

Early Warnings Save Lives During Rare November Tornado Outbreak

—By Keli Tarp

The deadliest tornado outbreak in three years claimed 35 lives and caused extensive property damage Nov. 10-11, but emergency management officials said timely warnings saved more lives than were lost.

A total of 92 tornadoes were reported in 12 states, according to NOAA's National Weather Service.

Most of the deaths occurred in Tennessee, where 17 people were killed. Eleven people died in Alabama, five in Ohio and one each in Pennsylvania and Mississippi. A total of 21 people—more than half of those killed—died in mobile homes. Early reports indicated approximately 200 people sustained injuries.

Tornadoes were also reported in Arkansas, Florida, Georgia, Illinois, Indiana, Louisiana and South Carolina.

However, it was clear the loss of life could have been much greater. Throughout the devastated communities, officials commended Weather Service forecasters for early watches and warnings.

Monitoring the developing storm system, the NOAA Storm Prediction Center in Norman, Okla., alerted officials, the media and public to the high risk of severe weather. The forecasters went on to issue 14 tornado watches and *continued on page 6*

Stitches Help Heal Hearts, Preserve Memories, Honor September 11 Heroes

—By Marilu Trainor

A beautiful, hand-crafted quilt sewn by two NOAA employees and other volunteers from around the nation to honor victims of the World Trade Center disaster was presented to victims' families and officials of the Port Authority of New York and New Jersey Police Department Nov. 15.

The quilt pays tribute to 38 officers who were killed in the line of duty on Sept. 11, 2001, during the attack on the center.

The two NOAA employees, based at the National Weather Service's western region headquarters in Salt Lake City, Utah, were among a group of 400 volunteer

quilters who sewed seven quilts to honor the victims of the disaster.

Under the auspices of a group known as "America's 9-11 Memorial Quilts," the volunteers began work more than a year ago to preserve the memories of the more than 3,000 victims and bring healing to the hearts of the victims' families.

Andrea Bair, the Weather Service's western region climate program manager, was the team leader for the port authority quilt. She traveled to New York to present the quilt to the families and the port authority police *continued on page 7*



New York PAPD

NOAA employee Andrea Bair presents a plaque and memorial quilt to representatives of the Port Authority of New York and New Jersey Police Department to honor port authority officers who lost their lives during the Sept. 11 attack on the World Trade Center.

Observing Deepwater Rockfishes off Southern California

—By Lisa Wooninck

The red-and-white-striped flag rockfish stands its ground, finding scant shelter among a bed of waving brittlestar arms as the 15-foot *Delta* submersible gently glides past.

Small red fish scatter behind fields of vase-shaped sponges, while a few solitary fish make failed attempts at hiding their large bodies by sticking their heads in small crevices of the rocky outcrop.

Pilot Chris Ijames guides the sub across the rocky sea floor at 400-foot depth, while I scrunch into a space the size of a steamer trunk.

This is my first dive, and the marine world at these depths is more amazing and diverse than I could have possibly imagined. When I glance through the upper porthole, I am awed by the dark shapes of schooling fish backlit by the down-welling surface light.

The lower porthole grabs my attention with an up-close view of tiny pink anemones and long spidery-armed crabs—so many creatures waving and pulsing their life force in so many directions. I can almost feel all the fish identification knowledge that I had been cramming into my brain the night before seep out of my ears from sheer sensory overload. Quickly, with my face plastered against the center porthole, I attempt to identify the fishes within six feet of the submersible's path, just as the expert rockfish biologists had done in dives before mine.

I use the lingo of rockfish biologists when rattling off the name, number and size of fish and invertebrates into a microphone linked to a digital camera. "About 50 pygmy and square spot rockfishes, five centimeters long. One flag amongst brittlestars, 10 centimeters long." My voice rises with excitement, "Oh, great! One

cowcod, 60 centimeters long."

Imagine looking out a tiny window on a busy intersection recording for 15-minute periods the model, number and year of cars that drive by your limited view. That is the challenge of counting fish from a manned submersible.

After only 50 minutes of skimming the sea floor, Ijames tells me it is time to surface.

"Already?" I plead. Everyone had told me that I would not want to return. I had not been convinced of this prior to the dive, being preoccupied with fears of becoming seasick or claustrophobic. My colleagues were right though. Once you leave the ocean's surface and begin the descent, thoughts of potential maladies are replaced by a delight in the ever-changing view of surrounding marine life.

I reluctantly bid farewell to the rockfish paradise. Ijames turns the lights off and we are enveloped in darkness that turns from deep blue to turquoise as we rise to the

surface.

At the surface to greet me are Mary Yoklavich and Milton Love, long-time research collaborators from the NOAA Fisheries lab in Santa Cruz and the University of California in Santa Barbara. They are the principal investigators of a recently completed research cruise in the Cowcod Conservation Areas. The 1,660-square-mile refuge, off the coast of southern California, was created in 2001 in response to intense overfishing of the economically important cowcod rockfish.

"There is a huge data gap in our understanding of how marine refuges function," said Love. "Counting fishes and assessing the habitat both inside and outside the conservation area will give us a baseline from which to compare in the future. Without initial baseline data and follow-up monitoring it will be impossible to determine what, if any, changes occur in the fish populations within and outside the refuge." ☺



Mary Nishimoto/UCSB

A view through the submersible Delta's porthole reveals a vermilion rockfish on rocks encrusted with colorful algae.



Lt. Cdr. Chris Beaverson/NOAA

Andrew Shepherd.

Andrew Shepherd Is the December Employee of the Month

—By Jana Goldman

When Andrew Shepherd was finishing up his studies at the University of Colorado, he thought it would be a fine idea to go to Alaska and build a log cabin.

He got as far as Seattle, Wash., and decided to stay there for the next 30 years.

"Seattle was halfway there," Shepherd said with the logic that one would expect from a person who deals with precise measurements.

Shepherd, a supervisory operations specialist with NOAA's Pacific Marine Environmental Laboratory, is the NOAA Employee of the Month.

"The award was a surprise," he said. "I received the notice and thought it was for the other Andy Shepherd at the University of North Carolina-Wilmington. We often get each other's e-mails. I just assumed it was a mistake."

Shepherd was nominated for his

nearly two decades of work with the TAO Project, which is responsible for the maintenance of an array of moored buoys in the equatorial Pacific that provides early warnings of an El Niño.

This is not a task to be taken lightly. There are 70 buoys in the array, with 58 of them the responsibility of the United States.

Called ATLAS buoys, for autonomous temperature line acquisition system, they were initiated by the lab's Engineering Development Division in 1984 as an inexpensive way to learn about the climate patterns of the equatorial Pacific.

Standard ATLAS moorings measure surface winds, air temperature, relative humidity, sea surface temperature and 10 subsurface temperatures from an approximately 1,500-foot-long thermistor cable. Daily-mean data are transmitted to shore in near real time via NOAA's polar-orbiting satellites.

After testing and deploying prototypes, the lab began monitoring a large-scale TAO array in November 1984. The full array was completed a decade later.

"Once the array started, technology changed," said Shepherd, who was nominated by Pacific Marine Environmental Laboratory director Eddie Bernard for his "exceptional contributions to the TAO project in managing the recent transition."

The lab started a re-engineering effort in the mid-90s to modernize the just-completed array. The upgrades included improving data quality, adding new sensors, increasing temporal resolution of internally recorded data, improving reliability to extend system life, simplifying fabrication procedures—and doing it all less expensively.

Shepherd was instrumental in identifying the problems with the old moorings and working with the *continued on page 8*



Carol Baldwin/NOAA

Raymond Mitchell.

Raymond Mitchell Is the December Team Member of the Month

—By Jeanne Kouhestani

Anyone who has experienced computer problems can appreciate how important it is to have good technical support so important projects can be completed on time, e-mail can be read and responded to and life can go on.

The Silver Spring, Md., staff of NOAA's Marine and Aviation Operations has counted its blessings since Raymond Mitchell, the December Team Member of the Month, joined its information technology team four years ago.

Mitchell is a contract employee who works for RS Information Systems. Since May 1998 he has provided top-notch service to Marine and Aviation Operations headquarters and Commissioned Personnel Center, and about a year ago began supporting the staff of the newly created Fisheries Survey Vessel Acquisition Program as well. *continued on page 8*

Focus On...

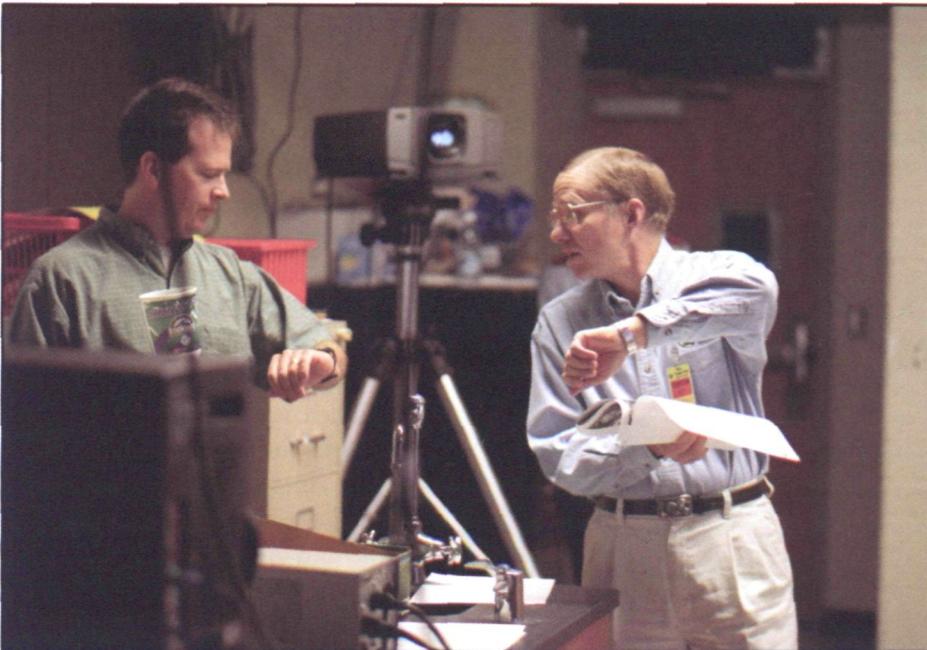
Science on a Sphere

—By Barbara McGehan



Wilfred Von Dauster/NOAA

David Himes (on ladder), senior software engineer for Science on a Sphere, attaches a suspension cable from the sphere to the ceiling girder in the science lab of Broomfield Heights (Colo.) Middle School.



Wilfred Von Dauster/NOAA

David Himes (left) and Russ Chadwick, senior engineer from NOAA's Forecast Systems Laboratory, synchronize watches before Chadwick presents a lesson to Broomfield Heights middle schoolers on Science on a Sphere.

As with all great projects, Science on a Sphere started with a question. "Why can't NOAA present its science more effectively?"

The question led to experiments on the deck of Sandy MacDonald's house in Boulder, Colo., projecting images onto a beach ball.

MacDonald, the director of NOAA's Forecast Systems Laboratory, is known as an innovative thinker, but even he didn't fully anticipate the results.

"I knew that putting NOAA climate, weather, geophysical and ocean data on a sphere would be a spectacular tool for explaining NOAA's science to a vast audience," MacDonald said. "It was just a question of working out the logistics," which MacDonald and his team began doing in the summer of 2001.

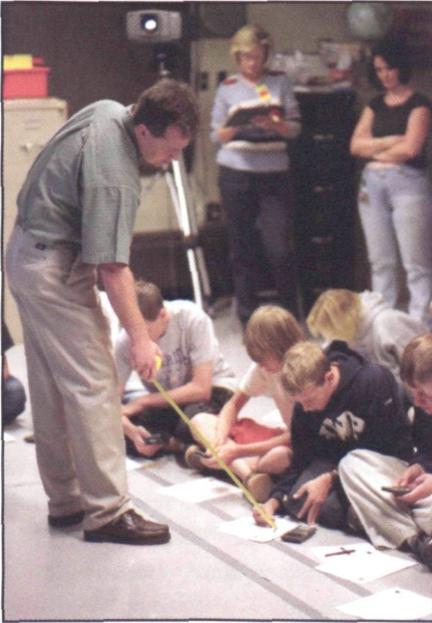
By the summer of 2002, Science on a Sphere was ready to use as a teaching tool, using images from environmental satellites, output from computer models of the atmosphere and data on land-surface and ocean-bottom topography projected onto the 200-pound, five-foot-diameter, white fiberglass sphere.

Beverly Meier, an eighth-grade teacher at Broomfield Heights Middle School in Broomfield, Colo., who has worked at the Forecast Systems Laboratory during summers, began work on some lesson plans that would be appropriate for middle school students.

The sphere was then transported to Broomfield Heights Middle School to see if students would be as captivated with it as were the adults who had seen it.

Meier arranged for over 500 students to view the sphere and participate in the lessons she developed. Fourteen scientific and technical staff from the Forecast System Lab and two representatives

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Wilfred Von Dauster/NOAA

David Himes helps a student calculate the distance between a geostationary satellite and the Earth using the Science on a Sphere as a model.

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of NOAA's Oceanic and Atmospheric Research outreach program conducted the lessons at the middle school using the sphere suspended from the science lab's ceiling struts, four projectors positioned at 90-degree spacing around the sphere, and a customized software package to correctly position the images on the sphere.

The students were brought into the darkened science lab in groups of 20 to 30.

The images projected onto the sphere allowed the students to imagine gazing upon Earth as if they were suspended in orbit 22,000 miles above the planet's surface. As the students watched, infrared satellite imagery was projected onto the movie screen-like surface of the sphere to show Earth's dynamic atmosphere.

The students could watch a hurricane form, slowly gather strength and travel westward from Africa across the Atlantic Ocean. They could see the colorful infrared images of cloud tops meet, join,

grow, collapse and disperse. The prevailing westerly winds and the easterly trade winds materialized before their eyes.

The students were wide-eyed and enthusiastic about the displays. As they looked at the sphere through 3-D glasses, the Earth's topography and bathymetry emerged and they saw enormous ridges, canyons and crustal plates beneath the oceans.

Students walked clockwise around the sphere to observe Earth by night and day. They were handed flat maps and asked, "How are the globe and map similar and different? How does Antarctica appear different on the map compared to the globe?" The questions and answers went on and on.

The sphere turned out to be a hit with teachers too.

Teacher Neida Gross said, "Science On a Sphere is an awesome learning tool. Being able to look at a large, three-dimensional Earth with real satellite images projected on it is almost as good as

going out into space to view and study the Earth."

The students also looked at infrared satellite images and discussed temperature.

One of the most popular activities was dividing up each group of students into teams, then giving students from each team a laser pointer to see who could locate an area on the globe first. Each student had a turn and had to look at the nighttime lights on the Earth to determine the correct location of various cities, countries and other cultural and physical features.

Eighth grader Tom Romaine said, "Science On a Sphere intrigued me and made me wonder about our Earth and the ways in which we can make our planet a better place to live."

Robert Croft, a sixth grade teacher at Broomfield Heights Middle School, said, "It is wonderful to know that there are still people out there who are willing to invest their time and effort in our youth." ☺



Wilfred Von Dauster/NOAA

An infrared image from seven satellites above Earth is projected onto Science on a Sphere to observe weather patterns, while Beverly Meier, the teacher who developed the NOAA Science on a Sphere lesson plans, instructs her students.

Early Warnings

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a severe thunderstorm watch.

More than two dozen Weather Service forecast offices issued dozens of tornado warnings, giving valuable advance notice to the public of the devastation sweeping across the South, Midwest and Ohio River Valley.

Following a tornado warning, an alert theater manager in Van Wert, Ohio, and his staff got more than 50 adults and children out of theaters in the multiplex and into safer conditions in a hallway and restrooms. Minutes later a tornado tore off the building's roof and tossed cars into the screen and front seats where children and parents had been watching "The Santa Clause 2." While surveying the ruined theater, Lt. Gov. Maureen O'Connor said, "There is no doubt in my mind that he saved many lives."

The National Weather Service's StormReady program helped Van Wert County be prepared for disaster. To earn a StormReady designation, county officials placed a series of warning alert systems in public locations, including the movie theater.

"This story illustrates a great success for the National Weather Service, NOAA Weather Radio and StormReady programs," said Stephan Kuhl, NOAA's national warning coordination meteorologist program manager.

"It also illustrates the importance of establishing a close working relationship between our local NWS offices, our emergency management partners and ultimately the communities that we serve."

The theater office was equipped with a Federal Signal Corporation local warning alert system called the "Informer." The Informer is activated via a digitally encoded

pager signal that automatically turns the unit on and sounds an alert. The theater's unit was tied directly into the Van Wert County siren system and activated immediately once the Van Wert County emergency operations center sounded the warning sirens. The unit then remained open for live broadcasts by the emergency manager.

The Van Wert County emergency operations center received the NOAA tornado warning via a NOAA Weather Radio receiver tuned to the Fort Wayne, Ind., weather radio transmitter frequency. Van Wert County emergency manager Rick McCoy received the warning and immediately activated the city of Van Wert siren warning system. McCoy also broadcast the Weather Service tornado warning and action statement live over the Informer.

Seventy of the alert units and a number of NOAA Weather Radio receivers were purchased with grant money by the Van Wert County emergency management office as one of the requirements to become

StormReady. Van Wert County was designated StormReady by the NOAA weather forecast office in northern Indiana this past Jan. 10.

"If we hadn't gone through the StormReady process and gotten our warning system in place before this storm, a lot of people would not have gotten the warning, and we could have lost many more lives," McCoy said.

"All communities across the country need to look at becoming StormReady, because at some point they're going to have severe weather of some kind. People shouldn't say 'it can't happen here,' because it can," he said.

The tornado touched down in Van Wert County with 13 minutes lead time. The tornado struck the movie theater 28 minutes after the warning was issued.

In Alabama, local emergency managers praised the Weather Service staff in Birmingham for the advance warning lead times.

Fayette County emergency management director Theresa Willcutt said, "The information *continued on page 7*



Ron Trumbula/NOAA

Residents reported they had ample warning of a powerful F3 tornado that damaged a women's university and numerous businesses Nov. 19 in Columbus, Miss., before moving through a residential neighborhood.

Sept. 11 Quilt

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department at the former World Trade Center site. The quilt includes fabric patches Bair made with photographs of all 38 fallen officers and the port authority's K-9 dog.

Bair said, "Working on the quilt has been such a personal privilege. We began work by designing our layout within one month of the tragedy. Sewing began in February 2002 and involved hundreds of hours of work by quilters from five states. More than 150 different fabrics were used to create the patchwork, [which] was designed in the traditional style known as the 'courthouse log cabin' style."

The quilt is adorned with mementos of the port authority police department, including badges, buttons from police uniforms and the department slogan, "Pride, Service, Distinction." The quilt also includes an appliquéd rendering of the New York skyline, in which each building is made from a separate piece of fabric, plus two hand-stitched poems. Photos of the fallen officers are mounted on a red field and are surrounded by contrasting blue and red fabric strips with hand-embroidered names and ranks of all the officers.

The centerpiece of the quilt, a port authority police shield, was cross-stitched by Karen St. Clair, the Weather Service's western region budget officer. It took her three months to create the large shield and another two months to make a similar depiction of the Statue of Liberty. St. Clair recruited her mother, Joan Foltz, also of Salt Lake City, to create an embroidered American flag.

"Working on the symbol gave me a special connection to the families and their sacrifices," St. Clair said. "I hope that the love

and affection that is displayed in the quilt gives the families a sense of the appreciation that is felt by all of us."

On accepting the quilt, port authority police superintendent Charles D. DeRienzoin said, "This is an extraordinary gift that comes from the heart and soul of America. On behalf of our police force and the families of our heroic brothers and sisters who made the ultimate sacrifice to save lives on Sept. 11, I would like to express our profound gratitude."

Bair said the port authority plans to display the quilt publicly at its headquarters in Jersey City.

She said another gigantic quilt, known as the "Victims' Quilt," will feature photos of every known victim of the terror attacks. That quilt will measure 10 feet by 60 feet and will contain all 3,000+ faces and names. The quilters hope it will be preserved and displayed for the families at the proposed World Trade Center memorial park in New York City or an appropriate museum to permanently safeguard the memory of all who perished in New York, Washington and Pennsylvania.

Weather Service western region director Vickie Nadolski added, "Andrea and Karen have dedicated their hearts to this project. They created a fabric of love that will become part of American history. They chose to memorialize those workers who perished for knowing what they had to do to protect others."

Following the dedication Bair said, "After visiting Ground Zero and meeting several of the families, I knew every hour I spent working on the quilt was more than worth it. I was truly overwhelmed and touched by their reaction to seeing the quilt for the first time. I was speechless when three of the families gave me special pins that they had made in honor of their

loved one. To say the least, the event was very emotional for me, and for the families who were present at the dedication." ☺

Early Warnings

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you provided beforehand and as the storms were occurring was superb. We always knew exactly what was happening."

Walker County emergency management director Johnny Burnette concurred. "The flow of information was more than anyone could ever hope to have in a situation like last night [Nov. 10]."

Ken Graham, NOAA meteorologist in charge at the Birmingham forecast office, surveyed the tornado damage from a helicopter. He was impressed with how well the entire warning process worked. "We monitored the radar images and got the warnings out early. The media did a terrific job of relaying the information to the public. The emergency management people were providing critical information and, most important, the citizens heeded the warnings and took appropriate actions," Graham said.

"It just all came together the way it's supposed to," Graham added. "Despite the 11 fatalities in Alabama, a lot of lives were saved by the watch and warning process."

While a tornado outbreak of this size is unusual any time of the year, it is especially rare in November. The last major November outbreak was in 1992.

This outbreak is the biggest to occur during what had previously been a quiet year for tornadoes. In fact, the total tornado count for the year had been as low as 50 percent of average. Through October, 670 tornadoes had been reported during 2002, according to the Storm Prediction Center. The three-year average for tornadoes during that same time is 1,068. ☺

Shepherd

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lab's engineering development division to solve them.

"Andy managed this transition, including development of new calibration procedures, production of new sensors and design and construction of a new sensor test facility, with no increase in budget or personnel," Bernard wrote in his nomination.

"Although funds for running the TAO array have been essentially flat since 1996, through efforts like Andy's, the TAO project continues to sustain a high level of efficiency in the delivery of high-quality oceanographic and surface meteorological data to NOAA forecasting centers, NOAA researchers and to the scientific community," Bernard wrote.

Depending on sea conditions, the 12-foot aluminum TAO tower, secured atop an orange and white doughnut-shaped buoy, can be seen by radar from four to eight miles away.

Pieces of the buoys are loaded onto ships and assembled aboard the moving vessel at sea. The ease of deploying or installing these systems depends on sea conditions.

With each buoy having a lifetime of a year, it's steady work for *Ka'imimoana* (ocean seeker), the NOAA ship dedicated to the service of the array in the Pacific.

"In a research environment, few things are purchased off the shelf," Shepherd said. "The people who work at PMEL are creative and flexible."

In addition to the moorings, Shepherd also supervises the checkout and preparation for deployment of about 900 temperature and conductivity sensor modules and the calibration of 114 air temperature sensors, 185 relative humidity sensors, 200 wind sensors, 105 rain gauges and

1,146 module temperature calibrations.

Shepherd has spent his entire career at NOAA's Pacific Marine Environmental Laboratory. "You couldn't ask for a better job," he said. "It's a complex challenge that changes daily."

As for that cabin in the wilds of Alaska, well, Shepherd visited the forty-ninth state a while back. "It's too cold," he said. ☺

Mitchell

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"More than once I've received feedback from the people that Ray has helped, and I'm always pleased to hear this well-deserved recognition for him," said Greg Bass, who oversees Mitchell's work.

"Ray is a real people person who never keeps a customer waiting. He has resolved many issues for Marine and Aviation Operations management and staff, often in hours or days instead of the weeks sometimes taken by others. His trademarks are prompt response, attention to detail, insight to the inner workings of IT systems, providing solutions quickly and in general keeping the users satisfied—all with a smile," Bass said.

Mitchell came to NOAA with excellent credentials. After retiring from the Navy, he worked for the State Department and White House from 1995 to 1997.

When he began working for NOAA Marine and Aviation Operations, he was responsible for arranging for the migration of the mail system to Netscape.

Mitchell now manages the network and provides software and hardware installation with upgrades and configurations. He works closely with the NOAA Network Operations Center and coordinates information with other NOAA offices. He also administers a personnel document imaging

system and an Oracle database.

His many achievements include migrating the Marine and Aviation Operations headquarters and NOAA Corps Commissioned Personnel Center offices from Banyan to Windows, migrating e-mail from BeyondMail to the NOAA Enterprise Messaging System and keeping the office running smoothly from an information technology perspective.

"Ray single-handedly got all 45 users off the Banyan network one at a time. We were pleased it did not interrupt anyone's work, because a shift like this would usually bring the system down for half a day or more," Bass said. "He was able to do this because of his planning capabilities and resourcefulness, and because he took the time to research solutions to problems and was able to respond to surprises when the system didn't work the way it was supposed to."

Mitchell can be recognized by his "can do" attitude and cheerful willingness to serve. His motto is, "If I do not have the solution to a problem, I do know how to get it." And he does, consistently.

Mitchell's friendly smile and genuine approach go a long way in dealing with his customers and truly make him an asset to NOAA Marine and Aviation Operations. ☺

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