NOAA REPORT

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NOAA-Led Team Maps the Volcanic Ring of Fire

—By Dane Konop

A NOAA-funded and organized team of scientists has surveyed and mapped 50 volcanoes on the sea floor in the Mariana Arc, a part of the submarine "Ring of Fire" extending northward for 1,000 kilometers from Guam to the island of Farallon de Pajaros in the Pacific.

In the month-long cruise aboard the University of Washington's research vessel *Thomas G. Thompson* that ended March 5, the team also discovered ten new hydrothermal vent systems, where molten lava and fluids from the Earth's core breach the surface of the sea floor, mix with cold sea water and re-solidify in sometimes fantastic mountains of precipitated chemicals.

Preliminary findings from the cruise indicate that fluids from the Mariana Arc hydrothermal vent systems may be gas-rich and support microbiological growth and other exotic animal and plant life that feeds off chemicals released in the waters.

When analyzed, the findings may also provide important new information on sea floor landslides that could generate destructive tsunamis.

Many of these subsea volcanoes had been previously known, and some had been crudely mapped by satellites, other research vessels and U.S. Navy ships. The new surveys

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Flood Forecasts for East Now on the Web

—By Pat Slattery

In March, just in time for spring flood season, the National Weather Service unveiled a new Web page for emergency management officials and members of the public who live in flood-prone areas of the eastern region of the country.

The Web page, a product of the Advanced Hydrologic Prediction Service, displays forecasts of flood levels in addition to measured levels at river and stream gages maintained by the U.S. Geological Survey. This information and other guidance provided on the Web page allow residents who live near rivers and streams to plan ahead and avoid potentially dangerous flood conditions, particularly on low-lying roads.

The North Central River Forecast Center in Chanhassen, Minn., which has responsibility for the upper Mississippi River and the Red River of the North, began incorporating AHPS products in its flood forecasts in 1997 following the spring flood that inundated Grand Forks, N.D., and East Grand Forks, Minn. The eastern region introduced AHPS products in February 2000, followed by the Weather Service's 14-state central region, which implemented the Advanced Hydrologic Prediction Service region-wide in late 2000.

In early March of this year, former NOAA and Weather Service employee Janet Springsteen visited

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Dane Konop/NOAA

Snow melt and rain drove the Potomac River over its banks onto River Road near Shepherdstown, W.Va., March 7, blocking traffic and forcing this truck to turn back to higher ground.

Ring of Fire

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and maps from the NOAA Ring of Fire cruise now provide a detailed baseline of volcanic activity that can guide future studies.

The area is part of the Commonwealth of the Northern Marianas, a U.S. protectorate.

"It's the territory of the United States, and we didn't know anything about it," said principal investigator Robert Embley of NOAA's Pacific Marine Environmental Laboratory in Newport, Ore. "[The cruise] was an opportunity to bring in the latest imaging and survey tools to an area that has never been investigated before. Exploration there, in and of itself, is an activity that has been neglected. And that's why we were there," Embley said.

Over the years, there have been many reports from that area of the ocean of discolored water coming to the surface, indicative of submarine eruptions, Embley said.

"There are seamounts that are growing very quickly to the surface, up to tens of meters. Really close," Embley said. "Yet we just don't know anything about the area."

The researchers, which included 19 scientists from the Pacific Marine Environmental Laboratory, the University of Washington, Oregon State University and the University of Hawaii, plus two Japanese scientists, worked in two teams, "port and starboard," 24-hours a day for 25 days.

The team used existing maps and data, water sampling casts and multibeam sounding surveys to locate and characterize the submarine volcanoes and their hydrothermal vents.

"We were doing two main activities, mapping and water sampling and surveys of the water column along these volcanoes," Embley said. "Usually we would spend a couple days mapping, and then come back and start up a line of volcanoes doing CTD [conductivity, temperature and depth] casts. We'd get to a volcano, maybe do a bit more mapping to try to get the best spot for the CTD, put the CTD over the side, and then look at the signal coming back and decide where we wanted to sample the water column. When it came back on deck, there would be a

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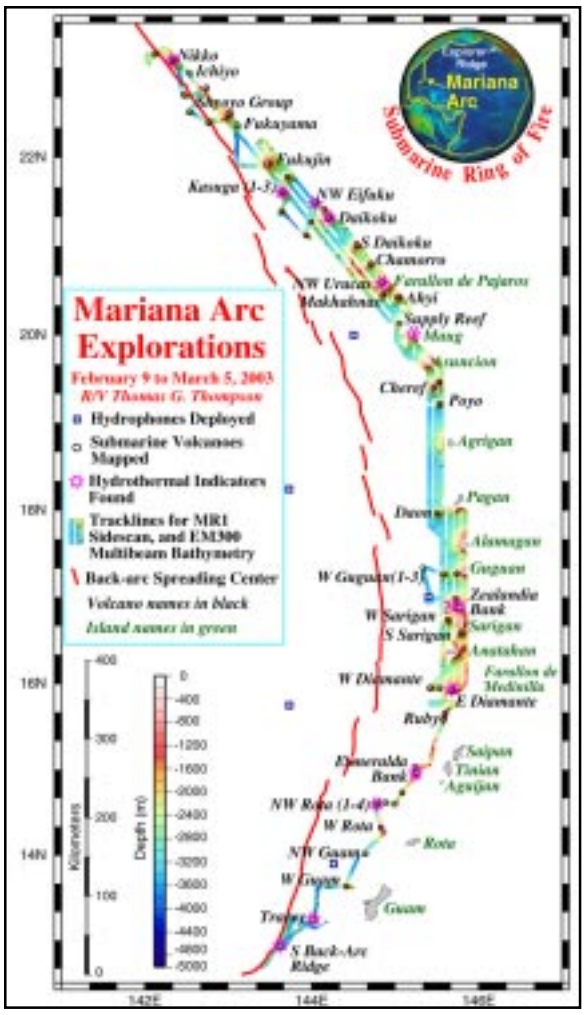

NOAA, Air Force Promote Advanced Emergency Beacons

—By John Leslie

On March 2 in the rugged, snowy terrain of Beartown State Forest in Massachusetts, tragedy forever changed the lives of a New Hampshire family. A plane carrying all seven members of one family crashed into the dark woods, killing the mother and two of her sons. The crash captured national headlines when the father, who was piloting the plane, and three other sons survived the ordeal and were rescued 17 hours later. Although the father would later die from multiple trauma and hypothermia, the three remaining sons lived.

What hampered rescuers from finding the family sooner was the outdated emergency beacon, or emergency locator transmitter, onboard their plane. The beacon was an old-style 121.5-megahertz unit, the version government officials are phasing out by Feb. 1, 2009.

The delay in finding the New Hampshire family may be the critical turning point for NOAA and the Air Force, which are fine-tuning a national public awareness campaign to get more than 250,000 owners of the 121.5-megahertz units to switch over to the newer, more accurate 406-megahertz beacons. In June, both agencies plan to kick off an aggressive effort to educate general aviation pilots about the need to use the more advanced models.

"What happened to the family really speaks volumes to the need for people to own the 406-megahertz beacons," said Lt. Daniel Karlson, a NOAA Corps Officer and a spokesman for NOAA's

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Dan Purcell/NOAA

Mark Betsch.

Mark Betsch Is April's Employee of the Month

—By Keli Tarp

Mark Betsch, the April Employee of the Month, has a motto: "On time, under budget." Following these four words has brought him success and recognition for his superior performance as the project manager for two recent National Weather Service radar projects.

Betsch, major projects deployment manager with the NEXRAD Radar Operations Center in Norman, Okla., was responsible for procurement, integration and installation of the Evansville, Ind., weather radar and the relocation of the Jackson, Miss., radar to Brandon, Miss.

"Mark proved himself an invaluable asset to the Radar Operations Center and the National Weather Service through his exceptional performance on these projects," said Marty Williams, retrofit management team leader with the Radar Operations Center.

Betsch shares the credit for his success. "I couldn't have accomplished these projects without the hard work and dedication of many talented individuals," he said.

The establishment of a weather radar in Evansville was Congressionally mandated to improve the ability of local forecasters to detect tornadoes and other severe weather in the region. The Evansville project was especially challenging, Betsch said, because of the complexity, schedule constraints and broad scope of tasks required to introduce a unique commercial radar into an established weather radar network.

The original concept of the Evansville radar project was to install separate and unique control and display equipment at the National Weather Service forecast office to operate this commercial radar, Betsch said.

This would have complicated the daily operation and required specialized operator training to control and interpret the weather data.

By thinking "outside the box," Betsch and his team were able to utilize the NEXRAD radar product generator to control and monitor a commercial weather radar, as if it were like any other radar in the existing NEXRAD network.

Most importantly, with the successful installation of the Evansville radar, the Weather Service has demonstrated the ability to expand the existing NEXRAD network to incorporate commercial "state-of-the-art" weather radars if required in the future.

"I really enjoy my position here at the Radar Operations Center," Betsch said. "It provides me with tremendous diversity of activity and it affords me the opportunity to work with some very talented and dedicated individuals who enjoy what they do. The success of each of these projects was largely

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David Grossman/Gurnet Road Photography

Chad Demarest.

Chad Demarest Is the Team Member of the Month

—By Teri Frady

Chad Demarest, a contract fishery analyst for NOAA Fisheries' northeast region, hired on to support managers and users of the nation's most storied and contentious commercial fishery—New England groundfish. In his job, he can count on controversy, unpredictability and odd working hours. He stays relaxed by simply messing about in boats.

In a lifetime spent hugging the coast, Demarest has managed to combine his knack for analysis and his interest in ocean resources in an unusual job. His assignment with NOAA Fisheries is to provide economic and other evaluations of the region's ongoing work with the groundfish fishery management plan intended to end overfishing, rebuild stocks that need it, reduce unwanted catch and protect important habitat for marine life.

He came into the job at a particularly interesting time, when the region is making ground-

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Focus On...

A Research Cruise to "Kick 'em Jenny"

—By Debby Kay

As a budget analyst in NOAA's Office of Oceanic and Atmospheric Research, my duties include compiling the required justifications for all the research projects for our annual budget request to Congress. All my work is done from the headquarters office in Silver Spring, Md. It is a rare opportunity that a headquarters employee in such a position can participate first hand in a research expedition. So when the NOAA Office of Ocean Exploration offered me that chance my immediate response was, "When do I leave?"

My adventure on the high seas began March 9 when I met the NOAA research vessel *Ronald H. Brown* in port at San Juan, Puerto Rico.

It took most of that Sunday for the scientists to arrive and the best part of Monday to outfit the ship with stores and scientific equipment. But by 1800 hours (6 p.m.) Monday evening, we were under way at last. I watched the shoreline slowly fade as we headed for our final destination, a small submarine volcano 7.5 kilometers off the coast of Grenada in the Caribbean Sea called "Kick 'em Jenny," so named according to the U.S. Geological Survey because the waters in this region are sometimes extremely rough.

Kick 'em Jenny, the most active volcano in the Antilles Volcanic Arc, made its entrance into recorded history on July 24, 1939, with an enormous spew of black ash and steam rising from the relatively tranquil sea. Earthquakes and tremors followed its debut, along with underwater explosions when hot molten rock mixed with seawater. It is the only "live" submarine volcano in the West Indies known to scientists, erupting at least 12 times since 1939. The last major eruption was in December 2001.

It is the most intensively monitored volcano in the Eastern Caribbean and probably the most intensively monitored submarine volcano in the world, providing scientists with a rare opportunity to learn about the growth and development of submarine volcanoes into eventual islands.

Debby Kay/NOAA

The NOAA Ship Ronald H. Brown sits atop the active submarine volcano Kick 'em Jenny in the Caribbean.

Although Kick 'em Jenny has been surveyed at least 11 times since 1962, this cruise was the most detailed study to date, involving sonar surveys, chemical sampling and analyses of surround-

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Debby Kay/NOAA

The ROV Oceanic Explorer is launched from the aft deck of the R/V Ron Brown. It took a coordinated effort of the deck crew and ROV team to carefully place the ROV in the water far enough from the bobbing ship so it could be safely released from its protective bouy.

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ing waters, and dives by a remotely operated vehicle equipped with video cameras to examine the volcano and animal life close-up in real time.

I was the official marine mammal observer and the Ocean Exploration web site coordinator for the trip. It was my responsibility to record all sightings of marine mammals in detail and to prepare a log and final report on their activity during the cruise. This kept me busy the entire mission, either on deck looking for whales or following scientists, helping when I could, but mostly documenting the various tests and sampling going on around the clock.

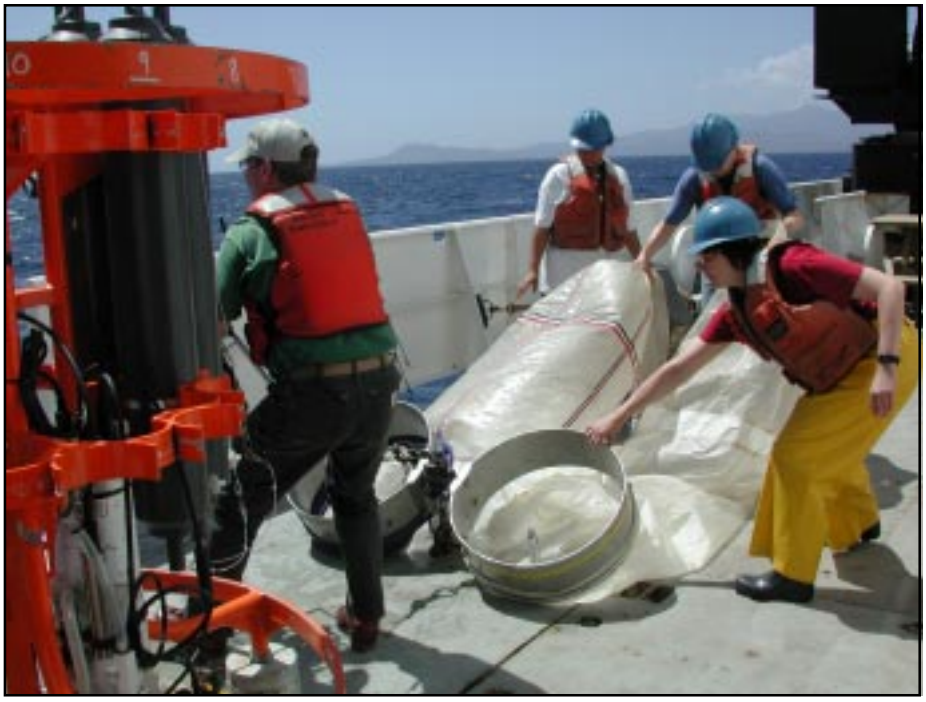
Everyone on board worked 12-hour shifts in order to maximize the time at sea.

One of our first mission tasks was to enlarge the multibeam surveys done on the previous cruise of *Brown* in the area.

Everyone watched excitedly as the colors filled in on the three-dimensional map generated as each sweep of the ship's multibeam was completed and new features were revealed. This new and more detailed map helped scientists to plot out the tracks that the remotely operated vehicle, *Oceanic Explorer*, would make the following days.

Debby Kay/NOAA

Instruments for conductivity, temperature and depth measurements are launched to provide a better understanding of the mass water movement in the area.



Debby Kay/NOAA

The Catch! Bongo nets are carefully brought on board with specimens collected in the container at the end of the nets. These are detached and the specimens are taken to the ship's laboratory for further study.

The moments were intense as we all gathered around the large screen TV monitor to witness the first underwater views of Kick 'em Jenny since its December 2002 eruption.

The optics on the ROV *Oceanic Explorer* gave us an incredible view of the ocean floor. As *Oceanic Explorer* approached the rim of the volcano, small fissures in the side of the cone appeared, leaking gases from the interior and creating a wall of bubbles for a most dramatic effect. As the camera panned the area around the gas vents, masses of shrimp came into view, some of the first life forms we saw around the vents.

That night the ship's cook, not knowing any of this, served boiled shrimp for dinner. We joked about the coincidence and aptly dubbed the dinner the "Kick 'em Jenny shrimp special." This type of lighthearted joking in the evenings helped relieve the tension of the day's work and made all of us feel more at ease on the ship.

The crew easily accommodated all the scientific staff and visitors. They were always patient, helpful and friendly as we all learned our way around the ship and called on their expertise to assist in the sampling and surveying.

As the cruise neared the final days, I felt both eager to return home and sad to leave the ship. I have come to appreciate many things from my experience, not the least of which is the impact of headquarters decisions on field operations.

When I put together future budget justifications for programs such as ocean exploration, I now know better how to capture the essence of the work being done and how to represent the value of the work to Congress. It is not just an exercise on paper any longer for me. If I don't do my job well, it reflects down the line to the folks in the field, who now have faces in my mind.

Flood Forecasts

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the Advanced Hydrologic Prediction Service Web site of NOAA's Middle Atlantic River Forecast Center in State College, Pa., after seeing a news release about it on the NOAA home page. She found what she called "one of the most valuable tools I've ever seen for coping with flooding problems" near her home along the Potomac River near Shepherdstown, W.Va.

Springsteen and her family moved into a home on River Road in August 2002. The aptly-named road parallels the Potomac just down river from Shepherdstown, providing the only access to dozens of homes along a two and one half mile stretch of river.

Significant snow melt in February that saturated the ground coupled with heavy rains in early March to bring river levels quickly up above flood stage on March 7 and again on March 21.

"We are situated high enough on the ridge we don't have to worry about water getting into the house," Springsteen said. "Ours is one of about 30 houses in about a three-mile stretch along the river, most built well above the flood plane. But we do get flooded in or flooded out on occasion. It's not unusual for water to run up to three feet deep on the roadway along our riverfront."

Springsteen learned about flood hazards while working on the NEXRAD radar project during the Weather Service modernization. She said she was also well aware of old flood information products that provided current river levels but little else. "It was obvious to everyone when the river flooded," she said, "but everyone wanted to know when the water would go back down so they could use the road again. Just getting to and from work and getting kids to and from school was an adventure in risk-taking."

According to Kenneth D. King, chief of hydrologic services at the Weather Service's central region headquarters, "Public input has shown us that people not trained in hydrology can follow rising and falling river levels on our AHPS graphics pages. It's heartening to know the public is making excellent use of AHPS to access all sorts of information about water levels, from full flood to drought," he said.

Seeing the Advanced Hydrologic Prediction Service news release and finding the State College Web site eased a great deal of tension, Springsteen said. A major concern for her had been how floods on the Potomac would affect getting her son to and from school, which is located well out of the flood plain in Shepherdstown.

"When the road is flooded, the closest you can get to our house and about 20 other houses is about a quarter-mile to a half-mile before you have to park and start walking across neighbors' properties," she said. "There's no risk to the walk, but it is really an inconvenience. Before the new flood forecast Web page, we had to guess when the water would make the road impassable or when it would recede."

The Advanced Hydrologic Prediction Service forecasts how much a given stream will likely rise, how rapid the rise will be, where flooding is likely to occur and how long flooding will last.

"The product is fantastic," Springsteen said. "Any time there's a concern about flooding, we go to the Web site and check the probabilities. The information about the projected rise or fall of the river is invaluable. It makes all the difference in being able to plan the day. And it helps me double check to make sure there is no risk in getting our son to school and back home."

The Advanced Hydrologic Prediction Service Web page of the Weather Service's eastern region is http://ahps.erh.noaa.gov.

Ring of Fire

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whole bunch of people gathered around the CTD getting successive samples of water out. With that they'd go back to the lab. Some analyses were done on board, and others were stored for later analysis," he said.

The R/V *Thompson's* multibeam system maps in a swath along the sea floor. "It gives you depths at maybe 100 places along that swath," Embley said. "It's a way to produce an image of the sea floor [in which] you can actually see small-scale features."

The team also used a side-scan sonar, which "samples" the sea bottom with more tightly focused soundings from one side of the ship. "From the side-scan, we get texture," Embley said. "For instance, is it sand there or mud there? Or is it gravel? Or is it something else?"

The ship was able to overlay the texture from the side-scan data onto the bathymetry from the multibeam system to guide their surveys.

Now that they have detailed maps to guide them, Embley said the general plan is to come back and resurvey some of the more interesting submarine volcanoes, possibly using a remotely operated vehicle to examine the volcanic activity and hydrothemal vents in more detail.

When they do return, the new maps will help scientists determine whether new volcanic activity is changing the sea floor.

"There's a baseline now that any change will be measured against," Embley said.

Emergency Beacons

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Search and Rescue Satellite Aided Tracking Program, called SARSAT.

Karlson said the other major problem with the 121.5-megahertz beacons is that they lack a "unique identifier," enabling officials to quickly determine whether the distress signal is legitimate. The 406-megahertz units, he said, "have a slew of [user] registration requirements, which makes it easier for us to verify inadvertent activations."

Karlson said rescuers had difficulty detecting the New Hampshire family's emergency beacon because NOAA satellites didn't pick up the beacon signal until two hours after the plane crashed, a major shortcoming with the 121.5-megahertz models that lack the instant-detection capability. Rescue agencies had to wait more than an hour to confirm the family's signal was coming from a plane, and not from an inanimate object, such as an ATM machine, a notable source of interference on the 121.5-megahertz frequency.

"There's always precious time lost with 121.5-megahertz beacons, which may prove to be a matter of life and death," Karlson said. By contrast, signals from the newer 406-megahertz models can be detected instantly. Many of the new units have a built-in global positioning system feature that helps satellites and rescuers zero-in on the location of the distress signal faster and more accurately.

The GPS feature of the 406-megahertz model can help pinpoint trouble spots within 100 feet in a matter of minutes. At best, the 121.5-megahertz models have a 12-mile accuracy range.

The serious limitations of 121.5-megahertz beacons prompted the worldwide satellite search and rescue system, called COSPAS-SARSAT, to 'turn-off' satellite detection for these beacons on Feb. 1, 2009. This decision, which was agreed to internationally and endorsed by the United Nations, means that users of the older units should begin transitioning now to the newer 406-megahertz beacons. "After Feb. 1, 2009 our satellites won't be able to detect you." Karlson said.

The COSPAS-SARSAT System uses a cluster of NOAA and Russian COSPAS satellites in geostationary and polar orbits to detect distress signals from emergency beacons on ships and airplanes.

NOAA uses two types of satellites—the Geostationary Operational Environmental Satellites, which can instantly detect 406-megahertz emergency signals, and the Polar Orbiting Environmental Satellites, which locate distress signals as they circle the Earth from pole to pole.

The emergency signals are relayed to the U.S. Mission Control Center based at NOAA's Satellite and Information Center in Suitland, Md., for processing, then automatically sent to rescue agencies around the world. All 406-megahertz beacons, including emergency position indicating radio beacons, called EPIRBS, which are used by boaters, and personal locator beacons, used by outdoor enthusiasts in the United States, are required by law to be registered with NOAA's SARSAT program office.

Last year, the twentieth anniversary for COSPAS-SARSAT, the program tallied about 1,500 rescues worldwide. Since 1982, more than 15,000 lives have been saved, including about 4,500 in the United States.

Karlson said, "The key [now] is getting the word out to all pilots, boaters and back-country adventurers about the significant advantages of 406-megahertz beacons."

Demarest

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breaking decisions about how to manage a recovering fishery. The groundfish management plan has been the subject of significant litigation on its own merits, and is also influenced by settlement of other litigation concerning how essential fish habitat should be defined and accounted for in all such plans.

After only nine months of operating in a complex regulatory environment, Demarest took on the job of completing the final draft of the environmental impact statement on essential fish habitat. His deadline? A matter of weeks.

"I knew I could do the work, so I agreed to get it done," Demarest said.

"While others were pessimistic about completing the work under the time table, Chad very optimistically stated that it could be done," said his NOAA supervisor, Chris Mantzaris. "He took the lead in environmental analyses, incorporating economic and social analyses, and coordinating among regional management institutions to assemble a comprehensive and very coherent DEIS [draft environmental impact statement]."

There were moments of added drama: the spate of blizzards that pounded New England during that time, a bout of illness and everybody's deadline nightmare—computer file corruption the day before the document was due.

"Okay, that last part was my worst day, but there are plenty of good ones," Demarest said. "I'm happy to be here and to be part of the team."

Demarest's hard work has paid off. The massive fishery plan amendment is still on track for implementation by the court-required deadlines.

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Betsch

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due to the efforts of a multi-disciplined project team, coupled with the support from the ROC leadership."

Betsch's responsibilities included providing a temporary leased radar at Evansville, followed by technical specification development, system technical evaluation, site acquisition, system procurement and installation of the permanent radar, and the challenging task of seamlessly integrating weather products generated from this unique radar system into the National Weather Service's existing AWIPS data network.

"Through his impressive teamwork, leadership and commitment, Mark led the Evansville project through all challenges to complete the full integration of the permanent Evansville radar data into the NEXRAD network—four months ahead of schedule and under budget," Williams said.

At the same time, Betsch managed relocation of the Jackson radar to a new, optimal coverage site at Brandon, Miss. By judiciously using radar assets from a training NEXRAD operated by the U.S. Air Force for the Brandon site, he ensured that the "old" Jackson NEXRAD provided continuous radar coverage during establishment of the new site. This major project included installing an alternate training system for the Air Force.

"The successful management of either of these tasks alone would have been impressive," Williams said. "Mark's management of both tasks simultaneously was nothing short of remarkable, requiring very detailed project planning and foresight, as well as flexibility to adjust plans, as necessary, to ensure the success of the project. Mark's broad technical background, diplomatic leadership style and measured tenacity were pivotal in the successful completion of this NEXRAD system relocation while maintaining regional weather radar coverage during the transition."

Betsch has many years of experience managing multi-million dollar radar projects. He worked with Lockheed Martin, previously known as Sperry, on NEXRAD radar development for 11 years before joining the Radar Operations Center in 1999.

Originally from Long Island, N.Y., Betsch earned a Bachelor of Science degree in mechanical engineering from Drexel University.

"Few possess the talent and initiative that Mark displayed through his expert management of these critical and highly visible projects," Williams said. "Mark truly deserves the recognition afforded by this prestigious award."

Demarest

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Hailing from the Houston area, Demarest got his love of the ocean early in life. He was accepted at the U.S. Coast Guard Academy at New London, Conn., in 1990. "The academy was fun, and it's where I first got interested in fisheries," he says. "It was also an opportunity to be near the water, and I didn't see much chance I'd be assigned away from the coast," he said.

While at the academy, he was a collegiate all-American sailor and met his future wife Kelly at a national competition. Kelly, now a dentist with a local practice, was a competitive sailor while an undergraduate at Purdue.

Demarest still maintains a seasonal collection of small racing sailboats—a few for warm weather and a few for cold weather.

"Some people think it's interesting that we race sailboats every Sunday, all winter long," he said, a version of the sport known regionally as "frostbiting."

After the academy, Demarest was assigned to the Coast Guard's first district, where he worked off a vessel homeported in New Bedford, Mass., and out of the headquarters office in Boston. He left the service in 1999 and, after a short stint as a fishery observer in the northeast sea scallop fishery, entered Brown University to complete work on a graduate degree in environmental economics. Four days before his thesis defense, the Demarests had a son, Carder.

While taking Carder for a walk one day, Demarest stopped in at a New England Fishery Management Council public meeting and met up with an old colleague who knew that more help would be needed to complete work on the groundfish management plan.

"When I learned NOAA was looking for extra help with the groundfish plan, I thought this would be a good fit; it's right in line with my interests," he said.

Mantzaris is stronger in his assessment. "Chad provided us here in the northeast regional office with a model of professionalism. He has greatly inspired us as well as others with whom he has worked."

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