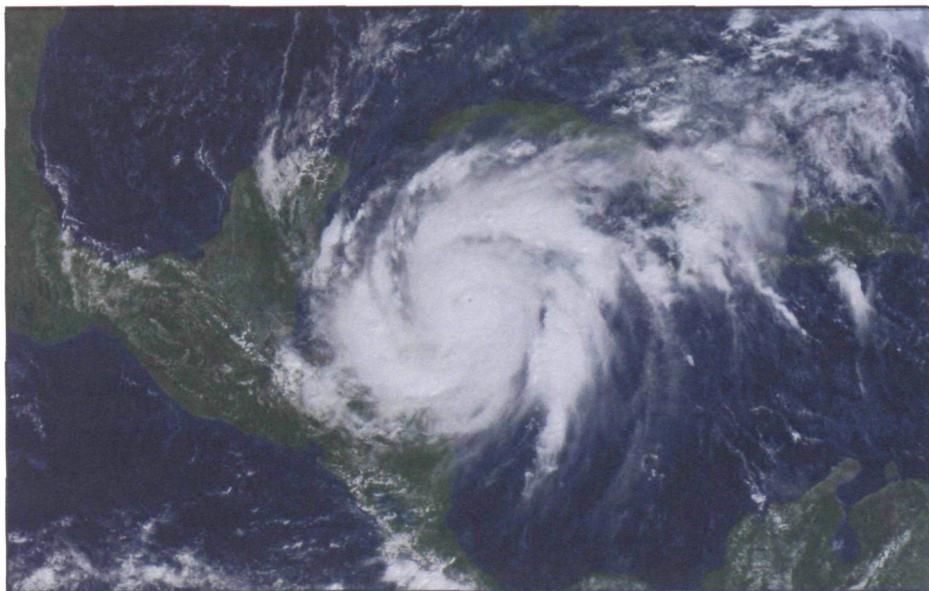


# NOAA REPORT



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December 2005



NOAA

*Hurricane Wilma, the strongest hurricane on record, approaches the Yucatan Peninsula Oct. 19 with maximum sustained winds of 175 mph.*

## November Twisters Set Deadly Record

—By Keli Tarp

Although tornadoes most often occur in the spring, November proved to be the deadliest month this year, with five tornadoes responsible for 27 deaths.

During the month, there were 117 total tornado reports, with three outbreaks of more than 30 tornadoes each, according to NOAA's Storm Prediction Center in Norman, Okla.

"Despite good forecasts, a few tornadoes last month caused a lot of deaths," said Dan McCarthy, warning coordination meteorologist with the Storm Prediction Center. "To get the number of tornadoes we had in November is not unprecedented, but it is unusual."

The deadliest tornado of the month, which was also the deadliest tornado nationwide since 1999, occurred early Sunday morning, Nov. 6, killing 23 people and injuring at least 200. Rated F3 on the 1 to 5 Fujita damage scale, it tracked 41 miles from Henderson County, Ky., northeast across the Ohio River and Ellis Park Horse Racing Track, then through Vanderburgh, Warrick and Spencer Counties in southwest Indiana. More than 100 buildings and homes were destroyed or severely damaged. Hardest hit was Eastbrook Mobile Home Park in Evansville, Ind., where most of the deaths occurred.

By the end of November, there were 1,161 tornadoes reported *continued on page 6*

## Unusual Weather Events Dominate 2005

—By John Leslie

An infamous, record-breaking Atlantic hurricane season, stifling heat waves, a crippling blizzard and soaking rains in the U.S. Northeast, and near-record to record high global temperatures topped the list of unusual weather events for 2005.

The "Blizzard of 2005" christened the new year by dumping up to two feet of snow throughout New England on Jan. 22 and 23. By the end of the month, Boston had recorded more than 43 inches of snow, making January 2005 the snowiest month on record. By the middle of March, snowfall in New York's Central Park had reached 40 inches for the season. That marked the first time New York had recorded three consecutive snow seasons with 40 inches or more since records began in 1869.

Unusually heavy winter rain and snow in the U.S. Southwest helped end drought in much of the region, but led to severe flooding and devastating landslides in some areas. In mid- to late July, residents of the Southwest were caught in the grip of a severe, deadly heat wave, which had temperatures soaring well past 100 degrees several consecutive days. During that stretch, more than 200 cities in Colorado, Wyoming, California, Nevada, New Mexico and Arizona set records for daily high temperatures. Las Vegas, Nev., tied its all-time record high temperature of 117 degrees, and Death Valley, Calif., had a record seven straight days with temperatures at or exceeding 125 degrees, including one day when the mercury reached 129 degrees.

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## E-calipers: The New Way To Sample Fish

—By Sarah M. Shoffler

This fall, NOAA information technology specialists and port samplers field-tested an innovative electronic measurement system used in forestry that could provide real-time information when sampling fish from the U.S. North Pacific albacore troll fishery.

Electronic calipers, or e-calipers, and a “ruggedized” personal computer make up the system, which the Southwest Fisheries Science Center of NOAA’s National Marine Fisheries Service in La Jolla, Calif., found also significantly reduces data-entry time, effort and cost.

“Port samplers measure U.S. albacore along the west coast and in Pago Pago, American Samoa. They collect length-frequency data which are used to develop length- and age-based models for stock assessments. These, in turn, are used to determine management options,” said Al Coan, leader of the Multispecies Data Collection and Evaluation Team at the center. “We’re looking at ways to improve efficiency of port and observer length sampling. We wanted something to electronically measure highly migratory species that typically range in length from 50 to 150 centimeters.

“We knew that the Northwest Fisheries Science Center was using electronic measuring boards to measure groundfish up to 50 centimeters. But the tuna are curved and they’re difficult to measure on the board, especially when frozen. We needed an electronic version of the original measuring device, a measuring caliper.”

Jim Kinane, an information technology specialist at NOAA’s Southwest Fisheries Science Center had learned of some electronic calipers produced by a Swedish

company, Haglöf, which develops measurement and computing devices for forestry inventory, but nothing large enough for their albacore work. “I talked to Haglöf and explained that they weren’t in the forestry business, they were in the measuring business. With only a little change to their equipment, they’d expand their business,” Kinane said.

Haglöf eventually agreed and sent a prototype of a larger caliper system to the Southwest Fisheries Science Center this summer.

The new system consists of an electronic caliper and a handheld Allegro personal computer. The caliper has metal arms which can be adjusted to the length of the fish. With the click of a button, the e-caliper wirelessly beams the length data back to the PC.

The computer is the key to the real-time technology.

“It’s waterproof and floats. It’s heated to work in cold environments, completely sealed and runs on Windows, not DOS,” Kinane said. “This computer is virtually indestructible.”

“With the current non-electronic system, port samplers measure fish from vessel landings and transcribe the data onto length-frequency sampling sheets. Then they transcribe when and where the fish were caught from vessel logbooks,” Coan said. The port samplers then send this information to the Southwest Fisheries Science Center, where transcription errors are sometimes found.

Time is also a factor with the current manual sampling technique, as sampling information can come from as far away as Pago Pago, American Samoa, taking up to several weeks to reach the data collection and evaluation team at the center. That team is then responsible for entering the data

into a database, which can take up to another two weeks.

With the electronic system, the data are collected by the PC and immediately transmitted to the center’s database.

“The port samplers can use whatever medium of transfer works in their location and with their resources. For example, once they’ve measured the fish samples, they can e-mail the data directly from the Allegro using cellular, or download the data from the Allegro to their computer and e-mail the data to us from there,” Kinane said.

Port samplers who field-tested the system in the Ilwaca, Wash., and Newport, Ore., ports for part of this year’s albacore fishing season reported that it takes little time to get used to using the new system.

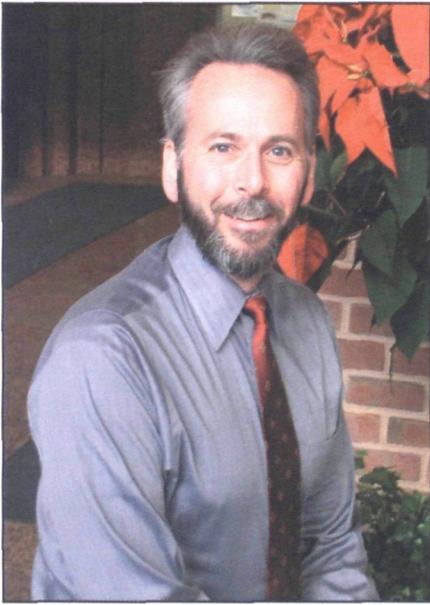
The electronic system will save time and effort by making it easier for one person to do the sampling.

“You don’t have to have one person measuring and one person to write the measurement down,” said Carla Sowell, who supervises the non-salmonid groundfish sampling team for the Oregon Department of Fish and Wildlife, one of the groups contracted by NOAA to conduct the port sampling.

“It was more efficient than with the paper and pencil method I was using,” said Brad Spidel, a port sampler for Washington Fish and Wildlife, another group contracted for sampling. “I could measure more fish in the same amount of time with the calipers. All I had to do was position the arms on the caliper, press a button then throw the fish in a bin. Transferring data was just as easy.”

Kinane estimates that the electronic system will eliminate approximately six weeks of work, which is how long it takes to enter the data transmissions under the current non-electronic system into

*continued on page 7*



Jeanne G. Kouhestani/NOAA

Leo Carling.

## Leo Carling Is the Team Member of the Month

—By Jeanne G. Kouhestani

NOAA's complicated planning, programming, budgeting and execution system, instituted several years ago, has been a long and winding road for many whose jobs have been affected by it. But Leo Carling, a contractor with BMT Designers & Planners, Inc., working with NOAA's Marine and Aviation Operations in Silver Spring, Md., on the fleet replacement program baseline assessment, has not only mastered the system, he has enthusiastically embraced it.

Development of the program baseline assessments requires a step-by-step approach, assigning and tracking action items and staff activities, coordinating staff and office calendars, making all the arrangements for productive weekly meetings and attending to the goal team lead.

"Leo contributes greatly to our ability to describe, justify and obtain the resources we need to sustain a healthy and robust fleet of research platforms that serve

NOAA's mission," said Beth White, who has the lead for the system's fleet services sub-goal.

White said Carling excels at sorting and tracking the status and changes made within the four program budgets and at assuring that accuracy is maintained in related databases and documents.

"Accurate budget details are the baseline of everything we do in the planning, programming, budgeting and execution system," White said.

Carling, a retired Navy lieutenant commander, is a naval engineer with two sea assignments under his belt and ample years of project management experience for the Navy in ship design, repair and construction. Educated at the U.S. Merchant Marine Academy in Kings Point, N.Y., he holds a bachelor's degree in marine engineering systems and a master's degree in mechanical architecture.

"Leo is meticulous in his work and dependable. If I need something, he gives it to me immediately," said Joe Bohr, head of Marine and Aviation Operation's Research Vessel Acquisition Program. "He knows the system and keeps us out of trouble."

Carling said he loves project management, which he likens to "getting everything moving in the right direction, and organizing the information and expertise to deliver a product at the end."

The annual planning, programming, budgeting and execution system process begins with determining what resources would be needed in a given year to provide the best service to NOAA's programs and line offices in a perfect world with an unlimited budget. Then, when budget and resource realities are brought into the mix, needs are prioritized and, as Carling put it, "the rubber meets the road."

Carling said he finds looming

*continued on page 8*



Chris Pearson

Elizabeth Scott-Denton.

## Liz Scott-Denton Is the Employee of the Month

—By Chris Smith

Amid the chaotic aftermath of Hurricane Katrina, employees from every NOAA line office rose to the daunting task of assessing the social, physical and economic impacts of the most horrific natural disaster ever to affect our nation.

Shortly after Katrina's fury subsided, NOAA's Fisheries Service took the lead to ascertain how the hurricane affected the valuable fisheries located in the north-central Gulf. NOAA's Southeast Fisheries Science Center in Miami, Fla., and NOAA's Galveston Laboratory, in cooperation with NOAA's Office of Oceanic and Atmospheric Research and National Ocean Service, addressed all aspects from environmental to socio-economic.

Research fishery biologist Elizabeth "Liz" Scott-Denton coordinated these efforts. Scott-Denton was charged with mobilizing personnel and deploying essential equipment aboard the

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# Focus On...

## National Weather Festival

—By Keli Tarp

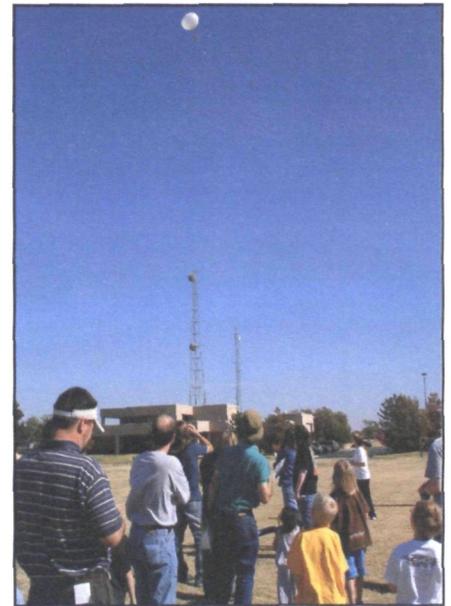
A warm and sunny fall day provided the perfect setting as more than a thousand people watched weather balloon launches, toured NOAA facilities, made their own weather instruments and learned about the many weather organizations in their community during the inaugural National Weather Festival Nov. 5 in Norman, Okla.

The event combined the annual open house of NOAA offices in Norman, called the NOAA Weather Partners, with displays and activities from other local weather-related organizations coordinated through the Norman Chamber of Commerce. The festival drew individuals and

families from throughout central Oklahoma and as far away as Dallas, Tex.

The NOAA Weather Partners include the National Severe Storms Laboratory, the Storm Prediction Center, the National Weather Service Norman Forecast Office, the Radar Operations Center and the Warning Decision Training Branch.

“Adding more organizations and several children’s activities really kicked it up a notch by creating a festive atmosphere and helping attract more families with young children,” said Rick Smith, warning coordination meteorologist with the Norman forecast office. Forecasters there offered a look inside their operations area and



Keli Tarp/NOAA

A crowd watches one of the hourly weather balloon launches.

launched two special weather balloons during the event.

Meteorologists at the Storm Prediction Center described the tools they use and explained their role in forecasting and issuing watches for severe weather across the United States.

“The weather balloon launches are very popular because they offer action and excitement,” said Kevin Kelleher, deputy director of the National Severe Storms Laboratory. “More importantly, they allow us to discuss our field research and show some of the tools we use to gather meteorological information.”

A video about the Radar Operations Center was shown every 15 minutes, and Air Force meteorologists working at the center highlighted their collaborations in a special display.

“Many community leaders, including the Chamber president, enthusiastically participated in the event and were happy with not only the size of the crowd but the quality of displays and activities,” said Air Force Lt. Col. Randy George, chief of the Radar Operations Center’s Applications Branch. *continued on page 5*



Keli Tarp/NOAA

Students watch as Clark Payne, a student employee with the Cooperative Institute for Mesoscale Meteorological Studies at the University of Oklahoma, makes sure the connections are secure as he fills a weather balloon with helium.

*continued from page 4*

National Severe Storms Laboratory researchers showed off their SMART mobile radar, short for Shared Mobile Atmospheric Research and Teaching radar, made possible by a partnership with the University of Oklahoma, Texas Tech and Texas A&M.

Throughout the day, meteorologists launched research weather balloons, explained how radar works, showed research projects on dual polarized radar and phased array radar and demonstrated the newest generation of hazardous weather warning decision-making applications designed for forecasters.

Several children's activities were offered under one tent. The Oklahoma Climatological Survey showed how windmills collect wind energy, measured the wind with homemade anemometers and distributed severe weather safety posters. The University of Oklahoma's student chapter of the American Meteorological Society painted weather symbols on faces and played "Pin the Eye of the



*James Murnan/NOAA*

*Visitors inspect NOAA's SMART mobile radar, short for Shared Mobile Atmospheric Research and Teaching radar, made possible by a partnership with the University of Oklahoma, Texas Tech and Texas A&M.*

Hurricane." The Oklahoma Alliance for Geographic Education demonstrated Mississippi River flooding with a floodplain model. The Sam Noble Oklahoma Museum of Natural History explained how erosion helps reveal fossils and dinosaur bones.

"The flow of children and

parents through the children's activity tent was steady during the whole event," said Andrea Melvin, program manager with the Oklahoma Climatological Survey. "The only time booth volunteers could catch their breath was at the top of the hour when the weather balloons were launched."

Another tent featured displays of weather products and services from several local companies and organizations, including Weathernews Americas, Inc., Moore Norman Technology Center, Xyant Technology, Sam's Club and the Oklahoma Climatological Survey. In addition to promoting their storm chasing software, Norman Computer Hospital blew up helium balloons, attached with an ID tag, for kids to release to see whose balloon would travel farthest.

Organizers are already looking forward to next year, when the event will be held in a new location—the National Weather Center currently under construction in Norman. The new facilities are expected to be an enticing draw for many weather enthusiasts throughout the state and region. ☺



*James Murnan/NOAA*

*Aisha Muhammad (right), a student employee of the Radar Operations Center, explains how radar works.*

## Unusual Weather

*continued from page 1*

The intense heat inched across the central U.S., bringing triple digit temperatures from the Dakotas to Illinois, Iowa, Nebraska, Kansas, Missouri, Arkansas, Texas and Louisiana.

The bristling temperatures hit the U.S. east coast, giving some areas their warmest June and July on record.

In early October, up to 10 inches of torrential rainfall hammered the Northeast, triggering massive flooding in parts of Maine, New Hampshire, Massachusetts, Connecticut, New York and New Jersey early in the month. Up to eight inches of additional rain later touched off more flooding in the area, making it the wettest October on record for at least 15 cities in the region.

Still in October, an early season winter storm piled up to two feet of snow from areas of the Dakotas to Denver. Heavy snow also fell in New England, where snowfall broke the previous October record on Mount Washington by almost 40 inches.

The year also brought its share of tornadoes. Through the end of November, NOAA's Storm Prediction Center in Norman, Okla., reported a preliminary number of 1,161 tornadoes in the U.S.

Record and near-record breaking temperatures around the world also were reported in 2005, bringing the year's global temperature close to the previous record warm year of 1998.

"An interesting question is why the 2005 annual global temperature may be so close to the record setting global temperature of 1998," said Jay Lawrimore, chief of the Climate Monitoring Branch of NOAA's National Climatic Data Center in Asheville, N.C., the official archives of U.S. weather and

climate information. "Temperatures in both 1997 and 1998 were influenced by an extremely strong El Niño, which led to 16 straight months of record breaking temperatures and the record warm year of 1998. But in 2005, there was no such powerful El Niño influence on global temperatures."

Lawrimore said that the National Climatic Data Center compares its global analyses with results from other independent teams in the United States and United Kingdom. "It's critical to have independent and diverse methods of analysis. If a single team is involved, critical errors are more likely to go unnoticed. In some cases, major adjustments have been made after collective scrutiny of an analysis process," he said.

The 2005 hurricane season shattered several major records, including: the most named storms (26), the most hurricanes (13), the highest number of major hurricanes hitting the U.S. (4), and the most category 5 hurricanes (3). Letters of the Greek alphabet were used to name storms for the first time since storms began acquiring names in 1953.

Hurricane Katrina, which submerged New Orleans and tore up huge sections of the Gulf Coast in September, became the costliest land-falling hurricane on record in the United States, eclipsing Hurricane Andrew of 1992.

Hurricane Wilma in October was briefly the most intense Atlantic hurricane ever recorded, with a minimum central pressure of 882 millibars. Wilma also was the fastest-strengthening storm on record. Its top sustained winds increased 105 mph in 24 hours while it was churning in the Caribbean.

NOAA forecasters are grim about the prospects of calmer hurricane seasons in the near future. Since 1995, the Atlantic

Basin has been in the active phase of a tropical multi-decadal signal, where optimal conditions in the ocean and atmosphere, including warmer-than-average sea-surface temperatures and low wind shear, strengthen hurricane activity.

"I would like to be able to tell you that next year will be calmer, but I can't," said NOAA Administrator Vice Adm. Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.) at a Washington, D.C., press conference at the end of November to wrap up the 2005 hurricane season. This increase in the number and intensity of tropical storms and hurricanes could last up to 30 years, according to NOAA experts. ☹

## November Twisters

*continued from page 1*

nationwide for the year, resulting in 37 deaths.

November was the fifth busiest tornado month, behind June with 299 tornadoes, April with 137, May with 134 and September with 131. Before the deadly November outbreaks, tornadoes killed four people in January, one in March, four in August and one in September.

Although spring is usually considered tornado season, the continental U.S. typically experiences a "second season" in October and November.

"A number of notable outbreaks have occurred in November in the past 20 years," said Harold Brooks, research meteorologist with NOAA's National Severe Storms Laboratory, also in Norman.

"We've learned the most dangerous and most fatal tornadoes do not occur in the peak months such as April and May, but on the edges, including November," McCarthy said.

A warm autumn contributed to *continued on page 7*

## November Twisters

*continued from page 6*

a busy November, as tornadoes were triggered by frontal systems bringing cold air into the mid-Mississippi and lower Ohio River valleys.

"What happens in November is opposite of March, when warm air comes up and pushes out the cold air," McCarthy said. "In November, colder air comes down from the north and collides with warmer air. That's how we get the second season."

The strong cold front that triggered the deadly Evansville tornado Nov. 6 also caused seven other tornadoes, plus damaging winds and large hail resulting in additional injuries and destruction.

Less than a week later, the same type of weather pattern caused 30 reported tornadoes that struck central Iowa, Missouri and Arkansas on Nov. 12, killing one person.

Three days later, the Midwest and South were hit with a widespread tornado outbreak. On Nov. 15, 40 tornadoes were reported in Alabama, Tennessee, Kentucky, Illinois, Indiana and Missouri. A death occurred in Benton, Ky., when two houses were damaged. That tornado, rated F3, tracked through Kentucky for more than 44 miles, from Graves and Marshall Counties to Lyon County.

The final outbreak of the month occurred at the end of Thanksgiving weekend on Sunday, Nov. 27, and caused two deaths. More than 40 tornadoes were reported in Alabama, Arkansas, Kansas, Louisiana, Mississippi, Missouri and Texas.

The deadly Evansville tornado, which despite good tornado warning lead times was the deadliest tornado in Indiana since 1974, illustrates the dangerous nature of fall tornadoes.

"November events tend to create

big problem situations," Brooks said. "Fall storms tend to move faster than typical late spring events. Faster ground speeds require longer lead times for people to take shelter.

"[Fall tornadoes] tend to occur when the days are shorter and thus have a greater chance to hit after dark, and they tend to occur in the eastern parts of the U.S., especially the southeast, where we have the greatest number of mobile homes, which increases the danger."

In fact, all of the 23 deaths from the Evansville tornado occurred in mobile homes, and all but five of the 37 total tornado deaths this year have been in mobile homes.

This continues a trend that worries Brooks, whose research estimates that mobile home residents are killed at a rate 20 times that of permanent home residents. During the past five years, more than half the tornado deaths have been in mobile homes. In addition, more people are living in mobile homes throughout the United States, especially in tornado prone states.

"Given the greater threat to mobile home residents, they have to respond quicker and perhaps at a lower level of threat," Brooks said.

During the Evansville tornado, many residents were sleeping and did not know the tornado was headed their way despite the warnings that were issued.

The fastest and easiest way for people to get weather warnings is through NOAA Weather Radio All Hazards.

"NOAA Weather Radio All Hazards can help you survive. You can program the county you live in and surrounding counties to alarm when hazardous weather is approaching," McCarthy said. "It's the closest thing you have to someone coming and knocking on your door and telling you a tornado is coming." ☺

## E-calipers

*continued from page 2*

the center's database of highly migratory fish species.

"We get submissions of data four or five times per year, and it takes one to two weeks to enter data each time," Kinane said.

Coan suggested that this savings in effort recovers the approximately \$5,700 price tag on each caliper-Allegro unit.

"We can easily recoup that on the reduction in keypunch costs in no time, not to mention this helps our compliance with the Paperwork Reduction Act," Coan said. "There will be fewer transcription errors, because there will be no transcription."

The system ties into NOAA Fisheries' efforts to provide a "one stop shop" for all fishery data.

His team is also working on electronic logbooks for albacore troll vessels and will be working with the Fisheries Information System in 2006 to support electronic dealer reporting of landings on the west coast. All data will automatically be synchronized with the length-frequency data collected by the port samplers as the data enter the master database.

The researchers at the Southwest Fisheries Science Center will be able to access the length, landings and logbook data as soon as they are collected, which can be useful to fisheries management.

After a few modifications based on the port samplers' critiques, the center team would like to roll out 10 calipers for the next albacore season. "We would like to send two to ports in Oregon, two to Washington, three to American Samoa, two to California and have one to keep in San Diego for sampling here," Coan said. "This is the wave of the future. Electronic sampling keeps us current with our answers to management." ☺

## Scott-Denton

*continued from page 3*  
commercial fishing vessel *Patricia Jean* in coordination with the NOAA Ship *Nancy Foster* based in Charleston, S.C. *Patricia Jean's* primary mission was to survey shallow water areas, provide a platform to sample marine seafood and water and sediment quality, deploy surface-current drifters and set an environmental baseline for future studies.

The two vessels worked collaboratively to collect biological samples and take oceanographic measurements.

*Patricia Jean*, because of its shallow draft, proved to be an invaluable asset, allowing the embarked observers, technicians and scientists to trawl for fish and shrimp in areas of concern off Louisiana, Mississippi and Alabama that are too shallow for *Nancy Foster* to operate.

"It was necessary to expediently marshal the surveys to assess potential biological and chemical contamination feared to be contained in the tremendous amount of runoff caused by Katrina's rains and storm surge," said James Nance, chief of the Fishery Management Branch at the Galveston Laboratory. "The safety of seafood from the highly productive northern Gulf of Mexico was in question, and it was NOAA Fisheries' responsibility to investigate that and promptly report our findings to the nation. Liz readily accepted the challenge of coordinating this urgent task of providing logistical support of the ships and crews. Even when Hurricane Rita was bearing down on Galveston Island and a mandatory evacuation was ordered, Liz continued to coordinate the team's efforts via her cell phone."

In addition to contracting *Patricia Jean* to trawl with trained

observers on board, Scott-Denton coordinated the deployment of NOAA Fisheries' Northwest Contamination Team and scientists from NOAA's Atlantic Oceanographic and Meteorological Laboratory on *Foster*. Scott-Denton spent countless hours, working through weekends during multiple successive surveys, coordinating people and shipments of equipment and samples to assure schedules were met.

"I had the privilege of working with a backing of a wonderfully talented and dedicated team," Scott-Denton said. "Kip Jones, a contract observer from Galveston, has been especially critical to our environmental assessment. He's been aboard the *Patricia Jean* on every deployment, taking samples of fish, shrimp and crabs as well as collecting water samples and sediment. He also deployed drifters which measure surface current trajectories that help us determine the direction that currents are flowing."

Since the initial cruise, coordination of Katrina impact response work aboard vessels, now including the NOAA Ship *Gordon Gunter*, has continued. Today, months after the storm, analyses of samples of fish and shrimp tissues for NOAA's Northwest Fisheries Science Center for contaminants and the deployment of oceanographic current drifters continue under Scott-Denton's watchful eye.

"The initial assessments from Dr. Tracy Collier and his group at the Northwest Fisheries Science Center indicate there are no elevated levels of substances such as pesticides, petroleum products, and sewage," Scott-Denton said.

Thanks in large part to Scott-Denton's efforts, NOAA was able to respond quickly after Hurricane Katrina and assure the nation of the safety of valued seafood from the northern Gulf of Mexico. ☺

## Carling

*continued from page 3*  
deadlines to be the biggest challenge, but one that gives him satisfaction to overcome.

"Sometimes a planning, programming, budgeting and execution system deadline arrives well before we're ready, even though we knew it was coming. We always wish we had an extra week. The work just seems to expand to more than fill the time," he said.

"There's a sense of relief after hitting the send button, which forwards the program plan to Program Analysis and Evaluation. It's the culmination of six months of ideas, talking to a lot of people in NOAA programs, and the challenge of figuring out how to best meet the needs of all of NOAA, not just Marine and Aviation Operations.

"It's a privilege to be part of a new agency effort that has evolved a lot in the time I've been here," Carling said. "I appreciate the value of the time people put into it, not only as someone working on the planning, programming, budgeting and execution system, but as a taxpayer. I'm thankful that NOAA people take the time to avoid paying for what isn't needed or just asking for more money." ☺

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# **National Oceanic and Atmospheric Administration**

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