NOAA REPORT

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NOAA Opposition to a Dam Helps Save Threatened Carmel River Steelhead Trout

—By Jim Milbury

At a time when humans and fish are often at odds over water use, it appears personnel from NOAA Fisheries' Santa Rosa, Calif., office have accomplished a minor "miracle." They didn't strike a rock with a staff bringing forth a spring. But they did help compel a water company to accept a plan that will bring an end to water rationing for residents on the Monterey Peninsula, while restoring water to a large section of Carmel River for steelhead trout habitat.

For more than 100 years, the municipal water supply for the Monterey Peninsula has been the Carmel River. During the past several years the local water company, California American Water Company, has withdrawn water that dried up long stretches of the river.

"Stream flow needs for steelhead in the Carmel River demonstrated that diversions needed to be reduced, and the annual de-watering of seven to eight miles of historic steelhead habitat was unacceptable," said NOAA Fisheries' William Hearn, leader of the scientific and technical support team for habitat conservation in Santa Rosa.

"Every summer, fish were rescued from the drying stream bed," explained Joyce Ambrosius, NOAA Fisheries' south coast team leader for protected resources.

This became a legal issue in 1997 when steelhead in the Carmel River were listed as threatened under the Endangered Species Act, which Congress passed in 1973 to conserve the various species of fish, wildlife and plants facing extinction.

Daniel Cheng/NOAA

The efforts of a team of NOAA habitat conservationists to find alternatives to a planned dam helped save threatened steelhead trout on California's Carmel River. Team members included (left to right) Brian Cluer, John McKeon, Joyce Ambrosius, Patrick Rutten and William Hearn.

An "endangered" species is any species that is in danger of extinction throughout all or a significant portion of its range. A "threatened" species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

"Only when we really got serious with legal action did they realize they had a serious problem on their

continued on page 6

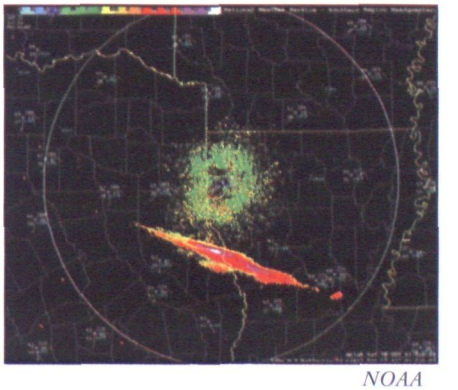
NOAA Weather Data Reflect *Columbia's* Descent

—By Ron Trumbla, Keli Tarp and Patricia Viets

As word of the *Columbia* space shuttle disaster began to spread on Feb. 1, the National Weather Service and other NOAA agencies shifted quickly into high gear, collecting a wealth of critical data that would soon be processed to support an investigation by NASA.

One of the first tasks was to archive data from WSR-88D Doppler weather radars from the Weather Service forecast offices along the path of *Columbia*. This was facilitated by an archiver program incorporated into NOAA's Advanced Weather Interactive Processing System network almost two years ago to support the agency's new weather event simulator forecaster training program.

continued on page 6



NOAA

Imagery from the Shreveport, La., NOAA weather radar at 11:43 a.m. CST Feb. 1 shows a streak of particles from the plume of the doomed space shuttle Columbia.

Recycled Paper

NOAA Coastal Services Center Employees Make Good Buddies

—By Alison Rogers

Kindergartners walk single file down the long hallway. Spelling words and construction paper projects line the walls. Laughter makes its way through open doorways from the playground. And in the library and outside, pairs of adults and children quietly read, play games or talk about what the kids are learning in school.

These adults are employees of the NOAA Coastal Services Center in Charleston, S.C., and the children are their "lunch buddies."

Approximately 20 center employees have volunteered to participate in the lunch buddy program, which pairs adults with students from a local elementary school to help them develop their academic skills. Volunteers were matched with a third, fourth or fifth grader from McNair Elementary School, a high-need school in a low-income area of North Charleston, S.C.

The students in the program are children who may need some help in reading or math, but who would especially benefit from one-on-one interaction with adults. A few times a month, volunteers from the Coastal Services Center spend their lunch breaks with their buddies—reading, working on math problems, playing games or just simply talking with them about their school work, their interests and their families.

This adult attention and interaction is, according to the school's faculty, exactly what these students need most.

"The program is a win-win situation," says fourth-grade teacher Elspeth Brewer. "One-to-one support is what they need—especially these kids—and we can't give it to them all the time. They need some positive adult role models."

David dosReis, a spatial analyst on contract at the Coastal Services Center, believes he has already affected his buddy. "At first he was very reserved, but now he's just the opposite. He wants to be heard. He's practicing his reading, and he's opening up more," dosReis said.

He and his buddy, Jason, have worked on a number of different subjects since the program started, including reading, telling time and math. They even play basketball every once in a while.

"I really enjoy giving something back to the community, especially these kids," dosReis said. "I like spending time with Jason and acting as sort of a big brother."

On a recent visit, dosReis and some other volunteers introduced their buddies to a bit of what they do at the NOAA center, showing the children a satellite image of Charleston. The children then tried to identify different areas and landmarks in the city. "It was a great activity," said Carmen Nash, a coastal management specialist on contract at the center. "My buddy, Kiera, loved it. She got excited about the landmarks that she knew, and that made her want to go further to figure out the rest," Nash said.

Shavonna James, a third-grade teacher at the school, said the program, at the very least, helps her students build positive relationships with adults. "The students are very excited about their buddies," she said. "After a session, they want to tell me or show me everything they did."

"It's really exciting to get to know your buddy and feel like you're contributing to their learning," Nash said. "As long as they're happy and excited about the program, I'm happy to be part of it."

Alison Rogers/NOAA

Lacy Johnson, program coordinator for coastal learning services at NOAA's Coastal Services Center in Charleston, S.C., reads with her buddy, Shawntel, from Ronald E. McNair Elementary School.

Frank Wells/NOAA

Eleanor Wells.

Eleanor Wells Is the Team Member of the Month

—By Glenda Tyson

When Typhoon Pongsona threatened "her tide station" on Guam this past December, Eleanor Wells, the March Team Member of the Month, called the U.S. Navy's construction Seabees battalion to the rescue.

For the past 14 years, Wells has worked as a contract tide observer at the Guam tide station, one of 175 stations on U.S. coastal waters, the Great Lakes and Pacific Islands.

Tide stations automatically measure the changing levels of tidal waters, providing data that are essential to navigation and important for many other activities on the water, such as fishing, surfing and diving.

Tide data are critical in coastal construction, such as building bridges and docks, and in determining costal boundaries.

Tide data also support NOAA's tsunami and storm surge warning programs, climate monitoring, and tectonic and coastal processes research.

Wells duties as tide observer include downloading tide data, performing frequent maintenance checks and sending the data to the National Ocean Service's Pacific regional office.

The Guam tide station sits precariously close to the water on a narrow piece of land on the U.S. Naval Base at Apra Harbor. Both sides of the land where the Guam tide station stands have been eroding away for decades.

With each typhoon, the erosion comes closer and closer to the building that houses the station, threatening the availability of the station's essential water level information. It had become apparent to Wells that the next typhoon to hit Guam would completely destroy the tide station.

The Seabees responded in December by reinforcing the riprap around the stations with dozens of truckloads of rocks.

"When the Seabees finished," Wells said, "it looked just like a fortress around the tide station."

The station building not only survived the typhoon, but all of its sensors operated continuously throughout the storm, providing valuable storm surge data from its tide gage and wind data from meteorological sensors at the station.

According to Michael O'Hargan, chief of the Field Operations Division of the National Ocean Service's Center for Operational Oceanographic Products and Services, "The actions and dedication of Ms. Wells went far beyond expectations and saved the government the nearly $100,000 that would have been required to replace the station."

In late January, large swells from a winter storm off Japan started to erode sections of the recently placed fill around the tide house. Again, Wells enlisted the Seabees to secure the tide station by filling in

continued on page 8

Carol Baldwin/NOAA

Jeanne Kouhestani.

Jeanne Kouhestani Is the Employee of the Month

—By Dane Konop

In a sense, Jeanne Kouhestani, the March Employee of the Month, created her current job as public affairs specialist for NOAA's Marine and Aviation Operations, which manages NOAA's fleet of research and survey ships and aircrafts, in Silver Spring, Md.

Following a career as an advertising copy writer and account executive, in the late 1990s Kouhestani had been working for several years in the NOAA headquarters public affairs office in the Hoover Building in Washington, D.C. Mostly, she cleared line office press releases and worked with news media clips.

She noticed that although the fleet and the NOAA Corps were an integral and wide-ranging part of NOAA operations, no one individual public affairs specialist was representing them.

"I took them on, adding them to my full-time job," Kouhestani said, "thinking, 'How bad can this be?' Boy, did I get a surprise. There was

continued on page 8

Focus On...

Bringing the Natural Wonders of the Channel Islands to Students Worldwide

—By Claire Johnson

It's 6:45 a.m. on Feb. 5. The sun is rising over California's Santa Ynez mountains, lighting the sky above Santa Barbara harbor with a brilliant combination of pink, orange, yellow and red. Although closed, the grounds of the Santa Barbara Maritime Museum are unusually crowded.

A television camera crew and a production team in a van replete with more than 70 television screens readies for a live broadcast, while a satellite truck prepares to capture the camera feed and beam the images via satellite.

In front of the museum's Waterfront Center, a small group of teachers and students outfitted in fleece pullovers and broadcast headsets reviews reports on the National Weather Service website of conditions 26 miles away at Anacapa Island, one of five islands and surrounding waters that make up Channel Islands National Park and NOAA's Channel Islands National Marine Sanctuary.

On Anacapa Island, another tv crew readies to photograph another small group of students and teachers who are there to work side-by-side with real scientists from NOAA, NASA and the National Park Service.

The students and teachers are "Argonauts" from the JASON Foundation for Education. Ocean explorer Robert Ballard founded the JASON Foundation after his 1986 discovery of the *RMS Titanic* wreck in the murky depths of the Atlantic Ocean generated 16,000 letters from school children asking to go along with him on his expeditions. The experience inspired Ballard to create the JASON Project, named after the mythical Greek explorer who sailed in search of the Golden Fleece aboard the legendary ship *Argo*.

Each year for the past 14 years, the JASON Project has invited a handful of teachers and students from around the world to be Argonauts and work directly with researchers doing real science in some of the most biologically rich ecosystems on earth. These Argonauts then share their first-hand experiences with their peers via live expedition broadcasts to other students assembled in classrooms and auditoriums around the world. The students watching the scientific demonstrations can also use a primary interactive network to ask questions in real-time and participate remotely.

This year's project, focusing on the Channel Islands National Marine Sanctuary and Channel Islands National Park, is called "JASON XIV: From Shore to Sea."

At exactly 7:00 a.m., the cameras roll as the students at the museum compare their Web weather reports of Anacapa Island with actual conditions observed by the students on the island, who have set up a mini-meteorological station.

After a few minutes, the on-camera action shifts inside the maritime museum, where Chris Mobley, manager of the Channel Islands National Marine Sanctuary, demonstrates scuba diving equipment.

Back on Anacapa Island, students don scuba gear to dive with marine sanctuary research coordinator Sarah Fangman. The camera follows them underwater as they inspect a kelp forest in Anacapa

continued on page 5

Daniel J. Splaine/JEF

A camera crew prepares to broadcast Park Ranger William Faulkner and student Argonauts as they interact with NOAA and other researchers on Anacapa Island.

continued from page 4

Island's Landing Cove Reserve, all the while communicating with the surface using broadcasting microphones in their face masks. The television audience can see and hear everything that goes on underwater.

Another set of students remains topside on the island with Sallie Smith of NASA, preparing to launch an unmanned aerial vehicle, or UAV, to fly around Anacapa Island, using its camera systems, thermal imaging and sensors to groundtruth corresponding satellite data.

Other student Argonauts on the island take water samples from near-shore waters to test for ocean color, temperature and chlorophyll.

Often throughout the broadcast, students from distant viewing sites interject real-time questions for the student Argonauts and scientists in the field.

In one hour, this first interactive broadcast of the day is complete.

From Jan. 27 to Feb. 7, JASON XIV conducted five of these one-hour live broadcasts a day from Anacapa Island and the Santa Barbara Maritime Museum, bringing the exploration and discovery of the ecologically diverse Channel Islands National Marine Sanctuary and Channel Islands National Park to over one million school children and 25,000 teachers in the United States and abroad.

NOAA, along with the Department of Education and NASA, has been a federal partner with the JASON Foundation for Education since its inception fourteen years ago. Other partners include the National Geographic Society, which aired the JASON XIV live broadcasts on the National Geographic Channel throughout the two weeks. Many corporate sponsors, such as Honeywell and Oracle, provided monetary support to ensure student and teacher Argonauts would have the opportunity to travel to the expedition sites and work directly with researchers.

Daniel J. Splaine/JEF

(Left to right) Channel Islands National Marine Sanctuary education coordinator Julie Bursek and Yvonne Menard of the National Park Service work with Sallie Smith of NASA, preparing an unmanned aerial vehicle for a flight over Anacapa Island to groundtruth satellite data using camera systems, sensors and thermal imaging.

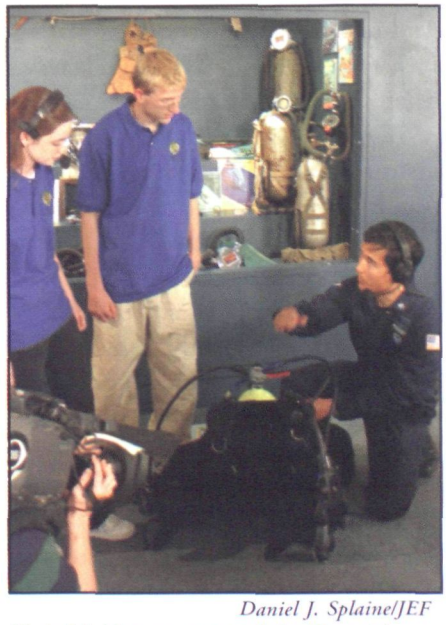
Student Argonaut Georgia Broughton said, "All learning should be like this. The hands-on approach makes science more interesting."

Teacher Argonaut Stephen Pesick from Thornwood, N.Y., said, "One of the most exciting things about being part of the JASON Project is the opportunity to work side by side with scientists on their research."

The broadcasts were the culmination of two years of planning and curriculum development and two weeks of intense set up at the Channel Islands National Marine Sanctuary.

"Students around the globe had a chance to learn about California's Channel Islands using a multi-disciplinary curriculum throughout the school year, and then they participate remotely with the live expedition. It makes the science come to life for them," said Julie Bursek, education coordinator at the marine sanctuary.

The benefits of JASON XIV didn't end with the live broadcasts. For years to come, local school children and teachers will continue to learn about the Channel Islands National Marine Sanctuary using the multi-disciplinary curriculum this year's project developed.



Daniel J. Splaine/JEF

Chris Mobley, manager of the Channel Islands National Marine Sanctuary, demonstrates scuba diving technology to student Argonauts.

Steelhead

continued from page 1

hands," said Patrick Rutten, NOAA Fisheries' northern California supervisor for protected resources.

But with a growing human population and increased water need, Cal-Am was faced with a conundrum of providing more water for both people and fish.

"Their solution to the problem of a water shortage was to build a dam at the head of the valley which was not going to have fish passage and was going to be a permanent structure for the next 100 years," Rutten said. "They were going to replace a 3,000-acre-foot dam with one that was 24,000 acre feet."

Besides severely restricting the river's flow, the dam would have also eliminated 50 percent of spawning habitat and 57 percent of rearing habitat upstream of its location.

"And there was no ability for the fish to pass over it or through it and get back down. It was such a large reservoir there wouldn't be enough downstream current strong enough for the fish to find their way upstream or downstream," said Ambrosius.

That's when the NOAA Fisheries team dug in their heels.

"Finally, we said that building a main stem dam was not a solution," said Rutten.

Under this "no new dam" policy, Cal-Am began researching other supply alternatives to solve their water woes. Ultimately, as a result of the Santa Rosa office's position, Cal-Am held a news conference in February announcing plans to build a desalination plant in addition to recharging aquifers in the area using excess winter flows to meet water needs. The water company would no longer pursue construction of a dam.

"This is a big benefit for the public," said Rutten. "They get a long-term supply project that they've been waiting years for. It's really the certainty of when you open the faucet you are going to have water. The dam in itself was still going to have to rely upon rain. So what they're going to have is certainty of water supply, drought or no drought," he said.

"On top of that, it's not just having the dam not put in place," Ambrosius said. "Right now, Cal-Am withdraws over 10,000 acre feet of water out of the river. And with the desalination plant, they're not going to withdraw 7,900 acre feet of it anymore."

The steelhead of the Carmel River have been steadily declining since the 1960's and came close to extinction with the drought of 1975-76 when the population dropped to less than 300 adult fish. Private groups like the Carmel River Steelhead Association became involved and set up a breeding program to release streelhead back into the wild.

Steelhead are ocean-going trout that migrate as juveniles to the ocean to mature. Mature steelhead typically gather in the lagoons and estuaries of rivers where they were born in late winter or early spring waiting for a surge of water that will trigger their migration upstream. Once they reach a suitable location in the stream they will spawn. Unlike salmon, steelhead don't die after spawning and may spawn several more times during their lifetimes.

After eggs hatch, juveniles will rear in the stream up to three years before undergoing a physiological change to prepare them for ocean life. These fish, referred to as smolts, will migrate out of the streams and into the ocean during winter and spring flood waters. The smolts will mature for approximately two years in the ocean and return to their streams to begin the process again.

Columbia

continued from page 1

"Working in cooperation with the AWIPS program office, we developed an archiver program designed to allow our forecast offices to quickly record severe weather events in a CD format," said Paul Kirkwood, chief of the southern region's dissemination enhancement team. "While our goal was to provide simulated real-time weather scenarios to help train our forecasters, we knew the archiving capability might provide some valuable information during other types of events, such as an airplane crash. But, we never imagined anything like this."

When *Columbia* broke apart shortly after 8 a.m. C.S.T. on Feb. 1, more than 200,000 feet above Fort Worth, Texas, Weather Service radars began picking up base reflectivity data from particles in *Columbia's* plume. The archiver program enabled the offices to immediately begin archiving the radar images and data.

Felix Navejar, science and operations officer for the weather forecast office in Lake Charles, La., was among those who stepped out to watch the shuttle fly overhead. When it failed to show, they returned to the office and noticed the radar image. "We saw a streak on the radar," Navejar said, "and our lead forecaster said, 'That doesn't look good.' We said, 'That's the shuttle, no doubt about it!' It all happened so quickly. The path just formed. We knew the shuttle had crashed and we needed to start archiving."

Mark Murphy, the lead forecaster in the Shreveport weather forecast office, saw the image as well. He recalls the shock and a brief moment of denial. "At first, you kind of hold out hope the astronauts might have found a way

continued on page 7

Columbia

continued from page 6

to survive. But coming in at that height and speed, you really know the inevitable," he said.

In response to interest from local and national news media and the public, radar images from Fort Worth, Texas, and Shreveport and Fort Polk, La., were displayed on the Weather Service's southern region website. Website hits increased dramatically after the radar images were included.

Critical radar data from these sites, as well as data from Houston, Texas, Slidell, La., Jackson, Miss., Birmingham and Mobile, Ala., and Tallahassee, Jacksonville and Melbourne, Fla., were also archived and forwarded to the southern region headquarters.

The southern region headquarters combined the radar data with information from computer models from NOAA's National Centers for Environmental Prediction, the NOAA Forecast Systems Laboratory's national profiler network and satellite imagery from NOAA's National Environmental Satellite, Data and Information Service for use by NASA investigators.

Nine of the Forecast Systems Laboratory's 35 profiling clear-air radars, located in the states of New Mexico, Texas, Oklahoma, Arkansas and Louisiana, were directly or nearly directly under the flight path of the shuttle. Because the unmanned profilers automatically acquire wind data continuously from near the ground up to 53,000 feet, the times and horizontal and vertical positions of the falling fragments of *Columbia* were captured in the data.

Vertical velocity data are measured by the profiler once every six minutes. A rather consistent pattern of downward falling objects at about 45,000 feet was apparent immediately following the time of the shuttle breakup. Many of these objects were falling with a velocity of 25 to 35 feet per second.

Satellite imagery from the National Environmental Satellite, Data, and Information Service was used to locate and investigate a possible debris field slightly north of *Columbia's* flight path. Forecasters at the NOAA Storm Prediction Center and the Johnson Space Center used imagery from the GOES-8 satellite to find grass fires that might have been initiated by debris that drifted north of the primary debris field.

NOAA technicians also searched GOES rapid scan imagery to further investigate short-lived hot spot activity in the region. In addition, NOAA's National Climatic Data Center, the official archive for all Weather Service ground radar data, processed and provided radar data from sites along the path of the shuttle tragedy.

The National Climatic Data Center received weather radar data collected from a total of 38 Air Force and Weather Service sites in the southern, central and western regions from all scans and at the highest spatial and data resolution the WSR-88D weather radar provides. Working with the Weather Service Radar Operations Center in Norman, Okla., the National Climatic Data Center made these data available to users via a new World Wide Web site.

A team representing the Weather Service's Spaceflight Meteorology Group, NOAA's National Severe Storms Laboratory, the Air Force's 45th Weather Squadron and the Radar Operations Center convened in Norman to analyze and enhance the radar data to conduct a forensic analysis of the shuttle breakup. The team ran the data through the National Severe Storms Laboratory's experimental warning decision support system to analyze and reconstruct the trajectories of shuttle debris.

"The radar data showed the trajectories of the debris as it fell," said Tim Crum, who serves as the focal point for WSR-88D issues for the Radar Operations Center. "Data from the west of Fort Worth were used to locate potential debris from the shuttle before the breakup. Data to the east were used to examine debris elements," he said.

Located in the Johnson Space Center in Houston, the Spaceflight Meteorology Group is currently supporting a number of the NASA working groups which report to the agency's mishap response team. A key element in this effort is the global analysis of atmospheric data from the surface to 250,000 feet, provided to the Spaceflight Meteorology Group by the NASA Goddard Space Flight Center Data Assimilation Office. The Spaceflight Meteorology Group is also using the NOAA National Center for Environmental Prediction's global data analysis system to provide additional information for reconstructing the atmosphere the shuttle encountered, including lightning data from the National Lightning Data Network. The mishap response team will report the findings to an independent accident investigation board.

"I know I speak for all our family in NOAA and the National Weather Service in expressing the shock and sorrow we feel for the loss of space shuttle *Columbia* and its seven courageous crew members," said William Proenza, director of the Weather Service's southern region. "We have suffered a great loss, but the professionalism of our employees who sprang into action to assist during this emergency reflects on their commitment to national service and inter-agency cooperation."

Kouhestani

continued from page 3

tons of stuff that could be done. So I started devoting more and more of my time to doing their work. And it was a lot of fun."

Then for a time, the Clinton Administration proposed "dis-establishing" the NOAA Corps as a cost-saving measure. Part of the problem, as Kouhestani saw it, was the lack of recognition within the Commerce Department of the contributions the Corps and fleet made to NOAA's and the department's mission and to the public good.

Kouhestani set out to help change that, frequently writing stories about the NOAA Corps and fleet for *Commerce People*, the department's monthly newsletter, and other publications.

The more she learned about the organization, the more work she saw to be done.

Ships and aircraft often operated in conspicuous view, generating public interest and news media attention. But the officers and civilian members of the organization, including the leadership, had no one to advise them on how to interact with the media.

"I thought they needed full-time support," Kouhestani said, "so I approached Adm. Fields and asked if she would be interested in that. And she was." Since there was no FTE in the headquarters public affairs office, Marine and Aviation Operations created a slot, and Kouhestani moved into it.

As appreciation for the role of the NOAA Corps grew and its Congressional and departmental support solidified, the idea of dis-establishment was dropped.

Kouhestani shifted her attention to establishing a full-blown public affairs program for the fleet and Corps—setting up media training for ship and aircraft commanders, writing and polishing important speeches, fielding news media calls, arranging press conferences and other special events, and advising Marine and Aviation Operations employees and leadership on media relations.

"It didn't take long for Jeanne to establish herself both with our folks here at headquarters and in the field. The ship and aircraft commanding officers also view her as the expert. They call her anytime they have a question about [the news media]," said Bobby Taylor deputy director of Marine and Aviation Operations.

"We all consider Jeanne to be the expert in her field," he said. "Every day she counsels us, guides us."

Like any good headquarters staff person, she helps make it easier for the leadership and personnel in the field to do their jobs, Taylor said.

"Jeanne is a pleasure to work with," he said. "She's always got a very positive attitude [and a] smile on her face. She boosts up the office. She is a a very trusted and valued employee."

An appreciation for her contribution to the mission of NOAA's Marine and Aviation Operations is one of her motivators.

"I think one of the reasons a person is successful in a job is the support he or she receives from the people in the office. And that's one of the reasons I've really loved my job because I've gotten a great deal of support, from the top down, at every level," Kouhestani said. "I'm really lucky to have this job."

Wells

continued from page 3

the holes in the "fortress." Once more, the tide station survived and continued to operate through the storm.

Except for four years when she lived in Omaha, Neb., Wells has lived on Guam since 1975. Her husband, Frank, works for the National Weather Service on Guam.

"My husband retired from the military in 1985, and we went to California where we commissioned our new sailboat and sailed it from Santa Barbara to Guam. We then moved aboard our houseboat, which we lived on from 1985 to 2002. I started work for NOAA as a tide observer in 1988. This was very handy because it is just a short distance from our houseboat," Wells said.

"Having grown up in New Bedford, Mass.," she said, "I have always had a love for the ocean and had my first sailboat at age ten. My husband and I both enjoy this tropical climate, except for the typhoons, and are fond of water sports—swimming, snorkling, sailing and fishing."

Wells attended Boston College and received undergraduate degrees from the University of Nebraska and the University of Guam, where she also did graduate studies at the university's marine laboratory.

"I feel it is a great honor and I am humbled and grateful for being selected [the Team Member of the Month]," Wells said. "The best thing about my job is that I am performing a productive service. It is very fulfilling."

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