

## Researchers Search the Great Plains for the Origin of Severe Storms in Clear Air

—By Keli Tarp

On a sunny, storm free afternoon in late-May, research meteorologists Conrad Ziegler from NOAA's National Severe Storms Laboratory and Erik Rasmussen from the University of Oklahoma rode in a van across the Oklahoma panhandle, watching weather images on laptop computer screens while talking on a radio to researchers underway in other vehicles.

As they rolled across the plains, the storm scientists viewed their weather observations in real time using a new network of mobile,

wireless, digital radio modems called Free Wave, supported by a NOAA High Performance Computing and Communications grant.

From mid-May through late June, Ziegler, Rasmussen and more than 100 other scientists and technicians from around the world are scattering across the rural countryside of Oklahoma, Kansas and Texas aiming radars and other sensors at the sky well before the day's first raindrops. The project, called the International H20 Project or IHOP for short, is one of the largest weather-related studies *continued on page 6*

## Weather Event Simulator Helps Forecasters Train for the Worst

—By Andrew Freedman

NOAA forecasters no longer have to wait for severe weather to hone their forecasting skills.

Weather event simulators, similar in concept to flight simulators, are now in place at each of the 122 National Weather Service forecast offices and 13 river forecast centers around the country. The simulators allow forecasters to re-create weather events in real time to be better prepared when severe weather strikes.

The simulators are already proving their worth.

When severe thunderstorms brought the first tornadoes in four years to western New York on April 28, forecasters recognized radar signatures they had seen in a simulation of an Alabama tornado outbreak. They issued warnings sooner than they would have without the aid of the simulator training.

Darin Figskey, meteorologist-in-charge of the Buffalo, N.Y., forecast office, said the simulation had taken place a week prior to the outbreak of severe weather.

"In the simulation we were looking at storms that occurred in an outbreak in Alabama a few years ago," Figskey said. "On April 28, the science and operations officer who was working the radar pointed *continued on page 7*

## Employees, Public Receive NOAA Awards



Juan Tricoche/DOC

Nearly 150 NOAA employees and others who received awards in the NOAA Auditorium in Silver Spring, Md., May 10, await the start of the awards ceremony. Awards given included the NOAA Administrator's Award, the Diversity SPECTRUM Award, the Best Practices Award, the Technology Transfer Award, NOAA Employee/Team Member of the Month Awards, Environmental Hero Awards and the Administrator's Special Recognition Award.

# Meteorologists Learn to Produce Graphical Weather Forecasts "By the Numbers"

—By Barbara McGehan

Forecasters from over 60 National Weather Service offices, including from Alaska and Guam, poured into a classroom at NOAA's David Skaggs Research Center in Boulder, Colo., in early May, anxious to learn more about a suite of revolutionary new forecast tools that will fundamentally change the way they make forecasts.

Developed at NOAA's Forecast Systems Laboratory in Boulder, the graphical forecast editing suite asks forecasters to think outside the box in a big way.

When making a forecast, meteorologists look at ground observations, satellite images, radar images and model data, then mentally put together a forecast.

"Currently, forecasters describe the forecast in terms of words.

They spend a lot of time typing the various types of forecasts and updating them," said research meteorologist Tom LeFebvre. "Partly cloudy, chance of rain, high in the 50's. But in this new, digital era, they will describe the forecast in terms of numbers."

According to LeFebvre, "With

the new system, they sit down at the computer, take the model guidance, run it through an algorithm that will calculate the various meteorological parameters, and then add their individual knowledge of the terrain and the local forecast situation into the mix and make a graphical forecast."

Thus, the graphical forecast editing suite permits the forecaster to insert his specialized knowledge of weather conditions in his area into the forecast and to draw or edit the image on the computer. This graphical forecast can then be displayed as both a text forecast and a graphic.

"This permits the forecaster to put much more detail in his forecast than was ever possible before," LeFebvre said.

Mark Mathewson, chief of the Enhanced Forecaster Tools Branch in the Modernization Division at the Forecast Systems Lab, says the graphical forecast editing suite is part of a larger project, the Interactive Forecast Preparation System.

"The IFPS method of forecasting has great benefits for the fore-

caster," Mathewson said. "The process is the same, but as the mental composite of the forecast is jelling, the meteorologist enters this mental picture into the computer in digital form. For example, temperature values can be 'painted,' with each temperature range represented by a different color on a geographical map. Since the forecast is in digital form, the generation of forecast products is automated and can be of virtually any format and resolution."

Mathewson said this permits the forecaster to spend more time doing meteorology instead of typing.

According to Mathewson, all 120 Weather Service offices have some version of the software. About 30 offices are using it on a regular basis to produce new gridded forecast products.

"By summer, every office will have the latest software. And by September of 2003, every office will be producing these grids," he said.

"It's a bigger paradigm shift than switching from typewriters to computers," LeFebvre said. "It's more like taking a novelist who's used to expressing his ideas in words and making him an artist and saying 'I'm taking away your computer now, and I'm giving you some paint and brushes and I want you to draw your ideas.' For some of the forecasters, it's an easy transition, but others find it much more difficult."

For Lynn Maximuk, the meteorologist-in-charge in Pleasant Hill, Mo., the transition has been a positive experience.

"Our forecasters actually like it," he said. "The biggest advantage is it allows the forecasters to convey more of the information to the customers than they did in the past. I think the level of accuracy is about the same, but we can provide more detail." ☺



Wilfred VonDauster/NOAA

Forecasters from over 60 National Weather Service offices are introduced to a suite of revolutionary new forecast tools that will fundamentally change the way they make forecasts.



Dane Konop/NOAA

Leila J. Afzal.

## Leila J. Afzal Is Employee of the Month for June

—By Dane Konop

Leila J. Afzal, the managing attorney in the NOAA Office of General Counsel and the June Employee of the Month, epitomizes the dedicated American civil servant, having spent all of her professional career with the federal government.

But her road to Washington, D.C., was longer than most.

Although born in the United States to an American mother, Afzal grew up in Iran, where her father was the dean of the college of education at Tehran University.

“We came to the United States in the 1970s. My family went back and forth until 1978, when we stayed here permanently,” she said. After the Shah of Iran was overthrown, “we did not return.”

After graduating from high school in the Hudson Valley of New York, Afzal earned a bachelor’s degree in international relations from Brown University, then spent a year as a research assistant in the

Nuclear Non-Proliferation Office at the State Department before deciding to go to law school.

“I had this exaggerated notion of justice and thought that the law would be the best way to pursue it,” she said.

She received her law degree from Rutgers University, then joined NOAA in 1984 as a staff attorney.

In 1987, she left NOAA for another Commerce Department job with the International Trade Administration. After three years at ITA, Afzal said, “I got a phone call (from NOAA) and was asked to come back. I did financial litigation, commercial and admiralty law. I was thrilled to come back.”

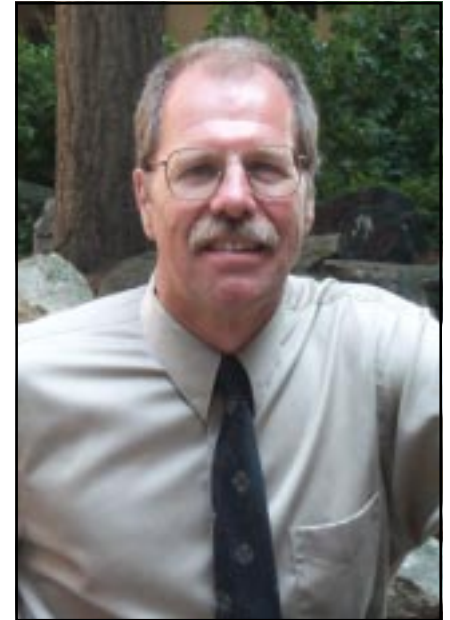
As managing attorney for the past three and a half years, Afzal has been responsible for coordinating legal issues and the administrative functions of the Office of General Counsel, whose 129 employees provides legal guidance to NOAA programs and the NOAA leadership.

As dedicated to her job as she is, Afzal said the most important thing in her life is her family, especially her husband, Malcolm Byrne, and ten-year-old son, Kian.

In an office in which 50-hour work weeks are not unusual, she credits her supervisor, Deputy General Counsel Craig O’Connor, with enabling her to juggle the demands of work and family.

“This has been the most incredibly family-oriented place,” she said. “I have been allowed to dedicate myself to my family as well as my work. I’m allowed to telecommute if I need to. I can take work home. If I have to leave (work) at a very specific time because I have to pick up my son, nobody blinks and I’m allowed to complete the rest of my work on my own time from home. And it’s fine. Everybody is very understanding of that. For a woman, and a

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Jeff Key/NOAA

Anthony J. Schreiner.

## Anthony J. Schreiner Is Team Member of the Month for June

—By Patricia Viets

Anthony J. Schreiner has been named NOAA Team Member of the Month for June. Schreiner is an associate researcher at the NOAA Cooperative Institute for Meteorological Satellite Studies in Madison, Wisc., part of the University of Wisconsin-Madison Space Science and Engineering Center.

Schreiner has been with the institute for the past 24 years. Throughout his career he has made significant contributions to NOAA’s National Environmental Satellite, Data and Information Service’s mission through the development and generation of cloud products derived from NOAA’s Geostationary Operational Environmental Satellites.

“It is an honor and privilege to be nominated by my NOAA NESDIS peers, here at the advanced satellite products team,” Schreiner said. “In my opinion there is not a better group of

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## Focus

## On...

Exploring the  
Davidson Seamount

Kelly Newton/NOAA

The remotely operated submersible *Tiburon* is launched through its mother ship's moon pool to start its one-hour journey to the top of the Davidson Seamount.



Kelly Newton/NOAA

Monterey Bay National Marine Sanctuary research assistant Erica Burton and Greg Cailliet, professor of ichthyology at the Moss Landing Marine Labs, examine angler fish from the sea toad family.

—By William J. Douros

Tuck, who “flies” the unmanned research submersible *Tiburon* for the Monterey Bay Aquarium Research Institute and prefers to use only one name, said it simply, “This place is special. I’ve never seen anything like it.”

“This place” is the Davidson Seamount, an underwater mountain 60 miles offshore of central California.

In a research expedition to the seamount May 17-24 funded by NOAA’s Office of Exploration, Tuck spent his day “playing” what appeared to be an elaborate and expensive video game. In reality, he was operating *Tiburon* from a video control panel aboard ship, connected by cable to the sub below.

The 7,800-foot-tall Davidson Seamount rises sharply to 4,000 feet below the sea’s surface. To dive on it safely, collect specimens and produce publication-quality imagery, NOAA’s Monterey Bay National Marine Sanctuary contracted with Monterey Bay Aquarium Research Institute for the use of *Tiburon*.

*Tiburon* is operated from the institute’s research vessel *Western Flyer*, a swath ship whose moon pool opens in the middle of the ship to launch *Tiburon* in seas that on this cruise reached eight feet in a 30-knot wind.

The cruise brought together talented specialists from five different fields to work and live together during the exploration.

“We have deep-sea biologists and geologists working one deck away from seabird and marine mammal

biologists,” said chief scientist Andrew DeVogelaere, research coordinator at the Monterey Bay marine sanctuary.

The benefit of the cross disciplines became clear on the second day when Greg Cailliet, an ichthyologist from Moss Landing Marine Labs, leaped out of his seat in the *Western Flyer*’s remotely operated vehicle control room. He saw a fish he did not recognize. Thinking it was a juvenile of a familiar species, he asked the pilots to capture it. Within two minutes they had suctioned it into a collection tube.

Five hours later, Ed Siedel of the Monterey Bay Aquarium gingerly walked the six-inch-long fish from *Tiburon* to an aquarium in the ship’s cold room to keep it alive.

It was not what Cailliet had expected. It looked like a small angler fish, with a lure-like appendage between its eyes to bring prey close, critical in the ocean’s pitch black depths a mile from sunlight. But the scientists could not pinpoint the species.

Randy Kochevar, also from Monterey Bay Aquarium, worked with Siedel to enhance digital images of the fish, emailing them to several experts to identify the species. Two days later, the scientists received emails back from excited ichthyologists saying it was probably from the sea toad family, of which only one species, found only twice before, had been identified.

The most striking images  
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continued from page 4  
photographed by *Tiburón* may have been the abundance of a giant, erect coral, *Paragorgia*.

On the Davidson Seamount, this persimmon-colored animal regularly reaches heights of 10 feet, and in at least one case rose 16 feet above the seafloor, taller than *Tiburón*.

The team also spotted a genuinely gigantic white sponge, whose name no one knew. In several places it was as big as a garage door, growing several feet thick. Its species name awaits further analysis, but many questions leap to mind. How long does it take a sponge, living a mile deep in the ocean, to grow to that size? What role does it play in the seamount's ecosystem?

*Tiburón* flew 14-hour transects up the seamount's west and east flanks from 11,000-foot water depths to the summit 4,000 feet below the sea surface. The team discovered that this seamount has zonation, like in rocky, intertidal coastal waters or on a tall mountain.

While the top of the seamount has the most diversity, the bottom

third has a surprising number of sea cucumbers, pycnogonids, sea stars, jellies and a thick band of brittle stars.

The east, nearshore transect had more fish species, including two other species no one aboard had seen and that reference books described poorly, at best.

A large portion in the mid-zone on the seamount may be the least biologically diverse. It's far from the currents at the high points and is too steep to hold sediments and trap organic matter. The currents sweep sediments clear on the upper margins, exposing complex, thick flows of pillow lava.

To assess the species found on the sea surface, Scott Benson, a marine biologist with NOAA's National Marine Fisheries Service, led the search for sea birds, marine mammals and leatherback turtles.

Leatherbacks tagged in previous years had crossed the Davidson Seamount from Monterey Bay back towards breeding beaches in Asia.

Although May is not typically a great month to find sea birds and marine mammals in this offshore area, the team sighted many black-footed albatross and several laysan

albatross. Other seabirds included storm petrels, a Steinjagers petrel, fulmars and several jaegers.

One evening at sunset, the team saw a pod of nine Orcas, with a huge male moving deliberately at high speed to the west across the seamount.

NOAA is an agency with hundreds of talented sailors, oceanographers and biologists who spend months each year at sea. They know well the feelings that come with a successful mission: The science party collects great data and gets along well. The ship's crew completes its 15-hour days with a smile and then hosts Soprano night on the DVD. Everyone eats too much, vows "I'll be good from today on," and then complains because the cook used to work in a fine restaurant (which is the case on *Western Flyer*).

Those in NOAA who have been on a long cruise can appreciate that you suddenly have time for in-depth conversations. You have time to learn how a colleague fell into their career. You listen to radio because there's no television. You share metaphors. Your shipmates become friends. ☺



William J. Douros/NOAA  
A young Guadalupe fur seal swims 60 miles offshore above the Davidson Seamount.



William J. Douros/NOAA  
Chief scientist Andrew DeVogelaere and research assistant Erica Burton hold samples of two species of coral collected from the Davidson Seamount for aging studies.

# Storm Study

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ever conducted in the United States.

Instead of targeting tornado-producing supercell thunderstorms, as in previous storm studies, the storm researchers are searching for the nearly invisible swaths of water vapor and the wind convergence bands that can fuel heavy rain across the southern Great Plains.

Where, when and how hard it will rain are the most difficult elements to nail down in weather forecasting, especially in spring and summer.

The National Science Foundation is providing the bulk of IHOP's \$7-million funding, with additional support from NOAA, the National Centers for Atmospheric Research, NASA and U.S. Department of Energy.

Scientists from France, Germany, the Netherlands and Canada are also participating.

On the ground, an armada of 23 cars and vans equipped with the mobile computer modems and other advanced meteorological instruments is combing "tornado alley," measuring temperature, humidity, wind and other variables in the lower atmosphere.

Nine cars have roof-mounted weather stations that monitor local conditions. They typically drive across wind convergence bands, called boundaries, where moisture-laden vertical air motions frequently initiate clouds and storms.

NOAA scientists are also operating a new mobile radar, called SMART radar, short for shared mobile atmospheric research and teaching radar. It's able to provide high resolution measurements of wind fields, both in clear air and in storm environments.

Six instrumented aircraft from the United States and Germany are also traversing the core study area,

some flying as low as 100 feet above the surface.

A futuristic, semi-autonomous research aircraft—the Proteus, sponsored by NASA—carries instruments up to 45,000 feet.

Some 800 radiosondes will be launched during the project, many twice each day from Liberal, Kan., and from National Weather Service offices in Norman, Okla., and Dodge City and Wichita, Kan. Others will be launched from vehicles positioned in and near regions where storms are expected to develop.

One of the keys to the success of the project is coordination of the ground-based vehicles by Ziegler from NOAA's Severe Storms Lab and Rasmussen from the NOAA Cooperative Institute for Mesoscale Meteorological Studies at the University of Oklahoma.

The Free Wave modems allow data and location to be transmitted from the instrumented vehicles, the SMART radar and the mobile sounding vehicle every 30 seconds.

The base scan reflectivity images from the radar are transmitted to the field coordination vehicle every three minutes, while the mobile weather balloon soundings are sent every hour. In addition, the Free Wave network allows the Naval Research Laboratory's P-3 and Wyoming King Air research aircraft to send their flight level weather observations to the field coordination vehicle.

"The mobile network has been very helpful," Rasmussen said. "Even in clear air we can see what the weather is doing and direct the vehicles to the spot that is most interesting scientifically. We didn't really know if it would work, and it's working better than we imagined."

Doug Kennedy, data manager at the Cooperative Institute for Mesoscale Meteorological Studies, used special Lab View software to

custom design the computer programs to manage the reception and transmission of the Free Wave data sets from the various platforms.

The system has an additional benefit. Free Wave network data are routinely collected from the mobile observing platforms in real time, combined with the high bandwidth capabilities of a two-way broadband geosatellite dish system on the field coordination vehicle, then transmitted to researchers over the Internet, Ziegler said.

"This allows National Weather Service forecasters, scientists at the IHOP operations center in Norman and students to follow the progress of the field data collection in near-real time," he said.

The experiment has already produced encouraging results.

On May 22 in the Oklahoma panhandle, IHOP researchers focused their efforts on a dryline, the boundary between moist and dry air, that did not initiate convection. "It was by far the most comprehensive data gathered on a dryline," Rasmussen said. "If they're all this good it's going to be tremendous."

Two days later the group intercepted a dryline in the Texas panhandle that was overtaken by a cold front and later initiated convection over the study area. Once again, Rasmussen said, they collected unprecedented data.

"I don't remember any other studies of a cold front interacting with a dryline. Already the data we have collected is way beyond what we had hoped it to be," he said.

Ziegler said, "We are confident the project will bring us closer to identifying thunderstorms before their clouds form, helping forecasters improve their timing, accuracy and precision. Lessons learned will have applications for better forecasts that will help save lives and property in the future." ☺

## Weather Simulator

*continued from page 1*

out that an approaching storm seemed to show the same characteristics as a recently viewed simulation. As a result, we issued a tornado warning which ended up verifying with about seven minutes lead time on a weak tornado.”

Figurskey said without the simulation a tornado warning would still have been issued, but with less lead time.

“We certainly would not have issued the warning as quickly if we hadn’t seen the simulation,” he said.

Instances such as this are sure to be repeated around the country as more and more forecasters benefit from simulator training.

The weather event simulator concept grew out of the warning decision-making workshops started in 1998 by staff of the Weather Service’s Warning Decision Training Branch in Norman, Okla., along with forecasters from Norman and Ft. Worth, Texas. The complexities of human decision-making and situation awareness in the forecast office were presented to workshop participants, who then were given a severe weather situation and the opportunity to exercise their new skills.

Because the computer system used in forecast offices, called the Advanced Weather Information Processing System, could not be used for simulated situations, members of the Warning Decision Training Branch designed a computer to mimic it.

Mike Foster, meteorologist-in-charge of the Norman, Okla., forecast office, attended one of the workshops and was instrumental in taking the simulators nationwide.

“We recognized early on the capabilities of practicing with a workstation that is configured to present all the data sets in the same

## BIG Awards Recognize Academic Achievement, Community Service



*Dane Konop/NOAA*

The NOAA Silver Spring, Md., chapter of Blacks in Government presented \$1,000 scholarship checks to six Washington, D.C., area high school seniors May 30. Pictured from left to right are Wendall Fisher, awards ceremony speaker, Barbara Tobe, BIG vice president, Terrence James, Banneker H.S., Washington, D.C., Monique Morton, Ballou H.S., Washington, D.C., Christopher Lloyd, John F. Kennedy H.S., Silver Spring, Md., Shondra Washington, Hammond H.S., Columbia, Md., Garret King, Westlake H.S., Waldorf, Md., Obinna N dum, Eleanor Roosevelt H.S., Upper Marlboro, Md., and Bernard Cody, BIG president.

relative time that they occurred in a real event. This allows forecasters to practice the way they are expected to perform,” he said.

“I have expectations that over the next few years we’ll see many cases that are similar to the Buffalo experience, where people are able to develop new skills and observe the data that they will later recognize in real time,” Foster said.

The Warning Decision Training Branch has provided case studies for each of the forecast offices to get started, and each office also has the capability to create its own case studies. In Buffalo, for example, the staff is planning to undergo simulator training for each type of seasonal severe weather. Offices in the west are tailoring their simulations to their unique weather threats, such as fire weather forecasting.

Foster said the ability to customize simulations is an integral

element of the simulator.

“A real key to the simulator is developing a capability at each office to collect the data and build their own cases. That capability is well underway. Here in Norman, we have collected data for at least a half a dozen cases, and have been able to use it within hours after an event,” he said.

Josh Watson, techniques development meteorologist with the Weather Service’s eastern region, said the simulators may be able to cut down on the false alarm rate for tornadoes and other types of severe weather.

“If you haven’t had recent training or experience on severe weather, you’re more likely to try to cover all the bases and issue lots of warnings, whereas had you gone through training on the WES, you might recognize that the signatures are not severe,” he said. ☺

## Schreiner

*continued from page 3*  
scientists or working environment in existence.”

“Schreiner’s work on better characterizing the current state of the atmosphere has resulted in many valuable contributions to NOAA’s mission of improving weather forecasts,” said Gregory Withee, NOAA assistant administrator for satellite and information services. “His recent accomplishments exemplify the collaborative scientific spirit characteristic of a university cooperative institute. He is an important member of the NESDIS team.”

On relatively short notice over the past year, Schreiner developed the new GOES clear-sky radiance product known as the clear-sky brightness temperature. This product uses all five spectral bands from both the GOES East and GOES West imagers to separate clear from cloudy pixels. The clear sky brightness temperature data will be used by global modelers worldwide to improve numerical weather prediction model forecasts.

The data are currently being tested by NOAA’s National Centers for Environmental Prediction as well as the European Centre for Medium-Range Weather Forecasts. Schreiner has also had a major role in ensuring that this product will be transferred from research into NOAA/NESDIS operations.

In addition to the clear sky brightness temperature product, Schreiner was instrumental in generating the first cloud-top pressure data sets from the GOES sounder. These data are now being generated by NESDIS operations and are used daily by the National Weather Service.

The GOES sounder cloud information is also used in regional numerical weather forecasting. In April, the data were first used

## Afzal

*continued from page 3*  
parent, it’s a wonderful place to work,” she said.

O’Connor said Afzal “oversees our budget office. She makes sure personnel issues are dealt with, as well as issues associated with procurement.” Although Afzal’s not the negotiator in the unionized General Counsel’s office, “she’s responsible for interfacing on behalf of management with the union. She’s the one who makes sure that we don’t get crosswise with our collective bargaining agreement,” O’Connor said.

In addition to her duties managing the office, Afzal is also the lead attorney for various NOAA programs.

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operationally in the rapid update cycle model for improving short-term forecasts over the continental United States.

Schreiner was also instrumental in developing the GOES sounder site-specific cloud product, which is still used to supplement the hourly Weather Service Automated Surface Observing System measurements.

“Working with Schreiner is a joy to his CIMSS and NOAA colleagues,” said Paul Menzel of NOAA’s Office of Research and Applications. “He displays exemplary dedication to his tasks, thorough attention to detail and goals, and scientific professionalism, all with a most hospitable and enjoyable demeanor.”

Schreiner received both a bachelor’s and master’s degree in meteorology from the University of Wisconsin-Madison. He and his wife of 23 years, Ann Breene Schreiner, have two daughters, Kathryn, 18, and Jaclyn, 17. They live in Black Earth, a small suburban community about 25 miles west of Madison. ☺

“I wear several hats,” she said. “I do the disaster relief program, part of the Magnuson-Stevens Act, the (fishing vessel) buyback program and the central lien registry program to develop a place where all fishing permits will be registered.”

Afzal is a creative problem solver who thrives on tackling new and unusual legal tasks, “situations no one has come up with solutions to before,” O’Connor said. “You can implicitly trust her to move forward with whatever’s necessary to get the job done.”

Until new General Counsel James L. Walpole joined NOAA May 22, Afzal had also served for a year and a half as acting deputy general counsel, filling in for O’Connor while he was acting general counsel.

“She stepped up when I needed her. She never batted an eye, moved forward and assumed significant additional responsibilities,” O’Connor said.

Afzal clearly thrives on her work at NOAA, where she has not lost the idealism that drew her to law school. “I love that we are trying to do good. That’s our mission,” she said. “We are trying to create a sustainable environment. So you feel very good about the work you’re doing. It’s a great job. Absolutely magnificent.” ☺

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