		2006		2007	
ARLENE		ALBERTO	al-BAIR-toe	ANDREA	
BRET		BERYL	BER-ril	BARRY	
CINDY		CHRIS		CHANTAL	shan-TAHL
DENNIS		DEBBY		DEAN	
EMILY		ERNESTO	er-NES-toe	ERIN	AIR-in
FRANKLIN		FLORENCE		FELIX	FEEL-ix
GERT		GORDON		GABRIELLE	ga-bree-EL
HARVEY		HELENE	he-LEEN	HUMBERTO	oom-BAIR-to
IRENE		ISAAC	EYE-zak	INGRID	
JOSE	ho-ZAY	JOYCE		JERRY	
KATRINA	ka-TREE-na	KIRK		KAREN	
LEE		LESLIE		LORENZO	
MARIA	ma-REE-ah	MICHAEL	MIKE-el	MELISSA	
NATE		NADINE	nay-DEEN	NOEL	
OPHELIA	o-FEEL-ya	OSCAR		OLGA	
PHILIPPE	fe-leep	PATTY		PABLO	PA-blow
RITA		RAFAEL	ra-fa-EL	REBEKAH	
STAN		SANDY		SEBASTIEN	say-BAS-tyan
TAMMY		TONY		TANYA	TAHN-ya
VINCE		VALERIE		VAN	
WILMA		WILLIAM		WENDY	

2008		2009		2010	
ARTHUR		ANA		ALEX	
BERTHA	BUR-tha	BILL		BONNIE	
CRISTOBAL		CLAUDETTE	claw-DET	COLIN	
DOLLY		DANNY		DANIELLE	dan-YELL
EDOUARD	eh-DWARD	ERIKA	ERR-ree-ka	EARL	
FAY		FRED		FIONA	
GUSTAV		GRACE		GASTON	
HANNA		HENRI	ahn-REE	HERMINE	her-MEEN
IKE		IDA		IGOR	
JOSEPHINE	JO-ze-feen	JOAQUIN		JULIA	
KYLE		KATE		KARL	
LAURA		LARRY		LISA	LEE-sa
MARCO		MINDY		MATTHEW	
NANA		NICHOLAS	NIK-o-las	NICOLE	ni-COLE
OMAR		ODETTE	o-DET	OTTO	
PALOMA	pa-LOW-ma	PETER		PAULA	
RENE	re-NAY	ROSE		RICHARD	RICH-erd
SALLY		SAM		SHARY	SHA-ree
TEDDY		TERESA	te-REE-sa	TOMAS	to-MAS
VICKY		VICTOR	VIC-ter	VIRGINIE	vir-JIN-ee
WILFRED		WANDA		WALTER	

EASTERN PACIFIC

2005		2006		2007	
ADRIAN		ALETTA	a LET ah	ALVIN	
BEATRIZ	BEE a triz	BUD		BARBARA	
CALVIN		CARLOTTA		COSME	COS may
DORA		DANIEL		DALILA	
EUGENE		EMILIA	ee MILL ya	ERICK	
FERNANDA	fer NAN dah	FABIO	FAH bee o	FLOSSIE	
GREG		GILMA	GIL mah	GIL	
HILARY		HECTOR		HENRIETTE	hen ree ETT
IRWIN		ILEANA	ill ay AH nah	IVO	
JOVA	Ho vah	JOHN		JULIETTE	
KENNETH		KRISTY		KIKO	KEE ko
LIDIA		LANE		LORENA	low RAY na
MAX		MIRIAM		MANUEL	mahn WELL
NORMA		NORMAN		NARDA	
OTIS		OLIVIA		OCTAVE	AHK tave
PILAR		PAUL		PRISCILLA	
RAMON	rah MONE	ROSA		RAYMOND	
SELMA		SERGIO	SIR gee oh	SONIA	SONE yah
TODD		TARA		TICO	TEE koh
VERONICA		VICENTE	vee CEN tay	VELMA	
WILEY		WILLA		WALLIS	
XINA	ZEE nah	XAVIER	ZAY vier	XINA	ZEE nah
YORK		YOLANDA	yo LAHN da	YORK	
ZELDA	ZEL dah	ZEKE		ZELDA	ZEL dah

2008		2009		2010	
ALMA	AL mah	ANDRES	ahn DRASE	AGATHA	
BORIS		BLANCA	BLAHN kah	BLAS	
CRISTINA		CARLOS		CELIA	
DOUGLAS		DOLORES		DARBY	
ELIDA	ELL ee dah	ENRIQUE	anh REE kay	ESTELLE	
FAUSTO	FOW sto	FELICIA	fa LEE sha	FRANK	
GENEVIEVE		GUILLERMO	gee YER mo	GEORGETTE	
HERNAN	her NAHN	HILDA		HOWARD	
ISELLE	ee SELL	IGNACIO	eeg NAH cio	ISIS	
JULIO	HOO lee o	JIMENA	he MAY na	JAVIER	
KARINA		KEVIN		KAY	
LOWELL		LINDA		LESTER	
MARIE		MARTY		MADELINE	
NORBERT		NORA		NEWTON	
ODILE	oh DEAL	OLAF	OH lahf	ORLENE	
POLO		PATRICIA		PAINE	
RACHEL		RICK		ROSLYN	
SIMON		SANDRA		SEYMOUR	
TRUDY		TERRY		TINA	
VANCE		VIVIAN		VIRGIL	
WINNIE		WALDO		WINIFRED	
XAVIER	ZAY vier	XINA	ZEE nah	XAVIER	
YOLANDA	yo LAHN da	YORK		YOLANDA	yo LAHN da
ZEKE		ZELDA	ZEL dah	ZEKE	

TROPICAL CYCLONE NAMES AND PRONUNCIATION GUIDES

CENTRAL PACIFIC

LIST 1	
AKONI	ah-KOH-nee
EMA	EH-mah
HANA	HAH-nah
IO	EE-oo
KELI	KEH-lee
LALA	LAH-lah
MOKE	MOH-keh
NELE	NEH-leh
OKA	OH-kah
PEKE	PEH-keh
ULEKI	oo-LEH-kee
WILA	VEE-lah

LIST 2	
AKA	AH-kah
EKEKA	eh-KEH-kak
HALI	HAH-lee
IOLANA	ee-OH-lah-nah
KEONI	keh-ON-nee
LI	LEE
MELE	MEH-leh
NONA	NOH-nah
OLIWA	oh-LEE-vah
PAKA	PAH-kah
UPANA	oo-PAH-nah
WENE	WEH-neh

LIST 3	
ALIKA	ah-LEE-kah
ELE	EH-leh
HUKO	HOO-koh
IOKE	ee-OH-keh
KIKA	KEE-kah
LANA	LAH-nah
MAKA	MAH-kah
NEKI	NEH-kee
OLEKA	oh-LEH-kah
PENI	PEH-nee
ULIA	oo-LEE-ah
WALI	WAH-lee

LIST 4	
ANA	AH-nah
ELA	EH-lah
HALOLA	hah-LOH-lah
IUNE	ee-OO-neh
KIMO	KEE-moh
LOKE	LOH-keh
MALIA	mah-LEE-ah
NIALA	nee-AH-lah
OKO	OH-koh
PALI	PAH-lee
ULIKA	oo-LEE-kah
WALAKA	wah-LAH-kah

NOTE: Use Column 1 list of names until exhausted before going to Column 2, etc. All letters in the Hawaiian language are pronounced, including double or triple vowels.

INTERNATIONAL TROPICAL CYCLONE NAMES FOR THE

NORTHWEST PACIFIC AND SOUTH CHINA SEA

Contributor	I	II	III	IV	V
	NAME	NAME	NAME	NAME	NAME
Cambodia	Damrey	Kong-rey	Nakri	Krovanh	Sarika
China	Longwang	Yutu	Fengshen	Dujuan	Haima
DPR Korea	Kirogi	Toraji	Kalmaegi	Maemi	Meari
HK, China	Kai-tak	Man-yi	Fung-wong	Choi-wan	Ma-on
Japan	Tembin	Usagi	Kammuri	Koppu	Tokage
Lao PDR	Bolaven	Pabuk	Phanfone	Ketsana	Nock-ten
Macau	Chanchu	Wutip	Vongfong	Parma	Muifa
Malaysia	Jelawat	Sepat	Nuri	Melor	Merbok
Micronesia	Ewiniar	Fitow	Sinlaku	Nepartak	Nanmadol
Philippines	Bilis	Danas	Hagupit	Lupit	Talas
RO Korea	Kaemi	Nari	Changmi	Sudal	Noru
Thailand	Prapiroon	Wipha	Mekkhala	Nida	Kulap
U.S.A.	Maria	Francisco	Higos	Omais	Roke
Viet Nam	Saomai	Lekima	Bavi	Conson	Sonca
Cambodia	Bopha	Krosa	Maysak	Chanthu	Nesat
China	Wukong	Haiyan	Haishen	Dianmu	Haitang
DPR Korea	Sonamu	Podul	Pongsona	Mindulle	Nalgae
HK, China	Shanshan	Lingling	Yanyan	Tingting	Banyan
Japan	Yagi	Kajiki	Kujira	Kompasu	Washi
Lao PDR	Xangsane	Faxai	Chan-hom	Namtheun	Matsa
Macau	Bebinca	Peipan	Linfa	Malou	Sanvu
Malaysia	Rumbia	Tapah	Nangka	Meranti	Mawar
Micronesia	Soulik	Mitag	Soudelor	Rananim	Guchol
Philippines	Cimaron	Hagibis	Molave	Malakas	Talim
RO Korea	Chebi	Noguri	Koni	Megi	Nabi
Thailand	Durian	Rammasun	Morakot	Chaba	Khanun
U.S.A.	Utor	Matmo	Etau	Aere	Vicente
Viet Nam	Trami	Halong	Vamco	Songda	Saola

NOTE: Names will be assigned in rotation starting with DAMREY for the first tropical cyclone of the year which is of storm strength or greater. When the last name in column five (SAOLA) is used the sequence will begin again with the first name in column one (DAMREY).

U.S. House of Representatives
Committee on Natural Resources
Washington, DC 20515

May 2, 2013

Dr. Kathryn Sullivan
Acting Under Secretary of Commerce
For Oceans and Atmosphere and NOAA Administrator
National Oceanic and Atmospheric Administration
1401 Constitution Avenue, NW
Room 5128
Washington, DC 20230

Dear Dr. Sullivan:

Thank you for appearing before the Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs oversight hearing on Thursday, April 18, 2013 to present testimony on the "*Spending for the National Oceanic and Atmospheric Administration, the Council on Environmental Quality, the Office of Insular Affairs, the U.S. Fish and Wildlife Service and the President's Fiscal Year 2014 Budget Request for these Agencies*."

Your testimony was extremely helpful in defining the Committee's understanding of the issue and I appreciate the effort you took to prepare and present your testimony. While many questions were asked during the hearing, the Committee has additional questions, attached, for your reply.

Please forward your responses to Dave Whaley, Legislative Staff for the Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs, at Dave.Whaley@mail.house.gov by no later than Friday, May 31, 2013.

Once again, thank you for your extensive effort in making this a valuable hearing.

Sincerely,

John Fleming, M.D.
Chairman
Subcommittee on Fisheries, Wildlife, Oceans
and Insular Affairs

Enclosure

Questions for the Record for the Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs Oversight Hearing on the FY 2014 Budget Requests for CEQ, NOAA, FWS, OIA

National Oceanic and Atmospheric Administration

Questions for the record for Dr. Fleming (R-LA)

* NOAA currently funds two scholarship programs that were created by appropriators and are permanently funded through a mandatory set-aside of a percentage of the NOAA or the National Marine Sanctuary budget. Does NOAA support permanently appropriated programs that are funded through such a mandatory annual assessment? If so, would NOAA support such a mandatory percentage of their budget to be put toward activities like cooperative research or fishery surveys?

* The Department of Defense is attempting to transfer the cost of the Ocean Research Advisory Panel (ORAP) - a multi-agency advisory panel that reports to the National Ocean Council - to NOAA. NOAA apparently agreed to fund the Ocean Research Advisory Panel (ORAP) in the future. Where will the $200,000 to $300,000 per year to fund this advisory panel come from? What in this budget are you going to cut to cover this cost? If this is an advisory panel that reports to the National Ocean Council, would it be more appropriate for CEQ to pay for this and request funding through their budget request?

* NOAA currently has a policy that prohibits the use of the Fisheries Finance Program for any vessel construction due to concerns about overcapitalization. Yet some fisheries are now requiring full utilization and concerns about energy consumption and safety issues are making some fishermen consider new vessel construction. Why is NOAA hindering new fishery vessel construction?

* The FY 2014 budget assumes $131 million transfer from USDA under the Saltonstall-Kennedy Program. How does NOAA use that money currently? As you are probably aware, there have been several legislative proposals to mandate other uses of that money. If any of those bills were to pass, how would NOAA fund the programs that are currently funded by S/K money?

* The FY 2014 budget request includes more than $28 million for the National Catch Share Program. What is this funding to be used for given that NOAA is collecting management fees from existing catch shares? Is this entire amount to be used to support the creation of new catch share programs? Are there any catch share programs that have been adopted by a Council but not yet implemented? If so, please provide information on what fisheries are affected and in what region.

* What funding level was obligated for Cooperative Research in FY 2012 and FY 2013? Please provide information on each project funded during these two years including – the fishery or fisheries involved in the research, what type of platform was used, the level and type of involvement of commercial or recreational fishermen, and the results of the research.

* The FY 2014 budget request includes $12 million for Cooperative Research (an increase of $2 million). Can you tell us what in fisheries you are planning on doing cooperative research in FY 2014? Have you already worked with fishermen in those fisheries to put together a plan of how many vessels you will need and the estimated costs for the research in each of those fisheries?

* Included in the NOAA budget request is an increase of approximately $6 million for "annual stock assessments and improving data collection activities" and an increase of $3 million for "Survey and Monitoring Projects". How will these increases be prioritized? How much of this increased funding will go for new fishery surveys for fisheries which have not been surveyed within the last five years? Will that increase bring us up to date so that all major fisheries in the U.S. will have had a survey within the last five years? Can you tell us whether red snapper in the Southeast or the Gulf of Mexico will be surveyed in FY 2014?

* Please provide information detailing how many scientists at the Southeast Science Center are working on red snapper stock assessments for the South Atlantic fishery and what kind of scientific work they are doing (and when the work begin). Please also provide the data used in your models used to keep the red snapper fishery closed. Please provide the Southeast Science Center's budget for the past five years concerning all aspects of the Center. Please provide details on funding for red snapper research off Florida for the last five years. Please also provide detailed information on the level of funding used for foreign travel by the Southeast Science Center.

* Please provide an estimate of the funding required to enforce the closure of the red snapper fishery in both the Gulf and the South Atlantic.

* At a previous budget hearing, some Members of this Committee were surprised to learn that the Assistant Administrator for Fisheries did not have any control over the fishery survey vessel funding. How do you determine how many days at sea the fishery research vessels will be doing fishery surveys in each of the regions? Can you tell us how many days each of the fishery survey vessels is expected to be doing fishery surveys in FY 2014 under this budget request? Can you tell us the projected number of days at sea these NOAA vessels will be conducting fishery surveys in FY 2013?

* The OMAO Fleet Characteristics website seems to indicate that the *Miller/Freeman* is an active fishery survey vessel, yet another page on their website says that it has been decommissioned. Can you tell us the status of the *Miller/Freeman* and whether it will be available for fishery surveys in FY 2013 or FY 2014?

* Does NOAA contract out for any of its fishery surveys? If so, please provide details.

* You note in your testimony that in FY 2014, you intend to complete the last of your new fishery research vessels. I do not see any budget request for that purpose. Can you give us more information on the budget impact of this vessel completion and tell us where that final fishery research vessel will be home ported?

* At a recent hearing, a witness noted that many commercial fishing vessels (primarily on the West Coast and Alaska) have acoustic equipment that is as good as NOAA's equipment. Has NOAA attempted to get commercial fishing vessels to do acoustic surveys to enhance NOAA's data?

* What has NOAA done since the news report of thousands of red snapper killed by the removal of decommissioned oil platforms in the Gulf to minimize this source of mortality? Can you tell us how many rigs or platforms were removed using explosives during the past year? Can you tell us how many DOI will require to be removed in FY 2013?

* In your written testimony, you note that the budget request includes $43.6 million for observers, but then you go on to say that this funding is apparently only available for fisheries currently managed under a catch share or transitioning to a catch share. Why is this funding only available for catch share fisheries in place? Does NOAA not feel any need to fund observers in non-catch share fisheries? What specific fisheries will this funding be used to provide Federally-funded observers and how was this decision made?

* Has NOAA requested any funding in this budget request for fisheries disaster assistance? If not, why not?

* As you know, the current groundfish fishery restrictions in the Aleutian Islands are estimated to cost the U.S. fishing industry more than $50 million per year (by your own agency's estimates). In addition, those restrictions have cost the U.S. industry an important market niche for cod that they will not be able to regain. How much is included in the FY 2014 budget request for Steller sea lion research in the Aleutian Islands? Will this include any funding for tagging? Will this include any cooperative research or research done from commercial fishing vessels?

* Your testimony notes that satellites are being used to designate critical habitat for endangered species by tracking migratory patterns and identifying feeding and breeding patterns. Can you tell us what endangered species in particular NOAA is using satellites to track?

* NOAA currently funds a number of satellite programs. How many of these satellites are primarily for weather observations and how many are primarily for climate observations?

* For FY 2014, NOAA is requesting $824 million for the Joint Polar Satellite System and $954 million for the Geostationary System-R. Both of these programs required significant funding in FY 2012. Did both of these programs receive significant funding in FY 2013 and how much for each? Is this funding for R&D, construction, launching, or actual use of the satellite? What will be the total construction, launch, maintenance, and use of each of the NOAA satellite programs?

* What is the average lifespan of a NOAA satellite (and in particular, the JPSS satellite)?

* What is the Polar Free Flyer and why is this a new request this year?

* Your testimony mentions a joint NOAA/NASA Suomi National Polar-orbiting Partnership satellite. Was this totally funded by NOAA and if so what was the total cost of this satellite? If not, what other agencies provided funding? How does the Suomi polar satellite differ from the Polar Orbiting Systems (POES) and the joint Polar Satellite System (JPSS)?

* How many agencies use the information from these satellites or have sensor equipment on these satellites? Do any other agencies which are using the information from these satellites provide funding for the construction or operations of the satellites?

* NOAA received $111 million for a "weather satellite data mitigation gap reserve fund" in the Sandy Disaster Assistance Supplemental Appropriations bill. This sounds suspiciously like a slush fund for NOAA weather satellite activities outside the regular appropriations process. Did NOAA request this money? If so, why? What is NOAA using this money for?

* The budget chart for the National Ocean Service was modified for fiscal year 2014 to show fewer budget line items. Can you confirm that the lack of a line item, for example for mapping and charting base and shoreline mapping, does not mean these items will go unfunded? Can you also provide information on how the line items that were shown in the fiscal year 2013 budget will be funded under in fiscal year 2014?

* Constituents continually tell the Committee that mapping and charting funding for contract services are underfunded and underutilized by NOAA. The Hydrographic Service Review Panel recommended NOAA maintain its necessary operational core activities and contract the remainder of surveys. NOAA accepted and implemented this recommendation. Can you provide the Committee with what NOAA considers to be core activities for it hydrographic survey operations? Can you also provide the same information for shore line mapping, aerial surveys and any other activities that are shared between NOAA and outside contractors?

* Can NOAA provide the committee with information on the time it takes for hydrographic survey contractors to get a NOAA contract and the time it takes to renew a contract? Provide the committee with specific time frames of contracts it has approved.

* The Hydrographic Services Review Panel recommended a new cost comparison report comparing NOAA and outside contractor costs. The concerns with the completed report are it uses estimates and not actual costs. What is hindering a new cost comparison study between NOAA's fleet of ships and planes and outside contractors to get a more accurate depiction of costs?

* How much funding does NOAA put toward supporting digital coast activities in fiscal year 2014? Since there isn't a specific line item for this activity, is the 2014 funding level consistent with past funding, an increase or decrease?

* What activities will be funded with the increase of $11 million for the Sea Grant program?

* What activities will be funded with the increase of $5 million for the ocean exploration and research line item?

* Your statement references an increase of $34.5 million for ocean observations. Can you provide the committee with what this increase will go toward?

* The National Ocean Policy Implementation Plan also advocates for the reactivation of the National Marine Sanctuary Site Evaluation List. The Plan also states that "This list is a public process tool for evaluating marine areas that may be considered for national marine sanctuaries in a transparent and public way." Yet at the same time, a proposed rule has been published that would do an end run on the Site Evaluation List and allow NOAA to create sanctuaries based on recommendations from anyone and without any criteria and without concern for the availability of funding - as required under the current Act. Please explain the thinking behind these two proposals.

* The Implementation Plan includes actions such as completing "a marine fish habitat assessment" which sounds great, but if it takes funding away from other existing priorities such as stock surveys and assessments, you are going to further alienate commercial and recreational fishermen. As we have discussed at previous hearings, the data collection activities conducted by NOAA are inadequate and those inadequacies are having a negative economic effect on our coastal communities. Meeting these new National Ocean Policy "action" requirements is likely to take staff and funding away from current activities and will further erode our data collection abilities – and further hurt coastal communities. Please provide for the Committee a list of all action items in the Implementation Plan which would be NOAA's responsibility to implement and an estimate of the costs involved and where those funds will come from.

* Section 6(b) of Executive Order 13547 that established the National Ocean Policy in July 2010 requires "[e]ach executive department, agency, and office that is required to take actions under this order shall prepare and make publicly available an annual report including a concise description of actions taken by the agency in the previous calendar year to implement the order, a description of written comments by persons or organizations regarding the agency's compliance with this order, and the agency's response to such comments." Pursuant to this requirement, has NOAA prepared ay such reports for calendar years 2010, 2011, or 2012? If so, please describe the findings and contents of such reports, and provide copies to the Committee within 10 days. If not, why has NOAA not complied with this provision of the Executive Order?

* The Northeast Regional Planning Body has already been established and met a couple of times, and the National Ocean Council has designated NOAA as the federal lead for it. NOAA apparently is responsible for providing resources and support to that effort. Can you tell us how much money and staff NOAA has already had to devote to setting up and hosting meetings of the Northeast Regional Planning Body? Have any outside groups provided funding for these meetings? If so, provide the name of the organization, the amount of funding provided, the uses of that outside funding, and the statutory authority that allows for the co-mingling of public and private funding for meetings convened by federal agencies.

* Do you know who is paying for participants (both federal and non-federal) to travel to attend meetings of the regional planning bodies? Is this coming from NOAA, other agencies, or states or outside groups?

* It appears that a group called the Meridian Institute was involved in facilitating some of these regional planning meetings. Do you know how much the Meridian Institute is being paid, and is this coming from NOAA's budget? Please provide detailed information.

* Do you see any conflict of interest in having the Meridian Institute facilitate these meetings and workshops when they have themselves submitted comments on the draft implementation plan last year and have been vocal supporters of the National Ocean Policy?

* An invitation-only meeting - apparently co-hosted by the Mid-Atlantic Regional Ocean Planning Workshop and Federal agencies - was recently held to advance ocean planning in the Mid-Atlantic region. Did NOAA provide any funding for this meeting? Are you aware that 41 Federal employees attended this meeting? Please provide the Committee with the amount NOAA provided for this meeting and what travel and/or lodging costs were paid for NOAA employees to attend.

Questions for the record for Chairman Hastings (R-WA)

* One of the issues that came up at the budget hearing for the Bureau of Reclamation on Tuesday was its practice of including money in surveys sent to gauge public awareness or support for Bureau projects. Please provide a list of all surveys issued by NOAA or any of its sub-agencies in FY 2012 and to date in FY 2013 that used financial incentives as an inducement to respond to the survey instrument. For all such surveys, please describe the total cost of the financial incentives for each survey instrument, as well as the amount, kind, and frequency of financial incentive offered to each respondent. For surveys administered by a third-party vendor, please also identify the contractor and provide the total dollar amount of the contract under which the survey was performed and explain whether the costs associated with the financial incentives were included in the total contract amount.

* At the budget hearing, I asked Mr. Schwaab if NOAA Fisheries had reviewed the Nez Perce Tribe's study on the Johnson Creek hatchery that challenges the theory that hatchery and "wild" fish should not interact (see: http://www.critfc.org/press/new-science-shows-that-hatcheries-rebuild-abundant-salmon-populations/). Please provide NOAA's written views on this significant scientific study and how NOAA intends to integrate this new science in the Columbia River.

* As you know, the National Marine Fisheries Service has listed 28 sub-populations of salmon and steelhead as threatened or endangered under the Endangered Species Act, including 13 populations in the Columbia and Snake Rivers. More than a decade ago, in 2002, NOAA released "interim" numerical goals for salmon in the Columbia and Snake basins. Has NOAA ever finalized the numerical goals by subbasin for listed Columbia and Snake basins? If so,

please provide this information. If not, please state NOAA's plans for finalizing numerical goals for listed salmon runs in the Columbia Basin.

* Please provide the most recent statistics for commercial, recreational, and tribal harvest exploitation for ESA-listed Columbia and Snake River salmon by population. Are these sanctioned by the current FCRPS Biological Opinion?

* On April 30, 2013, the National Academy of Sciences issued a 126-page report titled "*Assessing Risks to Endangered and Threatened Species from Pesticides.*" The report states that the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, as agencies responsible for implementing the Endangered Species Act, have no formal protocols to define "best data available," and that this leads to conflicts with the Environmental Protection Agency and a lack of credibility of the Services' assessments relating to pesticides and listed species. In addition, the report indicates that the Services have not adequately evaluated data input in to their own models that significantly alters the outcome as to how pesticides might impact species. The report also states that the Services' models do not now, but should measure survival impacts of pesticides to entire populations of species, not just the survival impact of a single species. And, the report notes that the Services' current risk assessments are not scientifically defensible to assess risks to listed species posed by pesticides. Given these significant findings by a neutral scientific panel, will NOAA re-initiate consultation on its biological opinions for pesticides?

* Recently, the Pacific Fishery Management Council and the Governor of American Samoa and others wrote to NOAA in opposition to its proposed November 2012 listing of 66 separate coral species on the Endangered Species Act. I understand that the listing proposal is connected to NOAA's negotiation of a stipulated settlement in 2011 with the Center for Biological Diversity, and filed in the federal District Court for the Northern District of California. Please provide a copy of the stipulated settlement for the Committee to be able to review the terms and provisions of that settlement. Please also provide all data that supports that each of the coral species is declining and warrants a listing.

* Recently, NOAA determined to separate the Atlantic sturgeon into 5 "distinct population segments" and listed them under the Endangered Species Act. Recent information suggests that Atlantic sturgeon at our impressive levels. Please provide numerical goals set by NOAA at the time of listing for each of these distinct population segments and the number NOAA determines is needed for them to be removed from the ESA list.

<u>Questions for the record for Congressman Southerland (R-FL)</u>

* According to NOAA's budget summary for FY 2013, the budget line for Educational Partnership Program/Minority Serving Institutions (EPP/MSI) ($12.561 million) under the NOAA Education Program was being consolidated with the Competitive Education Grants and Programs (PPA) and then blended into the NOAA Education Base Program ($5.029 million). Now that the FY2014 NOAA budget for FY 2014 has been released, the budget line covering EPP/MSI has no program changes but there is no FY 2014 request, which confirms the consolidation. The Competitive Education Grants and Programs (PPA) has now been renamed to

the Office of Education with a request of $16.271 million of which $12.637 million came from the EPP/MSI Program. Whenever funds are blended with other funds, it becomes difficult to ensure funding allocations are being spent as intended, thus protected.

* Since this program impacts 18 different universities and 4 lead institutions to my knowledge, one of which is in my district, I would like to understand why and how this decision was made?

* Why weren't the lead institutions, who have long and distinguished relationships with NOAA consulted before the decision was made?

* How much is currently in the account for EPP/MSI?

* How can I be assured that the integrity of EPP/MSI will be upheld?

Questions for the record for Mr. Markey (D-MA)

- During the hearing, Representative Bordallo asked about the limited enforcement capacity to address I.U.U. fishing. Mr. Eric Schwaab responded that I.U.U. was an important issue, and there was a modest investment in the enforcement program as well as for observation and monitoring. We would further ask whether the additional authorities provided by the proposed bill, H.R. 69, would help NOAA stretch its dollars further to address this problem.

- A great deal has been said about the National Ocean Policy, and some have conflated it with the existing Regional Ocean Councils created by President George W. Bush and administered by NOAA. Can you please briefly describe the ways in which these Councils have helped localities and regions, and how this budget proposes to continue that good work?

- NOAA has requested an increase of $11.5 million the Integrated Ocean Observing System. Can you please describe the benefits this System provides to coastal communities and the maritime economy?

- NOAA's proposed budget would significantly increase funding for fisheries observer programs, but the percentage of fisheries covered would remain largely unchanged. Isn't there a more cost-effective way to do monitoring given the technology we have today? What progress is NOAA making toward incorporating electronic monitoring options for fishermen?

- Recently, the Fish and Wildlife Service has found that Candidate Conservation Agreements and other cooperative strategies have been effective at protecting vulnerable species without listing them under the Endangered Species Act, especially in situations where there is little data available. Does this budget promote the use of those tools, and will they be considered as options for any of the coral species recently proposed for listing?

Questions for the record for Mr. Runyan (R-NJ)

- Does NMFS plan on conducting a stock assessment for Summer Flounder this year? It's my understanding that this has been delayed for several years. This is an extremely economically

important fish to New Jersey fishermen. The New Jersey fishing industry was crushed by Hurricane Sandy and can't afford another year of uncertainty and abundantly cautious decision making regarding one of its most valuable resources.

- Many believe that excessive litigation has diverted NOAA's already limited resources to defending itself in court as opposed to the actual work of trying to recover species. How much of NOAA's budget is allocated for litigation in FY14' and how much is budgeted for actual species recovery?

- According to NOAA only 27 species that have been designated as threatened, endangered, or depleted are expected to have stable or increasing population levels in FY 13 or 14. In 2012 that number was 29. Can you explain why this number has decreased and do you believe that funds currently being used on litigation can be better used to help increase this number?

Questions for the record for Mr. Costa (D-CA)

- I understand the challenging budgetary conditions through which NOAA must navigate while still fulfilling its mission. With that being said, I have a concern related to the fiscal year 2014 budget before us today. This relates to the staffing for a timely review of the Bay Delta Conservation Plan environmental documents. It is my understanding that the State of California intends to have the draft plan to the federal partners in mid to late May, at which point the timely publishing of the environmental documents will be dependent on sufficient staffing at your agency amongst others. Based on this budget request, will you have the ability to meet the review schedule proposed by the State for the environmental documents?
- As you know, NOAA Fisheries has historically made use of funds provided by other agencies to provide appropriate staffing levels to complete timely review of projects. There are concerns that this may need to occur again in order to review the BDCP in a timely manner. Does NOAA Fisheries anticipate having to acquire funds from any other federal agencies for their work on BDCP?
- If so, what agencies are anticipated to provide funding and is this funding level included in their respective Fiscal Year 2014 budget requests?

U.S. House of Representatives
Committee on Natural Resources
Washington, DC 20515

March 29, 2013

Dr. Kathryn Sullivan
Acting Under Secretary of Commerce
For Oceans and Atmosphere and NOAA Administrator
National Oceanic and Atmospheric Administration
1401 Constitution Avenue, NW
Room 5128
Washington, DC 20230

Dear Dr. Sullivan:

I am writing to thank you for appearing before the Committee on Natural Resources oversight hearing on Wednesday, March 13, 2013 to present testimony on the "*Reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act.*"

Your testimony was extremely helpful in defining the Committee's understanding of the issue and I appreciate the effort you took to prepare and present your testimony. While many questions were asked during the hearing, the Committee has additional questions, attached, for your reply.

Please forward your responses to Harry F. Burroughs, Staff Director, Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs, 1324 Longworth House Office Building, Washington, D.C. 20515 by no later than Thursday, April 15, 2013.

Once again, thank you for your extensive effort in making this a valuable hearing.

Sincerely,

Doc Hastings
Chairman
Committee on Natural Resources

Enclosure

Follow-up Questions
Full Committee Oversight Hearing
Reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act
March 13, 2013, 10:00 a.m.

Mr. Sam Rauch, National Marine Fisheries Service

* Mr. Jones, in his testimony, notes that "the science center in the southeast does not allow stakeholders or the council, to review their sampling protocols which determine what science makes the list of 'best available data.'" Can you explain why the science center is resistant to outside review? How could the Magnuson-Stevens Act be modified to require better transparency?

* In cases like the South Atlantic red snapper fishery - which has been closed for most of the last three years - how will a new stock assessment come up with different results when there is no new fishery dependent data and there is no new survey data? Will the dated nature of the survey information require even greater buffers?

* You note that progress on fisheries management has been due to the fishing fleets and their "commitment to science based management". You also note that "uncertainty in the stock assessments upon which annual catch limits are based should not be used as a basis for exempting fisheries from annual catch limits." Unfortunately, what we hear from many in the fishing industry is that data is very poor for many important fisheries and that because the data is poor, NOAA is being overly precautionary in setting harvest levels. There is also a perception that NOAA is not committed to obtaining better science in some of those data poor fisheries and is happy to remain overly precautionary. Can you comment?

* Several of today's witnesses note that the balance between "preventing overfishing" and "achieving optimum yield" is tilting significantly toward "preventing overfishing". Is this just a perception or has the agency made a determination that preventing overfishing is the more important of the two goals?

* In your testimony, you note that the scallop fishery has seen significant benefits from being rebuilt with revenues increasing "five-fold". You note that this fishery is one of 32 that have been rebuilt. Please provide economic information on each of the other rebuilt fisheries including revenues generated from the fishery prior to being rebuilt and annually since being declared rebuilt.

* The Alaska small-boat halibut fleet is about to be required to carry observers under a new data collection program for that fishery. When the fleet participated in designing this program, an integral part of the program was electronic monitoring. Now that the program is about to be implemented, there is no electronic monitoring component. Why is that?

* I am told that observer coverage in the North Pacific halibut fishery is likely to cost $1000/day. Yet in other fisheries, I am told the observer costs for other fisheries are estimated to be closer to $300/day. Why is there such a discrepancy?

* One of the concerns with the West Coast catch share program is the ever increasing cost of data collection - including observer costs - and the increasing burden that the industry is being required to shoulder. Why are the costs of this fishery under a catch share so much higher than under the previous management system?

* While NOAA notes the successes in the West Coast Groundfish IFQ plan, it does not acknowledge that a significant amount of commercial species allocated quotas are being left in the water - including English sole, lingcod and Dover sole. Why are these species remaining uncaught or under-harvested under the new IFQ plan?

* Electronic monitoring could certainly be helpful for data collection purposes if the technology is affordable enough to be used on more vessels than could be covered using human observers. Could NOAA provide specifications for what this technology should include so that private industry could develop the actual electronic monitoring technology?

* Your testimony notes that 200,000 jobs were created "in the midst of the severe economic issues". Could you provide more information on which regions, which sectors of the fishing industry, and, if possible, in which fisheries these additional jobs were created?

* Fisheries stock assessments are the key to marine resource management. It has come to my attention that NOAA may not be placing a high enough priority on conducting robust, peer-reviewed stock assessments on fisheries in the Gulf of Mexico. While I have heard that NOAA plans to place more emphasis on these assessments moving forward, I'd like to understand more specifically where you intend to focus these efforts in the coming year.

* Can you explain the process NOAA uses to prioritize stock assessments?

* Section 312(a) of the Magnuson Stevens Act states that the Secretary of Commerce has the authority to determine when a commercial fishery failure has occurred and to make funds available to help restore fisheries affected by the disaster. As you know, the oyster fishery in Apalachicola Bay is experiencing an unprecedented decline in oyster production as a result of severe and prolonged drought conditions and a lack of freshwater. In September, I called on the Dept. of Commerce to issue a fishery disaster declaration for our oyster community – yet this request is still pending. Meanwhile, resource assessments indicate oyster populations are down 85% and harvests are down 80%. Can you tell me how we can work through this reauthorization to streamline the fishery disaster declaration process so it is more effective? Florida's fishermen cannot hold out much longer and we need some clarity on whether help is or is not on the way.

Questions
The Honorable Peter DeFazio
Oversight hearing on Magnuson-Stevens Fishery Conservation and Management Act
March 13, 2013

Panel II

Sam Rauch, Deputy Assistant Administrator for Regulatory Programs, NOAA

1) Mr. Rauch: Last Congress I worked with Rep. Mike Thompson to introduce bipartisan legislation that would require the Secretary of Commerce to refinance the West Coast buyback loan. This year I am working with Rep. Huffman and Rep. Don Young on a similar bill. We don't need to go into all of the details since we haven't introduced a bill yet – which we plan on doing soon. **But do you support refinancing the loan and can I get your commitment to work with this bipartisan group to move forward on a bill that can pass Congress and get the support of the administration**?

2) I am hoping you can provide me with an update on the West Coast catch share **observer program**. Since the catch share program was implemented NOAA has provided some assistance to the fishing fleet to help cover the cost of the having observes on board for every trip. **Can you tell me how much of the observer costs NOAA will cover this year? Will those costs be impacted by budget sequestration?**

3) I think you would agree that we need to lower operating costs for the West Coast fishing fleet. Fishermen are currently facing the impending cost recovery provisions of the catch share program estimated to be 3% of landings. They have the annual payments for the buyback loan – which I am working to reduce. They are paying landing taxes in all three states. In addition, fishermen are paying a portion of observer costs – which currently run about $425/day. All of this is on top of fixed costs of a fishing vessel like fuel, crew, maintenance, etc. One way that I have talked about reducing operation costs is to utilize readily available technology instead of putting observers on every boat for every trip. **Can you provide me with an update on what NMFS is doing to replace observers with electronic monitoring?**

4) As you know the Pacific Council is now in the process of discussing and adopting dozens of "trailing amendments" and regulatory fixes to the catch share

program. My understanding is that some of these amendments have been passed through the Council process with industry support – such as season start dates, gear regulations and quota pounds transfers. **But the amendments haven't been implemented. Why not?**

5) As I mentioned, there are dozens of proposed amendments. **Has NFMS done any kind of analysis on costs associated with each trailing amendment? And has NMFS given any thought to how or when each trailing amendment will be implemented in a way that minimizes economic harm to the fleet and coastal communities? For example, does it make sense to wait one or two years to implement the most expensive changes to the program until the fishery is even more successful and the fleet has more resources?**

The following questions from Ms. Bordallo are for Mr. Rauch of Panel 2.

1. The EEZ of Guam and the other US territories is vast and situated in one of the most ecologically diverse places on earth. As such, stock assessments can be challenging and costly. I would like to know what funds may be available to strengthen the science behind our stock assessments? There is a concern on Guam that adequate funding has not been made available to do adequate science-based assessments.

2. The Magnuson Act has many facets that were not discussed today but affect many of the island territories. For example, the Act calls for Fishery Disaster Assistance in the case of natural disasters. The last major typhoon in Guam and the Tsunami in American Samoa are recent examples. What is the status of developing a disaster assistance template and protocols to seek relief for impacted fisheries?

3. What is the status of assessments for the turtle populations in the Pacific Islands Area? Will cultural aspects of traditional harvest be addressed in any such assessment? I recognize that the underlying law may not specifically require consideration of cultural heritage or tradition but this is a matter of great sensitivity to the people of Guam and other island populations.

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U.S. DEPARTMENT OF COMMERCE/ National Oceanic and Atmospheric Administration

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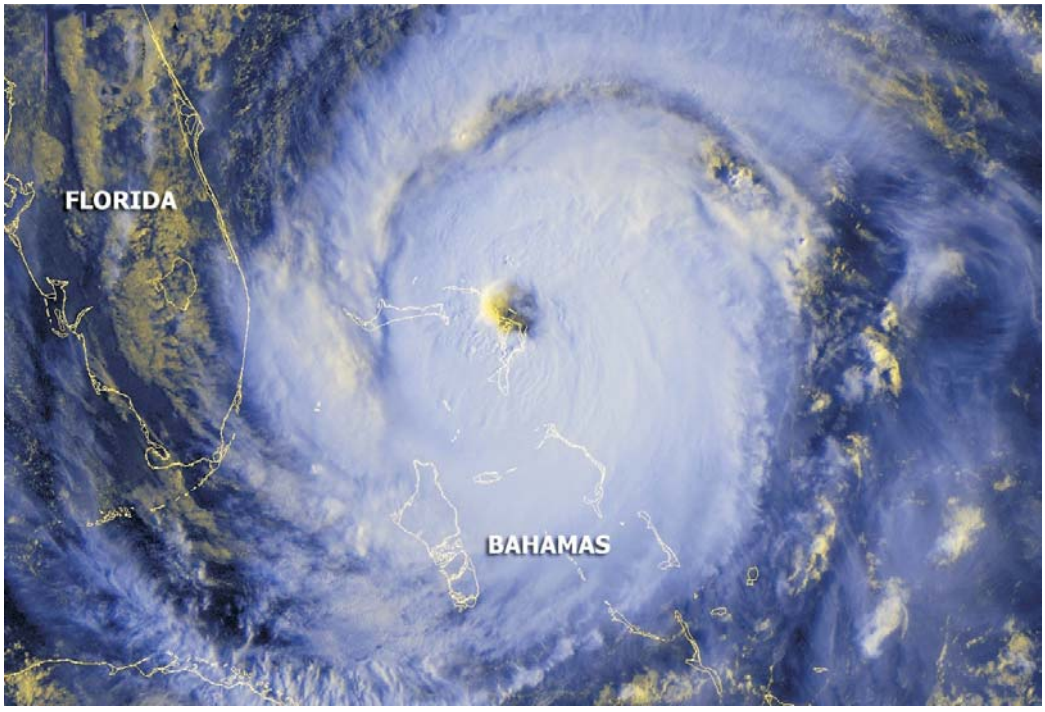
OFFICE OF THE FEDERAL COORDINATOR FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

National Hurricane Operations Plan

FCM-P12-2005



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NATIONAL HURRICANE OPERATIONS PLAN

FCM-P12-2005

Washington, D.C.
May 2005

CHANGE AND REVIEW LOG

Use this page to record changes and notices of reviews.

Change Number	Page Numbers	Date Posted	Initial
1			
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Review Date	Comments	Initial

FOREWORD

The Interdepartmental Hurricane Conference (IHC) is sponsored annually by the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) to provide a forum for the responsible Federal agencies, together with representatives from the user communities like emergency management, to review the Nation's hurricane forecast and warning program and to make recommendations on how to improve the program in the future. The major objective is to plan and prepare for the upcoming hurricane season. The 59th IHC was held in Jacksonville, Florida, March 7-11, 2005, and the new procedures, procedural changes, and agreements reached at the conference were incorporated into this publication—the 43rd edition of the *National Hurricane Operations Plan* (NHOP).

At the 59th IHC, the Working Group for Hurricane and Winter Storms Operations and Research (WG/HWSOR) addressed 13 action items. Of the 13, 6 will be closed through incorporation into the NHOP as approved recommendations and/or changes. Two of the items were informational in nature, and one was withdrawn. The action items will be published on the OFCM web site at www.ofcm.gov.

This edition includes a number of minor revisions and changes to Chapter 3, *General Operations and Procedures of the National Weather Service Hurricane Centers*, and Chapter 5, *Aircraft Reconnaissance*. Chapter 6, *Satellite Reconnaissance*, and Appendix A, *Local National Weather Service (NWS) Office Products*, were substantially updated, and the breakpoints for California were added to Appendix B.

For the state of Florida, the 2004 Atlantic tropical cyclone season was a season to remember. Two major hurricanes (Charley and Jeanne) hit Florida for the first time since 1950, with a third hurricane (Frances) making landfall in Florida and a fourth (Ivan) in Alabama, just west of the northern Panhandle. Hurricane Frances prompted the largest evacuation in Florida history, and Frances and Ivan each produced over 100 tornadoes in the U.S. Of the season's 15 tropical or subtropical storms, 9 became hurricanes, and 6 became major hurricanes. A record eight tropical storms formed during the month of August. Hurricanes Charley, Frances, Gaston, Ivan, and Jeanne made landfall in the U.S.—the most hurricane landfalls since 1985. The death toll for the season was over 3100, primarily due to the effects of Jeanne in Haiti; there were 60 direct deaths in the U.S. The unadjusted property damage in the U.S. is estimated to be near $45 billion—the costliest hurricane season on record for the U.S. The bottom line, however, is that forecast track errors were at record lows, and our multiagency tropical cyclone warning support system superbly responded to a very challenging season—a tribute to the professionalism, dedication, and cooperation of the civilian and military agencies involved.

Samuel P. Williamson
Federal Coordinator for Meteorological
Services and Supporting Research

NATIONAL HURRICANE OPERATIONS PLAN

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CHAPTER 1

INTRODUCTION

1.1. General. The tropical cyclone warning service is an interdepartmental effort to provide the United States and designated international recipients with forecasts, warnings, and assessments concerning tropical and subtropical weather systems. The National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce (DOC) is responsible for providing forecasts and warnings for the Atlantic and Eastern and Central Pacific Oceans while the Department of Defense (DOD) provides the same services for the Western Pacific and Indian Ocean (see Figure 1-1). NOAA, along with other Federal agencies such as the U.S. Navy and the National Aeronautics and Space Administration (NASA), also conducts supporting research efforts to improve tropical cyclone warning services. The bottom line--this interdepartmental cooperation achieves economy and efficiency in the provision of the tropical cyclone warning services to the Nation. The *National Hurricane Operations Plan* provides the basis for implementing agreements reached at the Interdepartmental Hurricane Conference (IHC), which is sponsored annually by the Office of the Federal Coordinator for Meteorological Services and Supporting Research. The goal of the IHC is to bring together the responsible Federal agencies to achieve agreement on items of mutual concern related to tropical cyclone warning services for the Atlantic and Pacific Oceans.

1.2. Scope. The procedures and agreements contained herein apply to the Atlantic Ocean, Gulf of Mexico, Caribbean Sea, and the Pacific Ocean. The plan defines the role of the individual agencies participating in the tropical cyclone warning service when more than one agency is involved in the delivery of service in any specific area. When a single agency is involved in any specific area, that agency's procedures should be contained in internal documents and, to the extent possible, be consistent with NHOP practices and procedures. Please note that under the National Weather Service Modernization Plan, the former National Hurricane Center (NHC) was incorporated into the Tropical Prediction Center (TPC), one of the seven service-oriented centers and two central support activities that comprise the National Centers for Environmental Prediction (NCEP)--formerly the National Meteorological Center. The tropical cyclone warning mission still resides with the NHC (Hurricane Specialist Unit), which is a major component of the TPC. For completeness, the NHC will be referred to as TPC/NHC throughout the document.

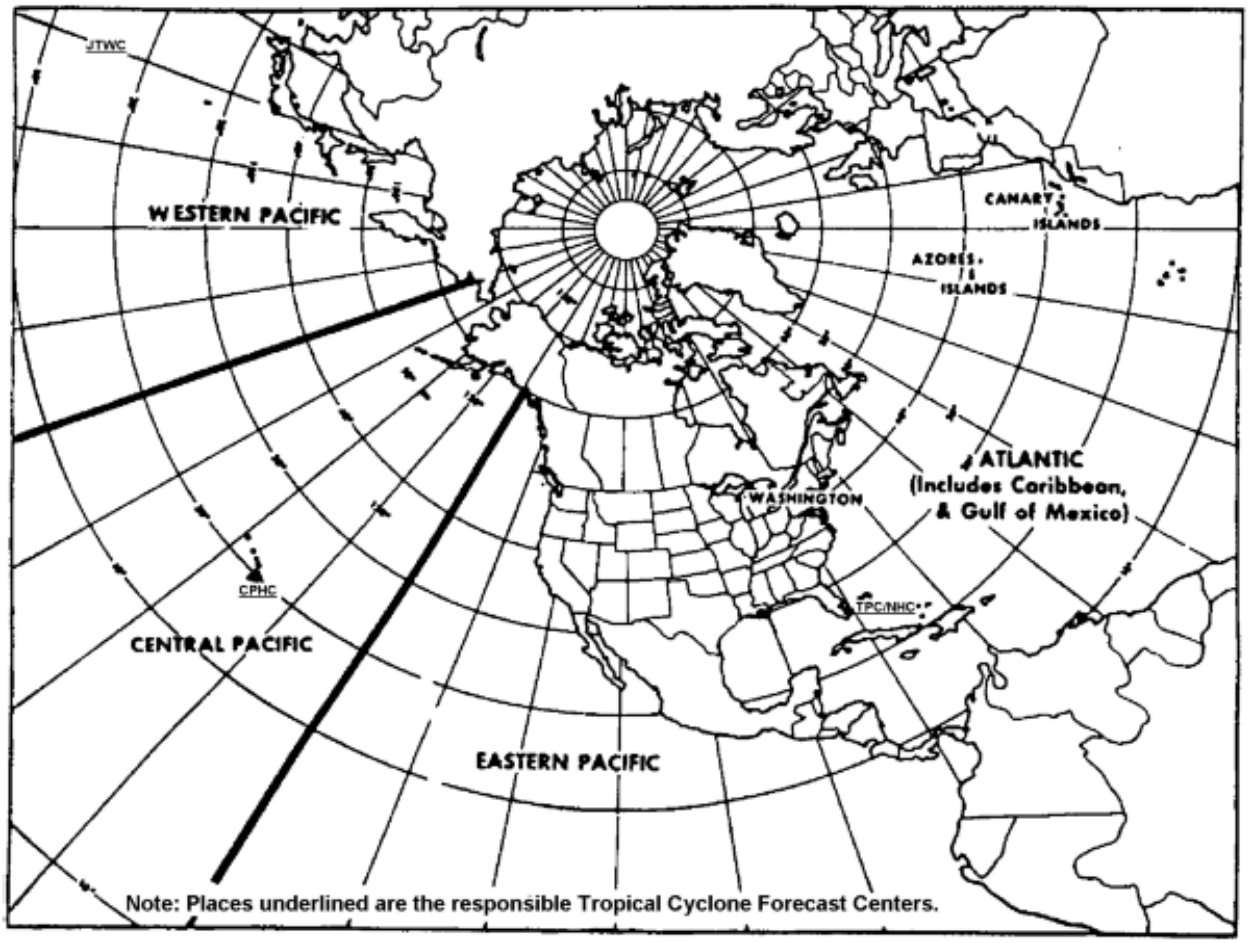

Figure 1-1. Tropical cyclone forecast centers' areas of responsibility

Note: While the Joint Typhoon Warning Center (JTWC) has physically moved to Pearl Harbor, Hawaii, its area of responsibility remains unchanged.

CHAPTER 2

RESPONSIBILITIES OF COOPERATING FEDERAL AGENCIES

2.1. General. The Department of Commerce (DOC), through the National Oceanic and Atmospheric Administration (NOAA), is charged with the overall responsibility to implement a responsive, effective national tropical cyclone warning service. Many local, state, and Federal agencies play a vital role in this system; their cooperative efforts help ensure that necessary preparedness actions are taken to minimize loss of life and destruction of property. The joint participation by the Department of Defense (DOD) and the Department of Transportation (DOT) with the DOC brings to bear those limited and expensive Federal resources considered essential for storm detection and accurate forecasting. This cooperative effort has proven to be a cost-effective, highly responsive endeavor to meet national requirements for tropical cyclone warning information.

2.2. DOC Responsibilities.

2.2.1. Forecast and Warning Services. The DOC will provide timely dissemination of forecasts, warnings, and all significant information regarding tropical and subtropical cyclones to the appropriate agencies, marine and aviation interests, and the general public.

2.2.2. Support to DOD. Through NOAA's National Weather Service (NWS), the DOC will:

- Consult, as necessary, with the DOD regarding their day-to-day requirements for forecast/advisory services and attempt to meet these requirements within the capabilities of the tropical cyclone warning service.

- Provide, through the Tropical Prediction Center/National Hurricane Center (TPC/NHC), the coordinated DOC requirements for weather reconnaissance and other meteorological data to be acquired by the DOD on tropical or subtropical cyclones and disturbances.

- Provide facilities, administrative support, and the means to disseminate meteorological data for the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH) as agreed to by the DOC and DOD.

- Provide the DOD with basic meteorological information, warnings, forecasts, and associated prognostic reasoning concerning location, intensity, and forecast movement of tropical and subtropical cyclones in the following maritime areas, including the adjacent states and possessions of the United States:

< Atlantic Ocean (north of the equator including the Caribbean Sea and Gulf of Mexico). Advisories are the responsibility of the Director, TPC/NHC, Miami, FL. The TPC/NHC will consult with the Naval Atlantic Meteorology and Oceanography Center (NAVLANTMETOCCEN), Norfolk, VA, prior to issuing initial and final advisories and prior to issuing any advisory that indicates a significant change in forecast of intensity or track from the previous advisory. Exchange of information is encouraged on subsequent warnings when significant changes are made or otherwise required.

< Eastern Pacific Ocean (north of the equator and east of 140EW). Advisories are the responsibility of the Director, TPC/NHC, Miami, FL. The TPC/NHC will consult with the Joint Typhoon Warning Center (JTWC), Pearl Harbor, HI, prior to issuing initial and final advisories and prior to issuing any advisory that indicates a significant change in forecast of intensity or track from the previous advisory. Exchange of information is encouraged on subsequent warnings when significant changes are made or otherwise required.

< Central Pacific Ocean (north of the equator between 140EW and 180E). Advisories are the responsibility of the Director, Central Pacific Hurricane Center (CPHC), Honolulu, HI. The CPHC will consult with JTWC prior to issuing initial and final advisories and prior to issuing any advisory that indicates a significant change in forecast of intensity or track from the previous advisory. Exchange of information is encouraged on subsequent warnings when significant changes are made or otherwise required.

< West Pacific Ocean (Guam and Micronesia). Public advisories are prepared by the NWS Forecast Office, Tiyan, Guam, using the tropical cyclone forecasts/advisories prepared by JTWC.

2.2.3. Post Analysis of Tropical Cyclones. The DOC, through NWS, will conduct an annual post analysis for all tropical cyclones in the Atlantic and the Pacific regions east of 180E and prepare an annual hurricane report for issue to interested agencies.

2.2.4. Environmental Satellite Systems. The National Environmental Satellite, Data, and Information Service (NESDIS) will:

- Operate DOC environmental satellite systems capable of providing coverage of meteorological conditions in the tropics during the tropical cyclone season, and monitor and interpret DOC satellite imagery.

- Obtain, as necessary, National Aeronautics and Space Administration (NASA) research and development satellite data and Defense Meteorological Satellite

Program (DMSP) data for NWS operational use and to comply with TPC/NHC and CPHC satellite data requirements.

- Provide, resources permitting, surveillance support with fixes and/or intensity estimates to the Joint Typhoon Warning Center (JTWC), TPC/NHC, and CPHC through analysis of all available satellite imagery.

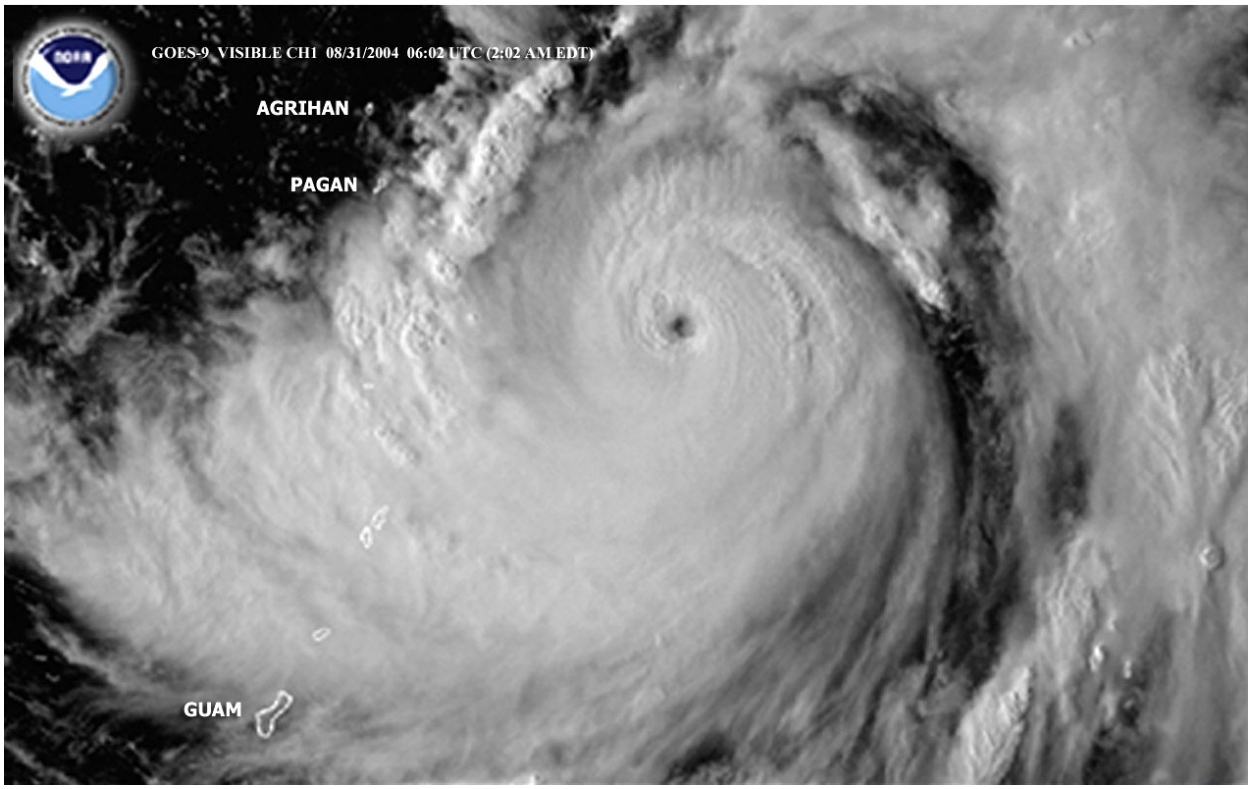

Figure 2-1. Typhoon Songda, August 31, 2004

2.2.5. Data Buoy Systems. Through the National Data Buoy Center (NDBC), the DOC will, subject to available funding, develop, deploy, and operate environmental data buoy systems and automated coastal stations to support the data requirements of TPC/NHC and CPHC.

2.2.6. Weather Reconnaissance. Through the NOAA Office of Marine and Aviation Operations (OMAO), DOC will provide weather reconnaissance flights, including synoptic surveillance, as specified in Chapter 5, unless relieved of these responsibilities by the Administrator of NOAA.

2.3. DOD Responsibilities. The DOD will:

- Disseminate significant meteorological information on tropical and subtropical cyclones to the NWS in a timely manner.

- Provide TPC/NHC and CPHC current DOD requirements for tropical and subtropical cyclone advisories.

- Meet DOC requirements for aircraft reconnaissance and other special observations as agreed to by DOD and DOC (see Appendix F).

- Provide at TPC/NHC a 24-hour aircraft operations interface--Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH).

- Designate CARCAH as the liaison to TPC/NHC. CARCAH will serve as TPC/NHC's point of contact to request special DOD observations in support of this plan; i.e., DMSP fixes, additional upper-air observations, etc.

- Provide weather reconnaissance data monitor services to evaluate and disseminate reconnaissance reports.

- Provide, resources permitting, through the Air Force Weather Agency (AFWA), Offutt AFB, NE, and the 17th Operational Weather Squadron Meteorological Satellite (MetSat) Operations Flight (17 OWS/WXJ), Joint Typhoon Warning Center, Pearl Harbor, HI, surveillance support with fixes and or intensity and gale-wind estimates to all United States tropical cyclone warning agencies through analysis of satellite imagery obtained primarily from the DMSP system. AFWA support will typically be worldwide, while the JTWC MetSat Operations Flight support focuses on the Indian Ocean and the Central, South, and Northwest Pacific Ocean.

- Western Pacific Ocean (north of the equator): Provide NWS with basic meteorological information, forecasts, and associated prognostic reasoning, concerning location, intensity and forecast movement of tropical cyclones for the Northwest Pacific west of 180^{o}. JTWC will consult with the NWS Forecast Office (NWSFO), Tiyan, Guam, regarding all tropical cyclones affecting Micronesia and Guam. Consultation will occur prior to issuing initial and final

advisories and prior to issuing any advisory that indicates a significant change in forecast intensity or track from the previous advisory.

- Initiate, monitor, and update satellite invest areas on the tropical cyclone satellite websites provided by the Fleet Numerical Meteorology and Oceanography Center (FNMOC) and the Naval Research Laboratory (NRL), Monterey, California. TPC/NHC and CPHC will coordinate with JTWC on the initiation of desired invest areas and will provide JTWC numbers for invest areas as required.

- Deploy, through the Naval Oceanographic Office (NAVOCEANO), drifting data buoys in support of Commander-in-Chief, Atlantic Fleet (CINCLANTFLT) requirements.

2.4. DOT/DHS Responsibilities.

2.4.1. Information Dissemination. The DOT will provide NWS with timely dissemination of significant information received regarding tropical and subtropical cyclones.

2.4.2. Flight Assistance. Through the Federal Aviation Administration (FAA), the DOT will provide air traffic control, communications, and flight assistance services.

2.4.3. U. S. Coast Guard. The DOT will provide the following through the U.S. Coast Guard:

- Personnel, vessel, and communications support to the NDBC for development, deployment, and operation of moored environmental data buoy systems.

- Surface observations to NWS from its coastal facilities and vessels.

- Communications circuits for relay of weather observations to NWS in selected areas.

- Coastal broadcast facilities at selected locations for tropical storm or hurricane forecasts and warnings.

2.5. Annual Liaison with Other Nations. The DOD, DOC, and DOT will cooperate in arranging an annual trip to the Caribbean and the Gulf of Mexico area to carry out a continuing and effective liaison with the directors of meteorological services, air traffic control agencies, and disaster preparedness agencies of nations in those areas, regarding the provision of tropical cyclone warning services. The Air Force Reserve Command (AFRC) and TPC/NHC jointly have the responsibility to plan and execute this mission, resources permitting. TPC/NHC will coordinate with the meteorological services in the countries to be visited. AFRC will fly the mission and will issue invitational travel orders (ITO) to the TPC/NHC Director and staff, other U.S. officials, and the media on a noninterference, non-reimbursable basis.

2.6. Air Traffic Control/Flight Operations Coordination. The operations officers of the principal flying units, the Assistant Manager, Operations, Air Traffic Control System Command Center, Herndon, VA, and the assistant managers for traffic management or assistant manager for military operations, as appropriate, at key Air Route Traffic Control Centers (ARTCC) will maintain a close working relationship on a continuing basis to ensure mission success under actual tropical storm conditions. This will involve visits to each other's facilities, familiarization flights, and telephone and teletype communications to improve the understanding of each other's requirements and capabilities.

2.6.1. Gulf of Mexico Weather Reconnaissance. The 53rd Weather Reconnaissance Squadron and the NOAA Aircraft Operations Center operations officers will maintain a close working relationship with the Air Traffic Control System Command Center, the ARTCCs, and the Fleet Aerial Control and Surveillance Facility (FACSFAC) for the coordination of weather reconnaissance flights in the Gulf of Mexico and over the Caribbean Sea in particular, and in the United States in general. The operations officers will:

- Request the assistance of the appropriate ARTCC/FACSFAC in support of the *National Hurricane Operations Plan*.

- Provide the current operations officer's name and telephone number to the appropriate ARTCC and FACSFAC.

- Publish the unit's telephone numbers [Defense Switched Network (DSN)/Commercial] and teletype address code for Service B (Appendix I).

2.6.2. Air Traffic Control Assistance. The Air Traffic Control System Command Center, appropriate ARTCCs, and FACSFAC will maintain a close working relationship with the weather reconnaissance units and provide airspace and air traffic control assistance to the extent possible. Those organizations will:

- Provide the current names and telephone numbers of points of contact to the flying units.

- Publish telephone numbers (DSN/Commercial) and teletype code for Service B (Appendix I).

CHAPTER 3

GENERAL OPERATIONS AND PROCEDURES OF THE NATIONAL WEATHER SERVICE HURRICANE CENTERS

3.1. General. This chapter describes the products, procedures, and communications headers used by the Tropical Prediction Center/National Hurricane Center (TPC/NHC) and the Central Pacific Hurricane Center (CPHC). See Appendix A for a description of local National Weather Service (NWS) office products which support the tropical cyclone forecast and warning program.

3.2. Products.

3.2.1. Tropical Weather Outlook (TWO). Tropical weather outlooks are prepared and issued by the TPC/NHC and CPHC during their respective hurricane seasons. The TPC/NHC writes TWOs for both the Atlantic and Eastern Pacific Basins. They are transmitted at 0530, 1130, 1730, and 2230 Eastern Local Time in the Atlantic and at 0400, 1000, 1600, and 2200 Pacific Local Time. In the Central Pacific, TWOs are transmitted by the CPHC at 0200, 0800, 1400, and 2000 UTC. The outlook briefly describes significant areas of disturbed weather and their potential for tropical cyclone development out to 48 hours. A tropical weather summary of Atlantic, Eastern Pacific, and Central Pacific tropical cyclone activity will be prepared and issued at the end of each month during the hurricane season.

3.2.2. Tropical Cyclone Discussion. The TPC/NHC and the CPHC will, as appropriate, issue tropical cyclone discussions on Atlantic, Eastern Pacific, and Central Pacific tropical cyclones at 0300, 0900, 1500, and 2100 UTC. Discussions will contain preliminary prognostic positions and maximum wind-speed forecasts up to 72 hours; will describe objective techniques, synoptic features, and climatology used; and will provide reasons for track changes.

3.2.3. Tropical Cyclone Public Advisories. Tropical cyclone public advisories are issued by the TPC/NHC for all tropical cyclones in the Atlantic. In the Eastern Pacific, tropical cyclone public advisories are issued by TPC/NHC for tropical cyclones that are expected to affect land within 48 hours. In the Central Pacific, tropical cyclone public advisories are issued by CPHC for all tropical cyclones within the area of responsibility. Tropical cyclone public advisories are issued at the same time scheduled tropical cyclone forecast/advisories are issued; i.e., 0300, 0900, 1500, and 2100 UTC. Watch and warning break points are listed in Appendix B. In the Western Pacific, public advisories are issued by the NWS Forecast Office (WFO), Tiyan, Guam, for all tropical cyclones within the Territory of Guam and Micronesia, using tropical cyclone forecasts/advisories prepared by the Joint Typhoon Warning Center (JTWC) as guidance. *Public advisories will be discontinued when (1) the tropical cyclone ceases to be a tropical cyclone; e.g., becomes extratropical, a remnant low, or dissipates, or (2) the tropical cyclone is centered over land, is below tropical storm strength, and is not forecast to move back over water as a tropical cyclone, and (3) there are no coastal tropical cyclone watches or warnings in effect.*

[NOTE: To further publicize local products, when a tropical cyclone threatens a land area, the following statement shall be included in the advisory..."For storm information specific to your area...please monitor products issued by your local weather office." Tropical cyclone public

advisories use statute miles for distance and miles per hour for speed. Nautical miles and knots may be added at the discretion of the centers. Atlantic advisories should include the metric units in kilometers and kilometers per hour following the equivalent English units except when the United States is the only country threatened.]

3.2.4. Tropical Cyclone Forecast/Advisories. Tropical cyclone forecast/advisories are issued by the TPC/NHC and the CPHC. See Section 4.3 for content and format of the advisories. In both the Atlantic and Pacific, the advisories are scheduled for 0300, 0900, 1500, and 2100 UTC. Pacific advisories should be transmitted 15 minutes before the effective time. In the Western Pacific, tropical cyclone forecasts/advisories are issued by the JTWC; Appendix C provides a listing of the abbreviated communications headings and titles for JTWC products. Information on the broadcast of tropical cyclone information to coastal and high-seas shipping can be found in Chapter 9, Marine Weather Broadcasts.

3.2.5. Probability of Hurricane/Tropical Storm Conditions.

3.2.5.1. When Issued. The probability of hurricane/tropical storm conditions shall be issued in tabular form at regularly scheduled tropical cyclone public advisory and tropical cyclone forecast/advisory times. These probabilities will generally be carried for all named storms in the Atlantic Basin[1] within 72 hours of forecasted landfall. In addition, TPC/NHC may issue probabilities for tropical depressions forecast to become named storms and be a threat to land within 72 hours. When a tropical cyclone is forecast to track parallel to a coastline, maximum values over water points should be included, and the tropical cyclone public advisory should state that the highest probabilities are over water. The 72-hour cumulative probabilities of less than 5 percent are not included in the transmitted probability tables.

3.2.5.2. When Computed. The probabilities, which are based on the official forecast track, should be issued when the 72-hour forecast position approaches the coast and should be carried in advisories until the storm makes landfall. Two conditions in which probability information should not be issued are: (1) the hurricane/tropical storm has made landfall and is not expected to reemerge over water and/or (2) the computed probability values are not significant. At the discretion of the hurricane forecaster, probabilities need not be listed for sites where the tropical storm or hurricane would likely be over land or less than tropical storm strength at the time it would affect the site. TPC/NHC may include a brief explanation of probabilities in the advisory.

These probabilities should be computed shortly after synoptic times for the 0-24, 24-36, 36-48, and 48-72 hours. A total probability for the next 72 hours should be shown in the last column and should represent a total of all forecast periods. The probability of the storm striking a coastal location within 48 hours may be determined by adding the 0-24, 24-36, and 36-48 hour probabilities. If the probability for a location is less than 1 percent, an "X" will be indicated in the table. If probabilities are not to be issued, a statement will be included in both the tropical cyclone public advisory and the tropical cyclone forecast/advisory. Refer to *Probability of Hurricane/Tropical Storm Conditions: A User's Manual* for further information.

[1] Atlantic Basin includes the Atlantic, Caribbean, and Gulf of Mexico

3.2.5.3. Locations. When appropriate, specific probabilities will be computed for the following locations:

Brownsville, TX
Corpus Christi, TX
Port O'Connor, TX
Galveston, TX
Port Arthur, TX
New Iberia, LA
New Orleans, LA
Buras, LA
Gulfport, MS
Mobile, AL
Pensacola, FL
Panama City, FL
Apalachicola, FL
St. Marks, FL
Cedar Key, FL
Tampa, FL
Venice, FL
Fort Myers, FL
Marco Island, FL
Key West, FL
Marathon, FL
Miami, FL
West Palm Beach, FL
29°N 85°W
29°N 87°W
28°N 89°W
28°N 91°W
Fort Pierce, FL
Cocoa Beach, FL
Daytona Beach, FL
Jacksonville, FL
Savannah, GA
Charleston, SC
Myrtle Beach, SC
Wilmington, NC
Morehead City, NC
Cape Hatteras, NC
Norfolk, VA
Ocean City, MD
Atlantic City, NJ
New York City, NY
Montauk Point, NY
Providence, RI
Nantucket Island, MA
Hyannis, MA
Boston, MA
Portland, ME
Bar Harbor, ME
Eastport, ME
28°N 93°W
28°N 95°W
27°N 96°W
25°N 96° W

Note: Probabilities are not issued for the west coast of the continental United States, Hawaii, and the Territory of Guam and Micronesia.

3.2.6. Tropical Cyclone Updates. Tropical cyclone updates are brief statements in lieu of or preceding special forecasts to inform of significant changes in a tropical cyclone, or to post or cancel watches and warnings.

3.2.7. Tropical Cyclone Position Estimates. The hurricane centers and WFO Guam may issue a position estimate between 2-hourly intermediate public advisories whenever sufficient, reliable radar center fix information is available. Position estimates disseminated to the public, DOD, and other Federal agencies will provide geographical positions in two ways: by latitude and longitude and by distance and direction from a well-known point.

3.2.8. Special Tropical Disturbance Statement. Special tropical disturbance statements may be issued to furnish information on strong formative, non-depression systems.

3.2.9. HPC Public Advisories (TCP). The National Centers for Environmental Prediction's Hydrological Prediction Center (HPC) will issue public advisories after TPC/NHC discontinues its on subtropical and tropical cyclones that have moved inland in the United States or Mexico, but still pose a threat of heavy rain and flash floods in the conterminous United States or Mexico. The last NHC advisory will normally be issued when winds in an inland tropical cyclone drop below tropical storm strength, and the tropical depression is not forecast to regain tropical storm intensity or reemerge over water. The TCP is an alphanumeric product, and advisories are issued at 0300, 0900, 1500, and 2100 UTC. TCPs will continue to be numbered in sequence with tropical cyclone advisories by TPC/NHC and will reference the former storm's name in the text. Content will refer to the decaying system's position, intensity, general forecast trends, highlight impacts which occurred and are expected to occur (usually in relation to heavy rain/flooding and tornadoes), and indicate when the next summary will be issued. Advisories will terminate when the threat of flash flooding has ended or when the remnants of these storms can no longer be distinguished from other synoptic features capable of producing flash floods.

```
WTNT3i KWNH DDHHMM
TCPATc

PUBLIC ADVISORY NUMBER XX FOR (TROPICAL CYCLONE TYPE) (NAME)
NWS HYDROMETEOROLOGICAL PREDICTION CENTER CAMP SPRINGS MD
time am/pm time_zone day mon DD YYYY

TEXT

$$
```

Figure 3-1. **HPC Public Advisory Product Format**

3.2.10. Tropical Disturbance Rainfall Estimates. As required, the TPC/NHC/CPHC will issue satellite-based rainfall estimates for tropical disturbances and tropical cyclones within 36 hours of forecasted landfall.

3.2.11. Tropical Weather Summary (Monthly). NHC and CPHC will prepare and issue these products each month during the hurricane season. The product will summarize the previous month's tropical cyclone activity. The last product issued at the end of the hurricane season will summarize November's activity plus the activity for the whole season.

3.2.12. Tropical Cyclone Summary - Fixes. CPHC will issue these products when a tropical cyclone is classifiable using the Dvorak technique. Fixes will be issued for the north central Pacific from 140ºW to 180º and for the south central Pacific from 120ºW to 160ºE. After the initial tropical cyclone fix, succeeding fixes will be done at approximately 0000, 0600, 1200, and 1800 UTC as long as the system is classifiable using the Dvorak technique.

3.2.13. Tropical Cyclone Danger Area Graphic. The Tropical Cyclone Danger Area is a graphical marine product depicting a tropical cyclone's track (out to 72 hours) and shades in a danger area determined by adding 100, 200, and 300 nautical miles plus the 34-knot wind radii to the 24-, 48-, and 72- hour forecast position respectively in the Atlantic and east Pacific. For the

central Pacific, the shaded danger area will vary in width dependent upon the hurricane specialist's confidence in the track and the length of the 34-knot wind radii. In addition, areas of possible tropical cyclone genesis (out to 36 hours) are included and depicted as either a circular, rectangle, oval, or polygon shaped area. The product is prepared by the TPC and covers the entire Atlantic north of the equator and the Pacific north of the equator from the Mexican and Central America coast west to 140ºW. CPHC prepares a separate chart for 140ºW to the International Dateline north of the equator. The product is disseminated four times per day during the hurricane season within 1 hour after the advisory package issuance. This would be at 0400, 1000, 1600 and 2200 UTC.

3.2.14. Aviation Tropical Cyclone Advisory (TCA). The TCA is intended to provide short-term tropical cyclone forecast guidance for international aviation safety and routing purposes. The product is prepared by TPC/NHC and CPHC for all ongoing tropical cyclone activity in their respective areas of responsibility. This requirement is stated in the World Meteorological Organization Region IV hurricane plan. TCAs list the current TC position, motion and intensity, and 12- and 24-hour forecast positions and intensities. It is an alphanumeric text product produced by hurricane forecasters and consists of information extracted from the official forecasts. This forecast is produced from subjective evaluation of current meteorological and oceanographic data as well as output from numerical weather prediction models, and is coordinated with affected WFOs, the National Centers, and the Department of Defense. It is prepared four times daily and issued at 0300, 0900, 1500, and 2100 UTC.

```
FKaa2i CCCC DDHHMM
TCAxxx

(TROPICAL CYCLONE TYPE) ICAO ADVISORY NUMBER ##
ISSUING OFFICE CITY STATE
time am/pm time_zone day mon DD YYYY

TEXT

$$
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Figure 3-2. Aviation Tropical Cyclone Advisory Format

3.3. Designation of Tropical and Subtropical Cyclones.

3.3.1. Numbering of Tropical and Subtropical Depressions. The hurricane centers are responsible for numbering tropical and subtropical depressions in their areas of responsibility. Tropical depressions shall be numbered consecutively beginning each season with the spelled out number "ONE." For ease in differentiation, tropical depression numbers shall include the suffix "E" for Eastern Pacific, "C" for Central Pacific, or "W" for Western Pacific, after the number. In both the Atlantic and Pacific, once the depression has reached tropical storm intensity, it shall be named and the depression number dropped. The depression number will not be used again until the following year. Give tropical cyclones a name in the first advisory after intensifying to 34 knots (39 mph) or greater.

The following rules apply for tropical cyclones passing from one basin to another: Retain the name if a tropical cyclone passes from one basin into another basin as a tropical cyclone; i.e., advisories are continuous. An unnamed tropical depression will also retain its number (e.g. Tropical Depression Six-E remains Tropical Depression Six-E) if it crosses into another area of responsibility. *For unnamed tropical depressions moving from west to east across 180°, CPHC will use the associated Joint Typhoon Warning Center's (JTWC) number and indicate JTWC in parentheses following the number. For named systems, CPHC will use the associated Regional Specialized Meteorological Center (RSMC) Tokyo and provide the associated JTWC number in parentheses.*

Within a basin, if the remnant of a tropical cyclone redevelops into a tropical cyclone, it is assigned its original number or name. If the remnants of a former tropical cyclone regenerate in a new basin, the regenerated tropical cyclone will be given a new designation.

3.3.1.1. Atlantic Basin. Depression numbers, ONE, TWO, THREE, will be assigned by the TPC/NHC after advising the Naval Atlantic Meteorology and Oceanography Center (NAVLANTMETOCCEN) Norfolk.

3.3.1.2. Pacific East of 140ºW. Depression numbers, with the suffix E, e.g., ONE-E, TWO-E, THREE-E, will be assigned by the TPC/NHC after advising JTWC, Pearl Harbor, HI. The assigned identifier shall be retained even if the depression passes into another warning area.

3.3.1.3. Pacific West of 140ºW and East of 180º. Depression numbers, with suffix C; e.g., ONE-C, TWO-C, THREE-C, will be assigned by the CPHC after advising JTWC.

3.3.1.4. Pacific West of 180º and North of 0º. Depression numbers, with suffix W; e.g., ONE-W, TWO-W, THREE-W, are assigned by JTWC.

3.3.1.5. Subtropical Depressions. A single list of numbers and names will be used for all tropical and subtropical cyclones. Therefore, numbering of subtropical depressions will follow the same procedure as tropical depressions. For example, if the first subtropical depression follows the first tropical depression, the subtropical depression will be given the designation SUBTROPICAL DEPRESSION TWO. If a subtropical depression becomes a subtropical storm, it receives the next available name in the tropical cyclone naming sequence.

3.3.2. Numbering and Naming of Tropical and Subtropical Cyclones.

3.3.2.1. Numbering and Naming Tropical Cyclones. Tropical cyclone centers will number tropical depressions in their areas of responsibility. Number tropical depressions consecutively beginning each season with the spelled out number "ONE." In the north Pacific, for ease in differentiation, tropical depression numbers, assigned by NHC or CPHC, will include the suffix "E" for eastern (east of 140°W longitude) or "C," for central (180° to 140°W longitude) respectively, after the number. In both the Atlantic and Pacific, once the depression reaches tropical storm intensity, name it and drop the depression number. The depression number will not be used again until the following year. Give tropical cyclones a name in the first advisory after intensifying to 34 knots (39 mph) or greater.

The following rules apply for tropical cyclones passing from one basin to another: Retain the name if a tropical cyclone passes from one basin into another basin as a tropical cyclone; i.e. advisories are continuous. An unnamed tropical depression will also retain its number (e.g. Tropical Depression Six-E remains Tropical Depression Six-E) if it crosses into another area of responsibility. *For unnamed tropical depressions moving from west to east across 180°, CPHC will use the associated Joint Typhoon Warning Center's (JTWC) number and indicate JTWC in parentheses following the number. For named systems, CPHC will use the associated Regional Specialized Meteorological Center (RSMC) Tokyo and provide the associated JTWC number in parentheses.*

Within a basin, if the remnant of a tropical cyclone redevelops into a tropical cyclone, it is assigned its original number or name. If the remnants of a former tropical cyclone regenerate in a new basin, the regenerated tropical cyclone will be given a new designation.

3.3.2.2. Numbering and Naming Subtropical Storms. A single list of numbers and names will be used for all tropical and subtropical cyclones. Therefore, numbering of subtropical depressions will follow the same procedure as tropical depressions. For example, if the first subtropical depression follows the first tropical depression, the subtropical depression will be given the designation SUBTROPICAL DEPRESSION TWO. If a subtropical depression becomes a subtropical storm, it receives the next available name in the tropical cyclone naming sequence.

3.3.2.3. Numbering Advisories and Tropical/Subtropical Cyclone Discussions. Tropical and subtropical cyclone advisories and discussions in the Atlantic and the Pacific will be numbered similarly. Number scheduled and special advisories and TCDs consecutively beginning with the number 1 (not spelled out) for each new tropical or subtropical cyclone, and continue through the duration of the cyclone. In situations where only TCMs and TCDs are being written (tropical cyclones in the eastern Pacific not threatening land) and at a later time a public advisory is required, the public advisory number will match the corresponding TCM. In both the Atlantic and the Pacific, intermediate advisories and TCDs will retain the advisory number of the scheduled or special advisory they update and append an alphabetic designator (e.g., "HURRICANE ALLISON INTERMEDIATE ADVISORY NUMBER 20A").

3.4. Transfer of Warning Responsibility.

3.4.1. TPC/NHC to CPHC. When a tropical or subtropical cyclone approaches 140ºW, the coordinated transfer of warning responsibility from TPC/NHC to CPHC will be made and the appropriate advisory issued.

3.4.2. CPHC to JTWC/RSMC, Tokyo. When a tropical or subtropical cyclone crosses 180º from east to west, the coordinated transfer of warning responsibility from CPHC to JTWC will be made and the appropriate advisory issued. At the same time, the CPHC will coordinate with the RSMC, Tokyo so that they are aware that CPHC will be suspending the issuance of advisories.

3.4.3. JTWC/RSMC, Tokyo to CPHC. When a tropical or subtropical cyclone crosses 180º from west to east, the coordinated transfer of warning responsibility from JTWC to CPHC will be made. JTWC will append the statement, "Next advisory by CPHC-HNL" to their last advisory. At the same time, the CPHC will coordinate with RSMC, Tokyo so that they are aware that CPHC will be assuming the issuance of advisories.

3.5. Alternate Warning Responsibilities.

3.5.1. Transfer to Alternate. In the event of impending or actual operational failure of a hurricane forecast center, tropical warning responsibilities will be transferred to an alternate facility in accordance with existing directives and retained there until resumption of responsibility can be made. Alternate facilities are as follows:

PRIMARY	ALTERNATE
TPC/NHC	National Centers for Environmental Prediction Hydrometeorological Prediction Center (HPC) Camp Springs, MD
CPHC	TPC/NHC
CARCAH	53rd Weather Reconnaissance Squadron (53 WRS)
JTWC	Fleet Numerical Meteorology and Oceanography Center (FLENUMETOCCEN), Monterey, CA
NWSO Tiyan, Guam	CPHC

3.5.2. Notification. The NAVLANTMETOCCEN, Norfolk, and JTWC, Pearl Harbor, will be advised by TPC/NHC, CARCAH, and CPHC, as appropriate, of impending or actual transfer of responsibility by the most rapid means available. JTWC will advise CPHC and TPC/NHC of impending or actual transfer of JTWC responsibilities. In the event of an operational failure of CARCAH, direct communication is authorized between the 53 WRS and the forecast facility. Contact 53 WRS at DSN 597-2409/COM 601-377-2409 or through the Keesler AFB Command Post at DSN 597-4330/COM 601-377-4330 (ask for the 53 WRS).

Table 3-1. Atlantic Tropical Cyclone Names

2005		2006		2007	
ARLENE		ALBERTO	al-BAIR-toe	ANDREA	
BRET		BERYL	BER-ril	BARRY	
CINDY		CHRIS		CHANTAL	shan-TAHL
DENNIS		DEBBY		DEAN	
EMILY		ERNESTO	er-NES-toe	ERIN	AIR-in
FRANKLIN		FLORENCE		FELIX	FEEL-ix
GERT		GORDON		GABRIELLE	ga-bree-EL
HARVEY		HELENE	he-LEEN	HUMBERTO	oom-BAIR-to
IRENE		ISAAC	EYE-zak	INGRID	
JOSE	ho-ZAY	JOYCE		JERRY	
KATRINA	ka-TREE-na	KIRK		KAREN	
LEE		LESLIE		LORENZO	
MARIA	ma-REE-ah	MICHAEL	MIKE-el	MELISSA	
NATE		NADINE	nay-DEEN	NOEL	
OPHELIA	o-FEEL-ya	OSCAR		OLGA	
PHILIPPE	fe-leep	PATTY		PABLO	PA-blow
RITA		RAFAEL	ra-fa-EL	REBEKAH	
STAN		SANDY		SEBASTIEN	say-BAS-tyan
TAMMY		TONY		TANYA	TAHN-ya
VINCE		VALERIE		VAN	
WILMA		WILLIAM		WENDY	

2008		2009		2010	
ARTHUR		ANA		ALEX	
BERTHA	BUR-tha	BILL		BONNIE	
CRISTOBAL		CLAUDETTE	claw-DET	*COLIN*	
DOLLY		DANNY		DANIELLE	dan-YELL
EDOUARD	eh-DWARD	ERIKA	ERR-ree-ka	EARL	
FAY		FRED		*FIONA*	
GUSTAV		GRACE		GASTON	
HANNA		HENRI	ahn-REE	HERMINE	her-MEEN
IKE		IDA		IGOR	e-GOR
JOSEPHINE	JO-ze-feen	JOAQUIN		*JULIA*	
KYLE		KATE		KARL	
LAURA		LARRY		LISA	LEE-sa
MARCO		MINDY		MATTHEW	
NANA		NICHOLAS	NIK-o-las	NICOLE	ni-COLE
OMAR		ODETTE	o-DET	OTTO	
PALOMA	pa-LOW-ma	PETER		PAULA	
RENE	re-NAY	ROSE		RICHARD	RICH-erd
SALLY		SAM		SHARY	SHA-ree
TEDDY		TERESA	te-REE-sa	TOMAS	to-MAS
VICKY		VICTOR	VIC-ter	VIRGINIE	vir-JIN-ee
WILFRED		WANDA		WALTER	

If over 21 tropical cyclones occur in a year, the Greek alphabet will be used following the W-named cyclone. *Colin replaces Charley, Fiona replaces Frances, Igor replaces Ivan, and Julia replaces Jeanne for 2010.*

Table 3-2. Eastern Pacific Tropical Cyclone Names

2005		2006		2007	
ADRIAN		ALETTA	a LET ah	ALVIN	
BEATRIZ	BEE a triz	BUD		BARBARA	
CALVIN		CARLOTTA		COSME	COS may
DORA		DANIEL		DALILA	
EUGENE		EMILIA	ee MILL ya	ERICK	
FERNANDA	fer NAN dah	FABIO	FAH bee o	FLOSSIE	
GREG		GILMA	GIL mah	GIL	
HILARY		HECTOR		HENRIETTE	hen ree ETT
IRWIN		ILEANA	ill ay AH nah	IVO	
JOVA Ho vah		JOHN		JULIETTE	
KENNETH		KRISTY		KIKO	KEE ko
LIDIA		LANE		LORENA	low RAY na
MAX		MIRIAM		MANUEL	mahn WELL
NORMA		NORMAN		NARDA	
OTIS		OLIVIA		OCTAVE	AHK tave
PILAR		PAUL		PRISCILLA	
RAMON	rah MONE	ROSA		RAYMOND	
SELMA		SERGIO	SIR gee oh	SONIA	SONE yah
TODD		TARA		TICO	TEE koh
VERONICA		VICENTE	vee CEN tay	VELMA	
WILEY		WILLA		WALLIS	
XINA ZEE nah		XAVIER	ZAY vier	XINA	ZEE nah
YORK		YOLANDA	yo LAHN da	YORK	
ZELDA	ZEL dah	ZEKE		ZELDA	ZEL dah

2008		2009		2010	
ALMA	AL mah	ANDRES	ahn DRASE	AGATHA	
BORIS		BLANCA	BLAHN kah	BLAS	
CRISTINA		CARLOS		CELIA	
DOUGLAS		DOLORES		DARBY	
ELIDA	ELL ee dah	ENRIQUE	anh REE kay	ESTELLE	
FAUSTO	FOW sto	FELICIA	fa LEE sha	FRANK	
GENEVIEVE		GUILLERMO	gee YER mo	GEORGETTE	
HERNAN	her NAHN	HILDA		HOWARD	
ISELLE	ee SELL	IGNACIO	eeg NAH cio	ISIS	
JULIO	HOO lee o	JIMENA	he MAY na	JAVIER	
KARINA		KEVIN		KAY	
LOWELL		LINDA		LESTER	
MARIE		MARTY		MADELINE	
NORBERT		NORA		NEWTON	
ODILE	oh DEAL	OLAF OH lahf		ORLENE	
POLO		PATRICIA		PAINE	
RACHEL		RICK		ROSLYN	
SIMON		SANDRA		SEYMOUR	
TRUDY		TERRY		TINA	
VANCE		VIVIAN		VIRGIL	
WINNIE		WALDO		WINIFRED	
XAVIER	ZAY vier	XINA ZEE nah		XAVIER	
YOLANDA	yo LAHN da	YORK		YOLANDA	yo LAHN da
ZEKE		ZELDA	ZEL dah	ZEKE	

Table 3-3. Central Pacific Tropical Cyclone Names

COLUMN 1		COLUMN 2	
Name	Pronunciation	Name	Pronunciation
AKONI	ah-KOH-nee	AKA	AH-kah
EMA	EH-mah	EKEKA	eh-KEH-kak
HANA	HAH-nah	HALI	HAH-lee
IO	EE-oo	IOLANA	ee-OH-lah-nah
KELI	KEH-lee	KEONI	keh-ON-nee
LALA	LAH-lah	LI	LEE
MOKE	MOH-keh	MELE	MEH-leh
NELE	NEH-leh	NONA	NOH-nah
OKA	OH-kah	OLIWA	oh-LEE-vah
PEKE	PEH-keh	PAKA	PAH-kah
ULEKI	oo-LEH-kee	UPANA	oo-PAH-nah
WILA	VEE-lah	WENE	WEH-neh

COLUMN 3		COLUMN 4	
Name	Pronunciation	Name	Pronunciation
ALIKA	ah-LEE-kah	ANA	AH-nah
ELE	EH-leh	ELA	EH-lah
HUKO	HOO-koh	HALOLA	hah-LOH-lah
IOKE	ee-OH-keh	IUNE	ee-OO-neh
KIKA	KEE-kah	KIMO	KEE-moh
LANA	LAH-nah	LOKE	LOH-keh
MAKA	MAH-kah	MALIA	mah-LEE-ah
NEKI	NEH-kee	NIALA	nee-AH-lah
OLEKA	oh-LEH-kah	OKO	OH-koh
PENI	PEH-nee	PALI	PAH-lee
ULIA	oo-LEE-ah	ULIKA	oo-LEE-kah
WALI	WAH-lee	WALAKA	wah-LAH-kah

NOTE: Use Column 1 list of names until exhausted before going to Column 2, etc. All letters in the Hawaiian language are pronounced, including double or triple vowels.

Table 3-4. International Tropical Cyclone Names for the Western Pacific and South China Sea

	I	II	III	IV	V
Contributor	**NAME**	**NAME**	**NAME**	**NAME**	**NAME**
Cambodia	Damrey	Kong-rey	Nakri	Krovanh	Sarika
China	Longwang	Yutu	Fengshen	Dujuan	Haima
DPR Korea	Kirogi	Toraji	Kalmaegi	Maemi	Meari
HK, China	Kai-tak	Man-yi	Fung-wong	Choi-wan	Ma-on
Japan	Tembin	Usagi	Kammuri	Koppu	Tokage
Lao PDR	Bolaven	Pabuk	Phanfone	Ketsana	Nock-ten
Macau	Chanchu	Wutip	Vongfong	Parma	Muifa
Malaysia	Jelawat	Sepat	*Rusa*	Melor	Merbok
Micronesia	Ewiniar	Fitow	Sinlaku	Nepartak	Nanmadol
Philippines	Bilis	Danas	Hagupit	Lupit	Talas
RO Korea	Kaemi	Nari	Changmi	Sudal	Noru
Thailand	Prapiroon	Wipha	Mekkhala	Nida	Kulap
U.S.A.	Maria	Francisco	Higos	Omais	Roke
Viet Nam	Saomai	Lekima	Bavi	Conson	Sonca
Cambodia	Bopha	Krosa	Maysak	Chanthu	Nesat
China	Wukong	Haiyan	Haishen	Dianmu	Haitang
DPR Korea	Sonamu	Podul	Pongsona	Mindulle	Nalgae
HK, China	Shanshan	Lingling	Yanyan	Tingting	Banyan
Japan	Yagi	Kajiki	Kujira	Kompasu	Washi
Lao PDR	Xangsane	Faxai	Chan-hom	Namtheun	Matsa
Macau	Bebinca	*Vamei*	Linfa	Malou	Sanvu
Malaysia	Rumbia	Tapah	Nangka	Meranti	Mawar
Micronesia	Soulik	Mitag	Soudelor	Rananim	Guchol
Philippines	Cimaron	Hagibis	*Imbudo*	Malakas	Talim
RO Korea	Chebi	Noguri	Koni	Megi	Nabi
Thailand	Durian	Rammasun	Morakot	Chaba	Khanun
U.S.A.	Utor	*Chataan*	Etau	Aere	Vicente
Viet Nam	Trami	Halong	Vamco	Songda	Saola

NOTE: The official international name list was effective January 1, 2000. Names will be assigned in rotation starting with Damrey for the first tropical cyclone of the year 2000 which is of tropical storm strength or greater. When the last name in column 5 (Saola) is used, the sequence will begin again with the first name in column 1 (Damrey).

3.6. <u>Abbreviated Communications Headings</u>. Abbreviated communications headings are assigned to advisories on tropical and subtropical cyclones and other advisories based on depression numbers or storm name and standard communications procedures. An abbreviated heading consists of three groups with ONE space between each of the groups. The first group contains a data type indicator (e.g., WT for hurricane), a geographical indicator (e.g. NT for Atlantic Basin), and a number. The second group contains a location identifier of the message originator (e.g., KNHC for TPC/NHC). The third group is a date-time group in UTC. An example of a complete header is: WTNT61 KNHC 180400.

3.6.1. Atlantic Headings (see paragraph 3.6.3 also).

ABNT20 KNHC	Tropical Weather Outlook
ABNT30 KNHC	Tropical Weather Summary (monthly)
WTNT31 KNHC	Tropical Cyclone Public Advisory (Atlantic)
WTNT51 KNHC	Tropical Cyclone Position Estimate
WTNT61 KNHC	Tropical Cyclone Update
WONT41 KNHC	Special Tropical Disturbance Statement
FXUS01 KWBC	1-2 Day Discussion
FXUS02 KWBC	3-7 Day Discussion
FXUS04 KWBC	Precipitation Discussion

3.6.2. Pacific Headings (see paragraph 3.6.3 also).

ABPZ20 KNHC	Tropical Weather Outlook (Eastern Pacific)
ABPZ30 KNHC	Tropical Weather Summary (monthly)
ACPN50 PHFO	Tropical Weather Outlook (Central Pacific)
ACPN60 PHFO	Tropical Weather Summary (monthly)
TXPN40 PHFO	Northern Hemisphere Tropical Cyclone Summary (Fixes)
TXPS40 PHFO	Southern Hemisphere Tropical Cyclone Summary (Fixes)
WTPZ51 KNHC	Tropical Cyclone Position Estimate (Eastern Pacific)
WTPA51 PHFO	Tropical Cyclone Position Estimate (Central Pacific)
WTPZ61 KNHC	Tropical Cyclone Update (Eastern Pacific)
WTPA61 PHFO	Tropical Cyclone Update (Central Pacific)
WOPZ41 KNHC	Special Tropical Disturbance Statement (Eastern Pacific)
ACPA80 PHFO	Special Tropical Disturbance Statement (Central Pacific)

3.6.3. Numbering. Depressions are numbered internally and storms are named internally, but the number in the abbreviated headings does not relate to either the internal number of the depression or the name of the storm. The first cyclone would have 21 and 31 in the abbreviated headings, the second cyclone would have 22 and 32, the sixth cyclone would have 21 and 31, etc. The abbreviated heading would not change when a depression was upgraded to storm status.

WTNT21-25 KNHC	Tropical Cyclone Forecast/Advisory (Atlantic)
WTNT31-35 KNHC	*Tropical Cyclone Public Advisory (Atlantic)*

WTNT31-35 KWNH	HPC Public Advisory (Atlantic)
WTNT41-45 KNHC	Tropical Cyclone Discussion (Atlantic)
WTNT51-55 KNHC	*Tropical Cyclone Position Estimate (Atlantic)*
WTNT61-65 KNHC	*Tropical Cyclone Update (Atlantic)*
WTNT71-75 KNHC	Tropical Cyclone Strike Probabilities (Atlantic)
WTPZ 21-25 KNHC	Tropical Cyclone Forecast/Advisory (Eastern Pacific)
WTPZ 31-35 KNHC	Tropical Cyclone Public Advisory (Eastern Pacific)
WTPZ41-45 KNHC	Tropical Cyclone Discussion (Eastern Pacific)
WTPZ51-55 KNHC	*Tropical Cyclone Position Estimate (Eastern Pacific)*
WTPZ61-65 KNHC	*Tropical Cyclone Update (Eastern Pacific)*
WTPA21-25 PHFO	Tropical Cyclone Forecast/Advisory (Central Pacific)
WTPA31-35 PHFO	Tropical Cyclone Public Advisory (Central Pacific)
WTPA41-45 PHFO	Tropical Cyclone Discussion (Central Pacific)
WTPA51-55 PHFO	*Tropical Cyclone Position Estimate (Central Pacific)*
WTPA61-65 PHFO	*Tropical Cyclone Update (Central Pacific)*
WTPQ31-35 PGUM	Tropical Cyclone Public Advisory (Western Pacific)

3.7. Hurricane Liaison Team (HLT).

3.7.1. National Weather Service (NWS) Responsibilities. The NWS supports the HLT through use of Tropical Prediction Center (TPC) meteorologists, Weather Forecast Office (WFO) personnel (typically warning coordination meteorologists and service hydrologists), and River Forecast Center (RFC) hydrologists. Eastern and Southern Region Headquarters will maintain a list of their available HLT candidates.

After HLT deactivation, the Hydrometeorological Prediction Center (HPC) will assume the briefing duties provided the remnants of the tropical cyclone remain a threat to inland areas. TPC and HPC will coordinate prior to the transfer. During the inland event HPC will coordinate with the appropriate WFOs and RFCs and when needed, hydrologists from the RFCs will provide hydrological briefings.

3.7.2. Activation. The HLT may be activated when a tropical cyclone in the Atlantic, Gulf of Mexico, Caribbean or eastern Pacific threatens the United States or its territories, and the Director or Deputy Director of TPC deems HLT assistance is required. TPC makes the request for activation by contacting the Federal Emergency Management Agency (FEMA) Operations Center (FOC). Upon FEMA's approval, the FOC will activate the HLT. The TPC Director or Deputy Director will contact the appropriate NWS Regional Director requesting meteorologic and/or hydrologic support. NWS personnel should arrive at TPC within 24 hours. The HLT will remain active until the hurricane threat has passed, at which time HLT operations will be terminated by FEMA. However, if the storm moves inland and if significant rainfall is expected, the HLT may remain activated.

If the HLT is deactivated, the Hydrometeorological Prediction Center (HPC) will assume the briefing duties provided the remnants of the tropical cyclone remain a threat to inland areas. TPC and HPC will coordinate prior to the transfer. During the inland event, HPC will coordinate with the appropriate WFOs and RFCs and, when needed, hydrologists from the RFCs will provide hydrological briefings.

3.7.3. Training. Completing NWS/FEMA's distance learning training module, Community Hurricane Preparedness, is required by HLT members. The module can be taken via the Internet at: http://meted.ucar.edu/hurrican/chp/index.htm. Other training opportunities are strongly encouraged. They are: FEMA's "Introduction to Hurricane Preparedness" conducted at TPC for emergency mangers and NWS personnel, and FEMA's annual HLT training session held at TPC.

3.7.4. Meteorologic Duties. The HLT meteorologist will:

- Establish and maintain contact with the impacted WFOs, RFCs, and the HPC.
- Facilitate participation of the impacted NWS offices in conference calls, briefings, and in preparation and distribution of graphics.
- Provide meteorological interpretations on National Hurricane Center advisories (NHC), WFO hurricane local statements, HURREVAC products, and storm surge forecasts for federal, state and local agencies on request.
- Provide storm briefings via video/audio teleconferences for federal, state and local organizations.
- Respond to meteorology-related incoming calls from federal, state, and local emergency managers, and as appropriate, refer meteorologic inquires to the local WFO.

3.7.5. Hydrologic Duties. The HLT hydrologist will:

- Establish and maintain contact with the impacted local WFOs, RFCs, and the HPC.
- Facilitate participation of the impacted NWS offices in conference calls, briefings, and in preparation and distribution of graphics.
- Provide hydrologic interpretation on NHC advisories, WFO hurricane local statements, and WFO and RFC hydrologic products for federal, state and local agencies on request.
- Provide technical support for RFC lead during hydrologic portion of video teleconference. In absence of the RFC, lead the hydrologic portion of the video teleconference.
- Respond to hydrology-related incoming calls from federal, state, and local emergency managers and as appropriate, refer hydrologic inquires to the local WFO.

CHAPTER 4

NATIONAL WEATHER SERVICE PRODUCTS FOR THE DEPARTMENT OF DEFENSE

4.1. General. The Department of Defense (DOD) and the Department of Commerce (DOC) weather forecasting, reconnaissance, and distribution agencies share technical information and some responsibilities. Mutually supportive relationships have developed over the years and have resulted in a mutual dependency. Due to the nature and distribution of DOD resources and operations, the DOD requires certain meteorological information beyond that available to the general public. Accordingly, the DOC provides DOD with special observations and advisories on tropical and subtropical storms threatening DOD resources or operations.

4.2. Observations. The Tropical Prediction Center/National Hurricane Center (TPC/NHC) and Central Pacific Hurricane Center (CPHC) will make available to DOD all significant tropical and subtropical cyclone observations that they receive.

4.3. Tropical Cyclone Forecast/Advisories.

4.3.1. General. The TPC/NHC and CPHC will provide to DOD forecasts and related information for tropical and subtropical weather disturbances of depression intensity or greater. Forecasts will include location, movement, intensity, and dimension of the disturbances. Tropical cyclone forecast/advisories will be disseminated through the National Weather Service (NWS) communications facility at Suitland, MD, to the Automated Weather Network (AWN) hub at the Air Force Weather Agency, Offutt AFB, NE, for further relay to DOD agencies. The DOD forecasters, who must give advice concerning an imminent operational decision, may contact the appropriate hurricane center forecaster (see Chapter 2) when published tropical cyclone forecast/advisories require elaboration. Telephone numbers for the hurricane centers are in Appendix I.

4.3.2. Tropical Cyclone Forecast/Advisory Issue Frequency. The first tropical cyclone forecast/advisory will normally be issued when meteorological data indicate that a tropical or subtropical cyclone has formed. Subsequent advisories will be issued at 0300, 0900, 1500, and 2100 UTC from TPC/NHC and CPHC. The public advisories issued by the NWS Forecast Office (NWSO) Tiyan, Guam, are issued 1 hour after the JTWC guidance. Advisories will continue to be issued until the system is classified below the depression intensity level. In addition, special forecasts will be issued whenever the following criteria are met:

- A significant change has occurred, requiring the issuance of a revised forecast package.
- Conditions require a hurricane or tropical storm watch or warning to be issued.

Remarks stating the reason for the special forecast or the relocation will be mandatory in all special forecasts or advisories that include a relocated position.

[NOTE: Tropical cyclone updates are permitted without the requirement of a special forecast, including when coastal warnings are cancelled. However, in some cases, a special forecast may follow.]

4.3.3. Tropical Cyclone Forecast/Advisory Content. Tropical cyclone forecast/advisories issued by the TPC/NHC and CPHC will contain appropriate information as shown in Figure 4-1. The forecast will contain 12, 24, 36, 48, 72, 96, and 120-hour forecast positions. A code string is appended at the end of the line "NATIONAL WEATHER SERVICE MIAMI FL." This is the Automated Tropical Cyclone Forecasting (ATCF) System Storm Identification Character String recognized by the WMO for tracking and verification of tropical cyclones. The ATCF storm identifier is three spaces after "FL" and uses the format below.

NATIONAL WEATHER SERVICE MIAMI FL BSNOYR
where: BS is the basin (AL, EP, or CP)
NO is the storm number (01, 02, 03,...99)
YR is the last two digits of the year.

Tropical cyclone public advisories issued by the NWS Forecast Office, Tiyan, Guam, will contain appropriate information as shown in Figure 4-2.

4.3.3.1. Definition of Wind Radii by Quadrant. The working definition of the wind radius for a quadrant is: use the largest radius of that wind speed found in the quadrant. Example: TPC/NHC's quadrants are defined as NE (0°-90°), SE (90°-180°), SW (180°-270°), and NW (270°-360°). Given a maximum 34-knot radius of 150 nm at 0°, 90 nm at 120°, and 40 nm at 260°, the following line would be carried in the forecast/advisory: 150NE 90SE 40SW 150NW.

4.3.3.2 Numbering of Tropical Cyclone Forecast/Advisories. All tropical cyclone forecast/advisories will be numbered sequentially; for example,

Tropical Depression ONE Forecast/Advisory Number 1
Tropical Depression ONE Forecast/Advisory Number 2
Tropical Storm Anita Forecast/Advisory Number 3
Hurricane (Typhoon) Anita Forecast/Advisory Number 4
Tropical Depression Anita Forecast/Advisory Number 5

```
WTNT25 KNHC 230300
TCMAT5

HURRICANE ISIDORE FORECAST/ADVISORY NUMBER 28
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL   AL1002
0300Z MON SEP 23 2002

A HURRICANE WARNING REMAINS IN EFFECT ALONG THE GULF OF MEXICO AND
CARIBBEAN COASTS OF THE YUCATAN PENINSULA FROM CAMPECHE NORTH AND
EASTWARD TO TULUM...INCLUDING THE ISLAND OF COZUMEL.

HURRICANE CENTER LOCATED NEAR 20.8N 89.5W AT 23/0300Z
POSITION ACCURATE WITHIN 20 NM

PRESENT MOVEMENT TOWARD THE SOUTHWEST OR 220 DEGREES AT 4 KT

ESTIMATED MINIMUM CENTRAL PRESSURE 950 MB
MAX SUSTAINED WINDS 90 KT WITH GUSTS TO 110 KT.
64 KT....... 45NE  25SE  25SW  45NW.
50 KT....... 75NE  50SE  50SW  75NW.
34 KT.......200NE 130SE 100SW 150NW.
12 FT SEAS..300NE 200SE 150SW 300NW.
WINDS AND SEAS VARY GREATLY IN EACH QUADRANT.  RADII IN NAUTICAL
MILES ARE THE LARGEST RADII EXPECTED ANYWHERE IN THAT QUADRANT.

REPEAT...CENTER LOCATED NEAR 20.8N 89.5W AT 23/0300Z
AT 23/0000Z CENTER WAS LOCATED NEAR 21.0N 89.4W

FORECAST VALID 23/1200Z 20.7N 90.3W
MAX WIND  80 KT...GUSTS 100 KT.
64 KT... 40NE  20SE  25SW  40NW.
50 KT... 60NE  40SE  40SW  60NW.
34 KT...180NE  60SE  60SW 150NW.

FORECAST VALID 24/0000Z 21.0N 91.0W
MAX WIND  95 KT...GUSTS 115 KT.
64 KT... 45NE  25SE  25SW  45NW.
50 KT... 75NE  50SE  50SW  75NW.
34 KT...200NE 150SE 100SW 150NW.

FORECAST VALID 24/1200Z 21.8N 92.0W
MAX WIND 115 KT...GUSTS 140 KT.
64 KT... 60NE  45SE  45SW  60NW.
50 KT...100NE  75SE  75SW 100NW.
34 KT...200NE 150SE 125SW 180NW.

FORECAST VALID 25/0000Z 22.8N 92.5W
MAX WIND 125 KT...GUSTS 155 KT.
50 KT...100NE 100SE  75SW 100NW.
34 KT...200NE 200SE 150SW 200NW.

FORECAST VALID 26/0000Z 25.0N 93.0W
MAX WIND 125 KT...GUSTS 155 KT.
50 KT...100NE 100SE  75SW 100NW.
34 KT...200NE 200SE 150SW 200NW.

EXTENDED OUTLOOK.  NOTE...ERRORS FOR TRACK HAVE AVERAGED NEAR 275 NM
ON DAY 4 AND 375 NM ON DAY 5...AND FOR INTENSITY NEAR 20 KT EACH DAY

OUTLOOK VALID 27/0000Z 22.8N 92.5W
MAX WIND 100 KT...GUSTS 120 KT.

OUTLOOK VALID 28/0000Z 25.0N 93.0W
MAX WIND  90 KT...GUSTS 110 KT.

REQUEST FOR 3 HOURLY SHIP REPORTS WITHIN 300 MILES OF 20.8N 89.5W

NEXT ADVISORY AT 23/0900Z

FORECASTER PASCH

$$
NNNN
```

Figure 4-1. Tropical cyclone forecast/advisory format

WTPQ31 PGUM 210931
TCPPQ1

BULLETIN
TROPICAL DEPRESSION 03W ADVISORY NUMBER 4
8 PM GUAM LST THU APR 21 2005

...TROPICAL DEPRESSION 03W CONTINUES MOVING SLOWLY TOWARD YAP...

A TROPICAL STORM WATCH REMAINS IN EFFECT FOR YAP...FAIS...ULITHI AND NGULU.

TROPICAL STORM CONDITIONS...INCLUDING DAMAGING WINDS OF 39 MPH TO 73 MPH...ARE POSSIBLE. IF TROPICAL DEPRESSION 03W STRENGTHENS MORE THAN FORECAST...A TROPICAL STORM WARNING COULD BE REQUIRED WITH LITTLE ADVANCE NOTICE.

RESIDENTS OF YAP STATE SHOULD CONTINUE TO CLOSELY MONITOR THIS TROPICAL DEPRESSION FOR ANY CHANGES OVER-NIGHT.

AT 7 PM GUAM LST...0900Z...THE CENTER OF TROPICAL DEPRESSION 03W WAS LOCATED NEAR LATITUDE 8.4 DEGREES NORTH AND LONGITUDE 140.3 DEGREES EAST. THIS IS ABOUT 95 MILES SOUTH OF FAIS
115 MILES SOUTH-SOUTHEAST OF ULITHI
170 MILES EAST-SOUTHEAST OF YAP
190 MILES EAST OF NGULU

TROPICAL DEPRESSION 03W IS MOVING WEST-NORTHWEST AT 5 MPH. OVER THE NEXT 12 HOURS...TROPICAL DEPRESSION 03W IS EXPECTED TO INCREASE ITS FORWARD SPEED OF MOTION. THE TROPICAL DEPRESSION IS STILL ORGANIZING AND ERRATIC MOVEMENT OF THE CENTER IS POSSIBLE UNTIL THE SYSTEM BECOMES BETTER ORGANIZED. IF TROPICAL DEPRESSION 03W MAINTAINS THE CURRENT FORECAST TRACK...WARNINGS WILL NOT BE NEEDED AND THE TROPICAL STORM WATCH WILL LIKELY BE DROPPED TOMORROW.

MAXIMUM SUSTAINED WINDS ARE 30 MPH. TROPICAL DEPRESSION 03W IS EXPECTED TO SLOWLY INTENSIFY...BUT WILL LIKELY REMAIN A TROPICAL DEPRESSION OVER THE NEXT 24 HOURS.

REPEATING THE 7 PM POSITION...8.4 DEGREES NORTH AND 140.3 DEGREES EAST...MOVING WEST-NORTHWEST AT 5 MPH WITH MAXIMUM SUSTAINED WINDS OF 30 MPH.

FOR STORM INFORMATION SPECIFIC TO YOUR LOCAL AREA...REFER TO TROPICAL DEPRESSION 03W LOCAL STATEMENT /WTPQ81 PGUM/ AND OTHER PRODUCTS FROM YOUR LOCAL WEATHER OFFICE.

AN INTERMEDIATE ADVISORY WILL BE ISSUED AT 11 PM TONIGHT...FOLLOWED BY THE NEXT SCHEDULED ADVISORY AT 2 AM FRIDAY MORNING.

$$

GUARD/AHN

Figure 4-2. Tropical cyclone public advisory format

CHAPTER 5

AIRCRAFT RECONNAISSANCE

5.1. General. All Department of Commerce (DOC) tropical and subtropical cyclone aircraft reconnaissance needs will be requested and provided in accordance with the procedures of this chapter. As outlined in the Air Force Reserve Command (AFRC)/National Oceanic and Atmospheric Administration (NOAA) Memorandum of Agreement (see Appendix F), DOC has identified a requirement for, and the Department of Defense (DOD) maintains aircraft to support, up to five sorties per day (see Figure 5-1). Requirements exceeding five sorties will be accomplished on a "resources-permitting" basis. In times of national emergency or war, some or all DOD reconnaissance resources may not be available to fulfill DOC needs. The Global Decision Support System (GDSS) JCS Priority Code for tasked, operational weather reconnaissance is **1A3** (IAW DOD Regulation 4500.9-R and Joint Publications 4-01 and 4-04). The Force Activity Designator (FAD)/Urgency of Need Designator (UND) Supply Priority Designator Determination code is **IIA2** (IAW Joint Publication 4-01 and Air Force Manual 23-110, Volume 2, Part 13, Attachment 3A-2.)

5.2. Responsibilities. The DOD, through the AFRC's 53rd Weather Reconnaissance Squadron (53 WRS), and DOC, through NOAA's Aircraft Operations Center (AOC), operate a complementary fleet of aircraft to conduct hurricane/tropical cyclone reconnaissance, synoptic surveillance, and research missions.

5.2.1. DOD. The DOD is responsible for:

- Providing operational aircraft for vortex fixes and data, synoptic surveillance missions, and investigative flights in response to DOC needs.
- Developing operational procedures and deploying data buoys to satisfy DOC needs.

5.2.2. DOC. The DOC is responsible for aircraft operations that may be requested to:

- Provide synoptic surveillance soundings (see Figure 5-2).
- Augment AFRC aircraft reconnaissance when DOC needs exceed the capabilities of DOD resources (see Figure 5-3).
- Assume responsibility for hurricane reconnaissance over foreign airspace that may be restricted for military operations.
- Conduct research flights.

Figure 5-1. WC-130 Weather Reconnaissance Aircraft

Figure 5-2. G-IV Weather Surveillance Aircraft

Figure 5-3. NOAA P-3 Weather Surveillance Aircraft

5.2.3. DOT. The DOT is responsible for providing air traffic control services to aircraft when within airspace controlled by the FAA. This includes offshore oceanic airspace. To expedite the handling of reconnaissance aircraft, paragraph 5.5.4, Air Traffic Control Procedures, has been significantly revised to update and incorporate the procedures in the FAA/AFRC/NOAA Letter of Agreement (LOA) entitled, Meteorological Reconnaissance Flights, found in Appendix F.

5.3. Control of Aircraft. Operational control of aircraft flying tropical and subtropical cyclone reconnaissance will remain with the operating agencies which own the aircraft.

5.4. Reconnaissance Requirements.

5.4.1. Meteorological Parameters. Data needs in priority order are as follows:

- Geographical position of the flight level vortex center (vortex fix) and relative position of the surface center, if known.
- Center sea-level pressure determined by dropsonde or extrapolation from within 1,500 ft of the sea surface or from the computed 925 hPa or 850 hPa height.
- Minimum 700, 850 or 925 hPa height, if available.
- Wind profile data for surface and flight level.
- Temperature at flight level.

- Sea-surface temperature.
- Dew-point temperature at flight level.

5.4.2. Accuracy.

5.4.2.1. Geographic Position.

- Aircraft position: within 3 nm.
- Storm surface center (wind/pressure): within 6 nm.
- Flight level storm center (wind/pressure): within 6 nm.

5.4.2.2. Wind Direction.

- Surface: within 10 deg.
- Flight level for winds greater than 20 kt: within 5 deg.

5.4.2.3. Wind Speed.

- Surface: within 10 kt.
- Flight level: within 4 kt.

5.4.2.4. Pressure Height.

- Surface: within 2 hPa.
- Flight level at or below 500 hPa: within 10 m.
- Flight level above 500 hPa: within 20 m.

5.4.2.5. Temperature.

- Sea surface: within lºC.
- Flight level: within lºC.

5.4.2.6. Dew-Point Temperature.

- From -20ºC to +40°C: within lºC.
- Less than -20ºC: within 3ºC.

5.4.2.7. Absolute Altitude: Within 10 m.

5.4.2.8. Vertical Sounding.

- Pressure: within 2 hPa.
- Temperature: within 1ºC.
- Dew-point temperature:
  From -20ºC to +40ºC: within lºC.
  Less than -20ºC: within 3ºC.

- Wind direction: within 10 deg.
  Wind speed: within 5 kt.

[NOTE: Present weather reconnaissance capabilities do not completely satisfy these requirements; data will be collected as close to stated requirements as possible.]

5.4.3. High Density/High Accuracy (HD/HA) Data Requirements. The HD/HA data include time, latitude, longitude, pressure altitude, D-value, radar altitude, peak winds, flight-level wind speed and direction, temperature, and dew-point temperature. All data provided in HDOB messages are 30-second averages, regardless of the interval at which the HDOB messages are reported. See Appendix G for HDOB message formats. The DOC requires rapid acquisition and transmission of tropical cyclone data, especially within the 24-hour period prior to landfall. If HD/HA capability is lost on an operational mission, the airborne meteorologist will immediately contact Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH) to determine data requirements for the remainder of the mission.

5.4.4. Synoptic Surveillance Data Requirements. When required, the TPC/NHC will request mid- and/or upper-tropospheric sounding data on the periphery of systems approaching the United States. The TPC/NHC and HRD will coordinate to provide specific tracks including control points, control times and dropwindsonde frequency allocations to CARCAH for coordination with the reconnaissance units.

Table 5-1. Requirement for aircraft reconnaissance data

	RECCO Section 1 plus 4ddff and 9VTTT as applicable	Vortex Data Message (VDM)	Supplemental Vortex Message (SVM)	Vertical Data WMO Temp Drop Code (FM37-VII)	High Density Observation (HDOB)
En route	Approx. every 30 minutes over water not to exceed 200 nm	NA	NA	Every 400 nm over water	None for WC-130H unless requested 30-sec interval for WC-130J
Invest area	Every 15 minutes and at major turn points	After closing a circulation	NA	NA	1-min interval for WC-130H 30-sec interval for WC-130J
Fix pattern	End points of Alpha pattern legs. When necessary with radar fix information.	Each fix.	2 per mission	Each tasked fix at or above 700 mb. Intermediate fixes and eyewall modules as requested.	1-min interval for WC-130H 30-sec interval for WC-130J

5.4.5. Required Frequency and Content of Observations. Observation requirements are summarized in Table 5-1. Deviations to these requirements will be coordinated through CARCAH. Vortex and Supplemental Vortex message format and information is shown in

Figure 5-4, Figure 5-5, Figure 5-6, and Table 5-2. Other data message formats and code breakdowns can be found in Appendix G.

5.5. Reconnaissance Planning and Flight Notification.

5.5.1. DOC Requests for Aircraft Reconnaissance Data.

5.5.1.1. Coordination. The Tropical Prediction/National Hurricane Center (TPC/NHC) will coordinate with the Central Pacific Hurricane Center (CPHC) to determine a list of the total DOC requirements for data on tropical and subtropical cyclones or disturbances for the next 24-hour period (1100 to 1100 UTC) and an outlook for the succeeding 24-hour period. This coordinated request will be provided to CARCAH as soon as possible, but not later than 1630 UTC each day in the format of Figure 5-7. Amendments will be provided as required.

5.5.1.2. Tropical Cyclone Plan of the Day. From the coordinated DOC request, CARCAH will publish the Tropical Cyclone Plan of the Day (TCPOD). The format for the TCPOD is shown in Figure 5-8. When DOC reconnaissance needs exceed DOD and DOC resources, CARCAH will coordinate with the TPC/NHC to establish priorities of requirements.

5.5.1.3. Anticipated Reconnaissance Requests. Reconnaissance requests can be anticipated for a forecast or actual storm location.

- For the Atlantic, Gulf of Mexico, Caribbean, and Central Pacific areas, the requests can be:

  < Up to four 6-hourly fixes per day when a storm is within 500 nm of landfall and west of 55ºW in the Atlantic.

  < Up to eight 3-hourly fixes per day when a storm is forecast to be within 300 nm of the U.S. coast, Hawaiian Islands, Puerto Rico, Virgin Islands, DOD installations, and other DOD assets when specified.

  < *Up to two* synoptic surveillance missions per 24-hour period for potentially landfalling storms. *Note: The 53 WRS does not view this as a change to current requirements. The 53 WRS will still be held to 5 sorties per day.*

- In the Eastern Pacific, reconnaissance missions may be tasked when necessary to carry out warning responsibilities.

- Investigative flights may be requested for disturbances in areas defined above, i.e., one or two flights per day dependent upon proximity of landfall and upon known or suspected stage of development.

- Exceptions may be made when additional reconnaissance is essential to carry out warning responsibilities.

DATE	SCHEDULED FIX TIME	AIRCRAFT NUMBER	ARWO

WX MISSION IDENTIFICATION	OB

VORTEX DATA MESSAGE

A		DATE AND TIME OF FIX
B	DEG MIN N S	LATITUDE OF VORTEX FIX
	DEG MIN E W	LONGITUDE OF VORTEX FIX
C		MINIMUM HEIGHT AT STANDARD LEVEL
D		ESTIMATE OF MAXIMUM SURFACE WIND OBSERVED
E		BEARING AND RANGE FROM CENTER OF MAXIMUM SURFACE WIND
F		MAXIMUM FLIGHT LEVEL WIND NEAR CENTER
G		BEARING AND RANGE FROM CENTER OF MAXIMUM FLIGHT LEVEL WIND
H		MINIMUM SEA LEVEL PRESSURE COMPUTED FROM DROPSONDE OR EXTRAPOLATED FROM FLIGHT LEVEL. IF EXTRAPOLATED, CLARIFY IN REMARKS.
I		MAXIMUM FLIGHT LEVEL TEMP/PRESSURE ALTITUDE OUTSIDE EYE
J		MAXIMUM FLIGHT LEVEL TEMP/PRESSURE ALTITUDE INSIDE EYE
K		DEWPOINT TEMP/SEA SURFACE TEMP INSIDE EYE
L		EYE CHARACTER: Closed wall, poorly defined, open SW, etc.
M		EYE SHAPE/ORIENTATION/DIAMETER. Code eye shape as: C -Circular; CO - Concentric; E-Elliptical. Transmit orientation of major axis in tens of degree, i.e., 01-010 to 190; 17-170 to 350. Transmit diameter in nautical miles. *Examples*: C8 - Circular eye 8 miles in diameter. EO9/15/5 - Elliptical eye, major axis 090-270, length of major axis 15 NM, length of minor axis 5NM. CO8-14 - Concentric eye, diameter inner eye 8 NM, outer eye 14 NM.
N	–	FIX DETERMINED BY/FIX LEVEL. FIX DETERMINED BY: 1 - Penetration; 2 - Radar; 3 - Wind; 4 - Pressure; 5 - Temperature. FIX LEVEL (Indicate surface center if visible; indicate both surface and flight level centers only when same): 0 - Surface; 1 - 1500ft; 9-925mb; 8 - 850 mb; 7 - 700 mb; 5 - 500 mb; 4 - 400 mb; 3 - 300 mb; 2 - 200 mb; NA - Other.
O	«	NAVIGATION FIX ACCURACY/METEOROLOGICAL ACCURACY
p	REMARKS MAX FL WIND_____KT_____QUAD_____Z SLP EXTRAP FROM (Below 1500 FT/ 925 MB/ 850 MB/ DROPSONDE) SFC CNTR_____/_____NM FROM FL CNTR MAX FL TEMP _____C_____/_____NM FROM FL CNTR	

INSTRUCTIONS: Items A through G (and H when extrapolated) are transmitted from the aircraft immediately following the fix. The remainder of the message is transmitted as soon as available.

Figure 5-4. Vortex data message worksheet

SUPPLEMENTARY VORTEX DATA MESSAGE

WX MISSION ID				OB
SUPPLEMENTARY VORTEX DATA MESSAGE				LEGEND
($L_aL_aL_a$)	($L_oL_oL_oL_o$)	(jHHH)	(TTT_dT_d)	(ddfff)
01	1	1	1	
02	2	2	2	
03	3	3	3	
04	4	4	4	
05	5	5	5	
06	6	6	6	
07	7	7	7	
MF ($L_aL_aL_a$)	M ($L_oL_oL_oL_o$)	MF (fff)		
OBS 01 AT: Z	OBS AT Z		OBS 01 SFC WND:	
01 ($L_aL_aL_a$)	1 ($L_oL_oL_oL_o$)	1 (jHHH)	1 (TTT_dT_d)	(ddfff)
02	2	2	2	
03	3	3	3	
04	4	4	4	
05	5	5	5	
06	6	6	6	
07	7	7	7	
MF ($L_aL_aL_a$)	M ($L_oL_oL_oL_o$)	MF (fff)		
OBS 01 AT: Z	OBS AT Z		OBS 07 SFC WND:	

01 INDICATOR FOR DATA COLLECTED APPROXIMATELY 105 NM FROM STORM CENTER (INBOUND) OR APPROXIMATELY 15 NM FROM CENTER (OUTBOUND)

OTHER INDICATORS (02/2, 03/3...) FOR DATA AT APPROXIMATELY 15 NM INTERVALS INBOUND OR OUTBOUND FROM STORM CENTER. INDICATORS MAY BE EXPANDED BEYOND 07(08,09...) AS NECESSARY AT APPROXIMATELY 15NM INTERVALS.

MF = INDICATOR FOR MAXIMUM FLIGHT LEVEL WIND OBSERVED

fff = SPEED OF WIND IN KNOTS

dd = TRUE DIRECTION OF FLIGHT LEVEL WIND SPEED IN TENS OF DEGREES

TTT_dT_d = TEMP/DEWPOINT IN DEGREES CELSIUS: ADD 50 FOR NEGATIVE VALUES

jHHH = PRESSURE HEIGHT DATA IN RECCO FORMAT

$L_aL_aL_a$ = LATITUDE IN DEGREES/TENTHS

$L_oL_oL_oL_o$ = LONGITUDE IN DEGREES/TENTHS

/ = DATA UNKNOWN/UNOBTAINABLE

REMARKS (*end of message*)

Figure 5-5. Supplementary vortex data message

Table 5-2. Vortex data message entry explanation

DATA ITEM	ENTRY
MISSION IDENTIFIER	As determined in Chapter 5, paragraph 5.7.6.
OBSERVATION NUMBER	A two digit number determined by the sequential order in which the observation is transmitted from the aircraft.
A (ALPHA)	Date and time (UTC) of the flight level center fix. If the flight level center cannot be fixed and the surface center is visible, enter the time of the surface center fix.
B (BRAVO)	The latitude and longitude of the center fix associated with item ALPHA. NOTE: If the surface center is fixable, enter bearing and range from the *FL* center in *Remarks*; e.g., SFC CNTR 270/15 nm, if the centers are separated by over 5 nm.
C (CHARLIE)	Indicate the standard atmospheric surface e.g. 925, 850 or 700 hPa. The minimum height of the standard surface observed inside the center. If at 1,500 ft or below or not within 1,500 ft of a standard surface, enter NA.
D (DELTA)	The maximum surface wind observed during the inbound leg associated with this fix.
E (ECHO)	Bearing and range of the maximum surface wind observed (item DELTA) from the coordinates reported in item BRAVO.
F (FOXTROT)	The maximum flight level wind observed during the inbound leg associated with this fix. If a significant secondary maximum wind is observed, report it in remarks.

Table 5-2. Vortex data message entry explanation (continued)

G (GOLF)	Bearing and range of the maximum flight level wind observed (item FOXTROT) from the coordinates reported in item BRAVO.
H (HOTEL)	The minimum sea level pressure (SLP) to the nearest hectopascal observed at the coordinates reported in item BRAVO. Preface the SLP with "EXTRAP" (extrapolated) when the data are not derived from dropsonde or when the SLP is extrapolated from a dropsonde that terminated early. Clarify the difference in remarks (e.g., SLP EXTRAPOLATED FROM BELOW 1500 FEET/850 HPA/DROPSONDE).
I (INDIA)	MAX FLT LVL TEMP--This temperature is taken just outside the central region of a cyclone (i.e., just outside the eyewall or just beyond the maximum wind band). This temperature may not be the highest recorded on the inbound leg but is representative of the environmental temperature just outside the central region of the storm. PRESSURE ALT--Pressure altitude data (meters) are taken at the same location as the maximum temperature data reported in item INDIA.
J (JULIET)	MAX FLT LVL TEMP--The maximum temperature observed within 5 nm of the center fix coordinates. If a higher temperature is observed at a location more than 5 nm away from the flight level center (item BRAVO), it is reported in *Remarks*, including bearing and distance from the flight level center. PRESSURE ALT--Pressure altitude data (meters) are taken at the same location as the maximum temperature data reported in item JULIET.
K (KILO)	Dewpoint temperature/sea surface temperature are collected at the same location as the maximum temperature reported in item JULIET. Enter NA if not observed.

Table 5-2. Vortex data message entry explanation (continued)

L (LIMA)	Only report if at least 50 percent of the center has an eyewall, otherwise enter NA. Closed wall--if the center has 100 percent coverage with no eyewall weakness. Open XX--if the center has 50 percent or more but less than 100 percent coverage. State the direction of the eyewall weakness.
M (MIKE)	Self explanatory. Report only if item LIMA is reported, otherwise enter NA.
N (NOVEMBER)	Fix determined by: Always report 1. Report 2 if radar indicates curvature or banding consistent with fix location. Report 3 if recorded or observed winds indicate a closed center. Report 4 if the fix pressure is lower than all reported on the inbound leg. Report 5 if the fix temperature is at least higher than any reported on the inbound leg. Fix level: Report 0 alone if fix is made solely on surface winds. Report 0 and the flight-level code if the centers are within 5 nm of each other.
O (OSCAR)	Navigational and meteorological accuracy are reported as the upper limit of probable error. Meteorological accuracy is normally reported as one-half of the diameter of the light and variable wind center.
P (PAPA)	Remarks to enhance the data reported above. Required remarks include: (1) mission identifier and observation number; (2) the maximum flight level wind observed, time of observation, and the relative quadrant of the storm of the observed wind on the latest pass through any portion of the storm; (3) the method of deriving the central SLP when extrapolated; and (4) the bearing and range of the surface center and/or maximum flight level temperature if not within 5 nm of the flight level center.

WC-130H

URNT12 KNHC 161821
VORTEX DATA MESSAGE
A. 16/1821Z
B. 15 DEG 30 MIN N
68 DEG 53 MIN W
C. 700 MB 2818 M
D. 70 KT
E. 263 DEG 13 NM
F. 329 DEG 81 KT
G. 263 DEG 53 NM
H. 967 MB
I. 10 C/ 3073 M
J. 18 C/ 3098 M
K. 8 C/ NA
L. OPEN SOUTH
M. E34/30/20
N. 12345/7
O. 0.1/2 NM
P. AF866 1016A LENNY OB 07
MAX FL WIND 81 KT W QUAD 1806Z

URNT14 KNHC 161853
SUPPLEMENTARY VORTEX DATA MESSAGE
01154 10713 13080 11106 32035
02154 20710 23074 21008 32039
03154 30708 33074 31107 32031
04154 40705 43064 41008 32036
05154 50703 53052 51007 33042
06154 60700 63029 61007 34056
07154 70697 73006 70909 35045
MF154 M0698 MF081
OBS 01 AT 1746Z
OBS 07 AT 1810Z
OBS 01 SFC WND 01030
01156 10687 13852 11509 13040
02158 20686 23937 21010 14082
03160 30684 33001 31010 16060
04162 40682 43028 41109 16046
05163 50680 53041 51008 17045
06165 60678 63046 61006 17055
07167 70676 73058 70908 17052
MF158 M0686 MF091
OBS 01 AT 1825Z
OBS 07 AT 1849Z
OBS 07 SFC WND /////
RMK AF866 1016A LENNY OB 11

WC-130J

URNT12 KNHC 162129
VORTEX DATA MESSAGE
A. 16/21:16:20Z
B. 15 DEG 41 MIN N
068 DEG 07 MIN W
C. NA MB 2743 M
D. NA KT
E. NA DEG NM
F. 121 DEG 087 KT
G. 034 DEG 010 NM
H. EXTRAP 957 MB
I. 7 C/ 3056 M
J. 16 C/ 3040 M
K. 10 C/ NA
L. OPEN W
M. E270/30/20
N. 12345/07
O. 0.02 / 3 NM
P. AF301 WXWXA LENNYTEST1 OB 05
MAX FL WIND 87 KT NE QUAD 21:13:30Z
SLP EXTRAP FROM 700 MB

URNT14 KNHC 162152
SUPPLEMENTARY VORTEX DATA MESSAGE
INBOUND
LAT LON jHHH TTDD ddfff
01166 10672 13038 10606 16031
02164 20674 23019 20906 17050
03162 30676 33985 30707 15052
04161 40678 43954 40909 16059
05159 50680 53868 51009 14073
MF158 M0680 MF087
OBS 01 AT 20:53:20Z
OBS 05 AT 21:12:00Z
OBS 01 SFC WND /////
OUTBOUND
LAT LON jHHH TTDD ddfff
01155 10683 13815 11605 32096
02153 20685 23929 20909 30089
03152 30687 33990 31008 31071
04150 40689 43018 41006 31060
05148 50691 53041 50909 30048
06146 60692 63050 61007 29046
07145 70694 73056 70908 28048
MF155 M0684 MF101
OBS 01 AT 21:20:50Z
OBS 07 AT 21:49:40Z
OBS 07 SFC WND 27045
RMK AF301 WXWXA LENNYTEST1 OB 07

Figure 5-6. Example Vortex Data Messages (VDM) and Supplementary Vortex Data Messages (SVDM) for the WC-130H and WC-130J

NHOP COORDINATED REQUEST FOR AIRCRAFT RECONNAISSANCE

__ Original
__ Amendment
(Check One)

I. ATLANTIC REQUIREMENTS

STORM NAME DEPRESSION # SUSPECT AREA	FIX OR ON STATION TIME	COORDINATES	FLIGHT PATTERN	FCST MVMT	NHC PRIORITY

GULFSTREAM _____

SUCCEEDING DAY OUTLOOK _____

REMARKS _____

II. PACIFIC REQUIREMENTS

STORM NAME DEPRESSION # SUSPECT AREA	FIX OR ON STATION TIME	COORDINATES	FLIGHT PATTERN	FCST MVMT	NHC PRIORITY

SUCCEEDING DAY OUTLOOK _____

REMARKS _____

III. DISTRIBUTION

A. TO CARCAH BY 1630Z OR AMEND AT ANY TIME
B. Date_____Time_____FCSTR INITIAL_____
C. 53 WRS_____AOC_____Other_____

Figure 5-7. NHOP coordinated request for aircraft reconnaissance

TROPICAL CYCLONE PLAN OF THE DAY FORMAT
--ATLANTIC AND CENTRAL PACIFIC OCEANS--

FM: CARCAH, NATIONAL HURRICANE CENTER, MIAMI, FL

TO: (AFRC-APPROVED ADDRESSEES)/(NOAA-APPROVED ADDRESSEES)

SUBJECT: THE TROPICAL CYCLONE PLAN OF THE DAY
VALID _____Z (MONTH) TO _____Z (MONTH) (YEAR)
TCPOD NUMBER.....(YR)-_____

I. ATLANTIC REQUIREMENTS

1. (STORM NAME, DEPRESSION, SUSPECT AREA) or (NEGATIVE RECON REQUIREMENTS)

FLIGHT ONE (NHC PRIORITY, if applicable)

A. _____Z FIX/INVEST TIME

_____Z

B. _____ MISSION IDENTIFIER

C. _____Z DEPARTURE TIME

D. _____ FORECAST POSITION

E. _____Z TIME ON STATION

F. _____ ALTITUDE(S) ON STATION

G. _____ REMARKS (if needed)

FLIGHT TWO (if applicable, same as FLIGHT ONE)

2. (SECOND SYSTEM, if applicable, same as in 1. above)

3. OUTLOOK FOR SUCCEEDING DAY (NHC PRIORITY, if applicable)

A. POSSIBLE _(Unit)_ ON STATION REQUIREMENT NEAR _(Location)_
AT _(Time)_ Z.

II. PACIFIC REQUIREMENTS (Same as in ATLANTIC)

Figure 5-8. Tropical cyclone plan of the day format

5.5.2. DOD and DOC Reconnaissance Aircraft Responsiveness.

5.5.2.1. Requirement Notification. Notification of requirements must precede tasked-on-station time by at least 16 hours plus en route time to the area of concern.

5.5.2.2. Prepositioning. The "Succeeding Day Outlook" portion of the TCPOD provides advance notification of requirements and authorizes units to preposition aircraft to forward operating locations. For missions requiring prepositioning, the "Succeeding Day Outlook" may not provide adequate advance notification. In this situation, an "Additional Day Outlook" may be included in the TCPOD to authorize units to preposition aircraft.

5.5.2.3. Resources Permitting. When circumstances preclude the appropriate notification lead time, the requirement will be levied as "resources permitting." When a "resources permitting" requirement is levied in an amendment, the TPC/NHC will indicate the priority of all existing or remaining requirements.

5.5.2.4. Emergency Requirement. If a storm develops unexpectedly and could cause a serious threat to lives and property within a shorter time than provided for in the paragraphs above, CARCAH will contact the reconnaissance units, or higher headquarters, as appropriate, and request assistance in implementing emergency procedures not covered in this plan. The TPC/NHC and CPHC directors have authority to declare an emergency.

5.5.3. Reconnaissance Tropical Cyclone Plan of the Day.

5.5.3.1. Preparation. CARCAH will coordinate the TCPOD (Figure 5-8) daily during the period from June 1 to November 30 and at other times during the year as required. Transmitted TCPODs will be serially numbered each season.

- CARCAH will coordinate the TCPOD with TPC/NHC, the 53 WRS, and NOAA AOC before publication.

- The TCPOD will list all DOC and DOD required tropical and subtropical cyclone operational reconnaissance. *Research missions will be listed in remarks when available by transmission time.*

- The DOD-required tropical or subtropical cyclone reconnaissance missions in the Atlantic or the Pacific west to 180º will be identified in the TCPOD as USN or USAF requirements.

- Amendments to the TCPOD will be published only when requirements change. When amended, the impact on each listed flight will be identified; i.e., No Change, Change Added, or Cancel.

5.5.3.2. Dissemination. The TCPOD will be made available to appropriate agencies, such as FAA, DOD, and NOAA, that provide support to or control of reconnaissance aircraft or are a part of the tropical cyclone warning service. Under normal circumstances, the TCPOD will be disseminated by 1900 UTC each day including weekends and holidays. If there are no current day or succeeding-day reconnaissance requirements, a negative report, which covers the appropriate time frame, will be disseminated. Amendments will be disseminated as required.

[NOTE: The TCPOD is disseminated under the header "MIAREPRPD" for AWIPS users and "NOUS42 KNHC" for AWDS users. The TCPOD can be accessed via the Internet at www.hurricanehunters.com/wxdata.htm, then click on Plan of the Day or via the Tropical Prediction Center/National Hurricane Center homepage at www.nhc.noaa.gov, then click on aircraft reconnaissance and then on Plan of the Day.]

5.5.4. Air Traffic Control (ATC) Clearances.

5.5.4.1. Air Traffic Control Clearances. Flight plans for reconnaissance and research flights shall be filed with the FAA as soon as practicable before departure time.

5.5.4.2. Prior Coordination. The 53 WRS/DOO, AOC Flight Operations Division, and the appropriate NASA *and NRL facilities* shall contact the Air Traffic Control System Command Center (ATCSCC) at (703) 708-5140/5144 as soon as possible prior to an NHOP/NWSOP reconnaissance, surveillance, or research mission, and provide the following information:

- Mission call sign.
- Departure point and estimated time of departure.
- Approximate route to be flown.
- Requested altitude(s).
- Any special requests.

They shall also contact the affected Air Route Traffic Control Center (ARTCC), or the ATCSCC shall contact the affected ARTCCs, if requested to do so. In addition, the 53 WRS, AOC, NASA, *and NRL* shall transmit via facsimile the information in Appendix D to the U.S. NOTAM office no later than 2 hours prior to departure, or as soon as possible. Transmittal of NOTAM information to the NOTAM office via other electronic means must be agreed upon in advance by the NOTAM office.

5.5.4.2.1. The 53 WRS shall only use the call sign "Teal ##," AOC shall only use "NOAA ##," NASA shall only use "NASA ##," *and NRL shall use only Warlock 587.* ATC will provide TEAL and NOAA aircraft priority handling when specifically requested.

5.5.4.3. Air Traffic Control (ATC) Separation. The FAA will provide ATC services and separation from nonparticipating aircraft on instrument flight rules to the 53 WRS, AOC, NASA, *and NRL* aircraft operating in other than Class G airspace. Aircraft not flying on instrument flight rules may be operating near the storm environment; therefore, adherence to ATC clearances is mandatory for safety. When appropriate, military pilots shall clearly state to ATC that a segment of flight will be conducted under the provisions of "due regard."

5.5.4.3.1. It is the responsibility of the aircraft commander to remain clear of obstacles and nonparticipating aircraft when operating in Class G airspace.

5.5.4.3.2. The 53 WRS, AOC, NASA, *and NRL* are responsible for ensuring that air traffic clearances and messages are relayed to/from the FAA in an accurate manner when those relays are initiated by the 53 WRS, AOC, and NASA and are routed through other than Aeronautical Radio, Inc. (ARINC).

5.5.4.3.3. CARCAH will advise the 53 WRS, AOC, NASA, *and NRL* operations centers whenever more than one PARTICIPATING AIRCRAFT will be in the area of interest at the same time. The respective operations centers will advise the affected flight crews.

5.5.4.3.4. PARTICIPATING AIRCRAFT crews will set 29.92 (inches hg) in at least one pressure altimeter. When contact is made with other PARTICIPATING AIRCRAFT, crews will confirm (as a minimum) other aircraft's pressure altitude, geographic position, and true heading. Crews will not fly within 2,000 feet (vertical) of other participants operating in the same area of interest without concurrence of other PARTICIPATING AIRCRAFT.

5.5.4.4. Assigned Altitudes. When storm aircraft are unable to maintain assigned altitudes due to turbulence, ATC shall be advised. When deviation from assigned altitude is required, the pilot shall coordinate with ATC and obtain a clearance prior to changing altitudes. When numerous changes in altitude will be required, the pilot should request a "block altitude" clearance from ATC. Any deviations from ATC clearance shall first be coordinated with the appropriate ATC facility.

5.5.4.5. Release of Dropsondes. During NHOP missions and when operationally feasible, dropsonde instrument releases from FL 190 or higher and sensor activation shall be coordinated with the appropriate *ARTCC/CERAP* by advising of a pending drop or sensor activation at least 10 minutes prior to the event when in direct radio contact with ATC. When contact with ATC is via ARINC, event coordination shall be included with the position report prior to the point where the action will take place, unless all instrument release points have been previously relayed to the affected ATC center(s). Example: "Teal 63, SLATN at 1215, FL290 block 310, estimating FLANN at 1250, CHAMP next; Weather instrument release at FLANN." Contact between participating aircraft will be made using the frequencies listed in paragraph 5.9.3.

5.5.4.5.1. During NHOP missions, commencing 5 minutes prior to release of dropsondes from FL190 or higher, the aircraft commander will broadcast in the blind on radio frequencies 121.5 MHZ and 243.0 MHZ to advise any traffic in the area of the impending drop. Pilots shall not make these broadcasts if they will interfere with routine ATC communications, such as in the vicinity of an airport approach control facility. The aircraft commander is responsible for determining the content and duration of a broadcast, concerning a dropsonde release or sensor activation.

5.5.4.5.2. The aircraft commander is the sole responsible party for all dropsonde releases or activation of sensors. Aircraft commanders will insure coordination with other PARTICIPATING AIRCRAFT prior to sensor activation or dropwindsonde release.

5.5.4.6. ATC Communications Backup. When 53 WRS, AOC, *NASA, or NRL* flights are unable to contact ATC to request an en route clearance, a clearance request may be relayed through the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH) or the 53 WRS Mission Commander/Supervisor of Flying. This backup procedure will only be used to preclude a potential emergency or safety-related situation.

5.5.4.7. Hurricane/Tropical Cyclone (NHOP) Mission Procedures. PARTICIPATING AIRCRAFT will comply with procedures in the NHOP in order to provide separation from other PARTICIPATING AIRCRAFT.

5.6. Reconnaissance Effectiveness Criteria.

5.6.1. General. Specified reconnaissance times are established to allow sufficient time for the forecaster to analyze the data before issuing an advisory. Every effort should be made to obtain data at scheduled times. The following criteria will be used to assess reconnaissance mission effectiveness:

5.6.1.1. Tropical Cyclone Fix Mission.

- ON-TIME. The fix is made not earlier than 1 hour before nor later than ½ hour after scheduled fix time.
- EARLY. The fix is made from 1 hour before scheduled fix time to one-half of the time interval to the preceding scheduled fix, not to exceed 3 hours.
- LATE. The fix is made within the interval from ½ hour after scheduled fix time to one-half of the time interval to the succeeding scheduled fix, not to exceed 3 hours.
- MISSED. Data are not obtained within the parameters specified for on-time, early, or late.

[NOTE: Appropriate credit will be given when the aircraft arrives in the requested area but is unable to locate a center due to storm dissipation or rapid movement. Credit will also be given for radar fixes if penetration is not possible due to geographic or other flight restrictions.]

5.6.1.2. Tropical Cyclone Investigative Missions.

- ON-TIME. An observation must be taken within 250 nm of the specified coordinates by the scheduled time.

- LATE. An observation is taken within 250 nm of the specified coordinates after the scheduled time but not later than the scheduled time plus 2 hours.

- MISSED. When the aircraft fails to be within the 250 nm of the specific coordinates by the scheduled time plus 2 hours or is unable to provide meaningful data.

5.6.1.3. Synoptic Surveillance Missions.

- SATISFIED. Requirements are considered satisfied upon completion of the assigned track and the acquired dropwindsonde data are transmitted from the aircraft prior to the HPC/MPC deadline for synoptic analysis.

- MISSED. When the requirements listed above are not satisfied.

5.6.2. Mission Assessment. The TPC/NHC or CPHC will provide CARCAH a written assessment of the reconnaissance mission anytime its timeliness or quality is outstanding or substandard (see Figure 5-9). Mission requirements levied as "resources permitting" will not be assessed for timeliness but may be assessed for quality of data gathered.

5.6.3. Summaries. CARCAH will maintain monthly and seasonal reconnaissance summaries, detailing requirements tasked by TPC/NHC and CPHC and missions accomplished.

5.7. Aerial Reconnaissance Weather Encoding, Reporting, and Coordination.

5.7.1. Vortex Data. A vortex data message (Figure 5-4) will be prepared for all fixes, using all observed vortex fix information, *each time the aircraft penetrates the center.*

5.7.2. Center Fix Data. When proximity to land, air traffic control restriction, or other factors prevent actual penetration of the vortex by the reconnaissance aircraft, it is permissible to fix the cyclone by radar. *Radar fixes may be reported in a vortex data message using available observed information or as a remark appended to a RECCO observation taken at fix time. The remark stating the type of radar fix and quality of the radar presentation is in accordance with Chapter 7, paragraph 7.3.2; e.g., RADAR CENTER FIX 21.5N 83.0W, POOR RADAR PRESENTATION, NAV ACCURACY 5NM.*

5.7.3. Peripheral Data. Storm penetration and collection of peripheral data will normally begin at the operational altitude approximately 105 nm from the center as determined by the flight meteorologist. The Supplementary Vortex Data Message (Figure 5-5) will be encoded and reported as specified in Table 5-1.

5.7.4. Mission Coordination. Mission coordination for all missions will be accomplished through CARCAH. Meteorological discussions for Central Pacific missions may be accomplished directly with the CPHC; however, any changes to tasking will be accomplished through CARCAH.

MISSION EVALUATION FORM

MEMORANDUM FOR: OL-A, 53WRS/CARCAH

FROM:_____(Director, NHC, CPHC)_____.

SUBJECT: Mission _____Evaluation
(Mission Identifier)

PUBLISHED REQUIREMENTS:

Premission Coordinates (As Updated Prior to TKO)_____N_____W

Flight Pattern _____

Mission Requirements Times _____

RECONNAISSANCE MISSION PERFORMANCE:

Flight Flown:	_____Completely	_____Partially	_____Other
Horizontal Data Coverage:	_____Complete _____Incomplete	_____Timely _____Untimely	_____Accurate _____Inaccurate
Vertical Data Coverage:	_____Complete _____Incomplete	_____Timely _____Untimely	_____Accurate _____Inaccurate
Requirements Accomplished:	_____On Time _____Missed	_____Early	_____Late

OVERALL MISSION EVALUATION:

OUTSTANDING_____

UNSATISFACTORY_____ FOR:

COMPLETENESS_____ TIMELINESS_____ ACCURACY_____

EQUIPMENT_____ PROCEDURES_____ OTHER_____

REMARKS: (Brief but specific)

_____
FORECASTER's SIGNATURE

Figure 5-9. Mission evaluation form

5.7.5. Post-flight Debriefing. Unless otherwise directed, the flight meteorologist will provide either an airborne or post-flight debriefing to the appropriate hurricane center through CARCAH to ensure all observations were received and understood.

5.7.6. Mission Identifier. Regular weather and hurricane reconnaissance messages will include the five-digit agency/aircraft indicator followed by the CARCAH-assigned mission/storm-system indicator. Elements of the mission identifier follow:

Agency/Aircraft	Mission Storm System Indicator			
Agency + Aircraft Number[1,2]	Sequential number of mission in this storm For non-tasked missions, WXWX, or for a numbered depression or stronger, WX+ depression number.	Two-digit depression number or two-letter identifier if not a depression or greater	Location A,E,C,or W[3]	Storm name or mission type (i.e., CYCLONE or INVEST)

-EXAMPLES-

AF966 0201C CYCLONE	(USAF aircraft 966 on the second mission on tropical depression number 1 in the Central Pacific. Invest or fix as specified in the TCPOD.)
AF984 0403E CARLOS	(USAF aircraft 984 on the fourth mission on tropical depression 3 which formed in the Eastern Pacific and acquired the name Carlos.)
NOAA2 01CCA INVEST	(NOAA aircraft 42RF on the first mission to investigate the third suspect area in the Atlantic, Gulf of Mexico or Caribbean.)
NOAA3 WX01A AGNES	(NOAA aircraft 43RF on a non-tasked mission into AGNES.)

[1] AF plus last 3 digits of tail number

[2] NOAA, plus last digit of aircraft registration number

[3] A=Atlantic, Caribbean, or Gulf of Mexico, E=Eastern Pacific, C=Central Pacific, W=Western Pacific

5.7.7. Observation Numbering and Content. Air Force aircraft movement information (i.e., departure time and location, and ETA's to locations) will not be included in observation remarks. That information should be passed to CARCAH via SATCOM administrative messages. The mission identifier will be the first mandatory remark followed by the observation number. All observations (RECCO, vortex, supplemental, and dropsonde) from the first to the last will be numbered sequentially. HDOBs will be automatically numbered sequentially but separately from other observations. When an aircraft is diverted from its original mission to fulfill TPC/NHC requirements, conclude the original mission by using the last report remark. The next observation from the diverted aircraft will use the CARCAH-assigned mission identifier, will be numbered OB 01, and will include the time of diversion.

-EXAMPLE-

RMK AF987 0lBBA INVEST OB 01 DPTD AF987 WXWXA AT 05/1235Z

5.8. <u>Operational Flight Patterns</u>. This section details the operational flight patterns that provide vortex and peripheral data on tropical and subtropical cyclones.

5.8.1. Flight Pattern ALPHA Operational Details.

5.8.1.1. Flight Levels and Sequence. Flight levels will normally be 1,500 ft, 925 hPa, 850 hPa, or 700 hPa, depending on data requirements and flight safety. Legs will normally be 105 nm long and flown on intercardinal tracks (45 degrees off cardinal tracks). The flight sequence is shown in Figure 5-10. The pattern can be started at any intercardinal point and then repeated throughout the mission. Prior to starting an inbound or outbound track the aircrew should evaluate all available data, e.g., radar presentation, satellite photo, for flight safety. Once started on course, every effort should be made to maintain a straight track and the tasked altitude. A horizontal observation is required at each leg end point. This data is transmitted immediately. The ALPHA pattern may be modified to satisfy unique customer requirements (such as extending legs to examine the wind profile of a strong storm) or because of proximity of land or warning areas.

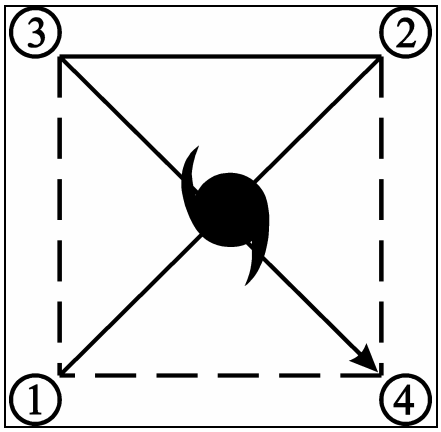

Figure 5-10. Flight pattern ALPHA

5.8.1.2. Vortex fix data. On each transit of the center a fix will be made and a vortex data message completed, using data gathered on the inbound track since the previous fix and will be transmitted immediately. Center dropsonde data will also be provided for scheduled fixes made at 700 hPa or above. The dropsonde will be released at the flight-level center coordinates (item BRAVO of the vortex data message). *For fixes when dropsonde-measured SLP is not available, an extrapolated SLP will be computed and reported.*

5.8.1.3. Supplementary Vortex Data Messages (SVDM). Two SVDM (one ALPHA pattern) will normally be provided per fix mission. Requests for additional SVDM will be directed to CARCAH. When high density data is not available, supplementary vortex data messages will be provided with each fix.

5.8.2. Investigative Missions. An investigative mission is tasked on tropical disturbances to determine the existence or non-existence of a closed circulation, supply reconnaissance observations in required areas, and locate the vortex center, if any.

5.8.2.1. Flight Levels. Flight level will normally be at or below 1,500 ft absolute altitude but may be adjusted as dictated by data requirements, meteorological conditions, or flying safety factors.

5.8.2.2. Vortex Fix. A vortex data message is required if a vortex fix is made.

5.8.2.3. Closed Circulation. A closed circulation is supported by at least one sustained wind reported in each quadrant of the cyclone. Surface winds are preferred.

5.8.2.4. Flight Pattern. The preferred approach is to fly to the tasked coordinates of the forecasted center and then execute a pattern as observed conditions dictate. Suggested patterns are the X, Box, or Delta patterns, but the flight meteorologist may choose any approach. See Figure 5-11. Turns are usually made to take advantage of tailwinds whenever possible.

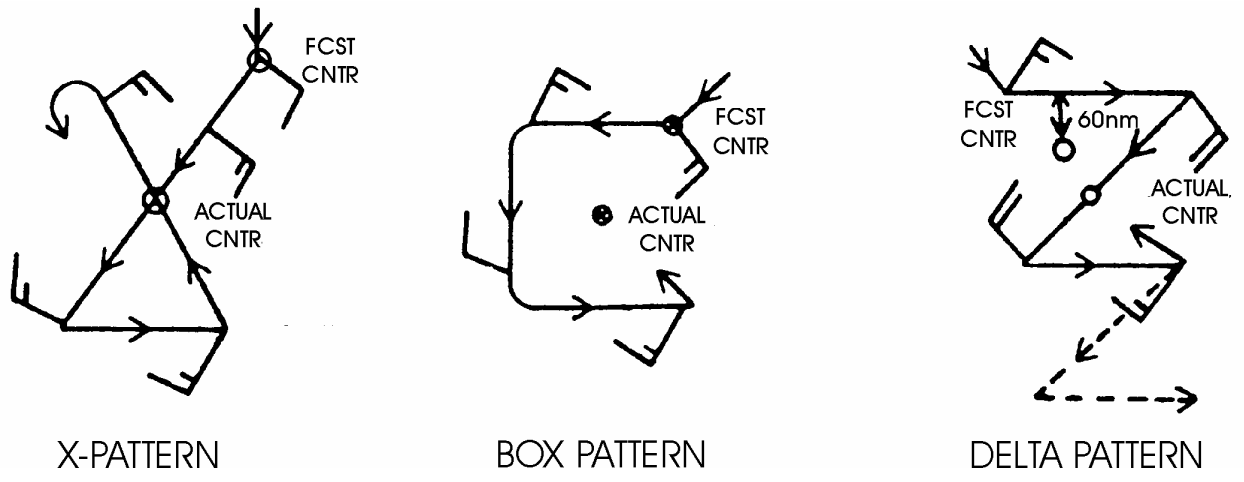

Figure 5-11. Suggested patterns for investigative missions

- On the X pattern, the aircraft is turned to head directly towards the center, as indicated by the surface or flight level winds. The aircraft is flown through the calm center until winds from the opposite direction occur (second quadrant). The aircraft is then turned to a cardinal heading until a wind shift occurs (third quadrant). Finally, the aircraft is turned towards the center and flown straight through the center to the last quadrant.

- On the Box pattern, the aircraft is flown on cardinal headings around the suspected center. The track resembles three sides of a square.

- On the Delta pattern, the aircraft is flown on a cardinal heading to pass 60 nm from the forecasted center. After observing a wind shift (second quadrant) the aircraft is turned to pass through the center until winds from the opposite direction occur (third quadrant). Finally, the aircraft is turned on a cardinal heading (parallel to the initial heading) to pick up the fourth quadrant winds. If data indicate that the aircraft is far north of any existing circulation, the pattern is extended as shown by the dashed lines.

[NOTE: The depicted pattern may be converted to a mirror image if entry is made from a different direction.]

5.8.3. Synoptic Surveillance Missions. A synoptic surveillance mission is tasked to measure the large-scale wind and thermodynamic fields within approximately 800 nautical miles of tropical cyclones. Specific flight tracks will vary depending on storm location and synoptic situation, and multiple aircraft may be required to satisfy surveillance mission requirements.

5.8.4. Eyewall and Outer-Wind Field Sampling Modules. These are patterns of dropwindsonde releases designed to measure the maximum surface wind, as well as the extent of hurricane and tropical storm force surface winds. They are meant to be flown using the operational alpha pattern. Dropwindsonde releases in these modules are in addition to any other releases required by *Table 5-1*.

5.8.4.1. Eyewall Module. While executing a standard alpha pattern to satisfy a fix requirement, one sounding will be taken during each inbound and outbound passage through the eyewall (except as noted below), for a total of four soundings. The releases should be made at or just inward (within 1-2 km) of the flight-level radius of maximum wind (RMW). If the radar presentation is suitable, the inner edge of the radar eyewall may be used to identify the release point. If possible, and when resources and safety permit, two dropwindsondes, spaced less than 30 seconds apart, should be deployed on the inbound leg on the side of the storm believed to have the highest surface winds (normally the right-hand side). In this case, the outer of the two releases should be made at the RMW, with the second release following as soon as possible. Typically, the eyewall module will be tasked within 48 hours of a forecasted hurricane landfall.

5.8.4.2 Outer-Wind Field Module. On an alpha pattern, deploy dropwindsondes at 50 nm intervals from the center on each of two successive inbound and outbound legs, outward to 200 nm. A release should also be made at the midpoint of the cross (downwind) leg, for a total of 17 soundings. The length of the legs and the sounding interval may be adjusted, depending on the size of the storm.

5.9. Aircraft Reconnaissance Communications.

5.9.1. General. The 53 WRS WC-130 and NOAA WP-3D aircraft will normally transmit reconnaissance observations via the Air Force Satellite Communications System (AFSATCOM), commercial SATCOM or high frequency (HF) radio phone patch. Figures 5-12 and 5-13 depict the ASDL and AFSATCOM communications links. The NOAA G-IV will normally transmit WMO Temp Drop messages via commercial SATCOM. Flight meteorologists should contact CARCAH following the first fix, and periodically throughout the mission.

5.9.2. Air-to-Ground Communications (HF Radio). The weather reconnaissance crew may relay weather data via direct telephone patch to the weather data monitor. Monitors will evaluate these reports and disseminate them through the Air Force's Automated Weather Network (AWN) or to the weather communications facility at Suitland, Maryland. When requested, aeronautical stations will provide a discrete frequency for mission use, if possible. Specific radio procedures and terminology will comply with Allied Communications Publication 125, Standard Telephone and Radio Procedures. The use of IMMEDIATE precedence for transmission of hurricane reconnaissance data is authorized because of the perishable nature and potential operational impact of weather data. Data will be routed by direct phone patch between the aircraft and CARCAH.

5.9.3. Air-to-Air Communications. When more than one aircraft is known to be operating in a particular area of interest, the following frequencies will be used for airplane-to-airplane communications and coordination unless otherwise directed by air traffic control:

- Primary: VHF 123.05 MHZ
- Secondary: UHF 304.8 MHZ
- Back-up: HF 4701 KHz USB

5.9.4. Aircraft-to-Satellite Data Link (ASDL) Equipped Aircraft. Aircraft equipped with ASDL have the option to utilize the ASDL system. Prior to the beginning of the hurricane season, each ASDL-equipped aircraft will perform a ground or airborne test of the equipment and data ground handling procedures to determine the equipment reliability, transmission errors, and time lapse between transmission of the data from the aircraft and receipt of the data by the hurricane forecaster. Test data will be forwarded to the Chairman, Working Group for Hurricane and Winter Storms Operations and Research.

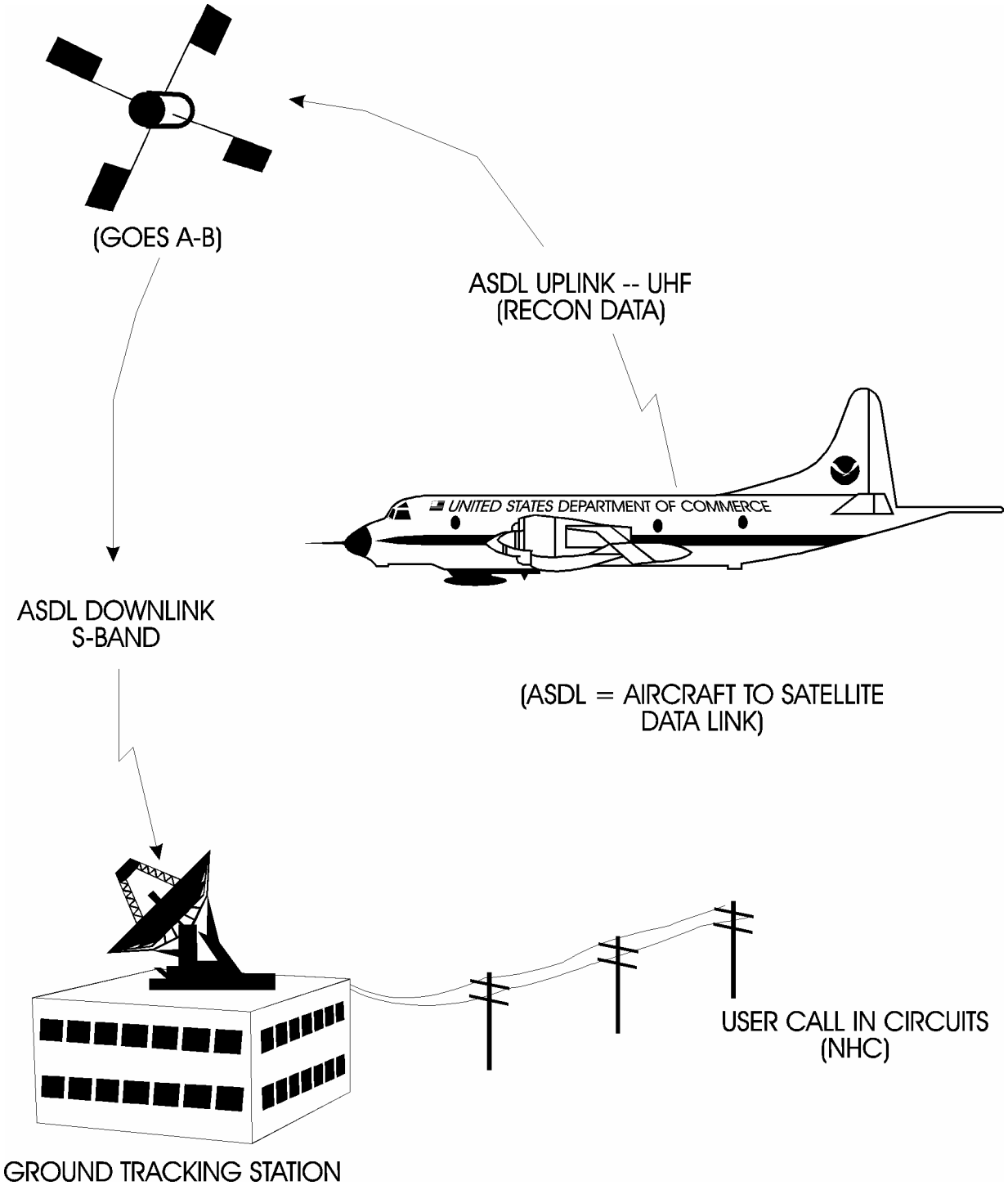

Figure 5-12. Schematic of aircraft-to-satellite data link for NOAA P-3 aircraft

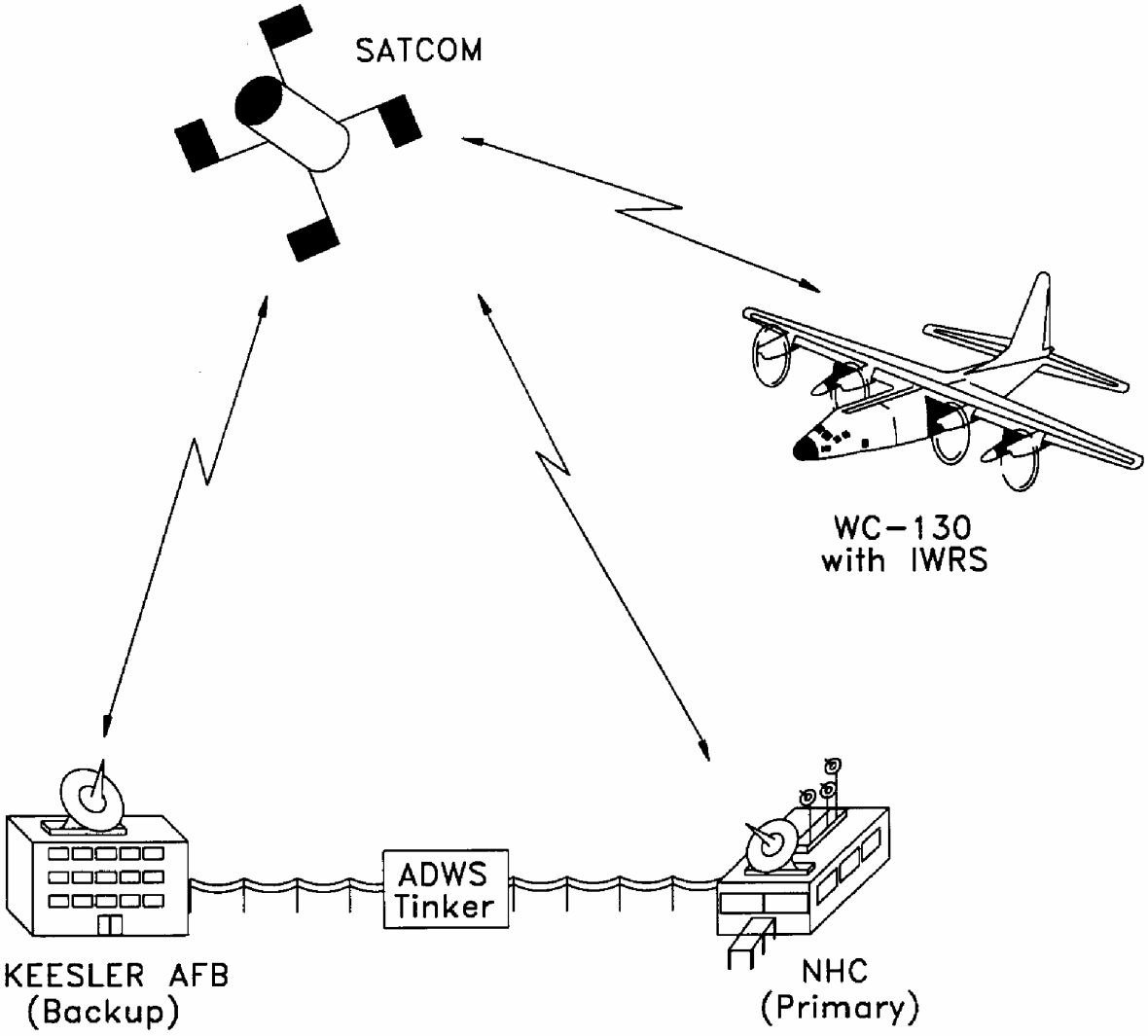

Figure 5-13. Schematic of aircraft-to-satellite data link for AFRC WC-130 aircraft

CHAPTER 6

SATELLITE SURVEILLANCE OF TROPICAL AND SUBTROPICAL CYCLONES

6.1. Satellites.

6.1.1. Geostationary Operational Environmental Satellite (GOES). Using modern 3-axis stabilization for orbit control, GOES-12 at 75°W and GOES-10 at 135°W support the operational two-GOES constellation. Independent imager and sounder instruments eliminate the need to time share, yielding an increase in spatial coverage of image and sounder data at more frequent scanning intervals. The GOES also provides higher resolution and additional spectral channels than its predecessor, affording the hydrometeorological community improvements in detection, monitoring, and analysis of developing tropical cyclones. From 135°W and 75°W, routine GOES satellite data coverage is extensive, stretching from the central Pacific through the Americas to the eastern Atlantic, including the vital breeding grounds for tropical cyclones.

Routinely, each GOES schedule provides two views of the CONUS (GOES-10 view is termed PACUS) every 30 minutes. More frequent interval scans can be employed to support NOAA's warning programs, including the tracking of tropical and subtropical cyclones. Government agencies and the private sector have access to digital data transmissions directly from NOAAPORT or directly from GOES.

The current series of GOES satellites provide satellite data generated from full resolution, and imager and sounder data. Imagery at 1, 4, and 8 km resolution is available for daytime and nighttime applications. The increased resolution of the satellite imagery is a vast improvement from previous satellites. Visible data are available at 1 km, “shortwave” infrared (channel 2 data) as well as the infrared channels 4 and 5 are available at 4 km resolution, and water vapor (channel 3) is available at 8 km resolution on GOES-10 and 4 km resolution on GOES-12. Channel 2 data are valuable for the detection of low clouds, fog, stratus, and surface hot spots; channel 5 data, available on GOES-10, in combination with data from channels 2 and/or 4 are useful for detecting volcanic ash in the atmosphere. On GOES-12, channel 5 is replaced by a new 13.3 micron channel 6 that detects the presence of CO_2. Channel 6 improves the measurement of the height of clouds and volcanic ash, thus improving computer model forecasts and ash warnings to the aviation community. The digital data may be enhanced to emphasize different features as desired. A suite of digital data and products is available to users in the National Weather Service (NWS), the National Environmental Satellite, Data, and Information Service (NESDIS), other Federal agencies, the academic community, and many private agencies, both national and international. These data are made available through NOAAPORT, RAMSDIS, the Internet, and other means such as local networks.

6.1.1.1. GOES-12. GOES-12, launched July 23, 2001, supports the GOES-East station at 75°W and serves NOAA operations, to include the TPC/NHC, other Federal agencies, and the private sector. Various imager channels at higher resolutions are being utilized to monitor the intensification and movement of tropical cyclones over the Atlantic Ocean and a

portion of the East Pacific. In particular, greater detail in the imagery facilitates tropical cyclone monitoring and analysis, and the use of the GOES imager channel 2 has vastly improved the detection of low-level circulation centers at night to assist in storm positioning. Retrievals from the GOES sounder are now being incorporated into NCEP's numerical models to improve model output. In addition, sounder data are being exploited to generate derived product imagery such as total precipitable water, atmospheric stability indices, surface temperatures and cloud heights.

During the 1996 hurricane season, NESDIS instituted a specialized GOES-East sounder schedule consisting of four sectors covering distinct areas of the Atlantic Ocean. Of the four sounder sectors, the CONUS sector is scanned every hour and covers the northern Gulf of Mexico and the east coast of the United States. During routine scanning operations, of the other 3 sounder sectors (the Gulf of Mexico, North Atlantic, and the East Caribbean) the Gulf of Mexico sector is designated as the “primary OCONUS” (off CONUS) sector and is scanned 4 times in a 6 hour period, while the other two sectors are only scanned once in every 6 hour period. Event driven, this “primary OCONUS” sounder sector can be changed by the TPC/NHC. The "primary" OCONUS sector provides frequent scans over the area of interest to generate experimental sounder winds (identifies steering currents) and provide moisture and temperature retrievals. Sounder winds are made available to TPC/NHC as a forecasting tool by the Cooperative Institute for Mesoscale Meteorological Studies (CIMSS), University of Wisconsin.

6.1.1.2. GOES-10. GOES-10 was launched on April 24, 1997, and supports the GOES-West station at 135°W. The routine scanning mode of GOES-10 provides coverage of the Northern and Southern Hemisphere eastern Pacific Ocean as well as the western United States. The GOES-West satellite also supports the missions of both the TPC/NHC and the CPHC, and provides coverage of developing tropical cyclones over the East and Central Pacific. The DOD and other Federal agencies are also supported.

6.1.1.3. GOES-9. GOES-9 was launched May 23, 1995. While the satellite has some momentum wheel problems, GOES-9 is currently stationed over the West Pacific at 155°E and is being used operationally for weather surveillance. This operation is the result of an agreement between NOAA and the Japanese Meteorological Agency (JMA) to ensure the continuity of weather satellite operations when GMS-5 was taken out of operation in mid-2003. *JMA launched MTSAT-1R on February 24, 2005. MTSAT-1R will replace GOES-9 in mid-July 2005.*

6.1.1.4. GOES-11. GOES-11 was launched on May 3, 2000. GOES-11 carries the same imager and instrumentation capabilities as GOES-10. GOES-11 is stored on orbit at 105°W until required to replace either of the older operational satellites.

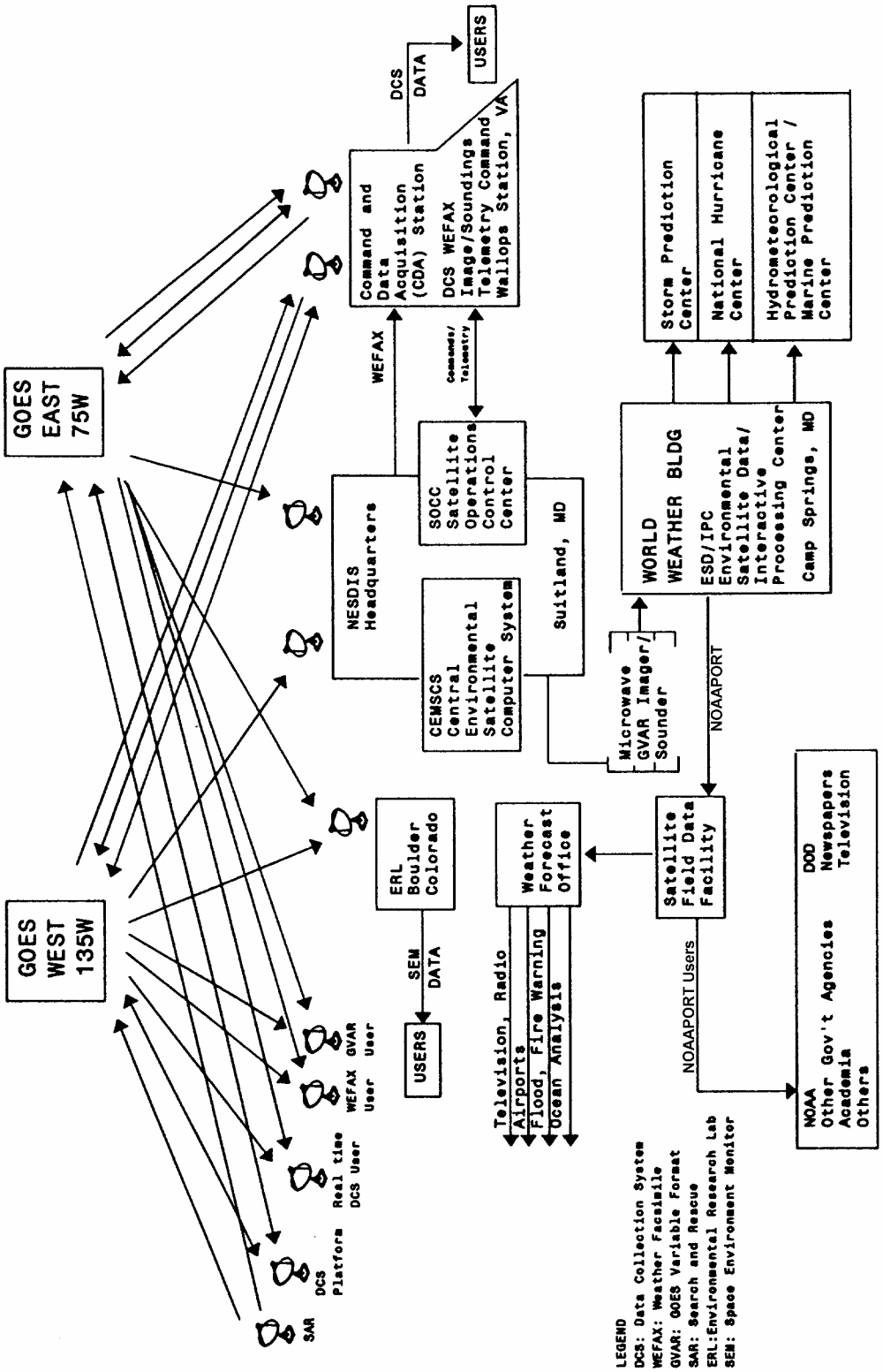

Figure 6-1. The GOES satellite system

6.1.1.5 GOES-N. *GOES-N is scheduled to be launched in May 2005. GOES-N is a clone of and will carry the same imager and instrumentation capabilities as GOES-12.*

(NOTE: For GOES imager/sounding schedules go to http://www.ssd.noaa.gov/PS/SATS/)

6.1.2. EUMETSAT Meteosat Geostationary Satellites. Meteosat-8, launched Aug 28, 2002, will replace Meteosat-7 and provides vital coverage of developing tropical waves off the African Coast and eastern Atlantic Ocean. Conventionally, the full disk IR, visible (VIS), and water vapor imagery have a 3km resolution whereas a specialized VIS sector provides a maximum 1 km resolution. This visible sector has a limited scan, and will shift from the West Indian Ocean to the East Atlantic Ocean from 14:00 UTC to 01:00 UTC every day during hurricane season. This shift will ensure interests monitoring for tropical activity in the North Indian Ocean (Meteo-France) as well as the East Atlantic (TPC) will be satisfied. The digital data are transmitted to NESDIS and NCEP at the NOAA Science Center (NSC) in Camp Springs, MD, every 15 minutes. They are also available to the TPC and the Storm Prediction Center (SPC) through central processing at the NSC. Meteosat WEFAX data are also available and distributed via the GOES WEFAX system and through NOAAPORT as part of a northern hemisphere composite image.

In December 1995, EUMETSAT, the program administrator, began encrypting digital Meteosat data 24 hours per day to regulate use within Europe. Based on international data policy agreements, U.S. non-government users are allowed access via a domestic satellite to non-encrypted Meteosat data 8 times per day at synoptic times; at other times, the data are encrypted. Hence, if half-hourly transmissions are required to support operational requirements, it is necessary for users to register with EUMETSAT to acquire decryption devices for installation at their local site (NOAA/DOD and other U.S. government agencies are registered).

6.1.3. MTSAT-1R. *The Japanese Meteorological Agency (JMA) launched the Multifunction al Transport SATellite – 1R (MTSAT-1R) on February 28, 2005. This satellite is scheduled to replace GOES-9 on or about June 1, 2005. MTSAT-1R will be located at 140° East, covering the West Pacific Ocean, Easter Asia, and the Eastern Indian Ocean. MTSAT-1R is similar to GOES as it will carry a 5 channel imager (one visible channel at 1 km plus four IR channels at 5 km). Data from MTSAT-1R will be available to CONUS users via the DOMestic SATellite (DOMSAT) or from the NOAA Science Center.*

6.1.4. National Oceanic and Atmospheric Administration (NOAA) Polar-Orbiting Satellites. Two primary operational NOAA polar orbiting satellites, NOAA-16 and NOAA-17, provide image coverage four times a day over a respective area in 6 spectral channels (however only 5 channels can be supported at one time; channel switching is used to support the 6th channel). These satellites cross the U.S. twice per day at 12-hour intervals for each geographical area near the Equatorial crossing times listed in Table 6-1. NOAA-16 and NOAA-17 provide the same capabilities as previous NOAA satellites, except for the addition of an Advanced Microwave Sounder Unit (AMSU). Data are available via direct readout--high resolution picture transmission (HRPT) or automatic picture transmission (APT)--or central processing. Data from the Advanced Very High Resolution Radiometer (AVHRR) are available on a limited basis through the GOES distribution system (Figure 6-1). The Air Force Weather Agency (AFWA), Offutt AFB, NE, receives global NOAA imagery data direct from central readout sites on a pass-by-pass basis. The Command and Data Acquisition (CDA) stations at Fairbanks, AK, and Wallops, VA, acquire recorded global area coverage data, and then route the data to NESDIS computer facilities in Suitland, MD, where the data are processed and distributed to the NOAA, the DOD, and private communities. Ground equipment installed at various NWS regions including Kansas City and Miami (TPC), enable direct readout and data processing of AVHRR data from NOAA-16 and NOAA-17. The high resolution polar data and products generated at TPC complement other satellite data sources to support tropical mission objectives.

6.1.4.1. NOAA-N. *NOAA-N is scheduled to be launched in May 2005. NOAA-N will have the same capabilities as NOAA-16 and NOAA-17.*

6.2. National Weather Service (NWS) Support.

6.2.1. Station Contacts. The GOES imagery is available in support of the surveillance of tropical and subtropical cyclones at specific NWS offices. Satellite meteorologists can be contacted at these offices; telephone numbers are in Appendix I.

6.2.2. Products. In addition to the satellite-related products listed in paragraphs 3.6.1, 3.6.2, and 3.6.3, there are two additional satellite products issued by the centers and their alternates.

6.2.2.1. Satellite Tropical Weather Discussions. TPC/NHC issues these discussions four times a day. They describe significant features from the latest surface analysis and significant weather areas for the Gulf of Mexico, the Caribbean, and between the equator and 32°N in both the Atlantic and eastern Pacific east of 140°W.

6.2.2.2. Satellite Interpretation Message. CPHC issues these messages four times a day to describe synoptic features and significant weather areas in the vicinity of the Hawaiian Islands. FAA contractions are used.

6.3. NESDIS Satellite Analysis Branch (SAB). The SAB operates 24 hours a day to provide satellite support to the HPC/OPC, TPC, CPHC, JTWC, and other worldwide users. SAB coordinates, as conditions warrant, four times per day with TPC and CPHC, relaying pertinent

information on tropical cyclone development, including location, tracking, and intensity analysis. A Satellite Weather Bulletin for the Indian Ocean and West Pacific Ocean, providing current position and current intensity of tropical cyclones, is also disseminated four times per day at the times indicated in Table 6-1. For numerical model input and forecasting applications, data from high density cloud motion wind vectors, high density water vapor wind vectors, four layers of derived precipitable water from sounder moisture retrievals, and tropical rainfall estimates are provided to HPC and TPC. Telephone numbers for the SAB are located in Appendix H.

6.4. Air Force Support and the Defense Meteorological Satellite Program (DMSP). Data covering the National Hurricane Operations Plan areas of interest are received centrally at the Air Force Weather Agency (AFWA) and locally at several direct readout sites. The USAF uses all available meteorological satellite data when providing fix and intensity information to NWS hurricane forecasters. The DOD will provide DMSP coverage of tropical and subtropical cyclones whenever possible.

6.4.1. North Atlantic and Eastern Pacific Surveillance. AFWA readouts will augment NESDIS surveillance for the North Atlantic and Eastern Pacific. AFWA will, resources permitting, transmit four daily electronic text bulletins, describing the location and intensity classification of the system, using format shown in Figure 6-2 to the TPC/NHC on organized disturbances evident at the tropical classification of one point five (T-1.5) or higher. AFWA will, resources permitting, provide gale wind radius analysis utilizing SSM/I data for all systems with maximum intensities greater than 50 kt.

6.4.2. Central Pacific Surveillance. AFWA will maintain the capability to provide surveillance support cited in para 6.4.1 to the CPHC. The 17 OWS/WXJ (JTWC Satellite Operations) will provide fix and intensity information to the CPHC on systems upon request.

Table 6-1. Communications headings for satellite tropical weather discussion summaries

WMO HEADING	TIME ISSUED	OCEANIC AREA	TYPE OF DATA
ATHW40 PHFO	0030, 0530, 1230, 1830 UTC	Vicinity of the Hawaiian Islands	VIS/IR
AXNT20 KNHC	0000,0600, 1200,1800 UTC	Atlantic Ocean South of 32EN to Equator.... Caribbean, Gulf of Mexico	VIS/IR
AXPZ20 KNHC	0135, 0735 1335, 1935 UTC	Eastern Pacific South of 32EN to the Equator.... east of 140E W	VIS/IR
WWPN20 KWBC	0400, 1000, 1600, 2200 UTC	West Pacific Ocean	VIS/IR
WWPS20 KWBC	0400, 1000, 1600, 2200 UTC	South Pacific Ocean	VIS/IR
WWIO20 KWBC	0400, 1000, 1600, 2200 UTC	North Indian Ocean	VIS/IR
WWIO21 KWBC	0400, 1000, 1600, 2200 UTC	South Indian Ocean	VIS/IR

MESSAGE HEADING:
TPNT KGWC (Atlantic) or **TPPZ1 KGWC** (Eastern and Central Pacific)

A CYCLONE DESIGNATOR	A. Designator of tropical cyclone category including name/number. When a cloud system has not yet been designated by name/number enter TROPICAL DISTURBANCE. Sample entry: TROPICAL STORM AMY (15)
B DATE/TIME (Z) OF FIX	B. Date and nodal crossing time in Zulu; round time to nearest minute. Sample entry: 252303Z.
C LATITUDE OF POSITION	C. Latitude to nearest tenth of degree (N or S), followed by checksum. Sample entry: 29.9N/0
D LONGITUDE OF POSITION	D. Longitude to nearest tenth of degree followed by checksum. Sample entry: 56.7 W/8
E VIS/IR POSITION CODE NUMBER SSM/I CONFIDENCE NUMBER	E. Enter SSM/I Confidence Number and source of data (DMSP, NOAA, etc.). Spell out VIS/IR Position Code Number (PCN). Select MI Confidence Number and PCN number from code below: GEOGRAPHICAL GRIDDING: ONE: eye fix; THREE: well defined circulation center; FIVE: poorly defined circulation center EPHEMERIS GRIDDING: TWO: eye fix; FOUR: well defined circulation center; SIX: poorly defined circulation center Sample entry: MI4/DMSP/SIX
F DVORAK CLASSIFICATION	F. Dvorak classification for storm intensity as described in NOAA Technical Report NESDIS 11. Dvorak classification will be made a minimum of twice each day based on infrared and/or visual data. If a new Dvorak classification number cannot be derived, use the last reported number. Include in parentheses the date and nodal time of the data on which the Dvorak analysis is based. Sample entry: T 4.5/4.5/D1.0/25HRS (252305Z)
G REMARKS	G. Include information, as appropriate, on data type, eye characteristics, spiral rainbands, unexpected changes in storm movement, departures from Dvorak (modeled) intensities, etc.
H NADIR REFERENCE DISTANCE	H. Include crosstrack distance in degrees latitude between fix center and satellite nadir subtrack. Sample Entry: Center WAS 5.4 DEG EAST OF NADIR
I GALE WIND RADIUS ANALYSIS	I. Experimental gale wind (34kt) radius boundary utilizing image mapped SSM/I ocean surface wind speed algorithm estimates. Sample Entry: Gale Wind Radius Anal-Boundary Compass Points

DIR	DIST-NM	LAT	LONG
1. N	140	29.4N	88.2W
2. NE	130	28.9N	86.6W
3. E	80	27.0N	86.7W
4. SE	65	26.2N	87.4W
5. S	65	25.9N	88.2W
6. SW	65	26.3N	89.3W
7. W	80	27.0N	89.7W
8. NW	95	28.5N	89.2W

Figure 6-2. Center fix data form and message format (satellite)

6.5. <u>Satellites and Satellite Data Availability for the Current Hurricane Season</u>. Table 6-2 lists satellite capabilities for the current hurricane season.

Table 6-2. Satellite and satellite data availability for the current hurricane season

SATELLITE	TYPE OF DATA	LOCAL TIME	PRODUCTS
GOES-9 at 155°E GOES-10 at 135°W GOES-11 *(on-orbit storage at 105°W)* GOES-12 at 75°W	Multispectral Imager and Sounder 5 Channels for Imager 19 Channels for Sounder	*GOES-12 and GOES-10: Every 30 min, in Routine Scan Mode, provides 3 sectors with prescribed coverages: Northern Hemisphere (NH) or Extended NH; CONUS or PACUS; and Southern Hemisphere. Exception is transmission of full disk every 3 hours. (Available Rapid Scan Operations yield increased transmissions to 7.5 minute intervals to capture rapidly changing, dynamic weather events).* *GOES-9: Provides one full disk scan every hour at xx:25, provides a Northern Hemisphere scan in between every three hours including a 9.5 minute "short" full disk scan.*	1. 1, 2, 4, and 8 km resolution visible standard sectors. 2. 4 km equivalent resolution IR sectors. 3. Equivalent and full resolution IR enhanced imagery. 4. Full disk IR every 3 hours. 5. 8 km water vapor sectors.(4 km on GOES-12) 6. Quantitative precipitation estimates; high density cloud and water vapor motion wind vectors; and experimental visible and sounder winds. 7. Operational moisture sounder data (precipitable water) in four levels for inclusion in NCEP numerical models. Other sounder products including gradient winds, vertical temperature and moisture profiles, mid-level winds, and derived product imagery (precipitable water, lifted index, and surface skin temperature). 8. Tropical storm monitoring and derivation of intensity analysis. 9. Volcanic ash monitoring and dissemination of Volcanic Ash Advisory Statements. 10. Daily northern hemisphere snow cover analysis. 11. Twice daily fire and smoke analysis over specific areas within CONUS.

Table 6-2. Satellite and satellite data availability for the current hurricane season (continued)

SATELLITE	TYPE OF DATA	LOCAL TIME	PRODUCTS
METEOSAT-7	Multi-spectral Spin-Scan Radiometer	Full disk image every half hour	1. 2.5 km resolution digital VIS imagery; 5 km resolution digital IR imagery. 2. 5 km resolution VIS and IR WEFAX imagery. 3. 5 km water vapor imagery. 4. Tropical storm monitoring and derivation of intensity analysis.
METEOSAT-8 (will replace METEOSAT-7 by the end of 2005)	*Multi-spectral Spin-Scan Radiometer (SEVIRI) and High Resolution Visible (HRV)*	*SEVIRI: Full disk image every 15 minutes.* *HRV: Sector scan to move with local noon.*	*1. 1 km resolution digital VIS imagery (HRV); 3 km resolution digital IR imagery (SEVIRI.* *2. 3 km resolution VIS and IR WEFAX imagery.* *3. 3 km water vapor imagery.* *4. Tropical storm monitoring and derivation of intensity analysis.* *5. Volcanic ash detection and analysis.*
MTSAT-1R (will replace GOES-9 in July 2005)	*Multi-band imager (Visible plus 4 IR channels)*	*Hourly Full disk and two Northern Hemisphere scans per hour, with special "quadrant" scans four per hour.*	*1. 1 km resolution digital VIS imagery* *2. 5 km resolution digital IR imagery and water vapor* *4. Tropical storm monitoring and derivation of intensity analysis.* *5. Volcanic ash detection and analysis*

Table 6-2. Satellite and satellite data availability for the current hurricane season (continued)

SATELLITE	TYPE OF DATA	LOCAL TIME	PRODUCTS
TRMM (NASA Tropical Rainfall Measuring Mission)	*85 and 37 GHz Microwave*	*Fluctuates from 30°N to 30°S*	*1. 15 km resolution microwave coverage of the tropics from 30°S to 30°N.* *2. Microwave analysis of 85 and 37 GHz radiance composited passes.* *3. Brightness temperature products of the 85 and 37 GHz horizontal and vertical polarization. Derived rain-rate products.*
NOAA-17 NOAA-16	AVHRR; GAC and LAC (recorded); HRPT (direct); AMSU; HIRS	1025D[1]/2225A[2] 0239D/1439A	1. 1 km resolution HRPT and Local Area Coverage (LAC) data. 2. 4 km resolution APT and Global Area Coverage (GAC) data. 3. Mapped imagery. 4. Unmapped imagery (all data types) at DMSP sites. 5. Sea-surface temperature analysis. 6. Soundings. 7. Moisture profiles. 8. Remapped GAC sectors. 9. Sounding-derived products--total precipitable water, rain rate, and surface winds under sounding 10. Daily northern hemisphere snow cover analysis. 11. Twice daily fire and smoke analysis over specific areas within CONUS.

[1] D - descending

[2] A - ascending

Table 6-2. Satellite and satellite data availability for the current hurricane season (continued)

SATELLITE	TYPE OF DATA	LOCAL TIME	PRODUCTS
DMSP F-12	OLS Imagery (direct only), SSM/I (non-functional), SSM/T-1 (non-functional), SSM/T-2 (direct only)	0504D/1704A	1. 0.3 nm (regional) and 1.5 nm (global) resolution (visual and infrared) imagery available via stored data recovery through AFWA. 2. Regional coverage at 0.3 nm and 1.5 nm resolution (visual and infrared) imagery available from numerous DOD tactical terminals. 3. SSM/T-1, SSM/T-2, SSM/I, and *SSM/IS* data transmitted to NESDIS and FNMOC from AFWA.
DMSP F-13	OLS Imagery (recorded and direct), SSM/I, SSM/T-1	0631D/1831A	
DMSP F-14	OLS Imagery (recorded and direct), SSM/I, SSM/T-1 (inop), SSM/T-2	0701D/1901A	
DMSP F-15	OLS Imagery (recorded and direct), SSM/I, SSM/T-1, SSM/T-2	0858D/2058A	
DMSP F-16	OLS Imagery (recorded and direct), *SSM/IS*	0810D/2010A Note: Times are accurate to +/- 5 minutes	

6.6. Current Intensity and Tropical Classification Number. The current intensity (C.I.) number relates directly to the intensity of the storm. The empirical relationship between the C.I. number and a storm's wind speed is shown in Table 6-3. The C.I. number is same as the tropical classification number (T-number) during the development stages of a tropical cyclone but is held higher than the T-number while a cyclone is weakening. This is done because a lag is often observed between the time a storm pattern indicates weakening has begun and the time when the storm's intensity decreases. An added benefit of this rule is the stability it adds to the analysis when short-period fluctuations in the cloud pattern occur. In practice, the C.I. number is not lowered until the T-number has shown weakening for 12 hours or more.

Table 6-3. The empirical relationship* between the C.I. number and the maximum wind speed and the relationship between the T-number and the minimum sea-level pressure

C.I. NUMBER	MAXIMUM WIND SPEED	T-NUMBER	MINIMUM SEA-LEVEL PRESSURE (Atlantic)	(NW Pacific)
1	25 kt	1		
1.5	25	1.5		
2	30	2	1009 hPa	1000 hPa
2.5	35	2.5	1005	997
3	45	3	1000	991
3.5	55	3.5	994	984
4	65	4	987	976
4.5	77	4.5	979	966
5	90	5	970	954
5.5	102	5.5	960	941
6	115	6	948	927
6.5	127	6.5	935	914
7	140	7	921	898
7.5	155	7.5	906	879
8	170	8	890	858

*Dvorak, V, 1984: Tropical Cyclone Intensity Analysis Using Satellite Data. NOAA Tech Report NESDIS 11, Washington, D.C.

CHAPTER 7

SURFACE RADAR REPORTING

7.1. General. Radar observations of tropical cyclones will be made at Department of Defense (DOD), National Weather Service (NWS), and Federal Aviation Administration (FAA) Weather Surveillance Radar-1988 Doppler (WSR-88D) facilities. Participating radar sites are listed in Table 7-1.

7.2. The WSR-88D. The WSR-88D is a computerized radar data collection and processing system. The design and implementation of the WSR-88D was a joint effort of the DOD, NWS, and FAA, and the utilization of the radar continues to be governed by tri-agency agreement. The WSR-88D is an S-band (10-cm), coherent radar, with a nominal beam width of 1 degree. The maximum data ranges are 248 n mi. (reflectivity) and 124 n mi. (velocity). Radar scanning strategies are selectable, using predetermined volume coverage patterns (VCP). The VCP in use depends upon which weather phenomena are under surveillance. Once the radar data has been collected, it is processed automatically at the radar site by a suite of algorithms which provide graphical products for forecaster use. TPC/NHC, as an external user, obtains these products through a *network* connection. CPHC controls and operates four WSR-88Ds in Hawaii and obtains products directly.

7.3. Procedures. As a tropical cyclone approaches, TPC/NHC uses the WSR-88D to perform radar center-fixing and to obtain other diagnostic information. Therefore, it is important to optimize WSR-88D performance for tropical cyclones and to allow other users, especially the TPC/NHC, access to radar products in the area of landfall. Most of the changes must be issued through the Master System Control Function (MSCF), Human Computer Interface (HCI). To facilitate this process, TPC/NHC in cooperation with the Radar Operations Center (ROC) has developed an operations plan for use during tropical cyclone events. The current tropical cyclone operations plan is available as a sub-link to the National Hurricane Operations Plan on the OFCM web site at http://www.ofcm.gov/homepage/text/pubs.htm. It is also available via fax from the ROC Hotline (1-800- 643-3363).

7.3.1. Radar Observation Requirements, WSR-88D. Chief among the requirements is the appropriate display of hurricane-force winds. Changes must be made at the radar site, guided by the WSR-88D Tropical Cyclone Operations Plan, in order to deal effectively with hurricane conditions. The physical characteristics of the tropical cyclone are best represented by use of the precipitation mode, usually VCP 11, 21 *or 121*, depending upon range. Radar characteristics of hurricanes are given in Federal Meteorological Handbook Number 11 (FMH-11), Part B, Chapter 9. Further discussion of product usage appears in FMH-11, Part D, Unit Description and Operational Applications. A recommended product list appears in FMH-11 Part D, Application versus Product Table 4-1.

Table 7-1. Participating radar stations [1]

LOCATION	RADAR TYPE	LATITUDE	LONGITUDE
	NATIONAL WEATHER SERVICE RADARS U.S. Gulf and Atlantic coast		
Albany, NY	WSR-88D	42E35' N	74E04' W
Atlanta, GA	WSR-88D	33E22' N	84E34' W
Binghamton, NY	WSR-88D	42E12' N	75E59' W
Birmingham, AL	WSR-88D	33E10' N	86E46' W
Boston, MA	WSR-88D	41E57' N	71E08' W
Brandon/Jackson, MS	WSR-88D	32E17' N	89E59' W
Brownsville, TX	WSR-88D	25E55' N	97E25' W
Caribou, ME	WSR-88D	46E02' N	67E48' W
Charleston, SC	WSR-88D	32E33' N	80E47' W
Columbia, SC	WSR-88D	32E39' N	81E03' W
Corpus Christi, TX	WSR-88D	27E47' N	97E31' W
Ft. Worth, TX	WSR-88D	32E34' N	97E18' W
Greer, SC	WSR-88D	34E53' N	82E13' W
Houston, TX	WSR-88D	29E28' N	95E05' W
Huntsville/Hytop, AL	WSR-88D	34E56' N	86E05' W
Jacksonville, FL	WSR-88D	30E29' N	81E42' W
Key West, FL	WSR-88D	24E36' N	81E42' W
Lake Charles, LA	WSR-88D	30E07' N	93E13' W
Melbourne, FL	WSR-88D	28E07' N	80E39' W
Miami, FL	WSR-88D	25E37' N	80E25' W
Mobile, AL	WSR-88D	30E41' N	88E15' W
Morehead City, NC	WSR-88D	34E46' N	76E53' W
New Orleans/Baton Rouge LA	WSR-88D	30E20' N	89E50' W
New York City, NY	WSR-88D	40E52' N	72E52' W
Philadelphia, PA	WSR-88D	39E57' N	74E25' W
Portland, ME	WSR-88D	43E53' N	70E15' W
Raleigh/Durham, NC	WSR-88D	35E40' N	78E29' W
Roanoke, VA	WSR-88D	37E01' N	80E16' W
San Antonio, TX	WSR-88D	30E43' N	97E23' W
Shreveport, LA	WSR-88D	32E27' N	93E50' W
State College, PA	WSR-88D	40E55' N	78E00' W
Sterling, VA	WSR-88D	38E58' N	77E29' W
Tallahassee, FL	WSR-88D	30E24' N	84E20' W
Tampa, FL	WSR-88D	27E42' N	82E24' W
Wakefield, VA	WSR-88D	36E59' N	77E00' W
Wilmington, NC	WSR-88D	33E59' N	78E26' W

[1]The criterion for selection is that the radar site is located within approximately 124 n mi (maximum velocity range) of the coastline.

NATIONAL WEATHER SERVICE RADARS
U.S. Southwest

Phoenix, AZ	WSR-88D	33E17' N	111E40' W
San Diego, CA	WSR-88D	33E49' N	117E38' W
Tucson, AZ	WSR-88D	31E57' N	110E54' W
Yuma, AZ	WSR-88D	32E40' N	114E37' W

FAA RADARS

Molokai, HI	WSR-88D	21E08'N	157E11'W
Kohala, HI	WSR-88D	20E06'N	155E45'W
San Juan, PR	WSR-88D	18E07'N	66E05'W
South Hawaii, HI	WSR-88D	19E06'N	155E34'W
South Kauai, HI	WSR-88D	21E54'N	159E33'W

DEPARTMENT OF DEFENSE
U.S. Gulf and Atlantic coast

Columbus AFB, MS	WSR-88D	33E54'N	88E20'W
Dover AFB, DE	WSR-88D	38E50'N	75E26'W
Eglin AFB, FL	WSR-88D	30E34'N	85E55'W
Fort Hood, TX	WSR-88D	30E43'N	97E23'W
Fort Polk, LA	WSR-88D	31E09'N	92E58'W
Fort Rucker, AL	WSR-88D	31E28'N	85E28'W
Maxwell AFB, AL	WSR-88D	32E32'N	85E47'W
Moody AFB, GA	WSR-88D	30E33'N	83E00'W
Robins AFB, GA	WSR-88D	32E40'N	83E21'W

(NHC has dial-in access to the above DOD sites.)

7.3.2. Central Region Report. The following fix definitions and criteria are used in reporting WSR-88D tropical cyclone radar observations:

- If the central region of a storm is defined by an identifiable circular, or nearly circular, wall cloud with an echo-free center, the fix (the geometric center) is reported as an "**EYE**".

- If the central region is recognizable, but not well-defined by a wall cloud (as in the case of a tropical storm), it is reported as a "**CENTER**."

- When the eye or center is only occasionally recognizable or some other central region uncertainty exists, the eye or center is reported as **"PSBL EYE"** or **"PSBL CENTER."**

- Remarks stating the degree of confidence will be included and will be classified as either "good," "fair," or "poor." If an eye is present, a "good" fix is reported when the eye is symmetrical--virtually surrounded by wall cloud; a "poor" fix is reported when the eye is asymmetrical--less than 50 percent surrounded by wall cloud; a "fair" fix is reported to express a degree of confidence between "good" and "poor." Note that a partial eyewall may be the result of excessive range from the radar, or represent the true structure of the system. Doppler velocities will, in general, increase confidence in the center position and, if available, should always be examined prior to establishing a fix.

7.3.3. Transmission of Radar Reports. When the tropical cyclone is within 200 n mi of a WSR-88D, and the center fix is considered reliable, the appropriate tropical cyclone warning center (TPC/NHC or CPHC) may issue a tropical cyclone position estimate (AFOS category TCE) between 2-hourly intermediate advisories. Note that although the issuance of this product depends upon the quality of the radar fix, other data sources such as aircraft reconnaissance may be blended with the radar estimate to obtain a position. Thus, a radar position based on a particular radar may appear to disagree with the TCE position, but has in fact been taken into consideration.

In the case of communications failure, and the event that TPC/NHC cannot obtain the necessary radar data, the local NWS Weather Forecast Office may be called upon to estimate the radar position and render qualitative assessment of the circulation.

Other radar facilities not having weather transmission capability but wishing to provide information deemed important, should call the nearest NWS Weather Forecast Office or the TPC/NHC.

CHAPTER 8

NATIONAL DATA BUOY CAPABILITIES AND REQUIREMENTS

8.1. General.

8.1.1. Automated Reporting Stations. The National Data Buoy Center (NDBC) maintains automated reporting stations in the Gulf of Mexico, in coastal areas and deep ocean of the Atlantic and Pacific Oceans, and in the Great Lakes. These data acquisition systems collect real-time meteorological and oceanographic measurements for operations and research purposes. Moored buoy station locations and configurations are given in Table 8-1. The locations of Coastal-Marine Automated Network (C-MAN) stations are listed in Table 8-2. Consult NDBC's web page at www.ndbc.noaa.gov to view the station locations and latest station operating status, and for site-specific information. Specific questions may be addressed to NDBC Observing Systems Branch, Stennis Space Center, Mississippi 39529-6000, phone 228-688-3134.

8.1.2. Data Acquisition. Moored buoy and C-MAN stations routinely acquire, store, and transmit data every hour; a few selected stations report more frequently. Data obtained operationally include sea level pressure, wind speed and direction, peak wind, and air temperature. Sea surface temperature and wave spectra data are measured by all moored buoys and a limited number of C-MAN stations. Relative humidity is measured at several stations. Ocean currents and salinity are measured at a few coastal stations.

NDBC acquires, encodes, and distributes data from regional coastal ocean observing systems which is distributed to customers via NWS dissemination systems. Data from participating regional observing systems pass through NDBC data quality control procedures prior to NWS dissemination. Information on these systems may be obtained from their respective web sites that are linked to www.ndbc.noaa.gov.

8.1.3. Drifting Buoys.

8.1.3.1. NDBC. NDBC is capable of acquiring, preparing, and deploying drifting buoys; however, an operational drifting buoy requirement has not been identified or funded.

8.1.3.2. Navy. Since 1998, the Naval Oceanographic Office (NAVOCEANO) has deployed meteorological drifting buoys to report surface meteorological and oceanographic measurements, for operational purposes, as tropical systems move through data sparse regions tracking toward the U.S. East Coast. Additionally, Navy drifting buoys have been deployed in the Intertropical Convergence Zone (ITCZ). The drifting buoy measurements, which are available to tropical forecasters, provide invaluable input for defining tropical storm movement and intensity, improve forecast model initialization, and give tropical forecasters a much better sense of storm characteristics and track as they approach the fleet concentration areas of Jacksonville, FL, and Norfolk, VA. Drifting buoys typically have a life span of 1 to 2 years, and the data are available through the NAVOCEANO homepage and through standard World Meteorological Organization (WMO) data sources.

NAVOCEANO acquires, prepares, and deploys drifting meteorological buoys based on operational requirements identified by Commander-in-Chief, Atlantic Fleet (CINCLANTFLT). Currently, CINCLANTFLT has identified the Navy's drifting buoy support as a standing requirement to support fleet safety, assist in fleet sortie decisions, and enhance tropical weather preparedness.

8.2. Requests for Drifting Buoy Deployment. Drifting buoy deployments should be coordinated through the Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA). *Deployments will be requested through the Office of the Federal Coordinator for Meteorology (OFCM) to HQ Air Force Reserve Command (AFRC).* Deployments in advance of a U.S. land-threatening hurricane require a 36- to 48-hour notification.

8.2.1. Tropical Prediction Center/National Hurricane Center (TPC/NHC). TPC/NHC forecasters will issue through the Tropical Cyclone Plan of the Day (TCPOD) an alert or outlook for drifting buoy deployment 48 hours before the planned deployment. *Hard tasking for the deployment will be issued via the TCPOD 16 hours, plus flying time to the deployment location, before the event.*

8.2.2. Deployment of Buoys. DOC may request the deployment of a drifting buoy and subsurface float array with up to 40 elements at a distance of 200 to 400 nm from the storm center, depending on the dynamics of the storm system. *DOC will ensure the buoys and mission-related DOC personnel are delivered to AFRC.* The specific DOC request for placement of the buoys will depend on several factors, including:

- Characteristics of the storm, including size, intensity, and velocity.
- Storm position relative to the coast and population centers.
- Availability of aircraft and dropsonde operators (DSO) certified for buoy deployment.

8.2.3. Deployment Position. The final deployment position will be provided before the flight crew briefing. An example of a possible buoy and float deployment pattern from the recent CLBAST Experiment is shown in Figure 8-1.

8.3. Communications. Moored buoy and C-MAN data are transmitted via NOAA Geostationary Operational Environmental Satellite (GOES) to the National Environmental Satellite, Data, and Information Service (NESDIS) and then are relayed to the NWS Telecommunications Gateway (NWSTG) for processing and dissemination. Moored buoy observations are formatted into the World Meteorological Organization (WMO) FM13-IX SHIP code. The SHIP code is defined in Federal Meteorological Handbook 2, Surface Synoptic Codes. C-MAN measurements are formatted into C-MAN code, which is very similar to the WMO FM12-IX SYNOP code. Code forms are shown in Table 8-3. The C-MAN code is contained in the C-MAN Users' Guide, which is available from NDBC. Drifting buoy data are sent through the NOAA Polar Orbiting Environmental Satellites (POES) to the U.S. Argos Global Processing Center, Largo, MD. Service Argos processes and formats the data into WMO FM18 BUOY code defined in the WMO *Manual on Codes*, Volume I. The messages are routed to the NWSTG for distribution.

Table 8-1. Moored buoy locations and configurations

SITE	STATION ID	LOCATION	HULL SIZE (m)	ANEMOMETER HEIGHT (m)
GULF OF MEXICO	42001	25.9E N., 89.7E W.	10	10
	42002	25.2E N., 94.4E W.	10	10
	42003	26.0E N., 85.9E W.	10	10
	42007	30.1E N., 88.8E W.	3	5
	42019	27.9E N., 95.4E W.	3	5
	42020	26.9E N., 96.7E W.	3	5
	42035	29.2E N., 94.4E W.	3	5
	42036	28.5E N., 84.5E W.	3	5
	42039[1]	28.8E N., 86.0E W.	3	5
	42040[1]	29.2E N, 88.2E W.	3	5
	42041	27.5E N, 90.5E W.	3	5
ATLANTIC OCEAN	41001	34.7EN., 72.7EW.	6	5
	41002	32.3EN., 75.4EW.	6	5
	41004	32.5EN., 79.1EW.	3	5
	41008	31.4EN., 80.9EW.	3	5
	41009[1]	28.5EN., 80.2EW.	3	5
	41010[1]	28.9EN., 78.5EW.	6	5
	41012	30.0EN, 80.60EW.	3	5
	41013	33.5EN, 77.6EW.	3	5
	41025	35.2EN, 75.3EW.	3	5
	44004	38.5EN., 70.5E W.	6	5
	44005	42.9EN., 69.2E W.	6	5
	44007	43.5EN., 70.1E W.	3	5
	44008	40.5EN., 69.4EW.	3	5
	44009	38.5EN., 74.7EW.	3	5
	44011	41.1EN., 66.6EW.	6	5
	44013	42.4EN., 70.7EW.	3	5
	44014[1]	36.6EN., 74.8EW.	3	5
	44017	40.7EN., 72.0EW.	3	5
	44018	41.3EN., 69.2EW.	3	5
	44025	40.3EN., 73.2EW.	3	5
	44027	44.3EN, 67.3EW	3	5
PACIFIC OCEAN (BETWEEN 10EN. AND 40EN.)	46011	34.9E N., 120.9E W.	3	5
	46012	37.4E N., 122.9E W.	3	5
	46013	38.2E N., 123.3E W.	3	5
	46014	39.2E N., 124.0E W.	3	5
	46023[1]	34.7E N., 121.0E W.	10	10
	46025	33.8E N., 119.1E W.	3	5
	46026	37.8E N., 122.8E W.	3	5
	46011	34.9E N., 120.9E W.	3	5
	46012	37.4E N., 122.9E W.	3	5
	46013	38.2E N., 123.3E W.	3	5
	46014	39.2E N., 124.0E W.	3	5
	46023[1]	34.7E N., 121.0E W.	10	10

continued	46062[1]	35.1E N., 121.0E W.	3	5
PACIFIC OCEAN	46063	34.3E N., 120.7E W.	6	5
(BETWEEN 10EN.	46069	33.6E N., 120.2E W.	3	5
AND 40EN.)	46086	32.5E N., 118.0E W.	3	5
	51001	23.4E N., 162.2E W.	6	6
	51002	17.2E N., 157.8E W.	6	6
	51003	19.2E N., 160.7E W.	6	6
	51004	17.5E N., 152.5E W.	6	5
	51028	0.0E N., 153.9E W.	3	5

[1]Temporary site established with other special funding.

Table 8-2. C-MAN sites

SITE	STATION ID	LOCATION	STATION NAME
GULF OF MEXICO	BURL1	28.9E N., 89.4E W.	Southwest Pass, LA
	CDRF1	29.1E N., 83.0E W.	Cedar Key, FL
	DPIA1	30.3E N., 88.1E W.	Dauphin Island, AL
	DRYF1	24.6E N., 82.9E W.	Dry Tortugas, FL
	GDIL1	29.3E N., 90.0E W.	Grand Isle, LA
	KTNF1	29.8E N., 83.6E W.	Keaton Beach, FL
	LONF1	24.8E N., 80.9E W.	Long Key, FL
	PTAT2	27.8E N., 97.1E W.	Port Aransas, TX
	SGOF1	29.4E N., 84.9E W.	Tydall AFB Tower C, FL
	SRST2	29.7E N., 94.1E W.	Sabine, TX
	VENF1	27.1E N., 82.4E W.	Venice, FL
ATLANTIC OCEAN	ALSN6	40.5E N., 73.8E W.	Ambrose Light, NY
	BUZM3	41.4E N., 71.0E W.	Buzzards Bay, MA
	CHLV2	36.9E N., 75.7E W.	Chesapeake Light, VA
	CLKN7	34.6E N., 76.5E W.	Cape Lookout, NC
	DUCN7	36.2E N., 75.8E W.	Duck Pier, NC
	FBIS1	32.7E N., 79.9E W.	Folly Island, SC
	FPSN7[2]	33.5E N., 77.6E W.	Frying Pan Shoals, NC
	FWYF1	25.6E N., 80.1E W.	Fowey Rocks, FL
	IOSN3	43.0E N., 70.6E W.	Isle of Shoals, NH
	LKWF1	26.6E N., 80.0E W.	Lake Worth, FL
	MDRM1	44.0E N., 68.1E W.	Mt. Desert Rock, ME
	MISM1	43.8E N., 68.9E W.	Matinicus Rock, ME
	MLRF1	25.0E N., 80.4E W.	Molasses Reef, FL
	SANF1	24.5E N., 81.9E W.	Sand Key, FL
	SAUF1	29.9E N., 81.3E W.	St. Augustine, FL
	SMKF1	24.6E N., 81.1E W.	Sombrero Key, FL
	SPGF1	26.7E N., 79.0E W.	Settlement Point, GBI
	TPLM2	38.9E N., 76.4E W.	Thomas Point, MD
EASTERN PACIFIC OCEAN	CARO3	43.3E N., 124.4E W.	Cape Arago, OR
(SOUTH OF 45E N.)	NWPO3	44.6E N., 124.1E W.	Newport, OR
	PTAC1	39.0E N., 123.7E W.	Point Arena, CA
	PTGC1	34.6E N., 120.6E W.	Point Arguello, CA

[1]Temporary site established with other special funding.
[2] Station will operate until platform fails; service visits discontinued due to condemnation of observing site

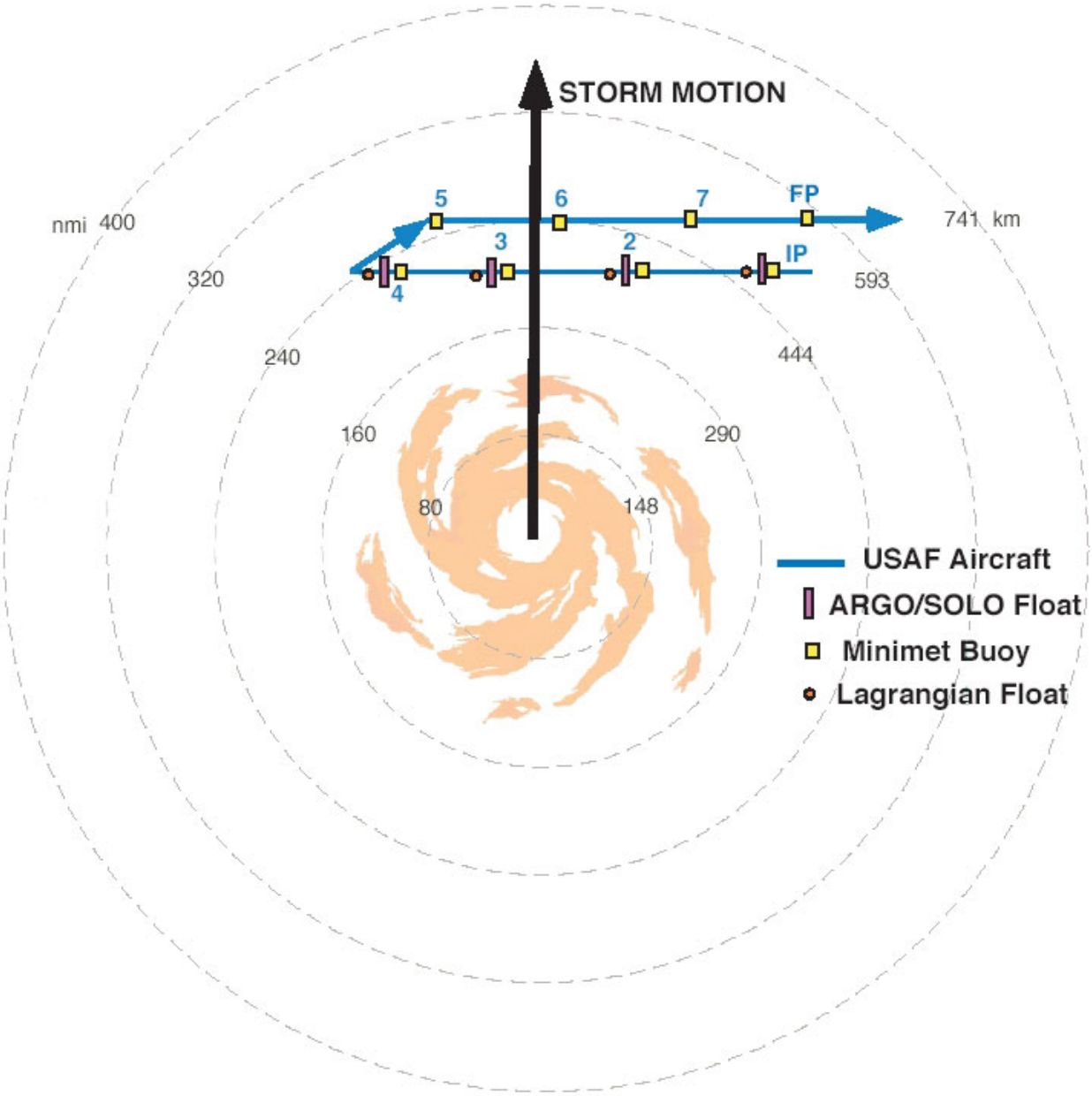

Figure 8-1. Example Buoy and Float Deployment Pattern

Table 8-3. Code forms for moored data buoys, C-MAN stations, and drifting buoys

FORM	CODE
FM13IX (SHIP) REPORT OF SYNOPTIC SURFACE OBSERVATION FROM A SEA STATION (AUTOMATIC WEATHER STATION)	$M_iM_iM_jM_j$ $A_1b_wn_bn_bn_b$ YYGGi_w 99$L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ i_ri_x/// /ddff $1s_nTTT$ ($2s_nT_dT_dT_d$) $3P_oP_oP_oP_o$ 4PPPP 5appp 9GGgg 222oo $Qs_sT_wT_wT_w$ $1P_{wa}P_{wa}H_{wa}H_{wa}$ 7o $H_{wa}H_{wa}H_{wa}$ 333 912ff (oofff) 555 11fff 22fff (3GGgg $4ddf_mf_m$) ($6G_cG_cg_cg_c$ $d_1d_1d_1f_1f_1f_1$ $d_6d_6d_6f_6f_6f_6$) $d_2d_2d_2f_2f_2f_2$ $d_3d_3d_3f_3f_3f_3$ $d_4d_4d_4f_4f_4f_4$ $d_5d_5d_5f_5f_5f_5$
U.S. NATIONAL (C-MAN LAND STATION) MODIFIED FM12-IX SYNOP	CMAN YYGGi_w XXXXn_t i_Ri_xhVV Nddff (oofff) $1s_nTTT$ $2s_nT_dT_dT_d$ $3P_oP_oP_oP_o$ 4PPPP 5appp $6RRRt_R$ 9GGgg 222// $os_nT_wT_wT_w$ $1_{wa}P_{wa}P_{wa}H_{wa}H_{wa}$ $7oH_{wa}H_{wa}H_{wa}$ 333 912ff (oofff) 444 $1P_{av}P_{av}P_{av}$ / 555 11fff 22fff (3GGgg) ($4ddf_mf_mf_m$) ($6G_cG_cg_cg_c$ $d_1d_1d_1f_1f_1f_1$ $d_6d_6d_6f_6f_6f_6$) $d_2d_2d_2f_2f_2f_2$ $d_3d_3d_3f_3f_3f_3$ $d_4d_4d_4f_4f_4f_4$ $d_5d_5d_5f_5f_5f_5$ (TIDE1111)
FM18 BUOY REPORT OF A DRIFTING BUOY OBSERVATION	ZZYY A_1 $b_wn_bn_bn_b$ YYMMJ GGggi$_w$ Q_c $L_aL_aL_aL_a$ $L_oL_oL_oL_oL_o$ $6Q_1$ Q_t O_d / $\underline{111}Q_dQ_x$ $\underline{O}$ddff ($\underline{1}_{SN}$ TTT) [($2_{SN}T_dT_dT_d$) or ($\underline{29}$ uuu)] ($\underline{3}P_oP_oP_oP_o$) ($\underline{4}$PPPP) ($\underline{5}$appp) $222Q_dQ_x$ ($\underline{O}s_nT_wT_wT_w$) ($1P_{wa}P_{wa}H_{wa}H_{wa}$) ($2OP_{wa}P_{wa}P_{wa}$) ($21H_{wa}H_{wa}H_{wa}$) $\underline{333}Q_{d1}Q_{d2}$ (8887k_2 $2z_oz_oz_oz_o$ $3T_oT_oT_oT_o$ $4S_oS_oS_oS_o$ .... $2z_nz_nz_nz_n$ $3T_nT_nT_nT_n$ $4S_nS_nS_nS_n$) (66$k_6$9k_3 $2z_oz_oz_oz_o$ $d_od_oc_oc_oc_o$ .... $2z_nz_nz_nz_n$ $d_nd_nc_nc_nc_n$) 444 ($\underline{1}Q_pQ_2Q_{Tw}Q_4$) ($\underline{2}Q_NQ_L$//) [($Q_cL_aL_aL_aL_a$ $L_oL_oL_oL_oL_o$ or (YYMMJ GGgg/)] ($8V_iV_iV_iV_i$) ($9_{1d}Z_dZ_dZ_dZ_d$)

CHAPTER 9

MARINE WEATHER BROADCASTS

9.1. General. The National Weather Service and the Department of Homeland Security's United States Coast Guard (USCG) broadcast forecast products that include information on tropical cyclones issued by the National Hurricane Center and the Central Pacific Hurricane Center. The broadcast of these products supports the U.S. participation in the Global Maritime Distress and Safety System, which provides the communications support to the International Maritime Organization's (IMO) global search and rescue plan.

9.2. Global Maritime Distress and Safety System (GMDSS). The goals of GMDSS are to provide more effective and efficient emergency and safety communications, and to disseminate maritime safety information to all ships on the world's oceans regardless of location or atmospheric conditions. These goals are defined in the International Convention for the Safety of Life at Sea (SOLAS) 1974. GMDSS is based upon a combination of satellite and terrestrial radio services and has changed international distress communications from being primarily ship-to-ship based to ship-to-shore (rescue coordination center) based. GMDSS provides for automatic distress alerting and locating, and requires ships to receive broadcasts of maritime safety information which could prevent a distress from happening in the first place. The NWS participates directly in the GMDSS by preparing weather forecasts and warnings for broadcast via two primary GMDSS systems--NAVTEX and Inmarsat-C SafetyNET.

9.2.1. NAVTEX. NAVTEX is an international, automated system for instantly distributing maritime navigational warnings, weather forecasts and warnings, search and rescue notices, and similar information to ships. It has been designated by the IMO as the primary means for transmitting coastal urgent marine safety information to ships worldwide. NAVTEX is broadcast from the 12 USCG stations. Coverage is reasonably continuous along the east, west, and Gulf coasts of the United States, as well as the area around Kodiak, Alaska, Guam, and Puerto Rico. Typical NAVTEX transmissions range from 200-400 nm.

9.2.2. SafetyNET. Satellite systems operated by Inmarsat Ltd. are an important element of the GMDSS. Inmarsat-C provides ship/shore, shore/ship, and ship/ship store-and-forward data and telex messaging; the capability for sending preformatted messages to a rescue coordination center; and the SafetyNET service. The Inmarsat-C SafetyNET service is a satellite-based worldwide maritime safety information broadcast service of high seas weather warnings, navigational warnings, radionavigation warnings, ice reports and warnings generated by USCG-conducted International Ice Patrol, and other information not provided by NAVTEX.

9.3. Coastal Maritime Safety Broadcasts. In addition to NAVTEX, the USCG and other government agencies broadcast maritime safety information, using a variety of different radio systems to ensure coverage of different ocean areas for which the United States has responsibility and to ensure all ships of every size and nationality can receive this vital safety information.

9.3.1. VHF Marine Radio. The USCG broadcasts nearshore and storm warnings of interest to the mariner on VHF channel 22A (157.1 MHZ) following an initial call on the distress, safety, and calling channel 16 (156.8 MHZ). Broadcasts are made from over 200 sites, covering the coastal areas of the U.S., including the Great Lakes, major inland waterways, Puerto Rico, Alaska, Hawaii, and Guam. All ships in U.S. waters over 20 meters in length are required to monitor VHF channel 16 and must have radios capable of tuning to the VHF simplex channel 22A. Typical coverage is 25 nm offshore.

9.3.2. Medium Frequency Radiotelephone (Voice). The USCG broadcasts offshore forecasts and storm warnings of interest to mariners on 2670 kHz, after first being announced on the distress, safety, and calling frequency 2182 kHz.

9.3.3. NOAA Weather Radio. The NOAA Weather Radio network continually broadcasts coastal and marine forecasts on frequencies near 162 MHZ. Recorded voice broadcasts have largely been supplanted by a synthesized voice. The network provides near-continuous coverage of the coastal U.S., Great Lakes, Hawaii, Guam, and the populated Alaska coastline. Typical coverage is 25 nm offshore.

9.4. High Seas Broadcasts. NWS high seas weather forecasts and warnings are also available on the following high frequency (HF) broadcasts.

9.4.1. HF Radiotelephone (Voice). Weather forecasts and warnings for the high seas are broadcast over scheduled HF radiotelephone channels from USCG communications stations using a very distinctive and recognizable computer-synthesized voice. Limited offshore forecasts are also available.

9.4.2. HF Radiofacsimile. The USCG broadcasts NWS high seas weather maps from five communications stations--Boston, MA (NMF); Point Reyes, CA (NMC); New Orleans, LA (NMG), Honolulu, HI (KVM-70) (a DOD station); and Kodiak, AK (NOJ). Limited satellite imagery, sea surface temperature maps, and text forecasts are also available.

9.4.3. HF Radiotelex (HF SITOR). High seas forecasts in text format, recognized by the GMDSS, are broadcast over scheduled GMDSS HF narrow-band direct printing channels from USCG communications stations. Limited offshore forecasts are also available.

9.4.4. WWV, WWVH HF Voice (Time Tick). Atlantic high seas warnings are broadcast at 7 and 8 minutes past the hour over WWV (Boulder, CO) on the following HF frequencies: 2.5, 5, 10, 15, and 20 MHZ; Pacific high seas warnings are broadcast at 9 minutes past the hour. Pacific high seas warnings are broadcast from 48-51 minutes past the hour over

WWVH (Honolulu, HI) at 2.5, 5, 10, and 15 MHZ. These are the National Institute of Standards and Technology (NIST) standard time/frequency broadcasts.

9.5. Additional Information. Further information concerning these and other marine broadcasts, including schedules, frequencies, and links to products can be found at:

- www.nws.noaa.gov/om/marine/home.htm
- www.navcen.uscg.mil/marcomms/marcomms.htm

In addition, the *National Geospatial-Intelligence Agency (NGA)*, Publication 117, Radionavigation Aids, (http://pollux.nss.nima.mil/pubs/) contains detailed information on maritime safety information broadcasts within the U.S. and worldwide. This publication is also available from the Superintendent of Documents; it can be ordered by calling 1-202-512-1800 or by visiting their Internet site at http://bookstore.gpo.gov.

CHAPTER 10

PUBLICITY

10.1. News Media Releases . News media releases, other than warnings and advisories, for the purpose of informing the public of the operational and research activities of the Departments of Commerce, Defense, and Transportation should reflect the joint effort of these agencies by giving due credit to the participation of other agencies.

10.2. Distribution . Copies of these releases should be forwarded to the following agencies:

- NOAA Office of Public Affairs
  Herbert C. Hoover Building
  14th and Constitution Avenue, N.W.
  Washington, DC 20230

- Commander, Naval Meteorology and Oceanography Command
  1100 Balch Boulevard
  Stennis Space Center, MS 39522-3001

- Hq Air Force Reserve Command (AFRC/PA)
  Robins AFB, GA 31093

- Joint Staff Weather Officer
  The Joint Chiefs of Staff (J3/DDGO-ROD)
  Pentagon Room 2D-921G
  Washington, DC 20318-3000

- Federal Aviation Administration (APA-310)
  800 Independence Avenue, S.W.
  Washington, DC 20591

- Director, NOAA Aircraft Operations Center
  P.O. Box 6829
  MacDill AFB, FL 33608-0829

- Federal Coordinator for Meteorology
  Suite 1500, 8455 Colesville Road
  Silver Spring, MD 20910

APPENDIX A

LOCAL NATIONAL WEATHER SERVICE (NWS) OFFICE PRODUCTS

A.1. Hurricane/Typhoon Local Statements (HLS). WFOs with coastal county responsibilities *and selected inland WFOs* will issue these unnumbered products which are very specific and designed to inform media, local decision makers, and the public on present and anticipated storm effects in their county warning area (CWA) and adjacent coastal waters. Keep HLSs as succinct as possible.

A.1.1. Mission Connection. Alert the public, media, and local decision makers of potential or actual storm affects due to tropical cyclones. The product is intended to provide information to assist in the preparation and implementation of necessary precautions for the protection of life and property, as well as minimize the economic losses as a result of tropical cyclones.

A.1.2. Issuance Guidelines.

A.1.2.1. Creation Software. AWIPS.

A.1.2.2. Issuance Criteria. *The following WFOs will issue HLSs when their area of responsibility is affected by a tropical cyclone watch/warning or evacuation orders. HLSs may also be issued as needed to dispel rumors or to clarify tropical cyclone related information for their CWA. Coastal WFOs have the option to include inland counties in the HLS.*

Coastal WFOs are defined as those having at least one county with significant tidal influences. Those are:

Eastern Region
Caribou, ME
Portland, ME
Boston, MA
New York City, NY
Philadelphia, PA
Baltimore, MD/Washington, DC
Wakefield, VA
Newport/Morehead City, NC
Wilmington, NC
Charleston, SC

Southern Region
Brownsville, TX
Corpus Christi, TX
Houston/Galveston, TX
Lake Charles, LA
New Orleans, LA
Mobile, AL
Tallahassee, FL
Tampa Bay, FL
Miami, FL
Key West, FL
Melbourne, FL
Jacksonville, FL
San Juan, PR

Western Region
San Diego, CA
Los Angles/Oxnard, CA

Pacific Region
Honolulu, HI
Guam
WSO Pago Pago, American Samoa

Inland WFOs listed below will also issue HLSs when hurricane or tropical storm force winds are expected to impact their area of responsibility. Inland offices not issuing HLSs but expecting hurricane or tropical storm force winds may be required to issue an Inland Tropical Storm/Hurricane Wind Watches or Warnings.

Atlanta, GA	*Jackson, MS*
Birmingham, AL	*Huntsville, AL*
Austin/San Antonio, TX	*Midland, TX*
San Angelo, TX	*Lubbock, TX*
Fort Worth, TX	

A.1.2.3. Issuance Times. *The initial HLS should be issued as soon as possible following the first issuance of a tropical storm/hurricane watch/warning for your area of responsibility. When a tropical storm or hurricane is close to the coast, issue HLSs every 2 to 3 hours or more frequently as circumstances warrant. Do not release HLSs immediately before an advisory unless information is coordinated with the appropriate Tropical Cyclone Center and, for watches or warnings, the valid initiation time is specified. HLSs do not need to immediately follow the issuance of a new hurricane advisory. Issuing HLSs midway between advisories maintains a steady flow of information to the media and the public. However, when local storm impacts are changing rapidly, or a new advisory changes the potential impact on a local area, information needs to be distributed in a fresh HLS as soon as possible. Routine HLSs may cease when the tropical cyclone is no longer a threat to an office's CWA.*

A.1.2.4. Valid Time. HLSs are valid at the time of issuance until a subsequent HLS is issued. *HLSs are issued at least once every 6 hours.*

A.1.2.5. Product Expiration Time. Generally 6 hours after the issuance time and should coincide with the next expected update or when the event is forecast to end.

A.1.3. Technical Description. HLSs will follow the format and content described in this section.

A.1.3.1. UGC Type. HLSs will use the zone (Z) form of the UGC.

A.1.3.2. Mass News Disseminator (MND) Header. The HLS MND header product type line is "(TROPICAL CYCLONE TYPE) LOCAL STATEMENT."

A1.3.3. Content. HLSs will add localized details to Tropical Cyclone Center's advisory releases and should not conflict with or repeat advisory information not directly applicable to the local office's CWA. Before the first HLS, use public information statements (PNS) to inform the public on routine hurricane preparedness information. The first HLS can also contain standard preparedness messages. Information may be added to the end of the HLS describing where additional storm information can be found in supporting Center's TCP and TCM as well as PNSs and NOWs (Short Term Forecast) issued by the local office.

HLSs should use tropical cyclone position estimates provided by their tropical cyclone center between advisories when appropriate. When tropical cyclones threaten the Samoas (American Samoa and Samoa), the two local offices will coordinate with RSMC Nadi, CPHC, and with each other to determine the best integrated and internally consistent forecast of conditions expected in the area.

The following table defines which products are issued via the normal suite of product headers during tropical cyclone watches/warnings and those products superceded by tropical cyclone watches/warnings and carried in a HLS.

HLS Product Table

Product	**Tropical Cyclone Watch/Warning**	
	HLS	**Stand-alone**
Flash Flood Watch/Warning/Statement		X
Flood Warning		X
Tornado Warning		X
Inland Tropical Storm Wind or Inland Hurricane Wind Watch/Warning		X
Severe Thunderstorm Warning		X[1]
Coastal Flood Watch/Warning/Statement	X[2]	X[2]
Special Marine Warning		X[3]
Severe Weather Statement		X[1]
Marine Weather Statement		X[1]
Special Weather Statement	X	
Surf Zone Forecast/Surf Forecast	X	
High Surf Advisory/Warning (WFO Honolulu)	X	

[1] Can be issued as stand-alone products at the discretion of the WFO. However, their use should be confined to peripheral events, such as outer rainbands, prior to sustained tropical storm or hurricane strength winds.

[2] If no CFW products were issued by the WFO prior to the issuance of a tropical cyclone watch or warning and an HLS is issued, no CFW products will be issued for the duration of the tropical cyclone event.

Complications occur when a CFW product is in effect and tropical cyclone watches and/or warnings are issued. The basic premise is if the threat level of a tropical cyclone product equals

or exceeds the threat level of an existing CFW, the CFW will be discontinued. Below are details.

- *A CFW product is in effect for a Coastal Flood Warning and/or High Surf Warning and a tropical cyclone watch is issued - CFW will* ***continue*** *as standalone product along with HLS product.*
- *A CFW product is in effect for a Coastal Flood Warning and/or High Surf Warning and a tropical cyclone warning is issued - CFW will be* ***canceled*** *and users directed to the HLS for further information on coastal hazards.*
- *A CFW product is in effect for a Coastal Flood Advisory, Coastal Flood Watch, and/or High Surf Watch and a tropical cyclone watch or warning is issued - CFW will be* ***canceled*** *and users directed to the HLS for further information on coastal hazards.*

PRODUCTS IN EFFECT	***CONTINUE CFW***	***CANCEL CFW***	***ISSUE HLS***
Coastal Flood ADVISORY (CFW) and Tropical Cyclone WATCH is issued		***X***	***X***
Coastal Flood ADVISORY (CFW) and Tropical Cyclone WARNING is issued		***X***	***X***
Coastal Flood WATCH (CFW) and Tropical Cyclone WATCH is issued		***X***	***X***
Coastal Flood WATCH (CFW) and Tropical Cyclone WARNING is issued		***X***	***X***
Coastal Flood WARNING (CFW) and Tropical Cyclone WATCH is issued	***X***		***X***
Coastal Flood WARNING (CFW) and Tropical Cyclone WARNING is issued		***X***	***X***
High Surf WATCH (CFW) and Tropical Cyclone WATCH is issued		***X***	***X***
High Surf WATCH (CFW) and Tropical Cyclone WARNING is issued		***X***	***X***
High Surf WARNING/ADVISORY (CFW) and Tropical Cyclone WATCH is issued	***X***		***X***
High Surf WARNING (CFW) and Tropical Cyclone WARNING is issued		***X***	***X***

[3] WFOs have the option to issue stand-alone special marine warnings (SMWs) on an as needed basis. This will primarily occur during watch situations prior to the onset of tropical storm winds impacting a marine zone. In cases of waterspouts, SMWs may be issued anytime during tropical cyclone watch/warning situations.

A.1.3.4. *Format. As appropriate, product header options are "Hurricane or Typhoon Local Statement," "Tropical Storm Local Statement" or "Tropical Depression Local*

Statement." All HLSs will contain at least one headline. Prepare each section of the HLS by a content/topic header set off by three dots before and after each header. Prioritize and adjust the order to focus on the greatest threat and the most important information impacting the area.

A.1.4 Essential contents of Hurricane Local Statements:

...Headline...
A minimum of at least one concise lead sentence or headline.

...Areas Affected...
Details of which counties, parishes, or cities are included in the HLS.

...Watches/Warnings...
Watches and warnings in effect and counties or parishes to which they apply.

...Storm Information...
Present location, movement, and winds and expected time of onset of tropical storm/hurricane/typhoon force winds. Give timing of impacts in ranges or general terms such as "afternoon," "evening," and so on. Use the tropical cyclone forecast/advisory as guidance.

...Precautionary/Preparedness Actions...
Short-term precautionary actions and times they should be completed.
This includes any evacuation recommendations contained in the advisory or stated by local authorities. Listing these actions is particularly important once a tropical cyclone watch or warning is announced.

...Storm Surge Flood and Storm Tide Impacts...
Storm surge and storm tide (storm surge plus astronomical tide) information, including times, various heights are expected, present heights, and their locations. If data exists, a comparison of storm surge heights from previous tropical cyclones should be included. Storm surge information must agree with Tropical Cyclone Center forecasts as included in the advisories. Include storm tide information because local officials might not have access to tide tables. Reference storm tide forecasts to appropriate datums understood by local authorities. For many portions of the coast, this would be mean sea level although some areas use mean lower low water.

...Wind Impacts...
Present winds and expected time of onset of tropical storm or hurricane force winds. *WFOs may provide information about the local impacts of the expected winds.*

...Other Impacts...(Substitute appropriate header to reflect most important threat)
Any statements on potential tornado and flood/flash flood threats, rip currents, beach erosion, high wind warnings inland, etc. Headlines would read for example: "...Inland

Flooding Impacts..." or "...Tornado Impacts..."

...Probability of Hurricane/Tropical Storm Conditions...
Information on probability of hurricane/typhoon/tropical storm conditions is optional.

...New Information...
Specific new and vital information which you wish to bring to the attention of your users.

...Next Update...
Time of next or final statement.

Some private sector vendors are parsing and scrolling HLS information. Format consistency of some of the HLS information is required. WFOs should still arrange the sections as they see fit with the most important first. WFOs still retain the option to use whatever headline they wish in the "Other Impact" section. Any section (including the ones the private sector are using) can be omitted if it is not appropriate for a given situation. Below are the headlines and those section headlines which require consistent formatting, e.g. ellipses, carriage returns and the exact section headline wording.

...Headline(s)...
More than one headline allowed with no blank lines in between, each section headline beginning and ending with ellipses

...Precautionary/Preparedness Actions...

...Storm Surge Flood and Storm Tide Impacts...

...Wind Impacts...

For the Headlines section, the vendor's software will key in on the singular blank line between the Time/Date line of the Mass News Dissemination Header and the three ellipses (...) at the beginning and ending of each headline. For the other three sections, the vendor's software will key on a blank line, the headline as written above, and three ellipses (before and after).

EXAMPLE:

HURRICANE LOCAL STATEMENT
NATIONAL WEATHER SERVICE XXXXX
1019 AM CDT TUE JUL 15 2003

...HURRICANE ZENIA MOVING ONTO THE MIDDLE TEXAS COAST
NEAR PORT O'CONNOR...
...A HURRICANE WARNING IS IN EFFECT FROM BAFFIN BAY TO HIGH
ISLAND...

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
TEXT

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
TEXT

...WIND IMPACTS...
TEXT

Wtaaii CCCC DDHHMM
HLSxxx
stZXXX-XXX>XXX-DDHHMM-
(TROPICAL CYCLONE TYPE) LOCAL STATEMENT
NATIONAL WEATHER SERVICE CITY, STATE
time am/pm time_zone day mon DD YYYY

...HEADLINE...

...Areas Affected...

...Watches/Warnings...

...Storm Information...

...Precautionary/Preparedness Actions...

...Storm Surge Flood and Storm Tide Impacts...

...Wind Impacts...

...Other Impacts...(Substitute appropriate header to reflect most important threat)

...Probability of Hurricane/Tropical Storm Conditions...

...New Information...

...Next Update...
$$

Figure A-1. Hurricane Local Statement Format

A.1.5. Relationship of HLSs to the NOW. The NOW is a stand-alone product focused on conditions impacting the office's CWA for the next 0 to 6 hours. It will complement the HLS by providing critical storm information in the first eight lines.

A.2. Tornado and Flash Flood Warnings (TOR/FFW). *WFOs should follow policy for the issuance of tornado warnings as per directive 10-511. However, for the 2005 season, the TOR product may be used for the purpose to warn the public to immediately take shelter in an interior portion of a well-built structure due to the onset of extreme tropical cyclone destructive winds.*

A tornado warning for extreme tropical cyclone destructive winds may be issued when all of the following criteria are met:

- *Imminent or occurring onset of tropical cyclone-related sustained winds, greater than or equal to 100 knots (115 mph).*
- *Onset of tropical cyclone-related destructive winds are expected to develop or occur within a WFOs county warning area within an hour.*

The warning valid time should be 2 hours or less using county UGCs.

A.3. Inland Tropical Storm/Hurricane Wind Watch or Warning (NPW). *Coastal and inland WFOs will issue an inland tropical storm watch or warning, or inland hurricane watch or warning, when a tropical cyclone is expected to spread tropical storm or hurricane force winds inland under the non-precipitation weather product NPW. The NPW will be exclusively used for this product's initial issuance, subsequent follow-up, and cancellation. The following WFOs are exempt from this policy and will issue NPWs for high wind watches and/or warnings if tropical storm winds move into their area of responsibility.*

Albany, NY	*Cleveland, OH*
Binghamton, NY	*Pittsburgh, PA*
Buffalo, NY	*State College, PA*
Burlington, VT	*Wilmington, OH*
Charleston, WV	

A.3.1. Mission Connection. Non-precipitation watches and warnings provide our customers and partners advance notice of hazardous non-precipitation weather events which have the potential to threaten life and property.

A.3.2. Issuance Guidelines.

A.3.2.1. Creation Software. Use AWIPS Watch/Warning/Advisory software or other text editors.

A.3.2.2. *Issuance Criteria. WFOs will issue Inland Tropical Storm/Hurricane Watches when tropical storm/hurricane force winds are possible within the watch area within 36 hours. WFOs will issue Inland Tropical Storm/Hurricane Warnings when tropical storm/hurricane force winds are expected within the warning area within 24 hours. For those offices issuing the inland watch/warnings, the NPW product will be updated as conditions warrant. At a minimum this should be every six hours or after the issuance of a six hourly NHC TCP advisory.*

A.3.2.3. Issuance Times. Event driven.

A.3.2.4. *Valid Time. Watch is valid up to 48 hours after the issuance time. The valid time (event start and end times) is described in the watch headline. A warning is valid up to 36 hours after issuance time. The valid time (event start and end times) is described in the warning headline.*

A.3.2.5. Product Expiration Time. Generally 6-8 hours after the issuance time and should coincide with the next expected update or when the event is forecast to end.

A.3.3. Technical Description. NPWs will follow the format and content described in this section.

A.3.3.1. UGC Type. NPWs will use the zone (Z) form of the UGC.

A.3.3.2. Mass News Disseminator Header. Not applicable.

A.3.3.3. *Content. A headline will be "Inland Tropical Storm Watch (or Warning)" or "Inland Hurricane Watch (or Warning)." When the effects of the tropical cyclone can be clearly described to the public and not lead to confusion, inland sections of coastal counties may be placed under inland tropical storm/hurricane watch or warning versus using tropical cyclone watches or warnings. Coordination will occur with all impacted offices and NHC before issuance. The appropriate forecasts and statements will highlight watches and warnings.*

A.3.3.4. *Format.*

```
WWaaii CCCC DDHHMM
NPWxxx

URGENT - WEATHER MESSAGE
NATIONAL WEATHER SERVICE CITY, STATE
time am/pm time_zone day mon DD YYYY

...<Overview headline statement>...

…<General non-precipitation weather synopsis>…

stZxxx-xxx>xxx-DDHHMM-
zone-zone-zone
INCLUDING THE CITIES OF...
time am/pm time_zone day mon dd yyyy

...HEADLINE...

TEXT


$$
```

Figure A-2. **Inland Wind NPW Product Format**

A.4. Inland Tropical Storm/Hurricane Wind Watch or Warning for Subtropical Storms. WFOs will issue an inland tropical storm wind watch or warning, or inland hurricane wind watch or warning when a subtropical storm is expected to spread tropical storm or hurricane force winds inland. *Use same procedures as noted in section A.3.*

A.5. Post-Tropical Cyclone Reports (PSH). All WFOs issuing HLSs will prepare post-storm reports. Inland offices issuing inland tropical storm/hurricane wind watches or warnings will also submit reports. *Other offices whose CWA's experienced wind gusts greater than 33 knots, flooding, tornadoes, damage, or casualties will also submit reports.*

A.5.1. Mission Connection. The PSH product is intended to provide the NHC, NWS Headquarters, the media, the public, and emergency management officials with a record of peak tropical cyclone conditions. This data is then used to formulate other post-event reports, news articles and historical records.

A.5.2. Issuance Guidelines.

A.5.2.1. Creation Software. AWIPS.

A.5.2.2. Issuance Criteria. If HLSs are issued, a PSH will be issued.

A.5.2.3. Issuance Times. Transmit the reports within 5 days following the transmission of the last HLS or inland tropical storm/hurricane wind watches or warnings addressed to the appropriate Tropical Cyclone Center or National Center and a copy to Weather Service Headquarters, W/OS21. Amend reports as needed.

A.5.2.4. Valid Times. Not applicable.

A.5.2.5. Product Expiration Time. Not applicable

A.5.3. Technical Description.

A.5.3.1. UGC Type. Not applicable.

A.5.3.2. Mass News Disseminator Header. The PSH header block product type line is "POST-TROPICAL CYCLONE REPORT...(TROPICAL CYCLONE TYPE)."

A.5.3.3. Content. Include the following items in the initial report and in any subsequent updated reports:

a. Wind data: If the observed peak gusts are greater than 33 knots, report highest sustained surface wind speed (knots) and duration (1-, 2- 8-, or 10-minute average which ever applies), peak gust (knots), and date/times of occurrence in UTC. Specify anemometer height (feet) if other than 33 feet. Report all NOAA, Department of Defense, and Federal Aviation Administration official observing sites in a NWS office's CWA including ASOS sites, NOAA buoy/Coastal Marine Automated Network (C-MAN) stations, and National Ocean Service stations. Also report other reliable data collected by government sources or other institutions. These include reports from stations maintained by the U. S. Coast Guard; state, county, and local governments; universities; private companies; and experimental networks. List adjusted speeds corrected for instrument type and speed range if known. Data reports from the public are optional. However, NWS offices should encourage these data and include them in the PSH when considered reliable.

b. Pressure data: Report lowest sea level pressure (millibars), and date/time of occurrence (UTC). Report data from all sources given in Section a, and other stations where significant pressure observations are available. Report pressures less than 1005 mb, with pressure greater than 1005 mb reported as needed or as requested by the NHC.

c. Storm total rainfall: Report amount (inches) and duration (dates). In addition, list maximum 1-, 6-, 12-, and 24-hour amounts (inches) identifying date/time (UTC) of occurrence. Report data from all sources given in Section a, and other stations where significant rainfall observations are available. Report storm total rainfalls of 3 inches or more, with amounts under 3 inches reported as needed or as requested by the NHC.

d. Maximum storm tide heights: Reference storm tide to appropriate datums understood by local authorities. For many portions of the coast, this would be National Geodetic Vertical Datum although some areas use mean lower low water. Report storm tide in feet above the datum, and storm surge/wind waves in feet above the normal, predicted (astronomical) tide level. Identify location and date/time (UTC) of occurrence where possible. Report tides of 1 foot or greater above normal, with tides of less than 1 foot above normal reported as needed or as requested by the NHC.

e. Extent of beach erosion: As appropriate.

f. Flooding and/or flash flooding in CWA: Report to include date/times (UTC) and locations of occurrence.

g. Tornadoes in CWA: Report (times and locations).

h. Storm effects: Such as deaths, injuries, dollar damages, number of people evacuated, etc., within an office's CWA.

A.5.3.4. Format.

Ataa2i CCCC DDHHMM
PSHxxx

POST TROPICAL CYCLONE REPORT...(TROPICAL CYCLONE TYPE)
NATIONAL WEATHER SERVICE CITY STATE
time am/pm time_zone day mon DD YYYY

Wind data

Pressure data

Storm total rainfall

Maximum storm tide heights

Extent of beach erosion

Flooding and/or flash flooding in CWA

Tornadoes in CWA

Storm effects
$$

Figure A-3. **Post-Tropical Cyclone Report Format**

A.6. Information for Service Assessments. WFOs will forward a copy of media reports, especially newspaper clippings (online and printed) representative of the event and its impacts. Send reports to the appropriate RH and TPC within 7 days following the issuance of the last product concerning the storm. Reports do not have to include all interviews or radio or television spots concerning the landfall event in each local office's CWA.

A.7 Local Storm Reports (LSR). *WFOs will prepare these reports in accordance with LSR instructions (reference NWS Instruction 10-517, available at http://nws.noaa.gov/directives).*

A.8. Storm Reports. *WFOs will prepare these reports in accordance with Storm Data Preparation instruction (Reference NWS Instruction 10-1605).*

A.9. Correction Procedures. Tropical cyclone centers and WFOs should correct products using the following format:

WTNT KNHC 161441 CCA
TCDAT1

TROPICAL STORM ARTHUR DISCUSSION NUMBER 8...CORRECTED
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 AM EDT TUE JULY 16 2002

CORRECTED FOR (GIVE REASON)

TEXT FOLLOWS....

CCA - If a second correction is necessary, the "A" becomes a "B" (CCB).
"CORRECTED FOR" is optional but encouraged.

A.9. Procedures for Populating WFO-Generated Wind Forecast Grids for Tropical Cyclone Events*. The following are short-term solutions to be followed by all impacted WFOs for populating WFO wind grids for tropical cyclones. Updates to this directive will take place as better methods for populating WFO-generated wind forecasts are integrated into the Interactive Forecast Preparation System.*

A.9.1. *Wind Speed Values Within the 34 kt Wind Radii*

0-24 hours
Use wind forecast from the TCM as guidance for locating the 34-, 50- and 64-kt wind radii to maintain synoptic consistency. Apply local knowledge and mesoscale expertise to produce explicit/deterministic wind speed forecasts for all CWA/MAR grids using a full continuum of values up to the maximum sustained wind value provided by tropical cyclone centers.

25-72 hours
Use wind forecast from the TCM as guidance for locating the 34-, 50- and 64-kt wind radii to maintain synoptic consistency. Extrapolate the 64-kt radii from the 36-hour model guidance (TCMWind tool will do this). Coordinate consensus with NHC and adjacent WFOs. Apply local knowledge and mesoscale expertise to produce explicit/deterministic wind speed forecasts for all CWA/MAR grids using a full continuum of wind speeds up to 100 knots or up to the maximum sustained wind forecast by the NHC if it is less than 100 knots. For 101 kts and above use the capped value of 100 kts for grid points inside the 64 kt wind radii.

73-120 hours

Use forecast from the TCM as guidance for locating the center positions to maintain synoptic consistency. Extrapolate the 64-kt radii, the 50-kt radii and the 34-kt from model guidance (TCMWind tool will do this). Coordinate consensus with NHC and adjacent WFOs. Apply local knowledge and mesoscale expertise to produce explicit/deterministic wind speed forecasts for all CWA/MAR grids using a full continuum of wind speeds up to 64 knots or up to the maximum sustained wind forecast by the NHC if it is less than 64 knots. For 65 kts and above use the capped value of 64 kts for grid points inside the 64 kt wind radii.

121-168 hours

*Use traditional guidance and WFO discretion to produce explicit/deterministic wind speed forecasts for all CWA/MAR grids using a full continuum of wind speeds up to 30 kts. The choice for 30 kts avoids potential confusion which can result from the automated rounding of 33 kts to 35 kts when generating graphical wind barbs, and with associated textual formatters which convert kts to miles per hour (then round to the nearest 5 mph**).***

A.9.2. *Wind Speed Values Outside the 34 kt Wind Radii*

0-120 hours

Use deterministic wind speed values.

A.9.3. *Wind Direction Values Inside or Outside the 34 kt Wind Radii*

0-168 hours

Use deterministic wind direction values.

A.9.4. *Wind Gust Values Inside or Outside the 34 kt Wind Radii. At this time, there is no requirement to produce a gust grids. As an option, if a WFO desires to produce a gust grid it will have to be created with little or no guidance.*

A.9.5. *Caveat. It is highly recommended the following caveat be placed on all text and graphical products..."Winds in and near tropical cyclones should be used with caution due to uncertainty in forecast track, size, and intensity."*

A.10. Product Examples.

EXAMPLE: HURRICANE LOCAL STATEMENT

WTUS84 KCRP 151519
HLSCRP
TXZ230>234-241>247-151815-

HURRICANE LOCAL STATEMENT
NATIONAL WEATHER SERVICE CORPUS CHRISTI TX
1019 AM CDT TUE JUL 15 2003

...HURRICANE CLAUDETTE MOVING ONTO THE MIDDLE TEXAS COAST NEAR PORT O'CONNOR...

...A HURRICANE WARNING IS IN EFFECT FROM BAFFIN BAY TO HIGH ISLAND...

...AREAS AFFECTED...
THIS STATEMENT RECOMMENDS ACTIONS TO BE TAKEN BY RESIDENTS IN THE FOLLOWING COUNTIES OF ARANSAS...CALHOUN...KLEBERG...NUECES... REFUGIO...SAN PATRICIO...BEE...GOLIAD...LIVE OAK...MCMULLEN...JIM WELLS AND VICTORIA.

...WATCHES/WARNINGS...
A HURRICANE WARNING IS IN EFFECT FOR THE TEXAS COAST FROM BAFFIN BAY TO HIGH ISLAND. AN INLAND TROPICAL STORM WIND WARNING IS IN EFFECT FOR BEE...GOLIAD...LIVE OAK...JIM WELLS...MCMULLEN AND VICTORIA COUNTIES FOR TODAY. AN INLAND TROPICAL STORM WIND WATCH IS IN EFFECT FOR DUVAL AND LASALLE COUNTIES FOR TONIGHT. A FLASH FLOOD WATCH IS IN EFFECT FOR TODAY FOR THE COUNTIES OF ARANSAS...BEE...CALHOUN...GOLIAD...LIVE OAK...MCMULLEN...REFUGIO... SAN PATRICIO AND VICTORIA.

...STORM INFORMATION...
AT 9 AM CDT...THE CENTER OF HURRICANE CLAUDETTE WAS LOCATED NEAR LATITUDE 28.5 NORTH AND LONGITUDE 96.1 WEST...OR APPROXIMATELY 20 MILES EAST OF PORT O'CONNOR. MAXIMUM SUSTAINED WINDS ARE NEAR 80 MPH WITH HIGHER GUSTS. CLAUDETTE IS MOVING WEST-NORTHWEST NEAR 10 MPH. A CONTINUED MOVEMENT TOWARDS THE WEST-NORTHWEST IS EXPECTED TODAY. GIVEN THIS FORECAST TRACK...THE EYE OF CLAUDETTE IS EXPECTED TO MOVE ACROSS THE PORT OCONNOR TO PALACIOS AREA AROUND 11 AM. WEAKENING IS EXPECTED AFTER THE EYE OF CLAUDETTE MOVES INLAND.

...PRECAUTIONARY/*PREPAREDNESS* ACTIONS...
AS OF 1130 PM MONDAY EVENING...EMERGENCY MANAGEMENT OFFICIALS RECOMMENDED EVACUATIONS OF RESIDENTS OF ARANSAS COUNTY. ALSO...EVACUATIONS HAVE BEEN RECOMMENDED FOR RESIDENTS AND NON-RESIDENTS OF PORT ARANSAS. NO OTHER EVACUATIONS HAVE BEEN REPORTED TO THE NATIONAL WEATHER SERVICE AT THIS TIME. RESIDENTS OF SOUTH TEXAS...ESPECIALLY THOSE WHO LIVE IN THE COASTAL COUNTIES FROM KLEBERG TO CALHOUN...SHOULD COMPLETE ALL NECESSARY ACTIONS TO PROTECT LIFE AND PROPERTY.

...STORM SURGE *FLOOD* AND *STORM* TIDE IMPACTS...
AT 9 AM CDT...TIDES WERE APPROXIMATELY 3.5 FEET ABOVE MEAN SEA LEVEL AT BOBHALL PIER...AND 2.5 FEET ABOVE MEAN SEA LEVEL AT PORT OCONNOR. AS CLAUDETTE MOVES ACROSS THE COASTLINE...TIDES WILL CONTINUE TO INCREASE...ESPECIALLY FROM ROCKPORT NORTHWARD.

TIDES ARE EXPECTED TO RISE TO BETWEEN 3 AND 4 FEET ABOVE MEAN SEA LEVEL SOUTH OF ROCKPORT...AND 5 TO 6 FEET ABOVE MEAN SEA LEVEL BETWEEN ROCKPORT AND PORT OCONNOR BY THIS AFTERNOON.

AT 5 FEET MSL...WATER WILL FLOOD MANY STREETS IN LAMAR...ROCKPORT...INGLESIDE...FULTON...ARANSAS PASS...PORT ARANSAS AND PORT OCONNOR. WATER WILL REACH 1/4 MILE INLAND TO THE SOUTHERN PART OF ROCKPORT. PORTIONS OF HIGHWAY 35 BETWEEN ARANSAS PASS AND ROCKPORT WILL BE UNDER 1 FOOT OF WATER. ROADS WEST OUT OF ROCKPORT WILL BE UNDER WATER. BEACH AND HARBOR FACILITIES WILL BE FLOODED AT PORT ARANSAS. AT 4 FEET MSL...THE JFK CAUSEWAY WILL HAVE AROUND 1 FOOT OF WATER OVER IT. THE T-HEADS WILL BE FLOODED. FLOODING IS LIKELY ALONG HIGHWAY 35 FROM ARANSAS PASS TO ROCKPORT. SOME FLOODING IS LIKELY ALONG WATERFRONT FACILITIES AND ROADS THAT ARE NEAR THE WATER ALONG MANY COASTAL COMMUNITIES.

AT 3 FEET MSL...BEACH ROADS WILL BE FLOODED ON PADRE AND MUSTANG ISLANDS. THE JFK CAUSEWAY WILL HAVE SOME WATER OVER IT BUT NOT ENOUGH TO CLOSE IT DOWN. HIGH TIDES AT PORT ARANSAS OCCURRED AT 745 AM THIS MORNING AND WILL OCCUR AGAIN AT 817 AM ON WEDNESDAY. HIGH TIDES AT PORT OCONNOR WILL BE AT 259 PM THIS AFTERNOON AND 400 PM ON WEDNESDAY.

...WIND IMPACTS...
AT 9 AM CDT...THE COAST GUARD REPORTED WINDS OF 30 TO 40 KNOTS FROM THE NORTHWEST AT PORT O'CONNOR. A MESONET SITE IN PORT

OCONNOR REPORTED A WIND GUST AT 75 MPH AT 940 AM. WINDS ACROSS THE COASTAL WATERS FROM PORT O'CONNOR AND OUT TO 60 NAUTICAL MILES EAST OF PORT OCONNOR...HAVE INCREASED TO HURRICANE FORCE THIS MORNING.

WINDS OVER INLAND LOCATIONS FROM ROCKPORT TO VICTORIA ARE NORTH-NORTHWEST AROUND 25 TO 35 MPH. AS CLAUDETTE CONTINUES TO MOVE INLAND...WINDS WILL GRADUALLY INCREASE ACROSS THE ENTIRE AREA FROM EAST TO WEST.

TROPICAL STORM FORCE WINDS ARE EXPECTED TO SPREAD ACROSS THE REMAINDER OF THE COASTAL WATERS...PRIMARILY EAST OF PORT ARANSAS...THIS MORNING. WINDS GUSTING TO HURRICANE FORCE WILL MOVE INTO REFUGIO AND ARANSAS COUNTIES AROUND 11 AM CDT. THE TROPICAL STORM FORCE WINDS WILL ADVANCE SOUTHWEST DOWN THE COAST WITH TROPICAL STORM FORCE WINDS ENTERING THE COASTAL BEND NEAR CORPUS CHRISTI AROUND NOON. WIND GUSTS TO HURRICANE FORCE COULD OCCUR THIS AFTERNOON AND EVENING NEAR CORPUS CHRISTI AND REDFISH BAYS AND THE ADJACENT LAND AREAS.

...SEAS AND RIP CURRENTS...
AT 9 AM CDT...SEAS WERE AVERAGING AROUND 8 TO 10 FEET OUT TO AROUND20 NAUTICAL MILES...14 TO 18 FEET BEYOND 20 NAUTICAL MILES. AS CLAUDETTE MAKES LANDFALL...SEAS WILL INCREASE TO 12 TO 17 FEET OUT TO 20 NAUTICAL MILES...15 TO 20 FEET BEYOND 20 NAUTICAL MILES OFFSHORE THIS MORNING. THESE LARGE SEAS WILL CONTINUE TO PRODUCE VERY ROUGH SURF AND DANGEROUS RIP CURRENTS ACROSS ALL OF THE SOUTH TEXAS BEACHES. ENTERING THE SURF IS STRONGLY DISCOURAGED THROUGH AT LEAST WEDNESDAY.

...FLOOD IMPACTS...
HEAVY RAINFALL WILL ACCOMPANY CLAUDETTE LATER THIS MORNING INTO THIS EVENING. THE GREATEST POTENTIAL FOR HEAVY RAIN SHOULD BE THIS AFTERNOON THROUGH WEDNESDAY. TOTAL RAINFALL AMOUNTS OF 5 TO 8 INCHES WILL BE POSSIBLE MAINLY TO THE NORTH OF A ROCKPORT TO ENCINAL LINE...WITH 2 TO 4 INCHES POSSIBLE TO THE SOUTH OF THIS LINE. THESE RAINFALL AMOUNTS MAY NEED TO BE REVISED IF THE FORECAST TRACK CHANGES. THIS AMOUNT OF RAINFALL WILL HAVE THE POTENTIAL TO PRODUCE FLOODING OVER THE NORTHERN PORTIONS OF THE COASTAL BEND AND RIO GRANDE PLAINS AREA.

...NEXT UPDATE...
THE NEXT SCHEDULED STATEMENT WILL BE ISSUED AROUND 1 PM.
$$

EXAMPLE: SHORT TERM FORECAST (NOWcast)

FPUS71 KMOB 192130
NOWMOB

SHORT TERM FORECAST
NATIONAL WEATHER SERVICE MOBILE AL
430 PM CDT SAT AUG 19 1995

ALZ051>064-MSZ067-075-076-078-079-192330-

.NOW...
...HURRICANE GARY WILL MOVE ACROSS BALDWIN AND MOBILE COUNTIES BY 530 PM... SUSTAINED WINDS ABOVE 80 MPH WITH HIGHER GUSTS AND TORRENTIAL RAINFALL CAN BE EXPECTED AS THE RAIN BAND MOVES ACROSS. THE RAIN BAND SHOULD WEAKEN SLIGHTLY AS IT MOVES ACROSS CLARKE...WASHINGTON...AND GEORGE COUNTIES BY 6 PM. BUT PEOPLE IN THESE COUNTIES SHOULD EXPECT WIND GUSTS TO NEAR HURRICANE FORCE AND EXTREMELY HEAVY RAINFALL.
&&

SCATTERED AREAS OF MODERATE TO HEAVY RAINFALL WILL CONTINUE ACROSS SOUTHERN ALABAMA AND MISSISSIPPI THROUGH 6 PM. BANDS OF STRONG STORMS WILL MOVE NORTHWESTWARD ACROSS THE AREA. EAST WINDS OF 30-40 MPH AND HEAVY RAIN WILL PERSIST WITH STRONGER WINDS AND HEAVIER RAINFALL NEAR THE RAIN BANDS. TEMPERATURES ACROSS THE REGION WILL REMAIN IN THE 70S.

EXAMPLE: INLAND HURRICANE WARNING

WWUS45 KHGX 101030
NPWHOU

URGENT - WEATHER MESSAGE
NATIONAL WEATHER SERVICE HOUSTON-GALVESTON TX
600 AM CDT FRI SEP 10 1995

...AN INLAND HURRICANE WARNING IN EFFECT FOR SOUTHEAST TEXAS...

HURRICANE FRED...LOCATED 60 MILES SOUTHEAST OF GALVESTON TX AT 6 AM CDT...IS MOVING TO THE NORTH NORTHWEST AT 10 MPH AND IS EXPECTED TO MAKE LANDFALL AROUND NOON CDT ON THE UPPER TEXAS COAST. FRED IS THEN FORECAST TO CONTINUE ON A NORTH NORTHWEST

COURSE MOVING ACROSS HOUSTON AND REACHING THE SAN JACINTO NATIONAL FOREST BY LATE AFTERNOON. SUSTAINED WINDS OF 100 MPH WITH GUSTS TO 120 MPH SHOULD BEGIN SWEEPING ACROSS THE UPPER TEXAS COAST BY LATE MORNING.

TXZ177>179-197>199-210>212-102200-
WALKER-SAN JACINTO-POLK-WASHINGTON-GRIMES-MONTGOMERY-
COLORADO-AUSTIN-WALLER-

...INLAND HURRICANE WARNING...

WINDS ARE EXPECTED TO RAPIDLY INCREASE TO 50 TO 60 MPH BY 12 NOON AND 80 MPH WITH GUSTS TO 100 MPH BY MID AFTERNOON. 75 MPH WINDS WITH HIGHER GUSTS ARE LIKELY AS FAR INLAND AS HUNTSVILLE...NAVASOTA...AND LAKE LIVINGSTON BY LATE AFTERNOON.

BE PREPARED FOR NUMEROUS DOWNED TREES AND WIRES. DO NOT CROSS DOWNED WIRES...WHICH MAY STILL BE LIVE.
$$

TXZ226-227-235-213-200-102200-
WHARTON-FORT BEND-JACKSON-HARRIS-LIBERTY-

...INLAND HURRICANE WARNING...
WINDS FROM WHARTON TO HOUSTON AND LIBERTY ARE EXPECTED TO INCREASE TO 50 TO 60 MPH THIS MORNING AND 90 MPH WITH GUSTS TO NEAR 110 MPH BY MIDDAY...DECREASING TO 50 TO 60 MPH LATE THIS AFTERNOON.

FLYING DEBRIS WILL POSE A MAJOR THREAT TO ALL STRUCTURES IN THE WARNED AREA...ESPECIALLY GLASS FROM HIGH-RISE BUILDINGS IN DOWNTOWN HOUSTON. PEOPLE LIVING IN MOBILE HOMES AND THOSE CONCERNED ABOUT THE ABILITY OF THEIR HOMES TO WITHSTAND HURRICANE WINDS SHOULD MOVE TO A STRONG BUILDING OR SHELTER IMMEDIATELY. BE PREPARED FOR NUMEROUS DOWNED TREES AND WIRES. TAKE SHELTER IN SMALL INTERIOR ROOMS OR REINFORCED STRUCTURES.
$$

EXAMPLE: POST-TROPICAL CYCLONE REPORT

ACUS71 KNEW 032226
PSHNEW

POST-TROPICAL CYCLONE REPORT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
500 PM CDT MON SEP 3 1992

A. HIGHEST WINDS...

NEW ORLEANS INTERNATIONAL AIRPORT...
1 - MINUTE 39 KNOTS FROM 150 DEGREES 0950 UTC AUG 26 1992
PEAK GUST 72 KNOTS FROM 020 DEGREES AT 0728 UTC AUG 26 1992
P92 AMOS LOCATED AT SALT POINT, ST. MARY PARISH 19.5N 91.3W
...ETC

B. LOWEST PRESSURE...

LOWEST PRESSURE NEW ORLEANS INTERNATIONAL AIRPORT - 960.1 MB AT 0805 UTC AUG 26 1992
...ETC

C. RAINFALL...

NEW ORLEANS INTERNATIONAL AIRPORT

STORM TOTAL	5.70 IN.	AUG 25-26 1992
1 HOUR TOTAL	0.89 IN.	0800-0900 UTC 26 AUG 1992

...ETC

D. STORM TIDES...

MARINA	4.28	2100 UTC AUG 26 1992
N END OF CAUSEWAY	4.94	1100 UTC AUG 26 1992

...ETC

E. BEACH EROSION...

LEVEL OF EROSION PRESENTLY UNKNOWN
...ETC

F. FLOODING...

STORM TIDE FLOODING TO THE ENTIRE LOUISIANA COAST FROM LAKE BORGNE WEST TO VERMILION BAY...ETC

G. TORNADOES...

F3 TORNADO FROM LA PLACE TO RESERVE IN ST JOHN THE BAPTIST PARISH...ETC

H. STORM EFFECTS...

TORNADO	2 DEAD	32 INJURED	
HURRICANE	4 DEAD	UNKNOWN	2 MISSING

AN ESTIMATED ONE AND ONE QUARTER MILLION PEOPLE EVACUATED ACROSS SOUTHEAST AND SOUTH CENTRAL LOUISIANA...ETC

APPENDIX B

DEFINING POINTS FOR TROPICAL CYCLONE WATCHES/WARNINGS

La Pesca, MX	23.76EN	97.78EW
Rio San Fernando, MX	25.00EN	97.60EW
Brownsville, TX		
Brownsville, TX	25.95EN	97.16EW
Port Mansfield, TX	26.59EN	97.29EW
Baffin Bay, TX	27.29EN	97.37EW
Corpus Christi, TX		
Baffin Bay, TX	27.29EN	97.37EW
Corpus Christi, TX	27.67EN	97.19EW
Port Aransas, TX	27.83EN	97.08EW
Port O'Connor, TX	28.40EN	96.39EW
Houston, TX		
Port O'Connor, TX	28.40EN	96.39EW
Matagorda, TX	28.63EN	95.93EW
Sargent, TX	28.75EN	95.60EW
Freeport, TX	28.93EN	95.33EW
San Luis Pass, TX	29.08EN	95.13EW
High Island, TX	29.57EN	94.39EW
Lake Charles, LA		
High Island, TX	29.57EN	94.39EW
Sabine Pass, TX	29.71EN	93.85EW
Cameron, LA	29.80EN	93.30EW
Intracoastal City, LA	29.62EN	92.04EW
Morgan City, LA	29.49EN	91.29EW
New Orleans, LA		
Morgan City, LA	29.49EN	91.29EW
Grand Isle, LA	29.25EN	89.96EW
Mouth of Mississippi River, LA	29.12EN	89.11EW
Mouth of Pearl River, LA	30.15EN	89.60EW
Pascagoula, MS	30.37EN	88.55EW
Mobile, AL		
Pascagoula, MS	30.37EN	88.55EW
MS/AL Border	30.40EN	88.40EW
AL/FL Border	30.28EN	87.50EW
Fort Walton Beach, FL	30.41EN	86.62EW
Destin, FL	30.39EN	86.50EW
Tallahassee, FL		
Destin, FL	30.39EN	86.50EW
Panama City, FL	30.12EN	85.70EW
Indian Pass, FL	29.68EN	85.27EW
Apalachicola, FL	29.73EN	84.99EW
Ochlockonee River, FL	29.95EN	84.40EW
St. Marks, FL	30.11EN	84.21EW
Aucilla River, FL	30.05EN	83.92EW
Steinhatchee River, FL	29.70EN	83.40EW
Suwanee River, FL	29.30EN	83.17EW
Tampa Bay, FL		
Suwanee River, FL	29.30EN	83.17EW
Yankeetown, FL	29.03EN	82.74EW
Bayport, FL	28.54EN	82.65EW
Anclote Key, FL	28.18EN	82.85EW
Tarpon Springs, FL	28.15EN	82.77EW
Anna Maria Island, FL	27.53EN	82.75EW
Longboat Key, FL	27.39EN	82.64EW
Englewood, FL	26.94EN	82.38EW
Boca Grande, FL	26.72EN	82.27EW
Bonita Beach, FL	26.33EN	81.85EW
Miami, FL (Gulf)		
Bonita Beach, FL	26.33EN	81.85EW
Chokoloskee, FL	25.80EN	81.36EW
East Cape Sable, FL	25.15EN	81.08EW
Flamingo, FL	25.14EN	80.93EW
Key West, FL (Gulf)		
Flamingo, FL	25.14EN	80.93EW
Dry Tortugas, FL	24.66EN	82.86EW
Key West, FL	24.55EN	81.81EW
Seven Mile Bridge, FL	24.70EN	81.15EW
Craig Key, FL	24.83EN	80.77EW
Key Largo, FL	25.09EN	80.44EW
Ocean Reef, FL	25.32EN	80.26EW
Miami, FL (Atlantic)		
Ocean Reef, FL	25.32EN	80.26EW
Florida City, FL	25.45EN	80.33EW
Golden Beach, FL	25.97EN	80.12EW
Hallandale Beach, FL	25.99EN	80.13EW
Deerfield Beach, FL	26.32EN	80.10EW
Boca Raton, FL	26.36EN	80.07EW
Jupiter Inlet, FL	26.95EN	80.07EW
Melbourne, FL		
Jupiter Inlet, FL	26.95EN	80.07EW
Stuart, FL	27.21EN	80.18EW
Fort Pierce, FL	27.46EN	80.30EW
Vero Beach, FL	27.66EN	80.37EW
Sebastian Inlet, FL	27.84EN	80.43EW
Cocoa Beach, FL	28.32EN	80.61EW
Titusville, FL	28.64EN	80.63EW
New Smyrna Beach, FL	29.03EN	80.89EW
Flagler Beach, FL	29.47EN	81.13EW

Jacksonville, FL

Flagler Beach, FL	29.47EN	81.13EW
St. Augustine, FL	29.89EN	81.31EW
Fernandina Beach, FL	30.66EN	81.45EW
Altamaha Sound, GA	31.30EN	81.29EW

Charleston, SC

Altamaha Sound, GA	31.30EN	81.29EW
Savannah River, GA	32.04EN	80.86EW
Edisto Beach, SC	32.40EN	80.33EW
South Santee River, SC	33.12EN	79.27EW

Wilmington, NC

South Santee River, SC	33.12EN	79.27EW
Murrells Inlet, SC	33.56EN	79.00EW
Little River Inlet, SC	33.85EN	78.55EW
Cape Fear, NC	33.87EN	77.94EW
Surf City, NC	34.44EN	77.50EW

Morehead City, NC

Surf City, NC	34.44EN	77.50EW
New River Inlet, NC	34.32EN	77.34EW
Bogue Inlet, NC	34.39EN	77.11EW
Cape Lookout, NC	34.58EN	76.55EW
Ocracoke Inlet, NC	35.06EN	76.00EW
Cape Hatteras, NC	35.22EN	75.52EW
Oregon Inlet, NC	35.76EN	75.50EW
(The inclusion of Pamlico and Albemarle Sounds should be on a case-by-case basis).		
Currituck Beach Light, NC	36.38EN	75.83EW

Wakefield, VA

Currituck Beach Light, NC	36.38EN	75.83EW
NC/VA State Line	36.55EN	75.87EW
Cape Charles Light, VA	37.11EN	75.90EW
Parramore Island, VA	37.53EN	75.63EW
Chincoteague, VA	37.93EN	75.32EW
Chesapeake Bay, New Point Comfort, VA	37.30EN	76.28EW
Chesapeake Bay, Windmill Point,VA	37.61EN	76.28EW
Chesapeake Bay, Smith Point, VA	37.89EN	76.24EW

Sterling, VA

Chesapeake Bay, Smith Point, VA	37.89EN	76.24EW
Tidal Potomac, Cobb Island, MD	38.26EN	76.84EW
Tidal Potomac, Indian Head, MD	38.61EN	77.15EW
Tidal Potomac, Key Bridge, MD	38.89EN	77.07EW
Chesapeake Bay, Drum Point, MD	39.33EN	76.42EW
Chesapeake Bay, North Beach, MD	38.70EN	76.53EW
Chesapeake Bay, Sandy Point, MD	39.02EN	76.40EW
Chesapeake Bay, Pooles Island, MD	39.29EN	76.27EW

Mt. Holly, NJ

Cape Henlopen, DE	38.80EN	75.09EW
Cape May, NJ	38.93EN	74.90EW
Great Egg Inlet, NJ	39.29EN	74.54EW
Little Egg Inlet, NJ	39.49EN	74.31EW
Manasquan Inlet, NJ	40.10EN	74.03EW
Delaware Bay north/south of Slaughter Beach, DE to	38.91EN	75.30EW
East Point, NJ	39.19EN	75.02EW
Sandy Hook, NJ	40.46EN	74.00EW

New York City, NY

Sandy Hook, NJ	40.46EN	74.00EW
Fire Island Inlet, LI, NY	40.63EN	73.30EW
Moriches Inlet, LI, NY	40.77EN	72.75EW
Montauk Point, LI, NY	41.07EN	71.86EW
Port Jefferson Harbor, LI, NY	40.95EN	73.08EW
New Haven, CT	41.30EN	72.91EW
Watch Hill, RI	41.31EN	71.86EW

Boston, MA

Watch Hill, RI	41.31EN	71.86EW
Point Judith, RI	41.35EN	71.49EW
Westport, MA	41.45EN	71.20EW
Woods Hole, MA	41.52EN	70.69EW
Chatham, MA	41.66EN	69.95EW
Plymouth, MA	41.98EN	70.65EW
Gloucester, MA	42.57EN	70.66EW
Merrimack River, MA	42.84EN	70.82EW

Portland, ME

Merrimack River, MA	42.84EN	70.82EW
Portsmouth, NH	43.06EN	70.70EW
Portland, ME	43.64EN	70.20EW
Rockland, ME	44.10EN	69.10EW
Stonington, ME	44.16EN	68.67EW

Caribou, ME

Stonington, ME	44.16EN	68.67EW
Bar Harbor, ME	44.39EN	68.20EW
Eastport, ME	44.92EN	67.00EW

CALIFORNIA BREAKPOINTS

San Diego, CA

CA/Mexico Border	32.53°N	117.12°W
San Mateo Point, CA	33.38°N	117.60°W
Orange Co/Los Angeles Co, CA.	33.75°N	118.11°W

Los Angles/Oxnard, CA

Orange Co/Los Angeles Co.,CA	33.75°N	118.11°W
Point Mugu, CA	34.12°N	119.12°W
Point Conception, CA	34.45°N	120.45°W

Figure B-1. Tropical Cyclone Break Points for the Northeast

Figure B-2. Tropical Cyclone Break Points for the Southeast

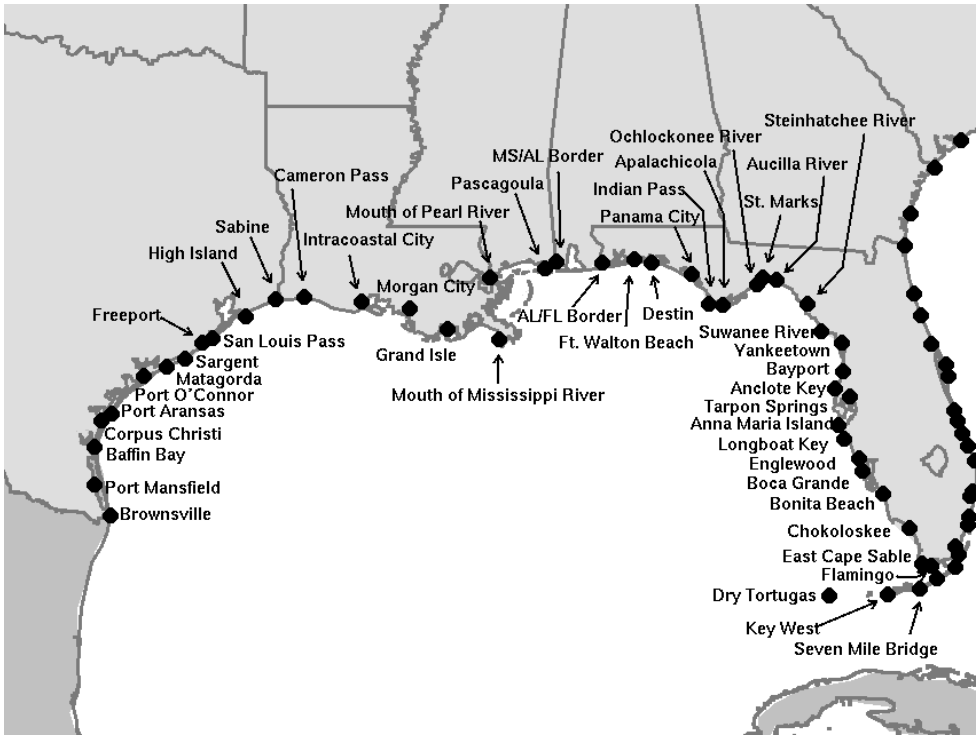

Figure B-3. Tropical Cyclone Break Points for the Gulf of Mexico

APPENDIX C

JOINT TYPHOON WARNING CENTER (JTWC) BULLETINS

Below are the abbreviated communications headers and titles for the products for which JTWC is responsible. A brief description of each product, to include scheduled transmission times, is available in USCINCPACINST 3140.1 (series)–JTWC's governing instruction.

ABIO 10 PGTW	Significant Weather Advisory, Indian Ocean
ABPW 10 PGTW	Significant Weather Advisory, Western Pacific Ocean
WTPN 21-26 PGTW	Tropical Cyclone Formation Alert, Northwest Pacific Ocean
WTPN 31-36 PGTW	Tropical Cyclone Warning, Northwest Pacific Ocean
WDPN 31-36 PGTW	Prognostic Reasoning Bulletin, Northwest Pacific Ocean
WTIO 21-25 PGTW	Tropical Cyclone Formation Alert, North Indian Ocean
WTIO 31-35 PGTW	Tropical Cyclone Warning, North Indian Ocean
WTPS 21-25 PGTW	Tropical Cyclone Formation Alert, Southwest Pacific Ocean
WTPS 31-35 PGTW	Tropical Cyclone Warning, Southwest Pacific Ocean
WTXS 21-26 PGTW	Tropical Cyclone Formation Alert, South Indian Ocean
WTXS 31-36 PGTW	Tropical Cyclone Warning, South Indian Ocean
WTPN 21-25 PHNC	Tropical Cyclone Formation Alert, Northeast Pacific Ocean
WTPN 31-35 PHNC	Tropical Cyclone Warning, Northeast Pacific Ocean
FKPN 31-35 PHNC	Prognostic Reasoning Bulletin, Northeast Pacific Ocean
WTPS 21-25 PHNC	Tropical Cyclone Formation Alert, Southeast Pacific Ocean
WTPS 31-35 PHNC	Tropical Cyclone Warning, Southeast Pacific Ocean

APPENDIX D

FORMAT FOR NHOP/NWSOP FLIGHT INFORMATION FOR INTERNATIONAL AND DOMESTIC NOTAM ISSUANCE

Flight information shall be sent to the NOTAM office *via facsimile* for dissemination as an International and Domestic NOTAM in the following format (Note: The request is made for a domestic NOTAM which will then automatically makes its way into the international NOTAM system):

Header
Request a Domestic NOTAM be Issued

A. Affected Center(s). This field will include all affected ARTCCs in 3-letter identifier format; e.g., ZNY, ZOA, ZAN. Synoptic track flights will probably utilize more than one ARTCC, and any adjacent ARTCC should be included when the flight track is within 100 miles of the adjacent center's airspace. Flights that are flying in the storm environment will utilize the ARTCC whose airspace is mostly affected.

B. Start Time (YYMMDDZZZZ). For example, 0006011600. This time would correspond to the entry time on a reconnaissance track or time at the storm fix latitude/longitude.

C. Ending Time (YYMMDDZZZZ). This would be the completion time of reconnaissance track or the time exiting the storm environment.

E.* Text. This field is free form and should include the following information: route of flight for the mission portion (latitude/longitude, fixes, airways), type of activity (laser, dropsonde, etc.), frequency/location of deployment, broadcast frequencies, any other pertinent information that may concern other flights. *Include a unit/agency phone number and point of contact for possible questions.*

F. Lower Altitude (during mission). Use "Surface" since the dropsonde is the "reason" for the NOTAM as much or more so than the aircraft altitude.

G. Upper Altitude (during mission). For example, FL450.

If only one altitude is to be used, then F and G may be combined. If altitude is going to vary throughout the mission, utilize "see text" and the information can be inserted there and the altitudes may be explained in field E.

* Note that there is no paragraph "D". It is reserved for FAA use.

NOTES:
1. Only ICAO approved contractions may be used.
2. Using this format will help ensure timely and accurate information dissemination.

APPENDIX E

SAFFIR-SIMPSON HURRICANE SCALE

Saffir/Simpson Hurricane Scale (SSHS). A scale ranging from one to five based on the hurricane's present intensity. This can be used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane. This scale may be used in public hurricane releases although the SSHS may not be applicable for all geographical areas; e.g., Hawaii and Guam. In practice, sustained surface wind speed (1-minute average) is the parameter that determines the category since storm surge is strongly dependent on the slope of the continental shelf.

ONE. Winds 74-95 mph (64-82 kts). No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.

TWO. Winds 96-110 mph (83-95 kts). Some roofing material, door, and window damage of buildings. Considerable damage to vegetation and mobile homes. Flooding damages piers, and small craft in unprotected anchorages break moorings.

THREE. Winds 111-130 mph (96-113 kts). Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures with larger structures damaged by floating debris. Terrain may be flooded well inland.

FOUR. Winds 131-155 mph (114-135 kts). More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.

FIVE. Winds greater than 155 mph (>135 kts). Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.

Note 1: A "major" hurricane is one that is classified as a Category 3 or higher.

APPENDIX F

OFFICIAL INTERAGENCY AGREEMENTS

The following enclosure is the Memorandum of Agreement (MOA) between the Air Force Reserve Command (AFRC) and the National Oceanic and Atmospheric Administration (NOAA), October 12, 2000. The purpose of this agreement is to establish policies, principles, and procedures under which the AFRC and NOAA provide aircraft weather reconnaissance and surveillance in support of NOAA's tropical cylone forecast, warning, and research missions.

MEMORANDUM OF AGREEMENT

BETWEEN

THE UNITED STATES AIR FORCE RESERVE COMMAND

AND

THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

PURPOSE: The National Oceanic and Atmospheric Administration (NOAA), an agency of the Department of Commerce, does not have the capability to fully support all operational requirements in support of tropical cyclone and winter storm aerial reconnaissance. This memorandum of agreement establishes policies, principles, and procedures under which the Air Force Reserve Command (AFRC) will provide aircraft weather reconnaissance support to NOAA. NOAA and AFRC enters into this agreement pursuant to its authority under 15 U.S.C. 313.

1. REFERENCES:

   a. *National Hurricane Operations Plan* (NHOP)

   b. *National Winter Storms Operations Plan* (NWSOP)

   c. Department of Defense Appropriations Act, 2000

2. BACKGROUND: The Air Force Reserve Command (AFRC) maintains 10 WC-130s to meet the Department of Commerce (DOC) aircraft reconnaissance requirements. AFRC will conduct up to five (5) sorties per day in support of NHOP requirements and up to two (2) sorties per day in support of NWSOP requirements. The Department of Defense (DOD), through AFRC, will bear all costs directly attributed to providing aircraft weather reconnaissance support. Support will be limited to the number of AFRC congressionally funded aircraft flying hours per year.

   a. Total flying hours used to support the weather reconnaissance mission are set annually in the DOD Appropriations Act. The 53rd Weather Reconnaissance Squadron (53 WRS) manages the flying hour program.

   b. The operational area for AFRC weather reconnaissance includes the Atlantic Ocean, Gulf of Mexico, the Caribbean Sea, and the North Pacific Ocean east of the international date line, as outlined in the NHOP and the NWSOP.

   c. The 53 WRS will be capable of operating from two (2) deployed locations, as well as from home station, simultaneously, supporting a maximum of five tropical cyclone

sorties per day or two winter storm sorties per day.

3. IMPLEMENTATION: Implementation details are contained in "GENERAL PROVISIONS."

4. GENERAL PROVISIONS:

   a. AFRC agrees:

      1) Within the limits of military capability, to meet NOAA's requirements for aerial weather reconnaissance in accordance with the NHOP and NWSOP.

      2) To provide at the Tropical Prediction Center/National Hurricane Center (TPC/NHC) the staff and equipment required to support the mission of the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH). CARCAH provides 24-hour telecon/aircraft SATCOM operational interface between NOAA/TPC/NHC and AFRC/53WRS for NHOP and NWSOP taskings. CARCAH is a subunit of and reports directly to the 53WRS.

   b. NOAA agrees to promptly notify AFRC/53WRS of the requirements for tropical cyclone or winter storm mission taskings in accordance with the NHOP and the NWSOP. Tropical cyclone missions will be tasked by the Director, TPC/NHC. Winter storm missions will be tasked by the Director, National Centers for Environmental Prediction.

   c. AFRC recognizes the obligation to support winter storm operations and associated research projects as delineated by the DOD Appropriations Act and the NWSOP. Support to research projects will be contingent upon aircraft availability.

5. MOBILIZATION: In times of national emergency or war, some or all AFRC/53WRS reconnaissance resources may not be available to fulfill DOC/NOAA needs.

6. EFFECTIVE AND TERMINATION DATES: This memorandum will become effective on the date signed by the last approving official. The parties will review this memorandum of agreement at least once every three years to determine whether it should be revised, amended, or cancelled. Amendments or revisions to this agreement require the mutual consents of the parties.

7. COORDINATION:

The agency contacts for coordination of the activities under this MOU are:

AOC: CAPT Robert W. Maxson, NOAA, Aircraft Operations Center, DOC, MacDill AFB, Florida; phone: (813) 828-3310 ext. 3001; fax: (813) 828-3266 E-mail Bob.W.Maxson@NOAA.gov

Ms. Julie Robertson, (813) 828-3310 ext. 3010; fax: (813) 828-8923 E-mail Julie.A.Robertson@NOAA.gov

AFRC:

HQ AFRC/DOOX
DSN 497-1161; Commercial (228)327-1161

403 WG/XPL
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8. RESOLUTION OF DISAGREEMENTS

Nothing herein is intended to conflict with current DOC or the NOAA Aircraft Operations Center directives. If the terms of this agreement are inconsistent with existing directives of either of the agencies entering into this agreement, then those portions of this agreement which are determined to be inconsistent shall be invalid, but the remaining terms and conditions not affected by the inconsistency shall remain in full force and effect. At the first opportunity for review of the agreement, all necessary changes will be accomplished either by an amendment to this agreement or by entering into a new agreement, whichever is deemed expedient to the interest of both parties.

Should disagreement arise on the interpretation of the provisions of this agreement, or amendments and/or revisions thereto, that cannot be resolved at the operating level, the area(s) of disagreement shall be stated in writing by each party and presented to the other party for consideration. If agreement on interpretation is not reached within thirty (30) days, the parties shall forward the written presentation of the disagreement to respective higher officials for appropriate resolution.

FOR THE UNITED STATES
AIR FORCE RESERVE COMMAND

Date: 20 Oct 2000

FOR THE NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION

R W Maxson Capt NOAA

Date: 10/12/2000

APPENDIX G

RECCO, HDOB, MINOB, AND TEMP DROP

CODES, TABLES, AND REGULATIONS

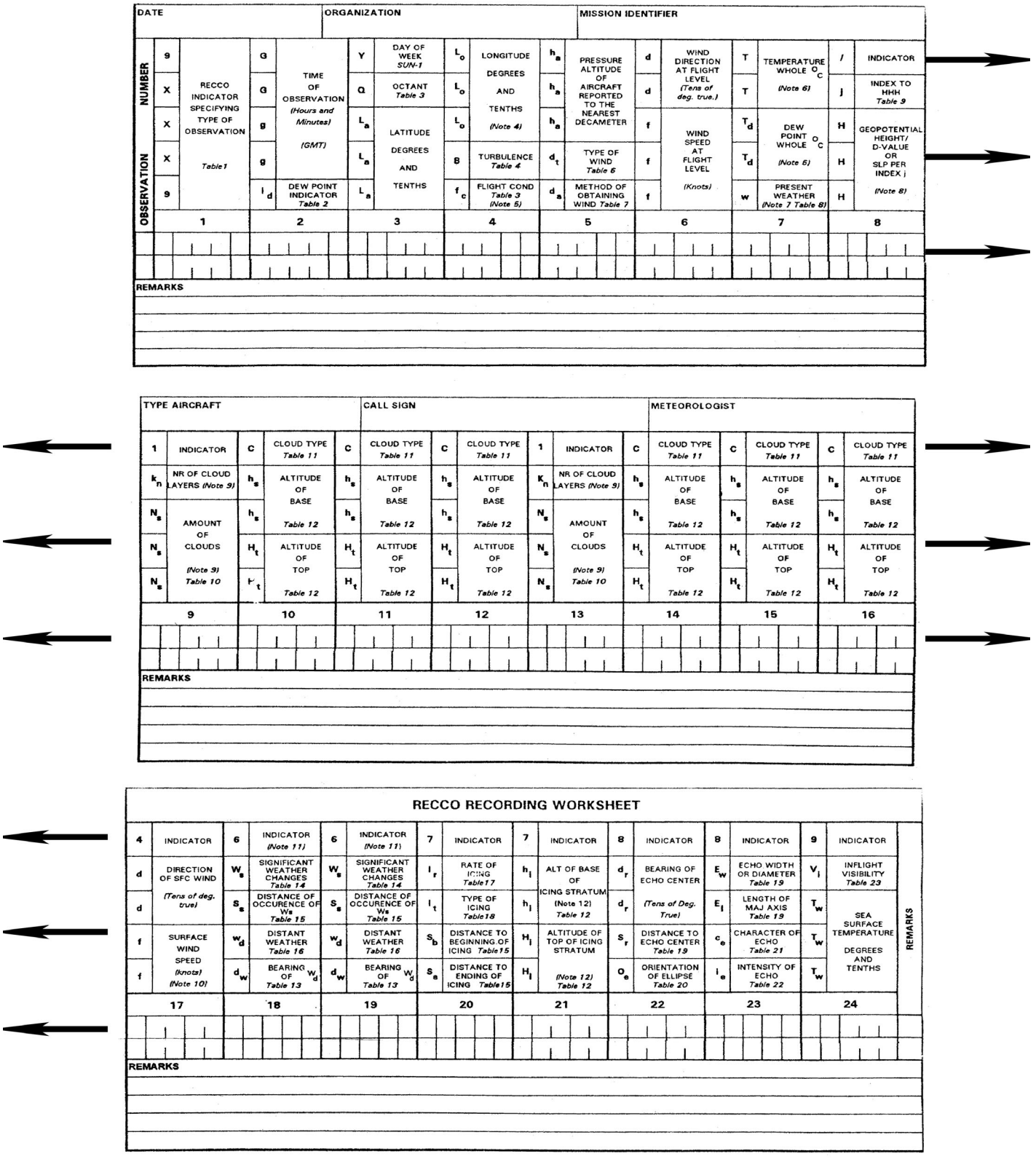


Figure G-1. Reconnaissance code recording form

Table G-1. Reconnaissance code tables

TABLE 1 XXX

222 Sec One Observation without radar capability
555 Sec Three (intermediate) observation with or without radar capability
777 Sec One Observation with radar capability

TABLE 2 i_d

0 No dew point capability/acft below 10,000 meters
1 No dew point capability/acft at or above 10,000 meters
2 No dew point capability/acft below 10,000 meters and flight lvl temp -50EC or colder
3 No dew point capability/acft at or above 10,000 meters and flight lvl temp -50EC or colder
4 Dew point capability/acft below 10,000 meters
5 Dew point capability/acft at or above 10,000 meters
6 Dew point capability/acft below 10,000 meters and flight lvl temp -50EC or colder
7 Dew point capability/acft at or above 10,000 meters and flight lvl temp -50EC or colder

TABLE 3 Q

0	0E -90E W	Northern
1	90E W - 180E	Northern
2	180E - 90E E	Northern
3	90E - 0E E	Northern
4	Not Used	
5	0E - 90E W	Southern
6	90E W - 180E	Southern
7	180E - 90E E	Southern
8	90E - 0E E	Southern

TABLE 4 B

0 None
1 Light turbulence
2 Moderate turbulence in clear air, infrequent
3 Moderate turbulence in clear air, frequent
4 Moderate turbulence in cloud, infrequent
5 Moderate turbulence in cloud, frequent
6 Severe Turbulence in clear air, infrequent
7 Severe Turbulence in clear air, frequent
8 Severe Turbulence in cloud, infrequent
9 Severe Turbulence in cloud, frequent

TABLE 5 f_c

0 In the clear
8 In and out of clouds
9 In clouds all the time (continuous IMC)
/ Impossible to determine due to darkness or other cause

TABLE 6 d_t

0 Spot of Wind
1 Average wind
/ No wind reported

TABLE 7 d_a

0 Winds obtained using doppler radar or inertial systems
1 Winds obtained using other navigation equipment and/or techniques
/ Navigator unable to determine or wind not compatible

TABLE 8 w

0 Clear
1 Scattered (trace to 4/8 cloud coverage)
2 Broken (5/8 to 7/8 cloud coverage)
3 Overcast/undercast
4 Fog, thick dust or haze
5 Drizzle
6 Rain (continuous or intermittent precip - from stratiform clouds)
7 Snow or rain and snow mixed
8 Shower(s) (continuous or intermittent precip - from cumuliform clouds)
9 Thunderstorm(s)
/ Unknown for any cause, including darkness

TABLE 9 j

0 Sea level pressure in whole millibars (thousands fig if any omitted)
1 Altitude 200 mb surface in geopotential decameters (thousands fig if any omitted)
2 Altitude 850 mb surface in geopotential meters (thousands fig omitted)
3 Altitude 700 mb surface in geopotential meters (thousands fig omitted)
4 Altitude 500 mb surface in geopotential decameters
5 Altitude 400 mb surface in geopotential decameters
6 Altitude 300 mb surface in geopotential decameters
7 Altitude 250 mb surface in geopotential decameters (thousands fig if any omitted)
8 D - Value in geopotential decameters; if negative 500 is added to HHH
9 Altitude 925 mb surface in geopotential meters
/ No absolute altitude available or geopotential data not within ± 30 meters/4 mb accuracy requirements

TABLE 10 N_s

0 No additional cloud layers (place holder)
1 1 okta or less, but not zero (1/8 or less sky covered)
2 2 oktas (or 2/8 of sky covered)
3 3 oktas (or 3/8 of sky covered)
4 4 oktas (or 4/8 of sky covered)
5 5 oktas (or 5/8 of sky covered)
6 6 oktas (or 6/8 of sky covered)
7 7 oktas or more but not 8 oktas
8 8 oktas or sky completely covered
9 Sky obscured (place holder)

TABLE 11 C

0 Cirrus (Ci)
1 Cirrocumulus (Cc)
2 Cirrostratus (Cs)
3 Altocumulus (Ac)
4 Altostratus (As)
5 Nimbostratus (Ns)
6 Stratocumulus (Sc)
7 Stratus (St)
8 Cumulus (Cu)
9 Cumulonimbus (Cb)
/ Cloud type unknown due to darkness or other analogous phenomena

TABLE 12 $h_s h_s H_t H_t h_l h_l H_l H_l$

00 Less than 100
01 100 ft
02 200 ft
03 300 ft
etc, etc
49 4,900 ft
50 5,000 ft
51-55 Not used
56 6,000 ft
57 7,000 ft
etc, etc
79 29,000 ft
80 30,000 ft
81 35,000 ft
82 40,000 ft
etc, etc
89 Greater than 70,000 ft
// Unknown

TABLE 13 d_w

0	No report	5	SW
1	NE	6	W
2	E	7	NW
3	SE	8	N
4	S	9	all directions

TABLE 14 W_s

0 No change
1 Marked wind shift
2 Beginning or ending or marked turbulence
3 Marked temperature change (not with altitude)
4 Precipitation begins or ends
5 Change in cloud forms
6 Fog or ice fog bank begins or ends
7 Warm front
8 Cold Front
9 Front, type not specified

TABLE 15 $S_b S_e S_s$

0 No report
1 Previous position
2 Present position
3 30 nautical miles
4 60 nautical miles
5 90 nautical miles
6 120 nautical miles
7 150 nautical miles
8 180 nautical miles
9 More than 180 nautical miles
/ Unknown (not used for S_s)

Table G-1. Reconnaissance code tables (continued)

TABLE 16 w_d

0 No report
1 Signs of a tropical cyclone
2 Ugly threatening sky
3 Duststorm or sandstorm
4 Fog or ice fog
5 Waterspout
6 Cirrostratus shield or bank
7 Altostratus or altocumulus shield or bank
8 Line of heavy cumulus
9 Cumulonimbus heads or thunderstorms

TABLE 17 I_r

7 Light
8 Moderate
9 Severe
/ Unknown or contrails

TABLE 18 I_t

0 None
1 Rime ice in clouds
2 Clear ice in clouds
3 Combination rime and clear ice in clouds
4 Rime ice in precipitation
5 Clear ice in precipitation
6 Combination rime and clear ice in precip
7 Frost (icing in clear air)
8 Nonpersistent contrails (less than 1/4 nautical miles long)
9 Persistent contrails

TABLE 19 S_r, E_w, E_l

0 0NM
1 10NM
2 20NM
3 30NM
4 40NM
5 50NM
6 60-80NM
7 80-100NM
8 100-150NM
9 Greater than 150NM
/ Unknown

TABLE 20 O_e

0 Circular
1 NNE - SSW
2 NE - SW
3 ENE - WSW
4 E - W
5 ESE - WNW
6 SE - NW
7 SSE - NNW
8 S - N
/ Unknown

TABLE 21 c_e

1 Scattered Area
2 Solid Area
3 Scattered Line
4 Solid Line
5 Scattered, all quadrants
6 Solid, all quadrants
/ Unknown

TABLE 22 i_e

2 Weak
5 Moderate
8 Strong
/ Unknown

TABLE 23 V_i

1 Inflight visibility 0 to and including 1 nautical mile
2 Inflight visibility greater than 1 and not exceeding 3 nautical miles
3 Inflight visibility greater than 3 nautical miles

RECCO SYMBOLIC FORM

SECTION ONE (MANDATORY)

9XXX9 GGggi$_d$ YQL$_a$L$_a$L$_a$ L$_o$L$_o$L$_o$Bf$_c$ h$_a$h$_a$h$_a$d$_t$d$_a$

ddfff TTT$_d$T$_d$w /jHHH

SECTION TWO (ADDITIONAL)

1k$_n$N$_s$N$_s$N$_s$ Ch$_s$h$_s$H$_t$H$_t$ 4ddff

6W$_s$S$_s$W$_d$d$_w$ 7I$_r$I$_t$S$_b$S$_e$ 7h$_i$h$_i$H$_i$H$_i$ 8d$_r$d$_r$S$_r$O$_e$

8E$_w$E$_l$c$_e$i$_e$ 9V$_i$T$_w$T$_w$T$_w$

SECTION THREE (INTERMEDIATE)

9XXX9 GGggi$_d$ YQL$_a$L$_a$L$_a$ L$_o$L$_o$L$_o$Bf$_c$ h$_a$h$_a$h$_a$d$_t$d$_a$

ddfff TTT$_d$T$_d$w /jHHH

Table G-2. Reconnaissance code regulations

1. At the time of the observation the aircraft observing platform is considered to be located on the axis of a right vertical cylinder with a radius of 30 nautical miles bounded by the earth's surface and the top atmosphere. Present weather, cloud amount and type, turbulence, and other subjective elements are reported as occurring within the cylinder. Flight level winds, temperature, dew point, and geopotential values are sensed or computed and reported as occurring at the center of the observation circle. Radar echoes, significant weather changes, distant weather, and icing are phenomena that may also be observed/reported. Code groups identifying these phenomena may be reported as necessary to adequately describe met conditions observed.

2. The intermediate observation (Section Three) is reported following Section One (or Section Two if appended to Section One) in the order that it was taken.

3. Plain language remarks may be added as appropriate. These remarks follow the last encoded portion of the horizontal or vertical observation and will clearly convey the intended message. Vertical observations will not include meteorological remarks. These remarks must begin with a letter or word-e.g. "FL TEMP" vice "700 MB FL TEMP." The last report plain language remarks are mandatory, i.e., "LAST REPORT. OBS 01 thru 08 to KNHC, OBS 09 and 10 to KBIX."

4. The hundreds digit of longitude is omitted for longitudes from 100E to 180E.

5. Describe conditions along the route of flight actually experienced at flight level by aircraft.

6. TT, T_dT_d. When encoding negative temperatures, 50 is added to the absolute value of the temperature with the hundreds figure, if any, being omitted. A temperature of -52EC is encoded as 02, the distinction between -52EC and 2EC being made from i_d. Missing or unknown temperatures are reported as //. When the dew point is colder than -49.4EC, Code T_dT_d as // and report the actual value as a plain language remark - e.g. "DEW POINT NEG 52EC".

7. When two or more types of w co-exist, the type with the higher code figure will be reported. Code Figure 1, 2 and 3 are reported based on the total cloud amount through a given altitude, above or below the aircraft, and when other figures are inappropriate. The summation principle applies only when two or more cloud types share a given altitude.

8. When j is reported as a /, HHH is encoded as ///.

9. If the number of cloud layers reported exceeds 3, k_n in the first 1-group reports the total number of cloud layers. The second 1-group reports the additional number of layers being reported exclusive of those previously reported. In those cases where a cloud layer(s) is discernible, but a descriptive cloud picture of the observation circle is not possible, use appropriate remarks such as "Clouds Blo" or "As Blo" to indicate the presence of clouds. In such cases, coded entries are not made for group 9. The sequence in which cloud amounts are encoded depends upon type of cloud, cloud base, and vertical extent of the cloud. The cloud with the largest numerical value of cloud type code (C) is reported first, regardless of coverage, base, or vertical extent. Among clouds of the same cloud type code, sharing a common base, the cloud of greatest vertical extent is reported first. The summation principle is not used; each layer is treated as though no other clouds were present. The total amount of clouds through one altitude shared by several clouds will not exceed 8 oktas. Only use code figure 0 as a place holder when you can determine that no additional cloud layers exist. In case of undercast, overcast, etc., use code figure 9 as a placeholder.

10. Due to limitations in the ability to distinguish sea state features representative of wind speeds above 130 knots, surface wind speeds in excess of 130 knots will not be encoded. Wind speeds of 100 to 130 knots inclusive will be encoded by deleting the hundreds figure and adding 50 to dd. For wind speeds above 130 knots, dd is reported without adding 50 and ff is encoded as // with a plain language remark added, i.e., "SFC WIND ABOVE 130 KNOTS."

11. Significant weather changes which have occurred since the last observation along the track are reported for W_s.

12. When aircraft encounters icing in level flight, the height at which the icing occurred will be reported for h_ih_i. The H_iH_i will be reported as //.

HDOB messages are created automatically by system software. Each consists of 20 lines of HD/HA data. Within an HDOB message, the time interval between individual HD/HA observations (the encoding interval) can be set by the operator to be either 30 seconds, 1 minute, or 2 minutes. Regardless of the encoding interval, all HD/HA meteorological parameters except MMM (maximum wind speed, Table G-3) represent 30- second averages ending at the time of the HD/HA observation. The maximum wind speed, however, is the highest 10-sec average wind speed occurring during the encoding interval.

Samples of HDOB messages using different encoding intervals are shown below. HDOB messages with 30 second, 1 minute, and 2 minute encoding intervals will be generated and transmitted every 10 minutes, 20 minutes, and 40 minutes, respectively.

SXXX50 KNHC 040952
AF967 1017A OPAL HDOB 39

```
0942. 2643N  08846W  03036  5374  127  106  140  136  112  02680  0000000000
0943  2641N  08847W  03036  5442  116  116  136  136  120  02612  0000000000
0943. 2640N  08849W  03065  5521  100  087  140  140  099  02561  0000000000
0944  2638N  08850W  03028  5591  087  059  186  160  074  02454  0000000000
0944. 2637N  08850W  03053  5630  097  028  202  158  036  02440  0000000000
0945  2635N  08850W  03059  5647  197  009  218  148  018  02429  0000000000
                                .
                                .
```

30-second data interval

SXXX50 KNHC 040952
AF967 1017A OPAL HDOB 39

```
0942  2644N  08844W  03039  5333  135  094  138  136  096  02724  0000000000
0943  2641N  08847W  03036  5442  116  116  136  136  120  02612  0000000000
0944  2638N  08850W  03028  5591  087  059  186  160  099  02454  0000000000
0945  2635N  08850W  03059  5647  197  009  218  148  036  02429  0000000000
0946  2632N  08849W  03028  5632  274  052  226  148  067  02413  0000000000
0947  2628N  08849W  03057  5488  271  118  194  130  124  02587  0000000000
                                .
                                .
```

1-minute data interval

SXXX50 KNHC 040952
AF967 1017A OPAL HDOB 39

```
0942  2644N  08844W  03039  5333  135  094  138  136  096  02724  0000000000
0944  2638N  08850W  03028  5591  087  059  186  160  120  02454  0000000000
0946  2632N  08849W  03028  5632  274  052  226  148  067  02413  0000000000
0948  2625N  08849W  03050  5378  263  113  172  140  124  02690  0000000000
0950  2620N  08849W  03047  5268  259  094  142  134  109  02797  0000000000
0952  2614N  08849W  03044  5217  262  075  162  108  090  02845  0000000000
                                .
                                .
```

2-minute data interval

Figure G-2. HDOB Description and Sample Messages

Table G-3. HDOB Message Format

HHMM $L_aL_a$mmH $L_oL_oL_o$mmH PPPPP DDDD WWW SSS TTT ddd MMM RRRRR FFFFFFFFFF

HHMM:	The time of observation in hours and minutes (UTC). A period following HHMM indicates a data time of 30 seconds past the minute.
$L_aL_a$mmH:	The latitude of the observation in degrees, minutes and hemisphere (N or S).
$L_oL_oL_o$mmH:	The longitude of the observation in degrees, minutes and hemisphere (E or W).
PPPPP:	The pressure altitude in meters.
DDDD:	The absolute value of the D-value in meters (a 5 occupies the thousands place if the D-value is negative. For example, -34m is encoded as 5034.
WWW:	The wind direction in degrees, with 0 being true north, increasing clockwise.
SSS:	*The 30-second average wind speed in knots.*
TTT:	The air temperature in degrees and tenths Celsius. The tenths digit is even for temperatures at or above 0EC, odd for temperatures below 0EC.
ddd:	The dew point temperature, encoded the same way as air temperature.
MMM:	*The maximum 10-second average wind speed in knots measured during the encoding interval of 30 seconds, 1 minute, or 2 minutes.*
RRRRR:	Radar altitude in meters
FFFFFFFFFF:	Default status for the MINOB/HDOB data. A "1" indicates the parameter is defaulted (suspect value) or based on a parameter that is defaulted. A "0" indicates the value is not defaulted. The field indicate default for (in order): latitude, longitude, pressure altitude, D-value, wind direction, wind speed, air temperature, dew point, maximum wind speed, radar altimeter.

MinOb messages are created automatically by the NOAA P-3 Research Aircraft Measurement System (RAMS). Each MinOb message contains one or more lines of flight level data. Each line consists of data parameters, averaged over an operator-selected sample interval (common settings are 30 seconds and 1 minute). The time interval for collecting lines in a block before forming a message for transmission is also selectable, typically 10 or 15 minutes. The message length is based on the operator's selection of sample interval and block length, but will never exceed 3300 characters (approximately 50 lines) due to satellite transmission protocol limits.

Each line is terminated with an ASCII <cr><cr><lf> sequence (Hex 0D 0D 0A). The line length is variable, depending on whether the optional Stepped Frequency Microwave Radiometer (SFMR) fields are included (see Table G-4 description). All fields are separated by at least one ASCII blank (Hex 20) as shown in the Table by a . symbol.

URNT40 KWBC 261950
NOAA3 WX02A BONNIE
194030 3136 07758 6849 +0152 251053 +171 +106 251054 040 005
194100 3138 07758 6847 +0148 247053 +171 +102 249053 040 005
194130 3141 07758 6849 +0146 246053 +166 +106 247053 039 005
194200 3143 07758 6851 +0144 246054 +162 +111 246054 039 004
194230 3145 07758 6849 +0141 246053 +162 +112 246054 999 999
194300 3147 07558 6852 +0134 245053 +160 +114 245053 039 004
194330 3149 07759 6845 +0126 247052 +162 +110 247052 038 000
.
.

30-Second Data Interval (with optional SFMR data)

Note: Differences from the Air Force HDOB message include the following:

- Time code includes seconds, rather than a period to show 30-second mark
- Latitude and longitude hemispheres are denoted by a minus sign rather than an alphabetic character (N,S,E,W)
- Pressure altitudes and D-values are in feet
- D-value sign is explicit, rather than coded as a leading `5'
- Temperature and dewpoint signs are explicit, rather than making tenths odd/even
- There is no radar altitude or default status
- There may be SFMR data fields

Figure G-3. MinOb Description and Sample Message

Table G-4. NOAA MinOb Message Format

HHMMSS . $L_aL_aL_a$mm . $L_oL_oL_o$mm . PPPPP . ±DDDD . WWWSSS . ±TTT . ±ddd . wwwsss . *sss* . rrr

HHMMSS	The time of the observation in hours, minutes and seconds (UTC). All averages (except peak wind) are centered around this time.
$L_aL_aL_a$mm	The latitude of the observation in degrees and minutes. A negative number signifies the Southern hemisphere. There may be leading blanks in the degree subfield; the minutes will always be a two digit numeric (zero filled as required).
$L_oL_oL_o$mm	The longitude of the observation in degrees and minutes. A negative number signifies the Eastern hemisphere. NOTE: This is opposite the normal convention. There may be leading blanks in the degree subfield; minutes will always be a two digit numeric.
PPPPP	The pressure altitude in feet. There may be leading blanks.
±DDDD	The D-value (Geopotential Altitude - Pressure Altitude) in feet. There will always be a leading sign (+ or -) followed by four numeric characters (leading zeros if required)
WWW	The wind direction in degrees, with 0 being true North, increasing clockwise. There will always be three numeric characters, with leading zeros if required.
SSS	The wind speed in knots. There will always be three numeric characters, with leading zeros if required.
±TTT	The air temperature in degrees and tenths Celsius. There will always be a leading sign (+ or -) followed by three numeric characters (leading zeros if required). For example, 5.3 C would be coded +053.
±ddd	The dewpoint temperature, encoded the same way as air temperature.
www	The direction of the peak wind during this interval (30 sec, 1 min, etc.). The peak wind is defined as the maximum 10 second average wind. Format is the same as wind direction above.
sss	The speed of the peak wind in knots. Format is the same as wind speed above.
sss	The wind speed at the surface in knots, as measured by the Stepped Frequency Microwave Radiometer (SFMR). This is an optional field new for 1999, and may be omitted depending on the version of software being run. If omitted, the rain rate field will also be omitted, and the <cr><cr><lf> sequence will occur immediately after the peak wind speed field (no trailing blank). When present, there will be three numeric characters, with leading zeros if required. If the SFMR wind can not be calculated during the sample interval, it (and the rain rate) will be coded as 999.
rrr	The rain rate in mm/hr, as measured by the SFMR. When present (see SFMR wind speed discussion above), there will be three numeric characters, with leading zeros if required. If rain rate can not be calculated it will be coded as 999.

Table G-5. TEMP DROP CODE

EXTRACT FROM: WMO-No. 306 MANUAL ON CODES

FM 37-X Ext. TEMP DROP - Upper-level pressure, temperature, humidity and wind report from a sonde released by carrier balloons or aircraft. See Figure G-4 for an example TEMP DROP message for tropical cyclone operations.

CODE FORM:

PART A

SECTION 1	$M_iM_iM_jM_j$ YYGGI_d 99$L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ MMM$U_{La}U_{Lo}$
SECTION 2	99$P_oP_oP_o$ $T_oT_oT_{ao}D_oD_o$ $d_od_of_of_of_o$
	$P_1P_1h_1h_1h_1$ $T_1T_1T_{a1}D_1D_1$ $d_1d_1f_1f_1f_1$
	$P_nP_nh_nh_nh_n$ $T_nT_nT_{an}D_nD_n$ $d_nd_nf_nf_nf_n$
SECTION 3	88$P_tP_tP_t$ $T_tT_tT_{at}D_tD_t$ $d_td_tf_tf_tf_t$ or 88999
SECTION 4	77$P_mP_mP_m$ $d_md_mf_mf_mf_m$ ($4v_bv_bv_av_a$) or
	66$P_mP_mP_m$ $d_md_mf_mf_mf_m$ ($4v_bv_bv_av_a$) or 77999
SECTION 10	31313
	51515 $101A_{df}$ A_{df} $0P_nP_nP'_nP'_n$. or
	$101A_{df}$ A_{df} $P_nP_nh_nh_nh_n$ 61616
	62626

PART B

SECTION 1	$M_iM_iM_jM_j$ YYGG8 99$L_aL_aL_a$ $Q_cL_oL_oL_o$ MMM$U_{La}U_{Lo}$
SECTION 5	$n_on_oP_oP_oP_o$ $T_oT_oT_{ao}D_oD_o$
	$n_1n_1P_1P_1P_1$ $T_1T_1T_{a1}D_1D_1$

$n_n n_n P_n P_n P_n \quad T_n T_n T_{an} D_n D_n$

SECTION 6 21212 $n_o n_o P_o P_o P_o \; d_o d_o f_o f_o f_o$

$n_1 n_1 P_1 P_1 P_1 \quad d_1 d_1 f_1 f_1 f_1$

$n_n n_n P_n P_n P_n \quad d_n d_n f_n f_n f_n$

SECTION 7 31313 $s_r r_a r_a s_a s_a$ 8GGgg

SECTION 9 51515 $101 A_{df} \; A_{df}$ or

$101 A_{df} \; A_{df} \quad 0 P_n P_n P'_n P'_n$. or

$101 A_{df} \; A_{df} \quad P_n P_n h_n h_n h_n$

SECTION 10 61616

62626

PART ALPHA (A)

IDENTIFICATION LETTERS: $M_J M_J$

Identifier: **$M_J M_J$** - Identifier for Part A of the report.

DATE/TIME GROUP: $YYGGI_d$

Identifier: **YY** - Date group
Identifier: **GG** - Time group
Identifier: **I_d** - The highest mandatory level for which wind is available.

LATTITUDE: $99L_aL_aL_a$

Identifier: **99 –** Indicator for data on position follows.
Identifier: **$L_aL_aL_a$** – Latitude in tenths of degrees

LONGITUDE: $Q_cL_oL_oL_oL_o$

Identifier: **Q_c** – The octant of the globe.
Identifier: **$L_oL_oL_oL_o$** – Longitude in tenths of degrees

MARSDEN SQUARE: $MMMU_{la}U_{lo}$

Identifier: **MMM** - Marsden square.
Identifier: **$U_{la}U_{lo}$** – Units digits in the reported latitude and longitude.

SEA LEVEL PRESSURE: $99P_0P_0P_0 \;\; T_0T_0T_0D_0D_0 \;\; d_0d_0f_0f_0f_0$

Identifier: **99** – Indicator for data at the surface level follows
Identifier: **$P_0P_0P_0$** – Indicator for pressure of specified levels in whole millibars (thousands digit omitted)
Identifier: **$T_0T_0T_0$–** Tens and digits of air temperature (not rounded off) in degrees Celsius, at specified levels beginning with surface.

Identifier: **D_0D_0 –** Dewpoint depression at standard isobaric surfaces beginning with surface level.

NOTE

When the depression is 4.9C or less encode the units and tenths digits of the depression. Encode depressions of 5.0 through 5.4C as 50. Encode depressions of 5.5C through 5.9C as 56. Dew point depressions of 6.0 and above are encoded in tens and units with 50 added. Dew point depressions for relative humidities less then 20% are encoded as 80. When air temperature is below –40C report **D_nD_n** as //.

Identifier: **d_od_o –** True direction from which wind is blowing rounded to nearest 5 degrees. Report hundreds and tens digits. The unit digit (0 or 5) is added to the hundreds digit of wind speed.
Identifier: **$f_of_of_o$ –** Wind speed in knots. Hundreds digit is sum of speed and unit digit of direction, i.e. 295° at 125 knots encoded as 29625.

NOTE: 1. When flight level is just above a standard surface and in the operator's best meteorological judgment, the winds are representative of the winds at the standard surface, then the operator may encode the standard surface winds using the data from flight level. If the winds are not representative, then encode /////.

NOTE: 2. The wind group relating to the surface level ($d_od_of_of_o$) will be included in the report; when the corresponding wind data are not available, the group will be encoded as /////.

STANDARD ISOBARIC SURFACES : $P_1P_1h_1h_1h_1$ $T_1T_1T_1D_1D_1$ $d_1d_1f_1f_1f_1$

Identifier: **P_1P_1** – Pressure of standard isobaric surfaces in units of tens of millibars.
(1000 mbs = 00, 925mbs = 92, 850mbs = 85, 700mbs = 70, 500mbs = 50, 400mbs = 40, 300mbs = 30, 250mbs = 25).
Identifier: **$h_1h_1h_1$ –** Heights of the standard pressure level in geopotential meters or decameters above the surface. Encoded in decameters at and above 500mbs omitting, if necessary, the thousands or tens of thousands digits. Add 500 to hhh for negative 1000mb or 925mb heights. Report 1000mb group as 00/// ///// ///// when pressure is less than 950mbs.
Identifier: **$T_1T_1T_1D_1D_1$** – Same temperature/dew point encoding procedures apply to all levels.
Identifier : **$d_1d_1f_1f_1f_1$ –** Same wind encoding procedures apply to all levels.

DATA FOR TROPOPAUSE LEVELS: 88 $P_tP_tP_t$ $T_tT_tT_tD_tD_t$ $d_td_tf_tf_tf_t$

Identifier: **88 –** Indicator for Tropopause level follows
Identifier: **$P_tP_tP_t$ –** Pressure at the tropopause level reported in whole millibars. Report $88P_nP_nP_n$ as 88999 when tropopause is not observed.
Identifier: **$T_tT_tT_tD_tD_t$ –** Same temperature/ dew point encoding procedures apply.
Identifier: **$d_td_tf_tf_tf_t$ -** Same wind encoding procedures apply.

MAXIMUM WIND DATA: 77$P_nP_nP_n$ $d_nd_nf_nf_nf_n$ 4$v_bv_bv_av_a$

Identifier: 77 – Indicator that data for maximum wind level and for vertical wind shear follow when max wind does not coincide at flight. If the maximum wind level coincides with flight level encode as 66
Identifier: $P_nP_nP_n$ – Pressure at maximum wind level in whole millibars.
Identifier: **$d_nd_nf_nf_nf_n$ -** Same wind encoding procedures apply.

VERTICAL WIND SHEAR DATA: 4$v_bv_bv_av_a$

Identifier: **4 –** Data for vertical wind shear follow.
Identifier: **v_bv_b –** Absolute value of vector difference between max wind and wind 3000 feet BELOW the level of max wind, reported to the nearest knot. Use "//" if missing and a 4 is reported. A vector difference of 99 knots or more is reported with the code figure "99".
Identifier: **v_av_a –** Absolute value of vector difference between max wind and wind 3000 feet above the level of max wind, reported to the nearest knot. Use "//" if missing and a 4 is reported. A vector difference of 99 knots or more is reported with the code figure "99".

SOUNDING SYSTEM INDICATION, RADIOSONDE/ SYSTEM STATUS, LAUNCH TIME:
31313 $s_r r_a r_a s_a s_a$ 8GGgg

Identifier: **$s_r r_a r_a s_a s_a$ -** Sounding system indicator, radiosonde/ system status: $s_a r_a r_a s_a s_a$
Identifier**: s_a** - Solar and infrared radiation correction (**0** – no correction)
Identifier: **$r_a r_a$** – Radiosonde/sounding system used (**96** – Descending radiosonde)
Identifier: **$s_a s_a$** – Tracking technique/status of system used (**08** – Automatic satellite navigation)
Identifier: **8GGgg** – Launch time
Identifier: **8** – Indicator group
Identifier: **GG** – Time in hours
Identifier: **gg** – Time in minutes

ADDITIONAL DATA GROUPS: 51515 101XX 0$P_nP_nP_nP_n$

Identifier: **51515** – Additional data in regional code follow
Identifier: **10166** – Geopotential data are doubtful between the following levels 0$P_nP_nP_nP_n$. This code figure is used only when geopotential data are doubtful from one level to another.
Identifier: **10167** – Temperature data are doubtful between the following levels 0$P_nP_nP_nP_n$. This code figure shall be reported when only the temperature data are doubtful for a portion of the descent. If a 10167 group is reported a 10166 will also be reported. EXAMPLE: Temperature is doubtful from 540mbs to 510mbs. SLP is 1020mbs. The additional data groups would be : 51515 10166 00251 10167 05451.
Identifier: **10190** – Extrapolated altitude data follows:

When the sounding begins within 25mbs below a standard surface, the height of the surface is reported in the format **10190 $P_nP_nh_nh_nh_n$**. The temperature group is not reported. EXAMPLE: Assume the release was made from 310mbs and the 300mb height was 966 decameters. The last reported standard level in Part A is the 400mb level. The data for the 300mb level is reported in Part A and B as 1019030966.

When the sounding does not reach surface, but terminates within 25mbs of a standard surface, the height of the standard surface is reported in Part A of the code in standard format and also at the end of Part A and Part B of the code in the format as **10190 $P_nP_nh_nh_nh_n$**.
EXAMPLE: Assume termination occurred at 980mbs and the extrapolated height of the 1000mb level was 115 meters. The 1000mb level would be reported in Part A of the code as 00115 ///// ///// and in Part B as 10190 00115.

Identifier: **10191** – Extrapolated surface pressure precedes. Extrapolated surface pressure is only reported when the termination occurs between 850mbs and the surface. Surface pressure is reported in Part A as 99$P_0P_0P_0$ ///// and in Part B as 00$P_0P_0P_0$ /////. When surface pressure is extrapolated the 10191 group is the last additional data group reported in Part B.

AIRCRAFT AND MISSION IDENTIFICATION: 61616 AFXXX XXXXX XXXXX OB X

Identifier: **61616** – Aircraft and mission identification data follows.
Identifier: **AFXXX –** The identifier AF for U.S. Air Force and the last three digits of the aircraft's tail number.
Identifier: **XXXXX XXXXX –** The identifier for the type of mission being flown.

If a training mission the mission identifier is **WXWXA TRAIN.** The fifth letter "A" is the only character that could possibly change. The "A" defining that the flight originated in the Atlantic basin. The letter "C" identifies the Central Pacific area and the letter "E" identifies the Eastern Pacific.

If an operational storm mission: the first two numbers Identifier the number of times an aircraft has flown this system and the second two numbers Identifier the system number. The last character again identifies the basin flown. The name of the storm would replace TRAIN.

EXAMPLE: AF968 0204A MARIE – Aircraft number 50968, this was the second flight into this system and the system was the fourth of the season. The system reached tropical storm strength and was named MARIE.

Identifier: **OB 14** – The observation (both vertical and horizontal) number as transmitted from the aircraft.

NATIONALLY DEVELOPED CODES: 62626

Identifier: **62626** – This is the remarks section. Only the remarks EYE, EYEWALL XXX, MXWNDBND XXX, or RAINBAND will be used. If the remarks EYEWALL is used it will be followed by the radian to the eye center.

Identifier: **SPL XXXXNXXXXXW *hhmm*** - Impact location of the sonde based on its last GPS position *and the splash time*. The splash location will be recorded automatically by computer.

Identifier: **LAST WND XXX** - Height of the last reported wind. If a surface wind is reported the Last Wind remark is omitted. XXX will never be less than 13 meters

Identifier: **MBL WND dddff** - The mean boundary level wind. The mean wind in the lowest 500 meters of the sounding

Identifier: **AEV XXXXX** - This is the software version being used for the sounding.

Identifier: **DLM WND ddfff bbbttt** - The Deep Layer Mean wind. It is the average wind over the depth of the sounding. Where ddfff is the wind averaged from the first to the last available wind (these would correspond to the first and last significant levels for wind); ttt is the pressure at the top of the layer, and bbb is the pressure at the bottom of the layer (in whole mbs, with thousands digit omitted).

Identifier: **WL150 ddfff zzz** - Average wind over the lowest available 150 m of the wind sounding. Where ddfff is the mean wind over the 150 m layer centered at zzz m.

PART ALPHA (B)

DATA FOR SIGNIFICANT TEMPERATURE AND RELATIVE HUMIDITY LEVELSSIGNIFICANT ISOBARIC LEVELS:
$n_0n_0P_0P_0P_0$ $T_0T_0T_0D_0D_0$

IDENTIFICATION LETTERS: M_JM_J

Identifier: **M_JM_J** - Identifier for Part B of the report.

DATE/TIME GROUP: YYGG8

Identifier: **YY** - Date group
Identifier: **GG** - Time group
Identifier: **8** - Indicator for the use of satellite navigation for windfinding.

LATTITUDE: 99$L_aL_aL_a$ (Same as Part A)

LONGITUDE: $Q_cL_oL_oL_oL_o$ (Same as Part A)

MARSDEN SQUARE: MMM$U_{la}U_{lo}$ (Same as Part A)
SEA LEVEL PRESSURE: $n_on_oP_0P_0P_0$ $T_0T_0T_0D_0D_0$

Identifier: **nono** – Indicator for number of level starting with surface level. Only surface will be numbered as **"00".**

Identifier: **$P_0P_0P_0$** – Indicator for pressure of specified levels in whole millibars (thousands digit omitted)

Identifier: **$T_0T_0T_0$–** Tens and digits of air temperature (not rounded off) in degrees Celsius, at specified levels beginning with surface.

Identifier: **D_0D_0 –** Dewpoint depression at standard isobaric surfaces beginning with surface level. Encoded the same as Part A.

FOR STORM DROPS ONLY. If SLP is less than 950mb encode the 1000mb group as 00/// ///// /////. When the SLP is between 950mb and 999mb encode 1000mb as 00PoPoPo ///// ///// (500 meters are added to height below surface).

DATA FOR SIGNIFICANT WIND LEVELS: $n_0n_0P_0P_0P_0$ $d_od_of_of_of_o$

Identifier: **n_0n_0 –** Number of level starting with surface level. Only surface will be numbered as **"00".**
Identifier: **$P_0P_0P_0$ –** Pressure at specified levels in whole millibars.
Identifier: **d_od_o –** True direction from which wind is blowing rounded to nearest 5 degrees. Report hundreds and tens digits. The unit digit (0 or 5) is added to the hundreds digit of wind speed.
Identifier: **$f_of_of_o$ –** Wind speed in knots. Hundreds digit is sum of speed and unit digit of direction, i.e. 29$\underline{5}^{o}$ at 125 knots encoded as 29$\underline{6}$25.

Same notes in Part A apply.

31313, 51515, 61616, 62626 – Repeated from Part A.

FIGURE G-4. EXAMPLE TEMP DROP MESSAGE FOR TROPICAL CYCLONES

UZNT13 KNHC 061851
XXAA 56187 99251 70786 08158 99990 26444 ///// 00540 26247 13070 92827
22856 12565 85560 17834 13075 70200 13045 13585 88999 77999
31313 09608 81828
51515 10166 00270
61616 AF968 0204A MARIE OB 14
62626 MXWNDBND SPL 2525N07835W 1826 LST WND 012 MBL WND 13065
AEV 20200 DLM WND 13075 990699 WL150 13070 843
XXBB 56188 99251 70786 08158 00006 26444 11000 25841 22991 24657 33860
18233 44719 15657 55699 13045
21212 00990 ///// 11983 13570 22959 13065 33865 12560 44787 13075 55719
13575 66699 13585
31313 09608 81828
51515 10166 00270
61616 AF968 0204A MARIE OB 14
62626 MXWNDBND SPL 2525N07835W 1826 LST WND 012 MBL WND 13065
AEV 20200 DLM WND 13075 990699 WL150 13070 843

APPENDIX H

WSR-88D OPERATIONS PLAN FOR TROPICAL CYCLONE EVENTS

In order to perform radar center-fixing and obtain other diagnostic information, TPC/NHC must obtain radar products from WSR-88D sites in the area of landfall. As a tropical cyclone approaches, software commands must be issued at the site, using the Unit Control Position (UCP), in order for TPC/NHC to obtain the necessary products. To facilitate this process, TPC/NHC, in cooperation with the NWS Weather Forecast Office, Melbourne, and the NEXRAD Radar Operations Center (ROC), has developed an operations plan for use during tropical cyclone events.

The latest addition can be found on the OFCM web site at:

http://www.ofcm.gov/homepage/text/pubs.htm .

APPENDIX I

TELEPHONE AND TELETYPE LISTING

DEPARTMENT OF COMMERCE

AGENCY	LOCATION	TTY[1]	TELEPHONE
Alternate NHC (NCEP, HPC)	Camp Springs, MD	B	COM 301-763-8201
AOC	Tampa Bay, FL		COM 813-828-3310
CPHC - Forecaster and Warning Desk - Admin - Director - Operations	Honolulu, HI	B	COM 808-973-5284 COM 808-973-5270 COM 808-973-5272 FAX 808-973-5281
CPHC Satellite Coordinator	Honolulu, HI	B	COM 808-973-5285
NWSO Tiyan, Guam Forecast Warning Desk	Tiyan, Guam	B	COM 671-471-7398
NDBC - *Operations Branch*	SSC, MS		COM *228-688-7720*
NESDIS Satellite Analysis Branch	Camp Springs, MD	B	COM 301-763-8444
NHC	Miami, FL	AB	*COM 305-229-4415*
TAFB Lead Forecaster (TPC/NHC)	Miami, FL	AB	COM 305-229-4425
Hydrometeorological Prediction Center (HPC)	Camp Springs, MD	B	COM 301-763-8201
NCEP Senior Duty Met (Data QC)	Camp Springs, MD	B	COM 301-763-8298
NWS Hydrometeorological Services Core (Headquarters)	Silver Spring, MD		COM 301-713-1858 ext. 108 FAX *301-713-1520*
	INTERDEPARTMENTAL		
OFCM	Silver Spring, MD		COM 301-427-2002 DSN 851-1460

[1] A AWDS
B AWIPS

AGENCY	LOCATION	TTY	TELEPHONE	
AFWA	Offutt AFB, NE	AB	COM DSN	*402-294-7264* *271-7264*
CARCAH OLA, 53 WRS	Miami, FL	A	COM DSN	305-229-4474 434-3420
FACSFAC VACAPES OAC	Oceana, VA		COM DSN	804-433-1233 433-1233
FACSFAC Roosevelt Roads	Roosevelt Roads, PR		COM DSN	787-865-7007 831-7007/5202/5203
17 OWS/WXJ (Satellite Analyst)	Pearl Harbor, HI	A	COM DSN	808-471-3533 471-3533
325 OSS/OSW (Southeast Air Defense Sector/WE)	Tyndall AFB, FL	A	COM DSN	904-283-2845 523-2845
Keesler AFB Command Post	Keesler AFB, MS		COM DSN	228-377-4330 597-4330
NAVLANTMETOCCEN Norfolk, VA			COM DSN	757-444-7583/7750 564-7583/7750
JTWC (Typhoon Duty Officer)	Pearl Harbor, HI	A	COM	808-474-2320
Fleet Numerical Meteorology and Oceanography Center (FNMOC) (Alternate JTWC)	Monterey, CA		COM DSN	831-656-4325 878-4325
53 WRS/DO	Keesler AFB, MS	A	COM DSN	228-377-2409 597-2409
53 WRS (Office)	Keesler AFB, MS		COM DSN	228-377-3207 597-3207
53 WRS (Alternate CARCAH)	Keesler AFB, MS	A	COM DSN	228-377-1939 597-1939

	ARTCC	ARTCC PHONE DIRECTORY		
	ID	TMU	ADMINISTRATION	WATCH DESK OPERATIONS MANAGER
ANCHORAGE	ZAN	907-269-1108	907-269-1137	907-269-1103
ALBUQUERQUE	ZAB	505-856-4547	505-856-4601	505-856-4500
CHICAGO	ZAU	630-906-8445	630-906-8221	630-906-8341
BOSTON	ZBW	603-879-6666	603-879-6633	603-879-6655
WASHINGTON	ZDC	703-771-3471	703-771-3440/1	703-771-3470
DENVER	ZDV	303-651-4540	303-651-4101	303-651-4248
FT. WORTH	ZFW	817-858-7520	817-858-7500	817-858-7503
HOUSTON	ZHU	281-230-5530	281-230-5600	281-230-5560
INDIANAPOLIS	ZID	317-247-2267	317-247-2231	317-247-2242
JACKSONVILLE	ZJX	904-549-1570	904-549-1501	904-549-1537
KANSAS CITY	ZKC	913-254-8502	913-254-8403	913-791-8500
LOS ANGELES	ZLA	661-265-8250	661-265-8215	661-265-8205
SALT LAKE CITY	ZLC	801-320-2580	801-320-2501	801-320-2560
MIAMI	ZMA	305-716-1736	305-716-1500	305-716-1588
MEMPHIS	ZME	901-368-8250	901-368-8103	901-368-8234
MINNEAPOLIS	ZMP	651-463-5517	651-463-5510	651-463-5580
NEW YORK	ZNY	631-468-1010	631-468-1001	631-468-5959
OAKLAND	ZOA	510-745-3812	510-745-3000	510-745-3331
CLEVELAND	ZOB	440-774-0319	440-774-0320	440-774-0426
SEATTLE	ZSE	253-351-3525	253-351-3500	253-351-3520
ATLANTA	ZTL	770-210-7697	770-210-7600/3	770-210-7622
HONOLULU	HNL	N/A	808-840-6100	808-840-6201
SAN JUAN	SJU		787-253-8707	787-253-8664/5
TORONTO	YYZ		905-676-4590/1/2	Note:
MONTREAL	YUL		514-633-3211	TMO - Traffic Management Officer
MONCTON	YOM		506-867-7176	Area Manager - Watch Supervisor
WINNIPEG	YWG		204-983-8337	
EDMONTON	YEG		780-890-8304/5	ARTCC - Air Route Traffic Control Center
GANDER	YQX		709-651-5225	Canadian ACC - Area Control
VANCOUVER	YVR		604-775-9601/6	Centre

AIR TRAFFIC TACTICAL OPERATIONS ATT-100	COM 703-904-4403
AIR TRAFFIC MANAGEMENT SERVICE	COM 703-904-4401
AIR TRAFFIC CONTROL	800-333-4286
SYSTEM COMMAND CENTER - ATT 2	
HERNDON, VA.	
CENTRAL ALTITUDE	703-904-4427
RESERVATION FUNCTION (CARF)	DSN 725-3331/725-3333
NATIONAL NOTAM OFFICE	
HERNDON, VA	703-904-4557
ATCSCC NATIONAL OPERATIONS	703-904-4525/703-904-4953
MANAGER (NOM)	800-333-4286 MILITARY USE ONLY

CANADIAN OFCF (ARU)

ADMIN HOURS	613-998-6583
TELECONFERENCE	613-954-7425
	613-957-6390
ARU OPS (24 HRS)	613-957-6343
(ATCSCC OF CANADA)	613-992-9740
	613-992-7940
	613-992-9751
ARU FAX	613-957-6412

CENTER WEATHER SERVICE UNITS (CWSU) in FAA Coastal Facilities

Boston ARTCC	603-879-7698
New York ARTCC	631-468-1083
Washington ARTCC	703-771-3480
Jacksonville ARTCC	904-549-1839
Miami ARTCC	305-716-1635
Houston ARTCC	281-230-5676
Los Angeles ARTCC	661-265-8258
Oakland ARTCC	510-745-3457
Seattle ARTCC	253-351-3741
Anchorage ARTCC	907-269-1145

APPENDIX J

PHONETIC PRONUNCIATION LISTING

CARIBBEAN BASIN

Abaco	AB-a-KO	Guadaloupe	GWAH-deh-loop
Anguilla	ang-GWIL-a	Guatemala	gwaht-eh-MAH-la
Antigua	an-TEE-gua	Leeward	LEE-ward
Antilles	an-TILL-leez	Maracaibo	mar-a-KYE-boh
Aruba	ah-ROO-ba	Maracay	mah-rah-KYE
Azores	uh-ZOHRZ	Marigot	ma-ree-GOH
Bahamas	ba-HAHM-ahs	Mayaguez	may-yah-GWAYS
Barahona	ba-ra-HO-na	Merida	MAY-re-thah
Barbuda	bar-BOO-dah	Miami	mye-AM-ee
Barranquilla	bahr-rahn-KEE-yah	Montego	mon-TEE-go
Basse-Terre	baha-TER	Montserrat	mont-se-RAT
Bermuda	ber-MYOO-da	Nicaragua	nik-a-RAH-gwah
Biloxi	bi-LUX-ee	Ocho Rios	OH-cho REE-os
Bimini	BIM-i-ni	Oranjestad	o-RAHN-yuh-stat
Bonaire	ba-NAIR	Paramaribo	par-a-MAR-i-boh
Cap Haitien	kahp ah-ee-SYAN	Parguera	par-GWER-a
Caracas	kah-RAH-kahs	Pointe-a-Pitre	pwan-ta-PEE-tr
Caribbean	kar-a-BE-an	Ponce	PON-sa
Castries	KAS-tree	Port-au-Prince	port-oh-PRINS
Cayman	kay-MAHN	Saba	SAH-ba
Charlotte Amalie	SHAR-lot a-MAHL-ye	Sao Miguel (Azores)	soun ME-gel
		St. Croix	SAINT croy
Cozumel	koh-soo-MEL	St. Lucia	SAINT LOO-she-a
Curacao	koor-a-SOH	Soufriere	soo-free-AR
Dominica	dom-i-NEE-ka	Surinam	SOOR-i-nam
Eleuthera	el-OO-thera	Tampico	tam-PEE-ko
Exuma	ek-SOO-ma	Tela	TAY-lah
Flores	FLO-rish	Tobago	to-BAY-go
Fort de France	for-de-FRAHCS	Yucatan	yoo-ka-TAN
Grenada	gre-NAY-dah		

APPENDIX K

ACRONYMS/ABBREVIATIONS

-A-

AB	Data type header for Tropical Weather Outlook
ADWS	Automatic Digital Weather Switch
AFB	Air Force Base
AFOS	Automation of Field Operations and Services
AFRC	Air Force Reserve Command
AFSATCOM	Air Force Satellite Communications System
AFWA	Air Force Weather Agency
AIM	Airman's Information Manual
AMOS	Automated Meteorological Observing Station
AMSU	Advanced Microwave Sounding Unit
AOC	Aircraft Operations Center (NOAA)
APT	Automatic Picture Transmission
ARGOS	Argos, Inc., a French data collection system
ARSA	Airport Radar Service Area
ARTCC	Air Route Traffic Control Center
ARWO	Aerial Reconnaissance Weather Officer
APUP	Associated Principal User Processor (WSR-88D)
ASDL	Aircraft-to-Satellite Data Link
ATC	Air Traffic Control
ATCSCC	Air Traffic Control System Command Center
AVHRR	Advanced Very High Resolution Radiometer
AWDS	Automated Weather Distribution System
AWIPS	Advanced Weather Interactive Processing System
AWN	Automated Weather Network

-C-

CARCAH	Chief, Aerial Reconnaissance Coordination, All Hurricanes
CARF	Central Altitude Reservation Function
C.I.	Current Intensity
C-MAN	Coastal-Marine Automated Network
COM	Commercial (telephone)
CONUS	Continental United States
CPHC	Central Pacific Hurricane Center
EC	degree/degrees Celsius

-D-

DA	Daylight Ascending
DCS	Data Collection System
deg	degree (latitude or longitude)
Det	detachment
DMSP	Defense Meteorological Satellite Program
DOC	Department of Commerce
DOD	Department of Defense
DOT	Department of Transportation
DPTD	departed
DROP	dropsonde/dropwindsonde
DSN	Defense Switched Network (formerly AUTOVON)
DTG	date/time group

-E-

EDT	Eastern Daylight Time
ESA	European Space Agency
ETA	Estimated Time of Arrival
ETD	Estimated Time of Departure

-F-

FAA	Federal Aviation Administration
FACSFAC	Fleet Aerial Control and Surveillance Facility
FCM	Federal Coordinator for Meteorological Services and Supporting Research
FCMSSR	Federal Committee for Meteorological Services and Supporting Research
FCST	forecast
FCSTR	forecaster
FL	flight level
FLT LVL	flight level
FMH	Federal Meteorological Handbook
FNMOC	Fleet Numerical Meteorology and Oceanography Center (USN)
ft	foot/feet
FTS	Federal Telephone System

-G-

GAC	Global Area Coverage
GOES	Geostationary Operational Environmental Satellite
GMDSS	Global Maritime Distress and Safety System
GMS	Geostationary Meteorological Satellite
GTS	Global Telecommunications System

-H-

HA	High Accuracy
HD	High Density
HDOB	High Density Observation
HF	High Frequency
hPa	hectopascal/hectopascals
h	hour/hours
HLS	Hurricane Local Statement
HNL	Honolulu (CPHC)
HPC	Hydrometeorological Prediction Center (NCEP)
HRD	Hurricane Research Division (NOAA/OAR/ERL/AOML)
HRPT	High Resolution Picture Transmission

-I-

ICAO	International Civil Aviation Organization
ICMSSR	Interdepartmental Committee for Meteorological Services and Supporting Research
ID	identification
IFR	Instrument Flight Rules
INIT	initials
IR	Infrared
IWRS	Improved Weather Reconnaissance System

-J-

JTWC	Joint Typhoon Warning Center

-K-

km	kilometer/kilometers
KBIX	ICAO identifier for Keesler AFB, MS
KMIA	ICAO identifier for Miami, FL
KMKC	ICAO identifier for Kansas City, MO WSFO
KNEW	ICAO identifier for New Orleans, LA WSFO
KNHC	ICAO identifier for the Tropical Prediction Center/National Hurricane Center, Miami, FL
KSFO	ICAO identifier for San Francisco, CA
kt	knot/knots
KWAL	ICAO identifier for Wallops Island, VA

-L-

LAC	Local Area Coverage
LF	Light Fine (satellite data terminology)
LI	Long Island
LS	Light Smooth (satellite data terminology)

-M-

m	meter/meters
MANOP	communications header
MAX	maximum
METEOSAT	European Space Agency geostationary meteorological satellite
min/MIN	minute
MINOB	Minute Observation
MOU	Memorandum of Understanding
mph	mile/miles per hour
MVMT	movement

-N-

NAPUP	Non-associated Principal User Processor (WSR-88D)
NASA	National Aeronautics and Space Administration
NAVLANTMETOCCEN	Naval Atlantic Meteorology and Oceanography Center
NAVLANTMETOCDET	Naval Atlantic Meteorology and Oceanography Detachment
NAVLANTMETOCFAC	Naval Atlantic Meteorology and Oceanography Facility
NAVMETOCCOM	Naval Meteorology and Oceanography Command
NAVOCEANO	Naval Oceanographic Office
NAVPACMETOCCEN	Naval Pacific Meteorology and Oceanography Center
NAVTRAMETOCFAC	Naval Training Meteorology and Oceanography Facility
NCEP	National Centers for Environmental Prediction (NOAA/NWS)
NCO	NCEP Central Operations
NDBC	National Data Buoy Center
NESDIS	National Environmental Satellite, Data, and Information Service
NFDC	National Flight Data notice to airman Center
NHC	National Hurricane Center
NHOP	National Hurricane Operations Plan
NLT	Not Later Than
nm	nautical miles
NOAA	National Oceanic and Atmospheric Administration
NOM	National Operations Manager (FAA)
NSC	NOAA Science Center
NSTL	National Space Technology Laboratories (NASA)
NWS	National Weather Service

-O-

OAC	Oceanic Aircraft Coordinator (USN)
OB	observation
OFCM	Office of the Federal Coordinator for Meteorological Services and Supporting Research
OPC	Ocean Prediction Center (NCEP)
OSDPD	Office of Satellite Data Processing and Distribution (NESDIS)
OSF	Operational Support Facility (WSR-88D)
OSS	Operations Support Squadron (USAF)

-P-

PA	Public Affairs
PANC	ICAO identifier for Anchorage, AK
PCN	Position Confidence Number
PHFO	ICAO identifier for Honolulu, HI
POD	Plan of the Day
POES	Polar Orbiting Environmental Satellite
PRF	pulse repetition frequency (WSR-88D)

-R-

RECCO	Reconnaissance Code
RECON	reconnaissance
REQT	requested
RPS	routine product set (WSR-88D)
RSMC	Regional/Specialized Meteorological Center (WMO)

-S-

SAB	Satellite Analysis Branch
SFC	surface
SFDF	Satellite Field Distribution Facility
SLP	Sea Level Pressure
SSM/I	Special Sensor Microwave Imager (DMSP)
SSM/IS	*Special Sensor Microwave Imager Sounder*
SSM/T	Special Sensor Microwave Temperature Sounder
SST	Sea Surface Temperature
SPC	Storm Prediction Center (NCEP)
SVD	Supplementary Vortex Data

-T-

TAFB	Tropical Analysis Forecast Branch (TPC)
TCA	Aviation Tropical Cyclone Advisory
TCD	Tropical Cyclone Discussion
TCPOD	Tropical Cyclone Plan of the Day
TD	Tropical Depression
TEMP	temperature
TEMP	temporary
TEMP DROP	Dropwindsonde Code
TF	Thermal Fine
TKO	takeoff
TMO	Traffic Management Officer in air route centers and towers
T-number	Tropical classification number
TOVS	TIROS-N Operational Vertical Sounder
TPC	Tropical Prediction Center

TS	Thermal Smooth
TWO	Tropical Weather Outlook

-U-

UCP	unit control position (WSR-88D)
UHF	Ultra High Frequency
US/U.S.	United States
USAF	United States Air Force
USCG	United States Coast Guard
USN	United States Navy
UTC	Universal Coordinated Time

-V-

VAS	VISSR Atmospheric Sounder
VCP	volume coverage pattern (WSR-88D)
VDM	Vortex Data Message
VDUC	VAS Data Utilization Center
VIS	Visible
VISSR	Visible and Infrared Spin Scan Radiometer
VMI	velocity measurement increment (WSR-88D)
VTPR	Vertical Temperature Profile Radiometer

-W-

WEFAX	Weather Facsimile
WESTPAC	Western Pacific
WMO	World Meteorological Organization
WND	wind
WO	Data type header for special tropical disturbance statements
WRS	Weather Reconnaissance Squadron
WS	Weather Squadron
WSD	Wind Speed and Direction (data buoy)
WSFO	Weather Service Forecast Office
WSR-88D	Weather Surveillance Radar-1988 Doppler
WT	Data type header for hurricane bulletins
WW	Data type header for subtropical storm bulletins

-X-

XMTD	transmitted

-Z-

Z	Zulu (UTC)

APPENDIX L

GLOSSARY

-A-

Agency. Any Federal agency or organization participating in the tropical cyclone warning service.

Airport Radar Service Area (ARSA). Regulatory airspace surrounding designated airports wherein ATC provides radar vectoring and sequencing on a full-time basis for all IFR and VFR aircraft. The service provided in an ARSA is called ARSA Service which includes: IFR/IFR-standard IFR separation; IFR/VFR-traffic advisories and conflict resolution; and VFR/VFR-traffic advisories and, as appropriate, safety alert. The Airman's Information Manual (AIM) contains an explanation of ARSA. The ARSA's are depicted on VFR aeronautical charts.

Air Traffic Control System Command Center (ATCSCC). The facility responsible for the real-time command, control, and oversight of air traffic activity within the National Airspace System. The ATCSCC is a 24 hour a day, 7 day a week operation.

Area Manager. Supervisor in charge of air route traffic control center or airport tower, shift to shift.

-C-

Center Fix. The location of the center of a tropical or subtropical cyclone obtained by means other than reconnaissance aircraft penetration. See also Vortex Fix.

Controlled Airspace. An airspace of defined dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification.

a. Controlled airspace is a generic term that covers Class A, Class B, Class C, Class D, and Class E airspace.

b. Controlled airspace is also that airspace within which all aircraft operators are subject to certain pilot qualifications, operating rules, and equipment requirements in FAR Part 91 (for specific operating requirements, please refer to FAR Part 91). For IFR operations in any class of controlled airspace, a pilot must file an IFR flight plan and receive an appropriate ATC clearance. Each Class B, Class C, and Class D airspace area designated for an airport contains at least one primary airport around which the airspace is designated (for specific designations and descriptions of the airspace classes, please refer to FAR Part 71).

c. Controlled airspace in the United States is designated as follows:

CLASS A: Generally, that airspace from 18,000 feet MSL up to and including FL 600, including the airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska. Unless otherwise authorized, all persons must operate their aircraft under IFR.

CLASS B: Generally, that airspace from the surface to 10,000 feet MSL surrounding the nations's busiest airports in terms of airport operations or passenger enplanements. The configuration of each Class B airspace area is individually tailored and consists of a surface area and two or more layers (some Class B airspaces areas resemble upside-down wedding cakes), and is designed to contain all published instrument procedures once an aircraft enters the airspace. An ATC clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace. The cloud clearance requirement for VFR operations is "clear of clouds."

CLASS C: Generally, that airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the configuration of each Class C area is individually tailored, the airspace usually consists of a surface area with a 5 nautical mile (NM) radius, an outer circle with a 10 NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation and an outer area. Each person must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while within the airspace. VFR aircraft are only separated from IFR aircraft within the airspace. (See OUTER AREA).

CLASS D: Generally, that airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures. Arrival extensions for instrument approach procedures may be Class D or Class E airspace. Unless otherwise authorized, each person must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while in the airspace. No separation services are provided to VFR aircraft.

CLASS E: Generally, if the airspace is not Class A, Class B, Class C, or Class D, and it is controlled airspace, it is Class E airspace. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Also in this class are Federal airways, airspace beginning at either 700 or 1,200 AGL used to transition to/from the terminal or en route environment,

en route domestic, and offshore airspace areas designated below 18,000 feet MSL. Unless designated at a lower altitude, Class E airspace begins at 14,500 MSL over the United States, including that airspace overlying the waters within 12 nautical miles of the 48 contiguous States and Alaska, up to, but not including 18,000 MSL, and the airspace above FL 600.

Cyclone. An atmospheric closed circulation rotating counter-clockwise in the Northern Hemisphere.

-E-

Extratropical cyclone. A synoptic scale low pressure system whose primary energy source is baroclinic.

Eye. The relatively calm center of the tropical cyclone that is more than one half surrounded by wall cloud.

Eye Wall. An organized band of cumuliform clouds immediately surrounding the center of a tropical cyclone. Eye wall and wall cloud are used synonymously.

-H-

High Density/High Accuracy (HD/HA) Data. Those data provided by automated airborne systems--WP-3s or WC-130s equipped with the Improved Weather Reconnaissance System.

Hurricane/Typhoon. A warm-core tropical cyclone in which the maximum sustained surface wind speed (l-min mean) is 64 kt (74 mph) or more.

Hurricane Season. The portion of the year having a relatively high incidence of hurricanes. The seasons for the specific areas are as follows:

C Atlantic, Caribbean, and the Gulf of Mexico	June 1 to November 30
C Eastern Pacific	May 15 to November 30
C Central Pacific	June 1 to November 30

Hurricane Warning Offices. The designated hurricane warning offices follow:

- C Tropical Prediction Center/National Hurricane Center, Miami, Florida
- C Central Pacific Hurricane Center, Honolulu, Hawaii

Hurricane Warning. A warning that sustained winds of 64 kt (74 mph) or higher associated with a hurricane are expected in a specified coastal area in 24 hours or less. A hurricane warning can remain in effect when dangerously high water or a combination of dangerously

high water and exceptionally high waves continue, even though winds may be less than hurricane force.

Hurricane Watch. An announcement for specific coastal areas that a hurricane or an incipient hurricane condition poses a possible threat, generally within 36 hours.

-I-

ICAO-Controlled Airspace. An airspace of defined dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification. *(Note: Controlled airspace is a generic term which covers Air Traffic Service airspace Classes A, B, C, D, and E).*

-M-

Major Hurricane. A "major" hurricane is one that is classified as a Category 3 or higher.

Maximum 1-Min Sustained Surface Wind. When applied to a particular weather system, refers to the highest 1-minute average wind (at an elevation on 10 meters with an unobstructed exposure) associated with that weather system at a particular point in time.

Micronesia. An area defined by the Commonwealth of the Northern Marianas Islands, the Republic of Palau, the Federated States of Micronesia, and the Republic of the Marshall Islands.

Miles. The term "miles" used in this plan refers to nautical miles (nm) unless otherwise indicated.

Mission Identifier. The nomenclature assigned to tropical and subtropical cyclone aircraft reconnaissance missions for weather data identification. It's an agency-aircraft indicator followed by a Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH) assigned mission-system indicator.

-N-

National Operations Manager. Supervisor in charge of the overall operation of the Air Traffic Control System Command Center.

-P-

Present Movement. The best estimate of the movement of the center of a tropical cyclone at a given time and at a given position. This estimate does not reflect the short-period, small-scale oscillations of the cyclone center.

-R-

Reconnaissance Aircraft Sortie. A flight that meets the requirements of the tropical cyclone plan of the day.

Relocated. A term used in an advisory to indicate that a vector drawn from the preceding advisory position to the latest known position is not necessarily a reasonable representation of the cyclone's movement.

-S-

Storm Surge. An abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the cyclone. Storm surge is usually estimated by subtracting the normal or astronomic tide from the observed storm tide.

Storm Tide. The actual level of sea water resulting from the astronomic tide combined with the storm surge.

Subtropical Cyclone. A low pressure system that develops over subtropical waters that initially has a non-tropical circulation but in which some elements of tropical cyclone cloud structure are present.

Subtropical Depression. A subtropical cyclone in which the maximum sustained surface wind speed (l-min mean) is 33 kt (38 mph) or less.

Subtropical Storm. A non-frontal low pressure system that has characteristics of both tropical and extratropical cyclones.

- The most common type is an upper-level cold low with circulation extending to the surface layer and maximum sustained winds generally occurring at a radius of about 100 miles or more from the center. In comparison to tropical cyclones, such systems have a relatively broad zone of maximum winds that is located farther from the center, and typically have a less symmetric wind field and distribution of convection.

- A second type of subtropical cyclone is a mesoscale low originating in or near a frontolyzing zone of horizontal wind shear, with radius of maximum sustained winds generally less than 30 miles . The entire circulation may initially have a diameter of less than 100 miles. These generally short-lived systems may be either cold core or warm core.

Super Typhoon. A "super" typhoon is one that is classified as having winds of 130 kts (150 mph) or greater.

Sustained Surface Wind. The 1-minute averaged wind at the 10-meter elevation with an unobstructed exposure.

Synoptic Surveillance (formerly Synoptic Track). Weather reconnaissance mission flown to provide vital meteorological information in data sparse ocean areas as a supplement to existing surface, radar, and satellite data. Synoptic flights better define the upper atmosphere and aid in the prediction of tropical cyclone motion and intensity.

-T-

Traffic Management Specialist. ATCSCC personnel responsible for the active management of traffic throughout the National Airspace System.

Tropical Cyclone. A warm-core, non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about a well-defined center.

Tropical Cyclone Plan of the Day. A coordinated mission plan that tasks operational weather reconnaissance requirements during the next 1100 to 1100Z UTC day or as required, describes reconnaissance flights committed to satisfy both operational and research requirements, and identifies possible reconnaissance requirements for the succeeding 24-hour period.

Tropical Depression. A tropical cyclone in which the maximum sustained surface wind speed (l-min mean) is 33 kt (38 mph) or less.

Tropical Disturbance. A discrete tropical weather system of apparently organized convection--generally 100 to 300 mi in diameter--originating in the tropics or subtropics, having a nonfrontal migratory character, and maintaining its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field.

Tropical Storm. A tropical cyclone in which the maximum sustained surface wind speed (l-min mean) ranges from 34 kt (39 mph) to 63 kt (73 mph).

Tropical Storm Warning. A warning for tropical storm conditions including sustained winds within the range of 39 to 73 mph (34 to 63 kt) that are expected in a specified coastal area within 24 hours or less.

Tropical Storm Watch. An announcement that a tropical storm poses or tropical storm conditions pose a threat to coastal areas generally within 36 hours. A tropical storm watch should normally not be issued if the system is forecast to attain hurricane strength.

Tropical Wave. A trough or cyclonic curvature maximum in the trade-wind easterlies. The wave may reach maximum amplitude in the lower middle troposphere or may be the reflection of an upper tropospheric cold low or equatorial extension of a middle latitude trough.

Tropical Weather System. A designation for one of a series of tropical weather anomalies. As such, it is the basic generic designation, which in successive stages of intensification, may be classified as a tropical disturbance, wave, depression, storm, or hurricane.

Typhoon/Hurricane. A warm-core tropical cyclone in which the maximum sustained surface wind speed (l-min mean) is 64 kt (74 mph) or more.

-U-

Uncontrolled Airspace (Class G Airspace). That portion of the airspace that has not been designated as Class A, Class B, Class C, Class D, or Class E and within which Air Traffic Control has neither the authority nor the responsibility for exercising control over air traffic.

-V-

Vortex Fix. The location of the surface and/or flight level center of a tropical or subtropical cyclone obtained by reconnaissance aircraft penetration. See Center Fix, also.

-W-

Wall Cloud. An organized band of cumuliform clouds immediately surrounding the center of a tropical cyclone. Wall cloud and eye wall are used synonymously.

APPENDIX M

DISTRIBUTION

DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Administration Office, Aircraft Operations Center (AOC)	20
Assistant Administrator for Satellite and Information Services (E)	2
Director, National Climatic Data Center (E/CC)	2
Chief, Library and Information Services Division (E/OC4)	4
Chief, Satellite Services Division (E/SP2)	1
Chief, Library Division MASC (MC5)	2
Assistant Administrator for Ocean Svcs and Coastal Zone Management (N)	1
Director, Office of Public Affairs, NOAA (PA)	2
Assistant Administrator for Oceanic and Atmospheric Research (R)	1
Director, Environmental Research Laboratories (R/E/FS)	4
Chief, International Programs (R/E/FS7)	2
Director, AOML Hurricane Research Division (R/E/AO)	5
Director, Program Development and Coordination Staff (R/PDC)	2
Assistant Administrator for Weather (W)	1
Director, National Data Buoy Center (W/DB)	6
Director, National Centers for Environmental Prediction (W/NP)	1
Director, Central Operations (W/NP1)	2
Director, Environmental Modeling Center (W/NP2)	1
Deputy Director, Environmental Modeling Center (W/NP2x1)	1
Director, Hydrometeorological Prediction Center (W/NP3)	2
Director, Marine Prediction Center (W/NP4)	2
Director, Tropical Prediction Center (W/NP8)	20
Director, Office of Hydrology (W/OH)	1
Director, Office of Meteorology (W/OM)	1
Chief, International Activities Division (W/IA)	1
Chief, Hydrometeorological Services Core (W/OM12)	20
Director, NWS Eastern Region (W/ER)	50
Director, NWS Central Region (W/CR)	16
Director, NWS Southern Region (W/SR)	56
Director, NWS Western Region (W/WR)	15
Director, NWS Pacific Region (W/PR)	15
NOAA Budget Officer, Office of Management and Budget	1

DEPARTMENT OF DEFENSE

OFFICE OF THE JOINT CHIEFS OF STAFF

Joint Staff/J3/DDGO-ROD	2

UNIFIED/SPECIFIED COMMANDS

USCENTCOM/CCJ3-OW	1
USCINCPAC/J316 (ENV.GP)	1
USCINCSO/SCJ3-SWO	1
USEUCOM/EPOC-CCPD	
USJFCOM	1
USSOCOM/SCSO-OC-M	1
USSOUTHCOM/SCJ322	1
USSTRATCOM/J3624	2
USTRANSCOM/TCJ3	1

DEPARTMENT OF THE AIR FORCE

HQ USAF/XOO-W	3
HQ ACC/DOW	34
HQ AFMC/DOW	2
HQ AFSPC/XOSW	5
HQ AFSOC/DOW	1
HQ AMC/A3W	10
HQ AOC/XPPD	1
HQ AETC/TTO	2
HQ AETC/DOYW	10
HQ AU/WE	1
HQ AFWA/XO	6
HQ PACAF/DOW	6
HQ USAFE/DOW	2
AFRL/VSB (AFMC)	1
AFCCC (AFWA)	1
AFCWC (AFWA)	
ANG/XOOSW	1
MSD/AOW (AETC)	1
OO-ALC/LHW	2
3 WS/CC	1
17 OWS/CC	1
18 WS/CC	1
25 OWS/CC	2

26 OWS/CC	2
28 OWS/CC	2
36 OSS/OSW (PACAF)	1
45 WS/CC	3
45 SPW/XP and SE	4
46 WS/CC	2
88 WS/CC	1
78 OSS/OSW	1
325 OSS/OSW	1
335 TRS/UAO	2
607 WS/CC	1

AFRC

HQ USAF/REO	3
HQ AFRC/DOO	2
HQ AFRC/DOT/DOTA	2
HQ AFRC/DOVA	2
HQ 22AF/DOT/DOTA	2
403 WG/DO/XP	5
53 WRS	75
CARCAH (OL-A 53 WRS)	10

DEPARTMENT OF THE ARMY

HQ Department of the Army/DAMI- POB	2
Topographic Engineering Center	1
COE/CEWES-CD-P	1

DEPARTMENT OF THE NAVY

Commandant of the Marine Corps (DCS/Aviation)	12
Oceanographer of the Navy	2
NAVMETOCCOM	5
Commanding Officer, NAVOCEANO (N2513)	75
Commanding Officer, NAVLANTMETOCCEN	2
NAVPACMETOCCEN/JTWC, Pearl Harbor, HI	2
NAVLANTMETOCFAC Jacksonville	1
NAVTRAMETOCFAC Pensacola	1
CINCLANTFLT (N37)	2
CINCPACFLT (N3WX)	1
COMTHIRDFLT	1
COMFITMATAEWWINGLANT, NAS Oceana, VA	1
Commander, Naval Air Warfare Center, Weapons Division	2
Office of Naval Research (Code 1122MM)	2
NRL, Stennis Space Center, MS	1

NRL, Atmospheric Division, Monterey, CA	2
OPTEVFOR (Code 314)	1
Coastal System Station (Code 05W)	1
AFWTF, Roosevelt Roads, PR	1

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

Air Traffic System Requirements Service ARS-1	1
Air Traffic System Requirements Service/Weather ARW-1	1
Air Traffic Operations ATO-1	3
Air Traffic Operations ATO-110	1
Air Traffic Operations ATO-120	3
Air Traffic Resource Management Program ATX-100/ATX-400	2
Air Traffic Control System Command Center (ATCSCC) ATO-200	9
FAA Regional Air Traffic Division Managers	
AAL-500 Anchorage	1
ACE-500 Kansas City	1
AEA-500 New York	1
AGL-500 Chicago	1
ANE-500 Boston	1
ANM-500 Seattle	1
ASO-500 Atlanta	1
ASW-500 Dallas/Fort Worth	1
AWP-500 Los Angeles	1
Albuquerque ARTCC	2
Atlanta ARTCC	3
Boston ARTCC	3
Honolulu ARTCC	3
Houston ARTCC	3
Jacksonville ARTCC	3
Los Angeles ARTCC	2
Memphis ARTCC	1
Miami ARTCC	3
New York ARTCC	3
Oakland ARTCC	2
San Juan ARTCC	3
Seattle ARTCC	2
Washington ARTCC	2
AMA-500, Oklahoma City, OK	1
AIA-100/AIA-200	3
AOP-4	1
APA-300	3
ARW-100/ARW-200	2
Houston AIFSS	3

Miami (QAS) AIFSS	2
New York AIFSS	1
San Juan AIFSS	2

U.S. COAST GUARD

Commandant, USCG Headquarters (G-OPN-1)	2
Commandant, USCG (G-OPF)	1
Commander, Atlantic Area, USCG	2
Commander, Pacific Area, USCG	2
Commander, Maintenance and Logistics Command Atlantic	2
Commander, Maintenance and Logistics Command Pacific	1
Commander, First Coast Guard District	1
Commander, Fifth Coast Guard District	2
Commander, Seventh Coast Guard District	3
Commander, Eighth Coast Guard District	3
Commander, Ninth Coast Guard District	1
Commander, Eleventh Coast Guard District	1
Commander, Thirteenth Coast Guard District	1
Commander, Fourteenth Coast Guard District	2
Commander, Seventeenth Coast Guard District	1
Commanding Officer, USCG Air Station, Aquadilla, PR	1
Commanding Officer, USCG Air Station, Atlantic City, NJ	1
Commanding Officer, USCG Air Station, Cape Cod, MA	1
Commanding Officer, USCG Air Station, Clearwater, FL	1
Commanding Officer, USCG Air Station, Corpus Christi, TX	1
Commanding Officer, USCG Air Station, Elizabeth City, NC	1
Commanding Officer, USCG Air Station, Houston, TX	1
Commanding Officer, USCG Air Station, Kapolei, HI	1
Commanding Officer, USCG Air Station, Kodiak, AK	1
Commanding Officer, USCG Air Station, Los Angeles, CA	1
Commanding Officer, USCG Air Station, McClellan AFB, CA	1
Commanding Officer, USCG Air Station, McKinleyville, CA	1
Commanding Officer, USCG Air Station, Mt. Clemens, MI	1
Commanding Officer, USCG Air Station, New Orleans, LA	1
Commanding Officer, USCG Air Station, North Bend, OR	1
Commanding Officer, USCG Air Station, Opa Locka, FL	1
Commanding Officer, USCG Air Station, Port Angeles, WA	1
Commanding Officer, USCG Air Station, San Diego, CA	1
Commanding Officer, USCG Air Station, San Francisco, CA	1
Commanding Officer, USCG Air Station, Savannah, GA	1
Commanding Officer, USCG Air Station, Sitka, AK	1
Commanding Officer, USCG Air Station, Traverse City, MI	1
Commanding Officer, USCG Air Station, Warrenton, OR	1
Commanding Officer, USCG Reserve Training Center	1

DEPARTMENT OF AGRICULTURE

World Agriculture Outlook Board	1

DEPARTMENT OF ENERGY

Office of Emergency Management	1
Office of Biological and Environmental Research	1

DEPARTMENT OF INTERIOR

Bureau of Reclamation, Office of Liaison Engineering and Research	1

DEPARTMENT OF STATE

Office of Advanced Technology	1

NATIONAL SCIENCE FOUNDATION

Director, Meteorology Program	1
Director, Atmospheric Sciences Division	1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Goddard Space Flight Center, Code 912	1
Director, Atmospheric Sciences Division	1

DEPARTMENT OF HOMELAND SECURITY/
FEDERAL EMERGENCY MANAGEMENT AGENCY

FEMA, Mitigation Directorate	2
FEMA Region I	1
FEMA Region IV	2

OTHER U.S.

General Services Administration, Federal Information Center	1
Congressional Research Service, Library of Congress	1
University of Chicago Library, The Joseph Regenstein Library	1
South Florida Water Management District	1
Natural Hazards Research and Applications Information Center	1
Department of Atmospheric Sciences, Colorado State University	1
Cumberland County Maine Emergency Management Agency	1
Meteorological Services, Inc., Tampa, FL	3

GTE Government Systems	1
Larkin Associates	1
Nash C. Roberts, Jr. Consultants, New Orleans, LA	1
Hurricane and Weather Specialists, Inc., Valrico, FL	1

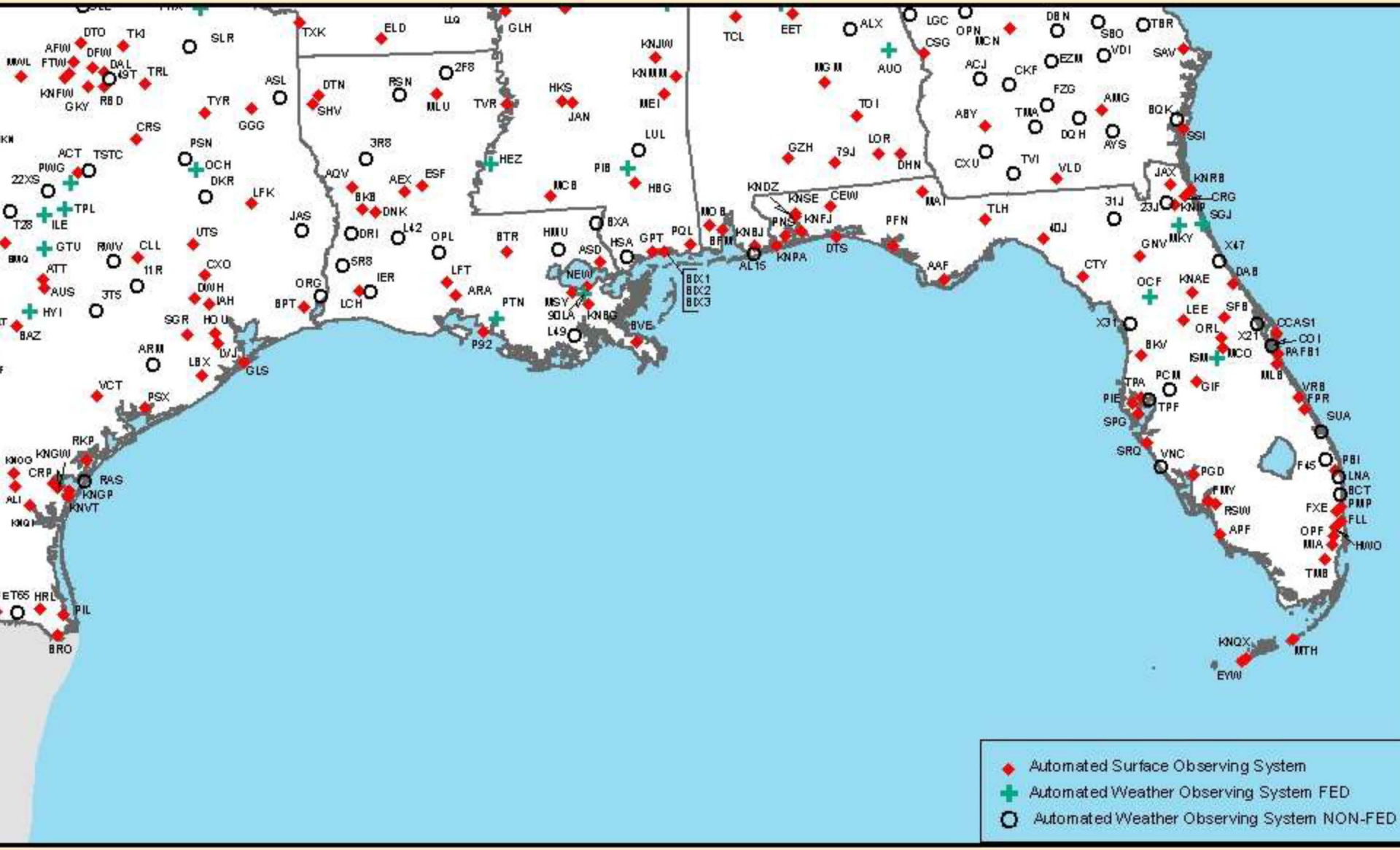
GOVERNMENT OF CANADA

Meteorological Operations Division, Canadian Meteorological Centre (AES), Dorval, QU	1
Officer in Charge, METOC Centre, Maritime Command Headquarters, Halifax, NS	1
Base Meteorological Officer, CFB Greenwood, NS	1
Atmospheric Environment Service, Downsview, ON	1
Transport Canada, Altitude Reservation Unit	2
Transport Canada, Monkton ACC	2

UNITED KINGDOM

Assistant Director, Head of Defense Services, Meteorological Office	1

Surface Observing Locations



OCTOBER 2005
MIRS GIS GROUP

NATIONAL WEATHER SERVICE

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UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

CENTER FOR BIOLOGICAL DIVERSITY, *Plaintiff*, v. NATIONAL MARINE FISHERIES SERVICE, *Defendant*.	Case No. C11-04779-EDL **STIPULATED SETTLEMENT AGREEMENT AND ~~[PROPOSED]~~ ORDER**

Plaintiff, Center for Biological Diversity ("Plaintiff" or "CBD"), and Defendant, National Marine Fisheries Service ("Defendant" or "NMFS") (collectively, the "Parties"), have agreed to

settle the above-captioned case in its entirety on the terms memorialized in this Stipulated Settlement Agreement ("Stipulation"):

WHEREAS, on October 20, 2009, the Plaintiff submitted to NMFS a petition seeking to list eighty-three (83) coral species as threatened or endangered under the Endangered Species Act ("ESA"), 16 U.S.C. § 1531 *et seq*.;

WHEREAS, on February 10, 2010, NMFS published a 90-day finding in the *Federal Register* that the petition presented substantial scientific or commercial information indicating that listing may be warranted for 82 of the 83 petitioned coral species, 75 Fed. Reg. 6,616 (Feb. 10, 2010) ("Positive 90-Day Finding");

WHEREAS, on September 27, 2011, Plaintiff filed a Complaint for declaratory and injunctive relief, pursuant to the ESA, 16 U.S.C. § 1531 *et seq*., challenging NMFS's failure to make a 12-Month Finding as required by 16 U.S.C. § 1533(b)(3)(B) as to the 82 coral species for which NMFS has made a Positive 90-Day Finding;

WHEREAS, Plaintiff and Defendant, through their authorized representatives, and without any admission or final adjudication of the issues of fact or law with respect to Plaintiff's claim, have reached a settlement that they consider to be a just, fair, adequate, and equitable resolution of the disputes set forth in Plaintiff's Complaint;

WHEREAS the Parties agree that settlement of this action in this manner is in the public interest and is an appropriate way to resolve this dispute;

NOW, THEREFORE, IT IS STIPULATED BY AND BETWEEN THE PARTIES AS FOLLOWS:

1. On or before April 15, 2012, NMFS shall submit to the *Federal Register* for

publication a 12-Month Finding as to the 82 coral species for which NMFS has made its Positive 90-Day Finding.

2. Either party may seek to modify the deadline for the action specified in Paragraph 1, for good cause shown, consistent with the Federal Rules of Civil Procedure. In that event, or in the event that either party believes that the other party has failed to comply with any term or condition of this Stipulation, the Parties shall use the dispute resolution procedures specified in Paragraph 3 below.

3. The Order entering this Stipulation may be modified by the Court upon good cause shown, consistent with the Federal Rules of Civil Procedure, by written stipulation between the Parties filed with and approved by the Court, or upon written motion filed by one of the Parties and granted by the Court. In the event that either party seeks to modify the terms of this Stipulation, including the deadline specified in Paragraph 1, or in the event of a dispute arising out of or relating to this Stipulation, or in the event that either party believes that the other party has failed to comply with any term or condition of this Stipulation, the party seeking the modification, raising the dispute, or seeking enforcement shall provide the other party with notice of the claim. The Parties agree that they will meet and confer (either telephonically or in-person) at the earliest possible time in a good faith effort to resolve the claim before seeking relief from the Court. If the Parties are unable to resolve the claim themselves, either party may seek relief from the Court. In the event that NMFS fails to meet the deadline identified in paragraph 1, Plaintiff's first remedy shall be a motion to enforce the terms of this Stipulated Settlement. This Stipulated Settlement shall not, in the first instance, be enforceable through a proceeding for contempt of court.

4. No party shall use this Stipulated Settlement or the terms herein as evidence of what does or does not constitute a reasonable time line for making a determination under 16 U.S.C. § 1533 in any other proceeding regarding NMFS's implementation of the ESA.

5. Subject to the qualifications in paragraph 6, no provision of this Stipulated Settlement shall be interpreted as, or constitute, a commitment or requirement that the Defendant take action in contravention of the ESA, the Administrative Procedure Act ("APA"), or any other law or regulation, either substantive or procedural. Nothing in this Stipulated Settlement shall be construed to limit or modify the discretion accorded to NMFS by the ESA, the APA, or general principles of administrative law with respect to the procedures to be followed in making any determination required herein, or as to the substance of any final determination.

6. Nothing in this Stipulated Settlement shall be interpreted as, or shall constitute, a requirement that the Defendant is obligated to pay any funds exceeding those available, or take any action in contravention of the Anti-Deficiency Act, 31 U.S.C. § 1341, or any other appropriations law.

7. Defendant agrees that Plaintiff is the "prevailing party" in this action, and agrees to pay Plaintiff's reasonable attorneys' fees and costs pursuant to section 11(g) of the ESA, 16 U.S.C. § 1540 (g). Defendant agrees to pay $4,414.00 to settle Plaintiff's claim for fees and costs. A check shall be made payable in this amount to Center for Biological Diversity, c/o Miyoko Sakashita, 351 California St., Suite 600, San Francisco, California 94104.

8. Plaintiff agrees to furnish Defendant with the information necessary to effectuate payment pursuant to paragraph 7 and to hold the United States harmless for any loss caused by following this authorization and direction, if any loss should occur. Defendant agrees to submit all necessary paperwork to the Department of Treasury's Judgment Fund Office pursuant to 16

U.S.C. § 1540(g)(4) within ten (10) business days of receipt of the signed court order approving this Stipulation.

9. Plaintiff agrees to accept payment of $4,414.00 in full satisfaction of any and all claims for attorneys' fees and costs of litigation to which Plaintiff is entitled in this matter through and including the date of this Stipulation. Plaintiff agrees that receipt of this payment from Defendant shall operate as a release of Plaintiff's claims for attorneys' fees and costs in this matter, through and including the date of this Stipulation.

10. By this Stipulation, the Defendant does not waive any right to contest fees claimed by Plaintiff, including the hourly rate, in any future litigation or continuation of the present action.

11. The terms of this Stipulation constitute the entire agreement of the Parties, and no statement, agreement, or understanding, oral or written, which is not contained herein, shall be recognized or enforced. Except as expressly stated herein, this Stipulation supersedes all prior agreements, negotiations, and discussions between the Parties with respect to the subject matters discussed herein.

12. This Stipulation may be modified or amended only by order of this Court.

13. Each of the Parties' undersigned representatives certifies that they are fully authorized to enter into and execute the terms and conditions of this Stipulation, and do hereby agree to the terms herein.

14. The terms of this Stipulation shall become effective upon entry of an order by the Court ratifying the Stipulation.

15. This Stipulation has no precedential value and shall not be used as evidence of such in any litigation or in representations before any forum or public setting.

16. Upon approval of this Stipulated Settlement by the Court, all counts of Plaintiff's Complaint shall be dismissed with prejudice. Notwithstanding the dismissal of this action, however, the Parties hereby stipulate and respectfully request that the Court retain jurisdiction to oversee compliance with the terms of this Stipulated Settlement and to resolve any motions to modify such terms. See Kokkonen v. Guardian Life Ins. Co. of Am., 511 U.S. 375 (1994).

Dated: September 27, 2011.

Respectfully submitted,

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Assistant Attorney General
SETH M. BARSKY
Section Chief
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Assistant Section Chief
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/s/ Brett Grosko(with permission)
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Attorney for Plaintiff

OF COUNSEL:

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~~[PROPOSED]~~ ORDER

The terms and conditions of this Stipulated Settlement Agreement are hereby adopted as an enforceable ORDER of this Court, and this matter is hereby DISMISSED with prejudice.

Dated: This 8th day of November, 2011.

Elizabeth D. Laporte

United States ~~District~~ Judge
Magistrate

CERTIFICATE OF SERVICE

I hereby certify that on September 27, 2011, I caused the foregoing to be served via United States mail to the attorneys of record.

/s/ Miyoko Sakashita

Miyoko Sakashita

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Tiffany Atkinson - NOAA Affiliate <tiffany.atkinson@noaa.gov>

For review - Question for the Record on Ocean Acidification

Craig McLean - NOAA Federal <craig.mclean@noaa.gov> Thu, May 7, 2020 at 11:56 PM
To: Bryan Cole - NOAA Federal <bryan.cole@noaa.gov>
Cc: Ko Barrett - NOAA Federal <ko.barrett@noaa.gov>, Erica Dintaman - NOAA Federal <erica.dintaman@noaa.gov>, James Jenkins - NOAA Federal <james.jenkins@noaa.gov>, Danielle Dodge - NOAA Affiliate <danielle.dodge@noaa.gov>, Tiffany Atkinson - NOAA Affiliate <tiffany.atkinson@noaa.gov>, _OAR Congressional Analysis Relations Division <oar.hq.card@noaa.gov>

Looks good. Approve.
Thank you,
Craig

On Wed, May 6, 2020 at 3:32 PM Bryan Cole - NOAA Federal <bryan.cole@noaa.gov> wrote:

> Hello Craig and Ko,
>
> We received the QFR below from Sen. Feinstein (D-CA) after Sec. Ross' FY 21 Budget Hearing back in March. OAP provided the response.
>
> By noon Friday, can you review and provide any edits or comments?
>
> Thank you,
> Bryan
>
> **Ocean Acidification**
> **Background**
> The National Oceanic and Atmospheric Administration (NOAA) recently released two studies highlighting the detrimental impacts of ocean acidification on the West Coast. NOAA scientists confirmed in a December 2019 study on acidification variability in the California ecosystem that California's waters are rising in acidity at twice the global average, threatening marine life and adding to a growing number of costly fishery disasters.
>
> A second NOAA study, published in January 2020 on Dungeness crab larvae in the Pacific Northwest, documented for the first time (outside of lab conditions) that ocean acidification can damage the shells and sensory organ of Dungeness crab, threatening the long term growth of the one of the most valuable fisheries in U.S. coastal waters.
>
> **Question A:** What efforts is the Department taking to combat ocean acidification? What programs and plans does the Department have in place as our oceans continue to acidify?
>
> **Answer A:**
>
> NOAA works to determine the vulnerability of the nation's blue economy to continued ocean acidification (OA) by 1) monitoring long term changes in ocean chemistry and 2) researching the impacts to marine species and ecosystems on which human communities depend. Through a suite of ship observations and advanced technologies NOAA tracks and monitors acidification to inform modeling of predicted future changes in OA. NOAA also funds research to understand the processes controlling acidification events like those detailed in the studies referenced. Monitoring informs experimental studies exploring how NOAA's managed species may respond to OA, which species are most sensitive and which may prove resilient to such changes. NOAA provides seasonal forecasts of OA conditions in the Pacific Northwest to alert shellfish industries of potential corrosive conditions and is currently working on developing new tools to forecast at-risk habitats from acidification events. The ability to predict OA events will enable us to better prepare society and impacted industries. We develop educational materials to teach the public

about ocean acidification and its causes, giving them the tools to understand and work to reduce their carbon footprint. NOAA is also exploring a competitive research funding opportunity to study the feasibility of carbon removal strategies, which will need to be part of any strategy to combat ocean acidification at the local or regional scale.

--
Bryan Cole, Ph.D.
Acting Congressional Team Lead
National Oceanic and Atmospheric Administration
Office of Oceanic and Atmospheric Research
(301) 734-1126

--
Craig N. McLean
Assistant Administrator
Oceanic and Atmospheric Research
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
1315 East West Highway
Silver Spring, MD 20910
Office: 301-713-2458

Questions for the Record
for the Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs
Committee on Natural Resources
U.S. House of Representatives

in follow-up to the Oversight Hearing

"Spending for the National Oceanic and Atmospheric Administration, the Council on Environmental Quality, the Office of Insular Affairs, the U.S. Fish and Wildlife Service and the President's Fiscal Year 2014 Budget Request for these Agencies"

April 18, 2013

National Oceanic and Atmospheric Administration

Questions for the record for Dr. Fleming (R-LA)

1. NOAA currently funds two scholarship programs that were created by appropriators and are permanently funded through a mandatory set-aside of a percentage of the NOAA or the National Marine Sanctuary budget. Does NOAA support permanently appropriated programs that are funded through such a mandatory annual assessment? If so, would NOAA support such a mandatory percentage of their budget to be put toward activities like cooperative research or fishery surveys?

Answer:
NOAA supports the FY14 President's Budget as proposed, to include the cooperative research and fishery surveys budget as requested.

2. The Department of Defense is attempting to transfer the cost of the Ocean Research Advisory Panel (ORAP) - a multi-agency advisory panel that reports to the National Ocean Council - to NOAA. NOAA apparently agreed to fund the Ocean Research Advisory Panel (ORAP) in the future. Where will the $200,000 to $300,000 per year to fund this advisory panel come from? What in this budget are you going to cut to cover this cost? If this is an advisory panel that reports to the National Ocean Council, would it be more appropriate for CEQ to pay for this and request funding through their budget request?

Answer:
NOAA's FY 2013 Budget requested a total of $300,000 for ORAP, to be administered through NOAA's Office of Oceanic and Atmospheric Research. Congress appropriated these funds in the Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6). This funding is an increase to NOAA; nothing in the NOAA budget has been cut to offset this increase. Though

ORAP has been funded through the Department of Defense in the past, NOAA would be an appropriate agency from which to support this organization. The FY 2014 Budget again requests funding for ORAP; however, this is the result of the President's Budget being delivered prior to a final FY2013 appropriation bill being passed by Congress.

3. NOAA currently has a policy that prohibits the use of the Fisheries Finance Program for any vessel construction due to concerns about overcapitalization. Yet some fisheries are now requiring full utilization and concerns about energy consumption and safety issues are making some fishermen consider new vessel construction. Why is NOAA hindering new fishery vessel construction?

Answer:
The regulations implementing the Fisheries Finance Program prohibit financing the cost of new vessel construction. Additionally, appropriation language, has for some time, stated that funds cannot be used for new vessels that will increase the harvesting capacity in any United States fishery.

The enhanced capabilities of modern fishing vessels may allow them to participate in multiple fisheries, making a determination that a new fishing vessel does not increase harvesting capacity difficult. That a new vessel does not increase harvesting capacity in one fishery provides no assurance that the same vessel cannot be used in another fishery that may be subject to overfishing or not yet regulated. In addition, if the new vessel is a replacement fishing vessel, there is concern about what fishery in which the replaced vessel may participate.

Allowing new vessel construction will require examination of the goals. We recognize that new vessels may improve energy efficiency. We are presently looking at options for modifying the Fisheries Finance Program. .

4. The FY 2014 budget assumes $131 million transfer from USDA under the Saltonstall-Kennedy Program. How does NOAA use that money currently? As you are probably aware, there have been several legislative proposals to mandate other uses of that money. If any of those bills were to pass, how would NOAA fund the programs that are currently funded by S/K money?

Answer:
The appropriations bills each year includes language directing transfer of a portion of the Promote and Develop account to NOAA's Operations, Research and Facilities (ORF) Account to support activities authorized by the appropriation including fisheries activities. Additional funds are utilized for the Saltonstall-Kennedy Grant Program.

The ORF offset supports fisheries research and management activities including the analysis and decision-making that support ecosystem approaches to fisheries management, fishery management plan and regulatory implementation, development of fisheries regulations and

Fisheries Management Plans and amendments in order to maintain and restore productive stocks important to commercial, recreational, tribal, and subsistence fisheries. Historically, these funds were executed under the "Fisheries Research and Management Programs" budget line item. In FY 2012, funds were executed under the following budget line items:

Fisheries Research and Management ($16.0M)
Expand Stock Assessments ($60.4M)
Survey and Monitoring Projects ($21.7M)
Cooperative Research ($11.0M)

These are some of the core funding lines that support the fisheries science mission including vessel surveys, stock assessments and collaborative science with the fishing industry. The Expand Annual Stock Assessments and Survey and Monitoring Projects lines support the science to set annual catch limits to prevent overfishing and maximize fishing opportunity. Cooperative research enables commercial and recreational fishermen to become involved in collecting fundamental fisheries information to support the development and evaluation of management options in their fishery. This year, NOAA will use the funds transferred from the Promote and Develop account in accordance with the FY 2013 Appropriations Act language: "That in addition, $119,064,000 shall be derived by transfer from the fund entitled 'Promote and Develop Fisheries Products and Research Pertaining to American Fisheries', which shall only be used for fishery activities related to Cooperative Research, Annual Stock Assessments, Survey and Monitoring Projects, Interjurisdictional Fisheries Grants, and Fish Information Networks…" The FY 2014 budget also proposes to use the funds to offset these accounts for the same activities as FY 2013.

If the "Promote and Develop Fisheries Products" funds are no longer available to offset the four budget line items that are currently being supported, additional appropriations from the general Treasury would be required in order to maintain the same level of services.
The transfer also supports competitive grants under the Saltonstall-Kennedy Grant Program. Specific program priorities change annually. In addition to the competitive grants, funds support the National Program under which NMFS has directed funds for shark research, commercial and recreational fishing information networks, marine mammal research, and support for bluefin tuna otolith research training. The National Program accomplishes research not adequately addressed by projects assisted under the competitive grant program.

For details on projects funded through the Competitive program, the Saltonstall-Kennedy reports to Congress through FY 2011 are available at:
http://www.nmfs.noaa.gov/mb/financial_services/skhome.htm.

5. The FY 2014 budget request includes more than $28 million for the National Catch Share Program. What is this funding to be used for given that NOAA is collecting management fees from existing catch shares? Is this entire amount to be used to support the creation of new catch share programs? Are there any catch share programs that have been adopted by a Council but

not yet implemented? If so, please provide information on what fisheries are affected and in what region.

Answer:
A breakdown of the FY 2014 President's request for the National Catch Share Program is provided below. This funding supports implementation and operation of existing catch share programs as well as the development of new catch share programs. Cost recovery programs, which allow NOAA to collect a fee for management, data collection and analysis and enforcement, have been implemented in several limited access privilege programs. However, these cost recovery fees do not cover the full cost of these programs, in particular the start-up costs, and are not required for all catch share programs. Where cost recovery programs have been implemented fees are capped at 3% of the ex-vessel value of the fishery.

National Catch Share Program ($ in millions)	FY 2014 Request
Support for Development and national coordination	$4.7
Regulatory Improvement and activities to address emerging issues	$11.4
Implementation and Operation of Specific Catch Shares	$12.1
Total	**$28.2**

Support for development and national coordination ($4.7 million): This includes activities and capabilities that support development and refinement of catch share programs. These include program management at the national and regional levels; improvements in fishery-dependent data collection systems; quality control on historic catch data used for catch share allocation; fishery data management; social and economic data collection or analysis; and, adjudication of administrative appeals by program participants.

Regulatory Improvement and activities to address emerging issues ($11.4 million): This includes support for the New England Sector program and activities supporting the continued adjustments in that management regime. Other activities include support for high priority regional projects such as development and evaluation of electronic monitoring and reporting tools.

Implementation and Operation of Specific Catch Shares ($12.1 million): This includes support for the Pacific Trawl program, Gulf of Mexico Grouper/Tilefish, Alaska Halibut Sportfish and development and implementation of new programs currently being worked on by the Councils. Key implementation activities include support for management and enforcement staff, establishment of share accounting databases and reporting systems, identification of eligible participants, issuance of catch shares, and computation of annual quota for each participant. The operational costs include program administration, at-sea and dockside monitoring, and enforcement.

The Alaska halibut sportfish catch sharing plan has been approved by the North Pacific Fishery Management Council and is in the process of being implemented by NOAA. The program is expected to be implemented in 2014. In addition, the Gulf of Mexico reef fish headboat pilot program has been supported by the Gulf of Mexico Fishery Management Council and is under final review with NOAA. If approved, the pilot program will begin in 2014.

6. What funding level was obligated for Cooperative Research in FY 2012 and FY 2013? Please provide information on each project funded during these two years including – the fishery or fisheries involved in the research, what type of platform was used, the level and type of involvement of commercial or recreational fishermen, and the results of the research.

Answer:
There are a variety of agency budget lines that support collaborative work with external partners (e.g., Reducing Bycatch, Survey and Monitoring, Expand Annual Stock Assessments (EASA), etc.), some of which have existed since near the agency's inception. The nature and level of cooperation can vary greatly among these lines as well as the projects supported by those lines. This response focuses only on the work conducted under the Cooperative Research funding line where the specific aim is to foster external stakeholder partnerships for increased quality of data through their knowledge of science and management. This work involves regional partnerships, including State and tribal managers and scientists (including interstate marine fisheries commissions), fishing industry participants (including commercial and recreational fishermen), and educational institutions.

NMFS executes the cooperative research program in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) in consultation with the fishery management councils, interstate marine fisheries commissions, and stakeholders. This involves collaboratively engaging in the collection of fishery-dependent and fishery-independent data, as well as conducting studies to address bycatch through conservation engineering. The program's level of involvement between agency scientists and stakeholders is characterized by strong lines of communication; sharing of ideas; consensus on decision making; and leveraging of resources whenever possible.

The agency's FY 2012 cooperative research program used a range of commercial and recreational platforms such as: cod pot boats, trawlers, longliners, hook and line vessels, trap boats, Commercial Passenger Fishing Vessels CPFV (party and charter boats), and sportfishing vessels.

Project details on Cooperative Research for FY 2013 are not available at this time. Attached is a list of external projects sorted by region for FY 2012. The list includes: the research topic, State, the fishery or fisheries involved, platform(s) used, stakeholder classification, level of collaboration and, research results. In the tables, "level of collaboration" is characterized under a classification system developed in the American Journal of Evaluation.

7. The FY 2014 budget request includes $12 million for Cooperative Research (an increase of $2 million). Can you tell us what in fisheries you are planning on doing cooperative research in FY 2014? Have you already worked with fishermen in those fisheries to put together a plan of how many vessels you will need and the estimated costs for the research in each of those fisheries?

Answer:
NMFS' cooperative research program staff is still engaged in the collaborative process of soliciting stakeholder input and consulting with the regional fishery management councils/interstate marine fisheries commissions on research areas and candidate fisheries that will comprise the FY 2014 project portfolio. However, some potential new or ongoing research areas/activities under consideration are included below:

Northeast Region*
Continuing projects under consideration:

- Maine-New Hampshire Inshore Trawl Survey (http://www.maine.gov/dmr/rm/trawl/)
- Marine Resource Education Program (MREP http://www.gmri.org/community/display.asp?a=5&b=15&c=225)
- University of Maine/Penobscot East Resource Center's Eastern Maine Longline Sentinel Survey Fishery;
- Western and Central Gulf of Maine bottom longline survey in hard-bottom areas not sampled by trawl vessels to fill data gaps for life history and abundance information for species of concern (e.g. cusk, wolffish, Atlantic halibut); and
- Study Fleet Program (http://www.nefsc.noaa.gov/read/popdy/studyfleet/);

*Note: All proposed FY14 projects will be consistent with the planning document titled Cooperative Research in the Northeast: A Strategic Direction for 2010-2014 (http://www.gmri.org/community/seastate/CR_NE_StratDir2010-14Final.pdf)

Southeast Region

- Engaging in cooperative billfish tagging;
- Continuing Turtle Excluder Device testing;
- Estimating shrimp fishing effort using electronic logbooks;
- Supporting the State Federal Cooperative Statics Program involving each southeastern state as well as Puerto Rico and the U.S Virgin Islands; and
- Supporting the Cooperative Unit for Fisheries Education and Research (CUFER http://cufer.rsmas.miami.edu/wordpress/?page_id=24) projects

Southwest Region

- Conducting biological sampling and tagging projects with albacore and salmon troll fisheries;

- Monitoring Commercial Passenger Fishing Vessels to improve rockfish assessments;
- Evaluating an experimental rockfish jig fishery;
- Exploring alternative gear options and collecting biological samples in the nearshore bottom longline and high seas pelagic longline fisheries; and
- Engaging in socioeconomic studies and life history/biological sampling with the swordfish drift gillnet and harpoon fisheries.

Northwest Region

- Continuing the Southern California Bight Hook and Line Groundfish Survey;
- Mapping the distribution of salmon stocks captured in West Coast commercial fisheries using genetic markers; and
- Engaging in bycatch studies

Alaska Region

- Continuing Alaska groundfish longline survey;
- Continuing sablefish logbook data collection;
- Advancing fishing technology and conservation engineering for Alaska pollock fishery; and
- Conducting surveys and biological studies on Bering Sea king, snow, and tanner crab

Pacific Islands Region

- Pilot study transition to a fully operational cooperative fishery independent survey for bottomfish in the Main Hawaiian Islands with the aim of extending survey to Guam/Saipan and American Samoa.

8. Included in the NOAA budget request is an increase of approximately $6 million for "annual stock assessments and improving data collection activities" and an increase of $3 million for "Survey and Monitoring Projects". How will these increases be prioritized?

Answer:
Eight regional Fishery Management Councils, three Marine Fisheries Commissions, and International Regional Fishery Management Organizations work closely with NMFS Fishery Science Centers and Regional Offices to determine which stocks are most in need of new or updated stock assessments. Several factors are taken into consideration: 1) the importance of the stock to the value of regional fisheries and the Nation; 2) the underlying scientific uncertainty of past assessments; 3) the tendency of a stock to naturally fluctuate (i.e. frequency and magnitude of changes since the previous assessment); 4) elapsed time since the last stock assessment; and 5) whether or not a stock is at or approaching an overfishing or overfished condition.

8 continued. How much of this increased funding will go for new fishery surveys for fisheries which have not been surveyed within the last five years?

Answer:
These funds will be used to enhance the existing survey effort by developing and implementing new survey methods, with an emphasis on advanced technologies. These new methods will be used to survey habitats and regions that have not been surveyed regularly in the past, primarily because we have not been able to access them with existing sampling gear. Some of the new data will be for stocks that have been surveyed in the past five years, but the new information will significantly improve the accuracy and precision of the stock assessments for those stocks. Some of the new data will be for stocks that have not had surveys sufficient to incorporate into a stock assessment. High-quality stock assessments require multiple years of survey data collected using consistent methods, so that a time series of information is available to detect trends.

NOAA Fisheries began two "Strategic Initiatives" in FY 2013 to develop operational advanced technologies to address two key technical problems that constrain surveys for multiple science centers around the country: surveys in untrawlable habitat and optical data processing. Some of the new FY14 funding will be used to further develop these two Strategic Initiatives. Fish stocks associated with reef and other rough bottom habitats will be a priority for these efforts. We also expect to devote a portion of these funds to improve abundance and catch data collection in the Caribbean and Western Pacific territories.

8 continued. Will that increase bring us up to date so that all major fisheries in the U.S. will have had a survey within the last five years?

Answer:
Most major commercial and recreational fish stocks will have been surveyed within the past five years. Furthermore, most major stocks will have an assessment no more than five years old. Major fish stocks refer to the 227 tracked under the Fish Stock Sustainability Index. These stocks constitute over 90 percent of U.S. commercial landings, and many are important to recreational fisheries.

The remaining unassessed fish stocks will require the development of additional biological understanding of the stock or the collection of longer time-series of abundance surveys before they can be transitioned into a fully assessed state. In the interim period, alternative peer-reviewed techniques will be used to provide catch advice to the Fishery Management Councils. It is important to differentiate the assessment activity from the survey activity. The survey activity collects data on the abundance and biology of the fish stock. The assessment activity uses data from surveys and from the fishery (e.g., catch data) to analyze the fish stock and provide management advice. While the better assessments will use survey data, in some limited cases NOAA Fisheries is able to conduct assessments using only data from fisheries. Further, some minor stocks will get a baseline assessment using only fishery data, because their low importance has not warranted a high priority for implementation of a survey.

In addition to the $3 million increase for "Surveying and Monitoring Projects", the FY 2014 President's Budget requests an increase in the Office of Marine and Aviation Operations (OMAO) Operations and Maintenance budget line, which would result in a fully utilized fleet as compared to ~60% utilization rate in recent years. This would allow for additional survey effort on many stocks, which should reduce the uncertainty in the stocks' assessments.

8 continued. Can you tell us whether red snapper in the Southeast or the Gulf of Mexico will be surveyed in FY 2014?

Answer:
Yes, the NMFS Southeast Fisheries Science Center annual Gulf of Mexico fishery-independent surveys and Southeast Atlantic Fishery-Independent Survey for red snapper and associated reef fish stocks are planned for FY 2014. Moreover, a new benchmark assessment is planned for South Atlantic red snapper and a subsequent assessment update will be prepared for Gulf of Mexico red snapper.

9. Please provide information detailing how many scientists at the Southeast Science Center are working on red snapper stock assessments for the South Atlantic fishery and what kind of scientific work they are doing (and when the work begin).

Answer:
The South Atlantic red snapper stock assessment is scheduled to begin in August 2014. NMFS Southeast Fisheries Science Center (SEFSC) staff that will work on the red snapper stock assessment include 4 FTE stock assessment analysts and 2 FTE support analysts. The red snapper stock assessment will be conducted through the Southeast Data, Assessment, and Review (SEDAR) process, which includes data, assessment and review phases, scheduled to be completed in early 2015.

However, SEFSC conducts its fishery-independent surveys, landings monitoring, fisheries observer work, biological sampling, etc. across a broad spectrum of taxa, rather than for one species or stock at a time. Hence, the table below represents the number of individuals who work on red snapper in addition to numerous other species, rather than exclusively on red snapper.

	FTE	**Contract**
Data analysts and managers	9	7
Port samplers	6	1
Headboat survey	5	2
Fishery-independent survey	2	5
Age Processing Lab	2	4
TOTAL	24	19

The SEFSC collects commercial landings, effort, and biological samples from commercial vessels via logbook programs and dockside sampling. The Southeast Region Headboat Survey collects landings, effort, and biological samples from headboat (for-hire vessels which carry more than six passengers) trips via logbooks and dockside sampling. The Southeast Fishery Independent Survey collects video- and trap-caught samples of reef fishes aboard NOAA and contract vessels from stations throughout the U.S. South Atlantic using a rigorous experimental design. The Age Processing Lab processes and reads spines, otoliths, and scales from reef fishes along the entire East Coast. Products from these efforts form the data inputs used to conduct stock assessments.

9 continued. Please also provide the data used in your models used to keep the red snapper fishery closed.

Answer:
The stock assessment that underpinned the decision to close directed fisheries for red snapper in the South Atlantic was SEDAR 24. The stock assessment report, which discusses the data inputs, models used and outputs from the stock assessment may be viewed at:

http://www.sefsc.noaa.gov/sedar/download/SEDAR%2024_SAR_October%202010_26.pdf?id=DOCUMENT

9 continued. Please provide the Southeast Science Center's budget for the past five years concerning all aspects of the Center.

Answer: Please see table below.

SOUTHEAST FISHERIES SCIENCE CENTER FIVE YEAR FINAL ALLOCATIONS					
National Marine Fisheries Service	**FY2008**	**FY2009**	**FY2010**	**FY2011**	**FY2012**
Operations, Research and Facilities (ORF)					
Protected Species					
Protected Species Research & Management Programs	2,304,583	2,484,475	2,505,341	2,482,030	2,611,199
Species Recovery Grants	0	0	90,000	0	0
Marine Mammals	1,549,448	1,547,186	2,025,127	1,783,316	1,917,114
Marine Turtles	1,514,315	1,580,457	1,503,588	1,542,005	1,696,084
Other Protected Species	260,748	316,437	436,525	573,974	376,550
Sub-Total Protected Resources	**5,629,094**	**5,928,555**	**6,560,581**	**6,381,325**	**6,600,947**
Fisheries Research & Management Programs (FRM)					
Fisheries Research & Management Programs	8,987,132	9,111,304	10,452,016	10,566,192	11,016,716
National Catch Share Program	0	0	0	4,269,109	2,331,325
Expand Annual Stock Assessments –EASA	5,284,222	6,839,227	9,959,897	10,058,982	12,768,278
Deepwater- EASA in the GOM (Oil Supplemental)	0	0	3,540,000	0	0
Economics & Social Sciences Research	534,105	541,549	650,901	910,796	1,177,199
Regional Councils and Fisheries	120,000	120,000	120,000	120,000	120,000

Commissions					
Fisheries Statistics	3,295,047	3,374,388	3,736,582	3,804,729	3,917,012
Fish Information Networks	672,715	797,143	739,783	1,248,260	1,411,466
Survey and Monitoring Projects	6,133,708	4,858,698	5,052,034	5,896,797	5,259,187
Fisheries Oceanography	119,551	0	174,833	325,000	159,340
National Standard 8	121,955	160,409	166,154	129,307	108,935
Reducing Bycatch	519,739	594,176	723,321	701,610	190,016
Product Quality and Safety/Seafood Inspection	336,622	348,887	378,319	473,625	460,535
Subtotal, Fisheries Research and Management (NMFS)	**26,124,796**	**26,745,781**	**35,693,840**	**38,504,407**	**38,920,009**
Congressionally Directed:					
Center for Ecosystem-based Fisheries Management	2,510,400	899,100	749,250	0	0
Gulf Oyster Industry Program	178,422	0	0	0	0
Southern Shrimp Fishing Effort Research		199,800	699,300	0	0
Gulf of Mexico Recreational Fishery Electronic Logbook	0	0	49,950	0	0
Turtle Observer Fund/ Gulf of Mexico Grouper Fishery			249,750	0	0
Subtotal, Congressionally Directed Projects	**2,688,822**	**1,098,900**	**1,748,250**	**0**	**0**
SUBTOTAL FRM and Congressionally-Directed Projects	**28,813,618**	**27,844,681**	**37,442,090**	**38,504,407**	**38,920,009**

Enforcement/Observers					
Enforcement	0	0	599,400	0	63,251
Observers/Training	4,505,782	5,508,445	5,336,307	4,870,028	4,656,806
Subtotal, Enforcement/Observers	**4,505,782**	**5,508,445**	**5,935,707**	**4,870,028**	**4,720,057**
Habitat Conservation & Restoration:					
Sustainable Habitat Management	2,280,168	2,546,967	2,667,902	1,462,664	1,454,321
Fisheries Habitat Restoration	0	0	18,005	0	0
Subtotal Habitat Conservation & Restoration	**2,280,168**	**2,546,967**	**2,685,907**	**1,462,664**	**1,454,321**
Other Activities Supporting Fisheries:					
Aquaculture	0	0	0	0	12,000
Computer Hardware and Software	141,584	208,754	208,754	180,639	54,814
Cooperative Research	3,535,929	4,404,315	4,447,303	4,299,222	4,385,210
Information Analyses & Dissemination	2,439,513	2,452,884	2,541,079	2,391,516	2,030,885
Marine Resources Monitoring, Assessment & Prediction Program (MarMap)	811,178	830,632	830,632	828,951	489,409
Regional Studies	4,248,308	4,868,765	5,090,879	5,093,115	4,835,356
Subtotal, Other Activities Supporting Fisheries (NMFS)	**11,176,512**	**12,765,350**	**13,118,647**	**12,793,443**	**11,807,674**
Congressionally Directed Projects: Other Activities					

Supporting Fisheries					
Aquatic Genomics and Biosecurity Research	892,106	0	0	0	0
SUBTOTAL Other Activities Supporting Fisheries: NMFS & Congressionally Directed Projects	**12,068,618**	**12,765,350**	**13,118,647**	**12,793,443**	**11,807,674**
Total ORF, Southeast Fisheries Science Center	**53,297,280**	**54,593,998**	**65,742,932**	**64,011,867**	**63,503,008**
Procurement, Acquisition, and Construction					
Center for Aquatic Resource Management - Auburn Univ.	1,471,977	1,498,500	0	0	0
Total PAC	**1,471,977**	**1,498,500**	**0**	**0**	**0**
Total NMFS SEFSC	**54,769,257**	**56,092,498**	**65,742,932**	**64,011,867**	**63,503,008**

9 continued. Please provide details on funding for red snapper research off Florida for the last five years.

Answer:
SEFSC budgets are not managed by species or by state. However, red snapper bycatch data collected by observers are used in the red snapper stock assessment for the Gulf of Mexico. Similarly, a fishery-independent survey may sample an area from the central Atlantic coast of Florida through North Carolina, making a break out of costs specific to the Florida coast challenging.

One category of research projects that does allow some ability to sort by geographic area and species/species group are our Marine Fisheries Initiative (MARFIN) and Cooperative Research grants. Between 2008-2012, MARFIN projects that were specific to or included red snapper off the coasts of Florida totaled to about $3 million. Over the last five years, about $2 million was spent on red snapper related research off the coasts of Florida. However, this represents a small fraction of our overall investment in red snapper research, monitoring and assessments.

9 continued. Please also provide detailed information on the level of funding used for foreign travel by the Southeast Science Center.

Answer:
In FY 2012, costs for foreign travel conducted by SEFSC staff totaled about $241,000, with about $159,000 (66%) of that for travel to support stock assessments on tunas, sharks and billfishes managed under the International Commission for the Conservation of Atlantic Tunas (ICCAT). The remaining travel was split among travel to conduct Turtle Excluder Device training and inspections, fieldwork (mainly sea turtles and tunas), international engagement (e.g., bilaterals, Intergovernmental Oceanographic Commission, Large Marine Ecosystem Programs) and scientific meetings.

10. Please provide an estimate of the funding required to enforce the closure of the red snapper fishery in both the Gulf and the South Atlantic.

Answer:
Enforcement of the red snapper closures in the South Atlantic and Gulf of Mexico is dependent on at-sea patrol efforts in the Exclusive Economic Zone beyond State territorial waters. NOAA conducts such patrols utilizing four patrol vessels (one in the South Atlantic and three in the Gulf of Mexico) and coordinates our patrol activity with our state and federal fisheries enforcement partners as appropriate.

NOAA Office of Law Enforcement estimates a cost of approximately $110,000 for Red Snapper patrol activity ($44,000 for Gulf of Mexico and $66,000 for South Atlantic) in FY 2014. This estimate accounts for anticipated patrol vessel fuel costs (based on current fuel prices), travel costs for assigned personnel and expected level of patrol activity needed to enforce the red

snapper closures. The estimate does not incorporate personnel costs for new or existing Office of Law Enforcement personnel needed to be assigned to this enforcement effort or unexpected maintenance costs for patrol vessels.

11. At a previous budget hearing, some Members of this Committee were surprised to learn that the Assistant Administrator for Fisheries did not have any control over the fishery survey vessel funding. How do you determine how many days at sea the fishery research vessels will be doing fishery surveys in each of the regions? Can you tell us how many days each of the fishery survey vessels is expected to be doing fishery surveys in FY 2014 under this budget request? Can you tell us the projected number of days at sea these NOAA vessels will be conducting fishery surveys in FY 2013?

Answer:
The FY 2014 President's Budget includes a request in NOAA's Office of Marine and Aviation Operations (OMAO) of $21 million for marine operations that would provide for full utilization of the NOAA fleet resulting in an increase to the days available for fisheries surveys and other ship-based science. This funding would increase the total days-at-sea for the fleet from 2,131 in FY 2012 to an estimated 3,517 in FY 2014.

NOAA's fishery survey vessels are listed in the NOAA Fleet Detail table in the FY14 Congressional Justification. They include: *McArthur II, Oregon II, Gordon Gunter, Oscar Elton Sette, Oscar Dyson, Henry B. Bigelow, Pisces, Bell M. Shimada,* and *Reuben Lasker*. The final allocation of ship time for FY 2014 will be determined by NOAA's Fleet Council using the Prioritization, Allocation and Scheduling (PAS) process and will be dependent on final appropriations. Each NOAA Line Office (LO) is represented on the NOAA Fleet Council which is chaired by RADM Devany of OMAO. This process ensures NOAA's highest priority programs are supported and that projects are assigned to assets that provide the best value to the Government.

The PAS process is informed at the onset by an evaluation of fleet composition, maintenance requirements, and estimated funds available for the upcoming fiscal year. Each NOAA LO provides a prioritized list of projects for consideration. NMFS develops its prioritized list of cruises from guidance provided by Vessel Coordinators in each Science Center. These regional priorities are reviewed by NMFS Headquarters staff who then prepare an integrated national priority list for the NMFS Chief Science Advisor. This informs a cross-LO prioritized list of projects developed with input from NOAA Leadership for OMAO to use in allocating best value assets to each project, then the Fleet Working Group, facilitated by OMAO, schedules projects on the Fleet Allocation Plan (FAP). The draft FAP developed by OMAO and the Fleet Working Group is approved by the Fleet Council and becomes final. After the initial FAP is created at the President's Budget level, subsequent revisions are made throughout as funding levels change.

The FAP is typically completed in the fall and the FY 2014 plan will likely be complete in late 2013. In FY 2013, NMFS expects to receive roughly 969 OMAO-funded Days at Sea to conduct

NMFS surveys. An additional $3.9 million of NMFS program funds will pay for 295 additional Days at Sea for NMFS survey work to ensure survey priorities are met.

The current version of the Fleet Allocation Plan can always be found:
http://www.omao.noaa.gov/shipallocation.html

12. The OMAO Fleet Characteristics website seems to indicate that the Miller/Freeman is an active fishery survey vessel, yet another page on their website says that it has been decommissioned. Can you tell us the status of the Miller/Freeman and whether it will be available for fishery surveys in FY 2013 or FY 2014?

Answer:
The Miller Freeman was decommissioned on March 29, 2013 and is no longer an active vessel in the NOAA fleet.

13. Does NOAA contract out for any of its fishery surveys? If so, please provide details.

Answer:
NOAA uses a variety of arrangements to provide components of fishery surveys. A common example is crewed vessels to perform fishery independent surveys, where a vessel owned and operated by the contractor performs sampling operations under the direction of NMFS scientific staff. In these cases, data collection and sample reduction is done by embarked NMFS scientists. A major example of this approach is the Bering Sea groundfish surveys, most of which are done using contracted commercial fishing vessels with NOAA scientists on board. Alternatively, in the case of the South East Area Monitoring and Assessment Program (SEAMAP), a state/federal cooperative research program, the Southeast Fisheries Science Center allocates funds through cooperative agreemments to SEAMAP managing units, comprised of designated state representatives, Southeast Fisheries Science Center scientists, and the respective fisheries management commissions and agencies (Gulf States and Atlantic States Marine Fisheries Commissions, and in the Caribbean, Puerto Rico Department of Natural and Environmental Resources). Tasks and operations are wholly defined by the respective managing units, reflecting distinct regional needs and priorities. Operations are assigned to get the best scientific and economic value, thus some SEAMAP surveys are performed by NMFS operating units but some are also performed wholly by state agencies. Similar arrangements exist with academic, state, and industry partners to conduct the Northeast Area Monitoring and Assessment Program (NEAMAP), Maine-New Hampshire Inshore Groundfish surveys, and the Atlantic surfclam surveys.

14. You note in your testimony that in FY 2014, you intend to complete the last of your new fishery research vessels. I do not see any budget request for that purpose. Can you give us more information on the budget impact of this vessel completion and tell us where that final fishery research vessel will be home ported?

Answer:
NOAA is scheduled to take delivery of the *Reuben Lasker* in FY 2013 and complete final post shipyard availability tests, conclude program management activities, and close out the contract. The funding associated with these activities will not be required after FY 2013; therefore, NOAA requested a decrease of $2.9M in FY 2014 to the New Vessel Construction budget line. The operations and maintenance costs associated with *Reuben Lasker* are factored into the FY 2014 estimates for total fleet utilization. The port of San Diego will be the *Reuben Lasker's* homeport with an approved 10-year lease.

15. At a recent hearing, a witness noted that many commercial fishing vessels (primarily on the West Coast and Alaska) have acoustic equipment that is as good as NOAA's equipment. Has NOAA attempted to get commercial fishing vessels to do acoustic surveys to enhance NOAA's data?

Answer:
Yes, the most recent effort to date is a just completed six-year NMFS cooperative research funded acoustic survey with scientists from the Alaska Fisheries Science Center and fishermen from the Aleutians East Borough community of Sand Point, Alaska.

Between September 2007 and April 2013, a locally owned and crewed 60ft multi-purpose fishing vessel supported a series of small-scale acoustic and mid-water trawl surveys. The 2013 survey was a culmination of several years of research into the effectiveness of small boat survey potential in the western Gulf of Alaska and the ability to assess the abundance of pollock. Acoustic biomass estimates and biological samples to verify species composition, age, and size were shown to be comparable to results taken aboard the NOAA Ship *Oscar Dyson*, which is the primary survey vessel for winter pollock acoustic-trawl surveys in the western Gulf of Alaska.

Additional comparative work has been conducted from commercial fishing vessels under Alaska Fisheries Science Center charter for the annual eastern Bering Sea crab-groundfish bottom trawl survey, which overlaps in space and time with *Oscar Dyson* acoustic-trawl summer surveys on pollock. Comparison of four years of acoustic data (1999, 2000, 2002, and 2004) between the two surveys was completed to determine feasibility of using the groundfish bottom trawl survey to provide a new mid-water pollock index. Again the acoustic biomass results obtained by fishing vessels compared favorably with *Oscar Dyson* results. These supplemental acoustic estimates have been validated and are incorporated in eastern Bering Sea Pollock stock assessments.

16. What has NOAA done since the news report of thousands of red snapper killed by the removal of decommissioned oil platforms in the Gulf to minimize this source of mortality? Can you tell us how many rigs or platforms were removed using explosives during the past year? Can you tell us how many DOI will require to be removed in FY 2013?

Answer:

The Department of the Interior is responsible for environmental and conservation compliance related to U.S. offshore oil and gas and renewable energy activities, including decisions related to decommissioned oil platforms. The DOI's Bureau of Safety and Environmental Enforcement is the best source of information on the number of explosive removals of rigs or platforms in 2012 and on planned removals in 2013.

DOI consults with NMFS to determine the effects of oil and gas exploration, including rig removal, on protected species and essential fish habitat. However, DOI also has to consider multiple other factors, including navigational hazards, liability and human safety issues. Standard mitigation measures DOI includes in its Notices to Gulf of Mexico Outer Continental Shelf Lessees include:

- Limitations on the size of explosive charges used for structure removals;
- Requirements to place explosive charges at least 15 ft (5 m) below the mudline;
- Site-clearance procedures to eliminate potential snags to commercial fishing nets;
- No Activity and Modified Activity Zones around high-relief live bottoms;
- Requirements to conduct remote-sensing surveys to detect and avoid potential archaeological sites and biologically sensitive areas such as low-relief live bottoms, pinnacles, and chemosynthetic communities; and,
- Requirements to coordinate with the military to prevent multiuse conflicts on the Outer Continental Shelf.

While NMFS does not have the authority to restrict or limit rig removals to avoid impacts to red snapper, we are concerned about the impact of explosive removals on the red snapper population and the Southeast Data, Assessment and Review Panel evaluated those impacts in the new red snapper assessment.

17. In your written testimony, you note that the budget request includes $43.6 million for observers, but then you go on to say that this funding is apparently only available for fisheries currently managed under a catch share or transitioning to a catch share. Why is this funding only available for catch share fisheries in place? Does NOAA not feel any need to fund observers in non-catch share fisheries? What specific fisheries will this funding be used to provide Federally-funded observers and how was this decision made?

Answer:
The NMFS FY 2014 budget request includes funding for observers in both catch share and non-catch share fisheries. Approximately 47 fisheries are monitored annually by observer programs, including observer coverage in 10 catch share fisheries. The most recent list of fisheries for which funding was provided is available in the National Observer Program FY 2012 Annual Report at http://www.st.nmfs.noaa.gov/observer-home/reports/nopannualreports/index.

NMFS observer programs are located in each region of the country (NE, SE, AK, NW, SW, and Pacific). Beginning in 1999, Congress appropriated funds to each regional observer program except the Southwest and the Alaska Marine Mammal Observer Program. NMFS observer

program priorities include monitoring fisheries in each of the regions to meet statutory and regulatory requirements under the Magnuson-Stevens Act, Marine Mammal Protection Act and Endangered Species Act for observer coverage in U.S. commercial fisheries, while also addressing critical science and management needs for catch and discard estimates as well as stock assessments. The funding amounts for each region were/are determined by the number of fisheries in each region, the regulatory requirements for observers including observer coverage levels, regional priorities for monitoring and data collection, quota monitoring requirements, bycatch monitoring requirements, court-ordered mandates, and availability of industry funding.

18. Has NOAA requested any funding in this budget request for fisheries disaster assistance? If not, why not?

Answer:
NOAA does not have a standing fund for disasters. After the Secretary of Commerce determines that a fishery resource disaster has occurred, Congress may appropriate funding to help those affected by the disaster to reduce the short-term, often severe, impacts associated with these situations. NMFS would then immediately work with States to develop a spending plan and help execute the funds provided by Congress.

19. As you know, the current groundfish fishery restrictions in the Aleutian Islands are estimated to cost the U.S. fishing industry more than $50 million per year (by your own agency's estimates). In addition, those restrictions have cost the U.S. industry an important market niche for cod that they will not be able to regain. How much is included in the FY 2014 budget request for Steller sea lion research in the Aleutian Islands? Will this include any funding for tagging? Will this include any cooperative research or research done from commercial fishing vessels?

Answer:
The FY 2014 President's budget request for Steller sea lion research is approximately $715,000. NMFS expects to support the following Aleutian Islands Steller sea lion research projects in 2013 and 2014:

- three contractors to man a field camp on sea lion rookery islands (Ugamak Island) for 2 months each year;
- three ship charters totaling 7 weeks to survey sea lion use areas for marked animals as part of a long-term vital rates project, pup condition, and to tag adult female Steller sea lions; and,
- aerial surveys for abundance monitoring throughout Alaska.

NMFS and the Alaska Department of Fish and Game collaborate on Steller sea lion vital rates and physiological research. NMFS also collaborates with scientists at University of California Davis, the Marine Mammal Center, Colorado State University, the Center for Disease Control, and the University of Alaska Fairbanks on questions relating to health and condition of Steller sea lions.

NMFS-fishing industry collaboration will likely support investigation of killer whale predation of Steller sea lions (Pollock Conservation Cooperative Research Center grant from University of Alaska Fairbanks). NMFS also has a proposal into the North Pacific Research Board to continue a cooperative tagging study of Atka mackerel in the western Aleutians. The study would include support from NMFS, the North Pacific Fisheries Foundation, and the North Pacific Research Board, using commercial fishing vessels for the tagging and recovery of Atka mackerel to further understand the distribution and abundance of this important Steller sea lion prey species.

20. Your testimony notes that satellites are being used to designate critical habitat for endangered species by tracking migratory patterns and identifying feeding and breeding patterns. Can you tell us what endangered species in particular NOAA is using satellites to track?

Answer:
Information from satellite tracking can provide important information for managers in the designation process. NOAA satellites provide the capability for researchers to track the movements of tagged fish, marine mammals or oceanographic buoys. The Data Collection System (DCS) instrument, also referred to as ARGOS[1], was provided by the French Space Agency and sent to NOAA for integration and launch on its Polar-orbiting Operational Environmental Satellite (POES); this U.S.-French cooperation started in the late 1980s. The DCS system provides scientists the ability to track objects in near-real-time over distance and time.

Examples of species tracking using the POES DCS are:

- Right whales, Hawaiian monk seals, Loggerhead and Olive Ridley turtles, and cetaceans by NOAA's National Marine Fisheries Service
- Leatherback Sea Turtle and Bluefin Tuna by the University of Massachusetts
- Green and Kemp's Ridley Sea Turtles by the United States National Park Service
- California Condor by the San Diego Zoo Institute For Conservation Research
- Whooping Crane by the US Geological Survey and Louisiana State University
- Bighorn Sheep by the Washington State University

NMFS also applies this type of movement information with satellite oceanography information (e.g., ocean color, altimetry (sea level height), and sea surface temperature) to characterize oceanic habitat for a variety of marine species including swordfish, albacore, whale sharks and

[1] http://www.argos-system.org/web/en/50-tracking-and-monitoring.php

other pelagic fish. A topical example would be the NOAA Pacific Islands Fisheries Science Center's 'TurtleWatch' that correlates oceanographic conditions with the migration of loggerhead sea turtles to help separate the protected sea turtles from the Hawaii longline fishery. See http://www.pifsc.noaa.gov/eod/turtlewatch.php.

A second example is from the NOAA Southwest Fisheries Science Center's participation in the Tagging of Pacific Predators (TOPP) project. Information from 4,300 apex predator satellite tags has been combined with climate change scenarios based on predictions by the Intergovernmental Panel on Climate Change. By the year 2100, our scientists found that some predators could face up to a 35 percent loss of habitat as the ocean water with their preferred temperature moves northward.

21. NOAA currently funds a number of satellite programs. How many of these satellites are primarily for weather observations and how many are primarily for climate observations?

Answer:
All of NOAA's satellites are built to support our environmental monitoring mission. The primary mission of NOAA's Geostationary Operational Environmental Satellite (GOES) –N Series and Polar-orbiting Operational Environmental Satellite (POES) is to provide support to NOAA's weather and space weather mission. The Jason-2 satellite provides precise measurement of sea surface height for both ocean climate and ocean weather missions.
NOAA is currently acquiring its next generation of satellites. The GOES-R Series Program will provide enhancements and continuity to the weather and space weather mission that the GOES-N Series satellites currently provide, while the Joint Polar Satellite System will continue observations after the Suomi National Polar-orbiting Partnership (Suomi NPP) satellite. NOAA is collaborating with its European partners to develop Jason-3, a near clone of the current Jason-2 satellite. And, NOAA is refurbishing the Deep Space Climate Observatory (DSCOVR) satellite, formerly known as Triana, which will support NOAA's space weather mission at the L1 Lagrange Point.

With an uninterrupted record of over 30 years of data, researchers have used NOAA GOES and POES data that had originally been collected to support NOAA's weather mission for other purposes, such as providing an analysis of long-term status and trends of the ocean, the atmosphere, and land. This includes better exploitation of the data to support advances in weather forecasting, and improvements to be incorporated into operational weather products and services. Climate monitoring is only one of the uses of these data. Details of NOAA's satellite systems are provided below:

Geostationary Systems
NOAA operates the GOES-N Series of satellites, which provide operational service as GOES-East, GOES-West, and an on-orbit spare satellite, which can be placed into operational service if either of the primary satellites malfunction. These GOES satellites provide the backbone of the National Weather Service's "now casting" weather observations, such as detecting and tracking severe events such as hurricanes and nor'easters, flash floods, and wildland fires. NOAA is

acquiring the next generation GOES-R Series to replace the GOES-N Series satellites without a break in coverage, while enhancing geostationary observations. The GOES-N Series satellites currently provide observations of the Americas every 30 minutes, while the GOES-R Series satellites[2] will provide observations at higher spatial resolution every 5 minutes with the capability of acquiring data every minute to monitor specific areas of concern, such as monitoring areas where conditions are conducive to the rapid development of severe weather. Data from GOES-R's space weather instruments will be used by the NWS Space Weather Prediction Center (SWPC) to support critical space weather warnings to the public and industrial sectors. NOAA has managed operational GOES satellites since 1974 to support NOAA's weather mission and with GOES-R plans to continue this coverage through 2036.

Polar-orbiting Systems

NOAA's polar satellite system, POES, has been operating since 1966. At one time NOAA operated satellites in the mid-morning and early afternoon orbit; now the Europeans operate a satellite in the mid-morning orbit with NOAA-supplied instruments onboard their Metop satellites, while NOAA operates satellites that fly in the early afternoon orbit. These polar-orbiting satellites provide approximately 85 percent of the data that goes into National Weather Service numerical weather prediction models, which provide the weather forecast 3 days and beyond. NOAA is developing the next generation polar-orbiting satellite, the Joint Polar Satellite System (JPSS)[3], which will provide higher resolution data than POES provides in the early afternoon orbit through 2025.

Within the FY 2014 President's Budget, a new program is requested entitled the Polar Free Flyer (PFF)[4]. The PFF mission will address NOAA's requirements to provide global environmental data critical to weather and other core missions, including data communication from buoys and other critical platforms, for providing the continuity of the 34 year total solar irradiance (TSI) data record which quantifies the variability in the Sun's output, as well as search and rescue and data collection services, supporting the NOAA life- and property-saving mission.

Also, within the FY 2014 President's Budget, the Administration requests that the follow-on instruments to three climate sensors[5] are transferred from NOAA to NASA.

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[2] Advanced Baseline Imager (ABI); Solar Ultraviolet Imager (SUVI); Extreme Ultraviolet and X-ray Irradiance Suite (EXIS); Space Environmental In-Situ Suite (SEISS); and Geostationary Lightning Mapper (GLM); Magnetometer; Search And Rescue Satellite-Aided Tracking (SARSAT); and Advanced Data Collection System (ADCS).

[3] Visible/Infrared Imager/Radiometer Suite (VIIRS); Crosstrack Infrared Sounder (CrIS); Advanced Technology Microwave Sounder (ATMS); and the Ozone Mapping Profiler Suite -Nadir (OMPS-N)

[4] Advanced Data Collection System (ADCS); Total Solar Irradiance Sensor (TSIS); Search And Rescue Satellite-Aided Tracking system (SARSAT)

[5] Total Solar Irradiance Sensor-1 (TSIS-1); Cloud and Earth Radiant Energy System (CERES); Ozone Mapping and Profiler Suite-Limb (OMPS-L)

Ocean Altimetry

NOAA is in partnership with Europe's operational weather satellite agency, the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), and the French space agency, Centre National d'Etudes Spatiales (CNES), to develop the Jason-3 satellite. Jason-3 is a copy of the current Jason-2 satellite and provides data on sea surface height, which is used to monitor a variety of oceanographic conditions. The Department of Defense, specifically the US Navy, uses Jason-2 data to support its worldwide operational and tactical readiness. The National Weather Service uses the data in its models to monitor factors that could lead to intensification of hurricanes and the potential for storm surge from hurricanes or nor'easters that are close to shore or exhibit a high likelihood of becoming land-falling weather systems. The altimetry data is also used to monitor long range trends of changes to global sea levels.

Solar Winds

NOAA is in partnership with the Air Force and NASA to refurbish a previously built satellite, Triana, which is now called the Deep Space Climate Observatory (DSCOVR). The satellite will provide a critical early warning of solar wind storms from the L1 Lagrange point. Over the past decade, our society has become increasingly vulnerable to the impacts of solar storms due to our increased usage of technology that can be interrupted by geomagnetic storms, also known as solar winds. Undetected solar winds could affect satellites, the electric grid, astronauts, all aviation sectors, and our telecommunications infrastructure on Earth. NASA plans to place some already-built Earth-pointing instruments on the spacecraft for environmental monitoring; these instruments and the spacecraft are being refurbished with NOAA funds.

22. For FY 2014, NOAA is requesting $824 million for the Joint Polar Satellite System and $954 million for the Geostationary System-R. Both of these programs required significant funding in FY 2012. Did both of these programs receive significant funding in FY 2013 and how much for each? Is this funding for R&D, construction, launching, or actual use of the satellite? What will be the total construction, launch, maintenance, and use of each of the NOAA satellite programs?

Answer:

Geostationary Operational Environmental Satellite-R (GOES-R) Series Program

NOAA is developing the GOES-R Series, the next generation operational weather satellite program that will fly in the geostationary orbit starting in FY 2016, when its first satellite in the four-satellite series will be launched. The GOES-R Series Program supports the development, launch and operations of a four-satellite program (GOES-R, S, T, U). It includes funds to develop algorithms and computer programs that will be used to process the GOES-R Series satellite data for use by the National Weather Service. The current total life cycle cost estimate is $10.9 billion, with incremental annual funding through FY 2036, which will be included in the President's Budget requests.

These budget requests will support acquisition of the ground segment (i.e., command and control, antennas, data processing, long-term archive, construction and retrofitting of existing facilities) and the space segment (i.e., 24 instruments in total - six instruments each for four

satellites, spacecraft bus, launch vehicle and launch services for each of the four satellites), and overall program management, systems integration and engineering.

NOAA is responsible for requesting total funding for the program; NASA provides engineering and technical assistance, on a cost-reimbursable basis for its responsibilities under a joint memorandum of understanding.

NOAA and the GOES-R program are still assessing the full impact of FY 2013 funding. An overview of recent President's Budget requests and final appropriations is listed below.

($M)	FY 2010		FY 2011		FY 2012		FY 2013		FY 2014 PB
	PB	Spend Plan	PB	Spend Plan	PB	Spend Plan	PB	Spend Plan	
GOES-R Series Program	737.0	667.5	730.0	662.4	617.4*	615.6	802.0	747.9	954.8

*Does not include the reduction for the Administrative Efficiency Initiative

Joint Polar Satellite System

The JPSS Program supports the development, launch and operations of a two-satellite program (JPSS-1 and JPSS-2), and operations of Suomi NPP.

The JPSS Program includes funds to develop algorithms and computer programs that are being used to process the Suomi-NPP and will be used when the JPSS-1 and -2 satellites are launched so that the National Weather Service can ingest the data into their numerical weather prediction models. The current total life cycle cost estimate of the JPSS Program is $11.3 billion with incremental annual funding through FY 2025, which will be included in President's Budget requests.

These budget requests will support acquisition of the ground segment (i.e., command and control, antennas, data processing, long-term archive, construction and retrofitting of existing facilities) and the space segment (i.e., 14 instruments in total - six instruments for Suomi NPP; the TSIS Calibration Transfer Experiment (TCTE) mission, ~~five~~ four instruments for JPSS-1, and four instruments for JPSS-2, spacecraft bus, launch vehicle and services for JPSS-1 and -2), and overall program management, systems integration and engineering.

NOAA is responsible for requesting total funding for the program and, has partnered with NASA to implement the JPSS Program, on a cost-reimbursable basis, using its space acquisition and engineering expertise and acquisition authority. As the program manager, NOAA sets the requirements for the program which are provided to NASA to implement, NOAA is responsible for total program budgets, interface with foreign partners, interaction with the user community in preparation for post-launch operational use of the data for weather forecasting and environmental monitoring.

NOAA and the JPSS program are still assessing the full impact of FY 2013 funding. An overview of recent President's Budget requests and final appropriations is listed below.

($M)	FY 2011		FY 2012		FY 2013		FY 2014 PB
	PB	Spend Plan	PB	Spend Plan	PB	Spend Plan	
JPSS Program	1,060.8	471.9	1,070.0*	924.0	916.4	821.2	824.0

*Does not include the reduction for the Administrative Efficiency Initiative

23. What is the average lifespan of a NOAA satellite (and in particular, the JPSS satellite)?

Answer:
NOAA constantly monitors its operational satellites to ensure that the mission critical instruments continue to provide the data required to support weather forecasting. In some instances, a satellite lasts longer than its design life, and in other instances it fails before its design life.

The JPSS-1 and JPSS-2 satellites are being built for a seven year design life. This is longer than the Suomi National Polar-orbiting Partnership (Suomi NPP), which was built for a five year design life. The Polar-orbiting Operational Environmental Satellite (POES) was built for a five year design life.

On average, the Geostationary Operational Environmental Satellite (GOES) -R Series satellites are being built for a ten year operational life and five year on-orbit storage. This is longer than the current GOES-N Series satellites that were built for a five year design life.

24. What is the Polar Free Flyer and why is this a new request this year?

Answer:
The FY 2014 President's budget request proposes transferring $62 million from the Joint Polar Satellite System (JPSS), previously requested for funding the JPSS Free Flyer project, to form the Polar Free Flyer (PFF) program outside of the JPSS Program. The decision to focus the JPSS program and budget on its critical weather mission necessitated a transfer of any instruments and management that were not primary weather functions out of the JPSS funding profile to a new PPA, titled PFF. The PFF program and the data it will provide remains critical for other NOAA missions, including environmental and climate monitoring, data collection services, and search and rescue.

The PFF consists of the costs to procure the Free Flyer-1 spacecraft, launch services, and the costs to accommodate the following instruments onto the spacecraft bus:

- Total and Spectral Solar Irradiance Sensor-1 (TSIS-1),
- Advanced Data Collection System-1 (ADCS-1),
- Search and Rescue Satellite Aided Tracking-1 (SARSAT-1), and
- Advanced Data Collection System-2 (ADCS-2) on a to-be-determined spacecraft

The Polar Free Flyer Program will also support operations and the necessary refresh of ground segment equipment to receive data, and will include launch services as part of a ride-share arrangement.

25. Your testimony mentions a joint NOAA/NASA Suomi National Polar-orbiting Partnership satellite. Was this totally funded by NOAA and if so what was the total cost of this satellite? If not, what other agencies provided funding? How does the Suomi polar satellite differ from the Polar Orbiting Systems (POES) and the joint Polar Satellite System (JPSS)?

Answer:
The Suomi NPP satellite was the result of a partnership among NOAA, NASA, and the Department of Defense (DoD) and was a risk reduction mission for the now-terminated National Polar-orbiting Operational Environmental Satellite System (NPOESS). Each of these agencies provided funds and resources that resulted in the development and successful launch of the Suomi NPP satellite.

The Suomi NPP satellite has six instruments onboard[6]. NOAA and DoD shared the cost of developing and acquiring three of the instruments (VIIRS, CrIS, OMPS-Nadir); NOAA, DoD and NASA shared in the development of one instrument (OMPS-Limb); NASA and NOAA shared in the development of one instrument (CERES); and NASA fully funded one instrument (ATMS). NOAA and DoD shared the cost of developing and deploying the ground system infrastructure and data processing algorithms, and NASA provided the spacecraft bus, and launch vehicle and services.

With the development challenges that led to launch delays, and the eventual termination of the NPOESS program, NOAA determined that it had to use Suomi NPP data operationally even though it had been developed as a risk reduction mission; Suomi NPP serves as a precursor satellite for the JPSS satellites that are currently being developed.

Subsequent to the launch of Suomi NPP in October 2011, NOAA has been providing the majority of the funding to operate the satellite, support the ground system infrastructure, and data processing, access, and long-term archiving.

The Suomi NPP will provide enhancements and continuity of some of the instruments that are currently flying on NOAA Polar-orbiting Operational Environmental satellites (POES).

[6] Visible/Infrared Imager/Radiometer Suite (VIIRS); Crosstrack Infrared Sounder (CrIS); Advanced Technology Microwave Sounder (ATMS); Ozone Mapper Profiler Suite (OMPS)-Nadir; OMPS-Limb; and Clouds and Earth's Radiant Energy System (CERES).

However, the instruments on the Suomi NPP will provide advanced capabilities and higher spatial and spectral resolution than the POES instruments. Some of the measurements that NOAA POES is currently providing are not continued by Suomi-NPP, nor will they be continued by JPSS-1 and -2 when it is launched.

The table below summarizes the funding arrangements of the polar-orbiting satellites that NOAA currently uses and is developing to provide data continuity:

	NOAA POES	**EUMETSAT Metop A, B, C**	**Suomi-NPP**	**JPSS-1**	**JPSS-2**
Instruments					
Imager (Advanced Very High Resolution Radiometer (AVHRR)) (Visible/Infrared Imager/Radiometer Suite (VIIRS)	AVHRR (100% NOAA funding)	AVHRR (100% NOAA funding)	VIIRS (50:50 NOAA and DoD funding)	VIIRS Initial funding (50:50 NOAA and DoD under NPOESS) Since FY 2011, 100% NOAA funding	VIIRS (100% NOAA funding)
Microwave Soundings (Advanced Microwave Sounding Unit (AMSU)) (Microwave Humidity Sounder (MHS)) (Advanced Technology Microwave Sounder (ATMS))	AMSU-A1, AMSU-A2 (AMSU: 100% NOAA funding) and MHS (100% EUMETSAT funding)	AMSU-A1, AMSU-A2 (AMSU: 100% NOAA funding)	ATMS (100% NASA funding)	ATMS Initial funding (50:50 NOAA and DoD under NPOESS) Since FY 2011, 100% NOAA funding	ATMS (100% NOAA funding)
Infrared Soundings (High Resolution Infrared Radiation Sounder (HIRS)) (Crosstrack Infrared Sounder)	HIRS (100% NOAA funding)	HIRS - on Metop A&B only (100% NOAA funding)	CrIS (50:50 NOAA and DoD funding)	CrIS Initial funding (50:50 NOAA and DoD under NPOESS) Since FY	CrIS (100% NOAA funding)

					2011, 100% NOAA funding	
	Stratospheric Ozone (Solar Backscatter Ultraviolet (SBUV)) (Ozone Mapping Profiler Suite – Nadir/Limb (OMPS-N/L))	SBUV/2 (100% NOAA funding)		OMPS Limb (50:50 NOAA and DoD funding, minor NASA funding) OMPS Nadir (50:50 NOAA and DoD funding)	OMPS Nadir only Initial funding (50:50 NOAA and DoD under NPOESS) Since FY 2011, 100% NOAA funding	OMPS Nadir only (100% NOAA funding). OMPS Limb will be transferred to NASA.
	Earth Radiation Budget	Derived from AVHRR & HIRS (100% NOAA funding)		CERES (Approx. 70:30 NASA and NOAA funding)	CERES (100% NOAA funding)	Transferred to NASA
	Space Weather (Space Environment Monitor (SEM))	SEM (100% NOAA funding)	SEM (100% NOAA funding)	-	-	-
	Search and Rescue suite (Search And Rescue Satellite Aided Tracking (SARSAT))	SARSAT (100% French Space Agency and Canadian Defence funding)	SARSAT - on Metop A&B only (100% French Space Agency and Canadian Defence funding)	-	Transferred to PFF	
	Advanced Data Collection System (ADCS)	DCS (100% French Space Agency funding)		-	Transferred to PFF	Transferred to PFF

Launch Services	100% NOAA funding	100% EUMETSAT funding	100% NASA funding	100% NOAA funding	100% NOAA funding
Spacecraft bus	100% NOAA funding	100% EUMETSAT funding	100% NASA funding	100% NOAA funding	100% NOAA funding
Ground System (IT Security, algorithms, command and control)	100% NOAA funding	US components supported by NOAA POES infrastructure	100% NOAA funding	100% NOAA funding	100% NOAA funding
Data Processing for weather forecasting	100% NOAA funding	US product processing supported by NOAA POES infrastructure	100% NOAA funding	100% NOAA funding	100% NOAA funding
Long-term Archiving	100% NOAA funding	NOAA pays for US archiving	100% NOAA funding	100% NOAA funding	100% NOAA funding

Instrument Acronym list:

NOAA-19		**Suomi-NPP / JPSS**	
AVHRR	Advanced Very High Resolution Radiometer	ATMS	Advanced Technology Microwave Sounder
A-DCS	Advanced Data Collection System (note: CNES-provided instrument)	CERES	Clouds and Earth's Radiant Energy System
AMSU-A1	Advanced Microwave Sounding Unit – A1	CrIS	Cross-track Infrared Sounder
AMSU-A2	Advanced Microwave Sounding Unit – A2	OMPS-Nadir	Ozone Mapping and Profiler Suite-Nadir
HIRS	High-resolution Infrared Radiation Sounder	OMPS-Limb	Ozone Mapping and Profiler Suite-Limb
MHS	Microwave Humidity Sounder (note: EUMETSAT-provided instrument)	VIIRS	Visible Infrared Imager Radiometer Suite
SARSAT	Search and Rescue suite (note: CNES and Canadian Defense provided instruments)		

SBU/V	Solar Backscatter Ultraviolet Radiometer
SEM	Space Environment Monitor

26a. How many agencies use the information from these satellites or have sensor equipment on these satellites? Do any other agencies which are using the information from these satellites provide funding for the construction or operations of the satellites?

Answer:
Data and products that have been developed from NOAA satellite data are widely used throughout Federal Agencies. Since the primary mission of these satellites is for weather forecasting, we know that any agency that depends on weather forecasts to implement its mission, or is affected by severe weather, uses data or products that are derived from NOAA satellites. NOAA makes its data fully and freely available to users who apply these data and derived products to support their various missions.

The use of environmental data is assessed using the U.S. Group on Earth Observations (USGEO) construct of Societal Benefit Areas (SBA). The agencies noted are illustrative of those that have stated dependence on access to NOAA GOES and/or POES data to generate products and services in order to meet their mission goals:

Societal Benefit Areas (SBA)	Agencies
• Agriculture and Forestry	U.S. Department of Agriculture (USDA); Department of the Interior (DOI): U.S. Geological Survey (USGS)
• Biodiversity	USGS; National Aeronautics and Space Administration (NASA); USDA: National Park Service (NPS), U.S. Forest Service (USFS); Smithsonian Institutions (SI)
• Climate	NOAA, U.S. Global Change Research Program (USGCRP), National Science Foundation (NSF), Environmental Protection Agency (EPA), NASA, USDA, Department of Energy (DOE); Department of Transportation (DOT)
• Disaster	NOAA; USGS; NASA; DOE; NSF; EPA; Department of Defense: U.S. Army Corps of Engineers (USACE), National Guard; Department of State (DOS): U.S. Agency for International Development (USAID); Department of Homeland Security (DHS): Federal Emergency Management Agency (FEMA), U.S. Coast Guard (USCG).
• Ecosystems	USGS, EPA, NSF, NASA, USDA, DOI
• Energy and Earth Resources	DOE, USGS, NOAA, USDA, NASA, DoD/USACE
• Human Health	Department of Health and Human Services (HHS): Centers

	for Disease Control (CDC), National Institutes of Health (NIH); EPA, NASA, NOAA, USGS
• Ocean and Coastal Resources	NOAA, DOI; DHS; DoD; HHS; DOT; DOE; USDA; Department of Labor (DOL); EPA; NASA; NSF
• Transportation	DOT; NOAA; DHS: USCG; DoD: USACE, U.S. Navy.
• Space Weather	NOAA/OFCM, USGS, DOE, USGS, NASA, DOS, DoD: U.S. Air Force (USAF), Naval Research Laboratory (NRL).
• Water Resources	USDA; DOI: USGS; DoD: USACE; NASA
• Weather	NOAA; DoD

NOAA's operational polar-orbiting and geostationary satellites are used within each and every Societal Benefit Areas listed above. The Office of Science and Technology Policy is leading and interagency working group to examine the benefits these SBA accrue from NOAA satellite data and will publish a report in 2013. Illustrative examples of the use of NOAA satellite data for specific SBAs and their associated Federal agencies include:

Agriculture and Forestry: includes missions of 1) Sustainable Agricultural with functions which include Global and National Crop Monitoring; Soil and Water Conservation, Water Supply Monitoring, and Disaster Response and Mitigation and 2) Sustainable Forestry.

The US Department of Agriculture (USDA) is the primary Agency for this SBA and uses NOAA satellite data in support of:

- Domestic monitoring of the forests and wildland health
    - NOAA makes specific wildland fire products available to the Interagency Fire Center which uses this information to detect and monitor the onset and spread of wildland fires.
    - Data from NOAA's satellites are incorporated in various drought monitoring products that are used by land management agencies to mitigate some of the impacts of longterm drought conditions on farms and ranches.
- Within the federal government's interagency wildland fire management and response team, U.S. Department of the Interior's U.S. Geological Survey (USGS) and Bureau of Land Management mission to manage federal lands, rivers, and reservoirs, and wildlife.
- A global dataset at 1 km resolution has been used by USDA to monitor foreign crop yields.
    - U.S. Department of State and U.S. Agency for International Development, in collaboration with USGS, and NASA use NOAA global data to monitor food security through the Famine Early Warning System worldwide, especially in the Horn of Africa.
        - The United Nations Environment Programme utilizes these data for its global environmental and climate monitoring programs, especially the advance and retreat of the Sahara/Sahel margins.

- **Transportation SBA:** includes all land (road & rail), air and marine transportation uses of satellite data for safety, planning, operations and maintenance, and to maximize efficiency for the systems. U.S. Department of Transportation is the primary Federal agency for this SBA and uses NOAA data in support of safe aviation, maritime, and surface transportation.
    - The Federal Aviation Administration (FAA) uses the satellite-derived products from NOAA satellites in advance of and during severe storms, such as hurricanes, thunderstorms and winter cyclones. In addition to using the information in-flight, the FAA uses the weather information to determine if flights should be re-routed in anticipation of severe weather at the flight's final destination.
    - FAA mandates carriage of Emergency Locator Transmitters (ELT) on United States commercial and general aviation aircraft, and the U.S. Coast Guard mandates the same on ships. NOAA currently has over 53,000 ELTs in its registration database. The SARSAT U.S. Mission Control Center, which is located at the NOAA Satellite Operations Facility (NSOF) in Suitland, Maryland, collects information when an ELT is activated and forwards the information to the appropriate U.S. Rescue Coordination Center. The ELT alerts are currently received and relayed through the POES satellites. The Department of Defense (DoD) also makes wide use of the SARSAT Program.

- **Weather and Disaster** This SBA cross-cuts numerous agencies including NOAA, U.S. Department of Homeland Security (Federal Emergency Management Agency (FEMA); U.S. Coast Guard), DoD (Uniformed Services, U.S. Army Corps of Engineers).
    - NOAA provides severe storm forecasts and warnings in advance of hurricanes, tornadoes, nor'easters to protect life and property from harm.
    - FEMA uses weather data that is derived from NOAA satellites. FEMA monitors the three day and beyond forecasts in advance of severe weather to determine what kinds of relief supplies need to be placed for the greatest effectiveness in advance of a landfalling hurricane.
    - In addition to Federal users, data from NOAA's satellites are widely used by State and local governments, emergency management, and relief agencies and organizations. The private sector and private weather organizations, such as The Weather Channel, Accuweather, and other specialized weather services also make extensive use of these data in order to deliver accurate information to their customers.

In addition, all services of the DoD use data from NOAA's satellites to support their operations and full and open access to NOAA satellite data and products allows military planners and tactical users to focus on anticipating atmospheric and space environmental conditions.

- For example, Air Force Weather Agency requires accurate wind and temperature forecasts for any decision to launch an aircraft that will need mid-flight refueling or conditions that could affect mission success either en-route or at the target site.
- The U.S. Navy uses NOAA satellite data to support its global operational weather forecast models and ocean modeling activities to meet its mission requirements.
- The Naval Ice Center (NAVICECEN), DoD's component of the National Ice Center (NIC), uses data from NOAA's POES and the Jason-2 satellite to detect sea ice conditions. The NIC

is a partnership among NOAA, U.S. Navy, and U.S. Coast Guard and supports the mission requirements of the partners.

- Observed data are sparse in polar regions, and satellite data are essential for locating the position of the marginal ice zone and pack ice location that affect U.S. Navy operations in those regions, especially decisions that affect the safety of surface and submarine assets.
- Throughout all DoD branches, there are over 130,000 emergency beacons of various types; Emergency Position Indicating Radio Beacons or EPIRBs, ELTs, and Personal Locator Beacons or PLBs. NOAA SARSAT provides the collection and distribution of alerts from these devices to appropriate U.S. Rescue Coordination Centers or in some cases, to a specific DoD organization.

Question 26b: How many agencies have sensor equipment on these satellites?

Answer:
The following descriptions provide the arrangements for hosting non-NOAA sensors on NOAA satellites.

Geostationary satellites

For the current GOES-N Series satellites and next generation GOES-R Series, NOAA is responsible for acquiring all sensors and data collection and relay instruments.

Polar-orbiting satellites

For the current polar-orbiting satellites, of the nine instruments on NOAA POES, seven instruments were procured by NOAA, and two instruments (SARSAT and DCS) are built and provided by French Space Agency (CNES) and the Canadian Department of Defence.

For the Suomi NPP, of the six instruments, NASA developed one instrument (ATMS); NOAA and DoD and NASA shared in the development of one instrument (OMPS-Limb); NASA and NOAA shared in the development of one instrument (CERES); while NOAA and DoD jointly shared in the development of the remaining three instruments (VIIRS, CrIS, OMPS-Nadir). There were no French or Canadian instruments developed for Suomi NPP.

For the JPSS-1 and JPSS-2 satellites, NOAA will be responsible for total funding of the nine instruments that will fly on these two spacecraft. For JPSS-1, NOAA will provide funding for: VIIRS, CrIS, ATMS, OMPS-Nadir, CERES). For JPSS-2, NOAA will provide total funding for : VIIRS, CrIS, ATMS, OMPS-Nadir.

Conversely, NOAA has provided 11 U.S.-built instruments (which will fly on three Metop satellites) to Europe's operational weather satellite agency, EUMETSAT, which provide data in the mid-morning orbit that are used by the NWS in its numerical weather prediction models. EUMETSAT's future operational polar-orbiting satellites will only carry European instruments

and will not carry any U.S.-built instruments. By providing the instruments to EUMETSAT, NOAA achieves cost avoidance of millions of dollars by not having to procure a spacecraft bus and pay for launch services to launch these instruments.

Polar Free Flyer Program

The French Space Agency (CNES) will build the A-DCS instruments; the SARSAT instrument is being built by CNES and the Canadian Defence.

Ocean Altimetry

On the Jason-3 satellite, of the five instruments being developed, NOAA is responsible for procuring three of the instruments: the Advanced Microwave Radiometer (AMR), Laser Reflector Array, and the GPS Payload receiver; and the launch vehicle and launch services. The Europeans are responsible for procuring the spacecraft bus and developing the remaining two instruments, the Poseidon-3 Radar Altimeter, and the Doris Tracking Receiver.

Solar Winds

For the DSCOVR mission, NASA had already built the spacecraft and instruments. NOAA is funding refurbishment of the spacecraft bus and the space weather instruments and the Plasma sensor and Magnetometer suite (Plas-Mag) sensors that will measure solar winds, while NASA is responsible for refurbishing the Earth-sensing instruments. The U.S. Air Force is responsible for procuring the launch vehicle and launch services.

Question 26c: Do any other agencies which are using the information from these satellites provide funding for the construction or operations of the satellites?

Answer:
NOAA does not require payment for access to its satellite data nor does it require funds from other agencies to support development. NOAA has arrangements with foreign space programs to share marginal costs for collecting and acquiring data from specific satellites.

Other than the French Space Agency and the Canadian Department of Defence, which build and provide the SARSAT and DCS instruments, no other agency provides funding for the construction or operations of NOAA's satellites. These arrangements are based on long-standing international cooperation versus an exchange of instruments for access to data.

NOAA has had a full and open data policy for many years which is implemented pursuant to the Office of Management and Budget's (OMB's) Circular No. A-130 and the Management of Federal Information Resources and is reflected in the National Space Policy. This policy allows NOAA to widely distribute its products and services to support its public safety and global environmental monitoring mission.

27. NOAA received $111 million for a "weather satellite data mitigation gap reserve fund" in the Sandy Disaster Assistance Supplemental Appropriations bill. This sounds suspiciously like a slush fund for NOAA weather satellite activities outside the regular appropriations process. Did NOAA request this money? If so, why? What is NOAA using this money for?

Answer:
In October 2012, NOAA commissioned an independent study to examine alternative measures that could be taken to mitigate impacts to National Weather Service forecasts and warnings in the event of a gap in polar satellite data. This funding in the Sandy Disaster Assistance Supplemental will enable NOAA to implement a majority of the activities recommended in this study, thereby reducing the Nation's vulnerability to a potential gap in vital polar-orbiting satellite data by investing in weather forecast products and services that mitigate the effects from the potential gap. Additionally, these services will improve weather forecasting even if the polar data gap does not occur. These activities fall into three general categories. First, NOAA will expand the use of existing and planned sources of data, including aircraft observations and satellite data. Secondly, NOAA will improve the use of existing data in our weather models through increased high performance computing capacity and new techniques for data assimilation. Finally, NOAA will leverage partnerships within the U.S. government, internationally, and with the research and operational weather forecasting communities to accelerate implementation of advances in weather forecasting capabilities.

28. The budget chart for the National Ocean Service was modified for fiscal year 2014 to show fewer budget line items. Can you confirm that the lack of a line item, for example for mapping and charting base and shoreline mapping, does not mean these items will go unfunded? Can you also provide information on how the line items that were shown in the fiscal year 2013 budget will be funded under in fiscal year 2014?

Answer: The restructuring of the NOS budget line items does not have programmatic implications. Programs and activities in the base continue to be included in the Budget unless modified by proposed program changes. The following table crosswalks the line item structure in the 2013 request to the proposed new structure for 2014.

Current PPA	Proposed PPA
Mapping & Charting Base	Navigation, Observations and Positioning
Hydrographic Research & Technology Development	Navigation, Observations and Positioning
Electronic Navigational Charts	Navigation, Observations and Positioning
Shoreline Mapping	Navigation, Observations and Positioning
Address Survey Backlog / Contracts	Hydrographic Survey Priorities / Contracts
Geodesy Base	Navigation, Observations and Positioning
National Height Modernization	Navigation, Observations and Positioning
Tide & Current Data Base	Navigation, Observations and Positioning
IOOS Regional Observations	IOOS Regional Observations

NOAA IOOS	Navigation, Observations and Positioning
Coastal Storms	Coastal Zone Management and Services
Coastal Services Center	Coastal Zone Management and Services
Coral Reef Program	Coral Reef Program
Response and Restoration Base	Coastal Science, Assessment, Response, and Restoration
Estuary Restoration Program	Coastal Science, Assessment, Response, and Restoration
Marine Debris	Coastal Science, Assessment, Response, and Restoration
National Centers for Coastal Ocean Science	Coastal Science, Assessment, Response, and Restoration
Competitive Research	Competitive Research
CZM Grants	Coastal Management Grants
CZM and Stewardship	Coastal Zone Management and Services
Regional Ocean Partnership Grants	Coastal Management Grants
National Estuarine Research Reserve System	National Estuarine Research Reserve System - NERRS
Marine Protected Areas	Sanctuaries and Marine Protected Areas
Marine Sanctuary Program Base	Sanctuaries and Marine Protected Areas

29. Constituents continually tell the Committee that mapping and charting funding for contract services are underfunded and underutilized by NOAA. The Hydrographic Service Review Panel recommended NOAA maintain its necessary operational core activities and contract the remainder of surveys. NOAA accepted and implemented this recommendation. Can you provide the Committee with what NOAA considers to be core activities for it hydrographic survey operations? Can you also provide the same information for shore line mapping, aerial surveys and any other activities that are shared between NOAA and outside contractors?

Answer:
NOAA recognizes that qualified commercial sources provide competent, professional, and cost-effective ocean and coastal mapping services and expertise to NOAA in support of its diverse mapping missions. NOAA utilizes contract services frequently and will rely greatly on contract services to carry out its work. At the same time, NOAA needs to maintain its own mapping capabilities to meet statutory core mission requirements and to build expertise that is critical to overseeing activities like contracting for hydrographic and shoreline mapping surveys. NOAA may determine that a particular ocean and coastal mapping activity is inherently governmental or otherwise not subject to contracting. NOAA clarified its policy in response to the Omnibus Public Land Management Act of 2009, and this policy was reviewed and approved by the Hydrographic Service Review Panel (HSRP). NOAA published the final policy in the Federal Register in January 2010 (see https://federalregister.gov/a/2010-564). Specifically, NOAA ocean and coastal mapping activities not subject to contracting may include, but are not limited to, services necessary to: (1) Monitor the quality of NOAA products; (2) promulgate and

promote national and international technical standards and specifications; (3) conduct basic research and development and ensure the rapid transfer of derived technologies to the private sector; and (4) maintain the integrity and accuracy of Federal geodetic, navigational, and other databases.

To carry out the services outlined above, NOAA continually seeks to foster the training and education of a new generation of hydrographers and ocean and coastal mapping scientists. Through surveys using NOAA assets, such as hydrographic vessels, aircraft, and survey equipment, NOAA hydrographers and surveying personnel are able to encounter a wide variety of geographic conditions that dictate survey protocols specific to each region. Personnel build upon this expertise and ultimately become expert hydrographers, nautical cartographers, and surveyors able to effectively and efficiently manage the national mapping and charting programs. These experiences also enable entry-level surveying and mapping technicians to develop the competencies needed to become organizational and international leaders in the field of hydrography. In addition, through collaboration such as NOAA's partnership with the University of New Hampshire's Joint Hydrographic Center, NOAA develops and evaluates a wide range of state-of-the-art hydrographic and ocean and coastal mapping technologies and applications to improve both NOAA's mapping products and processes as well as operational capability for both NOAA and contract surveyors.

30. Can NOAA provide the committee with information on the time it takes for hydrographic survey contractors to get a NOAA contract and the time it takes to renew a contract? Provide the committee with specific time frames of contracts it has approved.

Answer:
NOAA awards hydrographic survey task orders annually using 5-year contracts awarded to multiple firms. New 5-year contracts are now being competed as the current contracts' terms end. In April 2013, NOAA posted a Request For Quotes (RFQ) to FedBizOps and expects 5-year contracts to be awarded to qualifying firms in early 2014. As an example of contract award timing, in FY 2012 NOAA needed between 14 to 60 days to award 7 task orders, from initial entry of contract information into NOAA's contracting system until task order award with a "notice to proceed" to the contractor. Task orders were awarded between March 22 and June 13. Although the official task order award timeframe is 60 days, the timeline does not begin until funds are allotted to Coast Survey.

31. The Hydrographic Services Review Panel recommended a new cost comparison report comparing NOAA and outside contractor costs. The concerns with the completed report are it uses estimates and not actual costs. What is hindering a new cost comparison study between NOAA's fleet of ships and planes and outside contractors to get a more accurate depiction of costs?

Answer:
Per HSRP recommendations, OMB requested a study as part of the FY 2010 budget formulation process to compare the cost and efficiency of NOAA's hydrographic surveys with contract

surveys. The NOAA report to OMB in January 2010 was based on actual costs of surveys conducted from 2006-2009, and later updated to include actual costs and results from the 2010 survey season. The comparison found that the relative cost per unit of data between NOAA and contract surveys varied from year to year depending on factors such as total days at sea for NOAA hydrographic vessels (more days at sea and greater survey area lowers cost per unit area because the fixed costs of maintaining the fleet and personnel are spread over a larger survey area) and the geographical features of survey areas assigned to task orders (for example, deeper water generally requires lower costs per unit area). The cost of NOAA surveys is also affected by the addition of functions beyond data hydrographic collection such as developing the organization's hydrographic expertise, research and development, and support for ancillary missions such as collecting data for other NOAA programs, which improve the overall cost effectiveness of the cruises for NOAA.

The full study itself was developed as part of confidential pre-decisional budget deliberations and therefore is not publically available.

32. How much funding does NOAA put toward supporting digital coast activities in fiscal year 2014? Since there isn't a specific line item for this activity, is the 2014 funding level consistent with past funding, an increase or decrease?

Answer:
NOAA estimates directing $1.16 million of the Coastal Services Center's (CSC) total base budget toward Digital Coast activities in FY 2014. In the 2014 request, CSC programs are requested under the Coastal Zone Management and Services line item. This represents roughly a 25% increase from NOAA's FY 2012 investment to account for the development and delivery of new, enhanced, or expanded products and services, while continuing to provide quick and easy access to existing geospatial data, tools, training, and other services to inform coastal decision-making. This increase reflects a growing demand for applications of the Digital Coast, which surpassed expectations in both FY12 and FY13.

33. What activities will be funded with the increase of $11 million for the Sea Grant program?

Answer:
Overall, the FY 2014 request for the National Sea Grant College Program is $72.7 million. This is an increase of $9.7 million from the FY 2014 base level. This increase is composed of several increases and decreases outlined below.

<u>Changes to National Sea Grant College Program Base</u>

- Increase for Resilient Coastal Communities: NOAA requests $4.5 million to fund resilient coastline research projects which will be selected through a proposal-driven, competitive process at the state, regional, and national levels. Competitive projects will focus on research that successfully and directly assists coastal communities. Specific areas of competitive research will include: marine-related energy sources and efficiency, wise use of water resources, climate change adaptation, coastal processes studies,

resilience from natural hazards, technology development, and resilient coastal businesses and industries, including fisheries and tourism.

- Decrease for STEM Education Consolidation: NOAA requests a total decrease of $4 million for National Sea Grant STEM education programs, which entails a decrease of $0.8 million for the NMFS/Sea Grant Fellowship, $0.8 million for state Sea Grant STEM activities (including K-12), and $2.4 million for the Dean John A. Knauss Marine Policy Fellowship.

Increase for Marine Aquaculture Research

- NOAA requests an increase of $221,000 to enhance Sea Grant's support of national grant competitions for marine aquaculture research and technology transfer.
- Sea Grant facilitates the transfer of aquaculture research and technology into business operations and informs the public and practitioners about key issues and information related to aquaculture.

Aquatic Invasive Species Termination

- NOAA requests a decrease of approximately $1.0 million for the elimination of the national research and outreach competition for Aquatic Invasive Species, given the Environmental Protection Agency's more significant efforts on this issue. The individual state Sea Grant programs support some invasive species research in response to local, state, and regional issues and this research is expected to continue. Additionally, NOAA's current tools, technologies, and information services to control invasive species will be maintained.

Increase for Grand Challenge

- NOAA requests an increase of $10 million to sponsor a Grand Challenge with the overarching goal of revealing the unknown ocean while reducing overall costs and freeing up existing ship time. This initiative will be administered through the National Sea Grant College Program.
- The vision of this challenge will be to foster scientific and technological innovation in ocean mapping and observations in order to increase the rate of discovering new species, ecosystems, energy sources, seafloor features, pharmaceutical products, and artifacts, as well as improve understanding of the role oceans play in our weather and climate.
- NOAA is taking the unique opportunity to capitalize on innovative, prize-based solutions to bring industry and other partners' expertise to the agency to dramatically increase our technical abilities well beyond the value of the investment.

34. What activities will be funded with the increase of $5 million for the ocean exploration and research line item?

Answer:

The request for the Office of Ocean Exploration and Research (OER) consists of three program changes, which taken together form a net increase of $5.2 million for OER:

- A $10.1 million increase to expand NOAA's ocean exploration ability through enhanced competitive extramural awards and ocean mapping
- A $4 million decrease to terminate the National Undersea Research Program (NURP) (Please note, the proposal to terminate NURP was accepted as part of the FY 2013 appropriation. This additional request in the FY 2014 President's Request is due to the budget being delivered to Congress in advance of a final appropriation bill in FY 2013.)
- A $0.9 million decrease as part of the Administration's STEM education reorganization plan, which will consolidate most STEM funds into the Department of Education, National Science Foundation, and Smithsonian.

<u>Ocean Exploration Increase</u>

- NOAA requests an increase of $10,070,000 to continue NOAA's unique mission of ocean exploration and mapping, and to engage a broad spectrum of stakeholders.

- This program change will:

    - Increase grants and other extramural funding for ocean exploration. This includes: assessments and characterizations of unknown and poorly known ocean areas and phenomena; locating and assessing historically important submerged cultural resources such as shipwrecks; the development of advanced undersea technologies focused on accelerating the pace and efficiency of ocean exploration; and conducting focused exploration on targets identified in the potential U.S. Extended Continental Shelf (ECS).
    - Enable OER to perform more ECS mapping expeditions, pursuing the following areas of interest: the Arctic, Pacific, Gulf of Alaska, Palmyra Atoll/ Kingman Reef (between Hawaii and American Samoa), Necker Ridge (between Hawaii and the Midway Island). OER will also enhance ECS assessment and analysis efforts to better determine the potential extension of the U.S. continental shelf according to internationally recognized criteria as established in Article 76, United Nations Convention on the Law of the Sea.
    - Expand the systematic telepresence-enabled program, including expeditions conducted with partners using the NOAA Ship Okeanos Explorer, as well as the Exploration Vessel Nautilus through a Joint Program Agreement with the Ocean Exploration Trust.

35. Your statement references an increase of $34.5 million for ocean observations. Can you provide the committee with what this increase will go toward?

Answer:
The $34.5 million amount refers to the total NOAA request for Regional IOOS Observations, not any particular program increase. This amount includes $24.5 million for grants to IOOS regional associations to operate and maintain regional networks of observing infrastructure and $10

million for the Marine Sensor Innovation grant program to develop and make operational improved marine sensors. These activities are described in greater detail in NOAA's FY 2014 Congressional budget justification.

36. The National Ocean Policy Implementation Plan also advocates for the reactivation of the National Marine Sanctuary Site Evaluation List. The Plan also states that "This list is a public process tool for evaluating marine areas that may be considered for national marine sanctuaries in a transparent and public way." Yet at the same time, a proposed rule has been published that would do an end run on the Site Evaluation List and allow NOAA to create sanctuaries based on recommendations from anyone and without any criteria and without concern for the availability of funding - as required under the current Act. Please explain the thinking behind these two proposals.

Answer:
Among the proposed technical revisions of National Marine Sanctuaries regulations (RIN 0648-AV85), NOAA is proposing to remove the requirement that a site must be on the Site Evaluation List (SEL) for NOAA to evaluate it for potential designation as a national marine sanctuary. This change would only affect NOAA's ability to evaluate, but not designate, new sites. This change would allow NOAA to be responsive to external stakeholders proposing new sites for consideration as marine sanctuaries regardless of the status of the SEL. Under the proposed rule, any new site designation would continue to require further evaluation in a separate public process under the National Marine Sanctuaries Act.

37. The Implementation Plan includes actions such as completing "a marine fish habitat assessment" which sounds great, but if it takes funding away from other existing priorities such as stock surveys and assessments, you are going to further alienate commercial and recreational fishermen. As we have discussed at previous hearings, the data collection activities conducted by NOAA are inadequate and those inadequacies are having a negative economic effect on our coastal communities. Meeting these new National Ocean Policy "action" requirements is likely to take staff and funding away from current activities and will further erode our data collection abilities – and further hurt coastal communities. Please provide for the Committee a list of all action items in the Implementation Plan which would be NOAA's responsibility to implement and an estimate of the costs involved and where those funds will come from.

Answer:
NOAA, like all National Ocean Council Agencies, has a number of existing programs and resources committed to ocean related management activities, missions, and objectives under existing authorizations or other legislation. The National Ocean Policy does not detract from existing funding commitments or mandated directives. Rather it helps to better focus and leverage these existing, limited resources and allows for more efficient use of taxpayer dollars by improving coordination and collaboration, and identifying clear priorities and associated actions.

In 2014, NOAA is responsible for some aspect of 37 actions in the National Ocean Policy Implementation Plan. These may be found by reference in the Implementation Plan's Technical

Appendix. In keeping with the intent of the Policy as described above, each of these actions are encompassed within the existing mission and budget of its home program.

38. Section 6(b) of Executive Order 13547 that established the National Ocean Policy in July 2010 requires "[e]ach executive department, agency, and office that is required to take actions under this order shall prepare and make publicly available an annual report including a concise description of actions taken by the agency in the previous calendar year to implement the order, a description of written comments by persons or organizations regarding the agency's compliance with this order, and the agency's response to such comments." Pursuant to this requirement, has NOAA prepared ay such reports for calendar years 2010, 2011, or 2012? If so, please describe the findings and contents of such reports, and provide copies to the Committee within 10 days. If not, why has NOAA not complied with this provision of the Executive Order?

Answer:
To date, no report has been issued pursuant to Executive Order 13547, as the emphasis has been on developing the Implementation Plan, which was significantly revised in response to public input. The Plan will be in large part the benchmark from which agencies will provide progress updates that will be incorporated into a single Council annual report.

39. The Northeast Regional Planning Body has already been established and met a couple of times, and the National Ocean Council has designated NOAA as the federal lead for it. NOAA apparently is responsible for providing resources and support to that effort. Can you tell us how much money and staff NOAA has already had to devote to setting up and hosting meetings of the Northeast Regional Planning Body? Have any outside groups provided funding for these meetings? If so, provide the name of the organization, the amount of funding provided, the uses of that outside funding, and the statutory authority that allows for the co-mingling of public and private funding for meetings convened by federal agencies.

Answer:
As designated Federal Co-Lead for the Northeast region, NOAA has dedicated part of one federal employee's time to serve as Co-Lead and one full-time contractor to serve as the Executive Secretariat. The Northeast Regional Planning Body has met twice, once in November 2012 and again in April 2013.

For the November meeting, NOAA provided $9,000 in travel support, including $6,000 of invitational travel for State and Tribal representatives and $3,000 for NOAA employees. For the April meeting, NOAA provided $2,027 in travel support for regional NOAA employees. Additional support for travel and the meeting was provided by other federal agencies and entities like the Udall Foundation, and Northeast Regional Ocean Council.

Other than travel monies, no NOAA funds were used to support marine planning workshops in the NE region.

40. Do you know who is paying for participants (both federal and non-federal) to travel to attend meetings of the regional planning bodies? Is this coming from NOAA, other agencies, or states or outside groups?

Answer:
)NOAA provided travel assistance for State and Tribal Regional Planning Body members for the November 2012 meeting in the Northeast but only provided support for NOAA employees to attend the April 2013 meetings in the Northeast and Mid-Atlantic.

41. It appears that a group called the Meridian Institute was involved in facilitating some of these regional planning meetings. Do you know how much the Meridian Institute is being paid, and is this coming from NOAA's budget? Please provide detailed information.

Answer:
NOAA did not contract with the Meridian Institute for meeting facilitation so the contract did not utilize NOAA funding. The facilitation contracting was conducted by the U.S. Institute for Environmental Conflict Resolution, a program of the Udall Foundation, an independent federal agency.

42. Do you see any conflict of interest in having the Meridian Institute facilitate these meetings and workshops when they have themselves submitted comments on the draft implementation plan last year and have been vocal supporters of the National Ocean Policy?

Answer:
No, the Udall Foundation selected the Meridian Institute to facilitate the Northeast Regional Planning Body (RPB) meetings based on their own contracting criteria. Meridian has demonstrated experience facilitating and organizing large, complicated events which include challenging and complex issues among a variety of stakeholders.

43. An invitation-only meeting - apparently co-hosted by the Mid-Atlantic Regional Ocean Planning Workshop and Federal agencies - was recently held to advance ocean planning in the Mid-Atlantic region. Did NOAA provide any funding for this meeting? Are you aware that 41 Federal employees attended this meeting? Please provide the Committee with the amount NOAA provided for this meeting and what travel and/or lodging costs were paid for NOAA employees to attend.

Answer:
The Mid-Atlantic Regional Ocean Council (MARCO), a state led partnership, organized and hosted a stakeholder workshop on April 4-5, 2013. This workshop was an initial step which enabled government entities and stakeholders to develop a common understanding and dialogue about regional ocean planning, and how it can assist the Mid-Atlantic region in establishing shared goals for the use and conservation of its ocean resources. NOAA provided approximately $3,000 in materials support for the meeting and provided $775 in travel support for one NOAA

employee to attend the meeting. An additional three, local, NOAA employees also attended at no cost.

Questions for the record for Chairman Hastings (R-WA)

44. One of the issues that came up at the budget hearing for the Bureau of Reclamation on Tuesday was its practice of including money in surveys sent to gauge public awareness or support for Bureau projects. Please provide a list of all surveys issued by NOAA or any of its sub-agencies in FY 2012 and to date in FY 2013 that used financial incentives as an inducement to respond to the survey instrument. For all such surveys, please describe the total cost of the financial incentives for each survey instrument, as well as the amount, kind, and frequency of financial incentive offered to each respondent. For surveys administered by a third-party vendor, please also identify the contractor and provide the total dollar amount of the contract under which the survey was performed and explain whether the costs associated with the financial incentives were included in the total contract amount.

Answer:
Below is a list of NMFS surveys that used incentives for FY 2012-2013:

1. Mixed-Mode Dual Frame Survey of Fishing Effort (NMFS)
Instrument name: Weather and Outdoor Activity Survey
Contractor: Abt Associates (Abt SRBI)
Cost of incentives: $75,920
Total contract cost (including incentives): $2,032,184
Description: A $1.00 cash incentive (a dollar bill) was included in the initial survey mailing that was sent to each sampled household. The survey was conducted for a total of 6 reference periods. Incentives were included in the final three reference periods. Including an incentive increased response rates by 10-12%.
OMB PRA Clearance No.: 0648-0052

2. MRIP Fishing Effort Survey (NMFS)
Instrument names: Weather and Outdoor Activity Survey/Saltwater Fishing Survey
Contractor: Westat
Cost of incentives: $365,214
Total contract cost (including incentives): $2,330,921
Description: Initial 2 reference periods included an experiment to test the effect of different levels of cash incentives ($0, $1, $2, $5) on survey response, measurement and cost. The incentive was included in the initial survey mailing that is sent to each sampled household. Testing demonstrated that incentives significantly increase response rates, the $1 and $2 incentives actually decrease total data collection costs by minimizing the required number of survey mailings, and the $2 incentive is optimal in terms of cost and response rates. Subsequent reference periods (6 periods in 2013) include a $2 incentive.
OMB PRA Clearance No.: 0648-0652

3. Survey Name: AK Saltwater Sport Fishing Economic Survey (NMFS)
Contractor: ICF
Cost of Incentive: $4,600
Total Contract Cost (including incentive): $55,000
Description: $1.00 cash incentive included in initial survey mailing
OMB PRA Clearance No.: 0648-0639

4. Survey Name: California Signage Plan (NOS)
Contractor: Randi Korn and Associates, Inc.
Cost of Incentive: $200
Total Contract Cost (including incentive): $25,174
Description: Raffle among respondents for 4 $50 amazon gift cards.
OMB PRA Clearance No.: 0648-0653

45. At the budget hearing, I asked Mr. Schwaab if NOAA Fisheries had reviewed the Nez Perce Tribe's study on the Johnson Creek hatchery that challenges the theory that hatchery and "wild" fish should not interact (see: http://www.critfc.org/press/new-science-shows-that-hatcheries-rebuild-abundant-salmon-populations/). Please provide NOAA's written views on this significant scientific study and how NOAA intends to integrate this new science in the Columbia River.

Answer:
Late in 2012, the Nez Perce tribe completed the first phase of a research program investigating hatchery effects on the reproductive fitness of naturally spawning hatchery-origin spring Chinook salmon. This Johnson Creek study adds a valuable data point to what we know about effects from hatchery breeding and rearing on hatchery-fish fitness relative to the fitness of natural-origin fish. There were and continue to be criticisms over the exclusion of certain data from the analysis, but in general, the methodology is consistent with other similar studies and the results are similar as well.

In brief, this study shows that in the first generation, there is only a modest reduction in hatchery-fish reproductive fitness compared to natural-origin fish. For females, the difference was non-significant. The study does not address long-term demographic or genetic effects.

Overall, this study adds value to what we know about effects from hatchery breeding and rearing on hatchery-fish fitness relative to the fitness of natural-origin fish, but it does not support a universal shift or change in the practice of limiting hatchery fish on the spawning grounds. The conservation practice of allowing hatchery fish to spawn naturally and supplement natural-origin fish must be evaluated based on site-specific circumstances while weighing the potential near-term demographic benefits against risks to the natural-origin population that may accrue over time and over multiple generations. We support continuation of this and other studies and look forward to future results.

46. As you know, the National Marine Fisheries Service has listed 28 sub-populations of salmon and steelhead as threatened or endangered under the Endangered Species Act, including 13 populations in the Columbia and Snake Rivers. More than a decade ago, in 2002, NOAA released "interim" numerical goals for salmon in the Columbia and Snake basins. Has NOAA ever finalized the numerical goals by subbasin for listed Columbia and Snake basins? If so, please provide this information. If not, please state NOAA's plans for finalizing numerical goals for listed salmon runs in the Columbia Basin.

Answer:
To provide the technical basis for de-listing goals in Endangered Species Act (ESA) recovery plans for salmon and steelhead, NMFS Northwest Region appointed Technical Recovery Teams, including the Interior Columbia and Willamette-Lower Columbia Technical Recovery Teams. The Teams developed numerical targets for population abundance and productivity, guidelines for population spatial structure and diversity, and guidelines for how many and which populations within an Evolutionary Significant Unit or Distinct Population Segment needed to be recovered for the Evolutionary Significant Unit or Distinct Population Segment itself to be considered no longer threatened or endangered. These "viability criteria" provided the basis for ESA de-listing criteria incorporated into NMFS ESA recovery plans for salmon and steelhead. The Technical Recovery Teams' viability criteria recommendations are available on the following website: http://www.nwfsc.noaa.gov/trt/domains.cfm.

NMFS has completed recovery plans, including de-listing goals, for Upper Columbia River spring Chinook salmon and steelhead, Middle Columbia River steelhead, and Upper Willamette River spring Chinook and steelhead, Lower Columbia River Chinook and coho salmon, Columbia River chum salmon, and Lower Columbia River steelhead. These plans are available on the Northwest Region's website: http://www.nwr.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation.

NMFS is working with state and tribal co-managers, other federal agencies, and local stakeholders in Oregon, Washington, and Idaho to develop a proposed recovery plan for four ESA-listed Snake River species: spring/summer Chinook salmon, fall Chinook salmon, sockeye salmon, and steelhead. We intend to publish a notice in the Federal Register announcing the availability of the proposed plan for public review and comment in early 2014. As with the above mentioned recovery plans, the Technical Recovery Team's viability criteria for Snake River salmon and steelhead will serve as the basis for the de-listing criteria being developed for the Snake River recovery plan.

47. Please provide the most recent statistics for commercial, recreational, and tribal harvest exploitation for ESA-listed Columbia and Snake River salmon by population. Are these sanctioned by the current FCRPS Biological Opinion?

Answer:

The following table compares the authorized exploitation rate limits for Treaty Indian and non-Indian fisheries for ESA-listed Columbia and Snake River salmon and steelhead for 2012 with post season estimates. The non-Indian fisheries include both the recreational and commercial components. The exploitation rate limits were set in the Biological Opinion on the 2008-2017 U.S. v. Oregon Agreement and were then assumed as part of the FCRPS analysis. The exploitation rates are therefore consistent with those considered in the FCRPS Biological Opinion. With the exception of Lower Columbia River tule Chinook and Snake River sockeye salmon, actual impacts were lower than the allowable limits for all populations. Lower Columbia River tule Chinook are harvested primarily in ocean and in-river fisheries below Bonneville Dam. The overage on sockeye occurred in the Treaty Indian fishery that occurs above Bonneville Dam. Additional actions are being taken in 2013 to provide greater assurance that the standards will be met.

2012	Treaty Indian Impact			Non-Indian Impact			Total Impact		Comments
ESA Listed Group	**Limit**	**Actual**		**Limit**	**Actual**		**Limit**	**Actual**	
Snake River spring/ summer Chinook	9.1%	9.3%		1.9%	1.3%		11.0%	10.6%	Limit varies depending on abundance
Upper Columbia River spring Chinook	9.1%	9.3%		1.9%	1.2%		11.0%	10.5%	Limit varies depending on abundance
Willamette River spring Chinook	--	--		15.0%	7.8%		15.0%	7.8%	Includes ocean and in-river fisheries
Lower Columbia River tule Chinook	--	--		38.0% [1]	44.5%		38.0%	44.5%	Limit varies depending on abundance
Snake River Fall Chinook	30.0%	20.5%		15.0%	14.1%		45.0%	34.6%	Limit varies depending on abundance
Lower Columbia River Coho	--	--		15.0%	13.5%		15.0%	13.5%	Limit varies depending on abundance
Columbia River Chum	--	--		5.0%	0.1%		5.0%	0.1%	
Snake River Sockeye	7.0%	8.7%		1.0%	1.0%		8.0%	9.7%	Limit varies depending on abundance
A-Run Snake River Steelhead	--	--		4.0%	3.0%				Limit on non-treaty fisheries
B-Run Snake River Steelhead[2]	15.0%	13.5%		4.0%	2.1%				Limit varies depending on abundance
Upper Columbia River steelhead	--	--		4.0%	3.1%				Limit on non-treaty fisheries
Mid Columbia River Steelhead	--	--		6.0%	3.4%				Limit on non-treaty fisheries
Lower Columbia River Steelhead	--	--		6.0%	1.1%				Limit on non-treaty fisheries
Upper Willamette River steelhead	--	--		2.0%	0.5%				Limit on non-treaty fisheries
1/ Combined exploitation rate for ocean and in-river mainstem fisheries that occur below Bonneville Dam. 2012 limit reduced from 41% to 38% due to post season reduction in estimate of abundance									
2/Group B impacts from non-Indian and treaty Indian fisheries are non-additive. Non-Indian impacts based on natural origin (wild) fish, treaty Indian impacts based on total B-Run (hatchery and wild)									

48. On April 30, 2013, the National Academy of Sciences issued a 126-page report titled "Assessing Risks to Endangered and Threatened Species from Pesticides." The report states that the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, as agencies responsible for implementing the Endangered Species Act, have no formal protocols to define "best data available," and that this leads to conflicts with the Environmental Protection Agency and a lack of credibility of the Services' assessments relating to pesticides and listed species. In addition, the report indicates that the Services have not adequately evaluated data input in to their own models that significantly alters the outcome as to how pesticides might impact species. The report also states that the Services' models do not now, but should measure survival impacts of pesticides to entire populations of species, not just the survival impact of a single species. And, the report notes that the Services' current risk assessments are not scientifically defensible to

assess risks to listed species posed by pesticides. Given these significant findings by a neutral scientific panel, will NOAA re-initiate consultation on its biological opinions for pesticides?

Answer:
NMFS is reviewing the National Academy of Sciences report in close coordination with the U.S. Fish and Wildlife Service, U.S. Department of Agriculture, and U.S. Environmental Protection Agency. The four agencies are preparing a joint implementation plan. We are in general agreement with most, of the report recommendations. For example, we agree with the report recommendation to conduct population modeling when appropriate data are available.

The report supports our approach to Endangered Species Act, Section 7 consultation on the Environmental Protection Agency's registration of pesticides including incorporation of mixtures, relevant monitoring data, sublethal effects, and indirect effects into our analyses. We determined that conclusions and recommendations in the report do not contradict our jeopardy conclusions in past or current pesticide biological opinions. Therefore, we do not anticipate re-initiating consultation for existing pesticide biological opinions.

49. Recently, the Pacific Fishery Management Council and the Governor of American Samoa and others wrote to NOAA in opposition to its proposed November 2012 listing of 66 separate coral species on the Endangered Species Act. I understand that the listing proposal is connected to NOAA's negotiation of a stipulated settlement in 2011 with the Center for Biological Diversity, and filed in the federal District Court for the Northern District of California. Please provide a copy of the stipulated settlement for the Committee to be able to review the terms and provisions of that settlement. Please also provide all data that supports that each of the coral species is declining and warrants a listing.

Answer: A copy of the settlement agreement is attached.

The rationale for the proposal to list 66 corals under the Endangered Species Act (ESA) is provided in the proposed listing rule published on December 7, 2012, in the Federal Register Notice, and in the supporting documentation (Status Review Report, Management Report, and Supplemental Information Report). The proposed rule, the three reports, and related documents are available at: http://www.nmfs.noaa.gov/stories/2012/11/82corals.html.

ESA listing determinations take into consideration the current status of the species, as well as the projected status of the species over the foreseeable future. Many factors contribute to the current and projected status of a species, including distribution, abundance, habitat condition, threats, and management. The proposed listing rule and supporting documents cited above include all information on the factors considered for the proposal to list 66 corals under the ESA.

A public comment period on the proposed listing was open for 120 days from December 7, 2012 to April 6, 2013, during which 19 public hearings were held in Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, American Samoa, Florida, Puerto Rico, the U.S. Virgin Islands, and Washington DC. Nearly 1,400 unique public comments were received,

including new data on the status of the proposed species. NMFS is in the process of analyzing the public comments for application to the final listing decision. The public comments are available at:
http://www.regulations.gov/#!docketBrowser;rpp=25;po=0;D=NOAA-NMFS-2010-0036.

Together, the proposed rule and supporting documents, plus the public comments, all of which are available at the above two websites, provide the information currently available to NMFS with regard to the status of the 66 coral species proposed for listing. NMFS will use all of this information to develop the final listing decision.

50. Recently, NOAA determined to separate the Atlantic sturgeon into 5 "distinct population segments" and listed them under the Endangered Species Act. Recent information suggests that Atlantic sturgeon are at our impressive levels. Please provide numerical goals set by NOAA at the time of listing for each of these distinct population segments and the number NOAA determines is needed for them to be removed from the ESA list.

Answer:
Listing determinations under the Endangered Species Act (ESA) must be made based on the best scientific and commercial data available. The Atlantic sturgeon listing determination was based primarily on an analysis of the ongoing and future threats to the species as there were no overall population estimates available for any of the Atlantic sturgeon populations. In the listing determination, NMFS used the only available estimates, which were of spawning adults in the Hudson and Altamaha Rivers, and these estimates indicated that these populations were quite low (867 total adults in the Hudson and 343 spawning adults per year in the Altamaha).

Since the listing, NMFS has been working on deriving more comprehensive population estimates for use in recovery planning, in ESA section 7 consultations and section 10 permitting. Recovery planning will identify recovery goals, including the number of Atlantic sturgeon and the level of threat reduction needed to recover each distinct population segment. The recovery planning process involves stakeholders in determining what constitutes a recovered population and what recovery actions need to be undertaken to achieve the recovery objectives. It is important to note the population estimates recently derived by NMFS Northeast Fisheries Science Center reflect the total number of Atlantic sturgeon that may be in the ocean from Maine to North Carolina as determined from data derived primarily from bycatch studies. The new estimates are very different from the partial estimates available at the time of listing that represented the number of spawning adults in two particular rivers. The new estimates are still a mere fraction of the number of Atlantic sturgeon that were historically present along the East Coast of North America prior to the collapse in the early 1900s.

An Atlantic States Marine Fisheries Commission stock assessment for Atlantic sturgeon began this past summer 2013 using a range of information, including these new population estimates, to produce a comprehensive and contemporary picture of these stocks. As the new information is incorporated into the stock assessment, the population estimates may be revised and refined. Thus, we are committed to coordinating closely with the Commission in completing the stock

assessment. Ultimately, what we learn from the stock assessment will be used to inform future management actions and to determine if a revision to the status review is warranted. The Commission plans to complete final stock assessment in about a year.

Questions for the record for Congressman Southerland (R-FL)

According to NOAA's budget summary for FY 2013, the budget line for Educational Partnership Program/Minority Serving Institutions (EPP/MSI) ($12.561 million) under the NOAA Education Program was being consolidated with the Competitive Education Grants and Programs (PPA) and then blended into the NOAA Education Base Program ($5.029 million). Now that the FY2014 NOAA budget for FY 2014 has been released, the budget line covering EPP/MSI has no program changes but there is no FY 2014 request, which confirms the consolidation. The Competitive Education Grants and Programs (PPA) has now been renamed to the Office of Education with a request of $16.271 million of which $12.637 million came from the EPP/MSI Program. Whenever funds are blended with other funds, it becomes difficult to ensure funding allocations are being spent as intended, thus protected.

Overall Remarks: We are very appreciative for the interest on the Educational Partnership Program, NOAA's single largest education investment and our most significant effort in increasing participation of underrepresented groups in NOAA mission sciences and in providing a more diverse pool of trained students for the NOAA workforce and the broader oceanic and atmospheric community. While all programs and activities under Office of Education were indeed consolidated under a single line (Office of Education), the intent was to help reduce that large number of PPAs in NOAA budget. However, the funding allocation for each program and activity will be readily available. We are very aware of the continued strong interest of Congress and our constituents for these programs. We are fully committed to maintaining the integrity of these programs and allocating resources to them as the appropriations intends.

In the FY14 President's Budget request, the Office of Education line was indeed $16.271 million. Of this, EPP received a $1.682 million increase for a total of $14.4 million. The remaining $1.871 million was allocated to the Education Initiative (representing a $0.168 million reduction). Competitive Education Grants were zeroed out (a $3.1 million elimination). This information is available on page 6-107 of NOAA's FY2014 Blue Book (http://www.corporateservices.noaa.gov/nbo/fy14_bluebook/FINALnoaaBlueBook_2014_Web_Full.pdf)

51. Since this program impacts 18 different universities and 4 lead institutions to my knowledge, one of which is in my district, I would like to understand why and how this decision was made?

Answer:
The decision to consolidate the Educational Partnership Program (EPP), Competitive Education Grants and Programs, and NOAA Education Base under the Office of Education was made as a part of the Administrations initiative to consolidate STEM programs across the federal government. STEM consolidation proposes a reorganization of federal STEM dollars to focus

on four priority areas; K-12 instruction; undergraduate education; graduate fellowships; and informal education activities. The Administration will ensure that all science mission agencies have input into the development and implementation of these initiatives so that they align with agency goals of improving STEM education and gaining efficiencies across the government.

NOAA will maintain, and still strongly supports, the Educational Partnership Program (EPP). The EPP program has consistently exceeded performance targets for graduating students. Since the program started in 2001, 1376 students, including 150 PhDs, 354 Masters and 872 Bachelors have received degrees in NOAA fields as a direct result of the EPP program. Over 80% of the graduates are from underrepresented groups. The program currently involves over 1,000 students. In addition, EPP support has resulted in our university partners establishing eight new degree programs, attracting 85 new academic faculty (paid with non-NOAA funds) and generating 967 collaborative research projects with NOAA scientists. The program has produced 1,150 peer reviewed publications.

52. Why weren't the lead institutions, who have long and distinguished relationships with NOAA consulted before the decision was made?

Answer:
The Administration developed a government-wide STEM reorganization plan. Federal science mission agencies will continue their inspiring work in STEM by: identifying content, assets, and effective STEM programs that can be used in the classroom; playing an active role in developing and implementing STEM initiatives to ensure they align with agency and national goals; and coordinating with Department of Education, National Science Foundation, the Smithsonian to ensure broad use of agency expertise, assets and effective approaches to STEM education.

53. How much is currently in the account for EPP/MSI?

Answer: The FY13 enacted amount for EPP is $13.041 million (after the rescission and sequestration cuts) and the FY14 President's Budget request is $14.4 million.

54. How can I be assured that the integrity of EPP/MSI will be upheld?

Answer:
NOAA is fully committed to the continued success of the Educational Partnership Program. We have always honored congressional appropriations' intent regarding funding for the program and are fully committed to continue to do so in the future. The FY14 President's Budget Request included an increase of $1.682 million, indicating the program's importance.

<u>Questions for the record for Mr. Markey (D-MA)</u>

55. During the hearing, Representative Bordallo asked about the limited enforcement capacity to address I.U.U. fishing. Mr. Eric Schwaab responded that I.U.U. was an important issue, and there was a modest investment in the enforcement program as well as for observation and

monitoring. We would further ask whether the additional authorities provided by the proposed bill, H.R. 69, would help NOAA stretch its dollars further to address this problem.

Answer:
This legislation acknowledges the challenges of illegal, unreported and unregulated fish and fish product entering the global markets including the United States. The magnitude of the global illegal, unreported and unregulated fishing problem poses a significant challenge to the United States as a major seafood importer.

56. A great deal has been said about the National Ocean Policy, and some have conflated it with the existing Regional Ocean Councils created by President George W. Bush and administered by NOAA. Can you please briefly describe the ways in which these Councils have helped localities and regions, and how this budget proposes to continue that good work?

Answer:
The Regional Ocean Partnerships began to form in 2004, with the Gulf of Mexico Alliance as the first state driven, regional partnership. Also in 2004, the bi-partisan U.S. Commission on Ocean Policy recommended a regional approach to better understand and work on ocean and coastal issues. The Bush Administration's subsequent U.S. Ocean Action Plan supported this voluntary approach. Within the next four years, the Northeast, West Coast and Mid Atlantic also formed state driven partnerships adding to the existing efforts in the Gulf and Great Lakes. Since the Regional Ocean Partnership grant program was established, the Caribbean, South Atlantic and Pacific Islands created state-led partnerships as well. Coordination on a regional scale enables states and communities to leverage shared knowledge, efforts, and resources to more efficiently and effectively address coastal challenges and national priorities.

Regional Ocean Partnerships (ROP) provide a number of benefits to the regions, states, and communities they represent. Working together allows states to share lessons and leverage each other's work in order to be more efficient and effective, leveraging expertise and funding across a region and speaking with one voice on national policies with regional impact. Funding in FY 2014 is requested to continue to support the competitive grant program that has allowed the ROPs to move forward on ocean issues.

Through the Regional Ocean Partnerships program, regions have achieved a wide variety of successes that are helping to ensure an economically and ecologically sound future for the regions and the Nation. Below are some accomplishments of the various regions based on funding provided in previous fiscal years;

- **Alaska** – The Seward Association for the Advancement of Marine Science, representing the Alaska Ocean Observing System, was awarded $760,000 to develop stakeholder driven visualization and decision-support tools for Alaska and the U.S. Arctic for a range of ocean and coastal uses.
- **Northeast Region** – The Association of U.S. Delegates to the Gulf of Maine Council, representing the Northeast Regional Ocean Council (NROC), was awarded a total of

$1,545,000 for the development of a first-stage regional ocean plan supporting ecosystem-based management of New England's marine environment and its human uses and to expand partnerships and public participation in NROC activities. Additionally the NROC received funding from the Department of the Interior's U.S. Geological Survey to acquire and process topographic data needed to update shorelines and ultimately, provide states and localities with information to strengthen coastal community resilience to storms and rising sea levels.

- **Mid-Atlantic Region** – The Mid-Atlantic Regional Council on the Ocean (MARCO) is supported by a total of $1,569,000, including an award to Monmouth University to enhance MARCO's online Mapping and Planning Portal and an award to the Coastal States Stewardship Foundation to enable MARCO to better implement its actions and reach out to partners and the public. This tool is designed to address many coastal and ocean resource management challenges by providing common information on existing ocean uses and distribution and abundance of natural resources.
- **South Atlantic** – The South Carolina Sea Grant Consortium, representing the Governors' South Atlantic Alliance, was awarded $276,000 to support continued development of the Regional Information Management System portal and to initiate two pilot-scale efforts to support ocean planning and other information management needs of the alliance.
- **Gulf of Mexico** – The Gulf of Mexico Alliance (GOMA) was awarded $250,000 to support continued coordination of the GOMA Priority Issue Teams for achieving the specific priority objectives, including those concerning water quality and hazards resilience outlined in the Governors' Action Plan II. Accomplishments include projects and efforts on everything from hazards resilience to habitat including the development of a Gulf of Mexico Regional Sediment Management Master Plan to guide more effective management of sediment resources in the Gulf for habitat restoration as well as coastal resilience. In addition, GOMA recently established the GOMA Business Advisory Council to ensure industry-sector participation and advisement in regional environmental initiatives, a connection between policy and applied management decisions.
- **West Coast** – The Smith River Rancheria received $225,000 to build the capacity of West Coast tribes to coordinate at a regional level to engage in ocean governance and to integrate tribal science and ecological knowledge into ocean planning efforts. Additionally The West Coast Governors' Alliance has used funding to complete a West Coast Marine Debris Strategy, launch the West Coast Marine Debris Alliance, and develop a database on marine debris, all of which will aid in planning for and addressing marine debris and its impacts along the west coast.
- **Pacific Islands** – The University of Hawai'i, representing the Pacific Islands region, was awarded $225,000 to continue support for the establishment of the Pacific Regional Ocean Partnership as a governance structure to implement priorities of the Pacific region, as well as the National Ocean Policy, by enhancing the regional capacity for ocean planning.
- **Great Lakes** – The Council of Great Lakes Governors was awarded $275,000 to advance bi-national data exchange and information that supports local decision-

making for adaptive coastal planning and management. Through the ROP grant, the Council is partnering with the Great Lakes Observing System, NOAA and other U.S. and Canadian federal agencies to draft the first-ever cumulative impact assessment of water uses in the Great Lakes-St. Lawrence River Basin and provide the information in an integrated and public tool for enhanced decision making.

The FY 2014 Budget includes a request for $5 million to continue to support of the competitive grant program that fosters these state-led regional approaches to ocean issues ranging from hazards resilience to habitat to marine transportation, as well as emerging challenges such as ocean acidification.

57. NOAA has requested an increase of $11.5 million the Integrated Ocean Observing System. Can you please describe the benefits this System provides to coastal communities and the maritime economy?

Answer:
NOAA leads the implementation and administration of IOOS, a major improvement to ocean observing capability. IOOS draws together the vast network of Federal and non-federal observing systems to fulfill regional, national, and global needs for integrated ocean information. Human populations are continually increasing their interactions with our oceans and coastal waters through economic activity. Continued coastal development, changes in land use, climate change, and changes to ecosystems add complexity of environmental and human stressors. The vision of IOOS is a unified network of Federal and non-federal observing assets, which aid coastal industries and local, regional, and Federal decision-makers in understanding, predicting and responding to these changes.

Users of ocean data, including modelers, researchers, and meteorologists, spend an average of 25–50 percent of their time searching for, accessing, formatting, and ingesting data into their products. By improving the accessibility and interoperability of ocean data, IOOS delivers time and cost savings that can be redirected to research, forecasting and product development. Investments in ocean observation generate significant economic benefits to both NOAA and the Nation. A 2004 study summarized the magnitude of potential economic benefits of deploying a network of ocean observing systems[7]: conservative estimates of benefits estimate that between $100 million and $1 billion in economic growth would be created by an investment in regional ocean observing systems.

58. NOAA's proposed budget would significantly increase funding for fisheries observer programs, but the percentage of fisheries covered would remain largely unchanged. Isn't there a more cost-effective way to do monitoring given the technology we have today? What progress is NOAA making toward incorporating electronic monitoring options for fishermen?

[7] Kite-Powell et al. *Estimating the Economic Benefits of Regional Ocean Observing Systems*, 2004.

Answer:
Current appropriations provide sufficient funds for adequate or near adequate observer coverage in 29 fisheries nationwide, but only pilot or baseline levels of observer coverage in 18 fisheries. Many fisheries are observed at low levels of observer coverage (pilot or baseline) and require additional observer coverage to meet scientific, management, and other monitoring and data collection requirements. The increased funding would allow NMFS to increase observer coverage in existing fisheries and potentially one or two new fisheries.

A critical goal of the agency is to achieve a more cost-effective and sustainable approach to fishery-dependent data collection. In doing so, we want to align our different data requirements with the best of current and emerging data collection methods, including electronic technologies. The agency is currently engaged in a strategic effort with Regional Fishery Management Councils and the fishing industry leading to the adoption of electronic technologies in fishery-dependent data collection programs, most notably the use of electronic monitoring using video cameras and electronic reporting using e-logbooks. This will produce revised monitoring strategies and associated regulations for each of the Regional Fishery Management Councils.

59. Recently, the Fish and Wildlife Service has found that Candidate Conservation Agreements and other cooperative strategies have been effective at protecting vulnerable species without listing them under the Endangered Species Act, especially in situations where there is little data available. Does this budget promote the use of those tools, and will they be considered as options for any of the coral species recently proposed for listing?

Answer:
The Species of Concern Program (http://www.nmfs.noaa.gov/pr/species/concern/), is funded from the Other Protected Species (Marine Fish, Plants, and Invertebrates) budget line. Representatives Sablan, Bordallo, Hanabusa, Faleomavaega, Gabbard, Christensen, Garcia, and Pierluisi requested that NMFS consider developing Candidate Conservation Agreements (CCA) for the 66 proposed coral species as an alternative to listing them under the ESA. As part of the ongoing analysis, we are considering the request, guided by final CCA guidance that was jointly published by NOAA and the U. S. Fish and Wildlife Service in 1999 (64 FR 32726).

Questions for the record for Mr. Runyan (R-NJ)

60. Does NMFS plan on conducting a stock assessment for Summer Flounder this year? It's my understanding that this has been delayed for several years. This is an extremely economically important fish to New Jersey fishermen. The New Jersey fishing industry was crushed by Hurricane Sandy and can't afford another year of uncertainty and abundantly cautious decision making regarding one of its most valuable resources.

Answer:

A benchmark stock assessment for summer flounder was conducted in conjunction with state agencies, academic partners and industry stakeholder. The final results of the stock assessment were presented to the Mid-Atlantic Fishery Management Council during its October 8-10, 2013, meeting in Philadelphia, PA. Stock assessment updates are conducted annually for this stock, with the last update conducted in July 2012.

61. Many believe that excessive litigation has diverted NOAA's already limited resources to defending itself in court as opposed to the actual work of trying to recover species. How much of NOAA's budget is allocated for litigation in FY14' and how much is budgeted for actual species recovery?

Answer:
NOAA's budget does not allocate funding for litigation. However, NOAA's Office of General Counsel does maintain a litigation database. NOAA's General Counsel litigation database does not reflect "total dollars spent on litigation costs" or an amount budgeted each year for litigation. It does track information on attorney's fees and costs that the federal government paid for specific cases in which NMFS was a party.

Litigation fees and costs paid during the timeframe Jan 1, 2011 – May 2013 for cases that have been closed out in the database total $2,836,272. It is important to note that other claims, e.g., National Environmental Policy Act, Marine Mammal Protection Act, or Magnuson-Stevens Fishery Conservation and Management Act may have been raised in the litigation so not all fees paid stem directly from the Endangered Species Act (ESA) claims and other agencies may have also been responsible for a portion of the fees paid.

Regarding budget allocations for species recovery, NMFS budget is not appropriated by ESA activity, and we therefore cannot provide a precise breakdown of funding spent on ESA recovery, although a portion of each Protected Species funding line is spent to recover ESA listed species. Two programs are used exclusively to fund recovery activities: the Species Recovery Grants (FY14 President's Request = $17.8M) and the Pacific Coastal Salmon Recovery Fund (FY14 President's Request = $50.0M).

62. According to NOAA only 27 species that have been designated as threatened, endangered, or depleted are expected to have stable or increasing population levels in FY 13 or 14. In 2012 that number was 29. Can you explain why this number has decreased and do you believe that funds currently being used on litigation can be better used to help increase this number?

Answer:
The number has decreased in part because Atlantic salmon had unexpectedly good returns in 2012 so the species was briefly increasing, but the good returns were not maintained. Also, the status of the breeding colonies of green sea turtles has changed from increasing to mixed (some populations increasing, some populations decreasing). The status of many of NMFS Endangered Species Act-listed species is unknown due to insufficient population trend data to make a status determination.

Questions for the record for Mr. Costa (D-CA)

63. I understand the challenging budgetary conditions through which NOAA must navigate while still fulfilling its mission. With that being said, I have a concern related to the fiscal year 2014 budget before us today. This relates to the staffing for a timely review of the Bay Delta Conservation Plan environmental documents. It is my understanding that the State of California intends to have the draft plan to the federal partners in mid to late May, at which point the timely publishing of the environmental documents will be dependent on sufficient staffing at your agency amongst others. Based on this budget request, will you have the ability to meet the review schedule proposed by the State for the environmental documents?

Answer:
Funding for the NMFS Bay Delta Conservation Plan efforts during the past 4 years for the Central Valley Office in Sacramento has come through an interagency agreement with the California Department of Fish and Wildlife. The agreement funded 7 staff members and expired in 2013.. We are currently working with California Department of Fish and Wildlife and California Department of Water Resources on two separate funding agreements that will enable NMFS' support to continue.

64. As you know, NOAA Fisheries has historically made use of funds provided by other agencies to provide appropriate staffing levels to complete timely review of projects. There are concerns that this may need to occur again in order to review the BDCP in a timely manner. Does NOAA Fisheries anticipate having to acquire funds from any other federal agencies for their work on BDCP?

Answer:
Yes, NMFS believes additional funds will be needed from other state and federal partner agencies to ensure its full participation.

65. If so, what agencies are anticipated to provide funding and is this funding level included in their respective Fiscal Year 2014 budget requests?

Answer:
There are currently discussions ongoing between the U.S. Bureau of Reclamation, California Department of Water Resources, and California Department of Fish and Wildlife to determine the best approach for meeting NMFS critical funding needs for Fiscal Year 2014.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Washington, D.C. 20230
OFFICE OF LEGISLATIVE AFFAIRS

The Honorable Tom Davis
Chairman, Select Bipartisan Committee to
Investigate the Preparation For and Response
To Hurricane Katrina
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

I am enclosing the responses to the questions submitted to the National Oceanic and Atmospheric Administration (NOAA) following the Committee's September 22, 2005 hearing on the forecasting of Hurricane Katrina.

Please contact me if you require any additional information.

Sincerely,

Eric Webster

Eric Webster
Director

Enclosure

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE

SUITE 2320 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6301
(202) 225–6371
TTY: (202) 226–4410
http://www.house.gov/science/welcome.htm

November 7, 2005

Brigadier General David L. Johnson (Ret.)
Assistant Administrator for Weather Services
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
1325 East West Highway
Silver Spring, MD 20910

Dear General Johnson:

On behalf of the Science Committee, I want to express my sincere appreciation for your participation in the October 7, 2005 hearing, *NOAA Hurricane Forecasting.*

I have attached a **verbatim** transcript of the hearing for your review. The Committee's rule pertaining to the printing of transcripts is as follows:

> *The transcripts...shall be published in **verbatim form**, with the material requested for the record, as appropriate. Any requests to correct any errors, other than transcription, shall be appended to the record, and the appropriate place where the change is requested will be footnoted.*

Any corrections, other than errors in transcription, must be submitted in the form of a letter. Transcript edits, if any, should be submitted no later than December 7, 2005.

I am also enclosing questions submitted for the record by Members of the Committee. These are questions that the Members were unable to pursue during the time allotted at the hearing, but felt were important to address as part of the official record. The enclosed questions should be responded to no later than December 7, 2005.

Transcript edits and responses to the enclosed questions should be faxed to Jamie Brown at 202-225-4438 or emailed to jamie.brown@mail.house.gov. If you have any further questions or concerns, please contact Jamie at (202) 225-8844.

Thank you again for your testimony.

Sincerely,

Sherwood L. Boehlert
Chairman

Enclosures: Transcript & Member Questions

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

NOAA Hurricane Forecasting
October 7, 2005
10:00 a.m. to 12:00 p.m.
2318 Rayburn House Office Building

QUESTIONS FOR THE RECORD FOR GENERAL D. L. JOHNSON

1. What are the various notification systems the National Weather Service uses to disseminate weather warnings and information? For each notification system, please explain how Federal, State and local government officials receive the information. For each level of government (Federal, State and local), please explain how the National Weather Service (including its local weather forecast offices) confirms that government officials received emergency messages. Do these procedures change in case of an "incident of national significance" declared by the Department of Homeland Security?

2. For each notification system described in the answer to question one, please explain how often the National Weather Service and its local forecast offices test the systems to make sure they are working. Are the notification systems redundant to such a degree that no significant communications capability would be lost if any one of the notification systems fails to function during a severe weather event?

3. What are NOAA's back-up procedures during severe storms if a radar, buoy, or entire local weather forecast office is destroyed or cannot communicate? Please explain the circumstances that would trigger back-up procedures. Were any back-up procedures triggered during Hurricanes Katrina or Rita? If so, please explain what happened and what NOAA is doing to fix any damage.

4. In your testimony you mentioned that at the end of each hurricane season NOAA leads a "hotwash" to review all of its hurricane procedures with emergency managers and weather forecasters. Please provide the following information about the annual hotwash:

    a. Who from Federal, State, and local government agencies participates in the annual hotwash? Who from the private sector participates? Do you solicit input and/or participation from non-governmental organizations and the public?
    b. What is the process for selecting participants?
    c. What is the process for reviewing and prioritizing recommendations that result from the hotwash?
    d. What is the process for providing resources, if needed, for implementing priority recommendations?

12. NOAA has acknowledged that some hurricane research software still runs on old computers because the software has not been converted to run on newer machines. Are there plans to update the software to run on newer computers? If so, when will that update be completed? If not, why not?

Questions for the Record
Submitted by Democratic Members
Committee on Science
Hearing on: NOAA Hurricane Forecasting

Questions for General Johnson:

1) For hurricane Katrina, the weather forecasting offices that were in the main path of the hurricane were the New Orleans forecast office in Slidell, LA; the Mobile forecast office in Mobile, AL; Jackson, MS; and Lake Charles, LA. For hurricane Rita, Houston, TX and Lake Charles, LA were in the main path of the storm.

According to NOAA's daily Incident Coordination Center reports for Katrina, at least four other local offices were at-the-ready or engaged to provide backup for these offices – Shreveport, LA; Huntsville, AL; Houston, TX; and Tallahassee, FL. For Rita, it appeared to be the Fort Worth, TX WFO acting as the backup office.

The Southern Region Headquarters also provided additional personnel to the local forecast offices, the state emergency operations centers, and coordinated the backup plan and response for the offices in the hurricane path.

It appears NWS met its goal of maintaining continuity of weather forecasting capabilities overall for the affected areas during these hurricanes even as some of the local offices were experiencing communication and other equipment failure problems. It appears NWS had a good internal preparation and response plan.

What is your assessment of the performance of the NWS internal preparation and response plan for these storms? What changes, if any, are you considering to further improve the procedures for maintaining continuous NWS forecasting capabilities during hurricanes? What is the current status of the impacted NOAA offices and equipment damaged by these two storms?

Questions Submitted by Rep. Eddie Bernice Johnson

For General Johnson:

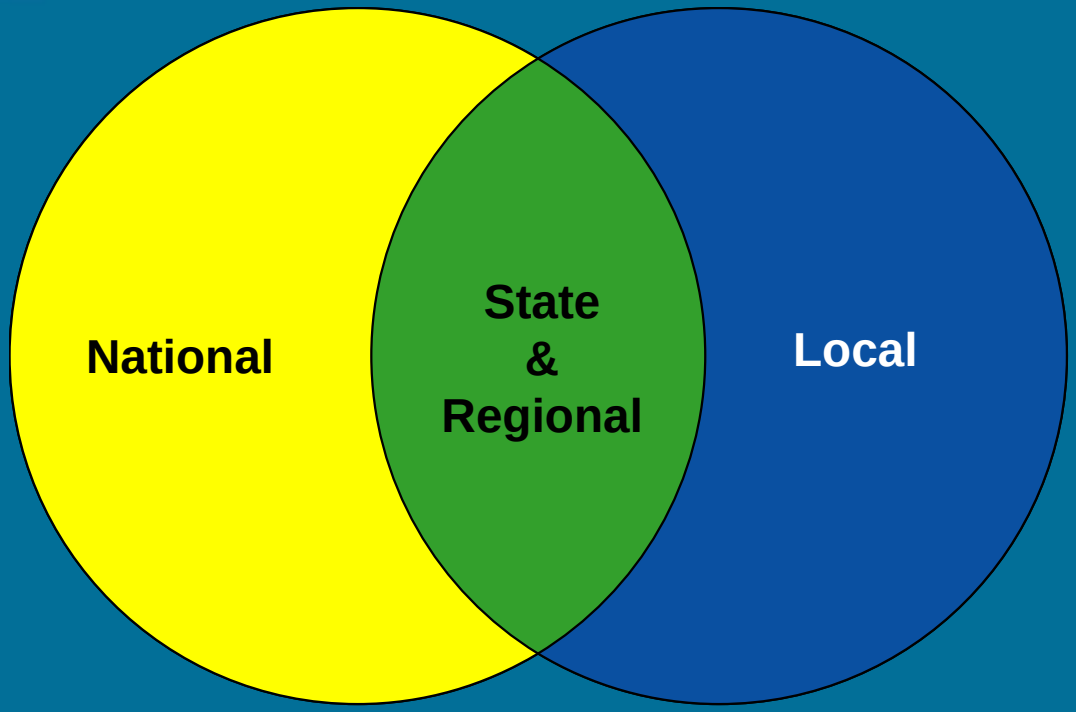
1) What role does NOAA play in providing information to the Army Corps of Engineers regarding the potential and magnitude of flooding and storm surge that would factor into setting construction standards for the New Orleans levee system? How often is this information updated?

National Weather Service Office Products and Services During Katrina

1965 (Betsy)

2005 (Katrina)

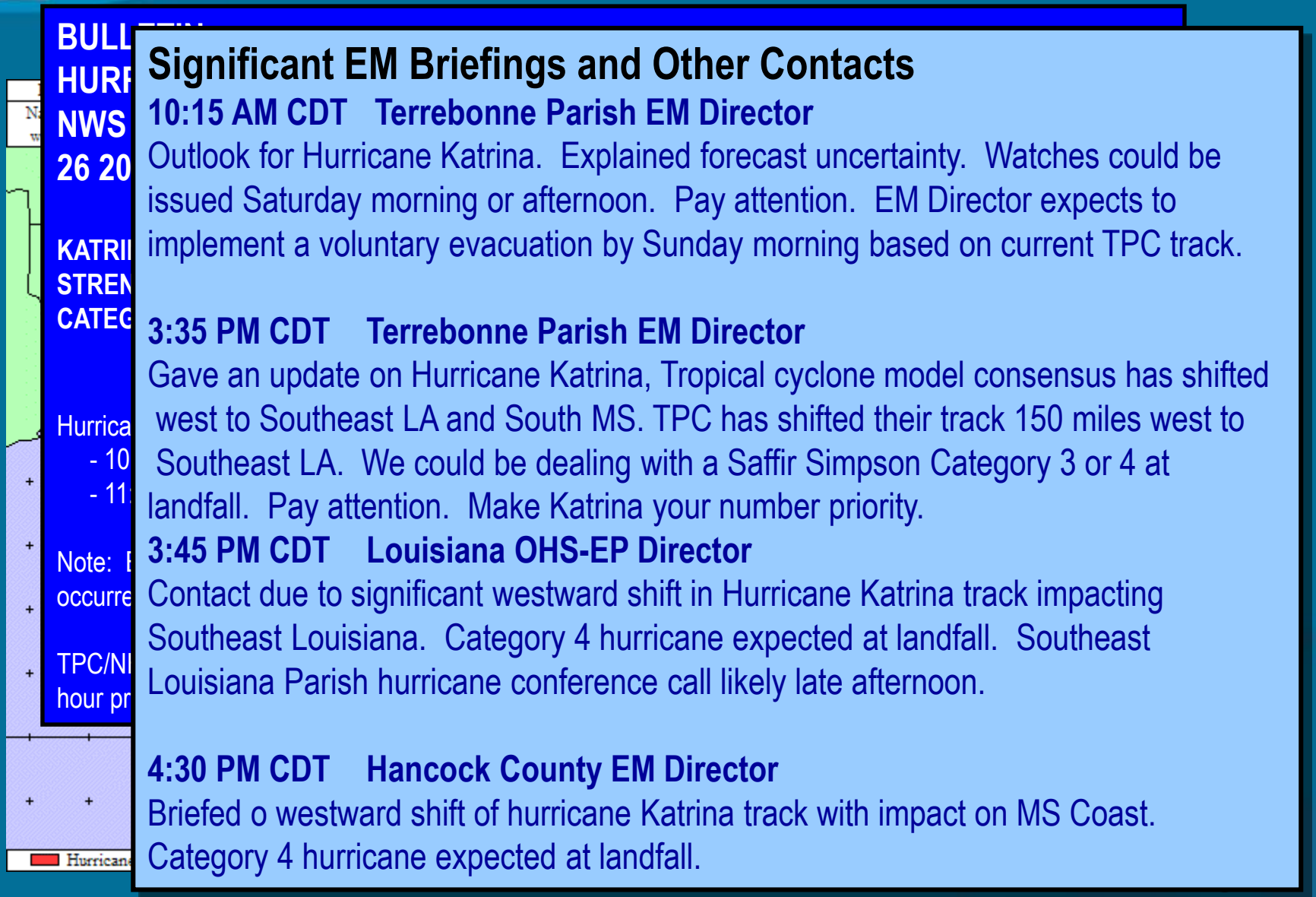
Forecast and Warning Responsibilities



- **Tropical Prediction Center/National Hurricane Center (National)**
  - Full responsibility for the track and intensity forecasts for hurricanes and tropical storms (even inland)
  - All coastal area hurricane watches and warnings.

- **Weather Forecast Office (Local)**
  - Local impacts and interpretation of Hurricane Center watches/warnings/information
  - Inland hurricane and tropical storm watches and warnings
  - Flood/flash flood/tornado watches and warnings associated with tropical systems
  - Communicate with public and primarily local EMs, media.

Advisory 13



Significant EM Briefings and Other Contacts

10:15 AM CDT Terrebonne Parish EM Director

Outlook for Hurricane Katrina. Explained forecast uncertainty. Watches could be issued Saturday morning or afternoon. Pay attention. EM Director expects to implement a voluntary evacuation by Sunday morning based on current TPC track.

3:35 PM CDT Terrebonne Parish EM Director

Gave an update on Hurricane Katrina, Tropical cyclone model consensus has shifted west to Southeast LA and South MS. TPC has shifted their track 150 miles west to Southeast LA. We could be dealing with a Saffir Simpson Category 3 or 4 at landfall. Pay attention. Make Katrina your number priority.

3:45 PM CDT Louisiana OHS-EP Director

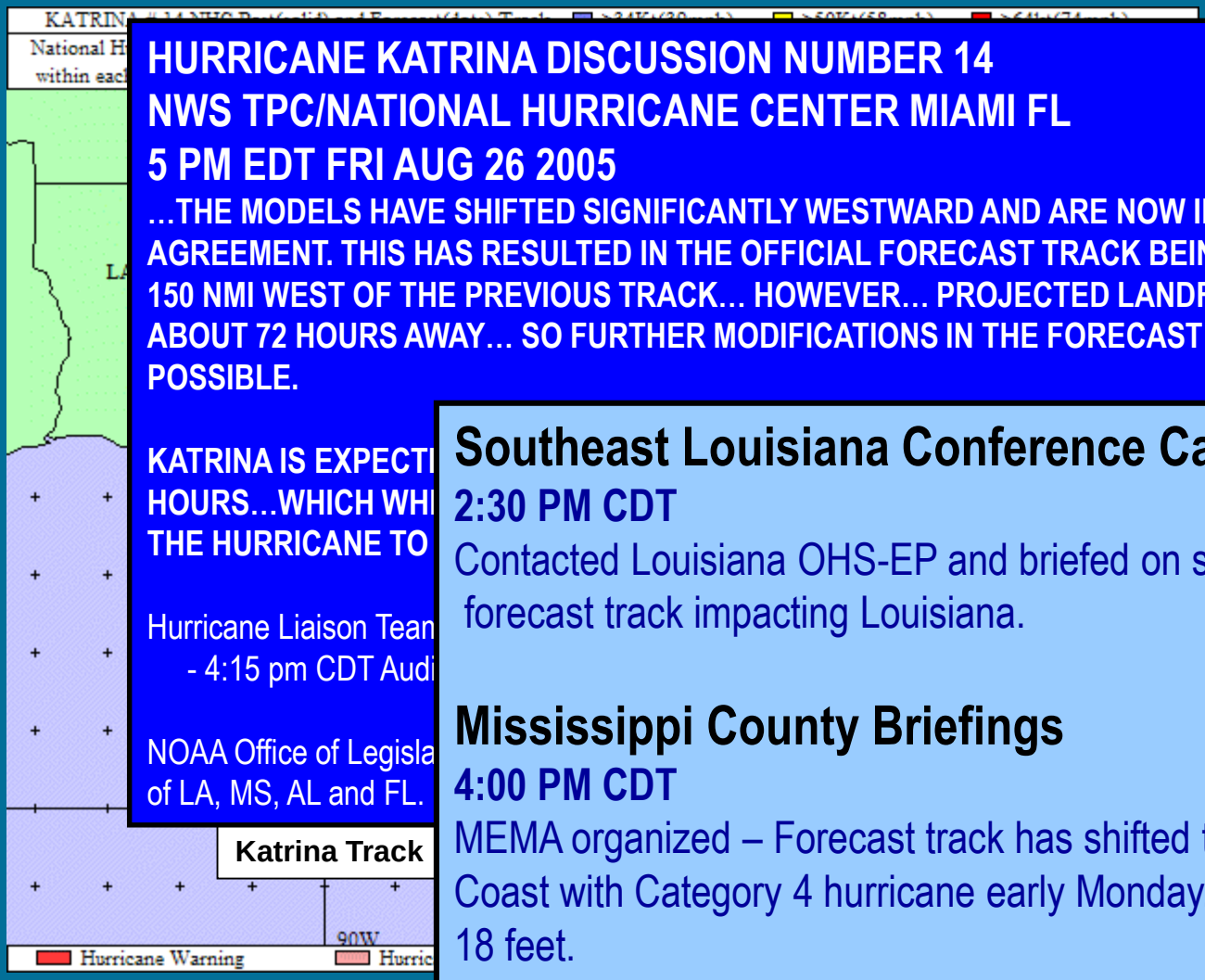
Contact due to significant westward shift in Hurricane Katrina track impacting Southeast Louisiana. Category 4 hurricane expected at landfall. Southeast Louisiana Parish hurricane conference call likely late afternoon.

4:30 PM CDT Hancock County EM Director

Briefed o westward shift of hurricane Katrina track with impact on MS Coast. Category 4 hurricane expected at landfall.

Advisory 14

Friday 08/26/2005 4:00 PM CDT



HURRICANE KATRINA DISCUSSION NUMBER 14
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 PM EDT FRI AUG 26 2005

…THE MODELS HAVE SHIFTED SIGNIFICANTLY WESTWARD AND ARE NOW IN BETTER AGREEMENT. THIS HAS RESULTED IN THE OFFICIAL FORECAST TRACK BEING SHIFTED ABOUT 150 NMI WEST OF THE PREVIOUS TRACK… HOWEVER… PROJECTED LANDFALL IS STILL ABOUT 72 HOURS AWAY… SO FURTHER MODIFICATIONS IN THE FORECAST TRACK ARE POSSIBLE.

KATRINA IS EXPECTI
HOURS…WHICH WHI
THE HURRICANE TO

Hurricane Liaison Tean
- 4:15 pm CDT Audi

NOAA Office of Legisla
of LA, MS, AL and FL.

Southeast Louisiana Conference Calls

2:30 PM CDT

Contacted Louisiana OHS-EP and briefed on significant change in forecast track impacting Louisiana.

Mississippi County Briefings

4:00 PM CDT

MEMA organized – Forecast track has shifted to west impact MS Coast with Category 4 hurricane early Monday. Storm surge 15 to 18 feet.

Advisory 17

Saturday 08/27/2005 10:00 AM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 17
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL 10 AM CDT SAT AUG 27

2005

AT 10 AM CDT...1500Z...A HURRICANE WATCH IS IN EFFECT FOR THE SOUTHEASTERN COAST OF LOUISIANA EAST OF MORGAN CITY TO THE MOUTH OF THE PEARL RIVER...INCLUDING

HE NORTHERN
R THE PROGRESS

RINA COULD

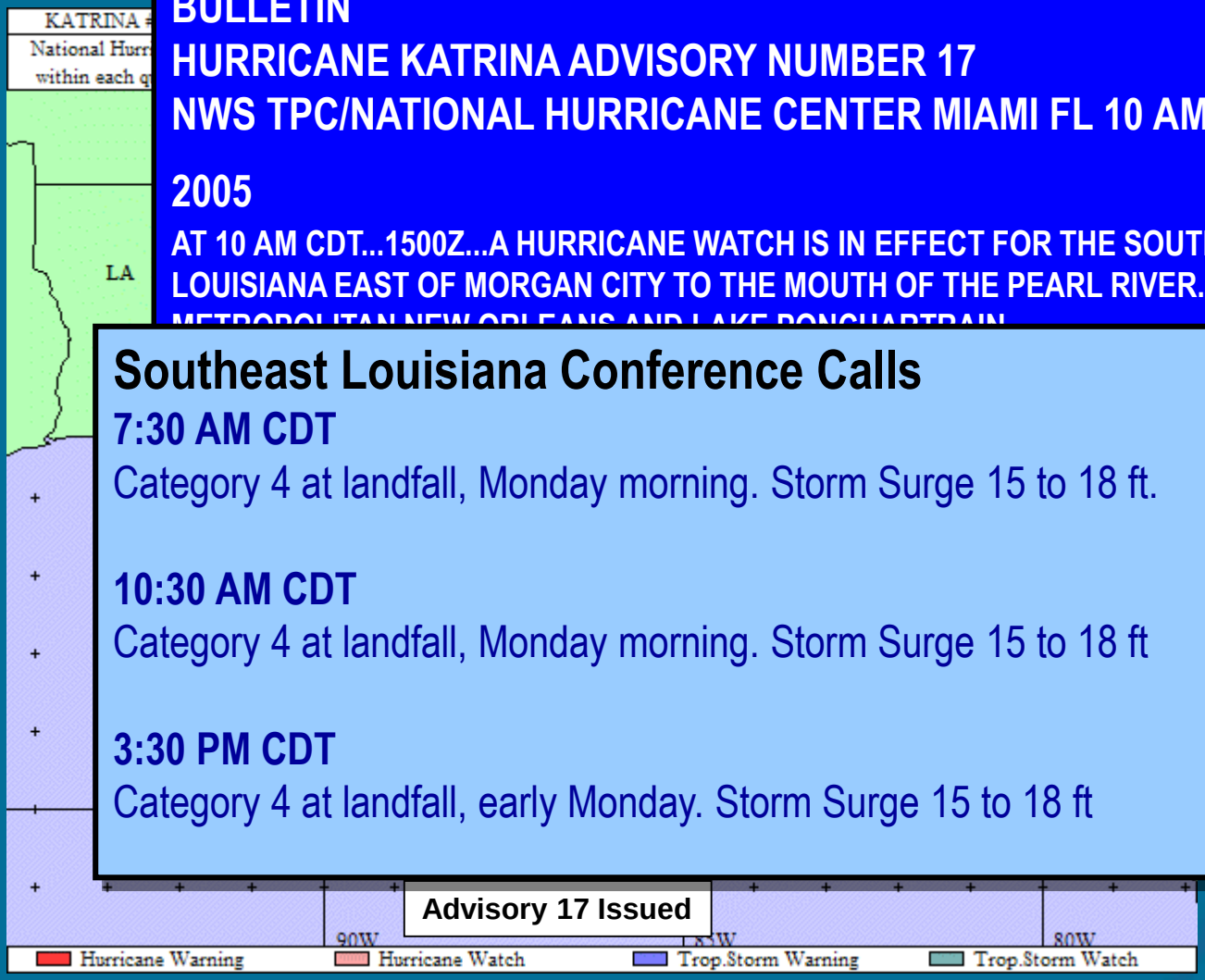
A, MS, AL, and GA)

Southeast Louisiana Conference Calls

7:30 AM CDT
Category 4 at landfall, Monday morning. Storm Surge 15 to 18 ft.

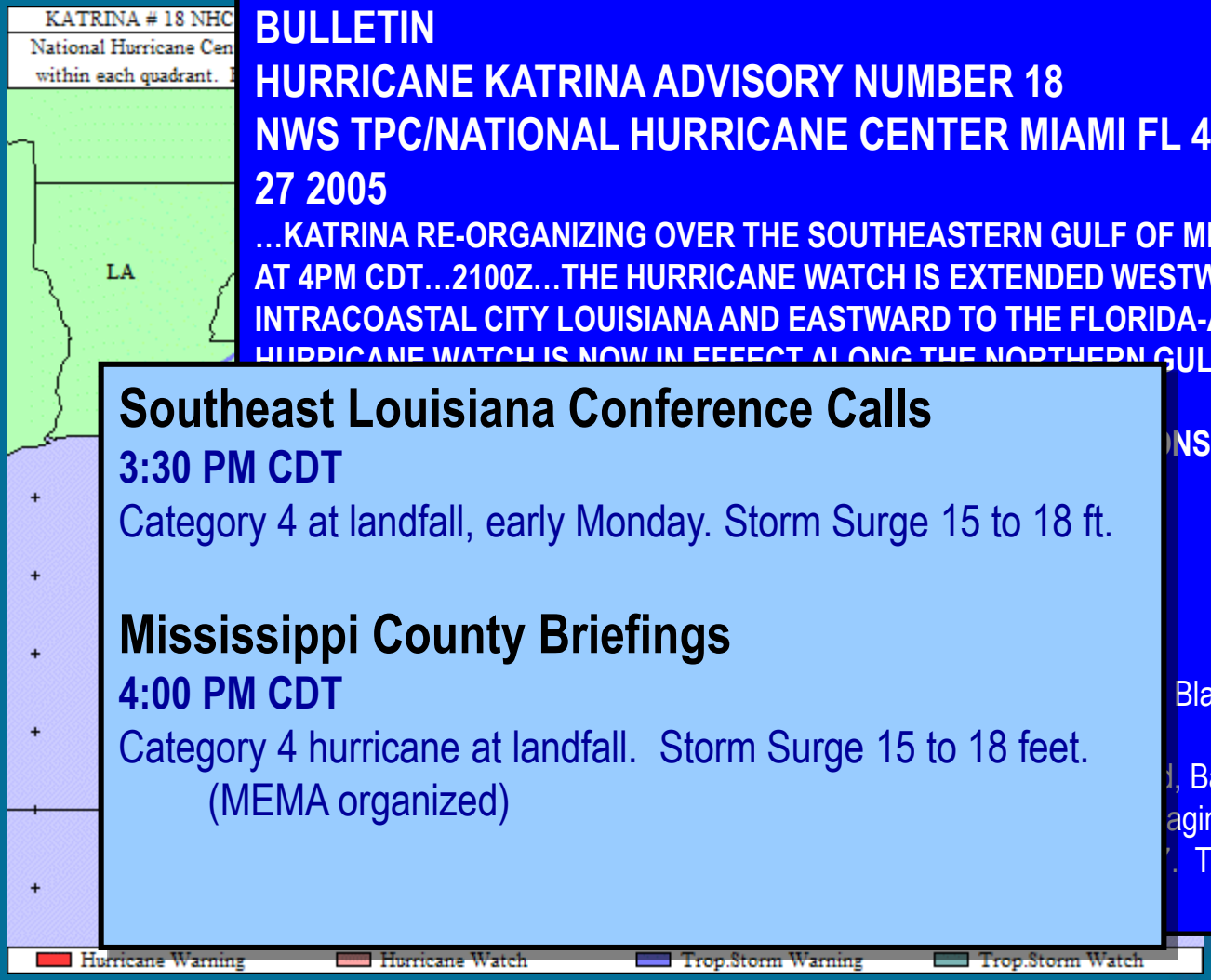
10:30 AM CDT
Category 4 at landfall, Monday morning. Storm Surge 15 to 18 ft

3:30 PM CDT
Category 4 at landfall, early Monday. Storm Surge 15 to 18 ft



Advisory 18

Saturday 08/27/2005 4:00 PM CDT



BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 18
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL 4 PM CDT SAT AUG 27 2005

…KATRINA RE-ORGANIZING OVER THE SOUTHEASTERN GULF OF MEXICO…
AT 4PM CDT…2100Z…THE HURRICANE WATCH IS EXTENDED WESTWARD TO INTRACOASTAL CITY LOUISIANA AND EASTWARD TO THE FLORIDA-ALABAMA BORDER. A HURRICANE WATCH IS NOW IN EFFECT ALONG THE NORTHERN GULF COAST FROM

NS OF THE NORTHERN

Blanco)

, Barbour)
agin)
. TPC/NHC provided 12

Southeast Louisiana Conference Calls

3:30 PM CDT

Category 4 at landfall, early Monday. Storm Surge 15 to 18 ft.

Mississippi County Briefings

4:00 PM CDT

Category 4 hurricane at landfall. Storm Surge 15 to 18 feet.
(MEMA organized)

Advisory 19

Saturday 08/27/2005 10:00 PM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 19
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL

Significant EM Briefings and Other Contacts

7:00 PM CDT City of New Orleans Emergency Management
Hurricane force wind Sunday evening. Category 4 conditions early Monday. Levees potentially overtopped dependant on precise track of hurricane.

7:30 PM CDT Terrebonne Parish EM Director
Category 4 Hurricane expected at landfall. Current forecast focused on east New Orleans, however too early to determine precise track.

Southeast Louisiana Conference Call

10:00 PM CDT
Category 4 at landfall, Monday morning. Storm Surge 15 to 20 ft.

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Advisory 22

Sunday 08/28/2005 7:00 AM CDT

Southeast Louisiana Conference Calls

7:00 AM CDT

Strong Category 4 or 5 at landfall, Monday morning. Storm Surge 15 to 20 feet, isolated to 25 feet.

Mississippi County Briefings

8:30 AM CDT

Category 4 or Cat 5 at landfall. Storm surge 15 to 18 feet.

Significant EM Briefings and Other Contacts

7:50 AM CDT St Bernard Parish OEP

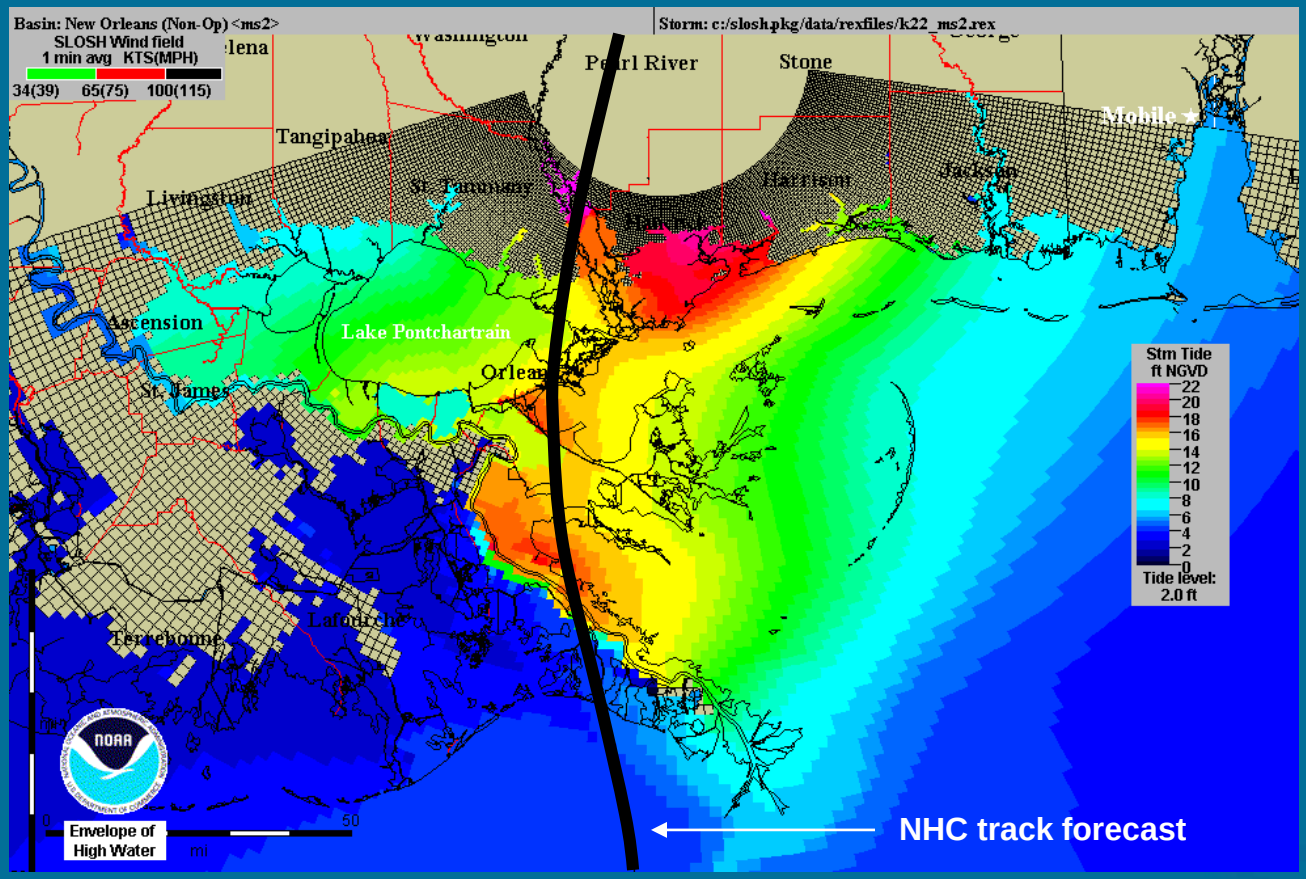
Expect direct strike of Category 4 hurricane. Major over topping of both federal and parish levees. Leave now!

8:00 AM CDT Washington Parish OEP Director

Confirmed hurricane winds expected for Washington Parish as indicated in latest TPC Hurrevac program display.

interviews through the pool or via telephone.

Single Track SLOSH forecast



Storm surge data posted by NHC at 9:20 am CDT 8/28/05
Shows envelope of high water relative to mean sea level (of 1929)

Advisory 23

Sunday 08/28/2005 10:00 AM CDT

000
WWUS74 KLIX 281550
NPWLIX

URGENT - WEATHER MESSAGE
NATIONAL WEATHER SERVICE NEW ORLEANS LA
1011 AM CDT SUN AUG 28 2005

...DEVASTATING DAMAGE EXPECTED....

HURRICANE KATRINA...A MOST POWERFUL HURRICANE WITH UNPRECEDENTEDSTRENGTH...RIVALING THE INTENSITY OF HURRICANE CAMILLE OF 1969.

MOST OF THE AREA WILL BE UNINHABITABLE FOR WEEKS...PERHAPS LONGER. ATLEAST ONE HALF OF WELL CONSTRUCTED HOMES WILL HAVE ROOF AND WALLFAILURE. ALL GABLED ROOFS WILL FAIL...LEAVING THOSE HOMES SEVERELYDAMAGED OR DESTROYED.

THE MAJORITY OF INDUSTRIAL BUILDINGS WILL BECOME NON FUNCTIONAL.PARTIAL TO COMPLETE WALL AND ROOF FAILURE IS EXPECTED. ALL WOODFRAMED LOW RISING APARTMENT BUILDINGS WILL BE DESTROYED. CONCRETE BLOCK LOW RISE APARTMENTS WILL SUSTAIN MAJOR DAMAGE...INCLUDING SOME WALLAND ROOF FAILURE.

HIGH RISE OFFICE AND APARTMENT BUILDINGS WILL SWAY DANGEROUSLY...AFEW TO THE POINT OF TOTAL COLLAPSE. ALL WINDOWS WILL BLOW OUT.

Advisory 23

Sunday 08/28/2005 10:00 AM CDT

AIRBORNE DEBRIS WILL BE WIDESPREAD...AND MAY INCLUDE HEAVY ITEMS SUCHAS HOUSEHOLD APPLIANCES AND EVEN LIGHT VEHICLES. SPORT UTILITYVEHICLES AND LIGHT TRUCKS WILL BE MOVED. THE BLOWN DEBRIS WILL CREATEADDITIONAL DESTRUCTION. PERSONS...PETS...AND LIVESTOCK EXPOSED TO THE WINDS WILL FACE CERTAIN DEATH IF STRUCK.

POWER OUTAGES WILL LAST FOR WEEKS...AS MOST POWER POLES WILL BE DOWNAND TRANSFORMERS DESTROYED. WATER SHORTAGES WILL MAKE HUMAN SUFFERINGINCREDIBLE BY MODERN STANDARDS.

THE VAST MAJORITY OF NATIVE TREES WILL BE SNAPPED OR UPROOTED. ONLYTHE HEARTIEST WILL REMAIN STANDING...BUT BE TOTALLY DEFOLIATED. FEWCROPS WILL REMAIN. LIVESTOCK LEFT EXPOSED TO THE WINDS WILL BE KILLED.

AN INLAND HURRICANE WIND WARNING IS ISSUED WHEN SUSTAINED WINDS NEARHURRICANE FORCE...OR FREQUENT GUSTS AT OR ABOVE HURRICANE FORCE...ARE CERTAIN WITHIN THE NEXT 12 TO 24 HOURS.

ONCE TROPICAL STORM AND HURRICANE FORCE WINDS ONSET...DO NOT VENTURE OUTSIDE!

Advisory 23A

Sunday 08/28/2005 1:00 PM CDT

BULLETIN
HURRICANE K
NWS TPC/NAT
1 PM CDT SUN

SIGNIFICANT
THE CENTRA
AND NORTHE

Hurricane Liais
- 10:15 am CD
- 11:00 am CD
LA, MS, AL, F

Southeast Louisiana Conference Call

12:00 PM CDT
Category 5 at landfall Monday morning. Storm surge 15-20 feet, isolated to 25 feet

.

Significant EM Briefings and other Contacts

12:45 PM CDT St Bernard Parish EM Director
Storm surge 18 to 20 feet
1:00 PM CDT St John the Baptist Parish EM Director
Storm surge predicted 11-13 feet in southwest portion of Lake Pontchartrain based on Cat. 5
1:30 PM CDT Hancock County EM Director
Current track of Katrina focused on Hancock County – expect Cat 5 conditions

Advisory 24

Sunday 08/28/2005 4:00 PM CDT

Significant EM contacts and Briefings

Mississippi

4:45 PM CDT Hancock County EM

Storm surge potential of 22-28 feet for Waveland in Cat 5 storm. Cat 5 winds can heavily damage buildings.

Louisiana

5:00 PM CDT St Tammany Parish EM

Katrina likely Cat 4/5 at landfall. Storm surge in Lake Ponchartrain increasing after 3:00 AM with onset of hurricane force winds. Storm surge of 17-19 feet along Lake Ponchartrain, and up to 20 feet near the Rigolettes

5:10 PM CDT Ascension Parish

Discussed MS River storm surge forecast.

5:30 PM CDT Torrobonne Parish

Discussed onset of tropical storm and hurricane force winds. Expect 120+ mph winds for a few hours.

Advisory 25

Sunday 08/28/2005 10:00 PM CDT

Southeast Louisiana Conference Calls

8:00 PM CDT City of New Orleans EM

Briefed onset of hurricane force winds late tonight and storm surge potential of 18-22 feet.

8:00 PM CDT Lake Borgne (St. Bernard Parish) Levee District

Direct strike of Cat 5. Winds greater than 120 MPH possible for 8 hrs. Bring pump operators into refuges of last resort now!

8:45 PM CDT Livingston Parish EM, Amite River Basin Commission

Discussed river flood warnings and storm surge

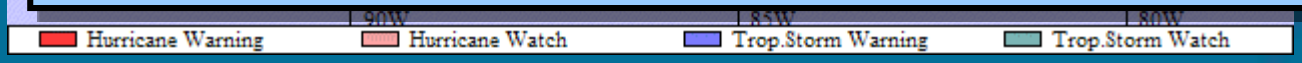
9:30 PM CDT

Category 5 at landfall, Monday morning. Storm surge 18 to 20 feet.

Mississippi County Briefings

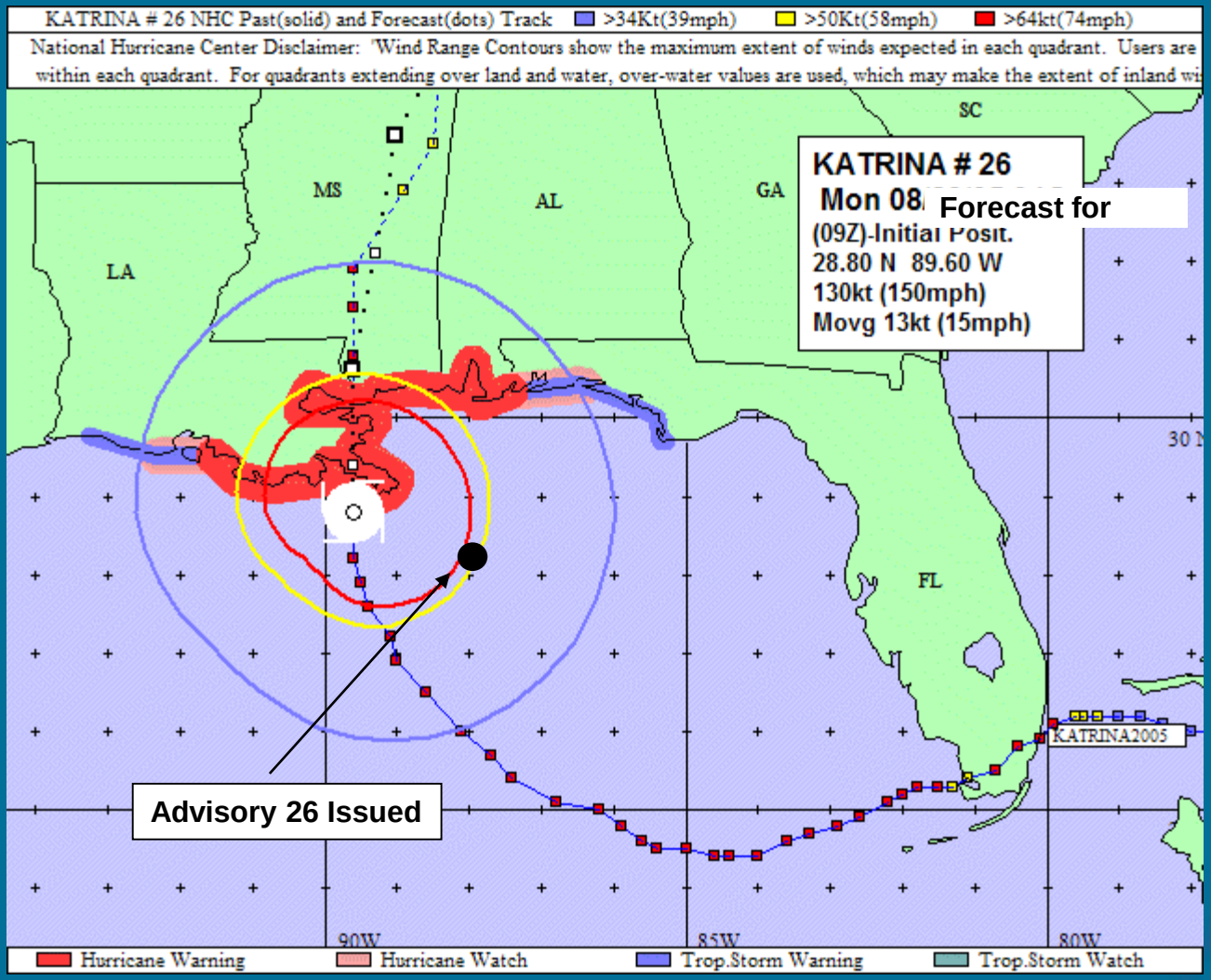
10:30 PM CDT

Category 4 or 5 at landfall. Storm surge 18 to 22 feet. Extreme damage possible. Locally 28 feet surge.



Advisory 26

Monday 08/29/2005 4:00 AM CDT



Advisory 26 and 26A

Monday 08/29/2005 4:00 and 6:00 AM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 26
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
4 AM CDT MON AUG 29 2005

…EXTREMELY DANGEROUS CATEGORY FOUR HURRICANE KATRINA MOVING NORTHWARD TOWARD SOUTHEASTERN LOUISIANA AND THE NORTHERN GULF COAST.

SOME FLUCTUATIONS IN STRENGTH ARE LIKELY PRIOR TO LANDFALL…BUT KATRINA IS EXPECTED TO MAKE LANDFALL AS A CATEGORY FOUR HURRICANE.

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 26A
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
6 AM CDT MON AUG 29 2005

KATRINA REMAINS A VERY LARGE HURRICANE. HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 120 MILES FROM THE CENTER…AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 230 MILES.

Advisory 26B

Monday 08/29/2005 8:00 AM CDT

BULLETIN
HURRICAN
NWS TPC/N
8 AM CDT M

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Mississippi County Briefings

7:15 AM CDT

Strong Category 4 moving onshore. Onset of extreme winds in next few hours. Storm surge ranging from 16 to 18 feet east portion to 20 to 25 feet west portion near landfall area. Wind gust to 100 mph already already reported. (WFO Slidell Organized – particpants Jackson, Harrison, Hancock, Pearl River County EMs)

8:14 AM Flash Flood Warning Message for Levee Failure

Hurricane I
- 10:15 am CDT Audio Conference (FL)
- 11:00 am CDT Video Teleconference (FEMA HQ, FEMA Region IV and VI HQs, LA, MS, AL, FL, and TX)
- 4:15 pm CDT Audio Conference Call (FL)

KLIX 291316

FFWLIXLAC071-087-291915-

BULLETIN - EAS ACTIVATION REQUESTED

FLASH FLOOD WARNING

NATIONAL WEATHER SERVICE NEW ORLEANS LA

814 AM CDT MON AUG 29 2005

THE NATIONAL WEATHER SERVICE IN NEW ORLEANS HAS ISSUED A FLASH FLOOD WARNING FOR... ORLEANS PARISH IN SOUTHEAST LOUISIANA THIS INCLUDES THE CITIES OF...NEW ORLEANS ST.BERNARD PARISH IN SOUTHEAST LOUISIANA THIS INCLUDES THE CITY OF CHALMETTE UNTIL 215 PM CDT

A LEVEE BREACH OCCURRED ALONG THE INDUSTRIAL CANAL AT TENNESSE STREET. 3 TO 8 FEET OF WATER IS EXPECTED DUE TO THE BREACH.

LOCATIONS IN THE WARNING INCLUDE BUT ARE NOT LIMITED TO ARABI AND 9TH WARD OF NEW ORLEANS.

DO NOT DRIVE YOUR VEHICLE INTO AREAS WHERE THE WATER COVERS THEROADWAY. THE WATER DEPTH MAY BE TOO GREAT TO ALLOW YOUR CAR TO CROSSSAFELY. VEHICLES CAUGHT IN RISING WATER SHOULD BE ABANDONED QUICKLY.MOVE TO HIGHER GROUND.A FLASH FLOOD WARNING MEANS THAT FLOODING IS IMMINENT OR OCCURRING.IF YOU ARE IN THE WARNING AREA MOVE TO HIGHER GROUND IMMEDIATELY.RESIDENTS LIVING ALONG STREAMS AND CREEKS SHOULD TAKE IMMEDIATEPRECAUTIONS TO PROTECT LIFE AND PROPERTY. DO NOT ATTEMPT TO CROSSSWIFTLY FLOWING WATERS OR WATERS OF UNKNOWN DEPTH BY FOOT OR BY AUTOMOBILE.

Advisory 26B

Monday 08/29/2005 8:00 AM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 26B
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
8 AM CDT MON AUG 29 2005

…THE CENTER OF HURRICANE KATRINA WAS LOCATED … ABOUT 40 MILES SOUTHEAST OF NEW ORLEANS LOUISIANA AND ABOUT 65 MILES SOUTHWEST OF BILOXI MISSISSIPPI

MAXIMUM SU
EXTREMELY
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COASTAL STO
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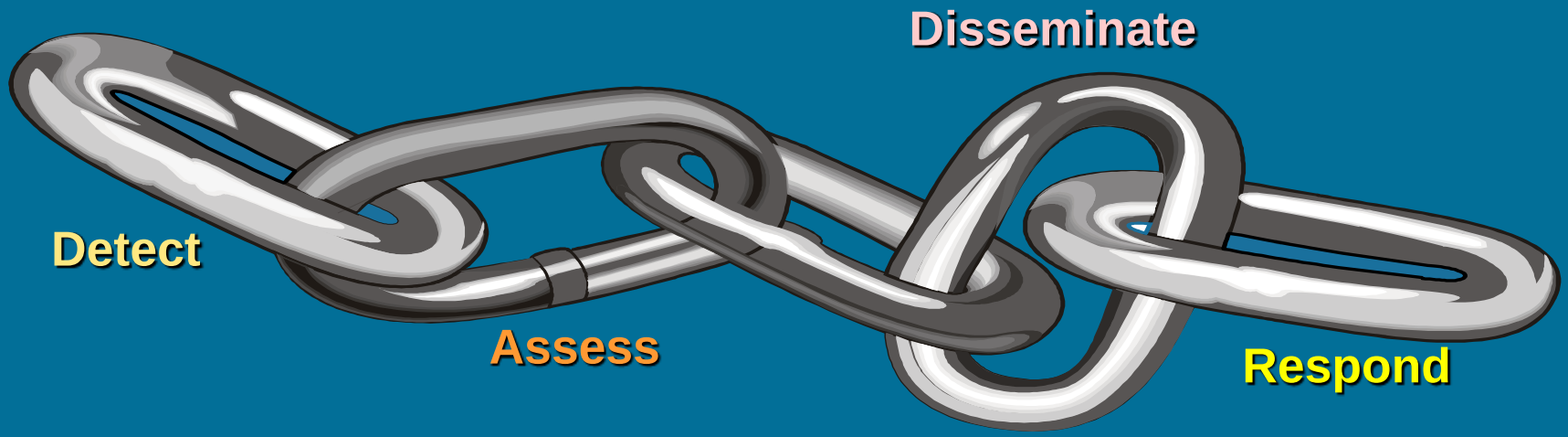
Hurricane Lia
- 10:15 am C
- 11:00 am C
- 4:15 pm C

, and TX)

9:00 AM – Complete communications failure. Offices on backup power. Service backup operations initiated at weather forecast offices

NOAA's Natural Hazard Warning Program



UNITED STATES DEPARTMENT OF COMMERCE
The Under Secretary of Commerce
for Oceans and Atmosphere
Washington, D.C. 20230

MAY - 1 2013

The Honorable Doc Hastings
Chairman
Committee on Natural Resources
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

Thank you for your letter and for the opportunity for the National Oceanic and Atmospheric Administration to testify before the Committee on Natural Resources regarding the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act. We are working on the Questions for the Record and will submit responses in the near future through the formal process.

If you have further questions, please contact Amanda Hallberg Greenwell, Director, Office of Legislative and Intergovernmental Affairs, at (202) 482-4981.

Sincerely,

Kathryn D. Sullivan, Ph.D.
Acting Under Secretary of Commerce
for Oceans and Atmosphere

Folder

Tracking ID	13-029917-
Category	NOAANNMFS
To/Owner	NOAA/ES (Group)
From	Honorable Hastings, Doc
Addressed To	Acting Under Secretary
Folder Types	Request Congressional
Mail Type	Mail
Subject	Questions regarding testimony on Reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act
Keyword Summary	Magnuson-Stevens Fishery Conservation and Management Act - Testimony
Structured Keywords	
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Date Due for LO	
Date of Document	03/29/2013
Date Received	04/04/2013
Date Due	04/11/2013
Date Closed	
Created By	04/04/2013 10:51:49 West, Michelle B
Modified By	04/10/2013 12:32:57 Peterson, Sheryl A.

CLOSED

Attachments

Type	Description	Document Status	Category	Owner	Created Modified
PDF (Adobe Acrobat Reader)		Incoming	NOAA/NMFS	West, Michelle B	04/04/2013 04/04/2013
Word Protected Document 2007 .DOCX	Response		NOAA/NMFS	Pflieger, Frances	04/09/2013 04/09/2013
PDF (Adobe Acrobat Reader)	Clearance Sheet and Signed Memo		NOAA/NMFS	Eisch, Joseph F	04/10/2013 04/10/2013

Assignments

NOAA-Internal Workflow

Action	Assigned By	Assigned To	Status	Category	Work Sequence	Date Assigned	Date Due	Closed
Prepare Reply for Signature	West, Michelle B	NMFS/CU (Group)	Closed	NOAA/NMFS		04/08/2013	04/10/2013	04/08/201

Requested Activity: NMFS is already answering the QFR's, please reassignment so they can respond to incoming letter. Thanks!

Response Notes: To F for advice 4/8 (fp)

Reassignment Request	Wildgoose, Jenell C	NOAA/ES (Group)	Closed	NOAA/NMFS		04/08/2013	Never	04/08/201

Requested Activity: NMFS is already answering the QFR's, please reassignment so they can respond to incoming letter. Thanks!

Prepare Reply for Signature	West, Michelle B	NOAA/LA (Group)	Closed	NOAA/NMFS	1000	04/04/2013	04/10/2013	04/08/201

Requested Activity: Response requested by 4/15/13

Response Notes: Please forward to NMFS they are already working on the QFRs from this incoming. Thanks!

Prepare Response	Pflieger, Frances	NMFS/F (Group)	Closed	NOAA/NMFS	1100	04/08/2013	04/10/2013	04/09/201
Review	NMFS/F (Group)	NMFS/CU (Group)	Closed	NOAA/NMFS	1200	04/09/2013	04/09/2013	04/09/201
Review	NMFS/CU (Group)	Pflieger, Frances	Closed	NOAA/NMFS	1250	04/09/2013	04/09/2013	04/09/201
Clearance (NOAA)	Pflieger, Frances	NMFS/GC (Group)	Closed	NOAA/NMFS	1300	04/09/2013	04/09/2013	04/09/201

Response Notes: Template response

Review	NMFS/GC (Group)	NMFS/CU (Group)	Closed	NOAA/NMFS	1400	04/09/2013	04/09/2013	04/09/201
Clearance (NOAA)	NMFS/CU (Group)	NMFS/LA (Group)	Closed	NOAA/NMFS	1500	04/10/2013	04/12/2013	04/08/2

Response Notes: Can clear downtown

Review	NMFS/CU (Group)	NMFS/CU (Group)	Closed	NOAA/NMFS	1600	04/09/2013	04/09/2013	04/09/201
Clearance (NOAA)	NMFS/CU (Group)	NMFS/DAA (Group)	Closed	NOAA/NMFS	1650	04/09/2013	04/09/2013	04/10/201

Response Notes: To F 4/9 (fp)

Signature	NMFS/DAA (Group)	NMFS/F (Group)	Closed	NOAA/NMFS	1700	04/10/2013	04/10/2013	04/10/201
Disposition	NMFS/F (Group)	NMFS/CU (Group)	Closed	NOAA/NMFS	1800	04/10/2013	04/10/2013	04/10/201
Appropriate Action	NMFS/CU (Group)	NOAA/ES (Group)	Closed	NOAA/NMFS	2000	04/10/2013	04/10/2013	04/10/201

Requested Activity: Rec'd

Review	Peterson, Sheryl A.	NOAA/ES (Group)	Active	NOAA/NMFS	2000	04/10/2013	04/10/2013	HRH 4/10/13
Clearance (NOAA)	NOAA/ES (Group)	NOAA/LA (Group)	Pending	NOAA/NMFS	2100	04/10/2013		AH 4/23
Clearance (NOAA)	NOAA/LA (Group)	PCO (Group)	Pending	NOAA/NMFS	2200	04/10/2013	04/12/2013*	4/15.13
Clearance (NOAA)	PCO (Group)	NOAA/POLICY (Group)	Pending	NOAA/NMFS	2300	04/12/2013	04/16/2013*	MAN 4/15/13
Clearance (NOAA)	NOAA/POLICY (Group)	GC (Group)	Pending	NOAA/NMFS	2400	04/16/2013	04/18/2013*	
Clearance (NOAA)	GC (Group)	DUS (Group)	Pending	NOAA/NMFS	2500	04/18/2013	04/22/2013*	4/17/13

Clearance	DUS (Group)	AS/CM (Group)	Pending	NOAA/NMFS	2510	04/22/2013	04/23/2013*	
Clearance (NOAA)	AS/CM (Group)	USCOS (Group)	Pending	NOAA/NMFS	2600	04/23/2013	04/25/2013*	
Signature	USCOS (Group)	USEC (Group)	Pending	NOAA/NMFS	2700	04/25/2013	04/26/2013*	
Close	USEC (Group)	NOAA/ES (Group)	Pending	NOAA/NMFS	2800	04/26/2013	04/29/2013*	

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HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
1030 AM CDT SAT AUG 27 2005

...HURRICANE WATCH NOW IN EFFECT FOR SOUTHEAST LOUISIANA
INCLUDING THE METRO NEW ORLEANS AREA...

...HURRICANE KATRINA CONTINUES TO MOVE SLOWLY WEST IN THE
SOUTHEASTERN GULF OF MEXICO...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...ST
BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

...WATCHES AND WARNINGS...
...HURRICANE WATCH IS IN EFFECT FROM EAST OF MORGAN CITY TO THE
MOUTH OF THE PEARL RIVER...THIS INCLUDES THE METRO NEW ORLEANS
AREA.

...STORM INFORMATION...
AT 10 AM...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE
24.5 NORTH...LONGITUDE 85.0 WEST OR ABOUT 405 MILES SOUTHEAST OF THE
MOUTH OF THE MISSISSIPPI RIVER.

MAXIMUM SUSTAINED WINDS ARE NEAR 115 MPH...WITH HIGHER GUSTS.
HURRICANE KATRINA IS A CATEGORY THREE HURRICANE ON THE SAFFIR
SIMPSON SCALE.

HURRICANE KATRINA IS MOVING SLOWLY WEST NEAR 7 MPH WITH GRADUAL TURN
TO TOWARD THE WEST NORTHWEST EXPECTED DURING THE NEXT 24 HOURS.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
RESIDENTS OF SOUTHEAST LOUISIANA SHOULD BEGIN PREPARATION FOR THE
POTENTIAL LANDFALL OF A MAJOR HURRICANE LATE SUNDAY NIGHT AND EARLY
MONDAY...WITH THE POSSIBILITY OF DAMAGING HURRICANE FORCE WINDS AND
HIGH STORM SURGE.

RESIDENTS...OF SOUTHEAST LOUISIANA...ESPECIALLY THOSE IN AREAS
VULNERABLE TO STORM SURGE FLOODING...SHOULD FOLLOW EVACUATION
RECOMMENDATIONS FROM LOCAL PARISH OFFICIALS.

...STORM SURGE AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG NORTHERN GULF OF MEXICO
COAST AS A MAJOR HURRICANE. WHILE EXACT LOCATION LANDFALL IS
UNCERTAIN AT THIS TIME SIGNIFICANT STORM SURGE FLOODING UP TO 18 FEET
IS POSSIBLE NEAR AND TO THE RIGHT OF THE LANDFALL AREA.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 10 TO 15 MPH SHOULD CONTINUE OVER

SOUTHEAST LOUISIANA THROUGH SUNDAY...THEN INCREASE SUNDAY NIGHT.
TROPICAL STORM FORCE WIND ARE LIKELY TO OVERSPREAD THE COASTAL
SUNDAY EVENING AND THE REMAINDER OF THE INLAND AREAS BY DAYBREAK
MONDAY. HURRICANE FORCE WINDS ARE LIKELY LATE SUNDAY NIGHT
AND MONDAY MORNING.

...RAINFALL...
SQUALLS AND HEAVY RAIN ASSOCIATED WITH HURRICANE KATRINA ARE NOT
EXPECTED TO AFFECT THE AREA UNTIL SUNDAY NIGHT AND CONTINUE
THROUGH MONDAY.

...NEXT UPDATE...

THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 200 PM.

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HLSLIX
LAZ038-040-050-056>070-272200-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
230 PM CDT SAT AUG 27 2005

...HURRICANE WATCH IN EFFECT FOR SOUTHEAST LOUISIANA
INCLUDING THE METRO NEW ORLEANS AREA...

...HURRICANE KATRINA CONTINUES TO MOVE SLOWLY WEST IN THE
SOUTHERN GULF OF MEXICO...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...ST
BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

...WATCHES AND WARNINGS...
A HURRICANE WATCH IS IN EFFECT FROM EAST OF MORGAN CITY TO THE
MOUTH OF THE PEARL RIVER...THIS INCLUDES THE METRO NEW ORLEANS
AREA.

...STORM INFORMATION...
AT 100 PM...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR
LATITUDE 24.5 NORTH...LONGITUDE 85.4 WEST OR ABOUT 390 MILES
SOUTHEAST OF THE MOUTH OF THE MISSISSIPPI RIVER.

THE HURRICANE HAS SHOWN LITTLE CHANGE IN STRENGTH DURING THE
PAST FEW HOURS. MAXIMUM SUSTAINED WINDS ARE NEAR 115 MPH...WITH
HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY THREE HURRICANE ON THE
SAFFIR SIMPSON SCALE. SOME STRENGTHENING IS POSSIBLE DURING THE
NEXT 24 HOURS AND KATRINA COULD BECOME A CATEGORY FOUR HURRICANE.

HURRICANE KATRINA IS MOVING SLOWLY WEST NEAR 7 MPH WITH GRADUAL TURN
TO TOWARD THE WEST NORTHWEST EXPECTED DURING THE NEXT 24 HOURS.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
RESIDENTS OF SOUTHEAST LOUISIANA SHOULD BEGIN PREPARATION FOR THE
POTENTIAL LANDFALL OF A MAJOR HURRICANE LATE SUNDAY NIGHT AND EARLY
MONDAY...WITH THE POSSIBILITY OF DAMAGING HURRICANE FORCE WINDS AND
HIGH STORM SURGE.

RECOMMENDED AND MANDATORY EVACUATION ORDERS ARE IN EFFECT
FOR MANY SOUTHEAST LOUISIANA PARISHES. RESIDENTS IN SOUTHEAST
LOUISIANA...SHOULD FOLLOW EVACUATION RECOMMENDATIONS FROM
LOCAL PARISH OFFICIALS.

...STORM SURGE AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG NORTHERN GULF OF MEXICO
COAST AS A MAJOR HURRICANE. WHILE EXACT LOCATION LANDFALL IS
UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE
UP TO 18 FEET ABOVE NORMAL IS POSSIBLE NEAR AND TO THE RIGHT OF THE

LANDFALL AREA.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 10 TO 15 MPH SHOULD CONTINUE OVER SOUTHEAST LOUISIANA THROUGH SUNDAY...THEN INCREASE SUNDAY NIGHT. TROPICAL STORM FORCE WIND ARE LIKELY TO OVERSPREAD THE COASTAL SUNDAY EVENING AND THE REMAINDER OF THE INLAND AREAS BY DAYBREAK MONDAY. HURRICANE FORCE WINDS ARE LIKELY LATE SUNDAY NIGHT AND MONDAY MORNING.

...RAINFALL...
SQUALLS AND HEAVY RAIN ASSOCIATED WITH HURRICANE KATRINA ARE NOT EXPECTED TO AFFECT THE AREA UNTIL LATE SUNDAY AFTERNOON AND CONTINUE THROUGH MONDAY.

...NEXT UPDATE...

THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 500 PM.

$$

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WTUS84 KLIX 272200
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-280100-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
500 PM CDT SAT AUG 27 2005

...HURRICANE WATCH EXPANDED TO INCLUDE THE MISSISSIPPI COAST...

...HURRICANE WATCH IN EFFECT FOR SOUTHEAST LOUISIANA
INCLUDING THE METRO NEW ORLEANS AREA....

...HURRICANE KATRINA CONTINUES TO MOVE SLOWLY WEST IN THE
SOUTHERN GULF OF MEXICO...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...ST
BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WATCH IS IN EFFECT FROM EAST OF INTRACOASTAL CITY
EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO
NEW ORLEANS AREA...AND THE MISSISSIPPI COAST. HURRICANE WARNINGS WILL
LIKELY BE REQUIRED FOR PORTIONS OF HURRICANE WATCH AREA LATER TONIGHT
OR SUNDAY.

...STORM INFORMATION...
AT 4 PM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR
LATITUDE 24.6 NORTH...LONGITUDE 85.6 WEST OR ABOUT 380 MILES
SOUTHEAST OF THE MOUTH OF THE MISSISSIPPI RIVER.

THE HURRICANE HAS SHOWN LITTLE CHANGE IN STRENGTH DURING THE
PAST FEW HOURS. MAXIMUM SUSTAINED WINDS ARE NEAR 115 MPH...WITH
HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY THREE HURRICANE ON THE
SAFFIR SIMPSON SCALE. SOME STRENGTHENING IS POSSIBLE DURING THE
NEXT 24 HOURS AND KATRINA COULD BECOME A CATEGORY FOUR HURRICANE.

HURRICANE KATRINA IS MOVING SLOWLY WEST NEAR 7 MPH WITH GRADUAL TURN
TO TOWARD THE WEST NORTHWEST EXPECTED DURING THE NEXT 24 HOURS.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
RESIDENTS OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI SHOULD
MAKE PREPARATIONS FOR THE POTENTIAL LANDFALL OF A MAJOR HURRICANE
LATE SUNDAY NIGHT AND EARLY MONDAY...WITH THE POSSIBILITY OF DAMAGING
HURRICANE FORCE WINDS AND HIGH STORM SURGE.

RECOMMENDED AND MANDATORY EVACUATION ORDERS ARE IN EFFECT
FOR MANY SOUTHEAST LOUISIANA PARISHES AND COASTAL MISSISSIPPI
COUNTIES. RESIDENTS IN SOUTHEAST LOUISIANA...SHOULD FOLLOW EVACUATION

RECOMMENDATIONS FROM LOCAL PARISH OFFICIALS.

...STORM SURGE AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG NORTHERN GULF OF MEXICO COAST AS A MAJOR HURRICANE. WHILE EXACT LOCATION LANDFALL IS UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE UP TO 18 FEET ABOVE NORMAL IS POSSIBLE NEAR AND TO THE RIGHT OF THE LANDFALL AREA.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 10 TO 15 MPH SHOULD CONTINUE OVER SOUTHEAST LOUISIANA THROUGH SUNDAY...THEN INCREASE SUNDAY NIGHT. TROPICAL STORM FORCE WINDS ARE LIKELY TO OVERSPREAD THE COASTAL AREAS SUNDAY EVENING AND THE REMAINDER OF THE INLAND AREAS BY DAYBREAK MONDAY. HURRICANE FORCE WINDS ARE LIKELY LATE SUNDAY NIGHT AND MONDAY MORNING.

...RAINFALL...
SQUALLS AND HEAVY RAIN ASSOCIATED WITH HURRICANE KATRINA ARE NOT EXPECTED TO AFFECT THE AREA UNTIL LATE SUNDAY AFTERNOON AND CONTINUE THROUGH MONDAY.

...NEW INFORMATION...
A HURRICANE WATCH HAS BEEN EXTENDED TO INCLUDE THE MISSISSIPPI COAST.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 730 PM CDT.

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WTUS84 KLIX 280031
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-280330-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
730 PM CDT SAT AUG 27 2005

...HURRICANE WATCH IS IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI....

...DANGEROUS HURRICANE KATRINA BEGINS TO MOVE WEST NORTHWEST IN THE SOUTHERN GULF OF MEXICO...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE... LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WATCH IS IN EFFECT FROM EAST OF INTRACOASTAL CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST. HURRICANE WARNINGS WILL LIKELY BE REQUIRED FOR PORTIONS OF HURRICANE WATCH AREA LATER TONIGHT OR SUNDAY.

...STORM INFORMATION...
AT 700 PM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 24.8 NORTH...LONGITUDE 85.9 WEST OR ABOUT 360 MILES SOUTHEAST OF THE MOUTH OF THE MISSISSIPPI RIVER.

THE HURRICANE HAS SHOWN LITTLE CHANGE IN STRENGTH DURING THE PAST FEW HOURS. MAXIMUM SUSTAINED WINDS ARE NEAR 115 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY THREE HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME STRENGTHENING IS POSSIBLE DURING THE NEXT 24 HOURS AND KATRINA COULD BECOME A CATEGORY FOUR HURRICANE AS IT APPROACHES THE COASTAL REGIONS.

HURRICANE KATRINA IS MOVING SLOWLY WEST NEAR 7 MPH WITH GRADUAL TURN TO TOWARD THE WEST NORTHWEST EXPECTED DURING THE NEXT 24 HOURS.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
RESIDENTS OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI SHOULD CONTINUE PREPARATIONS FOR THE POTENTIAL LANDFALL OF A MAJOR HURRICANE LATE SUNDAY NIGHT AND EARLY MONDAY...WITH THE POSSIBILITY OF DAMAGING HURRICANE FORCE WINDS AND HIGH STORM SURGE.

RECOMMENDED AND MANDATORY EVACUATION ORDERS ARE IN EFFECT FOR MOST SOUTHEAST LOUISIANA PARISHES AND COASTAL MISSISSIPPI COUNTIES. RESIDENTS SHOULD FOLLOW EVACUATION RECOMMENDATIONS FROM LOCAL PARISH OFFICIALS.

...STORM SURGE AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A MAJOR HURRICANE. WHILE EXACT LOCATION LANDFALL IS UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE UP TO 18 FEET ABOVE NORMAL IS POSSIBLE NEAR AND TO THE RIGHT OF THE LANDFALL AREA. RESIDENTS IN AREAS PRONE TO STORM SURGE FLOODING SHOULD HEED EVACUATION RECOMMENDATION FROM LOCAL EMERGENCY MANAGEMENT OFFICIALS

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 10 TO 15 MPH SHOULD CONTINUE OVER SOUTHEAST LOUISIANA THROUGH SUNDAY...THEN INCREASE SUNDAY NIGHT. TROPICAL STORM FORCE WINDS ARE LIKELY TO OVERSPREAD THE COASTAL AREAS SUNDAY EVENING AND THE REMAINDER OF THE INLAND AREAS BY DAYBREAK MONDAY. DAMAGING WIND GUSTS ASSOCIATED WITH A MAJOR HURRICANE ARE LIKELY TO OVERSPREAD THE AREA MONDAY.

...RAINFALL...
SQUALLS AND HEAVY RAIN ASSOCIATED WITH HURRICANE KATRINA ARE NOT EXPECTED TO AFFECT THE AREA UNTIL LATE SUNDAY AFTERNOON AND CONTINUE THROUGH MONDAY.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 1030 PM CDT.

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WTUS84 KLIX 280330
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-280700-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
1030 PM CDT SAT AUG 27 2005

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...DANGEROUS HURRICANE KATRINA MOVING WEST NORTHWEST IN THE GULF OF MEXICO...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE... LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

...STORM INFORMATION...
AT 10 PM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 25.0 NORTH...LONGITUDE 86.2 WEST OR ABOUT 335 MILES SOUTHEAST OF THE MOUTH OF THE MISSISSIPPI RIVER.

THE HURRICANE HAS SHOWN LITTLE CHANGE IN STRENGTH DURING THE PAST FEW HOURS. MAXIMUM SUSTAINED WINDS ARE NEAR 115 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY THREE HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME STRENGTHENING IS POSSIBLE DURING THE NEXT 24 HOURS AND KATRINA COULD BECOME A CATEGORY FOUR HURRICANE AS IT APPROACHES THE COASTAL REGIONS.

HURRICANE KATRINA IS MOVING SLOWLY WEST NORTHWEST NEAR 7 MPH WITH TURN TO TOWARD THE NORTHWEST EXPECTED ON SUNDAY.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
RESIDENTS OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI SHOULD CONTINUE PREPARATIONS FOR THE POTENTIAL LANDFALL OF A MAJOR HURRICANE LATE SUNDAY NIGHT AND EARLY MONDAY...WITH THE POSSIBILITY OF DAMAGING HURRICANE FORCE WINDS AND HIGH STORM SURGE.

RECOMMENDED AND MANDATORY EVACUATION ORDERS ARE IN EFFECT FOR MOST SOUTHEAST LOUISIANA PARISHES AND COASTAL MISSISSIPPI COUNTIES. RESIDENTS SHOULD FOLLOW EVACUATION RECOMMENDATIONS FROM LOCAL PARISH OFFICIALS.

...STORM SURGE AND STORM TIDE IMPACTS...

KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A MAJOR HURRICANE. WHILE EXACT LOCATION LANDFALL IS UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 15 TO 20 FEET ABOVE NORMAL IS POSSIBLE NEAR AND TO THE RIGHT OF THE LANDFALL AREA. RESIDENTS IN AREAS PRONE TO STORM SURGE FLOODING SHOULD HEED EVACUATION RECOMMENDATION FROM LOCAL EMERGENCY MANAGEMENT OFFICIALS.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 10 TO 15 MPH SHOULD CONTINUE OVER SOUTHEAST LOUISIANA THROUGH SUNDAY...THEN INCREASE SUNDAY NIGHT. TROPICAL STORM FORCE WINDS ARE LIKELY TO OVERSPREAD THE COASTAL AREAS SUNDAY EVENING AND THE REMAINDER OF THE INLAND AREAS BY DAYBREAK MONDAY. DAMAGING WIND GUSTS ASSOCIATED WITH A MAJOR HURRICANE ARE LIKELY TO OVERSPREAD THE AREA MONDAY.

...RAINFALL...
SQUALLS AND HEAVY RAIN ASSOCIATED WITH HURRICANE KATRINA ARE NOT EXPECTED TO AFFECT THE AREA UNTIL LATE SUNDAY AFTERNOON AND CONTINUE THROUGH MONDAY.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 130 AM CDT.

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WTUS84 KLIX 280638
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-280900-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
130 AM CDT SUN AUG 28 2005

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...DANGEROUS HURRICANE KATRINA MOVING WEST NORTHWEST IN THE GULF OF MEXICO...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE... LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

...STORM INFORMATION...
AT 1 AM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 25.1 NORTH...LONGITUDE 86.8 WEST OR ABOUT 310 MILES SOUTHEAST OF THE MOUTH OF THE MISSISSIPPI RIVER.

THE HURRICANE HAS INCREASED IN STRENGTH DURING THE PAST FEW HOURS. MAXIMUM SUSTAINED WINDS ARE NEAR 145 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FOUR HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME ADDITIONAL STRENGTHENING IS POSSIBLE TODAY.

HURRICANE KATRINA IS MOVING TOWARD THE WEST-NORTHWEST NEAR 8 MPH AND A GRADUAL TURN TOWARD THE NORTHWEST IS EXPECTED LATER TODAY.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
RESIDENTS OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI SHOULD CONTINUE PREPARATIONS FOR THE POTENTIAL LANDFALL OF A MAJOR HURRICANE LATER TONIGHT AND EARLY MONDAY...WITH THE POSSIBILITY OF DAMAGING HURRICANE FORCE WINDS AND HIGH STORM SURGE.

RECOMMENDED AND MANDATORY EVACUATION ORDERS ARE IN EFFECT FOR MOST SOUTHEAST LOUISIANA PARISHES AND COASTAL MISSISSIPPI COUNTIES. RESIDENTS SHOULD FOLLOW EVACUATION RECOMMENDATIONS FROM LOCAL PARISH OFFICIALS.

...STORM SURGE AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A MAJOR HURRICANE. WHILE EXACT LOCATION LANDFALL IS

UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 15 TO 20 FEET ABOVE NORMAL IS POSSIBLE NEAR AND TO THE RIGHT OF THE LANDFALL AREA. RESIDENTS IN AREAS PRONE TO STORM SURGE FLOODING SHOULD HEED EVACUATION RECOMMENDATION FROM LOCAL EMERGENCY MANAGEMENT OFFICIALS.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 10 TO 15 MPH SHOULD CONTINUE OVER SOUTHEAST LOUISIANA TODAY...THEN INCREASE TONIGHT. TROPICAL STORM FORCE WINDS ARE LIKELY TO OVERSPREAD THE COASTAL AREAS THIS EVENING AND THE REMAINDER OF THE INLAND AREAS BY DAYBREAK MONDAY. DAMAGING WIND GUSTS ASSOCIATED WITH A MAJOR HURRICANE ARE LIKELY TO OVERSPREAD THE AREA MONDAY.

...RAINFALL...
SQUALLS AND HEAVY RAIN ASSOCIATED WITH HURRICANE KATRINA ARE NOT EXPECTED TO AFFECT THE AREA UNTIL LATER THIS AFTERNOON AND CONTINUE THROUGH MONDAY.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 4 AM CDT.

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WTUS84 KLIX 280946
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-281230-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
400 AM CDT SUN AUG 28 2005

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...DANGEROUS HURRICANE KATRINA MOVING WEST NORTHWEST IN THE GULF OF MEXICO...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE... LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

...STORM INFORMATION...
AT 4 AM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 25.4 NORTH...LONGITUDE 87.4 WEST OR ABOUT 275 MILES SOUTHEAST OF THE MOUTH OF THE MISSISSIPPI RIVER.

MAXIMUM SUSTAINED WINDS ARE NEAR 145 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FOUR HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME STRENGTHENING IS FORECAST DURING THE NEXT 24 HOURS.

HURRICANE KATRINA IS MOVING TOWARD THE WEST-NORTHWEST NEAR 10 MPH AND A GRADUAL TURN TOWARD THE NORTHWEST IS EXPECTED LATER TODAY.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
RESIDENTS OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI SHOULD CONTINUE PREPARATIONS FOR THE POTENTIAL LANDFALL OF A MAJOR HURRICANE LATER TONIGHT AND EARLY MONDAY...WITH THE POSSIBILITY OF DAMAGING HURRICANE FORCE WINDS AND HIGH STORM SURGE.

RECOMMENDED AND MANDATORY EVACUATION ORDERS ARE IN EFFECT FOR MOST SOUTHEAST LOUISIANA PARISHES AND COASTAL MISSISSIPPI COUNTIES. RESIDENTS SHOULD FOLLOW EVACUATION RECOMMENDATIONS FROM LOCAL PARISH OFFICIALS.

...STORM SURGE AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A MAJOR HURRICANE. WHILE EXACT LOCATION LANDFALL IS

UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 15 TO 20 FEET ABOVE NORMAL IS POSSIBLE NEAR AND TO THE RIGHT OF THE LANDFALL AREA. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS HIGH AS 25 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. RESIDENTS IN AREAS PRONE TO STORM SURGE FLOODING SHOULD HEED EVACUATION RECOMMENDATION FROM LOCAL EMERGENCY MANAGEMENT OFFICIALS. SECONDARY ROADS OUTSIDE LEVEE PROTECTION WILL LIKELY BECOME IMPASSABLE THIS EVENING AND TONIGHT.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 10 TO 15 MPH SHOULD CONTINUE OVER SOUTHEAST LOUISIANA TODAY...THEN INCREASE TONIGHT. TROPICAL STORM FORCE WINDS ARE LIKELY TO OVERSPREAD THE COASTAL AREAS THIS EVENING AND THE REMAINDER OF THE INLAND AREAS BY DAYBREAK MONDAY. DAMAGING WIND GUSTS ASSOCIATED WITH A MAJOR HURRICANE ARE LIKELY TO OVERSPREAD THE AREA MONDAY.

...RAINFALL...
RAINFALL TOTALS OF 5 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE NORTH AND SOUTH OF LAKE PONTCHARTRAIN AND THE MISSISSIPPI COAST.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 730 AM CDT.

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WTUS84 KLIX 281059 RRA
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-281230-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
400 AM CDT SUN AUG 28 2005

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...DANGEROUS HURRICANE KATRINA MOVING WEST NORTHWEST IN THE GULF OF MEXICO...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE... LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

...STORM INFORMATION...
AT 4 AM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 25.4 NORTH...LONGITUDE 87.4 WEST OR ABOUT 275 MILES SOUTHEAST OF THE MOUTH OF THE MISSISSIPPI RIVER.

MAXIMUM SUSTAINED WINDS ARE NEAR 145 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FOUR HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME STRENGTHENING IS FORECAST DURING THE NEXT 24 HOURS.

HURRICANE KATRINA IS MOVING TOWARD THE WEST-NORTHWEST NEAR 10 MPH AND A GRADUAL TURN TOWARD THE NORTHWEST IS EXPECTED LATER TODAY.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
RESIDENTS OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI SHOULD CONTINUE PREPARATIONS FOR THE POTENTIAL LANDFALL OF A MAJOR HURRICANE LATER TONIGHT AND EARLY MONDAY...WITH THE POSSIBILITY OF DAMAGING HURRICANE FORCE WINDS AND HIGH STORM SURGE.

RECOMMENDED AND MANDATORY EVACUATION ORDERS ARE IN EFFECT FOR MOST SOUTHEAST LOUISIANA PARISHES AND COASTAL MISSISSIPPI COUNTIES. RESIDENTS SHOULD FOLLOW EVACUATION RECOMMENDATIONS FROM LOCAL PARISH OFFICIALS.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A MAJOR HURRICANE. WHILE EXACT LOCATION LANDFALL IS

UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 15 TO 20 FEET ABOVE NORMAL IS POSSIBLE NEAR AND TO THE RIGHT OF THE LANDFALL AREA. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS HIGH AS 25 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. RESIDENTS IN AREAS PRONE TO STORM SURGE FLOODING SHOULD HEED EVACUATION RECOMMENDATION FROM LOCAL EMERGENCY MANAGEMENT OFFICIALS. SECONDARY ROADS OUTSIDE LEVEE PROTECTION WILL LIKELY BECOME IMPASSABLE THIS EVENING AND TONIGHT.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 10 TO 15 MPH SHOULD CONTINUE OVER SOUTHEAST LOUISIANA TODAY...THEN INCREASE TONIGHT. TROPICAL STORM FORCE WINDS ARE LIKELY TO OVERSPREAD THE COASTAL AREAS THIS EVENING AND THE REMAINDER OF THE INLAND AREAS BY DAYBREAK MONDAY. DAMAGING WIND GUSTS ASSOCIATED WITH A MAJOR HURRICANE ARE LIKELY TO OVERSPREAD THE AREA MONDAY.

...RAINFALL...
RAINFALL TOTALS OF 5 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE NORTH AND SOUTH OF LAKE PONTCHARTRAIN AND THE MISSISSIPPI COAST.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 730 AM CDT.

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WTUS84 KLIX 281256
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-281600-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
800 AM CDT SUN AUG 28 2005

...HURRICANE KATRINA NOW A CATEGORY 5 HURRICANE PACKING SUSTAINED WINDS OF 160 MPH...

...DIRECT STRIKE OF CATASTROPHIC HURRICANE EXPECTED....

...RUSH PROTECTIVE MEASURES TO COMPLETION AND LEAVE AREA AS SOON AS POSSIBLE...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...DANGEROUS HURRICANE KATRINA MOVING WEST NORTHWEST IN THE GULF OF MEXICO...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE... LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

...STORM INFORMATION...
AT 7 AM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 25.7 NORTH...LONGITUDE 87.7 WEST OR ABOUT 250 MILES SOUTHEAST OF THE MOUTH OF THE MISSISSIPPI RIVER.

MAXIMUM SUSTAINED WINDS ARE NEAR 160 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FIVE HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME MINOR FLUCTUATIONS IN STRENGTH IS POSSIBLE DURING THE NEXT 24 HOURS. HURRICANE KATRINA IS MOVING TOWARD THE WEST-NORTHWEST NEAR 12 MPH AND A GRADUAL TURN TOWARD THE NORTHWEST IS EXPECTED LATER TODAY.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
RESIDENTS OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI SHOULD RUSH PREPARATIONS FOR THE LANDFALL OF A CATASTROPHIC HURRICANE LATER TONIGHT AND EARLY MONDAY...WITH DAMAGING HURRICANE FORCE WINDS AND HIGH STORM SURGE.

LEAVE NOW IF YOU CAN BEFORE WEATHER CONDITIONS WORSEN...

RECOMMENDED AND MANDATORY EVACUATION ORDERS ARE IN EFFECT
FOR MOST SOUTHEAST LOUISIANA PARISHES AND COASTAL MISSISSIPPI
COUNTIES. RESIDENTS SHOULD FOLLOW EVACUATION RECOMMENDATIONS FROM
LOCAL PARISH OFFICIALS.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF
MEXICO COAST AS A MAJOR HURRICANE. WHILE EXACT LOCATION LANDFALL IS
UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE
15 TO 20 FEET ABOVE NORMAL IS POSSIBLE NEAR AND TO THE RIGHT OF
THE LANDFALL AREA. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS
HIGH AS 25 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR
AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. RESIDENTS IN
AREAS PRONE TO STORM SURGE FLOODING SHOULD LEAVE NOW! HEED
EVACUATION RECOMMENDATION FROM LOCAL EMERGENCY MANAGEMENT OFFICIALS.
SECONDARY ROADS OUTSIDE LEVEE PROTECTION WILL LIKELY BECOME
IMPASSABLE THIS EVENING AND TONIGHT.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 10 TO 15 MPH SHOULD CONTINUE OVER
SOUTHEAST LOUISIANA TODAY...THEN INCREASE LATE THIS AFTERNOON
AND CONTINUING TONIGHT. TROPICAL STORM FORCE WINDS ARE LIKELY TO
OVERSPREAD THE COASTAL AREAS THIS EVENING AND THE REMAINDER OF THE
INLAND AREAS BY DAYBREAK MONDAY. DAMAGING WIND GUSTS ASSOCIATED WITH
A MAJOR HURRICANE ARE LIKELY TO OVERSPREAD THE AREA MONDAY.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF
15 INCHES...ARE POSSIBLE NORTH AND SOUTH OF LAKE PONTCHARTRAIN
AND THE MISSISSIPPI COAST.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 1030 AM CDT.

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WWUS74 KLIX 281550
NPWLIX

URGENT - WEATHER MESSAGE
NATIONAL WEATHER SERVICE NEW ORLEANS LA
1011 AM CDT SUN AUG 28 2005

...DEVASTATING DAMAGE EXPECTED...

.HURRICANE KATRINA...A MOST POWERFUL HURRICANE WITH UNPRECEDENTED STRENGTH...RIVALING THE INTENSITY OF HURRICANE CAMILLE OF 1969.

MOST OF THE AREA WILL BE UNINHABITABLE FOR WEEKS...PERHAPS LONGER. AT LEAST ONE HALF OF WELL CONSTRUCTED HOMES WILL HAVE ROOF AND WALL FAILURE. ALL GABLED ROOFS WILL FAIL...LEAVING THOSE HOMES SEVERELY DAMAGED OR DESTROYED.

THE MAJORITY OF INDUSTRIAL BUILDINGS WILL BECOME NON FUNCTIONAL. PARTIAL TO COMPLETE WALL AND ROOF FAILURE IS EXPECTED. ALL WOOD FRAMED LOW RISING APARTMENT BUILDINGS WILL BE DESTROYED. CONCRETE BLOCK LOW RISE APARTMENTS WILL SUSTAIN MAJOR DAMAGE...INCLUDING SOME WALL AND ROOF FAILURE.

HIGH RISE OFFICE AND APARTMENT BUILDINGS WILL SWAY DANGEROUSLY...A FEW TO THE POINT OF TOTAL COLLAPSE. ALL WINDOWS WILL BLOW OUT.

AIRBORNE DEBRIS WILL BE WIDESPREAD...AND MAY INCLUDE HEAVY ITEMS SUCH AS HOUSEHOLD APPLIANCES AND EVEN LIGHT VEHICLES. SPORT UTILITY VEHICLES AND LIGHT TRUCKS WILL BE MOVED. THE BLOWN DEBRIS WILL CREATE ADDITIONAL DESTRUCTION. PERSONS...PETS...AND LIVESTOCK EXPOSED TO THE WINDS WILL FACE CERTAIN DEATH IF STRUCK.

POWER OUTAGES WILL LAST FOR WEEKS...AS MOST POWER POLES WILL BE DOWN AND TRANSFORMERS DESTROYED. WATER SHORTAGES WILL MAKE HUMAN SUFFERING INCREDIBLE BY MODERN STANDARDS.

THE VAST MAJORITY OF NATIVE TREES WILL BE SNAPPED OR UPROOTED. ONLY THE HEARTIEST WILL REMAIN STANDING...BUT BE TOTALLY DEFOLIATED. FEW CROPS WILL REMAIN. LIVESTOCK LEFT EXPOSED TO THE WINDS WILL BE KILLED.

AN INLAND HURRICANE WIND WARNING IS ISSUED WHEN SUSTAINED WINDS NEAR HURRICANE FORCE...OR FREQUENT GUSTS AT OR ABOVE HURRICANE FORCE...ARE CERTAIN WITHIN THE NEXT 12 TO 24 HOURS.

ONCE TROPICAL STORM AND HURRICANE FORCE WINDS ONSET...DO NOT VENTURE OUTSIDE!

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WTUS84 KLIX 281521
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-281900-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
1015 AM CDT SUN AUG 28 2005

...HURRICANE KATRINA NOW A CATEGORY 5 HURRICANE PACKING SUSTAINED WINDS OF 175 MPH...

...DIRECT STRIKE OF POTENTIALLY CATASTROPHIC AND LIFE THREATENING HURRICANE EXPECTED...

...RUSH PROTECTIVE MEASURES TO COMPLETION AND LEAVE THE AREA NOW!...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...DANGEROUS HURRICANE KATRINA MOVING WEST NORTHWEST IN THE GULF OF MEXICO...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE... LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

...STORM INFORMATION...
AT 10 AM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 26.0 NORTH...LONGITUDE 88.1 WEST OR ABOUT 225 MILES SOUTHEAST OF THE MOUTH OF THE MISSISSIPPI RIVER.

MAXIMUM SUSTAINED WINDS ARE NEAR 175 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FIVE HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME MINOR FLUCTUATIONS IN STRENGTH IS POSSIBLE DURING THE NEXT 24 HOURS. HOWEVER...KATRINA IS EXPECTED TO MAKE LANDFALL AT A CATEGORY 5 HURRICANE PACKING SUSTAINED 160 MPH WINDS. HURRICANE KATRINA IS MOVING TOWARD THE WEST-NORTHWEST NEAR 12 MPH AND A GRADUAL TURN TOWARD THE NORTHWEST IS EXPECTED LATER TODAY.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
PROTECT YOU AND YOUR FAMILYS LIVES. FOLLOW LOCAL EMERGENCY MANAGERS RECOMMENDATIONS AND LEAVE HURRICANE WARNING AREA NOW BEFORE WEATHER CONDITIONS WORSEN. RESIDENTS OF SOUTHEAST LOUISIANA AND COASTAL

MISSISSIPPI SHOULD RUSH PREPARATIONS FOR THE LANDFALL OF A CATASTROPHIC HURRICANE LATER TONIGHT AND EARLY MONDAY...WITH DAMAGING HURRICANE FORCE WINDS AND HIGH STORM SURGE.

MANDATORY EVACUATION ORDERS ARE IN EFFECT FOR MOST SOUTHEAST LOUISIANA PARISHES AND COASTAL MISSISSIPPI COUNTIES. RESIDENTS SHOULD FOLLOW EVACUATION RECOMMENDATIONS FROM LOCAL PARISH OFFICIALS.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A CATASTROPHIC LIFE THREATENING HURRICANE. WHILE EXACT LOCATION LANDFALL IS UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 18 TO 22 FEET ABOVE NORMAL IS POSSIBLE NEAR AND TO THE RIGHT OF THE LANDFALL AREA. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS HIGH AS 25 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. RESIDENTS IN AREAS PRONE TO STORM SURGE FLOODING SHOULD LEAVE NOW! HEED EVACUATION RECOMMENDATION FROM LOCAL EMERGENCY MANAGEMENT OFFICIALS. SECONDARY ROADS OUTSIDE LEVEE PROTECTION WILL LIKELY BECOME IMPASSABLE THIS EVENING AND TONIGHT.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 20 TO 25 MPH SHOULD CONTINUE OVER THE REGION TODAY...THEN INCREASE LATE THIS AFTERNOON AND CONTINUING TONIGHT. TROPICAL STORM FORCE WINDS ARE LIKELY TO OVERSPREAD THE COASTAL AREAS THIS EVENING AND THE REMAINDER OF THE INLAND AREAS BY EARLY MONDAY MORNING. HURRICANE FORCE WINDS ARE LIKELY TO BEGIN BY MIDNIGHT AND MOVE INLAND MONDAY MORNING AND AFTERNOON.

KATRINA IS FORECAST TO MOVE ASHORE AS CATEGORY FIVE HURRICANE... SIMILAR IN STRENGTH TO HURRICANE CAMILLE IN 1969. WINDS ASSOCIATED CATEGORY 4 AND CATEGORY 5 HURRICANE CAN TOTALLY DESTROY MOBILE HOMES...AND CAUSE MAJOR DAMAGE TO EVEN WELL CONSTRUCTED BUILDINGS. HIGHER WIND SPEEDS ARE LIKELY TO BE EXPERIENCED ON UPPER FLOORS OF TALL BUILDINGS CAUSING DAMAGE.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE NORTH AND SOUTH OF LAKE PONTCHARTRAIN AND THE MISSISSIPPI COAST.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 130 PM CDT.

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WTUS84 KLIX 281903
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-282230-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
200 PM CDT SUN AUG 28 2005

...DIRECT STRIKE OF POTENTIALLY CATASTROPHIC AND LIFE THREATENING HURRICANE EXPECTED...

...RUSH PROTECTIVE MEASURES TO COMPLETION AND LEAVE THE WARNING AREA NOW!...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...DANGEROUS HURRICANE KATRINA MOVING WEST NORTHWEST IN THE GULF OF MEXICO...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

...STORM INFORMATION...
AT 100 PM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 26.5 NORTH...LONGITUDE 88.6 WEST OR ABOUT 225 MILES SOUTHEAST OF THE MOUTH OF THE MISSISSIPPI RIVER.

MAXIMUM SUSTAINED WINDS ARE NEAR 175 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FIVE HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME MINOR FLUCTUATIONS IN STRENGTH IS POSSIBLE DURING THE NEXT 24 HOURS. HOWEVER...KATRINA IS EXPECTED TO MAKE LANDFALL AT A CATEGORY 5 HURRICANE PACKING SUSTAINED 160 MPH WINDS. HURRICANE KATRINA IS MOVING TOWARD THE WEST-NORTHWEST NEAR 12 MPH AND A GRADUAL TURN TOWARD THE NORTHWEST IS EXPECTED LATER TODAY.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
PROTECT YOU AND YOUR FAMILY. FOLLOW LOCAL EMERGENCY MANAGERS RECOMMENDATIONS AND LEAVE HURRICANE WARNING AREA NOW BEFORE WEATHER CONDITIONS WORSEN. RESIDENTS OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI SHOULD RUSH PREPARATIONS FOR THE LANDFALL OF A CATASTROPHIC HURRICANE LATER TONIGHT AND EARLY MONDAY...WITH DAMAGING HURRICANE FORCE WINDS AND HIGH STORM SURGE.

MANDATORY EVACUATION ORDERS ARE IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA PARISHES AND COASTAL MISSISSIPPI COUNTIES. RESIDENTS SHOULD FOLLOW EVACUATION RECOMMENDATIONS FROM LOCAL OFFICIALS.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A CATASTROPHIC LIFE THREATENING HURRICANE. WHILE EXACT LOCATION LANDFALL IS UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 18 TO 22 FEET ABOVE NORMAL IS POSSIBLE NEAR AND TO THE RIGHT OF THE LANDFALL AREA. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS HIGH AS 25 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. RESIDENTS IN AREAS PRONE TO STORM SURGE FLOODING SHOULD LEAVE NOW! HEED EVACUATION RECOMMENDATION FROM LOCAL EMERGENCY MANAGEMENT OFFICIALS. SECONDARY ROADS OUTSIDE LEVEE PROTECTION WILL LIKELY BECOME IMPASSABLE THIS EVENING AND TONIGHT.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 20 TO 30 MPH SHOULD CONTINUE OVER THE REGION...THEN INCREASE LATE THIS AFTERNOON AND CONTINUING TONIGHT. TROPICAL STORM FORCE WINDS ARE LIKELY TO OVERSPREAD THE COASTAL AREAS LATE THIS AFTERNOON THE REMAINDER OF THE AREA THIS EVENING. HURRICANE FORCE WINDS ARE LIKELY TO BEGIN BY MIDNIGHT AND MOVE INLAND MONDAY MORNING AND AFTERNOON.

KATRINA IS FORECAST TO MOVE ASHORE AS CATEGORY FIVE HURRICANE... SIMILAR IN STRENGTH TO HURRICANE CAMILLE IN 1969. WINDS ASSOCIATED CATEGORY 4 AND CATEGORY 5 HURRICANE CAN TOTALLY DESTROY MOBILE HOMES...AND WEAKEN CAUSE MAJOR DAMAGE TO EVEN WELL CONSTRUCTED BUILDINGS. HIGHER WIND SPEEDS ARE LIKELY TO BE EXPERIENCED ON UPPER FLOORS OF TALL BUILDINGS CAUSING DAMAGE.

...TORNADOES...
THE THREAT FOR TORNADOES WILL DEVELOP OVER EXTREME SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI LATE TONIGHT AND MONDAY MORNING.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE NORTH AND SOUTH OF LAKE PONTCHARTRAIN AND THE MISSISSIPPI COAST.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 530 PM CDT.

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WTUS84 KLIX 282242
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-290100-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
545 PM CDT SUN AUG 28 2005

...DIRECT STRIKE OF POTENTIALLY CATASTROPHIC AND LIFE THREATENING HURRICANE EXPECTED LATE TONIGHT AND EARLY MONDAY...

...RUSH PROTECTIVE MEASURES TO COMPLETION...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...SQUALLS SPREADING OVER SOUTHEAST LOUISIANA WITH CONDITIONS DETERIORATING THIS EVENING...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST.

A TORNADO WATCH IS IN EFFECT THROUGH 200 AM MONDAY.

...STORM INFORMATION...
AT 400 PM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 26.9 NORTH...LONGITUDE 89.0 WEST OR ABOUT 150 MILES SOUTHEAST OF THE MOUTH OF THE MISSISSIPPI RIVER.

MAXIMUM SUSTAINED WINDS ARE NEAR 165 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FIVE HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME MINOR FLUCTUATIONS IN STRENGTH IS POSSIBLE DURING THE NEXT 24 HOURS. HOWEVER...KATRINA IS EXPECTED TO MAKE LANDFALL AS A CATEGORY FOUR OR FIVE HURRICANE PACKING SUSTAINED 160 MPH WINDS. HURRICANE KATRINA IS MOVING TOWARD THE WEST-NORTHWEST NEAR 12 MPH AND A GRADUAL TURN TOWARD THE NORTHWEST IS EXPECTED LATER TODAY.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
PROTECT YOU AND YOUR FAMILY. FOLLOW LOCAL EMERGENCY MANAGERS RECOMMENDATIONS AND LEAVE HURRICANE WARNING AREA IF POSSIBLE BEFORE

WEATHER CONDITIONS WORSEN.

MANDATORY EVACUATION ORDERS ARE IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA PARISHES AND COASTAL MISSISSIPPI COUNTIES. SOME PARISHES AND COUNTIES HAVE OPENED SHELTER OF LAST RESORT. RESIDENTS SHOULD FOLLOW EVACUATION RECOMMENDATIONS FROM LOCAL OFFICIALS AND LOCATIONS OF SHELTER OF LAST RESORT.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A CATASTROPHIC AND LIFE THREATENING HURRICANE. WHILE EXACT LANDFALL OF LANDFALL IS UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 18 TO 22 FEET ABOVE NORMAL. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS HIGH AS 28 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. SECONDARY ROADS OUTSIDE LEVEE PROTECTION WILL LIKELY BECOME IMPASSABLE THIS EVENING AND TONIGHT.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 25 TO 35 MPH SHOULD CONTINUE OVER THE COASTAL AREA THIS EVENING AND SPREAD INLAND. KATRINA HAS EVOLVED INTO A LARGE HURRICANE WITH HURRICANE FORCE WINDS EXTENDING AROUND 100 MILES FROM THE CENTER. HURRICANE FORCE WINDS WILL SPREAD INTO COASTAL SOUTHEAST LOUISIANA SHORTLY BEFORE MIDNIGHT AND INTO MUCH OF THE REMAINDER AREA BY 400 AM CDT. HURRICANE FORCE WINDS WILL PERSIST OVER MUCH OF THE REGION THROUGH EARLY MONDAY AFTERNOON.

KATRINA IS FORECAST TO MOVE ASHORE AS CATEGORY FIVE HURRICANE... SIMILAR IN STRENGTH TO HURRICANE CAMILLE IN 1969. WINDS ASSOCIATED CATEGORY 4 AND CATEGORY 5 HURRICANE CAN TOTALLY DESTROY MOBILE HOMES AND POORLY CONSTRUCTED DWELLINGS...AND CAUSE MAJOR DAMAGE TO EVEN WELL CONSTRUCTED BUILDINGS. HIGHER WIND SPEEDS WILL BE SIGNIFICANTLY STRONGER ON UPPER FLOORS OF TALL BUILDINGS CAUSING DAMAGE.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED FOR MUCH OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FOR THIS EVENING DUE TO THE THREAT OF TORNADOES. THE THREAT OF TORNADOES WILL CONTINUE THROUGHOUT THE NIGHT ACROSS THE AREA.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 800 PM CDT.

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WTUS84 KLIX 290100
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-290400-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
800 PM CDT SUN AUG 28 2005

...DIRECT STRIKE OF POTENTIALLY CATASTROPHIC AND LIFE THREATENING HURRICANE EXPECTED LATE TONIGHT AND EARLY MONDAY...

...RUSH PROTECTIVE MEASURES TO COMPLETION...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...SQUALLS SPREADING OVER SOUTHEAST LOUISIANA WITH CONDITIONS DETERIORATING THIS EVENING...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST.

A FLOOD WATCH IS IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA AND EXTREME SOUTHERN MISSISSIPPI TONIGHT.

A TORNADO WATCH IS IN EFFECT THROUGH 200 AM MONDAY.

...STORM INFORMATION...
AT 700 PM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 27.2 NORTH...LONGITUDE 89.1 WEST OR ABOUT 130 MILES SOUTH OF THE MOUTH OF THE MISSISSIPPI RIVER.

MAXIMUM SUSTAINED WINDS ARE NEAR 160 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FIVE HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME MINOR FLUCTUATIONS IN STRENGTH IS POSSIBLE DURING THE NEXT 24 HOURS. HOWEVER...KATRINA IS EXPECTED TO MAKE LANDFALL AS A CATEGORY FOUR OR FIVE HURRICANE PACKING SUSTAINED 160 MPH WINDS. HURRICANE KATRINA IS MOVING TOWARD THE NORTH NORTHWEST NEAR 11 MPH AND A GRADUAL TURN TOWARD THE NORTH IS EXPECTED LATER TONIGHT AND MONDAY.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
PROTECT YOU AND YOUR FAMILY. FOLLOW LOCAL EMERGENCY MANAGERS RECOMMENDATIONS AND LEAVE HURRICANE WARNING AREA IF POSSIBLE BEFORE WEATHER CONDITIONS WORSEN.

MANDATORY EVACUATION ORDERS ARE IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA PARISHES AND COASTAL MISSISSIPPI COUNTIES. SOME PARISHES AND COUNTIES HAVE OPENED SHELTER OF LAST RESORT. RESIDENTS SHOULD FOLLOW EVACUATION RECOMMENDATIONS FROM LOCAL OFFICIALS AND LOCATIONS OF SHELTER OF LAST RESORT.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A CATASTROPHIC AND LIFE THREATENING HURRICANE. WHILE EXACT LANDFALL OF LANDFALL IS UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 18 TO 22 FEET ABOVE NORMAL. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS HIGH AS 28 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. SECONDARY ROADS OUTSIDE LEVEE PROTECTION WILL LIKELY BECOME IMPASSABLE THIS EVENING AND TONIGHT.

...WIND IMPACTS...
EAST TO NORTHEAST WIND OF 25 TO 35 MPH SHOULD CONTINUE OVER THE COASTAL AREA THIS EVENING AND SPREAD INLAND. KATRINA HAS EVOLVED INTO A LARGE HURRICANE WITH HURRICANE FORCE WINDS EXTENDING AROUND 100 MILES FROM THE CENTER. HURRICANE FORCE WINDS WILL SPREAD INTO COASTAL SOUTHEAST LOUISIANA SHORTLY BEFORE MIDNIGHT AND INTO MUCH OF THE REMAINDER AREA BY 400 AM CDT. HURRICANE FORCE WINDS WILL PERSIST OVER MUCH OF THE REGION THROUGH EARLY MONDAY AFTERNOON.

KATRINA IS FORECAST TO MOVE ASHORE AS CATEGORY FIVE HURRICANE... SIMILAR IN STRENGTH TO HURRICANE CAMILLE IN 1969. WINDS ASSOCIATED CATEGORY 4 AND CATEGORY 5 HURRICANE CAN TOTALLY DESTROY MOBILE HOMES AND POORLY CONSTRUCTED DWELLINGS...AND CAUSE MAJOR DAMAGE TO EVEN WELL CONSTRUCTED BUILDINGS. HIGHER WIND SPEEDS WILL BE SIGNIFICANTLY STRONGER ON UPPER FLOORS OF TALL BUILDINGS CAUSING DAMAGE.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED FOR MUCH OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FOR THIS EVENING DUE TO THE THREAT OF TORNADOES. THE THREAT OF TORNADOES WILL CONTINUE THROUGHOUT THE NIGHT ACROSS THE AREA.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 1030 PM CDT.

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WTUS84 KLIX 290334
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-290800-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
1030 PM CDT SUN AUG 28 2005

...DIRECT STRIKE OF POTENTIALLY CATASTROPHIC AND LIFE THREATENING HURRICANE EXPECTED LATE TONIGHT AND EARLY MONDAY...

...RUSH PROTECTIVE MEASURES TO COMPLETION...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...HURRICANE FORCE WINDS EXPECTED ALONG SOUTHEAST LOUISIANA COAST AROUND MIDNIGHT THEN SPREADING INLAND...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST.

A FLOOD WATCH IS IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA AND EXTREME SOUTHERN MISSISSIPPI TONIGHT.

A TORNADO WATCH IS IN EFFECT THROUGH 200 AM MONDAY.

...STORM INFORMATION...
AT 1000 PM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 27.6 NORTH...LONGITUDE 89.4 WEST OR ABOUT 105 MILES SOUTH SOUTHEAST OF NEW ORLEANS.

MAXIMUM SUSTAINED WINDS ARE NEAR 160 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FIVE HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME FLUCTUATIONS IN STRENGTH ARE LIKELY AS THE HURRICANE APPROACHES THE COAST. KATRINA IS EXPECTED TO MAKE LANDFALL AS A CATEGORY FOUR OR FIVE HURRICANE PACKING SUSTAINED 160 MPH WINDS. HURRICANE KATRINA IS MOVING TOWARD THE NORTH NORTHWEST NEAR 10 MPH AND A GRADUAL TURN TOWARD THE NORTH IS EXPECTED LATER TONIGHT AND MONDAY.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
PROTECT YOU AND YOUR FAMILY. FOLLOW LOCAL EMERGENCY MANAGERS RECOMMENDATIONS. WITH THE APPROACH OF HURRICANE FORCE WINDS AND HEAVY SQUALLS PEOPLE ARE URGED TO SEEK REFUGE OF LAST RESORT IN STRONG REINFORCED BUILDINGS. IF LIFE THREATENING STORM SURGE FLOODING DEVELOPS...MOVE TO HIGHER FLOORS OR HOUSE ATTICS. BRING TOOLS TO MAKE AN EMERGENCY EXIT SHOULD THESE HIGHER FLOORS OR ATTICS BECOME INUNDATED.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A CATASTROPHIC AND LIFE THREATENING HURRICANE. WHILE EXACT LANDFALL OF LANDFALL IS UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 18 TO 22 FEET ABOVE NORMAL. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS HIGH AS 28 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. SECONDARY ROADS ALONG THE COAST AND OUTSIDE LEVEE PROTECTION AREA WILL BECOME IMPASSABLE IN THE NEXT SEVERAL HOURS.

...WIND IMPACTS...
KATRINA HAS EVOLVED INTO A LARGE HURRICANE WITH HURRICANE FORCE WINDS EXTENDING AROUND 100 MILES FROM THE CENTER. TROPICAL STORM FORCE WINDS ARE OCCURRING OVER MUCH OF THE COASTAL AREA. HURRICANE FORCE WINDS WILL SPREAD INTO COASTAL SOUTHEAST LOUISIANA SHORTLY BEFORE MIDNIGHT AND INTO MUCH OF THE REMAINDER AREA BY 400 AM CDT. HURRICANE FORCE WINDS WILL PERSIST OVER MUCH OF THE REGION THROUGH EARLY MONDAY AFTERNOON.

KATRINA IS FORECAST TO MOVE ASHORE AS A CATEGORY FOUR OR FIVE HURRICANE...SIMILAR IN STRENGTH TO HURRICANE CAMILLE IN 1969. WINDS ASSOCIATED CATEGORY 4 AND CATEGORY 5 HURRICANE CAN TOTALLY DESTROY MOBILE HOMES AND POORLY CONSTRUCTED DWELLINGS...AND CAUSE MAJOR DAMAGE TO EVEN WELL CONSTRUCTED BUILDINGS. HIGHER WIND SPEEDS WILL BE SIGNIFICANTLY STRONGER ON UPPER FLOORS OF TALL BUILDINGS CAUSING DAMAGE.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED FOR MUCH OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FOR THIS EVENING DUE TO THE THREAT OF TORNADOES. THE THREAT OF TORNADOES WILL CONTINUE THROUGHOUT THE NIGHT ACROSS THE AREA.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 230 AM CDT.

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WTUS84 KLIX 290739
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-291000-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
240 AM CDT MON AUG 29 2005

...DIRECT STRIKE OF POTENTIALLY CATASTROPHIC AND LIFE THREATENING HURRICANE EXPECTED LATE TONIGHT AND EARLY MONDAY...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...HURRICANE FORCE WINDS SPREADING INLAND ACROSS SOUTHEAST LOUISIANA...

...TIDES RAPIDLY INCREASING ALONG THE LOUISIANA AND MISSISSIPPI COAST...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST.

A FLOOD WATCH IS IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA AND EXTREME SOUTHERN MISSISSIPPI TONIGHT.

A TORNADO WATCH IS IN EFFECT THROUGH 12 PM CDT.

...STORM INFORMATION...
AT 2 PM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 28.2 NORTH...LONGITUDE 89.6 WEST OR ABOUT 130 MILES SOUTH SOUTHEAST OF NEW ORLEANS.

MAXIMUM SUSTAINED WINDS ARE NEAR 155 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FOUR HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME FLUCTUATIONS IN STRENGTH ARE LIKELY AS THE HURRICANE APPROACHES THE COAST. KATRINA IS EXPECTED TO MAKE LANDFALL AS A CATEGORY FOUR OR FIVE HURRICANE PACKING SUSTAINED 160 MPH WINDS. HURRICANE KATRINA IS MOVING TOWARD THE NORTH AT 12 MPH.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
PROTECT YOU AND YOUR FAMILY. FOLLOW LOCAL EMERGENCY MANAGERS RECOMMENDATIONS. WITH THE APPROACH OF HURRICANE FORCE WINDS AND HEAVY SQUALLS PEOPLE ARE URGED TO SEEK REFUGE OF LAST RESORT IN STRONG...WELL CONSTRUCTED BUILDINGS. IF LIFE THREATENING STORM SURGE FLOODING DEVELOPS...MOVE TO HIGHER FLOORS OR HOUSE ATTICS. BRING TOOLS TO MAKE AN EMERGENCY EXIT SHOULD THESE HIGHER FLOORS OR ATTICS BECOME INUNDATED.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A CATASTROPHIC AND LIFE THREATENING HURRICANE. WHILE EXACT LANDFALL OF LANDFALL IS UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 18 TO 22 FEET ABOVE NORMAL. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS HIGH AS 28 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. SEVERE TIDAL FLOODING...WILL ALSO DEVELOP OVER THE TIDAL LAKES OF PONTCHARTRAIN AND MAUREPAS INUNDATING LOW LYING AREAS SURROUNDING THE LAKES.

TIDES ARE RAPIDLY INCREASING ALONG THE SOUTHEAST LOUISIANA COAST... THREE TO FIVE FEET ABOVE NORMAL...WITH SOME LOCATIONS NEAR SEVEN FEET ABOVE NORMAL. SEVERE TIDAL FLOODING WILL BEGIN TO DEVELOP OVER THE AREA ALONG THE COAST AND TIDAL LAKES.

...WIND IMPACTS...
KATRINA HAS EVOLVED INTO A LARGE HURRICANE WITH HURRICANE FORCE WINDS EXTENDING AROUND 100 MILES FROM THE CENTER. TROPICAL STORM FORCE WINDS ARE OCCURRING OVER MUCH OF THE COASTAL AREA. HURRICANE FORCE WINDS ARE SPREADING INTO COASTAL SOUTHEAST LOUISIANA AT THIS TIME AND WILL MOVE INTO NEW ORLEANS AREA IN THE NEXT SEVERAL HOURS. POWER OUTAGES WILL BEGIN TO DEVELOP AND BECOME WIDESPREAD. HURRICANE FORCE WINDS WILL PERSIST OVER MUCH OF THE REGION THROUGH EARLY MONDAY AFTERNOON.

KATRINA IS FORECAST TO MOVE ASHORE AS A CATEGORY FOUR OR FIVE HURRICANE...SIMILAR IN STRENGTH TO HURRICANE CAMILLE IN 1969. WINDS ASSOCIATED CATEGORY 4 AND CATEGORY 5 HURRICANE CAN TOTALLY DESTROY MOBILE HOMES AND POORLY CONSTRUCTED DWELLINGS...AND CAUSE MAJOR DAMAGE TO EVEN WELL CONSTRUCTED BUILDINGS. HIGHER WIND SPEEDS WILL BE SIGNIFICANTLY STRONGER ON UPPER FLOORS OF TALL BUILDINGS CAUSING DAMAGE.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED FOR MUCH OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI DUE TO THE THREAT OF TORNADOES.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 430 AM CDT.

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WTUS84 KLIX 290839 CCA
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-291000-

HURRICANE KATRINA LOCAL STATEMENT...CORRECTION
NATIONAL WEATHER SERVICE NEW ORLEANS LA
240 AM CDT MON AUG 29 2005

...DIRECT STRIKE OF POTENTIALLY CATASTROPHIC AND LIFE THREATENING HURRICANE EXPECTED LATE TONIGHT AND EARLY MONDAY...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...HURRICANE FORCE WINDS SPREADING INLAND ACROSS SOUTHEAST LOUISIANA...

...TIDES RAPIDLY INCREASING ALONG THE LOUISIANA AND MISSISSIPPI COAST...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST.

A FLOOD WATCH IS IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA AND EXTREME SOUTHERN MISSISSIPPI TONIGHT.

A TORNADO WATCH IS IN EFFECT THROUGH 12 PM CDT.

...STORM INFORMATION...
AT 2 AM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 28.2 NORTH...LONGITUDE 89.6 WEST OR ABOUT 130 MILES SOUTH SOUTHEAST OF NEW ORLEANS.

MAXIMUM SUSTAINED WINDS ARE NEAR 155 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FOUR HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME FLUCTUATIONS IN STRENGTH ARE LIKELY AS THE HURRICANE APPROACHES THE COAST. KATRINA IS EXPECTED TO MAKE LANDFALL AS A CATEGORY FOUR OR FIVE HURRICANE PACKING SUSTAINED 160 MPH WINDS. HURRICANE KATRINA IS MOVING TOWARD THE NORTH AT 12 MPH.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
PROTECT YOU AND YOUR FAMILY. FOLLOW LOCAL EMERGENCY MANAGERS RECOMMENDATIONS. WITH THE APPROACH OF HURRICANE FORCE WINDS AND HEAVY SQUALLS PEOPLE ARE URGED TO SEEK REFUGE OF LAST RESORT IN STRONG...WELL CONSTRUCTED BUILDINGS. IF LIFE THREATENING STORM SURGE FLOODING DEVELOPS...MOVE TO HIGHER FLOORS OR HOUSE ATTICS. BRING TOOLS TO MAKE AN EMERGENCY EXIT SHOULD THESE HIGHER FLOORS OR ATTICS BECOME INUNDATED.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A CATASTROPHIC AND LIFE THREATENING HURRICANE. WHILE EXACT LANDFALL OF LANDFALL IS UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 18 TO 22 FEET ABOVE NORMAL. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS HIGH AS 28 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. SEVERE TIDAL FLOODING...WILL ALSO DEVELOP OVER THE TIDAL LAKES OF PONTCHARTRAIN AND MAUREPAS INUNDATING LOW LYING AREAS SURROUNDING THE LAKES.

TIDES ARE RAPIDLY INCREASING ALONG THE SOUTHEAST LOUISIANA COAST... THREE TO FIVE FEET ABOVE NORMAL...WITH SOME LOCATIONS NEAR SEVEN FEET ABOVE NORMAL. SEVERE TIDAL FLOODING WILL BEGIN TO DEVELOP OVER THE AREA ALONG THE COAST AND TIDAL LAKES.

...WIND IMPACTS...
KATRINA HAS EVOLVED INTO A LARGE HURRICANE WITH HURRICANE FORCE WINDS EXTENDING AROUND 100 MILES FROM THE CENTER. TROPICAL STORM FORCE WINDS ARE OCCURRING OVER MUCH OF THE COASTAL AREA. HURRICANE FORCE WINDS ARE SPREADING INTO COASTAL SOUTHEAST LOUISIANA AT THIS TIME AND WILL MOVE INTO NEW ORLEANS AREA IN THE NEXT SEVERAL HOURS. POWER OUTAGES WILL BEGIN TO DEVELOP AND BECOME WIDESPREAD. HURRICANE FORCE WINDS WILL PERSIST OVER MUCH OF THE REGION THROUGH EARLY MONDAY AFTERNOON.

KATRINA IS FORECAST TO MOVE ASHORE AS A CATEGORY FOUR OR FIVE HURRICANE...SIMILAR IN STRENGTH TO HURRICANE CAMILLE IN 1969. WINDS ASSOCIATED CATEGORY 4 AND CATEGORY 5 HURRICANE CAN TOTALLY DESTROY MOBILE HOMES AND POORLY CONSTRUCTED DWELLINGS...AND CAUSE MAJOR DAMAGE TO EVEN WELL CONSTRUCTED BUILDINGS. HIGHER WIND SPEEDS WILL BE SIGNIFICANTLY STRONGER ON UPPER FLOORS OF TALL BUILDINGS CAUSING DAMAGE.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED FOR MUCH OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI DUE TO THE THREAT OF TORNADOES.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 430 AM CDT.

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WTUS84 KLIX 290949
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-291200-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
445 AM CDT MON AUG 29 2005

...DIRECT STRIKE OF POTENTIALLY CATASTROPHIC AND LIFE THREATENING HURRICANE EXPECTED LATE TONIGHT AND EARLY MONDAY...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...WIND GUSTS OVER 100 MPH AT GRAND ISLE LOUISIANA...

...EXTENSIVE AND LIFE THREATENING STORM SURGE FLOODING EXPECTED ALONG THE LOUISIANA AND MISSISSIPPI COAST THIS MORNING...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST.

A FLOOD WATCH IS IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA AND EXTREME SOUTHERN MISSISSIPPI TONIGHT.

A TORNADO WATCH IS IN EFFECT THROUGH 12 PM CDT.

...STORM INFORMATION...
AT 400 AM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 28.8 NORTH...LONGITUDE 89.6 WEST OR ABOUT 90 MILES SOUTH SOUTHEAST OF NEW ORLEANS...AND ABOUT 120 MILES SOUTH SOUTHWEST OF BILOXI. KATRINA IS MOVING NORTH AT NEAR 15 MPH.

MAXIMUM SUSTAINED WINDS ARE NEAR 150 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FOUR HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME FLUCTUATIONS IN STRENGTH ARE LIKELY AS THE HURRICANE APPROACHES THE COAST. KATRINA IS EXPECTED TO MAKE LANDFALL AS A CATEGORY FOUR HURRICANE.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
PROTECT YOU AND YOUR FAMILY. FOLLOW THE RECOMMENDATIONS OF LOCAL EMERGENCY MANAGERS. WITH THE APPROACH OF HURRICANE FORCE WINDS AND HEAVY SQUALLS...PEOPLE ARE URGED TO SEEK REFUGE OF LAST RESORT IN STRONG...WELL CONSTRUCTED BUILDINGS. IF LIFE THREATENING STORM SURGE FLOODING DEVELOPS...MOVE TO HIGHER FLOORS OR HOUSE ATTICS. BRING TOOLS TO MAKE AN EMERGENCY EXIT SHOULD THESE HIGHER FLOORS OR ATTICS BECOME INUNDATED.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS A CATASTROPHIC AND LIFE THREATENING HURRICANE. WHILE EXACT LANDFALL LOCATION IS UNCERTAIN AT THIS TIME...SIGNIFICANT AND LIFE THREATENING STORM SURGE 18 TO 22 FEET ABOVE NORMAL. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS HIGH AS 28 FEET...ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. SEVERE TIDAL FLOODING...WILL ALSO DEVELOP OVER THE TIDAL LAKES OF PONTCHARTRAIN AND MAUREPAS INUNDATING LOW LYING AREAS SURROUNDING THE LAKES.

TIDES ARE RAPIDLY INCREASING ALONG THE SOUTHEAST LOUISIANA COAST... FIVE TO SEVEN FEET ABOVE NORMAL. SEVERE STORM SURGE FLOODING IS EXPECTED DEVELOP THROUGH THE REMAINDER OF THE MORNING ALONG THE COAST AND TIDAL LAKES.

...WIND IMPACTS...
KATRINA HAS EVOLVED INTO A LARGE HURRICANE WITH HURRICANE FORCE WINDS EXTENDING AROUND 100 MILES FROM THE CENTER. TROPICAL STORM FORCE WINDS ARE OCCURRING OVER MUCH OF THE COASTAL AREA. HURRICANE FORCE WINDS ARE SPREADING INTO COASTAL SOUTHEAST LOUISIANA AT THIS TIME AND WILL MOVE INTO NEW ORLEANS AREA AND MISSISSIPPI COAST IN THE NEXT FEW HOURS. POWER OUTAGES WILL BEGIN TO DEVELOP AND BECOME WIDESPREAD. HURRICANE FORCE WINDS WILL PERSIST OVER MUCH OF THE REGION THROUGH EARLY MONDAY AFTERNOON. AROUND 400 AM THIS MORNING WIND GUSTS AROUND 102 MPH AT GRAND ISLE LOUISIANA.

WINDS ASSOCIATED WITH CATEGORY 4 HURRICANES CAN TOTALLY DESTROY MOBILE HOMES AND POORLY CONSTRUCTED DWELLINGS...AND CAN CAUSE MAJOR DAMAGE TO EVEN WELL CONSTRUCTED BUILDINGS. HIGHER WIND SPEEDS WILL BE SIGNIFICANTLY STRONGER ON UPPER FLOORS OF TALL BUILDINGS CAUSING DAMAGE.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED FOR MUCH OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI DUE TO THE THREAT OF TORNADOES.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 630 AM CDT.

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WTUS84 KLIX 291138
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-291400-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
630 AM CDT MON AUG 29 2005

...EXTREMELY DANGEROUS HURRICANE PREPARING TO MOVE ACROSS
EXTREME SOUTHEAST LOUISIANA...THEN HEADING TOWARD COASTAL
MISSISSIPPI...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL
MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...EXTENSIVE AND LIFE THREATENING STORM SURGE FLOODING EXPECTED ALONG
THE LOUISIANA AND MISSISSIPPI COAST THIS MORNING AND EARLY
AFTERNOON...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE
ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS
AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE
COAST.

A FLOOD WATCH IS IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA AND
EXTREME SOUTHERN MISSISSIPPI TONIGHT.

A TORNADO WATCH IS IN EFFECT THROUGH 12 PM CDT.

...STORM INFORMATION...
AT 600 AM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR
LATITUDE 29.1 NORTH...LONGITUDE 89.6 WEST. THIS LOCATION WAS ABOUT 70
MILES SOUTH SOUTHEAST OF NEW ORLEANS OR ABOUT 95 MILES SOUTH
SOUTHWEST OF BILOXI.

MAXIMUM SUSTAINED WINDS ARE NEAR 145 MPH...WITH HIGHER GUSTS.
HURRICANE KATRINA IS A CATEGORY FOUR HURRICANE ON THE SAFFIR
SIMPSON SCALE. SOME FLUCTUATIONS IN STRENGTH ARE LIKELY AS THE
HURRICANE APPROACHES THE COAST. KATRINA IS EXPECTED TO MAKE
LANDFALL AS A CATEGORY FOUR HURRICANE.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
WITH THE ONSET OF HURRICANE FORCE WINDS AND HEAVY SQUALLS...PEOPLE
ARE URGED TO SEEK REFUGE OF LAST RESORT IN STRONG...WELL CONSTRUCTED

BUILDINGS. IF LIFE THREATENING STORM SURGE FLOODING DEVELOPS...MOVE TO HIGHER FLOORS OR HOUSE ATTICS. BRING TOOLS TO MAKE AN EMERGENCY EXIT SHOULD THESE HIGHER FLOORS OR ATTICS BECOME INUNDATED.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS EXPECTED TO MAKE LANDFALL ALONG THE NORTHERN GULF OF MEXICO COAST AS AN EXTREMELY DANGEROUS AND LIFE THREATENING HURRICANE...SIGNIFICANT AND LIFE THREATENING STORM SURGE 18 TO 22 FEET ABOVE NORMAL. A FEW AREAS MAY EXPERIENCE STORM SURGE FLOODING AS HIGH AS 28 FEET...ALONG WITH LARGE AND DANGEROUS BATTERING WAVES NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL. SEVERE TIDAL FLOODING WILL ALSO DEVELOP ALONG LOW LYING AREAS SURROUNDING LAKE PONTCHARTRAIN...WITH SEVERE INUNDATION LIKELY.

TIDES ARE RAPIDLY INCREASING ALONG THE SOUTHEAST LOUISIANA COAST. SEVERE STORM SURGE FLOODING IS EXPECTED DEVELOP THROUGH THE REMAINDER OF THE MORNING...WITH HIGHEST VALUES ALONG THE LOUISIANA COAST EAST OF THE MISSISSIPPI RIVER...MISSISSIPPI COAST...AND ALONG THE SHORE LINE OF LAKE PONTCHARTRAIN AND MAUREPAS.

...WIND IMPACTS...
KATRINA HAS EVOLVED INTO A LARGE HURRICANE WITH HURRICANE FORCE WINDS EXTENDING AROUND 100 MILES FROM THE CENTER. HURRICANE FORCE WINDS ARE OCCURRING OVER SOUTHEAST LOUISIANA AND SPREADING INTO COASTAL MISSISSIPPI. POWER OUTAGES WILL BECOME MORE WIDESPREAD DURING THE MORNING HOURS. HURRICANE FORCE WINDS WILL PERSIST OVER MUCH OF THE REGION THROUGH EARLY MONDAY AFTERNOON. WIND GUST OF 96 MPH WAS RECORDED AT BELLE CHASE NAVAL AIR STATION.

WINDS ASSOCIATED WITH CATEGORY 4 HURRICANES CAN TOTALLY DESTROY MOBILE HOMES AND POORLY CONSTRUCTED DWELLINGS...AND CAN CAUSE MAJOR DAMAGE TO EVEN WELL CONSTRUCTED BUILDINGS. HIGHER WIND SPEEDS WILL BE SIGNIFICANTLY STRONGER ON UPPER FLOORS OF TALL BUILDINGS CAUSING DAMAGE.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED FOR MUCH OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI DUE TO THE THREAT OF TORNADOES.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 830 AM CDT.

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WTUS84 KLIX 291359
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-291600-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
900 AM CDT MON AUG 29 2005

...HURRICANE KATRINA DIRECT HIT FOR NEW ORLEANS AND MISSISSIPPI COAST...

...LEVEES OVERTOPPED IN ORLEANS AND ST BERNARD PARISHES...

...EXTREMELY DANGEROUS HURRICANE MOVING ACROSS NEW ORLEANS AND MISSISSIPPI COAST...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...EXTENSIVE AND LIFE THREATENING STORM SURGE FLOODING OCCURRING ALONG THE LOUISIANA AND MISSISSIPPI COAST AT THIS TIME.

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST.

A FLOOD WATCH IS IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA AND EXTREME SOUTHERN MISSISSIPPI TONIGHT.

A TORNADO WATCH IS IN EFFECT THROUGH 12 PM CDT.

...STORM INFORMATION...
AT 800 AM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 29.7 NORTH...LONGITUDE 89.6 WEST. THIS LOCATION WAS ABOUT EASTERN ST BERNARD AND ORLEANS PARISHES.

MAXIMUM SUSTAINED WINDS ARE NEAR 135 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS A CATEGORY FOUR HURRICANE ON THE SAFFIR SIMPSON SCALE. SOME FLUCTUATIONS IN STRENGTH ARE LIKELY.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
WITH THE ONSET OF HURRICANE FORCE WINDS AND HEAVY SQUALLS...PEOPLE

SHOULD REMAIN IN LAST RESORT REFUGES IN STRONG...WELL CONSTRUCTED BUILDINGS. IF LIFE THREATENING STORM SURGE FLOODING DEVELOPS...MOVE TO HIGHER FLOORS OR HOUSE ATTICS. BRING TOOLS TO MAKE AN EMERGENCY EXIT SHOULD THESE HIGHER FLOORS OR ATTICS BECOME INUNDATED.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA MAKING LANDFALL IN EASTERN NEW ORLEANS AND MISSISSIPPI COAST AREA THIS MORNING. EXTREMELY DANGEROUS AND LIFE THREATENING HURRICANE...SIGNIFICANT AND LIFE THREATENING STORM SURGE 18 TO 22 FEET ABOVE NORMAL IS OCCURRING. LEVEES HAVE BEEN OVERTOPPED IN ORLEANS AND ST BERNARD PARISHES. IN ADDITION DANGEROUS BATTERING WAVES ARE OCCURRING ON TOP OF THE STORM SURGE NEAR THE COAST. SEVERE TIDAL FLOODING WILL CONTINUE IN THESE AREAS. IN ADDITION... SEVERE STORM SURGE FLOODING IS PROBABLY OCCURRING IN SOUTHEAST ST TAMMANY PARISH AND IN HANCOCK...HARRISON AND JACKSON COUNTIES IN COASTAL MISSISSIPPI.

IN ADDITION...A STORM SURGE OF 10 TO 12 FEET WILL BE OCCURRING IN THE SOUTHWEST PART OF LAKE PONTCHARTRAIN AFFECTING THE EAST BANKS OF JEFFERSON...ST CHARLES...ST JOHN THE BAPTIST AND LIVINGSTON PARISHES.

TIDES ARE RAPIDLY INCREASING ALONG THE SOUTHEAST LOUISIANA COAST. SEVERE STORM SURGE FLOODING IS EXPECTED DEVELOP THROUGH THE REMAINDER OF THE MORNING...WITH HIGHEST VALUES ALONG THE LOUISIANA COAST EAST OF THE MISSISSIPPI RIVER...MISSISSIPPI COAST...AND ALONG THE SHORE LINE OF LAKE PONTCHARTRAIN AND MAUREPAS.

...WIND IMPACTS...
KATRINA HAS EVOLVED INTO A LARGE HURRICANE WITH HURRICANE FORCE WINDS EXTENDING AROUND 100 MILES FROM THE CENTER. HURRICANE FORCE WINDS ARE OCCURRING OVER SOUTHEAST LOUISIANA AND SPREADING INTO COASTAL MISSISSIPPI. POWER OUTAGES WILL BECOME MORE WIDESPREAD DURING THE MORNING HOURS. HURRICANE FORCE WINDS WILL PERSIST OVER MUCH OF THE REGION THROUGH EARLY MONDAY AFTERNOON. WIND GUST OF 100 MPH WAS REPORTED BY THE GULFPORT EMERGENCY OPERATIONS CENTER. BELLE CHASSE NAVAL AIR STATION HAD A WIND GUST OF 105 EARLIER THIS MORNING.

WINDS ASSOCIATED WITH STRONG CATEGORY 3 HURRICANES CAN TOTALLY DESTROY MOBILE HOMES AND POORLY CONSTRUCTED DWELLINGS...AND CAUSE MAJOR DAMAGE TO EVEN WELL CONSTRUCTED BUILDINGS. HIGHER WIND SPEEDS WILL BE SIGNIFICANTLY STRONGER ON UPPER FLOORS OF TALL BUILDINGS CAUSING DAMAGE.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED FOR MUCH OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI DUE TO THE THREAT OF TORNADOES.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 1030 AM CDT.

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WTUS84 KLIX 291556
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-291600-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
1052 AM CDT MON AUG 29 2005

...KATRINA BATTERS NEW ORLEANS...SOME LEVEES TOPPED...EXTENSIVE DAMAGE IS OCCURRING...

...KATRINA MAKING SECOND LANDFALL ON MISSISSIPPI COAST....PRODUCING EXTREME DAMAGE...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...EXTENSIVE AND LIFE THREATENING STORM SURGE FLOODING OCCURRING ALONG THE LOUISIANA AND MISSISSIPPI COASTS AT THIS TIME...INCLUDING THE NEW ORLEANS AREA...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST.

A FLOOD WATCH IS IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA AN EXTREME SOUTHERN MISSISSIPPI TONIGHT.

TORNADO WATCHES IN EFFECT FOR COASTAL LOUISIANA AND SOUTH MISSISSIPPI.

...STORM INFORMATION...
AROUND 1030 AM CDT...THE EYE OF HURRICANE KATRINA WAS CENTERED OVER HANCOCK COUNTY MISSISSIPPI AND ST. TAMMANY PARISH LOUISIANA...AND WAS MOVING TOWARD THE NORTH AROUND 17 MPH. THIS MOTION WILL CONTINUE THIS AFTERNOON.

MAXIMUM SUSTAINED WINDS ARE NEAR 125 MPH...WITH HIGHER GUSTS. HURRICANE KATRINA IS NOW A CATEGORY THREE HURRICANE ON THE SAFFIR SIMPSON SCALE...AFTER STRIKING THE SOUTHEAST LOUISIANA COAST NEAR GRAND ISLE AS A CATEGORY FOUR HURRICANE EARLIER THIS MORNING.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
WITH THE ONSET OF HURRICANE FORCE WINDS AND HEAVY SQUALLS...PEOPLE SHOULD REMAIN IN LAST RESORT REFUGES IN STRONG...WELL CONSTRUCTED BUILDINGS. IF LIFE THREATENING STORM SURGE FLOODING DEVELOPS...MOVE TO HIGHER FLOORS OR HOUSE ATTICS. BRING TOOLS TO MAKE AN EMERGENCY EXIT SHOULD THESE HIGHER FLOORS OR ATTICS BECOME INUNDATED.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
KATRINA IS MAKING A SECOND LANDFALL ALONG THE MISSISSIPPI-LOUISIANA BORDER NORTHEAST OF NEW ORLEANS...GENERALLY OVER HANCOCK COUNTY MISSISSIPPI AND ST. TAMMANY PARISH LOUISIANA.

A SIGNIFICANT AND LIFE THREATENING STORM SURGE ESTIMATED AROUND 20 FEET HAS OCCURRED WITH KATRINA...CAUSING LEVEES TO BE OVERTOPPED IN ORLEANS AND ST BERNARD PARISHES. IN ADDITION DANGEROUS BATTERING WAVES ARE OCCURRING ON TOP OF THE STORM SURGE NEAR THE COAST. SEVERE TIDAL FLOODING WILL CONTINUE IN THESE AREAS FOR SEVERAL MORE HOURS. SIGNIFICANT FLOODING IS ALSO OCCURRING ALONG THE MISSISSIPPI GULF COAST OVER HANCOCK...HARRISON AND JACKSON COUNTIES. EXTENSIVE DAMAGE DUE TO THE WIND AND STORM SURGE IS OCCURRING ALONG THE MISSISSIPPI COAST.

IN ADDITION...A STORM SURGE OF 10 TO 12 FEET HAS OCCURRED IN THE SOUTHWEST PART OF LAKE PONTCHARTRAIN AFFECTING THE EAST BANKS OF JEFFERSON...ST CHARLES...ST JOHN THE BAPTIST AND LIVINGSTON PARISHES.

...WIND IMPACTS...
HURRICANE FORCE WINDS ARE OCCURRING OVER SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI...WITH WINDS OVER 100 MPH STILL OCCURRING NEAR THE COAST. POWER OUTAGES ARE OCCURRING...AND WILL BECOME MORE WIDESPREAD DURING THE REST OF THE MORNING. HURRICANE FORCE WINDS WILL PERSIST OVER MUCH OF THE REGION THROUGH EARLY MONDAY AFTERNOON.

WINDS ASSOCIATED WITH STRONG CATEGORY 3 HURRICANES CAN TOTALLY DESTROY MOBILE HOMES AND POORLY CONSTRUCTED DWELLINGS...AND CAUSE MAJOR DAMAGE TO EVEN WELL CONSTRUCTED BUILDINGS. HIGHER WIND SPEEDS WILL BE SIGNIFICANTLY STRONGER ON UPPER FLOORS OF TALL BUILDINGS CAUSING DAMAGE.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED FOR MUCH OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI DUE TO THE THREAT OF TORNADOES.

...RAINFALL...
RAINFALL TOTALS OF 8 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 130 PM CDT.

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WTUS84 KLIX 291759
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-292115-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
100 PM CDT MON AUG 29 2005

...KATRINA BATTERS NEW ORLEANS...SOME LEVEES TOPPED...EXTENSIVE DAMAGE IS OCCURRING...

...HURRICANE WARNING IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...EXTENSIVE AND LIFE THREATENING STORM SURGE FLOODING OCCURRING ALONG THE LOUISIANA AND MISSISSIPPI COASTS AT THIS TIME...INCLUDING THE NEW ORLEANS AREA...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST.

A FLOOD WATCH IS IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA AN EXTREME SOUTHERN MISSISSIPPI TONIGHT.

TORNADO WATCHES IN EFFECT FOR COASTAL LOUISIANA AND SOUTH MISSISSIPPI.

...STORM INFORMATION...
AROUND 1245 PM CDT...THE EYE OF HURRICANE KATRINA WAS CENTERED OVER AND WAS MOVING OUT OF NORTHERN PEARL RIVER COUNTY AND INTO SOUTHERN LAMAR COUNTY NEAR INTERSTATE 55...AND WAS MOVING NORTH NEAR 21 MPH. THIS MOTION WILL CONTINUE DURING THE AFTERNOON.

MAXIMUM SUSTAINED WINDS HAVE DECREASED TO NEAR 105 MPH...WITH HIGHER GUSTS. KATRINA IS NOW A CATEGORY TWO HURRICANE ON THE SAFFIR-SIMPSON SCALE. WINDS AFFECTING THE UPPER FLOORS OF HIGH RISE BUILDINGS ARE SIGNIFICANTLY STRONGER THAN THOSE NEAR GROUND LEVEL. WEAKENING IS FORECAST DURING THE NEXT 24 HOURS AS THE CENTER MOVES OVER LAND.

THE ESTIMATED MINIMUM CENTRAL PRESSURE IS 940 MB...27.76 INCHES.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
WITH THE ONSET OF HURRICANE FORCE WINDS AND HEAVY SQUALLS...PEOPLE SHOULD REMAIN IN LAST RESORT REFUGES IN STRONG...WELL CONSTRUCTED BUILDINGS. IF LIFE THREATENING STORM SURGE FLOODING DEVELOPS...MOVE TO HIGHER FLOORS OR HOUSE ATTICS. BRING TOOLS TO MAKE AN EMERGENCY EXIT SHOULD THESE HIGHER FLOORS OR ATTICS BECOME INUNDATED.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
AS KATRINA DEPARTS...COASTAL STORM SURGE FLOODING ALONG THE NORTHERN AND NORTHEASTERN GULF OF MEXICO COAST WILL BEGIN TO SLOWLY SUBSIDE LATER TODAY. HOWEVER...FOR THE NEW ORLEANS AREA...WATERS WILL NOT SLOWLY SUBSIDE. WIDESPREAD FLOODING HAS OCCURRED. A STORM SURGE OF 10 TO 12 FEET HAS OCCURRED IN THE SOUTHWEST PART OF LAKE PONTCHARTRAIN AFFECTING THE EAST BANKS OF JEFFERSON...ST CHARLES ...ST JOHN THE BAPTIST AND LIVINGSTON PARISHES.

...WIND IMPACTS...
HURRICANE KATRINA CONTINUES TO MOVE INLAND ACROSS SOUTHEAST MISSISSIPPI. HURRICANE FORCE SUSTAINED WINDS WILL PERSISTS ACROSS MUCH OF THE WARNED AREA THROUGH THE AFTERNOON. MAXIMUM WIND GUSTS BETWEEN 100 AND 125 MPH ARE LIKELY TO CONTINUE THIS AFTERNOON...THEN GRADUALLY DIMINISH DURING THE EARLY EVENING HOURS.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED FOR MUCH OF SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI DUE TO THE THREAT OF TORNADOES. TORNADOES ARE LIKELY AROUND KATRINA'S EYEWALL.

...RAINFALL...
RADAR ESTIMATED RAINFALL TOTALS OF 8 TO 10 INCHES HAVE ALREADY OCCURRED OVER HARRISON COUNTY INTO STONE AND PEARL RIVER COUNTIES. ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE ALONG THE PATH OF KATRINA...MAINLY SOUTHEAST OF A LINE FROM BATON ROUGE TO LUMBERTON. WIDESPREAD REPORTS OF MAJOR FLOODING HAVE BEEN REPORTED ACROSS NEW ORLEANS. AN ADDITIONAL ONE TO THREEE INCHES OF RAINFALL ARE POSSIBLE AS KATRINA DEPARTS.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 330 PM CDT.

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WTUS84 KLIX 292008
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LAZ038-040-050-056>070-MSZ080>082-292115-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
305 PM CDT MON AUG 29 2005

...THE CENTER OF HURRICANE KATRINA IS DEPARTING BUT WIDESPREAD DAMAGE AND FLOODING REMAINS IN HER WAKE ACROSS BOTH SOUTHEASTERN LOUISIANA AND SOUTHEASTERN MISSISSIPPI...

...HURRICANE WARNING REMAINS IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST...

...EXTENSIVE AND LIFE THREATENING STORM SURGE FLOODING REMAINS IN PROGRESS AT THIS TIME...ESPECIALLY IN THE NEW ORLEANS AREA...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING REMAINS IN EFFECT FOR AREAS AWAY FROM THE COAST. HOWEVER...THIS PRODUCT WILL LIKELY BE REPLACED BY AN INLAND TROPICAL STORM WARNING AFTER 4 PM CDT.

A FLOOD WATCH IS IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA AN EXTREME SOUTHERN MISSISSIPPI TONIGHT.

TORNADO WATCHES IN EFFECT FOR COASTAL LOUISIANA AND SOUTH MISSISSIPPI.

...STORM INFORMATION...
AT 2 PM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 31.4 NORTH... LONGITUDE 89.6 WEST OR ABOUT 20 MILES WEST-SOUTHWEST OF HATTIESBURG MISSISSIPPI.

KATRINA IS MOVING TOWARD THE NORTH NEAR 18 MPH...AND THIS GENERAL MOTION IS EXPECTED TO CONTINUE THIS EVENING. ON THIS TRACK...THE CENTER WILL CONTINUE MOVING INTO CENTRAL MISSISSIPPI THIS EVENING AND TONIGHT.

MAXIMUM SUSTAINED WINDS HAVE DECREASED TO NEAR 95 MPH...WITH HIGHER GUSTS. KATRINA IS NOW A CATEGORY ONE HURRICANE ON THE SAFFIR-SIMPSON SCALE. WINDS AFFECTING THE UPPER FLOORS OF HIGH RISE BUILDINGS WILL BE SIGNIFICANTLY STRONGER THAN THOSE NEAR GROUND LEVEL. WEAKENING IS FORECAST DURING THE NEXT 24 HOURS AS THE CENTER CONTINUES MOVING OVER LAND. SEE THE INLAND HURRICANE AND TROPICAL STORM WARNING PRODUCT BHMNPWLIX.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 125 MILES FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 230 MILES.

THE ESTIMATED MINIMUM CENTRAL PRESSURE IS 955 MB...28.20 INCHES.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
ALL PRECAUTION AND PREPAREDNESS ACTIVITIES WOULD HAVE BEEN COMPLETED.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
A STORM SURGE OF 10 TO 12 FEET HAS OCCURRED IN THE SOUTHWEST PART OF LAKE PONTCHARTRAIN AFFECTING THE EAST BANKS OF JEFFERSON...ST CHARLES...ST JOHN THE BAPTIST AND LIVINGSTON PARISHES. IN THE NEW ORLEANS AREA...THE WATERS WILL NOT SUBSIDE TODAY. WIDESPREAD FLOODING HAS OCCURRED AND STORM WATER RUNOFF WILL EXACERBATE THE PROBLEM IN THE SHORT-TERM.

...WIND IMPACTS...
HURRICANE KATRINA CONTINUES TO MOVE INLAND ACROSS SOUTHEAST MISSISSIPPI. ALTHOUGH TROPICAL STORM FORCE SUSTAINED WINDS WILL PERSIST ACROSS MUCH OF THE WARNED AREA FOR THE REMAINDER OF THE AFTERNOON...OCCASIONAL MAXIMUM WIND GUSTS FROM BETWEEN 60 TO 80 MPH WILL OCCUR...THEN GRADUALLY DIMINISH DURING THE EARLY EVENING HOURS.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED. THE TORNADO THREAT WILL CONTINUE UNTIL ONE FINAL BACKSIDE RAINBAND EXITS PORTIONS OF SOUTHEAST LOUISIANA LATER TODAY. STAY POSTED FOR POSSIBLE TORNADO WARNINGS.

...RAINFALL...
THE HEAVIEST RAINS FELL EAST OF KATRINA'S CENTER. ACCORDING TO THE NATIONAL WEATHER SERVICE DOPPLER RADAR IN MOBILE ALABAMA...THE LINE DELINEATING THE HEAVIEST RAINS EXTENDS FROM POPLARVILLE MISSISSIPPI SOUTH TO SLIDELL AND NEW ORLEANS AND THEN FURTHER SOUTH TO POYDRAS LOUISIANA. RADAR ESTIMATES THAT A GENERAL 5 TO 8 INCHES OF RAIN FELL EAST OF THIS LINE AND EXTENDS EASTWARD TO THE MISSISSIPPI-ALABAMA BORDER. A GENERAL 4 TO 6 INCHES OF RAIN FELL WEST OF THIS LINE. ISOLATED TOTALS OF 12 INCHES EXIST IN THE AFOREMENTIONED AREA. ANOTHER ONE TO TWO INCHES OF RAIN COULD FALL.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 600 PM CDT.

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WTUS84 KLIX 292010 CCA
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LAZ038-040-050-056>070-MSZ080>082-300100-

HURRICANE KATRINA LOCAL STATEMENT...CORRECTED EXPIRATION TIME...
NATIONAL WEATHER SERVICE NEW ORLEANS LA
310 PM CDT MON AUG 29 2005

...THE CENTER OF HURRICANE KATRINA IS DEPARTING BUT WIDESPREAD DAMAGE AND FLOODING REMAINS IN HER WAKE ACROSS BOTH SOUTHEASTERN LOUISIANA AND SOUTHEASTERN MISSISSIPPI...

...HURRICANE WARNING REMAINS IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST...

...EXTENSIVE AND LIFE THREATENING STORM SURGE FLOODING REMAINS IN PROGRESS AT THIS TIME...ESPECIALLY IN THE NEW ORLEANS AREA...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ASSUMPTION...ST JAMES...ST JOHN THE BAPTIST...ST CHARLES...
ST BERNARD...TERREBONNE...ORLEANS...JEFFERSON...PLAQUEMINE...
LAFOURCHE...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A HURRICANE WARNING IS IN EFFECT FROM EAST OF MORGAN CITY EAST TO THE ALABAMA-FLORIDA BORDER AREA. THIS INCLUDES THE METRO NEW ORLEANS AREA...AND THE MISSISSIPPI COAST.

AN INLAND HURRICANE WARNING REMAINS IN EFFECT FOR AREAS AWAY FROM THE COAST. HOWEVER...THIS PRODUCT WILL LIKELY BE REPLACED BY AN INLAND TROPICAL STORM WARNING AFTER 4 PM CDT.

A FLOOD WATCH IS IN EFFECT FOR MOST OF SOUTHEAST LOUISIANA AN EXTREME SOUTHERN MISSISSIPPI TONIGHT.

TORNADO WATCHES IN EFFECT FOR COASTAL LOUISIANA AND SOUTH MISSISSIPPI.

...STORM INFORMATION...
AT 2 PM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 31.4 NORTH... LONGITUDE 89.6 WEST OR ABOUT 20 MILES WEST-SOUTHWEST OF HATTIESBURG MISSISSIPPI.

KATRINA IS MOVING TOWARD THE NORTH NEAR 18 MPH...AND THIS GENERAL MOTION IS EXPECTED TO CONTINUE THIS EVENING. ON THIS TRACK...THE CENTER WILL CONTINUE MOVING INTO CENTRAL MISSISSIPPI THIS EVENING

AND TONIGHT.

MAXIMUM SUSTAINED WINDS HAVE DECREASED TO NEAR 95 MPH...WITH HIGHER GUSTS. KATRINA IS NOW A CATEGORY ONE HURRICANE ON THE SAFFIR-SIMPSON SCALE. WINDS AFFECTING THE UPPER FLOORS OF HIGH RISE BUILDINGS WILL BE SIGNIFICANTLY STRONGER THAN THOSE NEAR GROUND LEVEL. WEAKENING IS FORECAST DURING THE NEXT 24 HOURS AS THE CENTER CONTINUES MOVING OVER LAND. SEE THE INLAND HURRICANE AND TROPICAL STORM WARNING PRODUCT BHMNPWLIX.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 125 MILES FROM THE CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 230 MILES.

THE ESTIMATED MINIMUM CENTRAL PRESSURE IS 955 MB...28.20 INCHES.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
ALL PRECAUTION AND PREPAREDNESS ACTIVITIES WOULD HAVE BEEN COMPLETED.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
A STORM SURGE OF 10 TO 12 FEET HAS OCCURRED IN THE SOUTHWEST PART OF LAKE PONTCHARTRAIN AFFECTING THE EAST BANKS OF JEFFERSON...ST CHARLES...ST JOHN THE BAPTIST AND LIVINGSTON PARISHES. IN THE NEW ORLEANS AREA...THE WATERS WILL NOT SUBSIDE TODAY. WIDESPREAD FLOODING HAS OCCURRED AND STORM WATER RUNOFF WILL EXACERBATE THE PROBLEM IN THE SHORT-TERM.

...WIND IMPACTS...
HURRICANE KATRINA CONTINUES TO MOVE INLAND ACROSS SOUTHEAST MISSISSIPPI. ALTHOUGH TROPICAL STORM FORCE SUSTAINED WINDS WILL PERSIST ACROSS MUCH OF THE WARNED AREA FOR THE REMAINDER OF THE AFTERNOON...OCCASIONAL MAXIMUM WIND GUSTS FROM BETWEEN 60 TO 80 MPH WILL OCCUR...THEN GRADUALLY DIMINISH DURING THE EARLY EVENING HOURS.

...TORNADOES...
A TORNADO WATCH HAS BEEN ISSUED. THE TORNADO THREAT WILL CONTINUE UNTIL ONE FINAL BACKSIDE RAINBAND EXITS PORTIONS OF SOUTHEAST LOUISIANA LATER TODAY. STAY POSTED FOR POSSIBLE TORNADO WARNINGS.

...RAINFALL...
THE HEAVIEST RAINS FELL EAST OF KATRINA'S CENTER. ACCORDING TO THE NATIONAL WEATHER SERVICE DOPPLER RADAR IN MOBILE ALABAMA...THE LINE DELINEATING THE HEAVIEST RAINS EXTENDS FROM POPLARVILLE MISSISSIPPI SOUTH TO SLIDELL AND NEW ORLEANS AND THEN FURTHER SOUTH TO POYDRAS LOUISIANA. RADAR ESTIMATES THAT A GENERAL 5 TO 8 INCHES OF RAIN FELL EAST OF THIS LINE AND EXTENDS EASTWARD TO THE MISSISSIPPI-ALABAMA BORDER. A GENERAL 4 TO 6 INCHES OF RAIN FELL WEST OF THIS LINE. ISOLATED TOTALS OF 12 INCHES EXIST IN THE AFOREMENTIONED AREA. ANOTHER ONE TO TWO INCHES OF RAIN COULD FALL.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 600 PM CDT.

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WTUS84 KLIX 292126 CCA
HLSLIX
LAZ038-040-050-056>070-MSZ080>082-300045-

HURRICANE KATRINA LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
ISSUED BY NATIONAL WEATHER SERVICE MOBILE AL
420 PM CDT MON AUG 29 2005

...HURRICANE KATRINA IS DEPARTING BUT WIDESPREAD DAMAGE AND FLOODING REMAINS IN HER WAKE ACROSS BOTH SOUTHEASTERN LOUISIANA AND SOUTHEASTERN MISSISSIPPI...

...HURRICANE WARNING REMAINS IN EFFECT FOR SOUTHEAST LOUISIANA AND COASTAL MISSISSIPPI FROM MORGAN CITY EAST TO THE ALABAMA FLORIDA BORDER....

...AN INLAND HURRICANE WARNING IS ALSO IN EFFECT FOR AREAS AWAY FROM THE COAST...

...EXTENSIVE AND LIFE THREATENING STORM SURGE FLOODING REMAINS IN PROGRESS AT THIS TIME...ESPECIALLY IN THE NEW ORLEANS AREA...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ST JOHN THE BAPTIST...ST CHARLES...ST BERNARD...ORLEANS...
JEFFERSON...PLAQUEMINES...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A TROPICAL STORM WARNING REMAINS IN EFFECT FOR LAKE PONTCHARTRAIN AND FROM THE MOUTH OF THE PEARL RIVER EASTWARD TO THE ALABAMA/FLORIDA BORDER. THIS WARNING WILL LIKELY BE DISCONTINUED THIS EVENING.

AN INLAND TROPICAL STORM WARNING CONTINUES IN EFFECT FOR PORTIONS OF SOUTHEASTERN MISSISSIPPI AND SOUTHEASTERN LOUISIANA PARISHES. FOR DETAILED INFORMATION ON THIS SITUATION PLEASE REFER TO THE PRODUCT NEWNPWLIX.

TORNADO WATCHES REMAINS IN EFFECT THROUGH 7 PM CDT FOR COASTAL LOUISIANA AND SOUTHEAST MISSISSIPPI. THE WATCH WILL LIKELY BE CANCELLED.

...STORM INFORMATION...
AT 4 PM CDT...THE CENTER OF HURRICANE KATRINA WAS LOCATED NEAR LATITUDE 31.9 NORTH...LONGITUDE 89.6 WEST OR ABOUT 30 MILES NORTHWEST OF LAUREL MISSISSIPPI.

KATRINA IS MOVING TOWARD THE NORTH NEAR 18 MPH...AND A GRADUAL TURN TO THE NORTH-NORTHEAST WITH AN ADDITIONAL INCREASE IN FORWARD SPEED

IS EXPECTED DURING THE NEXT 24 HOURS.

MAXIMUM SUSTAINED WINDS ARE NEAR 75 MPH...WITH HIGHER GUSTS.
KATRINA IS A CATEGORY ONE HURRICANE ON THE SAFFIR-SIMPSON SCALE.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 60 MILES FROM THE
CENTER...AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 205
MILES...MAINLY TO THE SOUTHEAST.

...PRECAUTIONARY/PREPAREDNESS ACTIONS...
ALL PRECAUTION AND PREPAREDNESS ACTIVITIES WOULD HAVE BEEN COMPLETED.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
WIDESPREAD FLOODING HAS OCCURRED AND STORM WATER RUNOFF WILL
EXACERBATE THE PROBLEM IN THE SHORT-TERM. RIVER FLOODING WILL LIKELY
BECOME A PROBLEM OVER THE AREA INTO THIS WEEK.

...WIND IMPACTS...
HURRICANE KATRINA CONTINUES TO MOVE INLAND OVER EASTERN MISSISSIPPI.
AN INLAND TROPICAL STORM WARNING CONTINUES IN EFFECT FOR PORTIONS OF
SOUTHEASTERN MISSISSIPPI AND SOUTHEASTERN LOUISIANA PARISHES. FOR
DETAILED INFORMATION ON THIS SITUATION PLEASE REFER TO THE PRODUCT
NEWNPWLIX.

...TORNADOES...
THE TORNADO THREAT WILL DIMINISH AS KATRINA DEPARTS.

...RAINFALL...
THE HEAVIEST RAINS FELL EAST OF KATRINA'S CENTER. ACCORDING TO THE
NATIONAL WEATHER SERVICE DOPPLER RADAR IN MOBILE ALABAMA...THE LINE
DELINEATING THE HEAVIEST RAINS EXTENDS FROM POPLARVILLE MISSISSIPPI
SOUTH TO SLIDELL AND NEW ORLEANS AND THEN FURTHER SOUTH TO POYDRAS
LOUISIANA. RADAR ESTIMATES THAT A GENERAL 5 TO 8 INCHES OF RAIN FELL
EAST OF THIS LINE AND EXTENDS EASTWARD TO THE MISSISSIPPI-ALABAMA
BORDER. A GENERAL 4 TO 6 INCHES OF RAIN FELL WEST OF THIS LINE.
ISOLATED TOTALS OF 12 INCHES EXIST IN THE AFOREMENTIONED AREA.
ANOTHER ONE TO TWO INCHES OF RAIN COULD FALL.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 730 PM CDT.

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MEDLIN

000
WTUS84 KLIX 300114
HLSLIX
LAZ038>040-MSZ070-071-077-080>082-300301-

HURRICANE LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
ISSUED BY NATIONAL WEATHER SERVICE MOBILE AL
813 PM CDT MON AUG 29 2005

...NOW TROPICAL STORM KATRINA CONTINUES TO PUSH NORTHWARD INTO EAST CENTRAL MISSISSIPPI...LEAVING WIDESPREAD DAMAGE AND FLOODING ACROSS BOTH SOUTHEASTERN LOUISIANA AND SOUTHEASTERN MISSISSIPPI IN HER WAKE...

...A TROPICAL STORM WARNING IS IN EFFECT FOR LAKE PONTCHARTRAIN AND FROM THE MOUTH OF THE PEARL RIVER EASTWARD TO COASTAL ALABAMA...

...EXTENSIVE AND LIFE THREATENING STORM SURGE FLOODING REMAINS IN PROGRESS AT THIS TIME...ESPECIALLY IN THE NEW ORLEANS AREA...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES

ST JOHN THE BAPTIST...ST CHARLES...ST BERNARD...ORLEANS...
JEFFERSON...PLAQUEMINES...ST TAMMANY...TANGIPAHOA...LIVINGSTON.

IN COASTAL MISSISSIPPI...THE FOLLOWING COUNTIES
HANCOCK...HARRISON...JACKSON

...WATCHES AND WARNINGS...
A TROPICAL STORM WARNING REMAINS IN EFFECT FOR LAKE PONTCHARTRAIN AND FROM THE MOUTH OF THE PEARL RIVER EASTWARD TO THE ALABAMA/FLORIDA BORDER. THIS WARNING WILL LIKELY BE DISCONTINUED THIS EVENING.

...AN INLAND TROPICAL STORM WARNING IS IN EFFECT FOR PIKE AND WALTHALL COUNTIES OF SOUTHERN MISSISSIPPI...ST TAMMANY...TANGIPAHOA AND WASHINGTON PARISHES OF SOUTHEAST LOUISIANA...AND HANCOCK... HARRISON...JACKSON AND PEARL RIVER COUNTIES OF SOUTHEAST MISSISSIPPI. FOR DETAILED INFORMATION ON THIS SITUATION PLEASE REFER TO THE PRODUCT NEWNPWLIX.

TORNADO WATCHES FOR SOUTHEAST LOUISIANA AND SOUTHEAST MISSISSIPPI HAVE BEEN CANCELLED.

...STORM INFORMATION...
AT 8 PM CDT...THE CENTER OF NOW TROPICAL STORM KATRINA WAS LOCATED NEAR LATITUDE 32.9 NORTH...LONGITUDE 88.9 WEST OR ABOUT 40 MILES NORTH OF MERIDIAN MISSISSIPPI.

KATRINA IS MOVING TOWARD THE NORTH NEAR 21 MPH...AND AN INCREASE IN FORWARD SPEED IS LIKELY OVER THE NEXT 24 HOURS.

MAXIMUM SUSTAINED WINDS ARE NEAR 65 MPH...WITH HIGHER GUSTS. KATRINA IS A STRONG TROPICAL STORM PRODUCING SUSTAINED AND FREQUENT GUSTS OF TROPICAL STORM FORCE WELL AROUND THE STORMS CENTER.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
WIDESPREAD FLOODING HAS OCCURRED AND STORM WATER RUNOFF WILL CONTINUE TO EXACERBATE THE PROBLEM THROUGH THE EVENING. RIVER FLOODING WILL BE A PROBLEM OVER MUCH OF THE AREA THROUGH THE WEEK.

...WIND IMPACTS...
MAXIMUM SUSTAINED WINDS ARE NEAR 65 MPH...WITH HIGHER GUSTS. KATRINA IS A STRONG TROPICAL STORM PRODUCING SUSTAINED AND FREQUENT GUSTS OF TROPICAL STORM FORCE WINDS WELL OUT FROM THE CENTER IS ALL DIRECTION.

...TORNADOES...
THE TORNADO THREAT WILL HAS DIMINISHED AS KATRINA CONTINUES TO PUSH FURTHER TO THE NORTH.

...RAINFALL...
NATIONAL WEATHER SERVICE RADAR INDICATES FROM 4 TO 12 INCHES OF RAINFALL HAS FALLEN ACROSS THE AREA EARLIER TODAY...BUT THE RAINFALL HAS GREATLY DIMINISHED OR ENDED FOR MOST OF THE AREA.

THESE HEAVY RAINS HAVE CAUSED FLOODING OF SMALL CREEKS AND STREAMS... HIGHWAYS...STREETS AND UNDERPASSES...AS WELL AS OTHER POUR DRAINAGE AND LOW LYING AREAS...AND THESE AREAS WILL BE SLOW TO DRAIN THROUGH THE EVENING HOURS.

...NEXT UPDATE...
THE NEXT LOCAL STATEMENT WILL BE ISSUED AROUND 10 PM CDT.

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DARBE

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WTUS84 KLIX 300258
HLSLIX
LAZ038>040-MSZ070-071-077-080>082-300400-

TROPICAL STORM LOCAL STATEMENT
NATIONAL WEATHER SERVICE NEW ORLEANS LA
ISSUED BY NATIONAL WEATHER SERVICE MOBILE AL
10 PM CDT MON AUG 29 2005

...ALL TROPICAL STORM WARNINGS ALONG THE LOUISIANA...MISSISSIPPI AND ALABAMA COASTLINES HAVE BEEN CANCELLED...

...WINDS CONTINUE TO DIMINISH ACROSS THE LOUISIANA AND MISSISSIPPI COASTAL SECTIONS AS TROPICAL STORM KATRINA PUSHES FURTHER INLAND ACROSS EAST CENTRAL MISSISSIPPI...

...AREAS AFFECTED...
IN SOUTHEAST LOUISIANA...THE FOLLOWING PARISHES
ST TAMMANY...TANGIPAHOA...WASHINGTON.

IN SOUTH AND SOUTHEAST MISSISSIPPI...THE FOLLOWING COUNTIES
PIKE...WALTHAM...HANCOCK...HARRISON...JACKSON AND PEARL RIVER.

...WATCHES AND WARNINGS...
THE TROPICAL STORM WARNING THAT WAS IN EFFECT FOR LAKE PONTCHARTRAIN AND FROM THE MOUTH OF THE PEARL RIVER EASTWARD ACROSS COASTAL ALABAMA HAS BEEN CANCELLED.

...STORM INFORMATION...
AT 10 PM...THE CENTER OF TROPICAL STORM KATRINA WAS ESTIMATED NEAR LATITUDE 33.5 NORTH...LONGITUDE 88.5 WEST OR NEAR COLUMBUS MISSISSIPPI. KATRINA IS MOVING TOWARD THE NORTH-NORTHEAST NEAR 22 MPH. SOME INCREASE IN FORWARD SPEED IS EXPECTED OVER THE NEXT 24 HOURS. ON THE FORECAST TRACK...KATRINA WILL BE MOVING ACROSS CENTRAL TENNESSEE AND KENTUCKY ON TUESDAY.

MAXIMUM SUSTAINED WINDS ARE NEAR 60 MPH WITH HIGHER GUSTS. KATRINA IS EXPECTED TO WEAKEN TO A TROPICAL DEPRESSION ON TUESDAY.

...STORM SURGE FLOOD AND STORM TIDE IMPACTS...
ALTHOUGH THE TROPICAL STORM WARNING FOR KATRINA HAS BEEN DISCONTINUED ALONG THE MISSISSIPPI COAST...COASTAL FLOOD PROBLEMS COULD PERSIST ACROSS THE COASTAL SECTIONS OF HANCOCK...HARRISON AND JACKSON COUNTIES THROUGH THE NIGHT DUE TO CONTINUED MODERATE TO STRONG ONSHORE WINDS AND ASTRONOMICAL HIGH TIDE OCCURRING ONCE AGAIN AROUND SUNRISE TUESDAY MORNING. THEREFORE...A COASTAL FLOOD WARNING FOR THESE COUNTIES HAS BEEN ISSUED THROUGH TONIGHT.

...WIND IMPACTS...
AS KATRINA CONTINUES TO MOVE FURTHER INLAND ACROSS EAST CENTRAL MISSISSIPPI...WINDS HAVE SETTLED BELOW TROPICAL STORM FORCE ACROSS THE AREA. HOWEVER...WINDS WILL REMAIN MODERATELY STRONG WITH SUSTAINED 20 TO 25 MPH AND HIGHER GUSTS EXPECTED THROUGH THE NIGHT.

...TORNADOES...
THE TORNADO THREAT HAS DIMINISHED AS KATRINA CONTINUES TO PUSH

FURTHER TO THE NORTH. THEREFORE...THE TORNADO WATCH FOR SOUTHEAST LOUISIANA AND SOUTHEAST MISSISSIPPI HAS BEEN CANCELLED.

...RAINFALL...
NATIONAL WEATHER SERVICE RADAR INDICATES FROM 4 TO 12 INCHES OF RAINFALL HAS FALLEN ACROSS THE AREA EARLIER TODAY...BUT THE RAINFALL HAS ENDED...AND ANY ADDITIONAL HEAVY RAIN IS NOT EXPECTED.

...NEXT UPDATE...
THIS WILL BE THE LAST LOCAL STATEMENT ISSUED IN REFERENCE TO TROPICAL STORM KATRINA.

$$

DARBE

15-042554

DIANNE FEINSTEIN
CALIFORNIA

SELECT COMMITTEE ON INTELLIGENCE - VICE CHAIRMAN
COMMITTEE ON APPROPRIATIONS
COMMITTEE ON THE JUDICIARY
COMMITTEE ON RULES AND ADMINISTRATION

United States Senate

WASHINGTON, DC 20510-0504
http://feinstein.senate.gov

March 16, 2015

The Honorable Penny Pritzker
Secretary of Commerce
U.S. Department of Commerce
1401 Constitution Avenue, N.W.
Washington, D.C. 20230

Dear Secretary Pritzker,

I am writing to ask for your personal attention on the attached list of questions I sent to Dr. Kathryn Sullivan, Administrator of the National Oceanic and Atmospheric Administration.

This is a high-priority concern for me, and I urge you to do everything you can to focus more resources on the range of recovery and protective actions outlined.

Thank you for your kind attention to this important matter.

Sincerely,

Dianne Feinstein
United States Senator

DF/fy

DIANNE FEINSTEIN
CALIFORNIA

SELECT COMMITTEE ON INTELLIGENCE - VICE CHAIRMAN
COMMITTEE ON APPROPRIATIONS
COMMITTEE ON THE JUDICIARY
COMMITTEE ON RULES AND ADMINISTRATION

United States Senate

WASHINGTON, DC 20510-0504
http://feinstein.senate.gov

March 16, 2015

Dr. Kathryn Sullivan
Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration
U.S. Department of Commerce
1401 Constitution Avenue, N.W.
Washington, D.C. 20230

Dear Dr. Sullivan,

I am writing to ask for your personal attention on a list of questions, submitted for the record to supplement the Senate Appropriations Subcommittee on Commerce, Justice, and Science's hearing on the FY 2016 budget for the National Oceanic and Atmospheric Administration (NOAA). I request your immediate action to improve and accelerate endangered salmon recovery.

Peer-reviewed science shows endangered salmon survival in the Sacramento-San Joaquin River Delta hinges on a variety of factors, such as the quality and composition of spawning habitat, water temperature control, and removal of non-native predator species. The 2009 salmon biological opinion issued by the National Marine Fisheries Service has already imposed stringent water pumping restrictions on the federal and state water projects in California, but endangered salmon populations have yet to recover.

I firmly believe NOAA must focus more resources on the full range of recovery and protective actions for salmon. To that end, I request NOAA's report on the actions taken since the issuance of the 2009 salmon biological opinion that could quicken the pace of endangered salmon recovery. My questions are:

1) Based on the best available science today, what factors besides water pumping negatively affect the extent and pace of recovery in salmonid populations?

2) Since the issuance of the 2009 salmon biological opinion, what steps has NOAA taken to address these other factors and to improve salmon recovery efforts?

3) Please provide a list and description of the habitat restoration projects NOAA has supported or conducted in the Sacramento-San Joaquin River Delta since the

issuance of the 2009 salmon biological opinion to help improve endangered / listed salmonid recovery.

4) What steps has NOAA taken since the issuance of the 2009 biological opinion to reduce / mitigate the effects of non-native predator species (such as striped bass) on the recovery of endangered / listed salmonid species? Please specifically describe the projects involved and their status.

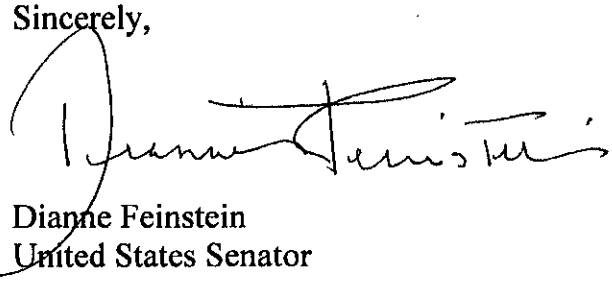
5) What steps has NOAA taken since the issuance of the 2009 biological opinion to improve monitoring, surveying, and detection of salmonid species in the Delta, so that the agency has a clear understanding of the presence and distribution of salmon in the Delta? Please specifically describe the projects involved and their status.

6) What steps has NOAA taken since the issuance of the 2009 biological opinion to test and/or implement physical and non-physical barriers in the Delta that would better protect salmon from entrainment? Please specifically describe the projects involved and their status.

7) What steps has NOAA taken since the issuance of the 2009 biological opinion to reduce or eradicate aquatic invasive weeds in the Delta that may negatively affect oxygen and nutrient levels in Delta water for endangered / listed salmonid species? Please specifically describe the projects involved and their status.

Thank you for your kind attention to this important matter.

Sincerely,

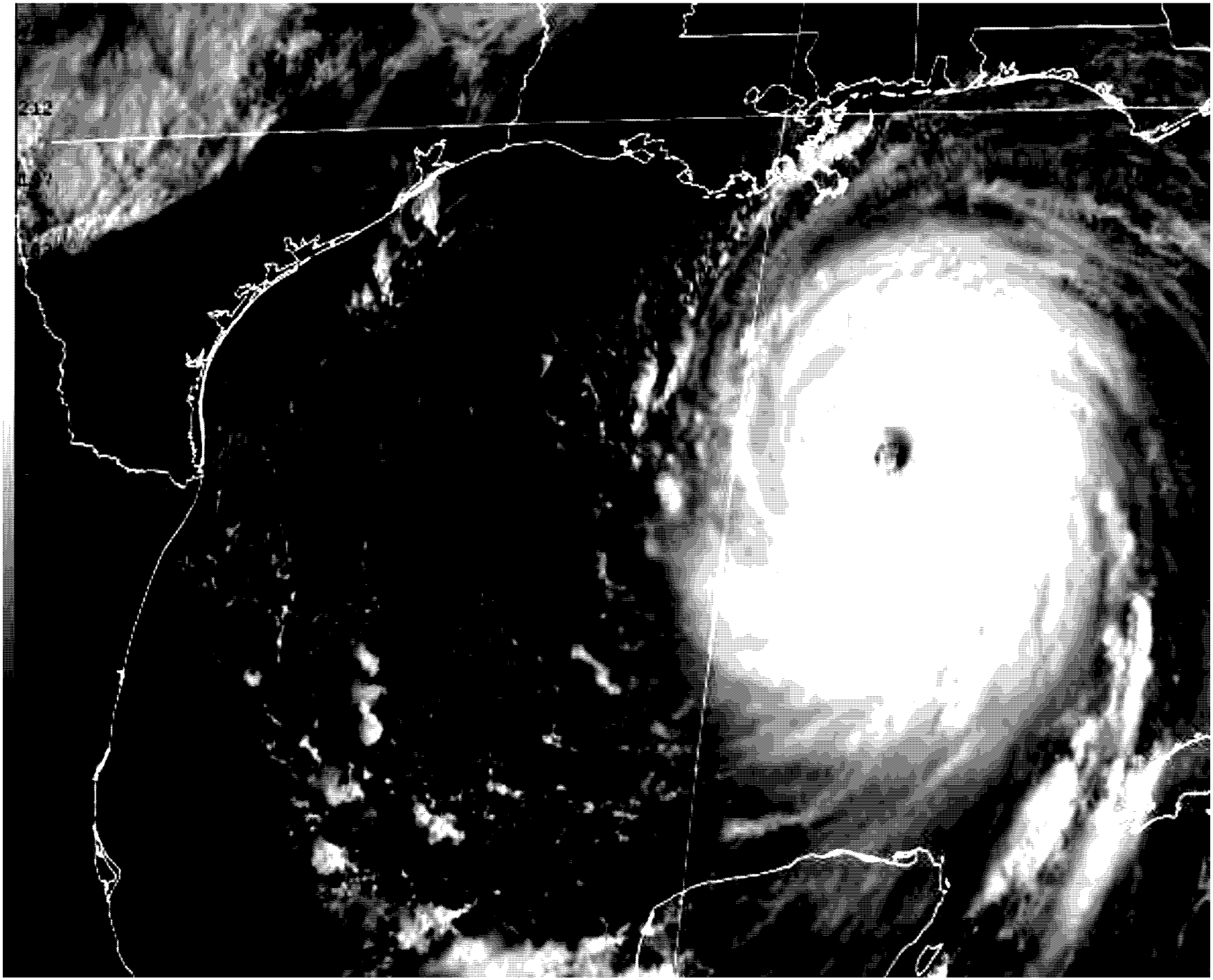


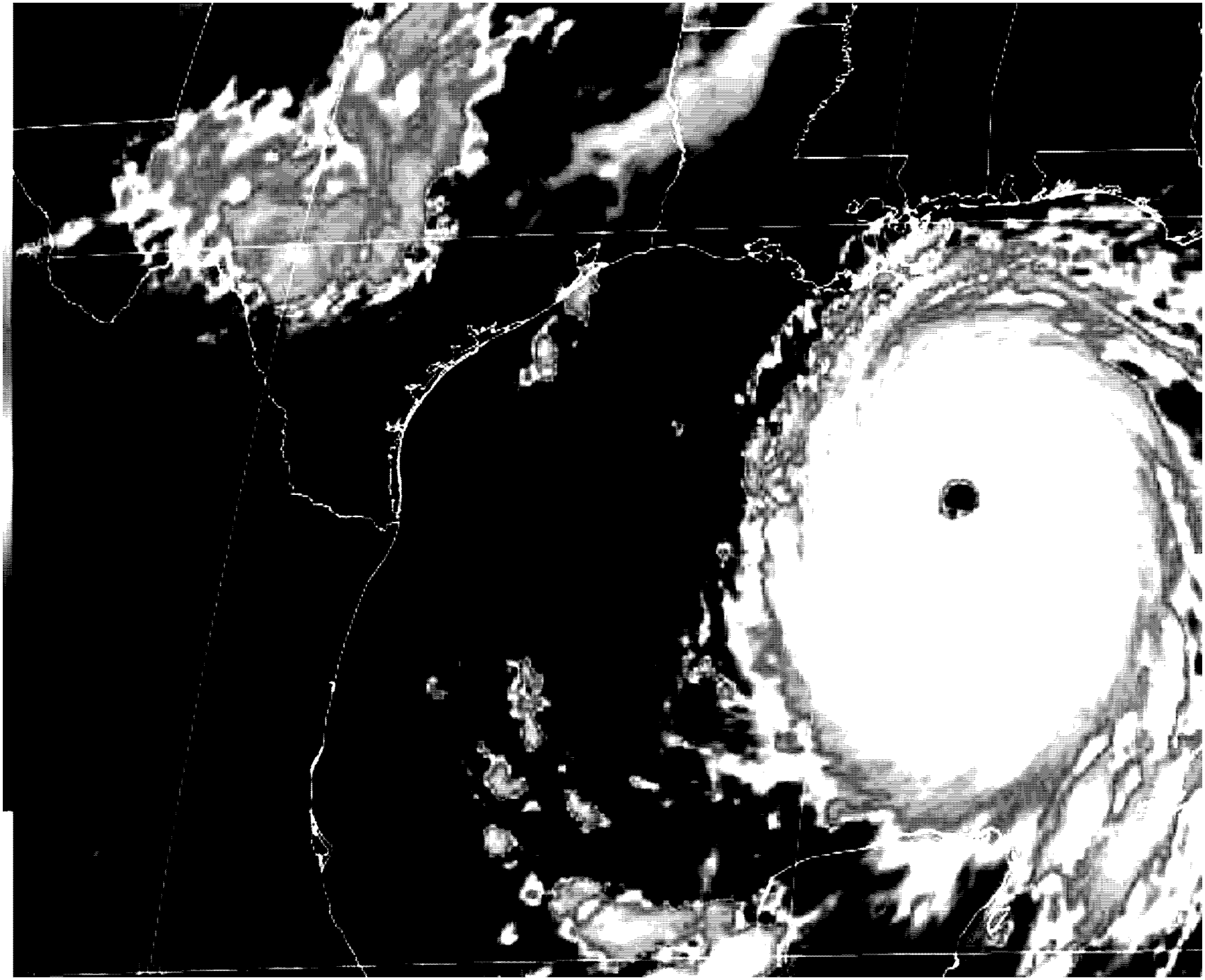
Dianne Feinstein
United States Senator

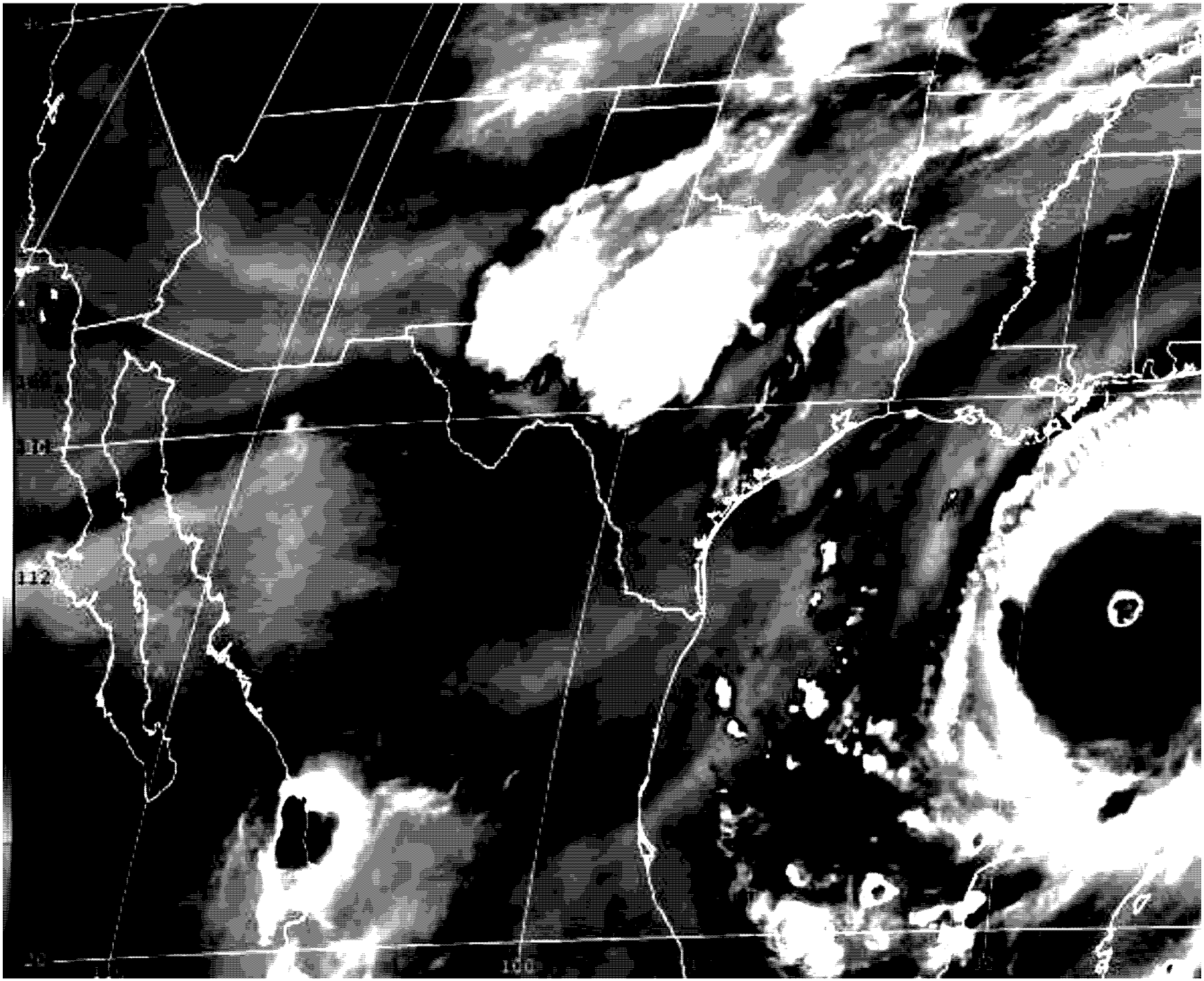
Cc: Secretary of Commerce Penny Pritzker

DF/fy

HLT Briefing
August 28, 2005



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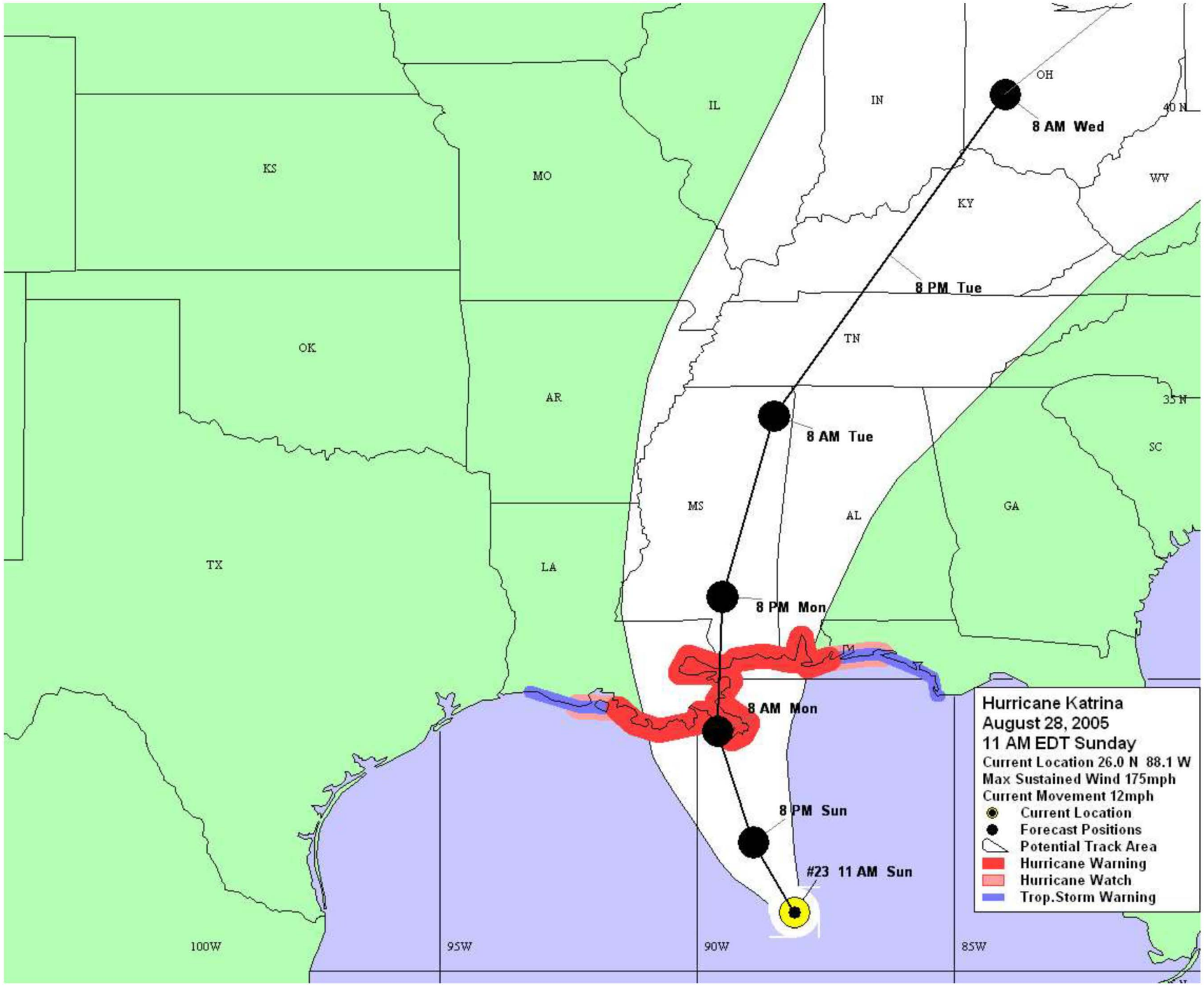
KS
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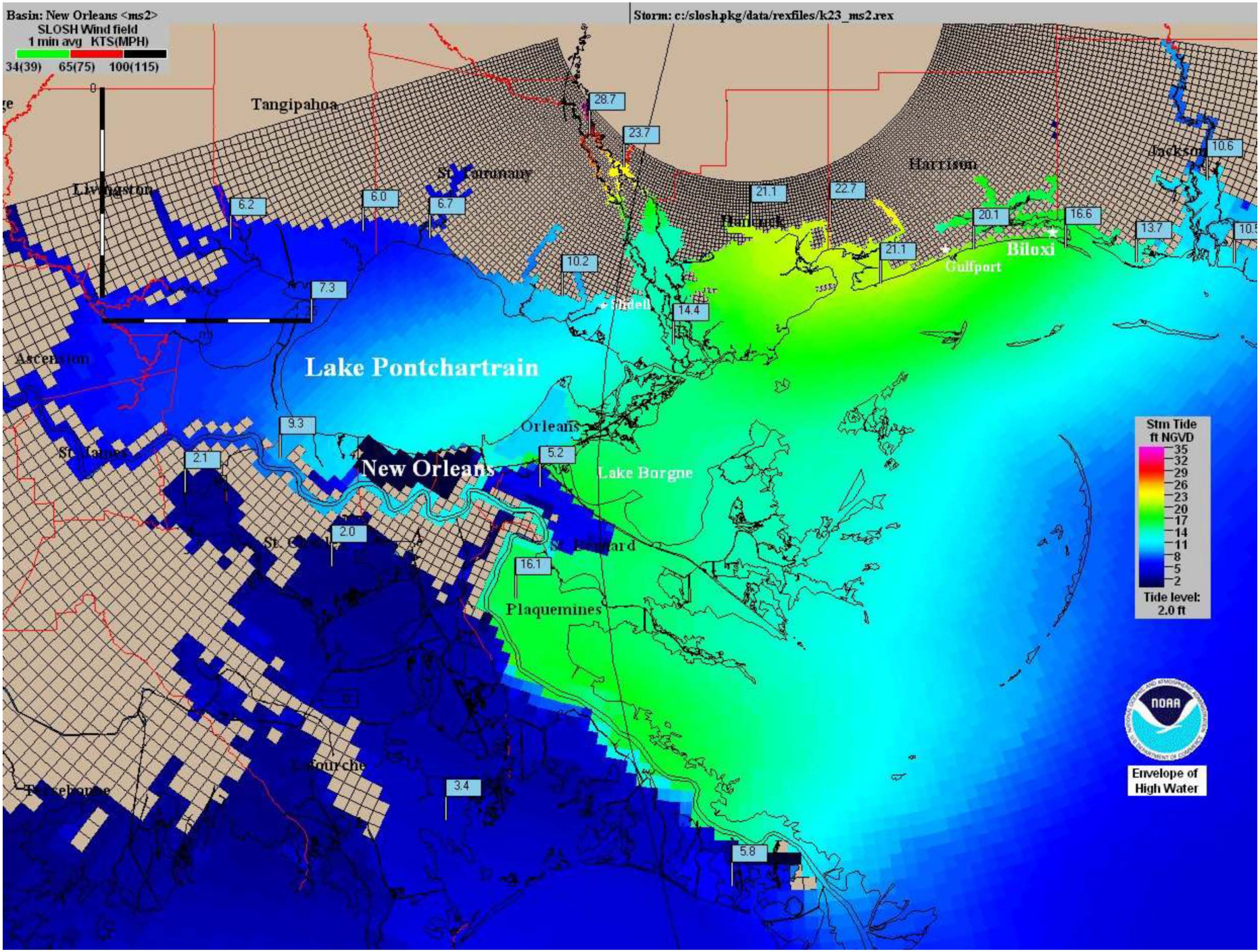
40 N
35 N
8 AM Wed
8 PM Tue
8 AM Tue
8 PM Mon
8 AM Mon
8 PM Sun
#23 11 AM Sun
100W
95W
90W
85W
Hurricane Katrina
August 28, 2005
11 AM EDT Sunday
Current Location 26.0 N 88.1 W
Max Sustained Wind 175mph
Current Movement 12mph
Current Location
Forecast Positions
Potential Track Area
Hurricane Warning
Hurricane Watch
Trop.Storm Warning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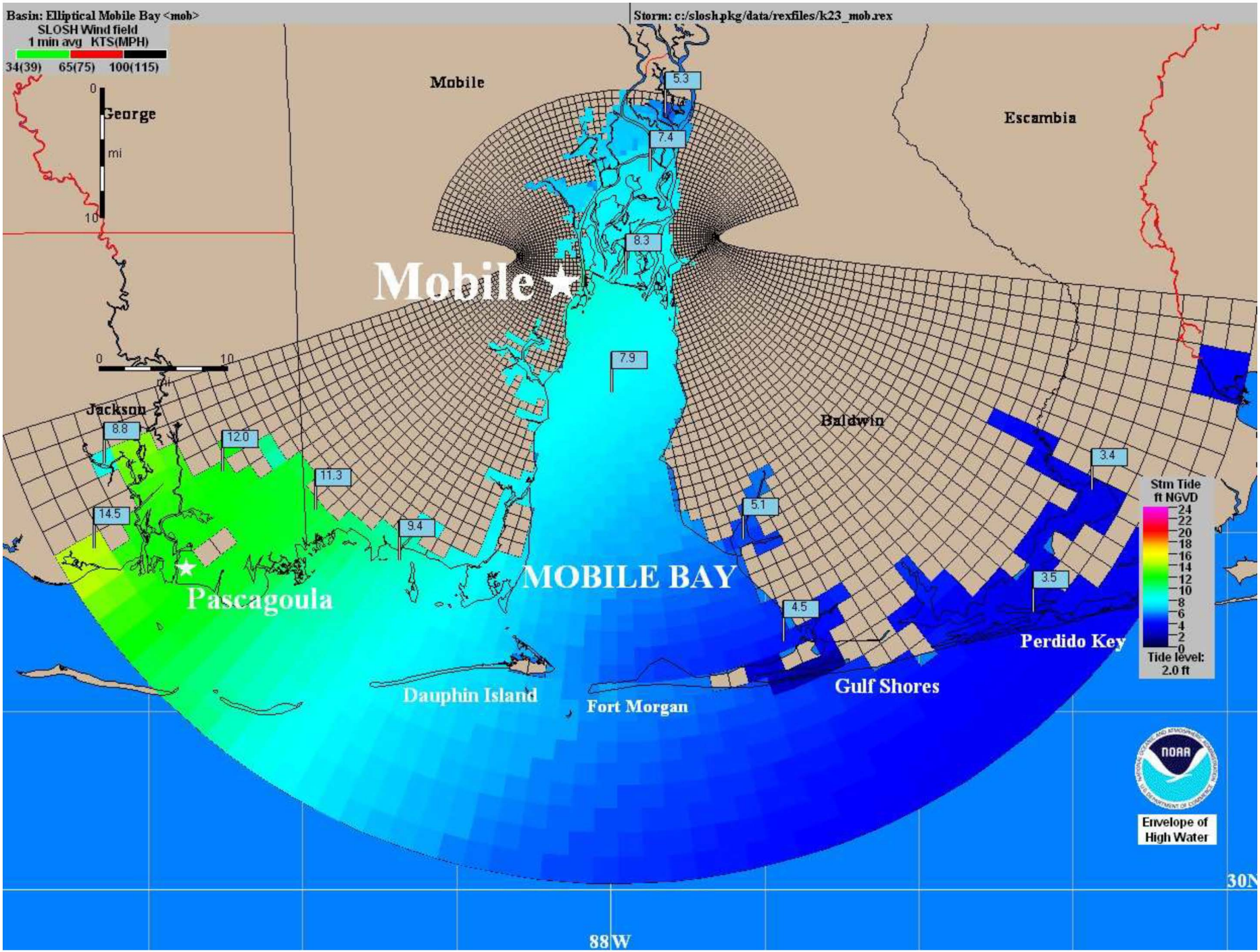
SLOSH Wind field
1 min avg KTS(MPH)
34(39) 65(75) 100(115)
Storm: c:/slosh.pkg/data/rexfiles/k23_ms2.rex
Tangipahoa
Livingston
St. Tammany
Harrison
Jackson
Hancock
Biloxi
Gulfport
Lake Pontchartrain
Orleans
New Orleans
Lake Borgne
Plaquemines
28.7
23.7
10.6
6.2
6.0
6.7
21.1
22.7
20.1
16.6
13.7
21.1
10.2
7.3
14.4
9.3
2.1
5.2
2.0
16.1
3.4
5.8
Stm Tide
ft NGVD
35
32
29
26
23
20
17
14
11
8
5
2
Tide level:
2.0 ft
NOAA
Envelope of
High Water


Basin: Elliptical Mobile Bay <mob>
SLOSH Wind field
1 min avg KTS(MPH)
34(39) 65(75) 100(115)
Storm: c:/sloshpkg/data/rexfiles/k23_mob.rex
George
mi
Mobile
Escambia
Baldwin
Jackson
Mobile
Pascagoula
MOBILE BAY
Dauphin Island
Fort Morgan
Gulf Shores
Perdido Key
5.3
7.4
8.3
7.9
8.8
12.0
11.3
14.5
9.4
5.1
3.4
4.5
3.5
Stm Tide
ft NGVD
24
22
20
18
16
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4
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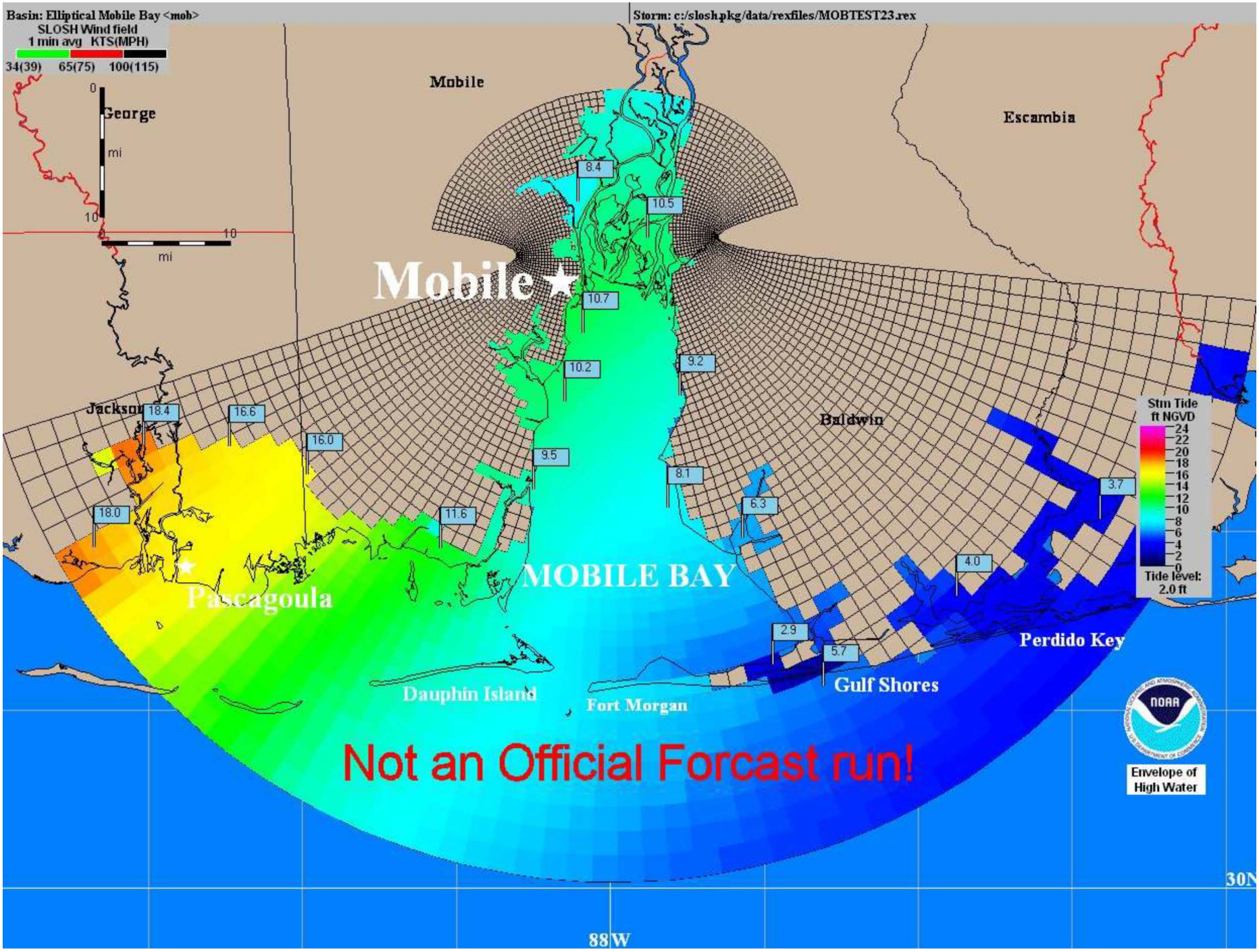
Tide level:
2.0 ft
NOAA
Envelope of
High Water
30N
88W


Basin: Elliptical Mobile Bay <mob>
Storm: c:/slosh.pkg/data/rexfiles/MOBTEST23.rex
SLOSH Wind field
1 min avg KTS(MPH)
34(39) 65(75) 100(115)
George
Mobile
Escambia
Baldwin
Jackson
Mobile
Pascagoula
MOBILE BAY
Dauphin Island
Fort Morgan
Gulf Shores
Perdido Key
8.4
10.5
10.7
10.2
9.2
18.4
16.6
16.0
9.5
8.1
3.7
18.0
11.6
6.3
4.0
2.9
5.7
Stm Tide
ft NGVD
Tide level:
2.0 ft
Not an Official Forcast run!
NOAA
Envelope of
High Water
30N
88W

DIANNE FEINSTEIN
CALIFORNIA

SELECT COMMITTEE ON INTELLIGENCE - VICE CHAIRMAN
COMMITTEE ON APPROPRIATIONS
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March 16, 2015

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Thank you for your kind attention to this important matter.

Sincerely,

Dianne Feinstein
United States Senator

Cc: Secretary of Commerce Penny Pritzker

DF/fy

FY12 Cooperative Research Projects - Northeast						
Research Topic (e.g., Conservation Engineering, Life History Study, Fishery Independent Survey, Logbook Program, etc)	**State**	**Fishery or Fisheries Involved**	**Platform Type(s) Used**	**Basic Stakeholder Classification (Commercial, Recreational, etc.)**	**Level of Collaboration (1- 5)**	**Research Results - major findings or data contributions**
Ecosystem modeling	NJ	Squid - butterfish - also mackerel and herring	Sampling aboard trawlers	Commercial	4.5	Ongoing network project that is utilizing habitat modeling to evaluate impacts of climate change on survey time series and also to inform collaborative discussions about alternative survey approaches for schooling pelagics.
Fishery Independent Survey	RI	Scup fish trap fishery	Commercial vessel	Commercial	**4**	Completion of a two year, two season, three area dogfish tagging program designed to address stock mixing issues, growth rates, and depending upon the number of recaptures estimation of mortality rates. Over 34,000 dogfish were tagged in the Gulf of Maine, on Georges bank and in Southern New England.
Fishery dependent sampling, tagging and conservation engineering support	MA	Multiple fisheries	Sampling aboard trawlers	Commercial	**3**	Field staff support for: Study Fleet (See Renewal for 28 study fleet vessel contracts: The Northeast Cooperative research program's Study Fleet project (Cell: C18) ; dogfish tagging (See support for 3 vessels involved in 2 dogfish tagging study during Fall 2013 (Cell: C21) ; and to work with Northeast Bycatch Reduction Engineering Program (BREP) -note BREP not included in project list. Separate budget line.
Fishery dependent sampling, QA/QC ecosystem data	MA	Multiple fisheries	Not applicable	Not applicable	**3**	Study fleet catch and effort data processing, bottom temp-GPS polling for oceanographic habitat modeling, mark recapture data processing, industry survey data processing
Tagging - life history study	MA	Multi-species trawl fishery	Commercial vessel	Commercial	**4**	Completion of a two year, two season, three area dogfish tagging program designed to address stock mixing issues, growth rates, and depending upon the number of recaptures estimation of mortality rates. Over 34,000 dogfish were tagged in the Gulf of Maine, on Georges bank and in Southern New England.

Fishery dependent sampling and ecosystem monitoring	ME	Multi-species trawl fishery	Commercial vessel	Commercial	**4**	Study fleet program described below.
Fishery dependent sampling and ecosystem monitoring	RI, NH, MA	Multi-species trawl fishery	Commercial vessel	Commercial	**4**	Study fleet vessels assisted in prototype testing of a new wireless Temperature/Depth probe that allows fishermen to see depth and temp immediately upon haul back of the gear. Real time bottom temp information is a priority need for industry trying to support selective fishing based on species temp distributions patterns.
Fishery Independent survey	ME - NH	Gulf of Maine groundfish	Commercial vessel	Commercial	**4**	Ongoing coastal survey aboard industry vessel in the Gulf of Maine. Survey indices used in Northeast Fisheries Science Center and Atlantic States Marine Fisheries Commission assessments.
Outreach / Education	ME	Multiple fisheries	Non-profit marine science center	Commercial, recreational and managers	**3**	More than 200 fishermen and managers have participated in the program over the past several years. Regional councils require Advisory Panel members to attend.
Fishery Independent survey	ME	Gulf of Maine Groundfish	Commercial vessel	Commercial	**4**	Pilot study developing a non-trawl survey for hard bottom habitat using bottom longline and jig fishing
Fishery Dependent monitoring	ME	Gulf of Maine Groundfish	Lobster fishery bycatch observations	Commercial	**3**	Support for graduate research evaluation of cusk bycatch data in the Maine lobster fishery observer data. Reports pending.
Conservation engineering	ME	New England groundfish	Commercial vessel	Commercial	**4.5**	Ongoing network program with academic, state and industry leaders working with sectors on conservation gear demonstrations and development efforts to improve fishery selectivity through gear engineering.
Fishery dependent monitoring, ecosystem monitoring	various	Northeast trawl, gillnet, and scallop fisheries	Commercial vessel	Commercial	**4**	The study fleet program is an ongoing effort with ~30 vessels that are assisting in developing electronic reporting systems, reporting oceanographic data associated with tow-by-tow catch data comparable to observer sampling and providing platforms of opportunity for enhanced biological sampling of species, stocks and areas where maturation data, age

						and growth, feeding information and length weight conversions require updating for stock assessments. Tow by tow data is being used in comparative estimates of discards from observer data and for bottom temp species distribution mapping efforts to support efforts to avoid ACL limited stocks.
Fishery dependent sampling, tagging and conservation engineering support	MA	Multiple fisheries	Not applicable		**4**	Contract field staff work very closely with industry and provide a valuable communication link to industry on emerging issues.
Life history studies	MA	Black sea bass	Not applicable	Commercial, recreational, and university	**3**	Contract to process histology slides for sea bass sampled as part of the scup trap survey and samples collected by study fleet and survey activities.
Tagging - life history study	MA	Multi-species trawl fishery	Commercial vessel	Commercial	**4**	Funds to complete fall tagging cruises after earlier cruises utilized all optional weather days in the dogfish tagging project described above.
FY12 Cooperative Research Projects - Southeast						
Research Topic (e.g., Conservation Engineering, Life History Study, Fishery Independent Survey, Logbook Program, etc)	**State**	**Fishery or Fisheries Involved**	**Platform Type(s) Used**	**Basic Stakeholder Classification (Commercial, Recreational, etc.)**	**Level of Collaboration (1- 5)**	**Research Results - major findings or data contributions**
Reef fish research	AL	Reef fish fishery	Charter boats	Commercial and recreational	**3**	Assessing the effect of gear selectivity
Reef fish research	FL	Red Drum Fishery	Purse seine	Commercial	**3**	Data used to assess stock movements structure and recruitment
HMS research	FL	Small Coastal Shark fishery	Hand-deployed longlines and anchored gillnets	Commercial	3	Examine the reproductive biology which will feed into assessment parameters
Reef fish research	FL	Reef fish	Hook and line, longline	Commercial	3	Develop and test a hybrid approach to sampling reef fishes using combined fishery dependent and independent methods
Reef fish research	TX	Deep Water Snapper	Hook-and-line fishing and traps	Commercial	3	Fishery-independent (FI) and fishery-dependent (FD) methods.
Highly Migratory	TX	Shark fishery	Hand-deployed	Commercial	3	Establish if stocks of smooth dogfish sharks occur in

Species research			longlines			U.S. waters, population-genetics data on population structure
Commercial Fishery Statistics	FL	All commercial fisheries	Not applicable	State	3	Fishery Statistics
Commercial Fishery Statistics	AL	All commercial fisheries	Not applicable	State	**3**	Fishery Statistics
Commercial Fishery Statistics	MS	All commercial fisheries	Not applicable	State	**3**	Fishery Statistics
Commercial Fishery Statistics	LA	All commercial fisheries	Not applicable	State	**3**	Fishery Statistics
Commercial Fishery Statistics	TX	All commercial fisheries	Not applicable	State	**3**	Fishery Statistics
Commercial Fishery Statistics	GA	All commercial fisheries	Not applicable	State	**3**	Fishery Statistics
Commercial Fishery Statistics	SC	All commercial fisheries	Not applicable	State	**3**	Fishery Statistics
Commercial Fishery Statistics	NC	All commercial fisheries	Not applicable	State	**3**	Fishery Statistics
Commercial Fishery Statistics	PR	All commercial fisheries	Not applicable	Trust territory	**3**	Fishery Statistics
Commercial Fishery Statistics	USVI	All commercial fisheries	Not applicable	Trust territory	**3**	Fishery Statistics
Fishery Ecosystems management Strategies	FL	Not Applicable	Not applicable	University	**4**	Assessment methods/studies
Administration	FL	Not Applicable	Not applicable	University	Not Applicable	Administrative
Reef fish research	NC	Snapper-grouper	Vertical longline, longline	Commercial	**3**	Data used for the South Atlantic Red Snapper Assessment.
Shark conservation and management in pelagic longline fisheries	FL	HMS Shark	Longline	Commercial	3	Overall, results suggest that using circle hooks on pelagic longlines do not have a major effect on shark catch rates, but do reduce at-vessel mortality compared to J-hooks. Thus circle hooks should be seen as one potential tool to help reduce bycatch mortality of sharks in longline fisheries. However, the high level of heterogeneity found between studies highlights the need for shark-specific controlled experiments to provide more definitive results.
FY12 Cooperative Research Projects - Alaska						
Research Topic (e.g.,	**State**	**Fishery or Fisheries**	**Platform**	**Basic**	**Level of**	**Research Results - major findings or data**

Conservation Engineering, Life History Study, Fishery Independent Survey, Logbook Program, etc)		Involved	Type(s) Used	Stakeholder Classification (Commercial, Recreational, etc.)	Collaboration (1- 5)	contributions
Conservation Engineering	AK	Pollock fishery	Trawler	Commercial	4	Development of an alternative pollock trawl design to reduce bycatch and damage to benthic fauna.
Fishery Independent Survey	AK	Alaska groundfish	Trawler	Commercial	4	Data used for stock assessment/set allowable catch limits.
Logbook program - fishery data	WA	Primarily sablefish	Longline vessel	Commercial	4	Data used for stock assessment/set allowable catch limits.
Fishery Independent Survey	WA	Alaska groundfish	Trawler	Commercial	4	Data used for stock assessment/set allowable catch limits.
Conservation Engineering	AK	Pollock fishery	Trawler	Commercial	4	Development of an alternative pollock trawl design to reduce bycatch and damage to benthic fauna.
Fishery Independent Survey	WA	Bering Sea crab, Alaska groundfish	Trawler	Commercial	4	Data used for stock assessment/set allowable catch limits.
Fishery Independent Survey	WA	Bering Sea crab, Alaska groundfish	Trawler	Commercial	4	Data used for stock assessment/set allowable catch limits.
Conservation Engineering	WA	Pollock fishery	Not applicable	Not applicable	4	Ongoing work to reduce bycatch of salmon and halibut
Life History and Fishery Independent Surveys	VA	Red king, snow, and tanner crab	Trawler	Commercial	4	Data used for stock assessment/set allowable catch limits.
Octopus Mortality	AK	Pacific cod pot fishery	Pot boat	Commercial	4	Data used for stock assessment/set allowable catch limits.
Stock Assessments	AK	Inshore pollock fishery	Trawler	Commercial	4	Data used for stock assessment/set allowable catch limits.
Bycatch reduction	AK	Alaska groundfish	Small trawlers, hook & line vessels	Commercial	4	Catch monitoring for vessels too small to require observers.

FY12 Cooperative Research Projects - Southwest						
Research Topic (e.g., Conservation Engineering, Life History Study, Fishery Independent Survey, Logbook Program, etc)	**State**	**Fishery or Fisheries Involved**	**Platform Type(s) Used**	**Basic Stakeholder Classification (Commercial, Recreational, etc.)**	**Level of Collaboration (1- 5)**	**Research Results - major findings or data contributions**
Life History Study; Fishery Independent Surveys	WA	Albacore Commercial Surface, HMS Recreational	Less than 100 ft troller and/or bait boat, and commercial party vessels	Commercial and Recreational	**4**	Provides data for albacore stock assessment. Contract is for equipment to support the cooperative albacore tagging project conducted with the West Coast albacore fisheries.
Life History Study; Fishery Independent Surveys	Canada	Albacore commercial surface, HMS Recreational	Less than 100 ft troller and/or bait boat, and commercial party vessels	Commercial and Recreational	**4**	Provides data for albacore stock assessment. Contract is for equipment to support the cooperative albacore tagging project conducted with the West Coast albacore fisheries.
Fishery Independent Surveys	CA	Bycatch in HMS (tuna and swordfish predominantly) Pelagic Fisheries	Less than 100 ft commercial longliner	Commercial and Recreational	**4**	Provides fishery-independent index of abundance for two pelagic shark species that are caught in commercial and recreational fisheries. Provides additional life history data for stock assessments of sharks, tunas and swordfish.
Conservation Engineering; Fishery Independent Surveys	CA	Swordfish Pelagic Fisheries (longline and drift gillnet)	Less than 100 ft commercial longliner	Commercial	**4**	Provides information for bycatch mitigation in swordfish fisheries. Provides additional life history data for stock assessments of sharks, tunas and swordfish.
Life History Study	CA	Albacore Commercial Surface, HMS Recreational, Hawaii tuna handline fishery	Less than 100 ft troller and/or bait boat, commercial party vessels, handliner	Commercial	**4**	Provides life history information for albacore stock assessment.
Life History Study	TX	Albacore Commercial	Less than 100 ft troller	Commercial and Recreational	**2 to 4**	Provides life history information for albacore and bluefin stock assessments.

		Surface, HMS Recreational, Hawaii tuna handline fishery, bluefin purse seine	and/or bait boat, commercial party vessels, handliner, purse seiner			Contract is for technical support and analysis of samples.
Fishery Independent Surveys; Life History Study; Conservation Engineering	Various	Albacore Commercial Surface, HMS Recreational, Hawaii Tuna Handline, Bluefin Purse Seine, Recreational Billfish	Less than 100 ft troller and/or bait boat, commercial party vessels, handliner, purse seiner, private recreational	Commercial and Recreational	**2 to 4**	Provides life history and abundance index information for stock assessments of tunas, sharks and billfish. Contract is for technical support to assist with surveys, tagging efforts, outreach, and sample analysis.
Life History Study	CA	Bluefin Purse Seine, HMS Recreational, International Bluefin Fisheries	Various	Commercial and Recreational	**2 to 4**	Provide data for northern bluefin stock assessment. Contract is to handle logistics of obtaining bluefin samples from international partners in the western Pacific. A Monterey Bay Aquarium staff member is a co-PI on the project and regularly consulted regarding project prioritization.
Life History Study	CA	International Purse Seine and Coastal Fisheries, Recreational Billfish	Various	Commercial and Recreational	**2 to 4**	Provide data for shark and billfish stock assessments. Contract is to manage rewards for tags returned through IATTC fisheries.
Life History Study	AZ	Bluefin Purse Seine, HMS Recreational, International Bluefin Fisheries, Albacore Commercial Surface, HMS Recreational, Hawaii tuna handline fishery	Various	Commercial and Recreational	**2 to 4**	Provide data for tuna stock assessments. Contract is for sample analysis.
Fishery Independent Surveys; Life	CA	Catch and Bycatch in HMS Pelagic and	<50 ft nearshore	Commercial	**4**	Provides fishery-independent index of abundance and life history information

History Study		Coastal Fisheries, Shark Recreational	longliner			for thresher sharks that are caught in commercial and recreational fisheries.
Life History Study; Conservation Engineering	MD	HMS (tuna and swordfish predominantly) Pelagic Fisheries, HMS Recreational	Various	Commercial and Recreational	**2 to 4**	Provides information for assessments and life history studies of shark and bycatch species caught in HMS commercial and recreational fisheries. Contract is to provide data from satellite tags.
Life History Study; Fishery Independent Surveys	CA	HMS (tuna and swordfish predominantly) Pelagic Fisheries, HMS Recreational	Charter party boats <100 ft	Recreational	**4**	Provides information for HMS life history and assessment studies. Provide data for habitat analysis of protected species. Provides data relevant for the management of rockfish.
Fishery Independent Surveys; Life History Study; Conservation Engineering	CA	HMS Swordfish	Research Vessel, <100 ft	Commercial	**4**	Provides data for effectiveness of alternative gear trials to target swordfish at depth while avoiding bycatch species of concern. Results may lead to the development of an Experimental Fishing Permit through the Pacific Fishery Mgmt Council to further test the gear aboard cooperative fishing vessels.
Life History Study; Conservation Engineering	Canada	Groundfish commercial and recreational fisheries	Charter party boats <100 ft	Commercial and Recreational	**4**	Provides data to assess post-release survival, habitat associations and behavior of rockfishes to improve management and assessment. Contract is for equipment to support the commercial and recreational groundfish fisheries.
Fishery Independent Surveys	CA	Chinook Salmon Commercial Troll-California	Less than 100 ft troller; 45 vessels participating	Commercial	**4**	Provide data for evaluation of stock distribution in different fishery management areas and months. Assessment of adequacy of tagged stock as proxy for untagged ESA-listed stock. Provides information on stock specific patterns of association with oceanographic conditions.
Fishery Independent Surveys	CA	FMP Groundfish	<100ft commercial vessel; trap gear	Commercial	**2 to 4**	GIS analysis and creation of habitat maps for improved survey stratification based on newly available 2-meter resolution bathymetry grids.
Fishery Independent Surveys; Life	CA	Commercial rockfish,	Charter party boats <100 ft	Commercial and Recreational	**4**	Provides data on maternal, spatial and oceanographic effects on rockfish

History Study		recreational rockfish	and commercial boats < 100 ft			fecundity, directly applicable to stock assessments. Partner study provides data on effectiveness of Rockfish Conservation Areas for population recovery.
Life History Study; Conservation Engineering	Washington DC	Groundfish commercial and recreational fisheries	Charter party boats <100 ft	Commercial and Recreational	**4**	Provides data to assess post-release survival, habitat associations and behavior of rockfishes to improve management and assessment. Contract is for skilled labor to analyze and conduct studies in support of the commercial and recreational groundfish fisheries.
Conservation Engineering	Ca	CPFV	Commercial boat <100 ft	Commercial and Recreational	**4**	Provides a non-lethal deterrence method for fisherman to deter California sea lions and harbor seals from gear and catch.
Conservation Engineering	CA	CPFV	Commercial boat <100 ft	Commercial and Recreational	**4**	Provides a non-lethal deterrence method for fisherman to deter California sea lions and harbor seals from gear and catch.
Fishery Independent Surveys	CA	FMP Groundfish	<100ft commercial vessel; trap gear	Commercial	**2 to 4**	Methodological pilot study for fishery-independent survey; information on relative abundances in nearshore untrawlable habitats
Fishery Independent Surveys; Life History Study	CA	Chinook Salmon Commercial Troll-California	Less than 100 ft troller; 45 vessels participating	Commercial	**4**	Provide data for evaluation of stock distribution in different fishery management areas and months. Assessment of adequacy of tagged stock as proxy for untagged ESA-listed stock. Provides information on stock specific patterns of association with oceanographic conditions.
Fishery Independent Surveys; Life History Study	CA	Commercial rockfish, recreational rockfish	Charter party boats <100 ft and commercial boats < 100 ft	Commercial and Recreational	**4**	Provides data on maternal, spatial and oceanographic effects on rockfish fecundity, directly applicable to stock assessments. Partner study provides data on effectiveness of Rockfish Conservation Areas for population recovery.
Fishery Independent Surveys; Life History Study	CA	Commercial rockfish, recreational rockfish	Charter party boats <100 ft and commercial	Commercial and Recreational	**4**	Provides data on maternal, spatial and oceanographic effects on rockfish fecundity, directly applicable to stock assessments. Partner study provides data

			boats < 100 ft			on effectiveness of Rockfish Conservation Areas for population recovery.
Fishery Independent Surveys; Life History Study	CA	Commercial rockfish, recreational rockfish	Charter party boats <100 ft and commercial boats < 100 ft	Commercial and Recreational	**4**	Provides data on maternal, spatial and oceanographic effects on rockfish fecundity, directly applicable to stock assessments. Partner study provides data on effectiveness of Rockfish Conservation Areas for population recovery.
FY12 Cooperative Research Projects - Northwest						
Research Topic (e.g., Conservation Engineering, Life History Study, Fishery Independent Survey, Logbook Program, etc)	**State**	**Fishery or Fisheries Involved**	**Platform Type(s) Used**	**Basic Stakeholder Classification (Commercial, Recreational, etc.)**	**Level of Collaboration (1- 5)**	**Research Results - major findings or data contributions**
Conservation Engineering	WA	Halibut fishery	Longline	Commercial	**4**	Designed an alternative longline hook based on Traditional Makah Halibut Hooks (Chiboods); testing still ongoing to reduce bycatch of rockfish.
Life History Study	WA	Sablefish fishery	Longline	Commercial	**4**	Parameters used to better classify reproductive status of fish collected during trawl surveys
Fishery Independent Survey	West Coast	West Coast groundfish	Hook-and-line boats	Recreational	**4**	Data used for stock assessments/set allowable catch limits (Field 20011-Bocaccio (update), Dick et al. 2011-Greenspotted (full); Field et al. 2010 Bocaccio (full), Stewart et al. 2009-Yelloweye (full), MacCall 2005-Vermillion (full)); non-lethal DNA sampling hook patented; 2 peer reviewed papers; one NOAA Tech memo
Conservation Engineering	West Coast	Sablefish fishery	Longline	Commercial	**4**	Ongoing work to reduce bycatch of seabirds; when available, results will be used to refine regulations of sablefish longline fishery to reduce seabird bycatch
Life History Study	West Coast	Salmon fishery	Tangle-net	Commercial and recreational	**3**	Weekly and annual reports to PFMC

			boats			provides in-season CPUE data & data on salmon migration timing
Life History Study	West Coast	Salmon fishery	Trollers	Commercial	**4**	Results from this project have been considered by the PFMC as ancillary data to support and informally validate CWT-based assessments, and to consider the possibility of adjusting management area boundaries to accommodate finer-scale distribution patterns.
Conservation Engineering	West Coast	West Coast groundfish	Trawler	Commercial	**3**	Data used to improve codend selectivity to reduce retention of unmarketable/undersize groundfishes.
FY12 Cooperative Research Projects – Pacific Islands						
Research Topic (e.g., Conservation Engineering, Life History Study, Fishery Independent Survey, Logbook Program, etc)	**State**	**Fishery or Fisheries Involved**	**Platform Type(s) Used**	**Basic Stakeholder Classification (Commercial, Recreational, etc.)**	**Level of Collaboration (1- 5)**	**Research Results - major findings or data contributions**
Fishery Independent Survey; Advancing Stock Assessments	FL	Pacific Islands Region Bottomfish (snappers and groupers)	Bottomfish commercial vessels	Commercial/recreational	**4**	Data used to advance stock assessments/set allowable catch limits
Fishery Independent Survey; Life History Research; Fishery Dependent Sampling; Advancing Stock Assessments	HI	PIR Bottomfish	Bottomfish commercial vessels	Commercial/recreational	**4**	Data used to advance stock assessments/set allowable catch limits
Fishery independent Survey; Life History Research; Fishery Dependent Sampling; Advancing Stock Assessments	CA	All fisheries	Not applicable	Not applicable	**4**	Data used to advance stock assessments/set allowable catch limits
Human Dimensions	HI	Pacific Islands	Bottomfish	Commercial/recreational	**4**	Data used to advance stock

		Region Bottomfish	commercial vessels			assessments/set allowable catch limits
Ecosystem Monitoring; Advancing Stock Assessments	HI	Pacific Islands Region Bottomfish, coral reef fish	Bottomfish commercial vessels, hook and line vessels	Commercial/recreational	**4**	Data used to advance stock assessments/set allowable catch limits
Fishery Independent Survey; Life History Research; Fishery Dependent Sampling; Advancing Stock Assessments	HI	Pacific Islands Region Pelagic and Insular (bottomfish, coral reef fish)	Not applicable	Commercial/recreational	**4**	Data used to advance stock assessments/set allowable catch limits

*Federal internal expenditures not included

Michelle West - NOAA Federal <michelle.b.west@noaa.gov>

Folder 13-030620

Jenell Wildgoose - NOAA Federal <jenell.c.wildgoose@noaa.gov> Mon, May 20, 2013 at 10:59 AM
To: Michelle West - NOAA Federal <michelle.b.west@noaa.gov>

Hi Michelle,

I was told by Sierra Jones of OLIA that Budget is handling this folder so you may want to reassign this folder to them. Thanks!

Michelle West - NOAA Federal <michelle.b.west@noaa.gov>

Folder 13-030620

Jenell Wildgoose - NOAA Federal <jenell.c.wildgoose@noaa.gov> Mon, May 20, 2013 at 11:43 AM
To: Michelle West - NOAA Federal <michelle.b.west@noaa.gov>

Michelle,

Budget is managing all QFR's for the 2014 budget, per Sierra.

[Quoted text hidden]

Folder

RUSH

Tracking ID	13-029917-
Category	NOAANLA
To/Owner	NOAA/ES (Group)
From	Honorable Hastings, Doc
Addressed To	Acting Under Secretary
Folder Types	Request Congressional
Mail Type	Mail
Subject	Questions regarding testimony on Reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act
Keyword Summary	Magnuson-Stevens Fishery Conservation and Management Act - Testimony
Structured Keywords	
DOC Control Number	Due downtown 4/10
Signature*	Under Secretary
Clearance Status (ExecSec Only)	100-01 PUBLICATIONS
NOAA File List	None
Date Due for LO	
Date of Document	03/29/2013
Date Received	04/04/2013
Date Due	04/11/2013
Date Closed	
Created By	04/04/2013 10:51:49 West, Michelle B
Modified By	04/04/2013 10:51:49 West, Michelle B

RUSH

Attachments

Type	Description	Document Status	Category	Owner	Created Modified
PDF (Adobe Acrobat Reader)		Incoming	NOAA/ES	West, Michelle B	04/04/2013 04/04/2013

Assignments
NOAA-Internal Workflow

Action	Assigned By	Assigned To	Status	Category	Work Sequence	Date Assigned	Date Due	Closed
Prepare Reply for Signature	West, Michelle B	NMFS/CU (Group)	Closed	NOAA/NMFS		04/08/2013	04/10/2013	04/08/2013

Requested Activity: NMFS is already answering the QFR's, please reassignment so they can respond to incoming letter. Thanks!

Response Notes: To F for advice 4/8 (fp)

Reassignment Request	Wildgoose, Jeneli C	NOAA/ES (Group)	Closed	NOAA/LA		04/08/2013	Never	04/08/2013

Requested Activity: NMFS is already answering the QFR's, please reassignment so they can respond to incoming letter. Thanks!

Prepare Reply for Signature	West, Michelle B	NOAA/LA (Group)	Closed	NOAA/LA	1000	04/04/2013	04/10/2013	04/08/2013

Requested Activity: Response requested by 4/15/13

Response Notes: Please forward to NMFS they are already working on the QFRs from this incoming. Thanks!

Prepare Response	Pflieger, Frances	NMFS/F (Group)	Active	NOAA/LA	1100	04/08/2013	04/10/2013	
Review	NMFS/F (Group)	NMFS/CU (Group)	Pending	NOAA/LA	1200	04/10/2013	04/10/2013	
Review	NMFS/CU (Group)	Pflieger, Frances	Pending	NOAA/LA	1250	04/10/2013	04/10/2013	JP 4/9/13
Clearance (NOAA)	Pflieger, Frances	NMFS/GC (Group)	Pending	NOAA/LA	1300	04/10/2013	04/10/2013	Template response
Review	NMFS/GC (Group)	NMFS/CU (Group)	Pending	NOAA/LA	1400	04/10/2013	04/10/2013	
Clearance (NOAA)	NMFS/CU (Group)	NMFS/LA (Group)	Closed	NOAA/LA	1500	04/10/2013	04/12/2013	**04/08/2013**

Response Notes: Can clear downtown

Review	NMFS/CU (Group)	NMFS/CU (Group)	Pending	NOAA/LA	1600	04/10/2013	04/10/2013	
Clearance (NOAA)	NMFS/CU (Group)	NMFS/DAA (Group)	Pending	NOAA/LA	1650	04/10/2013	04/10/2013	
Signature	NMFS/DAA (Group)	NMFS/F (Group)	Pending	NOAA/LA	1700	04/10/2013	04/10/2013	
Disposition	NMFS/F (Group)	NMFS/CU (Group)	Pending	NOAA/LA	1800	04/10/2013	04/10/2013	
Appropriate Action	NMFS/CU (Group)	NOAA/ES (Group)	Pending	NOAA/LA	31	04/10/2013	04/10/2013	4/9/13

- WebDocFlow 4.7 - Powered by DataByDesign Tracking Solutions™ - Monday, April 08, 2013 - 3:30:53 PM -

APR 0 9 2013

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

THE DIRECTOR

MEMORANDUM FOR: Kathryn D. Sullivan, Ph.D.
Acting Assistant Secretary of Commerce
for Conservation and Management

FROM: Samuel D. Rauch III
Deputy Assistant Administrator for Regulatory Programs,
performing the functions and duties of the
Assistant Administrator for Fisheries

SUBJECT: Questions for the Record regarding Testimony on Reauthorization of the Magnuson-Stevens Act

Name of Person(s) Requesting Action/Correspondent(s): Representative Doc Hastings (R-WA), Chairman, Committee on Natural Resources.

Subject/Issues Raised by Person(s) Requesting Action/Correspondent(s): Representative Hastings thanks you for your March 13, 2013, testimony on the reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act, and submits specific Questions for the Record.

Major Points in the Response:

- You thank Representative Hastings for his letter and for the opportunity to testify before the Committee.
- Regarding the specific Questions for the Record, you state that NOAA is working with the Committee and will submit responses via the standard process.

Potential Controversy: None.

Other Pertinent Information: None.

Coordination: Other than GC coordination, indicate all NMFS Line/Staff Offices consulted:

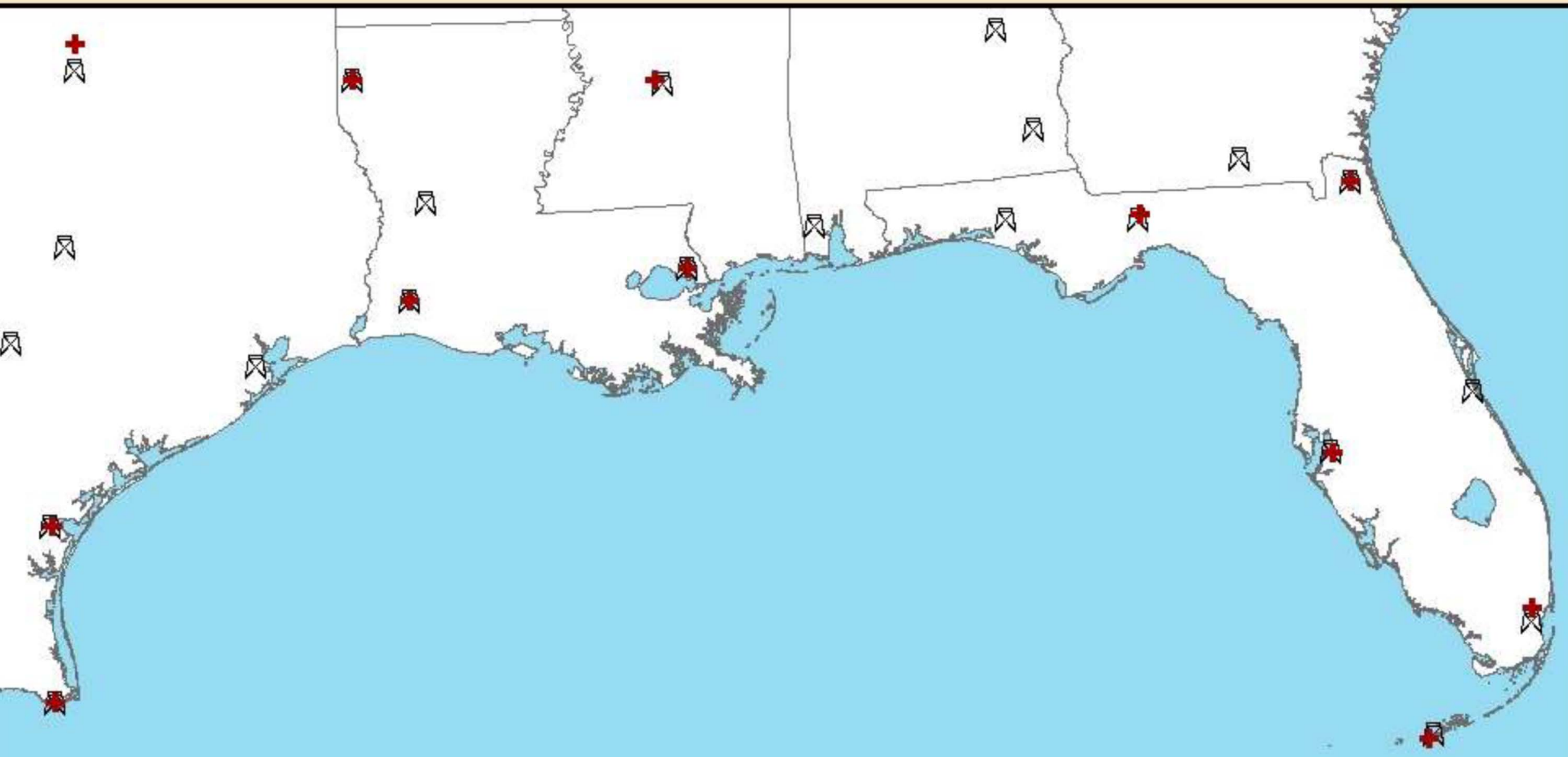
NMFS	NWS	NOS	OAR	NESDIS	PPI	NMAO	PA&E	PCIA	LA	IA	CFO	CAO	CIO	OED	AGO	WFMO	COS	DUS	AS	UNSEC

Clearance Official(s)/Line Office(s)/Date of Clearance(s): None.

Contact Person: Carrie Selberg, NMFS Office of the Assistant Administrator, (301) 427-8021.

Attachment

Radar and Upper Air Observation Sites



Puerto Rico and US Virgin Islands

OCTOBER 2005 MIRS GIS GROUP

Upper Air

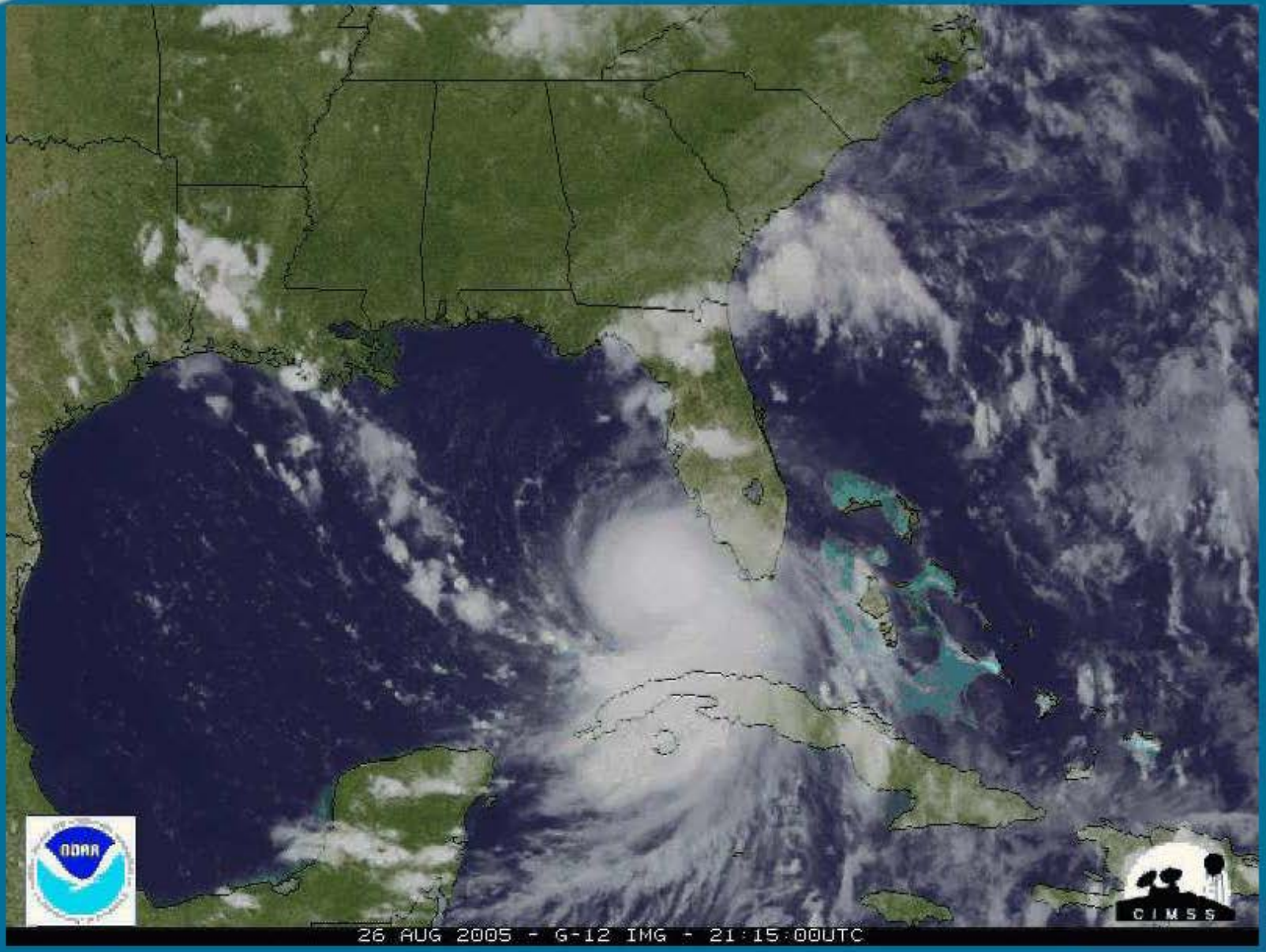
WSR-88D

National Hurricane Center (NHC) Products and Services During Katrina

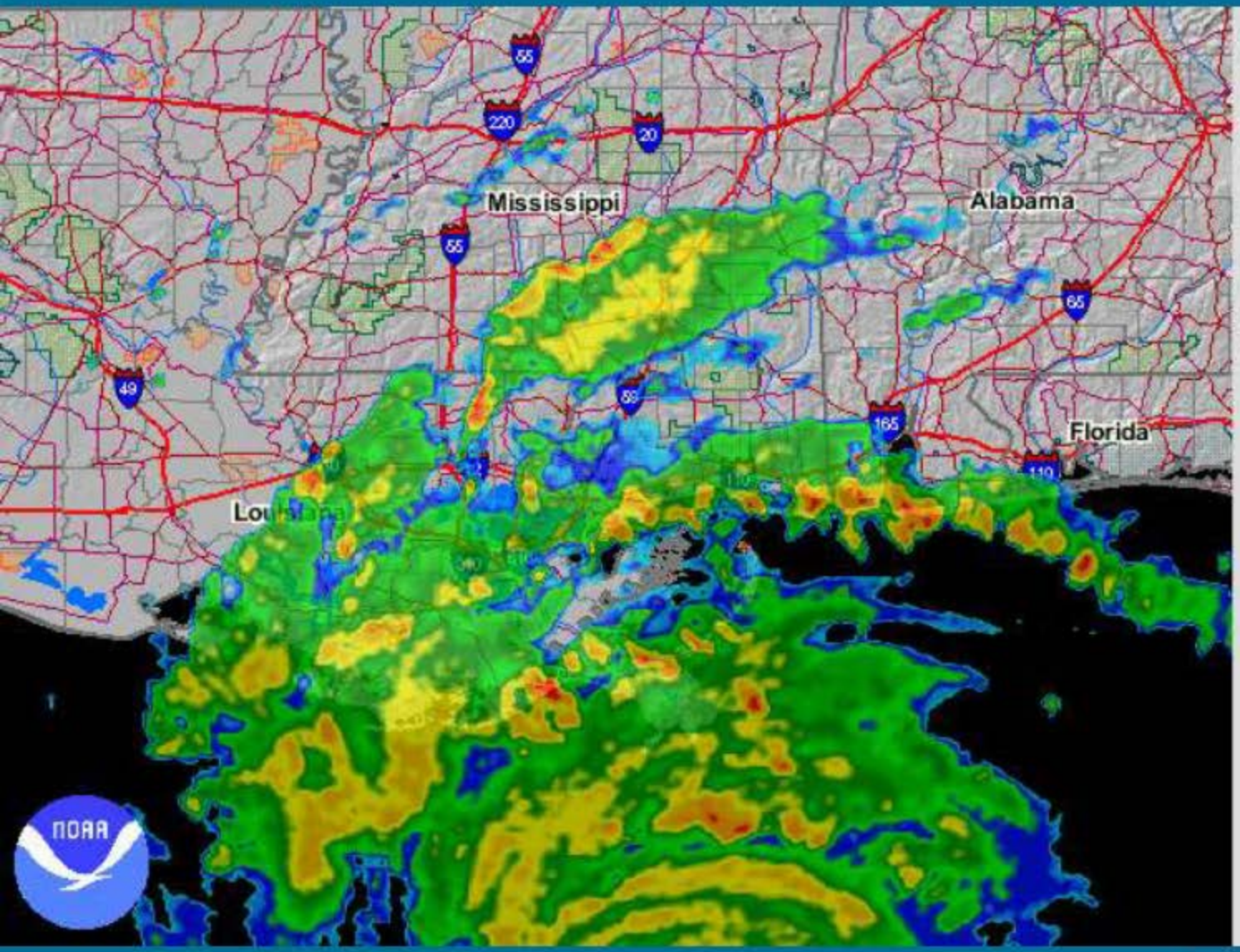
1965 (Betsy)

2005 (Katrina)

Satellite Loop of Katrina



Radar Loop of Katrina



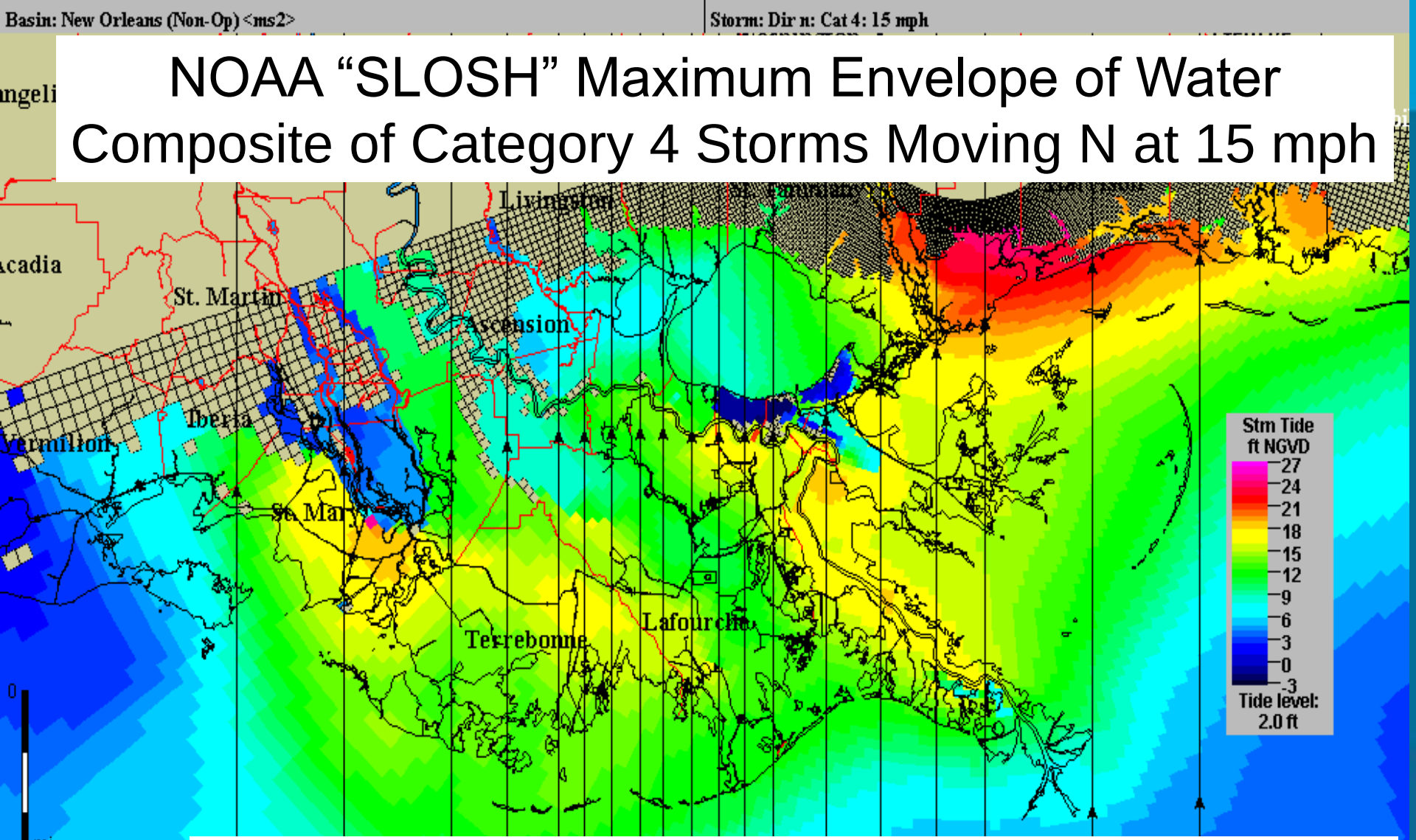
BASE REFLECTIVITY
KLIX - NEW ORLEANS, LA
08/29/2005 00:02:28 GMT
LAT: 30/20/13 N
LON: 89/49/30 W
ELEV: 138.0 FT
MODE/VCP: A / 11

ELEV ANGLE: 0.50 °
MAX: 56 dBZ
RANGE 248 NM

Legend: (Category) dBZ

(15) 75
(14) 70
(13) 65
(12) 60
(11) 55
(10) 50
(9) 45
(8) 40
(7) 35
(6) 30
(5) 25
(4) 20
(3) 15
(2) 10
(1) 5

NOAA “SLOSH” Maximum Envelope of Water
Composite of Category 4 Storms Moving N at 15 mph

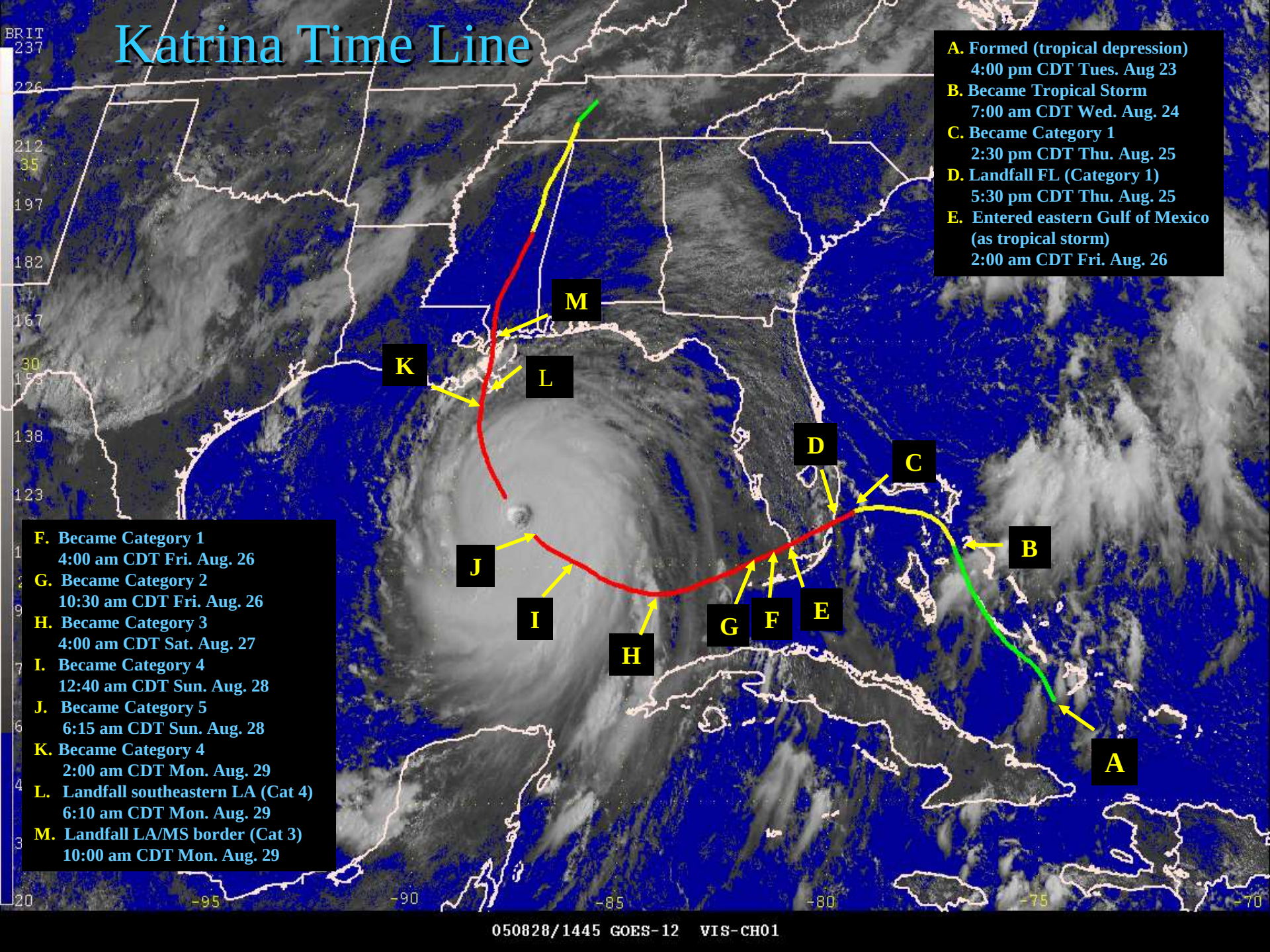


NOAA SLOSH Storm Surge Data First Provided to New Orleans Area in 1989. NOAA first provided guidance for forecasting storm surge along the open U.S. Gulf and east coasts from the precursor to SLOSH known as “SPLASH”, in 1972.

National Hurricane Conferences

Year	Location	Attendance
1980	Orlando, FL	~450
1981	St. Petersburg, FL	~600
1982	Orlando, FL	~600
1983	Tampa, FL	~600
1984	Tampa, FL	607
1985	New Orleans, LA	447
1990	Houston, TX	718
1991	Miami, FL	642
1992	Norfolk, VA	1,117
1993	Orlando, FL	1,260
1994	New Orleans, LA	1,047
1995	Atlantic City, NJ	1,055
1996	Orlando, FL	1,447
1997	Houston, TX	1,164
1998	Norfolk, VA	1,416
1999	Orlando, FL	1,447
2000	New Orleans, LA	1,751
2001	Washington, DC	1,144
2002	Orlando, FL	1,026
2003	New Orleans, LA	1,081
2004	Lake Buena Vista, FL	1,199
2005	New Orleans, LA	1,570

Example of NOAA's extensive outreach and education program for emergency managers and others conducted during the hurricane "off-season".


Katrina Time Line
A. Formed (tropical depression)
4:00 pm CDT Tues. Aug 23
B. Became Tropical Storm
7:00 am CDT Wed. Aug. 24
C. Became Category 1
2:30 pm CDT Thu. Aug. 25
D. Landfall FL (Category 1)
5:30 pm CDT Thu. Aug. 25
E. Entered eastern Gulf of Mexico
(as tropical storm)
2:00 am CDT Fri. Aug. 26
F. Became Category 1
4:00 am CDT Fri. Aug. 26
G. Became Category 2
10:30 am CDT Fri. Aug. 26
H. Became Category 3
4:00 am CDT Sat. Aug. 27
I. Became Category 4
12:40 am CDT Sun. Aug. 28
J. Became Category 5
6:15 am CDT Sun. Aug. 28
K. Became Category 4
2:00 am CDT Mon. Aug. 29
L. Landfall southeastern LA (Cat 4)
6:10 am CDT Mon. Aug. 29
M. Landfall LA/MS border (Cat 3)
10:00 am CDT Mon. Aug. 29
A
B
C
D
E
F
G
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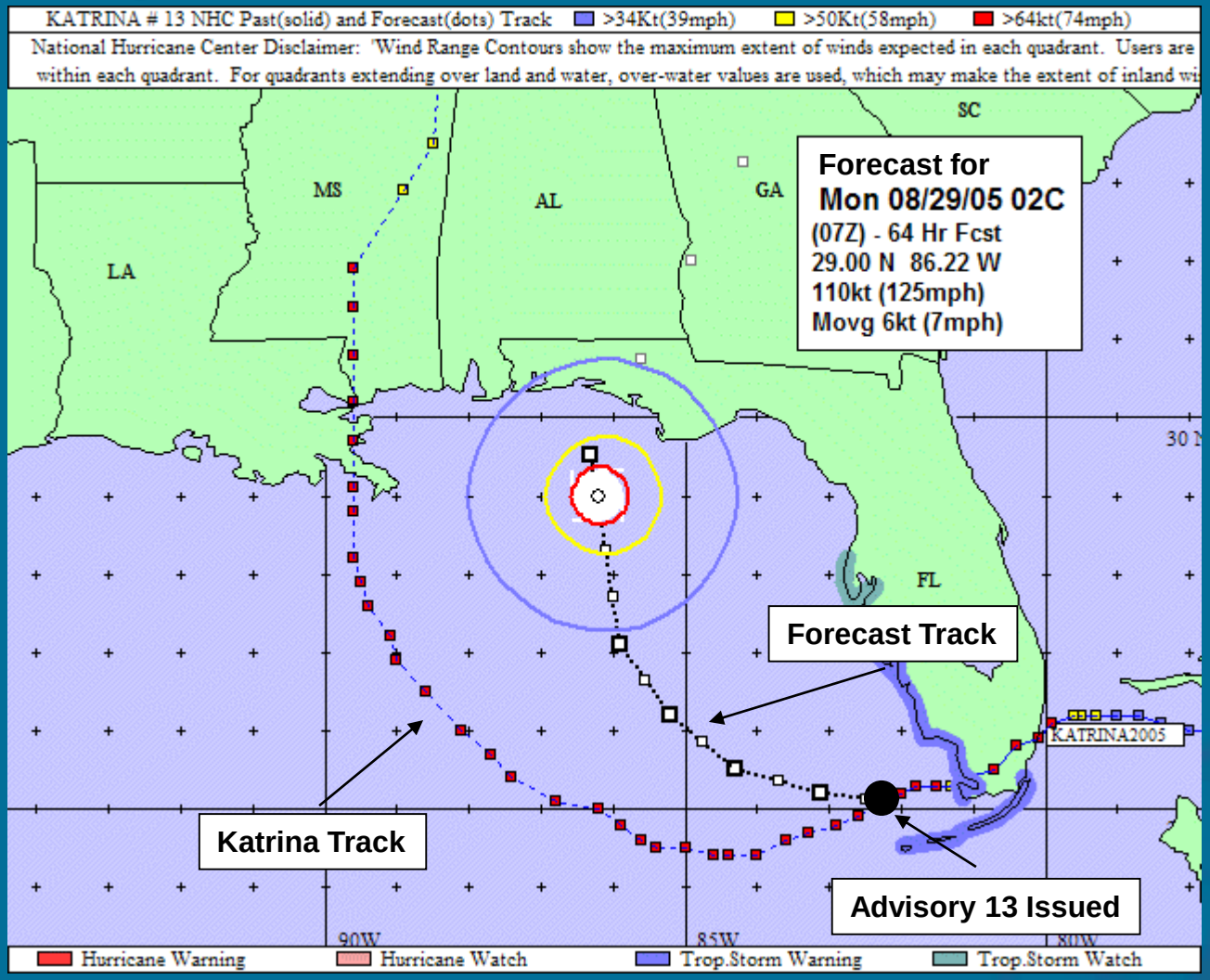
I
J
K
L
M
050828/1445 GOES-12 VIS-CH01

Advisory 13

Friday 08/26/2005 10:30 AM CDT



Advisory 13

Friday 08/26/2005 10:30 AM CDT

BULLETIN
HURRICANE KATRINA SPECIAL ADVISORY NUMBER 13
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
1130 AM EDT FRI AUG 26 2005

KATRINA IS A CATEGORY TWO HURRICANE ON THE SAFFIR-SIMPSON SCALE. SOME STRENGTHENING IS FORECAST DURING THE NEXT 24 HOURS...AND KATRINA COULD BECOME A CATEGORY THREE OR MAJOR HURRICANE ON SATURDAY .

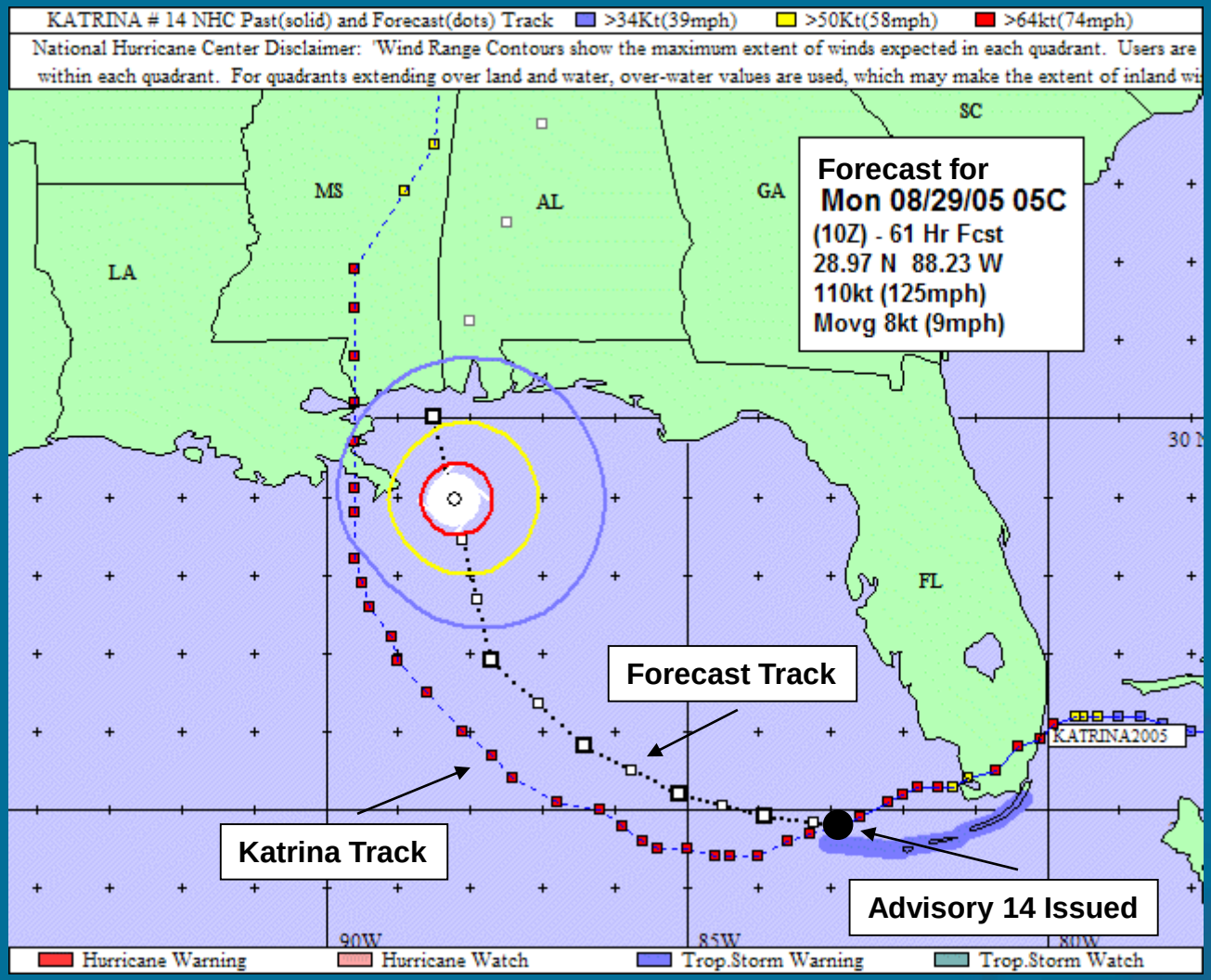
Hurricane Liaison Team (HLT) Coordination
- 10:15 am CDT Audio Conference (FL)
- 11:00 am CDT Video Teleconference (FEMA HQ, FEMA Region IV HQ, FL, AL, and GA)

Note: Earlier HLT Coordination calls with FL, FEMA HQ and FEMA Region IV HQ occurred on Wed. Aug 24 and Thurs. Aug 25

TPC/NHC and coastal National Weather Service Forecast Offices (WFOs) conduct coordination calls one hour prior to the release of every advisory. WFOs coordinate with local emergency management officials.

Advisory 14

Friday 08/26/2005 4:00 PM CDT



Advisory 14

Friday 08/26/2005 4:00 PM CDT

HURRICANE KATRINA DISCUSSION NUMBER 14
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 PM EDT FRI AUG 26 2005

…THE MODELS HAVE SHIFTED SIGNIFICANTLY WESTWARD AND ARE NOW IN BETTER AGREEMENT. THIS HAS RESULTED IN THE OFFICIAL FORECAST TRACK BEING SHIFTED ABOUT 150 NMI WEST OF THE PREVIOUS TRACK…HOWEVER…PROJECTED LANDFALL IS STILL ABOUT 72 HOURS AWAY… SO FURTHER MODIFICATIONS IN THE FORECAST TRACK ARE POSSIBLE.

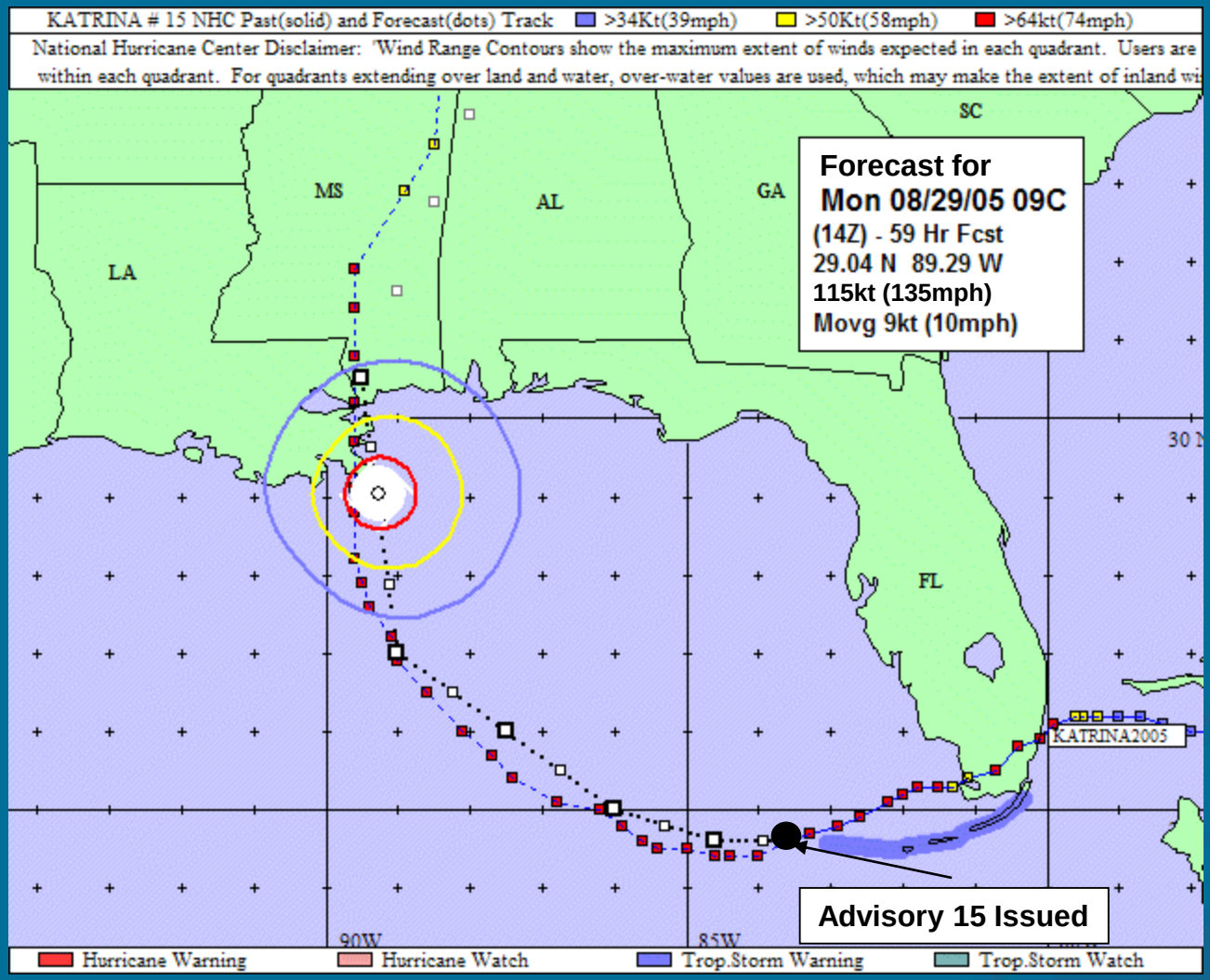
KATRINA IS EXPECTED TO BE MOVING OVER THE GULF LOOP CURRENT AFTER 36 HOURS…WHICH WHEN COMBINED WITH DECREASING VERTICAL SHEAR…SHOULD ALLOW THE HURRICANE TO REACH CATEGORY FOUR STATUS BEFORE LANDFALL OCCURS.

Hurricane Liaison Team (HLT) Coordination
- 4:15 pm CDT Audio Conference (FL)

NOAA Office of Legislative Affairs begins to provide NHC advisories via email to the Congressional staffers of LA, MS, AL and FL.

Advisory 15

Friday 08/26/2005 10:00 PM CDT



Advisory 15

Friday 08/26/2005 10:00 PM CDT

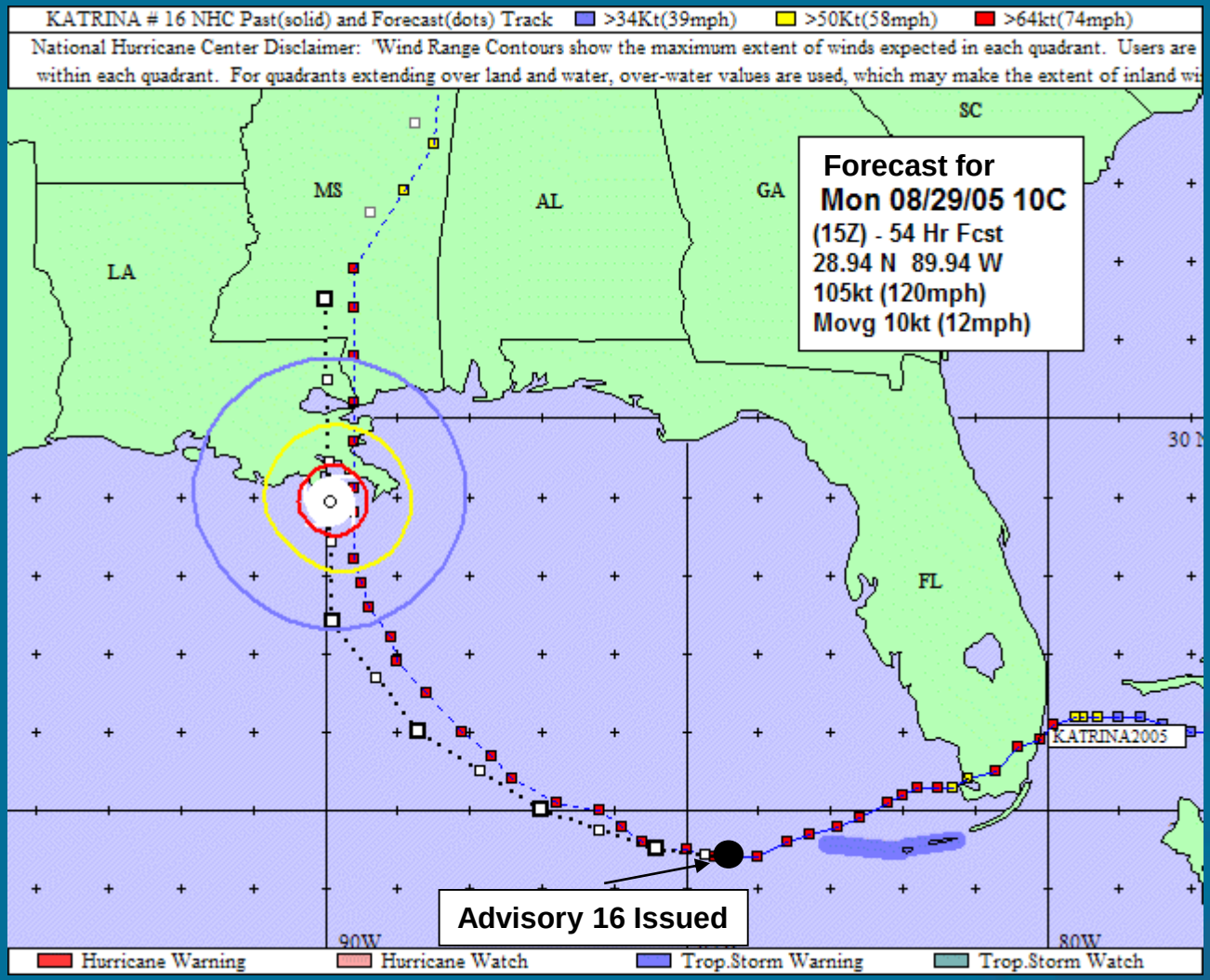
HURRICANE KATRINA DISCUSSION NUMBER 15
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 PM EDT FRI AUG 26 2005

THE OFFICIAL FORECAST BRINGS THE CORE OF THE INTENSE HURRICANE OVER THE NORTH CENTRAL GULF OF MEXICO IN 48 HOURS OR SO. IT IS WORTH NOTING THAT THE GUIDANCE SPREAD HAS DECREASED AND MOST OF THE RELIABLE NUMERICAL MODEL TRACKS ARE NOW CLUSTERED BETWEEN THE EASTERN COAST OF LOUISIANA AND THE COAST OF MISSISSIPPI. THIS CLUSTERING INCREASES THE CONFIDENCE IN THE FORECAST.

Note: Every NHC forecast beginning 10:00 pm CDT Friday evening (56 hours before the southeastern LA landfall Showed the center coming ashore in southeastern LA at category 4 or 5 intensity, and then passing near or over New Orleans and then near the LA-MS border are as a major hurricane (Category 3-5).

Advisory 16

Saturday 08/27/2005 4:00 AM CDT



Advisory 16

Saturday 08/27/2005 4:00 AM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 16
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 AM EDT SAT AUG 27 2005

KATRINA BECOMES A MAJOR HURRICANE WITH 115 MPH WINDS

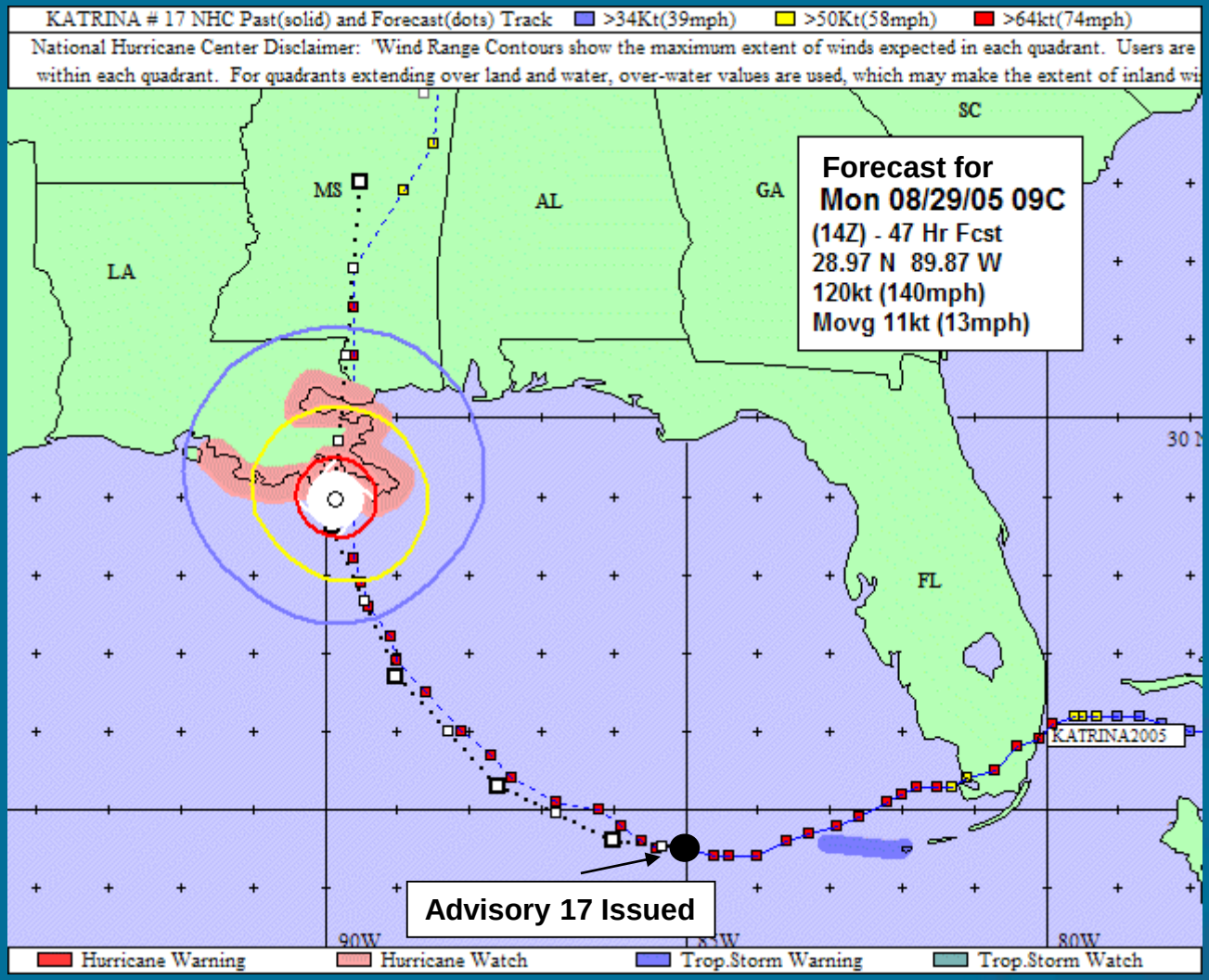
SOME STRENGTHENING IS FORECAST DURING THE NEXT 24 HOURS…. RECONNAISSANCE AIRCRAFT DATA AND SURFACE OBSERVATIONS INDICATE THAT KATRINA HAS BECOME A LARGER HURRICANE.

HURRICANE KATRINA DISCUSSION NUMBER 16
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 AM EDT SAT AUG 27 2005

DUE TO THE DECREASING SPREAD IN THE MODELS…THE CONFIDENCE IN THE FORECAST TRACK IS INCREASING.

Advisory 17

Saturday 08/27/2005 10:00 AM CDT



Advisory 17

Saturday 08/27/2005 10:00 AM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 17
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
10 AM CDT SAT AUG 27 2005

AT 10 AM CDT...1500Z...A HURRICANE WATCH IS IN EFFECT FOR THE SOUTHEASTERN COAST OF LOUISIANA EAST OF MORGAN CITY TO THE MOUTH OF THE PEARL RIVER...INCLUDING METROPOLITAN NEW ORLEANS AND LAKE PONCHARTRAIN.

A HURRICANE WATCH WILL LIKELY BE REQUIRED FOR OTHER PORTIONS OF THE NORTHERN GULF LATER TODAY OR TONIGHT. INTERESTS IN THIS AREA SHOULD MONITOR THE PROGRESS OF KATRINA..

SOME STRENGTHENING IS FORECAST DURING THE NEXT 24 HOURS...AND KATRINA COULD BECOME A CATEGORY FOUR HURRICANE.

Note: A hurricane watch advises of the possibility of hurricane conditions, with the objective of providing at least 36 hours of lead time. The center of Katrina came ashore in this hurricane watch area 44 hours after the watch was issued.

Hurricane Liaison Team (HLT) Coordination
- 10:15 am CDT Audio Conference (FL)
- 11:00 am CDT Video Teleconference (FEMA HQ, FEMA Region IV and VI HQs, FL, LA, MS, AL, and GA)

Advisory 17

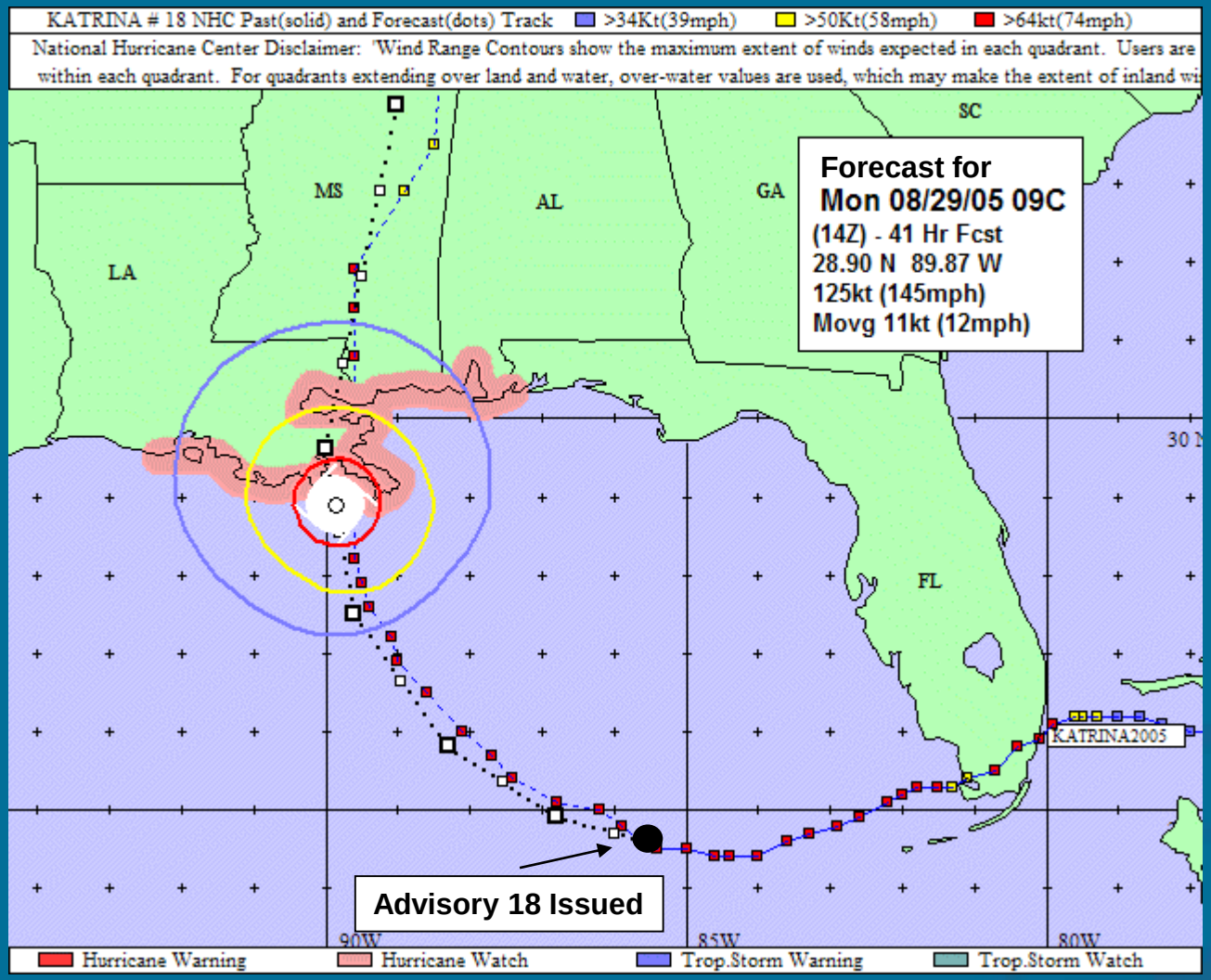
Saturday 08/27/2005 10:00 AM CDT

HURRICANE KATRINA DISCUSSION NUMBER 17
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
10 AM CDT SAT AUG 27 2005

IT IS NOT OUT OF THE QUESTION THAT KATRINA COULD REACH CATEGORY 5 STATUS AT SOME POINT BEFORE LANDFALL.

Advisory 18

Saturday 08/27/2005 4:00 PM CDT



Advisory 18

Saturday 08/27/2005 4:00 PM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 18
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
4 PM CDT SAT AUG 27 2005

…KATRINA RE-ORGANIZING OVER THE SOUTHEASTERN GULF OF MEXICO…

AT 4PM CDT…2100Z…THE HURRICANE WATCH IS EXTENDED WESTWARD TO INTRACOASTAL CITY LOUISIANA AND EASTWARD TO THE FLORIDA-ALABAMA BORDER. A HURRICANE WATCH IS NOW IN EFFECT ALONG THE NORTHERN GULF COAST FROM INTRACOASTAL CITY TO THE ALABAMA-FLORIDA BORDER.

A HURRICANE WARNING WILL LIKELY BE REQUIRED FOR PORTIONS OF THE NORTHERN GULF COAST LATER TONIGHT OR SUNDAY.

Hurricane Liaison Team (HLT) Coordination
- 4:15 pm CDT Audio Conference (FL)

- 7:25 pm CDT Louisiana Gubernatorial Briefing (Mayfield, Blanco)
- 7:35 pm CDT Alabama EM Briefing (Mayfield, Filter)
- 7:45 pm CDT Mississippi Gubernatorial Briefing (Mayfield, Barbour)
- 8:00 pm CDT New Orleans Mayoral Briefing (Mayfield, Nagin)

Advisory 18

Saturday 08/27/2005 4:00 PM CDT

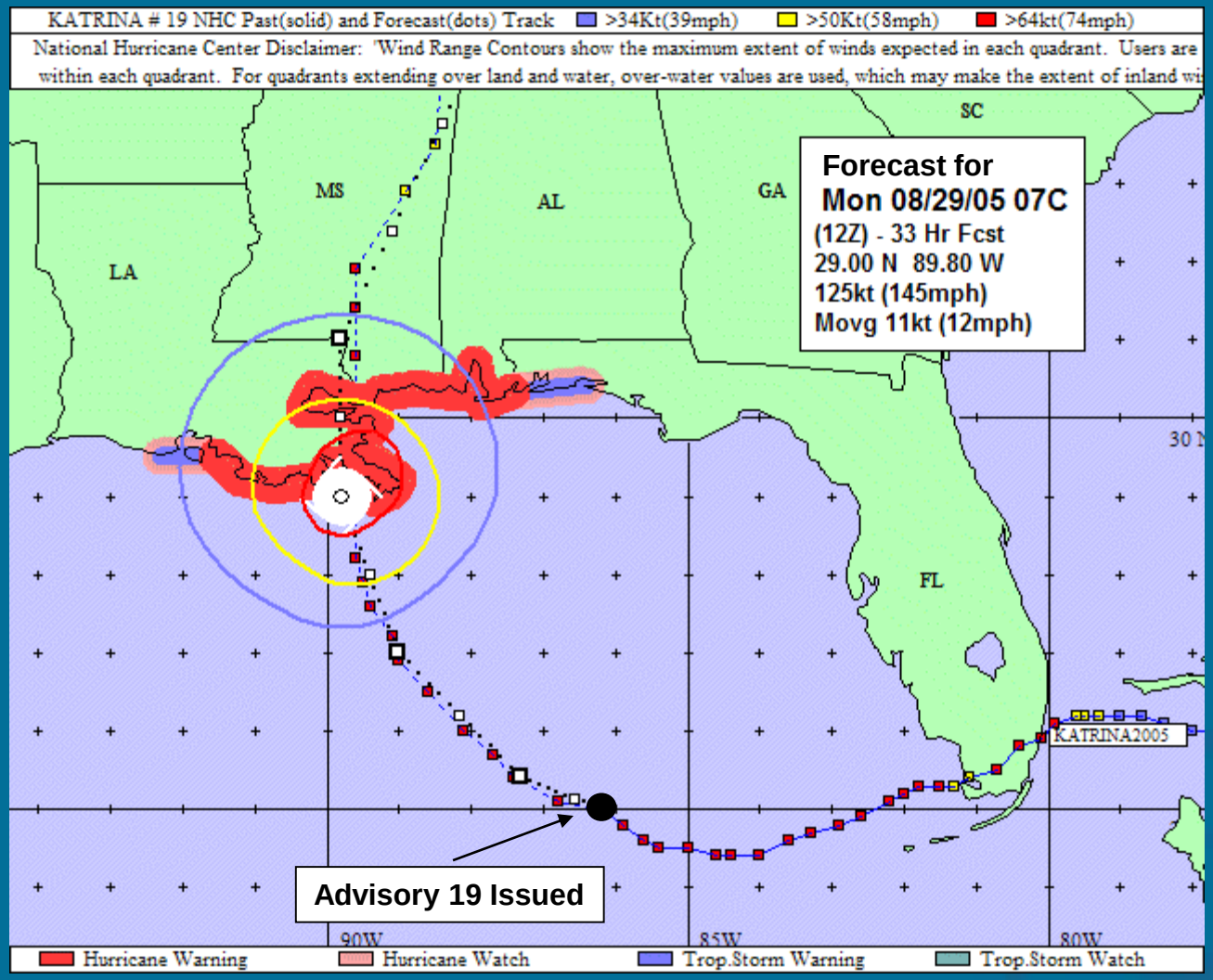
HURRICANE KATRINA DISCUSSION NUMBER 18
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 PM EDT SAT AUG 27 2005

THE INTENSITY FORECAST WILL CALL FOR STRENGTHENING TO 125 KT AT LANDFALL...AND THERE REMAINS A CHANCE THAT KATRINA COULD BECOME A CATEGORY FIVE HURRICANE BEFORE LANDFALL.

Note: Media pool operated from 3:00-10:30 pm CDT Saturday August 27. TPC/NHC provided 12 television and 2 radio interviews. In addition, TPC/NHC participated in 51 telephone briefings or media contacts on August 27.

Advisory 19

Saturday 08/27/2005 10:00 PM CDT



Advisory 19

Saturday 08/27/2005 10:00 PM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 19
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
10 PM CDT SAT AUG 27 2005

...DANGEROUS HURRICANE KATRINA THREATENS THE NORTH CENTRAL GULF COAST...A HURRICANE WARNING ISSUED...

AT 10 PM CDT...0300Z...A HURRICANE WARNING HAS BEEN ISSUED FOR THE NORTH CENTRAL GULF COAST FROM MORGAN CITY LOUISIANA EASTWARD TO THE ALABAMA/FLORIDA BORDER... INCLUDING THE CITY OF NEW ORLEANS AND LAKE PONTCHARTRAIN….PREPARATIONS TO PROTECT LIFE AND PROPERTY SHOULD BE RUSHED TO COMPLETION.

Note: A hurricane warning advises the likelihood of hurricane conditions, with the objective of providing at least 24 hours of lead time. The center of Katrina came ashore in the southeast LA part of the hurricane warning area 32 hours after the warning was issued, and in the Louisiana-Mississippi border part of the warning area 36 hours after the warning was issued.

COASTAL STORM SURGE FLOODING OF 15 TO 20 FEET ABOVE NORMAL TIDE LEVELS...LOCALLY AS HIGH AS 25 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES...CAN BE EXPECTED NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL.

HEAVY RAINS FROM KATRINA SHOULD BEGIN TO AFFECT THE CENTRAL GULF COAST SUNDAY EVENING. RAINFALL TOTALS OF 5 TO 10 INCHES...WITH ISOLATED MAXIMUM AMOUNTS OF 15 INCHES...ARE POSSIBLE ALONG THE PATH OF KATRINA.

Note: Beginning 32 hours before the initial landfall, NHC advisories contained the following or similar statements: "Coastal storm surge of 15 to 20 feet above tide levels… locally as high as 25 feet along with large and dangerous battering waves…can expected near and to the east of where the center makes landfall."

Advisory 19

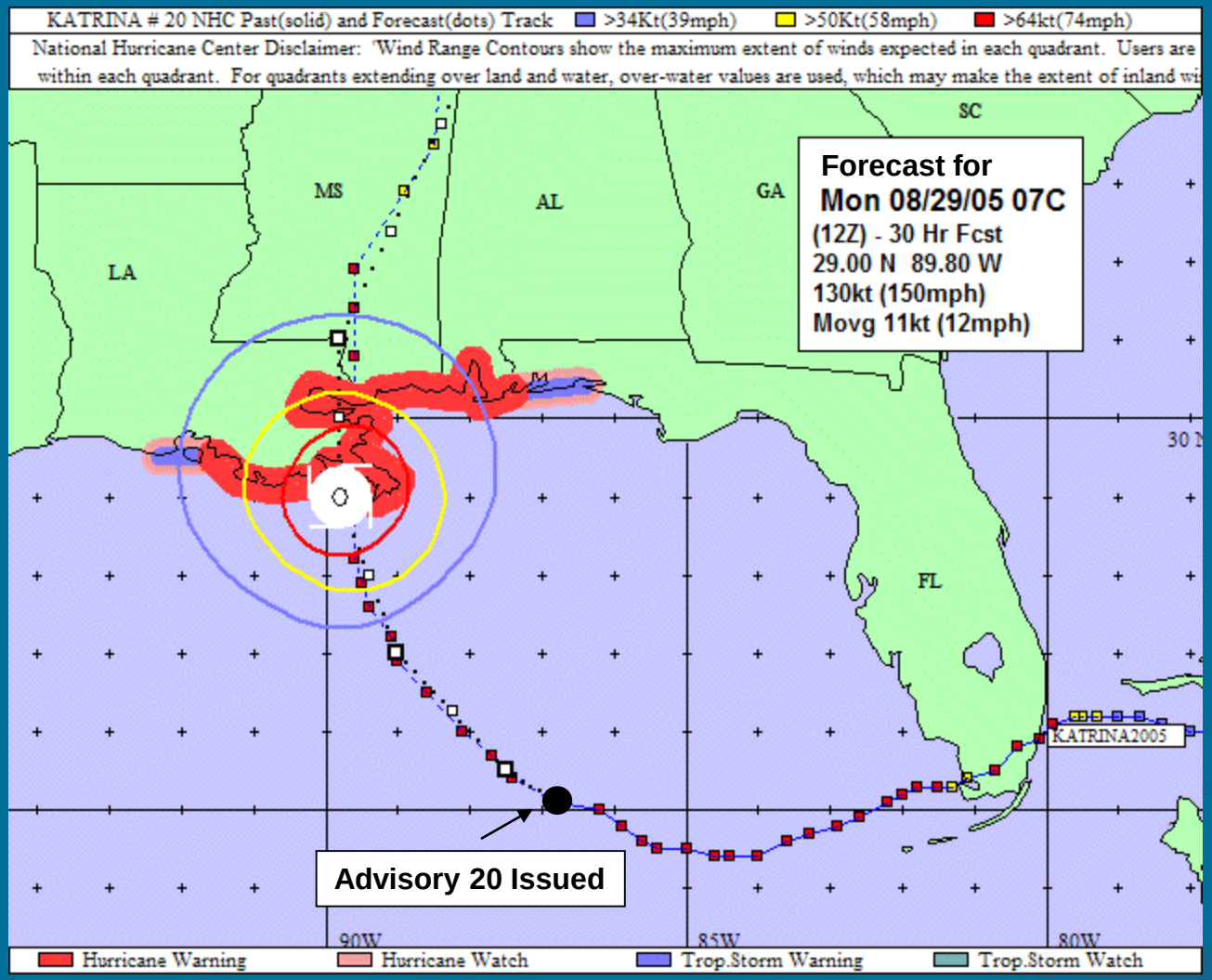
Saturday 08/27/2005 10:00 PM CDT

HURRICANE KATRINA DISCUSSION NUMBER 19
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 PM EDT SAT AUG 27 2005

DESPITE THESE CHANGES IN THE INNER CORE...THE BOTTOM LINE IS THAT KATRINA IS EXPECTED TO BE AN INTENSE AND DANGEROUS HURRICANE HEADING TOWARD THE NORTH CENTRAL GULF COAST...AND THIS HAS TO BE TAKEN VERY SERIOUSLY.

Advisory 20

Sunday 08/28/2005 1:00 AM CDT



Advisory 20

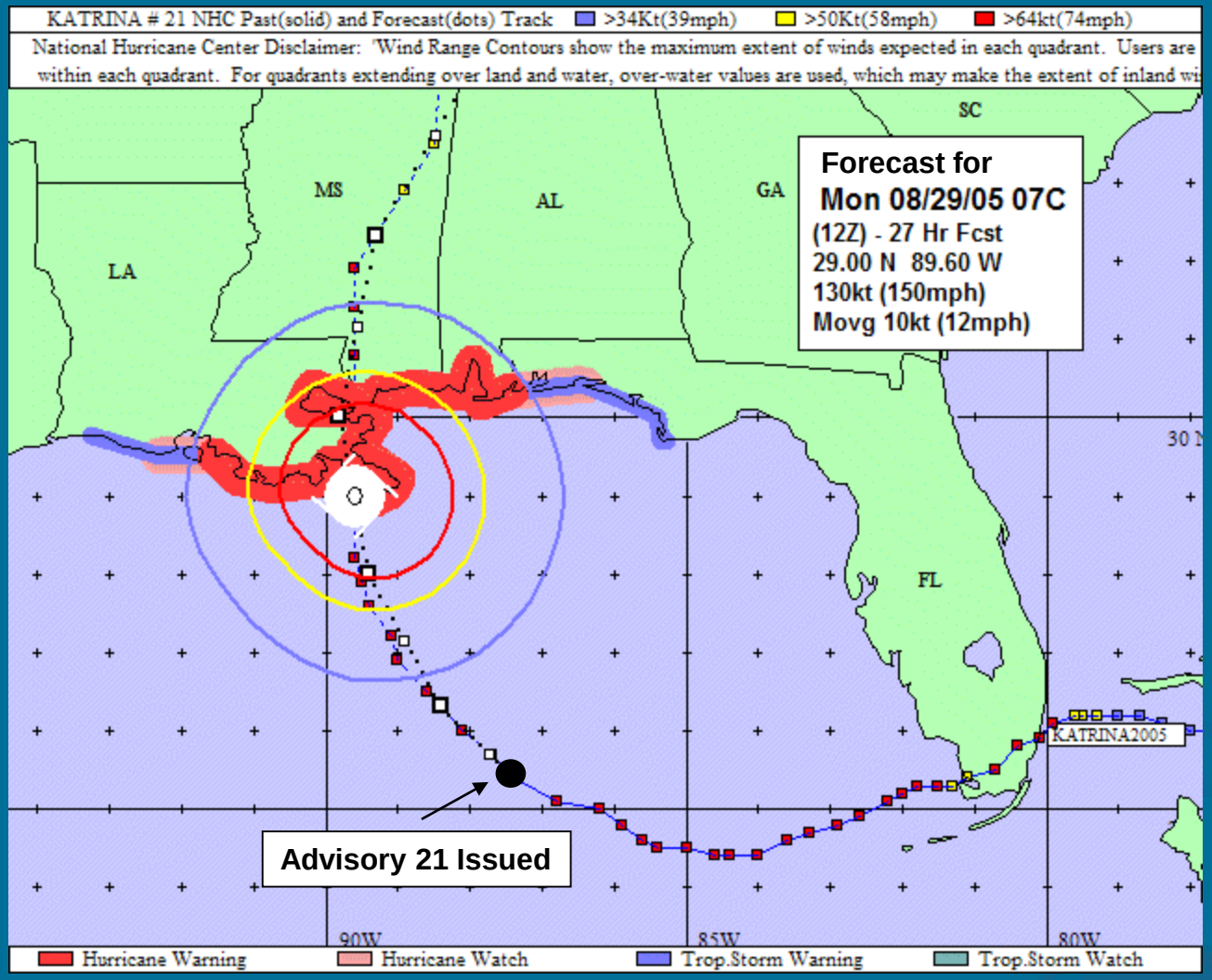
Sunday 08/28/2005 1:00 AM CDT

BULLETIN
HURRICANE KATRINA SPECIAL ADVISORY NUMBER 20
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
01 AM CDT SUN AUG 28 2005

...KATRINA STRENGTHENS TO CATEGORY FOUR WITH 145 MPH WINDS...

Advisory 21

Sunday 08/28/2005 4:00 AM CDT



Advisory 21

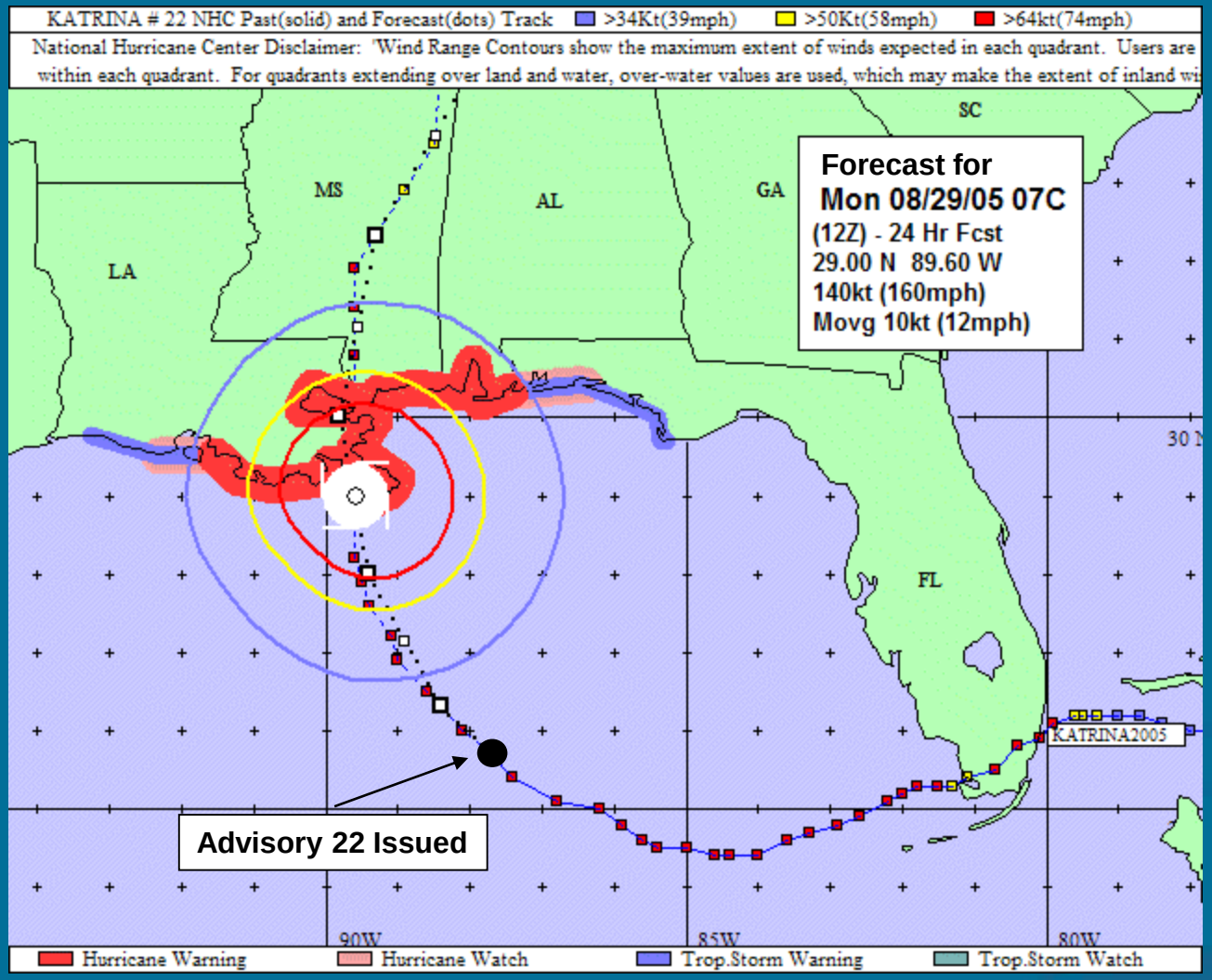
Sunday 08/28/2005 4:00 AM CDT

HURRICANE KATRINA DISCUSSION NUMBER 21
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
5 AM EDT SUN AUG 28 2005

THE SPREAD IN THE MODEL TRACKS ALONG THE NORTHERN GULF COAST IS AT MOST 90 MILES... SO CONFIDENCE IN THE OFFICIAL FORECAST IS RELATIVELY HIGH.

Advisory 22

Sunday 08/28/2005 7:00 AM CDT



Advisory 22

Sunday 08/28/2005 7:00 AM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 22
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
07 AM CDT SUN AUG 28 2005

...KATRINA...NOW A POTENTIALLY CATASTROPHIC CATEGORY FIVE HURRICANE... HEADED FOR THE NORTHERN GULF COAST....

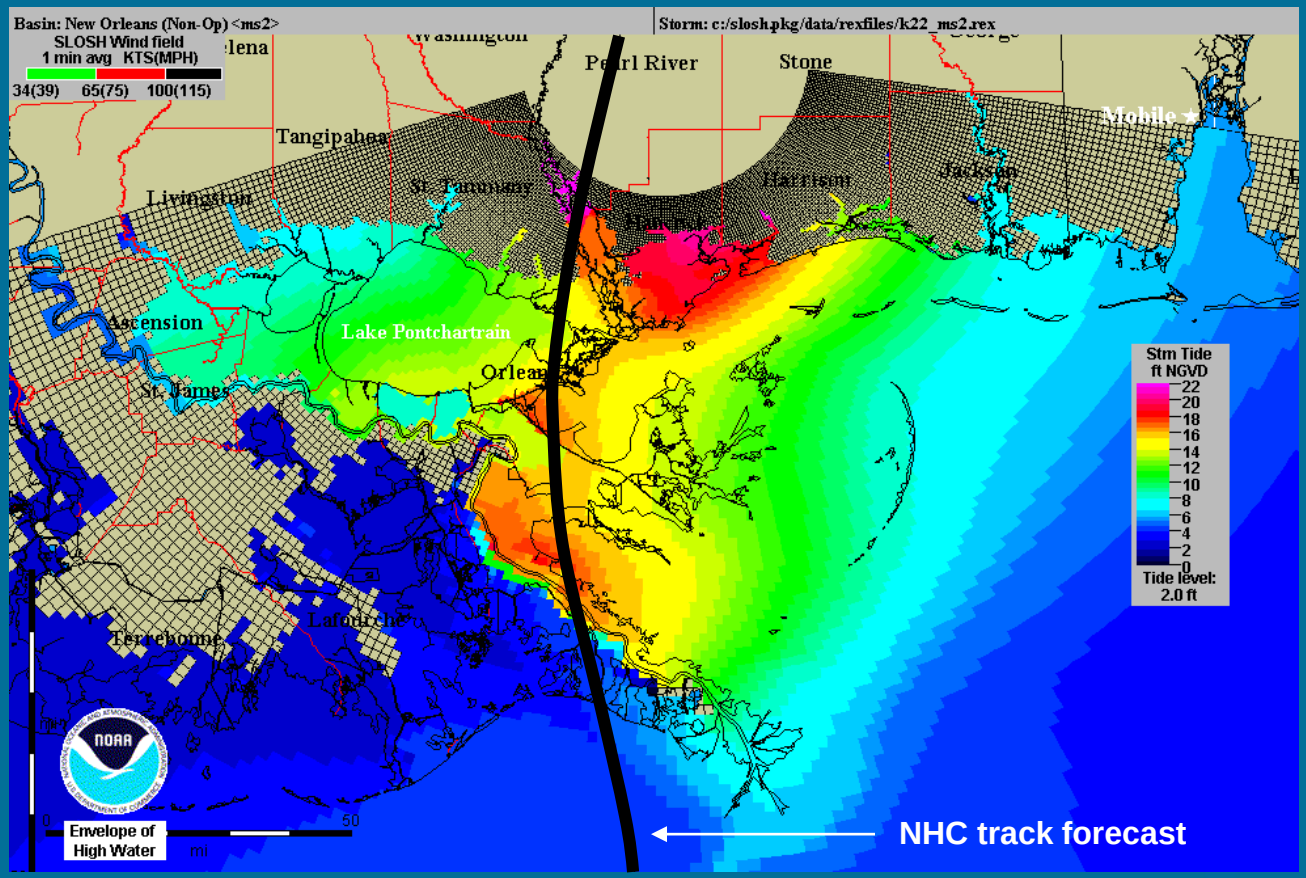
MAXIMUM SUSTAINED WINDS ARE NEAR 160 MPH...WITH HIGHER GUSTS. KATRINA IS A POTENTIALLY CATASTROPHIC CATEGORY FIVE HURRICANE ON THE SAFFIR-SIMPSON SCALE. SOME FLUCTUATIONS IN STRENGTH ARE LIKELY DURING THE NEXT 24 HOURS.

Note: from this time until landfall, every advisory used the term "POTENTIALLY CATASTROPHIC" or "EXTREMELY DANGEROUS".

Media pool active from 7:00 am CDT Sunday August 28 through 12:00 pm CDT Monday August 29. TPC/NHC provided 136 television and 7 radio interviews. In addition, TPC/NHC participated in 209 telephone briefings and media contacts during that period.

For Katrina (including for Florida), TPC/NHC provided a total of 471 television and radio interviews through the pool or via telephone.

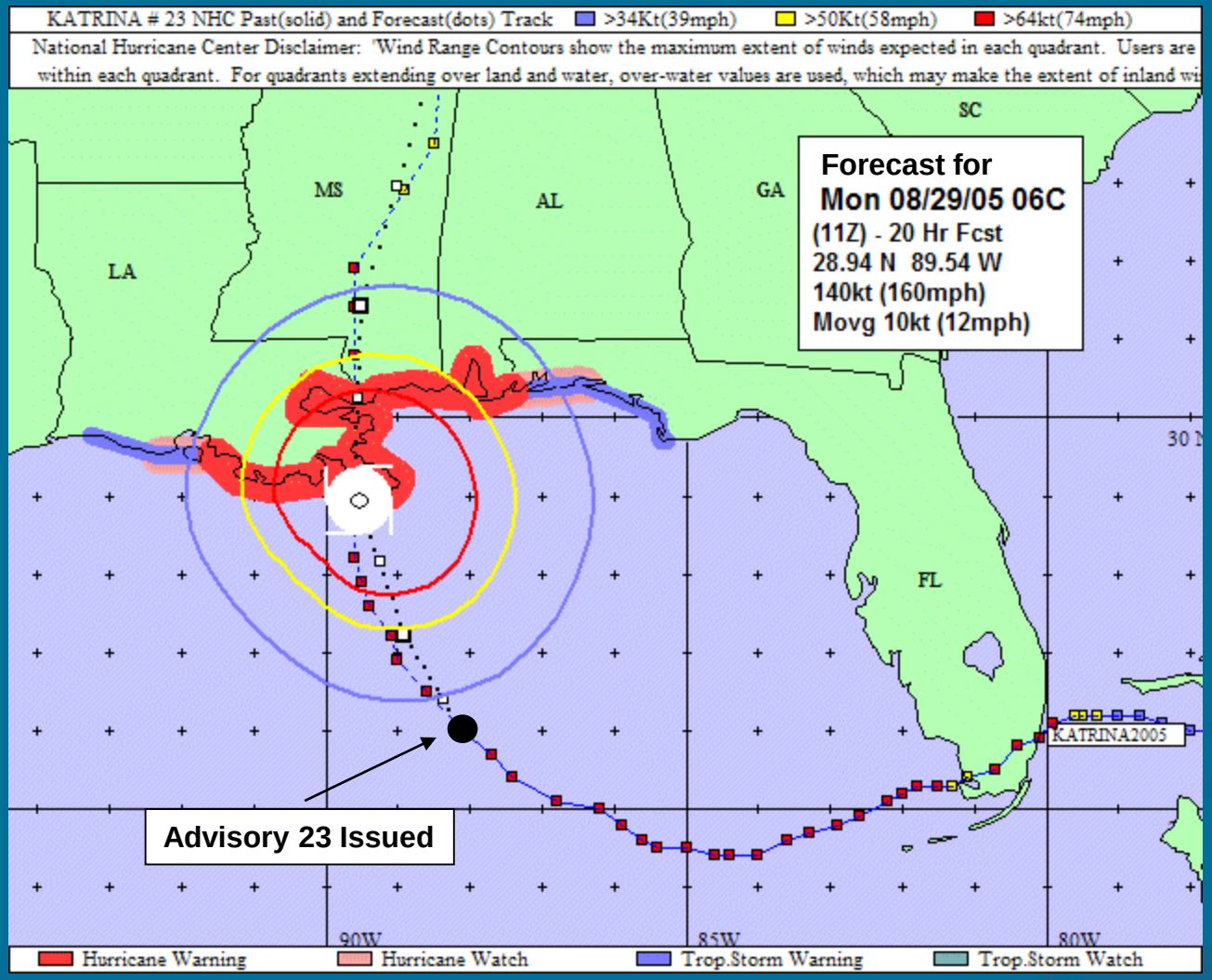
Single Track SLOSH forecast



Storm surge data posted by NHC at 9:20 am CDT 8/28/05
Shows envelope of high water relative to mean sea level (of 1929)

Advisory 23

Sunday 08/28/2005 10:00 AM CDT



Advisory 23

Sunday 08/28/2005 10:00 AM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 23
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
10 AM CDT SUN AUG 28 2005

...POTENTIALLY CATASTROPHIC HURRICANE KATRINA…EVEN STRONGER…HEADED FOR THE NORTHERN GULF COAST….

REPORTS FROM AN AIR FORCE HURRICANE HUNTER AIRCRAFT INDICATE THAT THE MAXIMUM SUSTAINED WINDS HAVE INCREASED TO NEAR 175 MPH…WITH HIGHER GUSTS.

HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 105 MILES FROM THE CENTER… AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 205 MILES..

COASTAL STORM SURGE FLOODING OF 18 TO 22 FEET ABOVE NORMAL TIDE LEVELS… LOCALLY AS HIGH AS 28 FEET ALONG WITH LARGE AND DANGEROUS BATTERING WAVES… CAN BE EXPECTED NEAR AND TO THE EAST OF WHERE THE CENTER MAKES LANDFALL.

HURRICANE KATRINA DISCUSSION NUMBER 23
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 AM EDT SUN AUG 28 2005

HURRICANE FORCE WINDS ARE FORECAST TO SPREAD AT LEAST 150 N MI INLAND ALONG THE PATH OF KATRINA. CONSULT INLAND WARNINGS ISSUED BY NATIONAL WEATHER SERVICE FORECAST OFFICES.

Advisory 23A

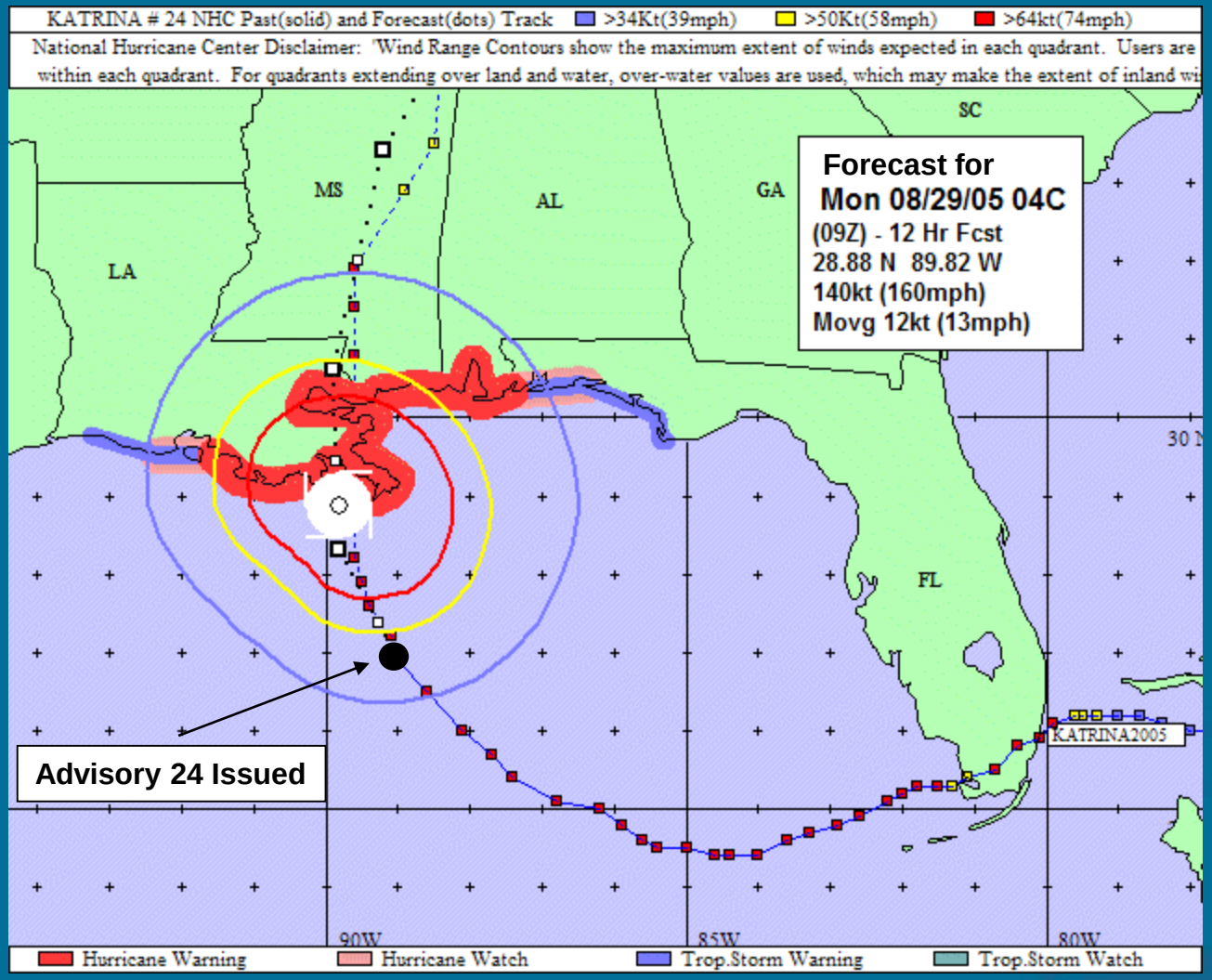
Sunday 08/28/2005 1:00 PM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 23A
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
1 PM CDT SUN AUG 28 2005

SIGNIFICANT STORM SURGE FLOODING WILL OCCUR ELSEWHERE ALONG THE CENTRAL AND NORTHEASTERN GULF OF MEXICO COAST.

Hurricane Liaison Team (HLT) Coordination
- 10:15 am CDT Audio Conference (FL)
- 11:00 am CDT Video Teleconference (FEMA HQ, FEMA Region IV and VI HQs, LA, MS, AL, FL, GA, and TX)

Advisory 24
Sunday 08/28/2005 4:00 PM CDT



Advisory 24
Sunday 08/28/2005 4:00 PM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 24
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
4 PM CDT SUN AUG 28 2005

KATRINA IS MOVING TOWARD THE NORTHWEST NEAR 13 MPH…AND A GRADUAL TURN TO THE NORTH IS EXPECTED OVER THE NEXT 24 HOURS. ON THIS TRACK THE CENTER OF THE HURRICANE WILL BE NEAR THE NORTHERN GULF COAST EARLY MONDAY. HOWEVER…CONDITIONS ARE ALREADY BEGINNING TO DETERIORATE ALONG PORTIONS OF THE CENTRAL AND NORTHEASTERN GULF COAST…AND WILL CONTINUE TO WORSEN THROUGH THE NIGHT.

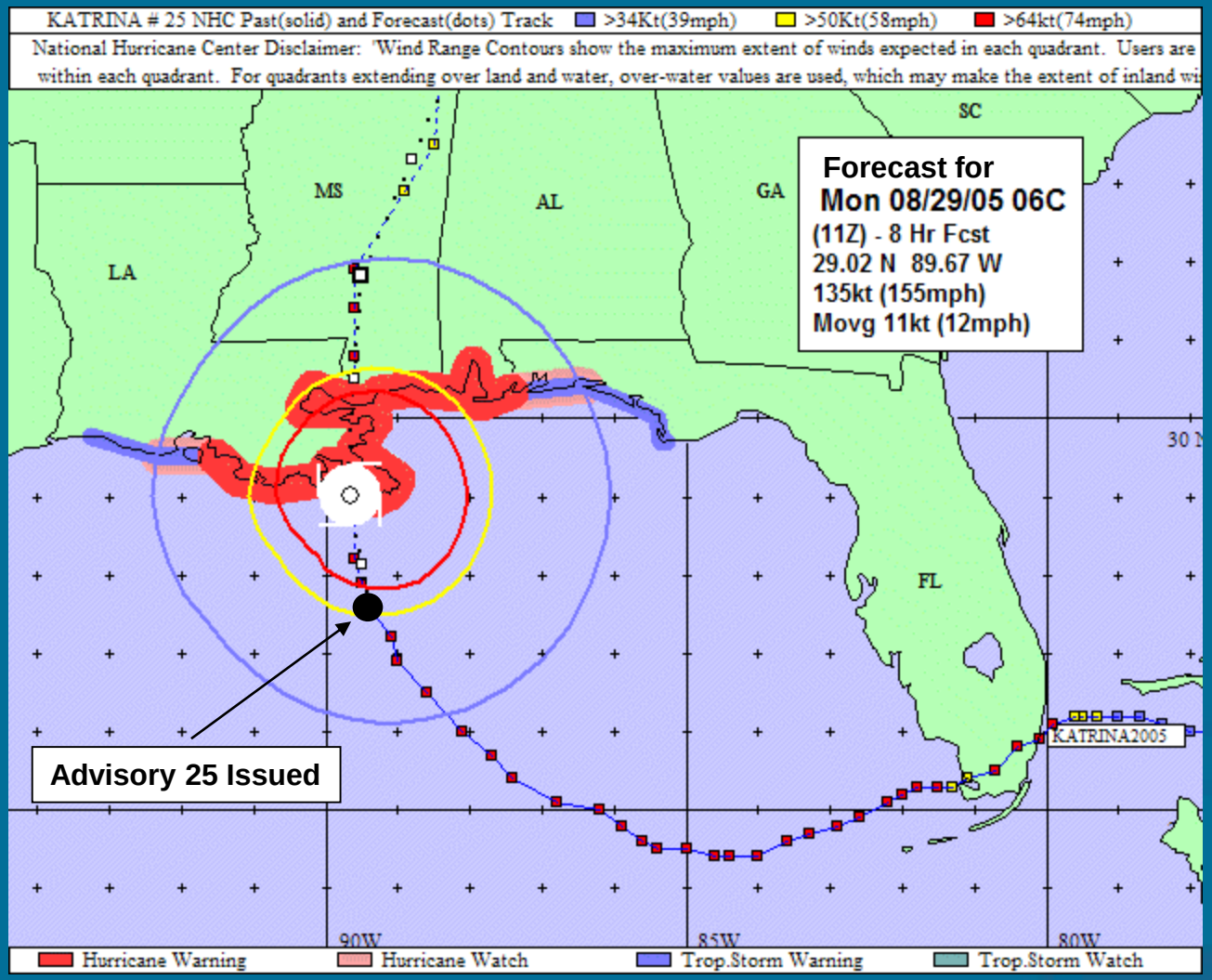
KATRINA IS A POTENTIALLY CATASTROPHIC CATEGORY FIVE HURRICANE ON THE SAFFIR-SIMPSON SCALE. SOME FLUCTUATIONS IN STRENGTH ARE LIKELY UNTIL LANDFALL. KATRINA IS EXPECTED TO MAKE LANDFALL AT CATEGORY FOUR OR FIVE INTENSITY. WINDS AFFECTING THE UPPER FLOORS OF HIGH-RISE BUILDINGS WILL BE SIGNIFICANTLY STRONGER THAN THOSE NEAR GROUND LEVEL.

SOME LEVEES IN THE GREATER NEW ORLEANS AREA COULD BE OVERTOPPED.

Hurricane Liaison Team (HLT) Coordination
- 4:15 pm CDT Audio Conference (FL)

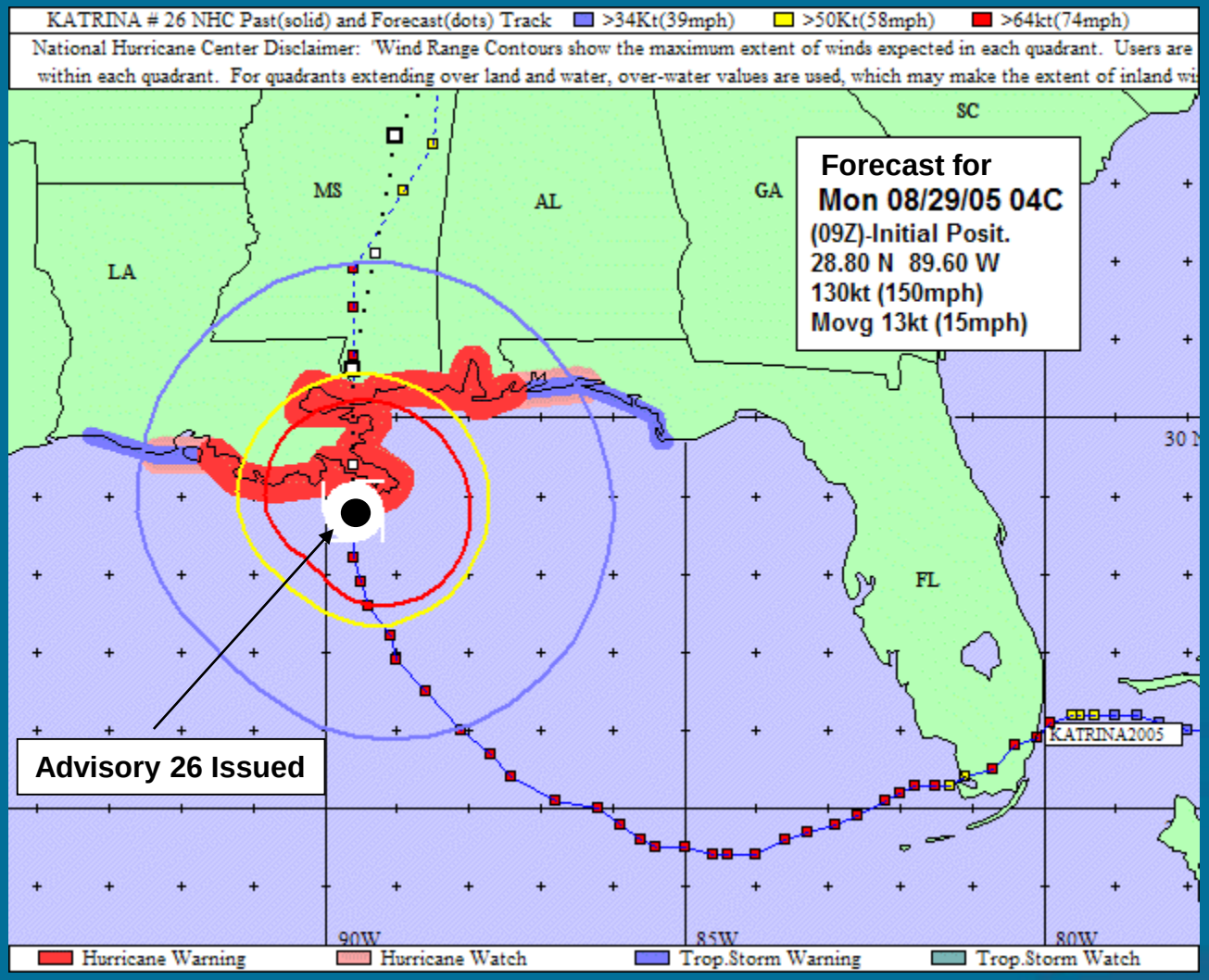
Advisory 25

Sunday 08/28/2005 10:00 PM CDT



Advisory 26

Monday 08/29/2005 4:00 AM CDT



Advisory 26 and 26A

Monday 08/29/2005 4:00 and 6:00 AM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 26
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
4 AM CDT MON AUG 29 2005

…EXTREMELY DANGEROUS CATEGORY FOUR HURRICANE KATRINA MOVING NORTHWARD TOWARD SOUTHEASTERN LOUISIANA AND THE NORTHERN GULF COAST.

SOME FLUCTUATIONS IN STRENGTH ARE LIKELY PRIOR TO LANDFALL…BUT KATRINA IS EXPECTED TO MAKE LANDFALL AS A CATEGORY FOUR HURRICANE.

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 26A
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
6 AM CDT MON AUG 29 2005

KATRINA REMAINS A VERY LARGE HURRICANE. HURRICANE FORCE WINDS EXTEND OUTWARD UP TO 120 MILES FROM THE CENTER…AND TROPICAL STORM FORCE WINDS EXTEND OUTWARD UP TO 230 MILES.

Advisory 26B

Monday 08/29/2005 8:00 AM CDT

BULLETIN
HURRICANE KATRINA ADVISORY NUMBER 26B
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
8 AM CDT MON AUG 29 2005

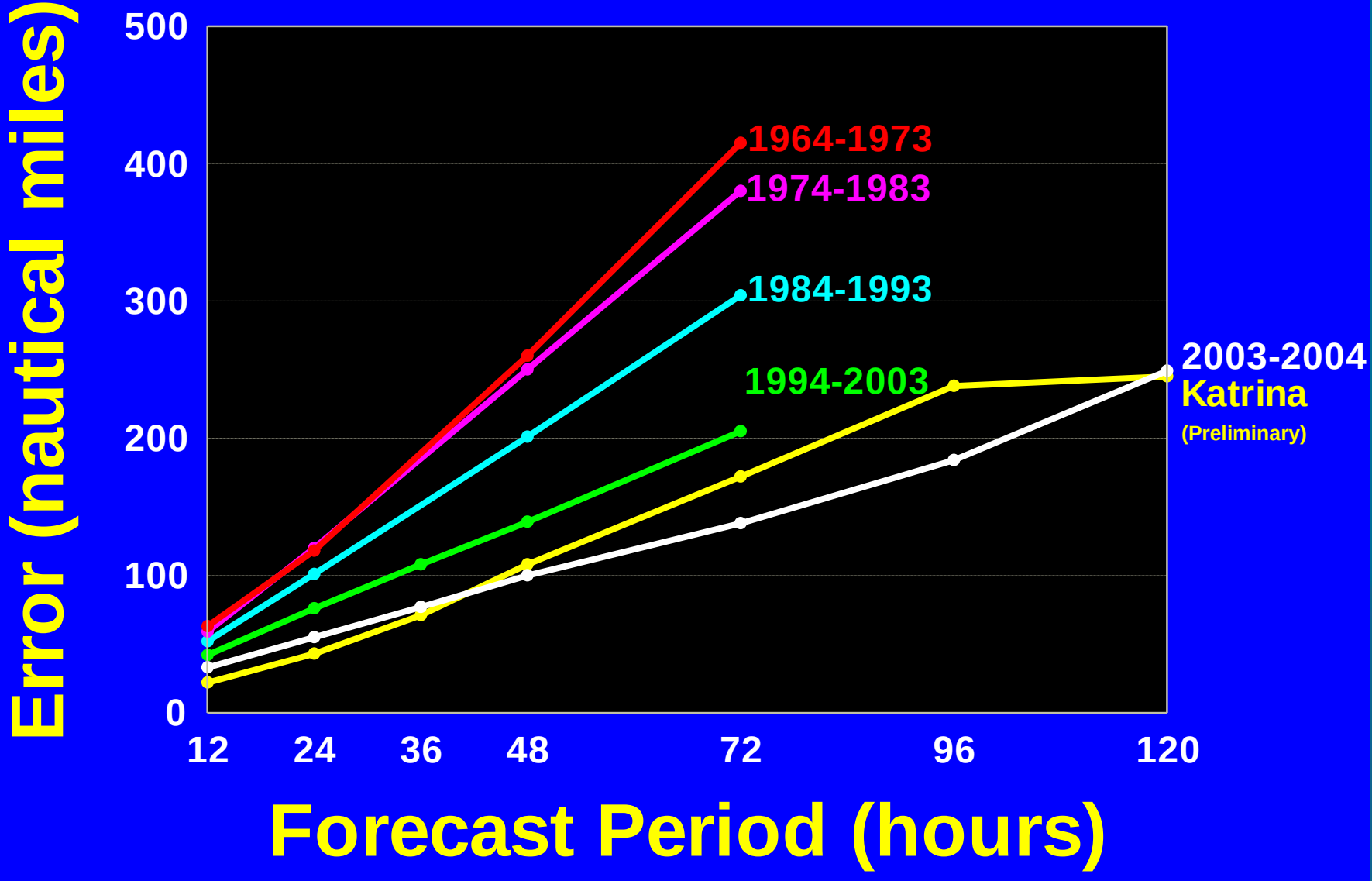
…THE CENTER OF HURRICANE KATRINA WAS LOCATED … ABOUT 40 MILES SOUTHEAST OF NEW ORLEANS LOUISIANA AND ABOUT 65 MILES SOUTHWEST OF BILOXI MISSISSIPPI.

MAXIMUM SUSTAINED WINDS ARE NEAR 135 MPH…WITH HIGHER GUSTS. KATRINA IS AN EXTREMELY DANGEROUS CATEGORY FOUR HURRICANE ON THE SAFFIR-SIMPSON SCALE. WEAKENING IS FORECAST AS THE CIRCULATION INTERACTS WITH LAND TODAY..

COASTAL STORM SURGE FLOODING OF 18 TO 22 FEET ABOVE NORMAL TIDE LEVELS…ALONG WITH LARGE AND DANGEROUS BATTERING WAVES…CAN BE EXPECTED NEAR AND TO THE EAST OF THE CENTER. STORM SURGE FLOODING OF 10 TO 15 FEET…NEAR THE TOPS OF LEVEES …IS POSSIBLE IN THE GREATER NEW ORLEANS AREA. SIGNIFICANT STORM SURGE FLOODING WILL OCCUR ELSEWHERE ALONG THE CENTRAL AND NORTHEASTERN GULF OF MEXICO COAST.

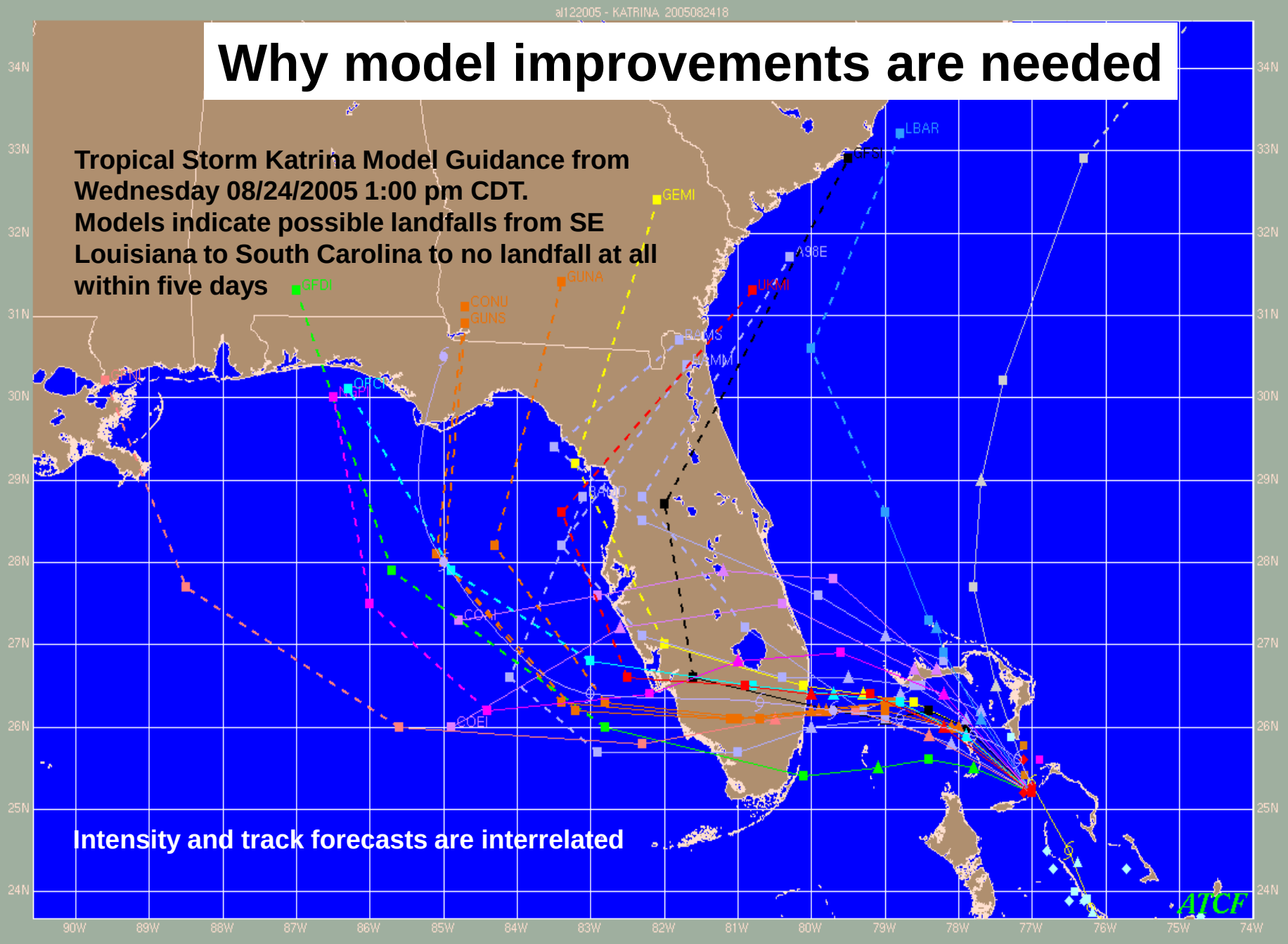
Hurricane Liaison Team (HLT) Coordination
- 10:15 am CDT Audio Conference (FL)
- 11:00 am CDT Video Teleconference (FEMA HQ, FEMA Region IV and VI HQs, LA, MS, AL, FL, and TX)
- 4:15 pm CDT Audio Conference Call (FL)

NATIONAL HURRICANE CENTER ATLANTIC TRACK FORECAST ERRORS



NHC Intensity Forecast Verification
(Preliminary)

- NHC forecasts for Katrina's landfall intensity in Florida and the central Gulf coast were excellent.
- All NHC forecasts within 30 hours of landfall in Florida indicated Katrina would come ashore with Category 1 intensity...it did.
- All NHC forecasts within 48 hours of landfall on the central Gulf coast indicated Katrina would come ashore in southeastern LA with at least Category 4 intensity...it did.
- The overall averages of NHC intensity forecast errors for Katrina, however, were larger than normal due to very large intensity forecast errors for the period when Katrina strengthened rapidly over the eastern Gulf. NHC forecast strengthening for that period, but not the extreme rapidity that occurred. Forecasting rapid intensification remains a challenge that NHC has indicated as its number one research priority to improve operational numerical models.


al122005 - KATRINA 2005082418
Why model improvements are needed
Tropical Storm Katrina Model Guidance from Wednesday 08/24/2005 1:00 pm CDT.
Models indicate possible landfalls from SE Louisiana to South Carolina to no landfall at all within five days
Intensity and track forecasts are interrelated
LBAR
GFSI
GEMI
A98E
UKMI
GFDI
CONU
GUNA
GUNS
BAMD
COAL
COEI
ATCF

What does the future hold?

Long-term statistics show:

- **Seven hurricanes strike the U.S. every 4 years**
- **Three major ($\geq$ Cat 3) hurricanes cross the U.S. coast every 5 years**

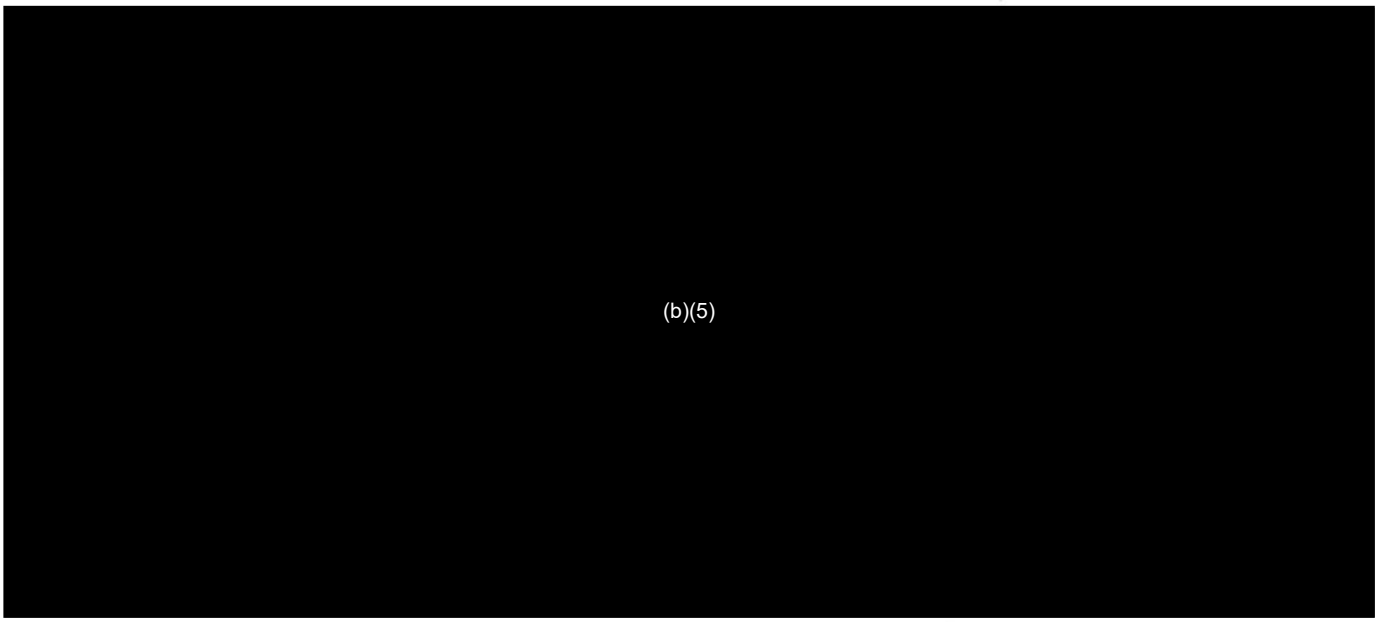
NOAA seasonal forecasts indicate we are in a period of above normal hurricane activity

What does the future hold?

- **There are other sites especially vulnerable to disaster**
  - ***Houston/Galveston***
  - ***New Orleans (again)***
  - ***Tampa Bay***
  - ***Southwest Florida***
  - ***Florida Keys***
  - ***Southeast Florida***
  - ***New York City/Long Island***
  - ***New England***

The Honorable Doc Hastings
Chairman
Committee on Natural Resources
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:



MEMORANDUM FOR: Kathryn D. Sullivan, Ph.D.
Under Secretary of Commerce
for Oceans and Atmosphere

FROM: Eileen Sobeck

SUBJECT: Request for the Secretary's Attention to a Letter Regarding Endangered Salmon Recovery in the Sacramento-San Joaquin River Delta

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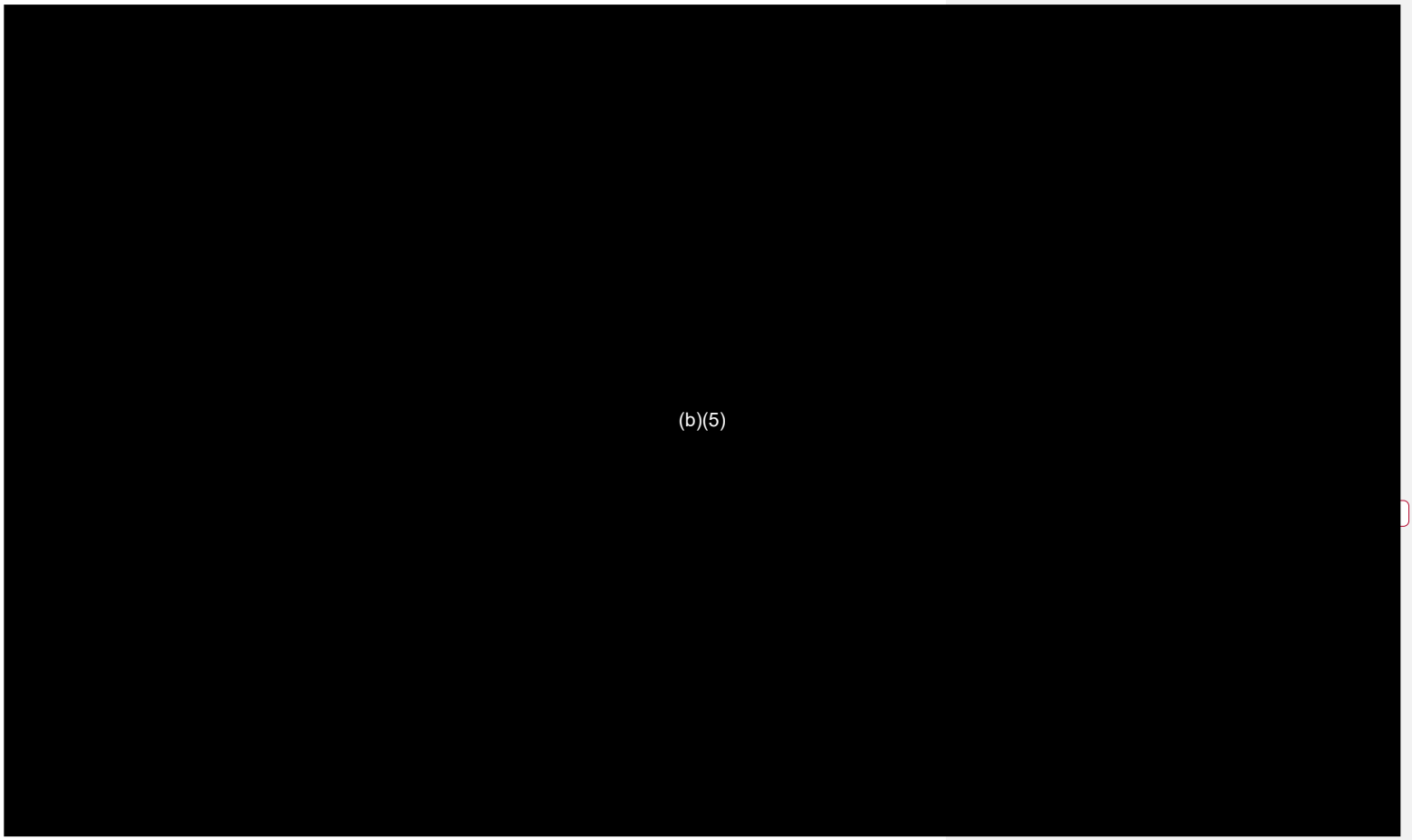
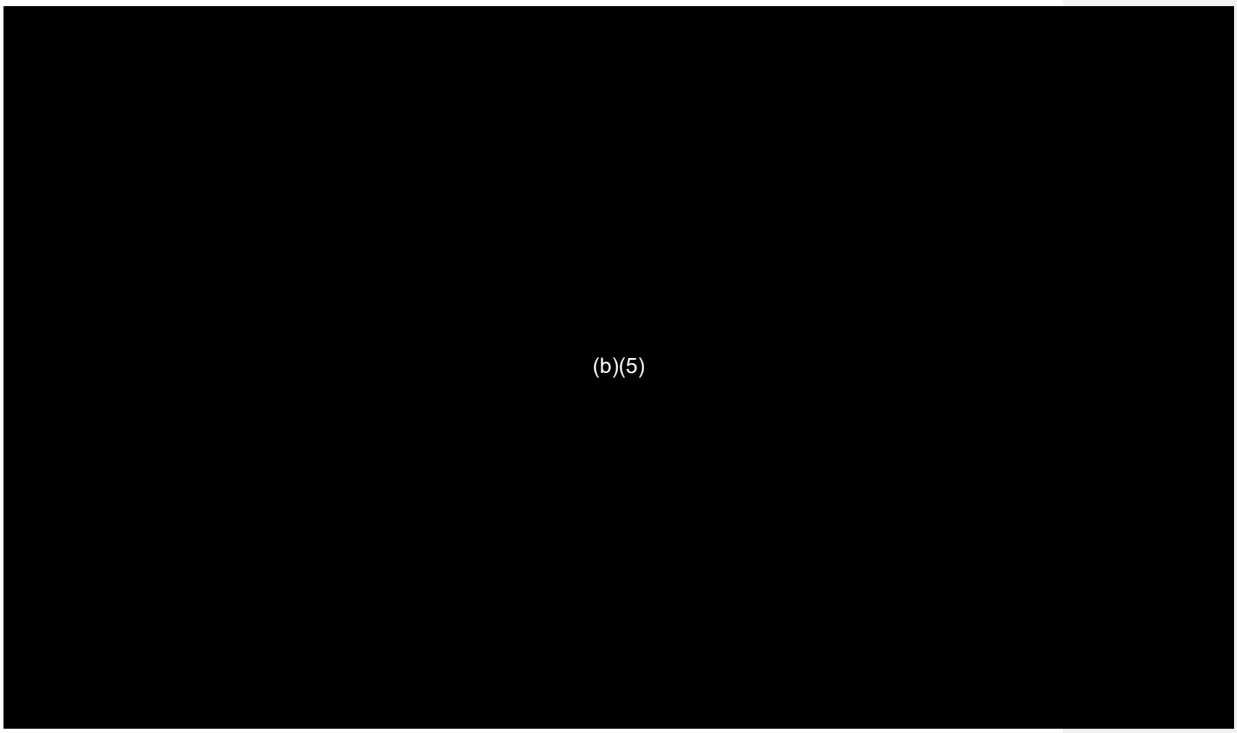
MEMORANDUM FOR THE SECRETARY

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

THE DIRECTOR

MAR 26 2015

MEMORANDUM FOR: Kathryn D. Sullivan, Ph.D.
Under Secretary of Commerce
for Oceans and Atmosphere

FROM: Eileen Sobeck

SUBJECT: Request for the Secretary's Attention to a Letter Regarding Endangered Salmon Recovery in the Sacramento-San Joaquin River Delta

[redacted]

(b)(5)

THE ASSISTANT ADMINISTRATOR
FOR FISHERIES

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(b)(5)

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Executive Secretariat Clearance Sheet

Phone: 202-482-5803 Fax: 202-482-4090

Name: Hon. Dianne Feinstein Tracking No: 15-042554

Subject: Ltr requesting the Secy's personal attention on a list of questions, submitted for the record to supplement the Senate Appropriations Subcommittee on Commerce, Justice and Science's hearing on FY 2016 budget for NOAA. Also, requesting immediate action to improve and accelerate endangered salmon recovery

Agency: NOAA Signature Level: Secy Due Date: 3/31/2015

RE-Clear Due Date: _____

TIME CRITICAL DUE DATE & TIME: _____

Clearance Office	Date Sent	Date Returned to ES	Cleared by: name/comments	Re-Clear Date	Date Returned to ES	Re-Cleared by: name/comments
GC	3/30					
OPSP	3/30					
OLIA	3/30					

ExecSec Clearance: _____

Processed in ExecSec - Date: 3/30/15 Time: 11:35 Correspondence Analyst: Camille Nelson

DO NOT MAIL – Call (name and extension): _____

APPROVED FOR: Signature: _____ **Autopen:** _____ **Date:** _____ **Approved by:** _____

TIME CRITICAL

DATE NEEDED: _____

REASON FOR EXPEDITE: _____

15 - 042504

UNITED STATES DEPARTMENT OF COMMERCE
The Under Secretary of Commerce
for Oceans and Atmosphere
Washington, D.C. 20230

MEMORANDUM FOR THE SECRETARY

FROM: Kathryn D. Sullivan, Ph.D.
Under Secretary of Commerce
for Oceans and Atmosphere

SUBJECT: Request for Attention to a Letter Regarding Endangered Salmon Recovery in the Sacramento-San Joaquin River Delta

Attached for your approval and signature is a response to Senator Dianne Feinstein, who asks for your personal attention to a list of questions submitted to me regarding the recovery of endangered salmon in the Sacramento-San Joaquin River Delta.

You thank Senator Feinstein for her letter and acknowledge the importance of this issue. You assure her that the National Oceanic and Atmospheric Administration (NOAA) is addressing her questions and will provide a substantive response soon.

Recommendation:
That you sign the attached letter.

Clearances: See attached NOAA clearance sheet.

Executive Secretariat Clearance:

_____ _____

Executive Secretariat Date

Attachment

The Honorable Dianne Feinstein
United States Senate
Washington, DC 20510

Dear Senator Feinstein:

Thank you for your letter regarding the list of questions you submitted to Under Secretary Kathryn Sullivan on the issue of endangered salmon recovery in the Sacramento-San Joaquin River Delta.

The National Oceanic and Atmospheric Administration (NOAA) has received your letter and is preparing a substantive response to your list of questions. The issue of salmon survival in this region is of great importance to us, and I assure you that NOAA will respond promptly.

If you have any further questions, please contact Margaret Cummisky, Assistant Secretary for Legislative and Intergovernmental Affairs, at (202) 482-3663.

Sincerely,

Penny Pritzker

15-042554

DIANNE FEINSTEIN
CALIFORNIA

SELECT COMMITTEE ON INTELLIGENCE - VICE CHAIRMAN
COMMITTEE ON APPROPRIATIONS
COMMITTEE ON THE JUDICIARY
COMMITTEE ON RULES AND ADMINISTRATION

United States Senate

WASHINGTON, DC 20510-0504
http://feinstein.senate.gov

March 16, 2015

The Honorable Penny Pritzker
Secretary of Commerce
U.S. Department of Commerce
1401 Constitution Avenue, N.W.
Washington, D.C. 20230

Dear Secretary Pritzker,

I am writing to ask for your personal attention on the attached list of questions I sent to Dr. Kathryn Sullivan, Administrator of the National Oceanic and Atmospheric Administration.

This is a high-priority concern for me, and I urge you to do everything you can to focus more resources on the range of recovery and protective actions outlined.

Thank you for your kind attention to this important matter.

Sincerely,

Dianne Feinstein
United States Senator

DF/fy

DIANNE FEINSTEIN
CALIFORNIA

SELECT COMMITTEE ON INTELLIGENCE - VICE CHAIRMAN
COMMITTEE ON APPROPRIATIONS
COMMITTEE ON THE JUDICIARY
COMMITTEE ON RULES AND ADMINISTRATION

United States Senate
WASHINGTON, DC 20510-0504
http://feinstein.senate.gov

March 16, 2015

Dr. Kathryn Sullivan
Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
1401 Constitution Avenue, N.W.
Washington, D.C. 20230

Dear Dr. Sullivan,

I am writing to ask for your personal attention on a list of questions, submitted for the record to supplement the Senate Appropriations Subcommittee on Commerce, Justice, and Science's hearing on the FY 2016 budget for the National Oceanic and Atmospheric Administration (NOAA). I request your immediate action to improve and accelerate endangered salmon recovery.

Peer-reviewed science shows endangered salmon survival in the Sacramento-San Joaquin River Delta hinges on a variety of factors, such as the quality and composition of spawning habitat, water temperature control, and removal of non-native predator species. The 2009 salmon biological opinion issued by the National Marine Fisheries Service has already imposed stringent water pumping restrictions on the federal and state water projects in California, but endangered salmon populations have yet to recover.

I firmly believe NOAA must focus more resources on the full range of recovery and protective actions for salmon. To that end, I request NOAA's report on the actions taken since the issuance of the 2009 salmon biological opinion that could quicken the pace of endangered salmon recovery. My questions are:

1) Based on the best available science today, what factors besides water pumping negatively affect the extent and pace of recovery in salmonid populations?

2) Since the issuance of the 2009 salmon biological opinion, what steps has NOAA taken to address these other factors and to improve salmon recovery efforts?

3) Please provide a list and description of the habitat restoration projects NOAA has supported or conducted in the Sacramento-San Joaquin River Delta since the

issuance of the 2009 salmon biological opinion to help improve endangered / listed salmonid recovery.

4) What steps has NOAA taken since the issuance of the 2009 biological opinion to reduce / mitigate the effects of non-native predator species (such as striped bass) on the recovery of endangered / listed salmonid species? Please specifically describe the projects involved and their status.

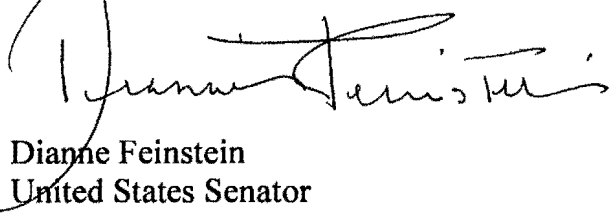
5) What steps has NOAA taken since the issuance of the 2009 biological opinion to improve monitoring, surveying, and detection of salmonid species in the Delta, so that the agency has a clear understanding of the presence and distribution of salmon in the Delta? Please specifically describe the projects involved and their status.

6) What steps has NOAA taken since the issuance of the 2009 biological opinion to test and/or implement physical and non-physical barriers in the Delta that would better protect salmon from entrainment? Please specifically describe the projects involved and their status.

7) What steps has NOAA taken since the issuance of the 2009 biological opinion to reduce or eradicate aquatic invasive weeds in the Delta that may negatively affect oxygen and nutrient levels in Delta water for endangered / listed salmonid species? Please specifically describe the projects involved and their status.

Thank you for your kind attention to this important matter.

Sincerely,



Dianne Feinstein
United States Senator

Cc: Secretary of Commerce Penny Pritzker

DF/fy

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MEMORANDUM FOR: Kathryn D. Sullivan, Ph.D.
Under Secretary of Commerce
for Oceans and Atmosphere

FROM: Eileen Sobeck

SUBJECT: Request for the Secretary's Attention to a Letter Regarding Endangered Salmon Recovery in the Sacramento-San Joaquin River Delta

[redacted]

(b)(5)

MEMORANDUM FOR THE SECRETARY

[redacted]

(b)(5)

The Honorable Dianne Feinstein
United States Senate
Washington, DC 20510

Dear Senator Feinstein:

Thank you for your letter regarding the list of questions you submitted to Under Secretary Kathryn Sullivan on the issue of endangered salmon recovery in the Sacramento-San Joaquin River Delta.

The National Oceanic and Atmospheric Administration (NOAA) has received your letter and is preparing a substantive response to the questions therein. The issue of salmon survival in this region is of great importance to us, and I assure you that NOAA will respond soon.

If you have any further questions, please contact Margaret Cummisky, Assistant Secretary for Legislative and Intergovernmental Affairs, at (202) 482-3663.

Sincerely,

Penny Pritzker

MEMORANDUM FOR: Kathryn D. Sullivan, Ph.D.
Under Secretary of Commerce
for Oceans and Atmosphere

FROM: Eileen Sobeck

SUBJECT: Request for the Secretary's Attention to a Letter Regarding Endangered Salmon Recovery in the Sacramento-San Joaquin River Delta

Name of Person(s) Requesting Action/Correspondent(s): Senator Dianne Feinstein (D-CA).

Subject/Issues Raised by Person(s) Requesting Action/Correspondent(s): Senator Feinstein asks the Secretary for her personal attention to a list of questions submitted to you regarding the recovery of endangered salmon.

Major Points in the Response:

- The Secretary thanks Senator Feinstein for her letter and acknowledges the importance of this issue.
- She assures the Senator that NOAA is addressing her questions and will provide a substantive response soon.

Potential Controversy: This issue remains highly controversial.

Other Pertinent Information: None.

Coordination: Other than GC coordination, indicate all NMFS Line/Staff Offices consulted:

NMFS	NWS	NOS	OAR	NESDIS	PPI	NMAO	PA&E	PCIA	LA	IA	CFO	CAO	CIO	OED	AGO	WFMO	COS	DUS	AS	UNSEC

Clearance Official(s)/Line Office(s)/Date of Clearance(s): None.

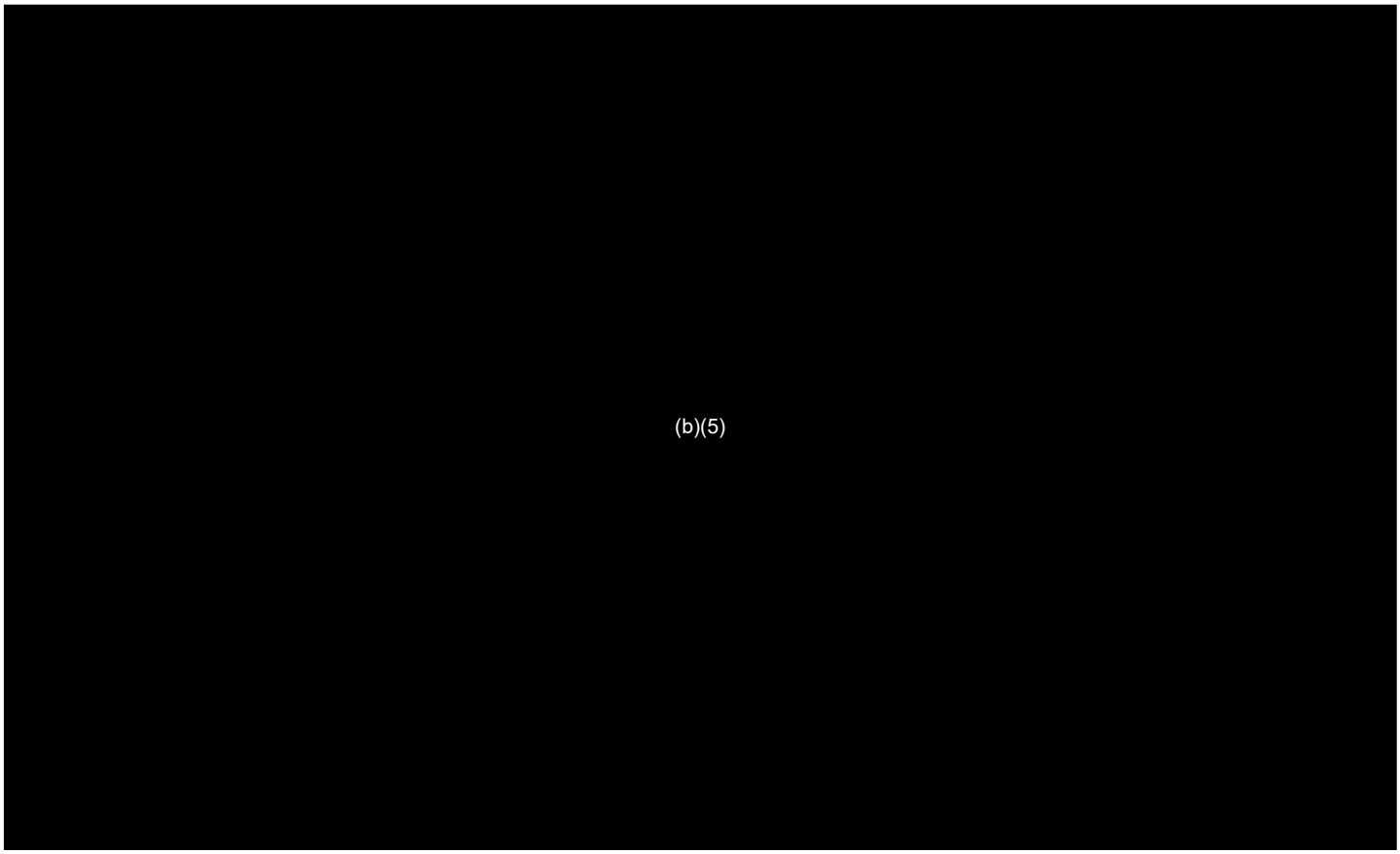
Contact Person: Fran Pflieger, NMFS Office of the Assistant Administrator, (301) 427-8741.

Attachments

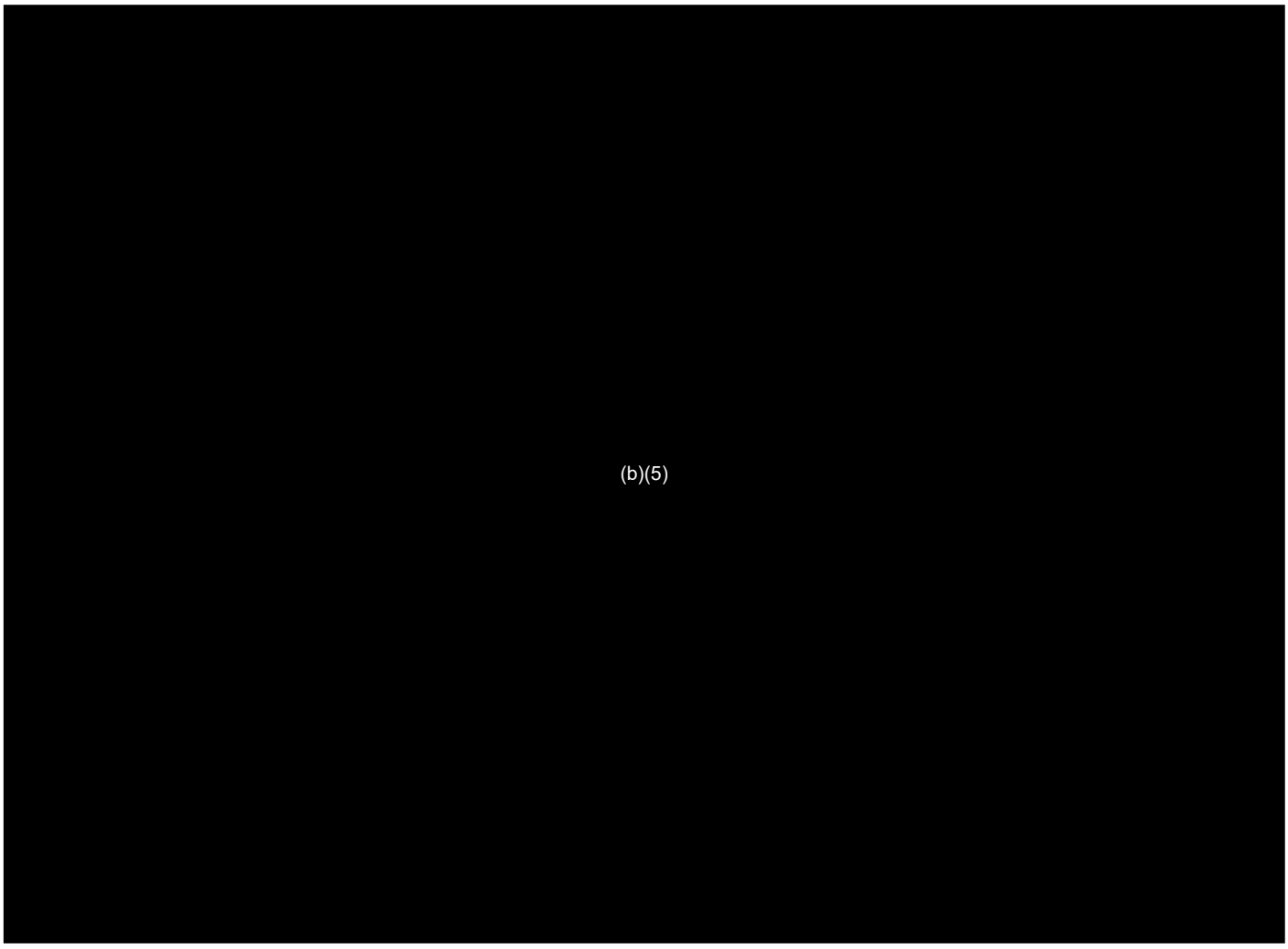
MEMORANDUM FOR THE SECRETARY

FROM: Kathryn D. Sullivan, Ph.D.
Under Secretary of Commerce
for Oceans and Atmosphere

SUBJECT: Request for Attention to a Letter Regarding Endangered Salmon Recovery in the Sacramento-San Joaquin River Delta



April 2, 2015



MEMORANDUM FOR: Kathryn D. Sullivan, Ph.D.
Acting Assistant Secretary of Commerce
for Conservation and Management

FROM: Samuel D. Rauch III
Deputy Assistant Administrator for Regulatory Programs,
performing the functions and duties of the
Assistant Administrator for Fisheries

SUBJECT: Questions for the Record regarding Testimony on Reauthorization of the Magnuson-Stevens Act

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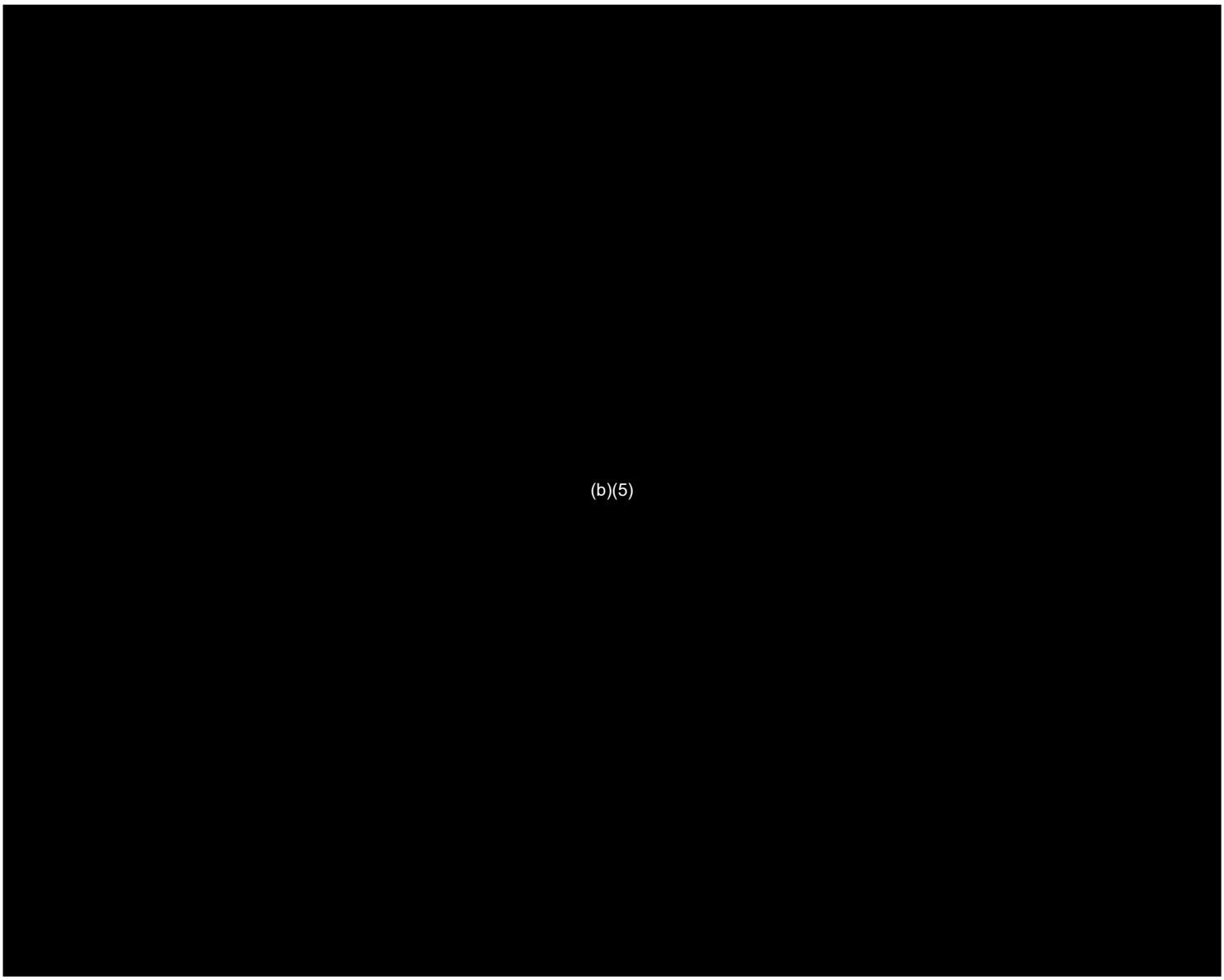
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QUESTIONS SUBMITTED FOR THE RECORD
TO BRIGADIER GENERAL DAVID L. JOHNSON
DIRECTOR, NATIONAL WEATHER SERVICE
FOLLOWING A HEARING BEFORE THE
SELECT BIPARTISAN COMMITTEE TO INVESTIGATE THE PREPARATION FOR AND RESPONSE TO HURRICANE KATRINA

SEPTEMBER 22, 2005

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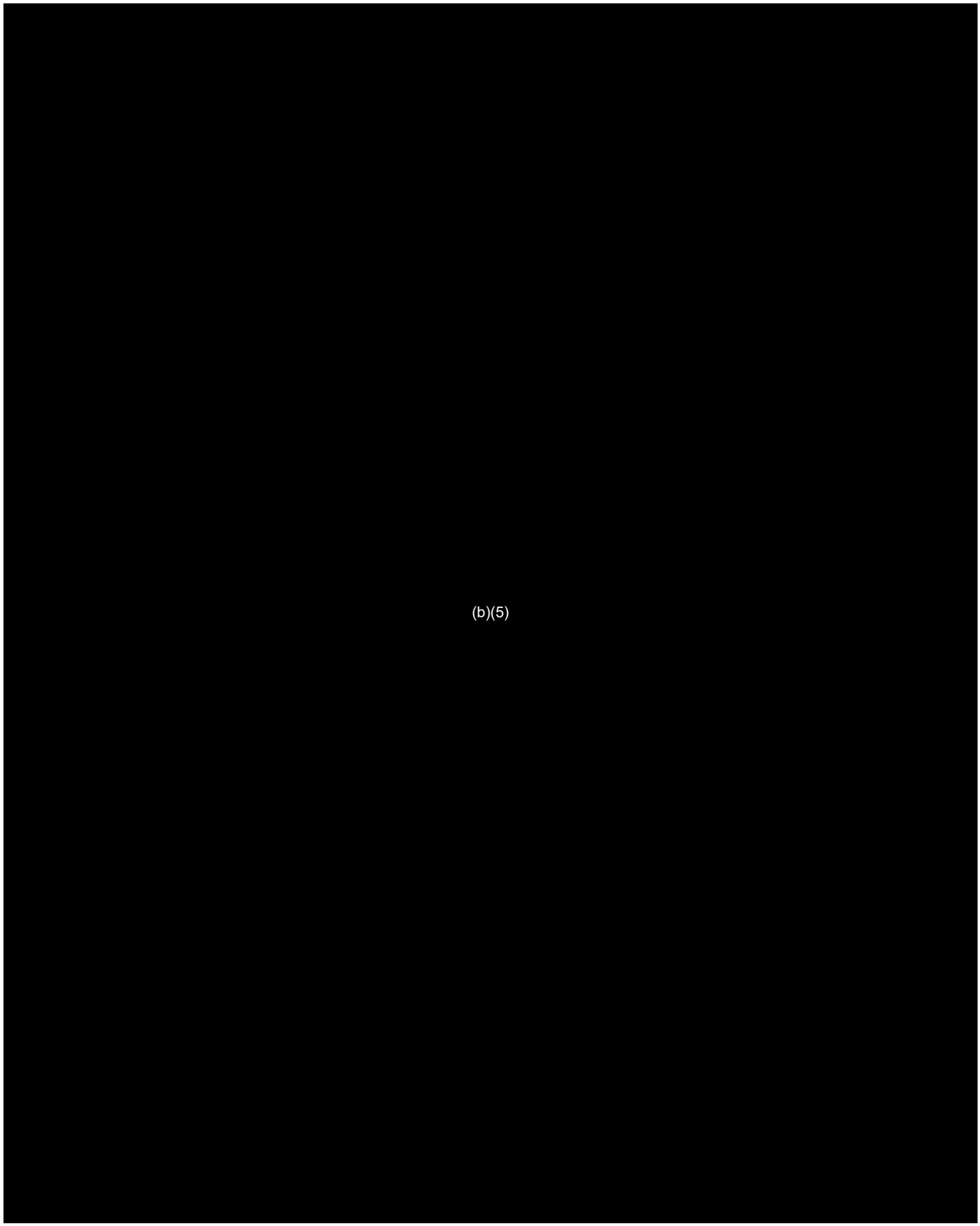
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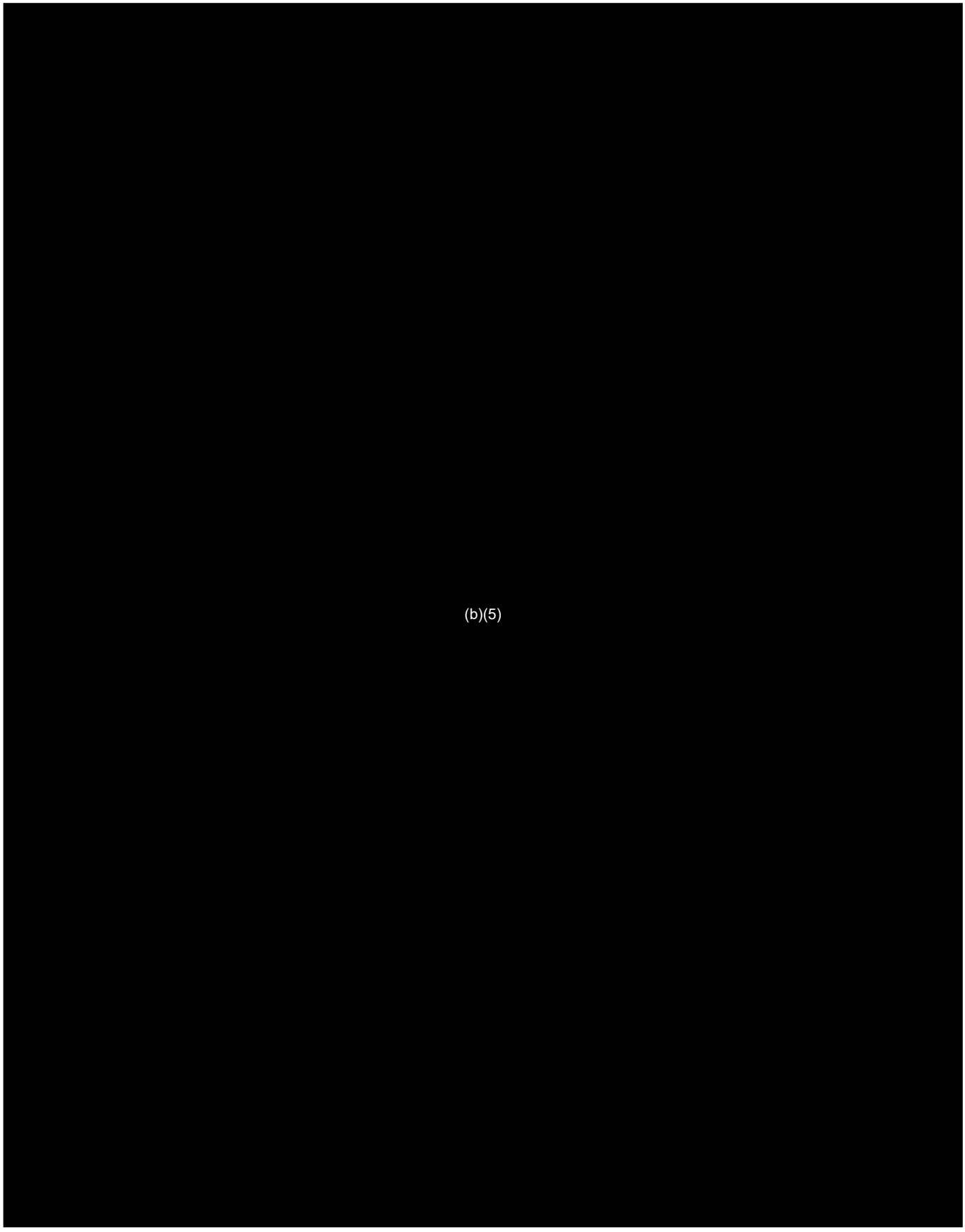
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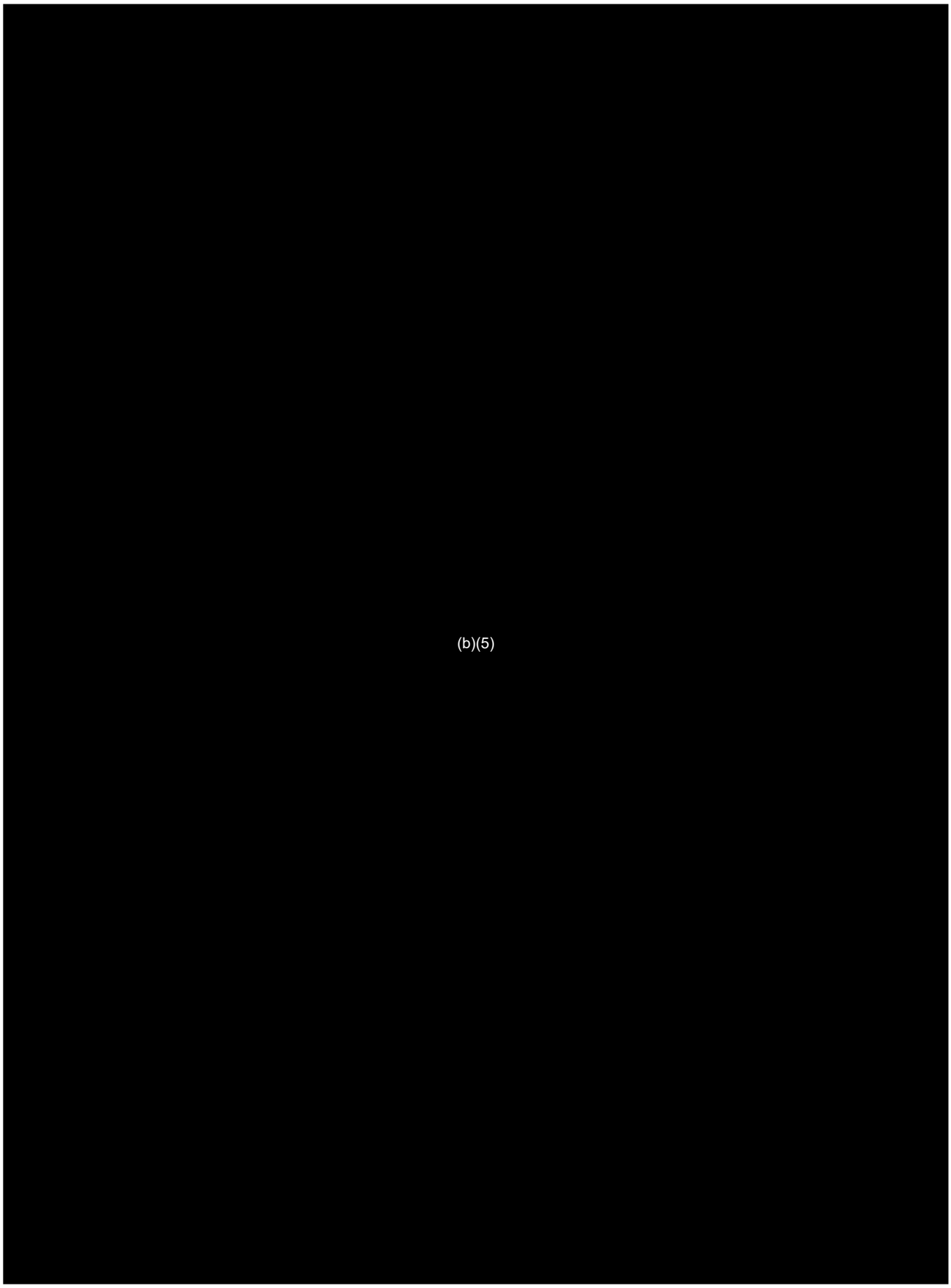
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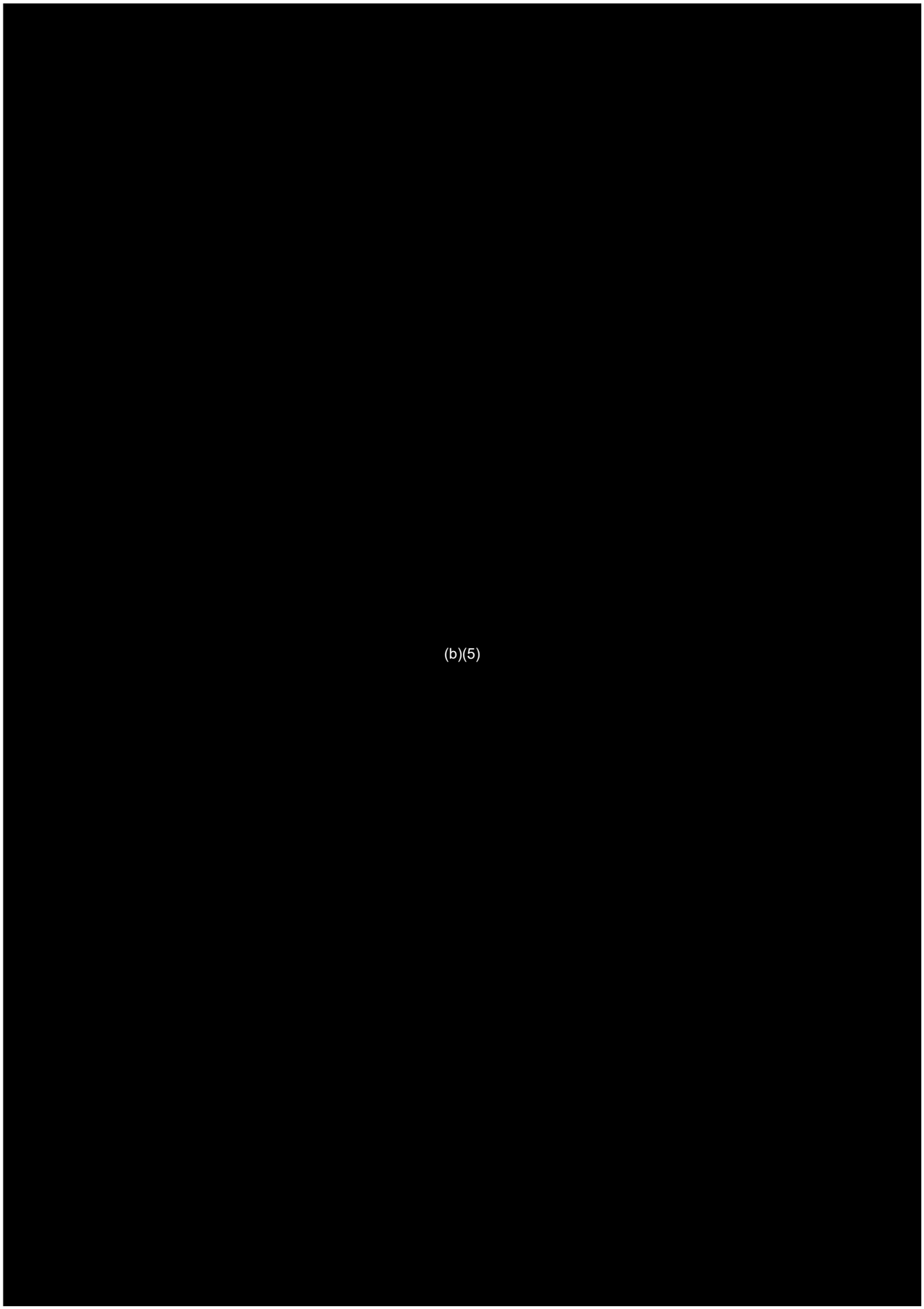
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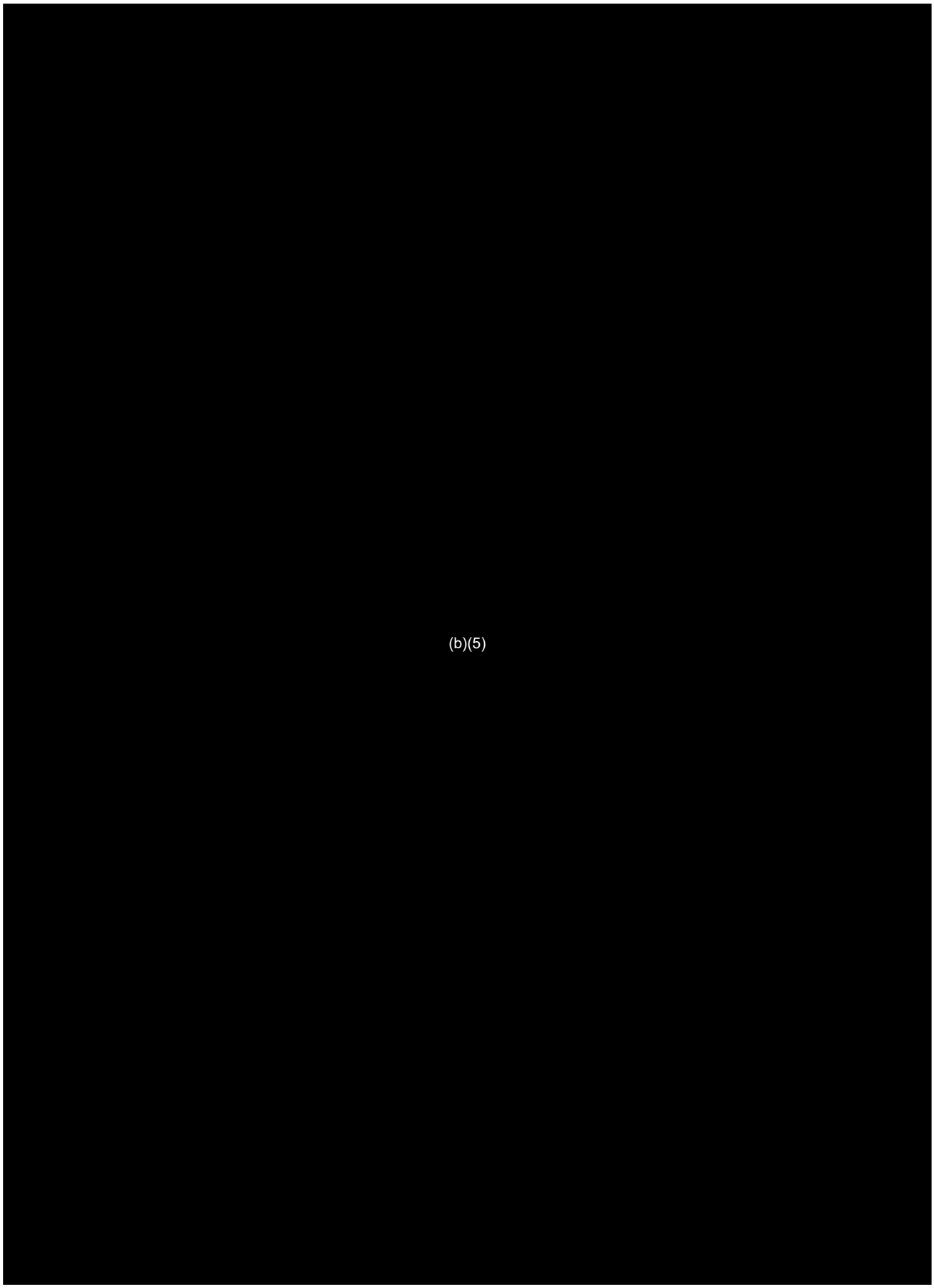
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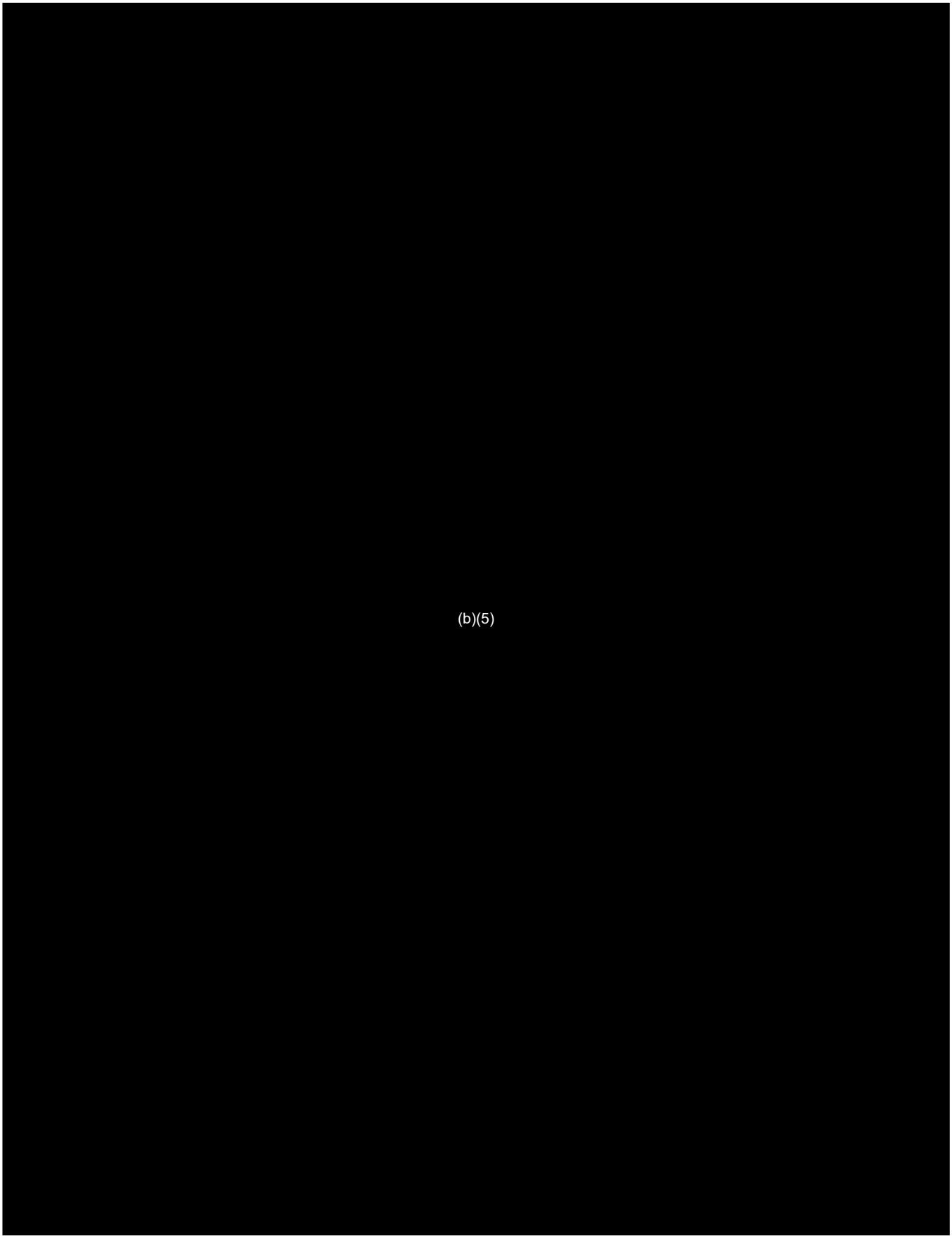
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MEMORANDUM FOR: Kathryn D. Sullivan, Ph.D.
Under Secretary of Commerce
for Oceans and Atmosphere

FROM: Eileen Sobeck

SUBJECT: Request for the Secretary's Attention to a Letter Regarding Endangered Salmon Recovery in the Sacramento-San Joaquin River Delta

[redacted]
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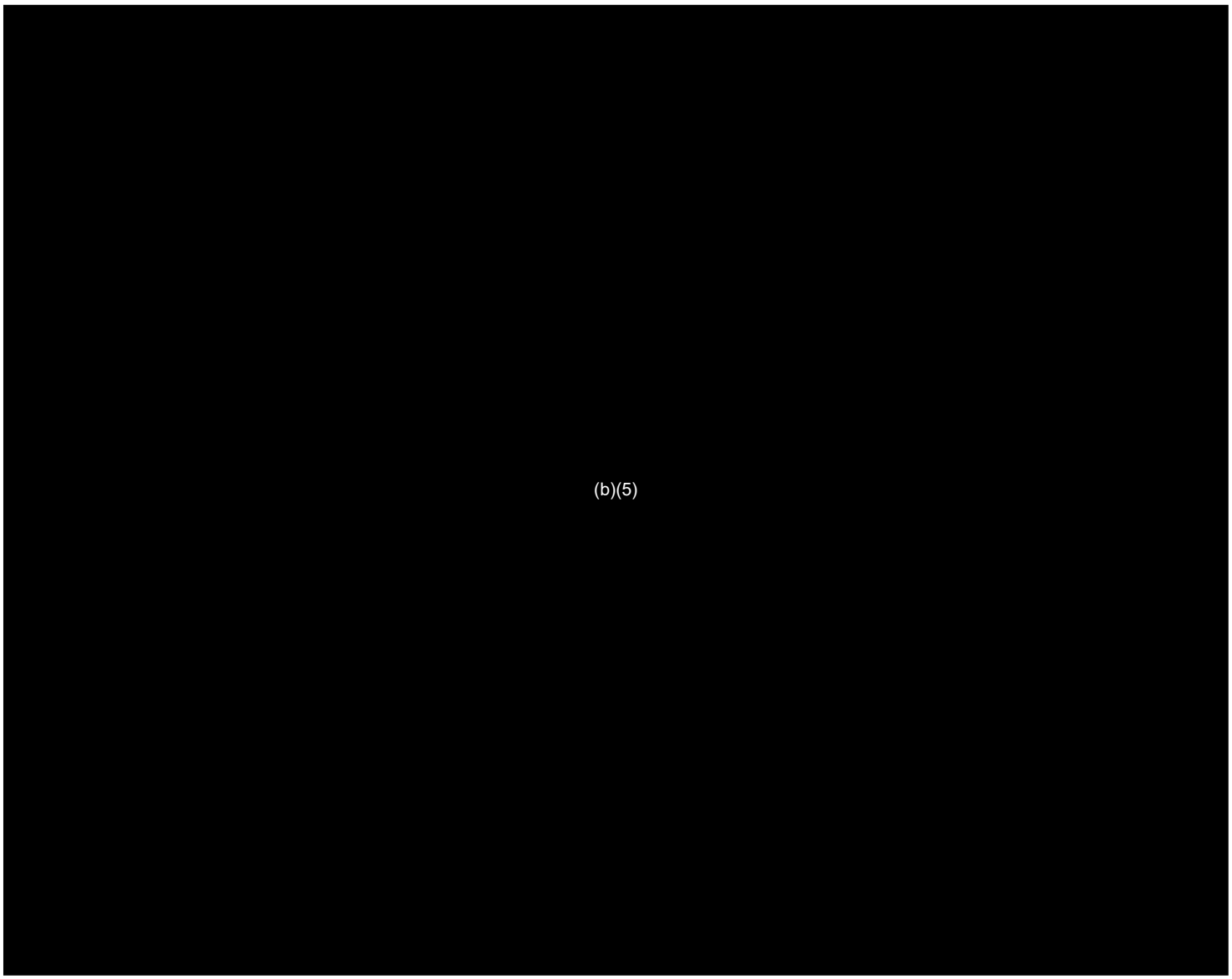
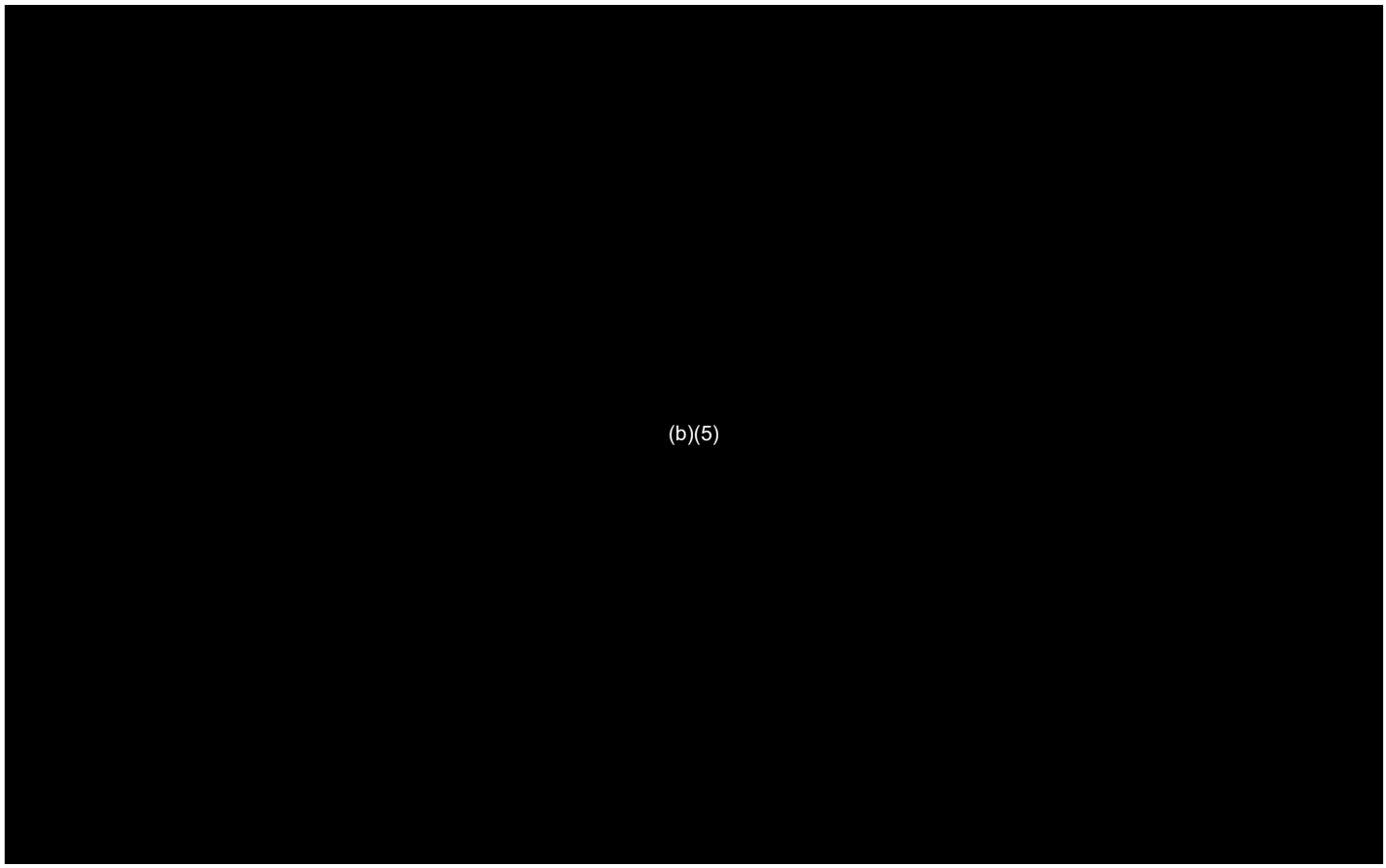
MEMORANDUM FOR THE SECRETARY

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