

THE NAVY'S ENERGY & ENVIRONMENTAL MAGAZINE

# Currents

spring 2018

CNO Recognizes **AWARD WINNERS** for  
exceptional  
environmental  
leadership

Laudable Efforts Resulted in Critical Habitat  
Protection for an Endangered Rabbit &  
Drastic Increases in Construction  
& Demolition Recycling

USS Monterey Earns Top Secretary of the Navy Energy  
Conservation Award

Naval Base Kitsap-Bremerton Replaces Historic, Declining Trees

NESDI Program Launches New Projects

WORLD  
TURTLE  
& TERRAPIN  
TURTLE DAYS  
poster inside!



THE NAVY'S ENERGY & ENVIRONMENTAL MAGAZINE  
**Currents**

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cover

Among the winners of the Chief of Naval Operations fiscal year 2017 Environmental Awards competition were personnel from the Naval Air Station Key West, Florida who dramatically increased critical habitat for the endangered Lower Keys Marsh Rabbit.

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**CNO Recognizes Award Winners for  
Exceptional Environmental Leadership**

Laudable Efforts Resulted in Critical Habitat Protection for an Endangered Rabbit & Drastic Increases in Construction & Demolition Recycling

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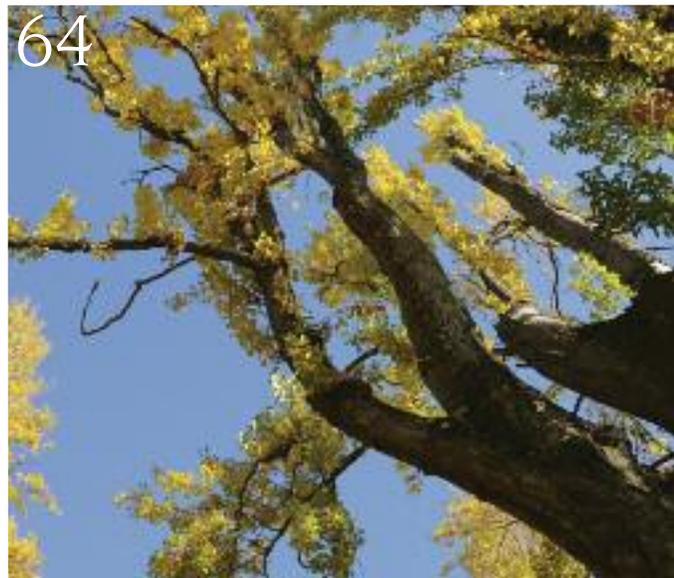


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## The CHIEF OF NAVAL OPERATIONS

(CNO) has announced the winners of the fiscal year (FY) 2017 CNO Environmental Awards competition, sponsored by the CNO Energy and Environmental Readiness Division.

The annual CNO Environmental Awards program recognizes exceptional environmental stewardship by Navy ships, installations and personnel. Twenty-seven winners were selected in nine award categories. (No nominations were received in the “Environmental Restoration, Installation” category.)

One U.S. installation was able to increase the critical habitat for an endangered rabbit while another overseas installation was able to increase its construction and demolition recycling efforts by 780 percent during the reporting period. Another team initiated a multi-year non-time-critical munitions removal action at Vieques, Puerto Rico and three

separate environmental teams created or maintained nesting platforms for local endangered bird species.

For the FY17 competition, Navy commands from around the globe submitted nominations for consideration in the following nine award categories:

1. Natural resources conservation (small installation)
2. Natural resources conservation (individual/team)
3. Environmental quality (non-industrial installation)
4. Environmental quality (individual/team)
5. Sustainability (industrial installation)
6. Environmental restoration (individual/team)
7. Cultural resources management (large installation)
8. Environmental excellence in weapon system acquisition (large program)
9. Afloat (includes five competitive sub-categories)

Accomplishments of the FY17 CNO environmental award winners are highlighted on the following pages.

## natural resources conservation

These awards recognize efforts that promote the conservation of natural resources. This includes the identification, protection and restoration of biological resources and habitats; long-term management and use of the land and its resources; and the promotion of the conservation ethic.

### SMALL INSTALLATION

#### Naval Air Station Key West, Florida

Naval Air Station (NAS) Key West (NASKW) is the southernmost military facility on the continental United States, home to 2,541 personnel. NASKW is located within two of only five regions of the state designated as an “Area of Critical State Concern”—a designation issued by the state to protect natural resources of statewide significance and oversee local government land use management to promote orderly and balanced growth.

The NASKW Integrated Natural Resources Management Plan (INRMP) identifies 23 federally listed species on NASKW property including 21 animals and two plants. One of these is the endangered Lower Keys marsh rabbit (*Sylvilagus palustris hefneri*). The U.S. Fish & Wildlife Service (USFWS) estimates there are only 2,116 acres of suitable habitat to support the Lower Keys marsh rabbit in the Florida Keys. While only 15 percent of this habitable land is on NASKW property, the base supports an estimated 60 percent of the total marsh rabbit population. The NASKW natural resources team plays a significant role in the management

The Lower Keys marsh rabbit was listed as endangered by the USFWS in 1990.



of this critically endangered species. Specifically, NASKW has ongoing management actions that include population and habitat monitoring, habitat enhancements, predator control and public educations.

The marsh rabbit habitat was enhanced a few years ago following the largest permitted wetland project in the Florida Keys after it was discovered that the NASKW airfield was found to be out of compliance due to a stand of mangroves up to 35 feet high within runway clear zones. Between 2009 and 2015, the mangrove wetlands were converted to saltwater wetlands consisting of native grasses and shrubs. This allowed the airfield to continue operating safely, while also enhancing the habitat for the Lower Keys marsh rabbit.

NASKW’s ongoing support of the Lower Keys marsh rabbit was

highlighted in a television documentary entitled “RARE: Creatures of the Photo Ark”—a Public Broadcasting Service (PBS) documentary highlighting nine of the rarest species on the earth. The PBS film crew came to the base in 2016 to film the rabbit because it is one of the last places on Earth that the animal can be found.

### view the documentary

To view this film, visit [www.pbs.org/video/creature-clip-lower-keys-marsh-rabbit-qr14mt](http://www.pbs.org/video/creature-clip-lower-keys-marsh-rabbit-qr14mt).



The film crew came to the base in 2016 to film the Lower Keys marsh rabbit }  
 because it is one of the last places on earth that the animal can be found. }

In addition, two different project teams formed to combat the problem of birds nesting near NASKW airfields. In one, the gravel was painted green next to runways to deter least terns from nesting there. In the second, a nesting platform was built, complete with tern decoys, to encourage endangered roseate terns (*Sterna dougallii*) and other shorebirds to nest in areas away from airfields. Both projects resulted in luring the birds away from airfields, lessening the bird strike threat and protecting the tern population.

NASKW's land restoration efforts are also impressive. Following the conversion of mangrove swamps to saltmarsh wetlands, qualitative monitoring of the sites is conducted annually—each year the vegetative cover has increased. In the 2016–2017 survey, virtually no invasive species were detected in any of the locations.



Federally endangered roseate terns occupying the habitat nesting boxes provided by NASKW as a short-term alternative to nesting on gravel topped roofs.

### Naval Air Station Pensacola, Florida

Home of the Blue Angels, NAS Pensacola covers 8,423 acres and attracts one million visitors each year. It is also home to 22 state and federally listed species of flora and fauna.

Natural resources initiatives during the award period included the restoration of five interpretive nature trails that educate visitors about local plants and trees and the installation of three beach walkovers that reduce the amount of

erosion across the coast and allowed the area to be reopened to the public following restoration from damaging storm events. Base beach cleanups involved over 200 volunteers in addition to an “All Hands” effort to restore the base, day-to-day, monthly, quarterly and annually. Osprey nesting platforms previously constructed yielded more than 30 fledglings this season, which helped to maintain the osprey population while reducing bird air strike hazard.



Two juvenile gopher tortoises rush towards the entrance of their burrow during an inventory survey. Due to the Gopher Tortoise Candidate Conservation Agreement and extensive management, these animals are thriving at NAS Pensacola.



Emily Williams, an SCA AmeriCorps conservation intern, assisting in a prescribed burn on board NAS Pensacola. Prescribed burning helps to manage for invasive species while promoting the growth of native plants and trees. The natural resources staff completed 430 prescribed burns in 2016 and 2017.



Additionally, gopher tortoise surveys were completed for the Candidate Conservation Agreement and INRMP stakeholders. The agreement with USFWS allows NAS Pensacola's mission to coexist with its abundant gopher tortoise population.

Supporting the natural resources program, three Student Conservation Association (SCA) interns (from AmeriCorps) added over 2,500 hours of dedicated, determined and professional conservation assistance. Much of their work involved the restoration of bluebird boxes which has produced approximately 75 bluebird fledglings.

### The Basics About the Student Conservation Association

The SCA is a national non-profit that engages high school and college-age member volunteers in conserving natural resources through internships, conservation jobs and crew experiences. Founded in 1957, the SCA has grown from 53 volunteers working in two national parks to more than 4,000 active members on federal, state and municipal lands, annually performing more than 1.6 million service hours across the United States. SCA has formed partnerships with governmental agencies, environmental groups and corporations. They complete projects in every conservation discipline, including ecological restoration, GIS/Global Positioning Systems, wildlife management and interpretation.



For more information, visit [www.thesca.org](http://www.thesca.org).



### Pacific Missile Range Facility Barking Sands, Hawaii

Pacific Missile Range Facility (PMRF) occupies over 2,342 acres in five separate areas on the island of Kaua'i. PMRF Barking Sands comprises a 7.5-mile-long, 0.5-mile-wide strip of coastal land and provides habitat for four waterbirds listed as federally endangered. During the awards period, PMRF initiated planning and implemented new monitoring programs for these seabirds as well as for Hawaiian hoary bats and aquatic resources within the nearshore marine environment. To further protect three of these endangered seabird species, the natural resources



A Wedge-tailed Shearwater chick sits outside its burrow at the Wedge-tailed Shearwater colony near the PMRF visitor beach cottages. The colony is protected from foot traffic by using protective burrow covers, fencing and informative signage to alert visitors.

*Corrina Carnes*



Nēnē at PMRF traverse the area with their goslings. Speed limits are decreased and signs are erected in areas of nēnē activity to alert drivers to slow down and be vigilant for these endangered birds crossing the road.

*Corrina Carnes*

## Darkening the night sky during fledgling season minimizes “fallout” associated with the presence of artificial lights. }

team intensified outreach and training efforts in the community and across the installation for the base-wide Dark Skies program. Darkening the night sky during fledgling season minimizes “fallout” associated with the presence of artificial lights.

Other accomplishments in FY17 include increased protection measures for Hawaiian native flora and fauna including signage, reduced speed limits and greater predator control efforts. The team also improved communications and cooperation with outside entities by initiating quarterly meetings with federal and state partners and inviting the local community to PMRF for events such as the annual Earth Day celebration.

### INDIVIDUAL/TEAM

#### Naval Base Ventura County, California

Naval Base Ventura County (NBVC) is comprised of three primary operating facilities: Port Hueneme, Point Mugu and San Nicolas Island (SNI)—one of eight Channel Islands 60 miles offshore.

In FY17, some of the natural resources conservation team’s significant accomplishments included a partnership with the Naval Facilities Engineering Command (NAVFAC) Engineering and Expeditionary Warfare Center to test the use of unmanned aerial systems to monitor the nesting activity of federally endangered California least terns. Another federally endangered species at Point

Mugu is the Light-Footed Ridgway’s Rail. The USFWS provided grant funding to build and deploy 15 nesting platforms in cooperation with the Girl Scouts of America. During the awards period, rail visitation was documented in six rafts as were other rare species such as the California salt marsh shrew.

Offshore, the SNI rare plant program is working to protect the beach spectacle pod (*Dithyrea maritima*), which only occurs on two Channel Islands and has a very limited mainland distribution. This plant, a perennial member of the mustard family, is currently a state-listed species that has been considered for federal Endangered Species Act (ESA) listing. Beach spectacle pod populations on SNI have been struggling due to invasive plants and pinniped impacts. The natural resources conservation team has partnered with an extensive network of collaborators to combat the problem through such means as surveys, genetic analysis and restoration plantings across the range of the species.

To date, the California Department of Fish and Wildlife (CDFW) has contributed \$90,000 to fund work that supports the SNI INRMP by re-establishing plant populations in non-operational areas on SNI and non-Department of Defense (DoD) lands. This collaborative approach reduces pressure on the SNI population, provides a measured perspective on the status of the species for regulators and allows other agencies and non-governmental organizations (NGO) to assist in funding efforts.

Due to the erodible terrain and frequent high winds, the SNI restoration program is continually working to stabilize erosion, to improve stormwater runoff quality and enhance habitat for rare flora and fauna. During the awards period, NBVC personnel worked with a local NGO—Channel Islands Restoration (CIR)—to coordinate 150 volunteers to plant 30,000 native plants. CIR provided 7,120 hours of labor, saving the Navy \$285,000. To monitor the islands for biosecurity impacts, the natural resources team collaborated



The Mugu Lagoon at Point Mugu provides habitat for thousands of migratory bird species as well numerous invertebrate, fish and plant species.

Francesca Ferrara



A flowering beach spectacle pod on SNI.  
*William Hoyer*

## Michael Wright coordinated response efforts to rescue, rehabilitate and release impacted wildlife.

with The Nature Conservancy (TNC) and the National Park Service to hire a biologist solely focused on monitoring each of the member islands. This partnership saves the DoD 60 percent of the cost for a full-time employee.

The terrain enhancement work also benefits the rare species at SNI, including the Island Night Lizard (*Xantusia riversiana*) and the California Channel Islands Fox (*Urocyon littoralis*)—an animal found nowhere else on earth. The fox population has experienced a drought-related population decline in the last few years. In FY17, NBVC's natural resources conservation team partnered with regulators (USFWS and CDFW), researchers and other population managers (National Park Service, TNC and CIR) to hold a structured decision-making workshop with the goal of refining and prioritizing management efforts. A reanalysis of four decades of Channel Islands Fox population data is currently underway and will result in an island-specific population viability analysis.

The conservation team also partnered with TNC in a first ever Memorandum of Agreement (MOA) to facilitate planning and protect NBVC assets from sea level rise. This MOA will serve as a model agreement for other DoD installations.

### Mrs. Michael F. Wright, Naval Air Station Oceana, Virginia

Located in Virginia Beach, Virginia, NAS Oceana is a 6,000-acre Master Jet Base supporting a community of more than 9,700 Navy personnel and 12,300 dependents.

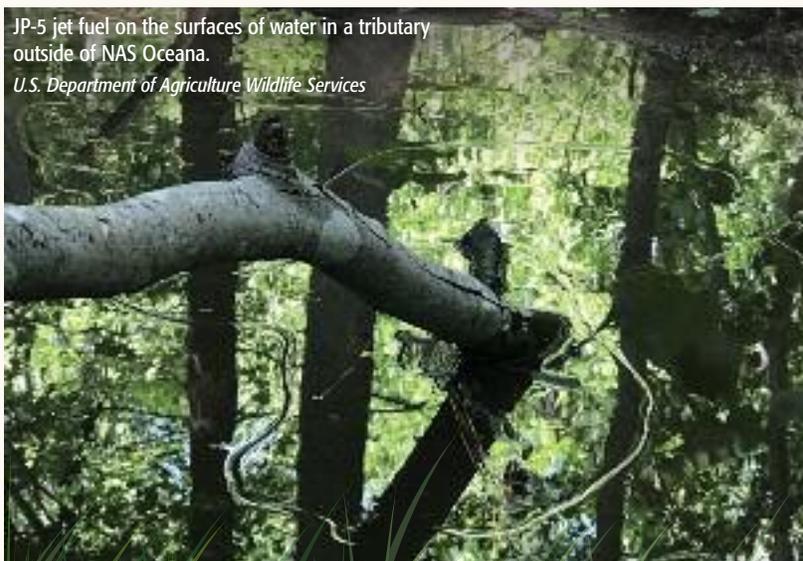
Mrs. Wright is the Natural Resources Manager and team leader. She oversees the management and implementation of three INRMPs covering four primary naval properties. A few of her accomplishments during the awards period include her appointment as Emergency Response Wildlife Branch Chief/Coordinator after a large jet fuel spill in May 2017. Approximately, 94,000 gallons of fuel spilled into the natural environment impacting natural resources on and off installation. Mrs. Wright coordinated search and rescue, impacted wildlife survey efforts, coordinated response efforts to rescue, rehabilitate and release

impacted wildlife and coordinated teams to deflect wildlife from entering the spill zone.

She helped organize and host a DoD/Department of Navy (DON) Migratory Bird Conservation, Compliance and Management course in 2017. And as in previous years, Mrs. Wright established and maintained cost-effective partnerships with universities, local government and federal and state agencies in support of zoonotic disease research, herpetological research (multiple species), bald eagle research and invasive species control.



Decontamination of an Eastern box turtle, rescued from the NAS Oceana jet fuel (JP-5) spill.  
Tri-State Bird Rescue and Research, Inc.



JP-5 jet fuel on the surfaces of water in a tributary outside of NAS Oceana.  
U.S. Department of Agriculture Wildlife Services



Marine mammal observers used multiple methods of observation, including the naked eye and “Big Eye” binoculars to identify species up to several kilometers from their stations during pile driving activities at Naval Base Point Loma.

## Navy Region Southwest

In FY17, Navy Region Southwest (NRSW) completed the replacement of a new fuel pier at Naval Base Point Loma, California. The pier was needed to replace the aging and seismically deficient old fuel pier and improve fuel receipt and delivery to existing and future classes of naval vessels. The project involved demolishing the 100-year-old fuel pier and dredging to deepen the existing turning basin to accommodate deep draft vessels. After an extensive consultation phase with federal and state agencies, the project design team had to change the structural piles from 40-inch concrete piles to 30- and 36-inch steel piles to meet new seismic criteria. Steel piles create

substantially more noise than concrete and therefore required even more consultations and permits.

As there is so little data on the effects of sound pressure on forage fish, the Navy conducted a special study to examine fish movement and dispersal patterns before, during and after pile driving. The Navy also consulted with USFWS pursuant to the ESA for the California least tern, which seasonally forages within the bay. In accordance with a previous Memorandum of Understanding, the Navy restricted construction activities that could interfere with California least tern foraging during the nesting period (1 April to 15 September). A major challenge with the construction project was the need to drive

piles in the April/May timeframe. They initiated an emergency consultation with USFWS. The Navy’s multi-year monitoring provided scientifically defensible data in support of the consultation and in-water construction was allowed up to 30 April on an annual basis, when unavoidable due to the critical path of the scheduled demolition or construction activity. This accomplishment represents a major step forward with applicability to implementation of future military construction projects in San Diego Bay.

Upon completion, the National Oceanic and Atmospheric Administration called this effort the “Gold Standard”—the way that all projects should be managed.

## Naval Air Station Whiting Field reduced its water consumption by nearly 22 million gallons through FY16.

### environmental quality

These awards recognize efforts to ensure military accomplishment and protection of human health in the areas of environmental planning, waste management and environmental law and regulation compliance. Meeting or exceeding all environmental requirements not only enhances the protection of environmental assets, but also sustains the DoD's ability to effectively train and maintain readiness.

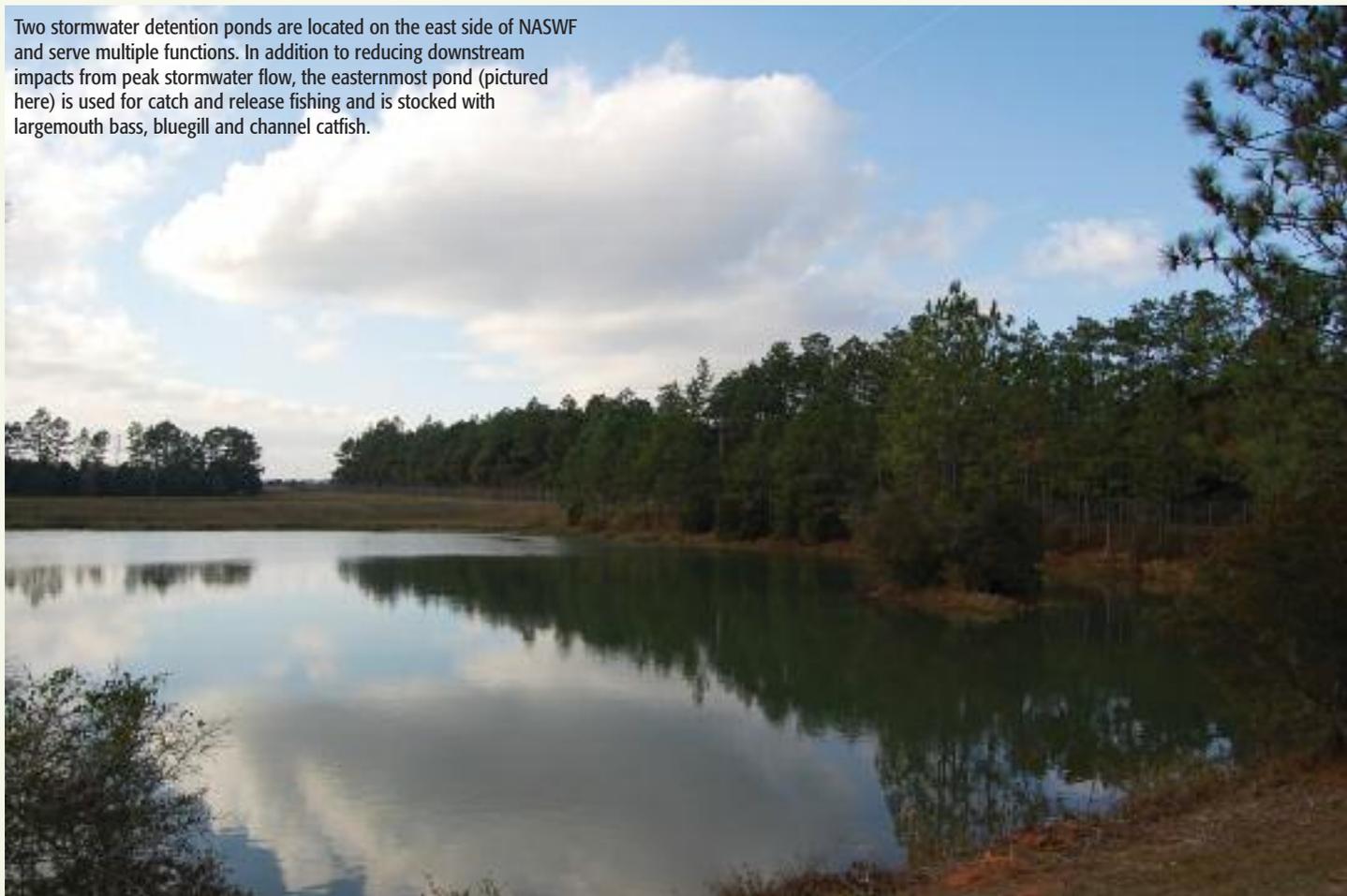
### NON-INDUSTRIAL INSTALLATION

#### Naval Air Station Whiting Field, Florida

The capabilities of Naval Air Station Whiting Field (NASWF) are critical to the Navy flight training mission. The NASWF Public Works Department (PWD) Environmental Division staff provides environmental management training for all new primary flight training students as part of flight school orientation. Nearly 3,000 student trainees have received instruction since the program's inception.

NASWF has received the Plant Operations Excellence Award for Small Community Public Water Supply Facilities every year since 2012. The Florida Department of Environmental Protection judged the award based on water quality, community outreach, operations and maintenance, the use of new technologies and sustainable processes and the lack of regulatory deficiencies. NASWF is well ahead of the pace mandated by Executive Order 12693 to reduce water consumption intensity by FY25. The base reduced

Two stormwater detention ponds are located on the east side of NASWF and serve multiple functions. In addition to reducing downstream impacts from peak stormwater flow, the easternmost pond (pictured here) is used for catch and release fishing and is stocked with largemouth bass, bluegill and channel catfish.





The gopher tortoise is listed as a threatened species in Florida and Alabama, therefore is protected on all NASWF property. With help from SCA interns, PWD Environmental personnel conduct annual surveys on the species presence and population.



Volunteers offloading recycled Christmas trees at JEBLCFS. Each year the trees are placed adjacent to sand-fenced areas to collect sand and stabilize dunes.  
*Roger White*

its water consumption by nearly 22 million gallons through FY16.

In March 2017, the Navy tested the water in specific off-base wells to address potential exposure to perfluorinated compounds. Seven properties located within a one-mile radius down gradient of NASWF's former South Fire Fighting Area were investigated. One well tested above the health advisory limit, consequently the owner was notified and the Navy began supplying bottled water.

### Joint Expeditionary Base Little Creek-Fort Story, Virginia

Joint Expeditionary Base Little Creek-Fort Story (JEBLCFS) is the major east coast operating base supporting overseas contingency operations. The base provides support services to 100 shore-based resident commands and 25 homeported Navy and auxiliary ships.

JEBLCFS had eight federal, state and local agency inspections during the award period and all inspection reports had zero discrepancies. After a May 2017 audit, the base was able to immediately re-declare International Organization for Standardization (ISO) 14001 conformance. (Note: ISO 14001 is the international standard that specifies requirements for an effective Environmental Management System (EMS).) The team attitude and environmental focus is fostered at JEBLCFS through hands-on training and weekly site visits. JEBLCFS consistently leads Navy Region Mid Atlantic (NRMA) in EMS scores.

The EMS team was first to identify the human health and environmental issue of potentially explosive indoor range

debris. Taking a hard stand, the team repeatedly called NRMA, resulting in the closure of the ranges until an effective, safe and environmentally sound procedure could be established.

During this award period, six newly-constructed facilities were Leadership in Energy and Environmental Design (LEED) certified by the Green Building Council. LEED certification is a globally recognized symbol of sustainability achievement.

In addition, a new utility energy service contract and a project to improve the energy efficiency of heating, ventilating and air conditioning systems at JEBLCFS have helped reduce base energy consumption by 8.5 percent since 2015.



Gunnery Sergeant Merville hands Private First Class Ledtje her first EMS "green card." 20,000 of these cards which contain information about JEBLCFS's EMS and phone numbers for spill response were disseminated base-wide.  
*Cenen Camerino*

Existing environmental GIS data was often stored on individual computer hard drives or compact discs and was at risk of being lost forever. }

## INDIVIDUAL/TEAM

### Environmental Geographic Information System Team, Navy Region Northwest

The Geographic Information System (GIS) team at Navy Region Northwest (NRNW) includes Environmental Geospatial Specialist Jonathan Crain of NAVFAC Northwest and Terry Kinsman, a GIS contractor employed by T3W. The work of these men between 2015 and 2017 has resulted in significant improvements to GIS data for the region's environmental programs. Benefits of their work include enhanced information sharing to promote military readiness, improved environmental program implementation, better execution of Navy mission and cost savings.



Mount Rainer in the background of the main fueling pier at Manchester Fuel Department. The Department's GIS team documented wetlands and other natural resources features which allows this information to be used in INRMPS, in National Environmental Policy Act (NEPA) documents and by facilities planners.

Prior to this team's work, existing environmental GIS data was often stored on individual computer hard drives or compact discs and was at risk of being lost forever. Some information was stored on other geospatial data systems, but prior to the start of this team's project, the data contained in these separate systems was accessed only by

a relatively small set of users. Mr. Crain and Mr. Kinsman gathered all the available data from all stakeholders, added it to the GRX database and made it substantively more accessible to multiple internal users including environmental, asset management, capital improvements and public works business line staff.

Data both new and old are now available on the NRNW GRX covering a wide spectrum of environmental programs including compliance, cultural resources, natural resources, restoration and other environmental liability program data.

## INDIVIDUAL

### Ms. Sharon Waligora, Joint Expeditionary Base Little Creek-Fort Story, Virginia

As Environmental Director of the Public Works Division at JEBLCFS, Ms. Waligora is directly responsible for the fact that the installation has continuously had a fully conforming EMS. During a May 2017 external audit, the most significant observation was the base-wide high level of EMS awareness.



Sharon Waligora and a state forester representative educate the children at the JEBLCFS Child Development Center. During this Arbor Day annual event, Ms. Waligora takes the opportunity to teach the children about the roles trees play in our environment. The children also get the opportunity to plant a tree as the final event in the celebration.

*Scott Mohr*



Ms. Waligora ties cinder blocks to recycled Christmas trees in preparation for sinking them in Lake Bradford. The trees serve as a habitat for juvenile bass, allowing them to grow to maturity and re-establish the game fish population.

*Kyle Russell*

Of all the programs Ms. Waligora oversees, one of the most notable achievements was in a stormwater construction project. Ms. Waligora also oversaw the development and implementation of a comprehensive training plan and inspection program, resulting in zero re-inspections by the Virginia Department of Environmental Quality and overall improvement of program goals by 97 percent.

A trained forester, Ms. Waligora supervised the planting of 331 surplus trees during the award period, improving air quality and carbon sequestration capacity. She also initiated a partnership with Virginia Game and Inland Fisheries to establish bass habitat in Lake Bradford by sinking 91 recycled Christmas trees in three different locations. Juvenile bass utilize the trees as protection from larger fish, allowing them to grow and re-establish the game fish population. During FY17, Ms. Waligora was selected for the DoD Executive Leadership Development Program and has completed three deployments to expand her understanding of global issues and the DoD mission in all corners of the world.

### Mr. Timothy Uplinger, Naval Station Rota, Spain

Naval Station (NAVSTA) Rota consists of three active piers; a 670-acre airfield (support U.S. Navy, U.S. Air Force and Spanish military aircraft); and 400 facilities (many of them shared between the U. S. and Spanish navies).

Mr. Uplinger's efforts as Environmental Program Director during this reporting period have saved and generated an estimated \$3.85 million dollars in waste reduction, increased recycling and natural and cultural resources conservation. With the regularly high employee turnover rate at this overseas base, Mr. Uplinger has played a key role in teaching new employees how to implement successful environmental programs.

Mr. Uplinger led the effort for the NAVSTA Rota Qualified Recycling Program (QRP) to transition to a contractor-operated program with direct sales authority, saving the government \$424,500 annually. Under his management, NAVSTA Rota increased the solid waste

recycling rate from 48 percent in FY15 to 66 percent in FY17. Part of this recycling success involved incorporating recycling into the early project planning stages. Construction and demolition recycling increased by 780 percent during the reporting period, saving \$3.29 million and allowing NAVSTA Rota's overall diversion of solid waste to recycling rate for FY17 to reach 95 percent.

The QRP diverted over 91 tons of used motor oil, saving the government more than \$46,300 in disposal costs over the course of the year. Under Mr. Uplinger's management, a Natural Resources Plan and a Cultural Resources Plan were also developed. The Natural Resources Plan includes a new "protected species protocol," which allows Mr. Uplinger and future natural resource program managers to relocate chameleons when needed, thus saving the government \$20,000 per project.



Tim Uplinger handles a falcon at NAVSTA Rota's Falcon Show during Earth Week.

This was one of the many community outreach events coordinated by Mr. Uplinger through the Spanish government to help showcase the installation's U.S. and Spanish environmental programs.

*Amos Webb*

## Fleet Readiness Center East maintained a sustained landfill diversion rate of greater than 60 percent.

Tim Uplinger arranged for a recycling contractor to compact material on a large demolition site, reducing transportation costs and increasing profit for the government.

*Tim Uplinger*



During the award period, the facility also maintained a sustained landfill diversion rate of greater than 60 percent and initiated a project to sustain process improvements expected to provide water use and industrial waste reductions of more than 500,000 gallons per year. Personnel also coordinated an outreach event involving local community children to design a logo for repurposed fiber board drums used to collect recyclables.



FRC East personnel sort and discuss recyclable material findings during a FY17 dumpster dive.

### sustainability

This award recognizes efforts to prevent or eliminate pollution at the source, including practices that increase efficiency and sustainability in the use of raw materials, energy, water or other resources. Nominations may be from the military departments or Defense Agencies for any U.S. military active or closing industrial installation worldwide.

### INDUSTRIAL INSTALLATION

#### Fleet Readiness Center East

Fleet Readiness Center (FRC) East facilities include 119 buildings with a total of 2.1 million square feet, 1.6 million square feet of which is industrial production space.

FRC East has had a fully conforming EMS continuously for over 14 years. During FY17, FRC East participated with Marine Corps Air Station Cherry Point for inclusion in a utilities energy service contract to obtain energy savings throughout the facility. Support for this effort included providing historical energy/utility data, fielding Duke Energy inquiries, addressing additional utility requests and participating in monthly status calls during the progression of the preliminary assessment. The assessment is in its final stages.

#### Naval Station Everett, Washington

Naval Station (NAVSTA) Everett is a 117-acre developed site supporting port operations and vessel maintenance plus recreation activities including a 90-slip marina.

In FY16 and FY17, the station set new EMS goals and objectives, implemented operational controls, expanded work center and staff training and deployed a quarterly assessment program. They upgraded their spill prevention and response program with formalized training and drilling to minimize impacts to operations and the environment in the case of fuel spills.

NAVSTA Everett continues to exceed solid waste diversion rates and currently recycles over 50 percent of its waste stream.

During the awards period, the base reduced energy usage by over 10 percent, with a cost savings of \$343,000.



Earth Day activities included NAVSTA Everett volunteers who contributed to salmon habitat restoration efforts. Lieutenant Commander Jacob Reed of NAVSTA Everett removes wild blackberries to make room for native plants. Hand tools were supplied by the Port of Everett.

The team also delivered environmental review, consultation and permit support to keep more than 150 projects ahead of schedule. They also developed a new Compwater Management Unit that produces cleaner wastewater, reducing time and costs associated with refueling destroyers.



The zinc filtration vessels inside the Compwater Management Unit capture zinc present in oily wastewater (compwater) discharge. This wastewater is discharged from destroyers that use sacrificial zinc anodes in their fuel tanks for the purpose of seawater corrosion prevention.

## Naval Base Kitsap, Washington

Located approximately 20 miles west of Seattle, Naval Base Kitsap (NBK) hosts approximately 70 tenant commands and covers 12,438 acres. NBK has been successful at reducing the amount of energy used across the installation. The base saw a reduction of energy consumption by nearly 35 percent in FY17, as compared to the FY03 baseline, exceeding the DoD's reduction goals of 30 percent.



The USS Bremerton (SSN 698) returns to its namesake at Naval Base Kitsap's Pier Delta. Sea lions adopting the deck of the submarine as a lounging area has become a common afternoon activity for these marine mammals.

*MC2 Lawrence Davis*

A ship-to-shore hazardous material management program significantly reduces the generation of hazardous waste from U.S. Navy vessels. Hazardous material on the piers afford the reuse of material between ship and shore. In FY17 alone, this program yielded over 1.6 million dollars in acquisition and disposal cost savings.

NBK continues to reduce the amount of petroleum-based fuel used in non-military vehicles by using alternative fuels and electricity. E-85, an ethanol fuel blend, is the primary fuel dispensed, diverting a total of 195,000 gallons from fossil fuels in FY17. Biodiesel is also used as an alternative fuel which has diverted 9,300 gallons in FY17. In addition, 12 percent of the government fleet is comprised of electric vehicles.



David Blake, an electronics control mechanic at NBK demonstrates use of an industrial mop-water reuse/recycle system. The system treats used mop water which would otherwise be designated as a hazardous waste.

In FY17 alone, the Naval Base Kitsap ship-to-shore hazardous material management program yielded over 1.6 million dollars in acquisition and disposal cost savings. }

## NON-INDUSTRIAL INSTALLATION

### Naval Support Activity, Bahrain

Naval Support Activity (NSA) Bahrain has no excess infrastructure to spare on its 268 acres serving a community of over 8,500 personnel. NSA Bahrain's EMS has been an essential tool in enhancing the base's existing, mature environmental programs. Increased awareness training and communication among installation tenants and contractor personnel has resulted in a 15 percent reduction in the number and severity of oil and hazardous substance releases to the environment from FY14.

With no permanent environmental staff onsite to manage the waste streams, NSA Bahrain relies on a local company to collect, segregate and transport material that would otherwise require disposal.



NSA Bahrain engages the host nation annually in an spill response table top exercise. More than 70 participants met this year exploring possible solutions to spill scenarios that may impact the Arabian Gulf.

*Layla Turabi*

## environmental restoration

These awards recognize efforts to protect human health and the environment by cleaning up DoD sites in a timely, cost-efficient and responsive manner. Nominations can be submitted from the military departments and defense agencies for any U.S. military active or closing installation worldwide and any individual or team.

## TEAM

### Naval Air Station Oceana, Virginia

Environmental restoration at NAS Oceana is currently conducted through a Resource Conservation and Recovery Act (RCRA) Administrative Order on Consent which was issued by the U.S. Environmental Protection Agency (EPA) and required response actions at 60 Solid Waste Management Units at NAS Oceana and Naval Auxiliary Landing Field (NALF) Fentress. During the awards period, the environmental restoration team performed environmental management activities on 20 active sites at these two sites as well as Dam Neck Annex, also under the operational control of NAS Oceana. The team assessed and addressed drinking water impacts



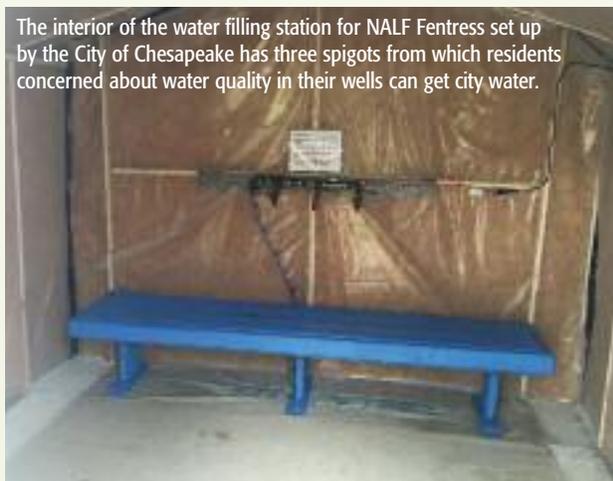
NSA Bahrain's environmental department installed a truck scale to weigh all recyclable materials before sending those materials off-base for recycling. Getting an accurate weight for these materials increases recycling revenues.

*Binoy Chacko*



**Finding and discriminating subsurface anomalies using the Time-domain Electromagnetic Multi-sensor Towed Array Detection System. Successful application at the Dam Neck Annex has helped to evaluate the use of this technology for military construction activities at other bases.**

from per-and polyfluoroalkyl substances (PFAS) at NALF Fentress and NAS Oceana, which required interactions with more than 500 residents, regulatory agencies, municipalities and other stakeholder organizations and preparation for and attendance at four public meetings. Granular activated carbon systems were tested, designed and installed to address PFAS in wastewater on-base and in drinking water on- and off-base. All activities were completed with a steadfast commitment to communication with the public.



**The interior of the water filling station for NALF Fentress set up by the City of Chesapeake has three spigots from which residents concerned about water quality in their wells can get city water.**

The systems established at NALF Fentress and NAS Oceana have been successful in removing PFAS to levels less than the lifetime health advisory set by the EPA. Key technical findings were presented at the Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies. The environmental restoration team also investigated a solvent plume surrounding a hangar with care to minimize impacts to building operations.

### **Naval Base Coronado, California**

Naval Base Coronado (NBC) is home to over 34,000 active duty and civilian employees and includes eight geographically separate installations.

Since 2014, the environmental restoration team has been working to address the potential effects of volatile organic compounds (VOC) in the groundwater at the base, including its effects on indoor air. One building in particular (Building 379) showed indoor air contaminant concentrations above action levels, due to the presence of VOCs. In FY16, the team developed a remediation plan and during the awards period, they worked diligently with all stakeholders to carry out their plan—also being nimble enough to modify the plan when room for improvement was discovered.

The team developed and implemented an innovative and sustainable approach to clean out and seal 15,000 feet of floor cracks resulting in resource and cost savings of over \$450,000. A soil vapor extraction system was installed



**Soil vapor is extracted from horizontal wells and treated using a cooling, compression and condensation system. This system is capable of removing over 99 percent of the compounds entrained in the vapor stream as a liquid condensate.**

## Removal of munitions on Vieques will accelerate the public use of these beaches and their nearshore waters by more than a decade. }

using horizontal wells to extract vapors from under the building without impacting building operations. This approach allowed relocated employees to return to the building.

The extracted VOCs were converted to liquid and recycled for an additional \$53,000 savings. The building-specific attenuation factors developed for slabs could have applicability across DoD facilities (with potential savings in the millions of dollars).



A total of 15,380 linear feet of large concrete floor joints, cracks and penetrations were cleaned and sealed throughout NBC's Building 379. A dry-cleaning method using various concrete crack chasing saws connected to a vacuum were used to "open" the joint and floor cracks and seal using a chemical-resistant self-leveling silicone-based concrete joint sealant.

### Vieques Naval Installation, Vieques, Puerto Rico

Vieques Naval Installation was used during six decades of military training by the Navy and allied forces. In 2005, the site was placed on the National Priorities List, requiring the Navy to undertake cleanup across 23,000 acres of land and 12,000 acres of surrounding waters. Environmental restoration on Vieques is the highest priority and the costliest project in the Navy's Munitions Response Program

In FY17, a multi-year non-time-critical removal action (NTCRA) is being implemented to accelerate risk reduction by removing underwater munitions that may be readily encountered. The NTCRA utilizes a removal prioritization process that includes criteria such as likely public exposure, munitions types, densities, condition and potential mobility. This NTCRA began with the removal of five World War II-era rockets just offshore of a small island adjacent to a popular public beach. Removal of these munitions will accelerate the public use of these beaches and their nearshore waters by more than a decade.

Also in FY17, a time critical removal action was instituted to clean up a 75-acre former bombing range where tens of

thousands of submunitions from cluster bombs were dropped over decades of military training. This innovative cleanup approach includes using remotely operated equipment to remove large bombs (using a magnetic attachment) and cut and rake the vegetation into piles (using mowers with rake attachments). This will allow munitions clearance workers to safely access the area to remove the submunitions and burn the vegetation piles.

As part of a 2,000-acre Remedial Investigation, the nature and extent of subsurface munitions and associated contamination must be delineated. To streamline logistics and reduce cost, the Navy developed an innovative



The Polar Organic Chemical Integrative Sampler technology has helped to demonstrate that munitions constituents are not a significant concern in the marine environment, which may save millions of dollars at Vieques and elsewhere.

*Gunther Rosen*



Diver measuring the movement and burial of a munitions surrogate. The Vieques team is helping to develop a predictive model that will support underwater munitions cleanup efforts across DoD.  
*John Martin*

approach that includes the use of an advanced geophysical classification instrument. This technology is used to distinguish subsurface munitions from scrap metal and is estimated to save an estimated \$100,000.

Understanding the movement of munitions in the underwater environment and their interaction with beaches is of critical importance because beaches are the most sought-after destinations by the public. Throughout 2016 and 2017, the mobility of 61 munitions surrogates, deployed just offshore of nine beaches, was monitored to measure their movement changes under variable sea conditions. The results of this study will be used to make long-term predictions of beach changes and burial and mobility of munitions in a wide range of conditions both at Vieques and other restoration sites across the country.

A preliminary wide area assessment (WAA) of the entire 12,000-acre marine environment was also conducted using a towed magnetometer and underwater video cameras. This wide area approach will

save significant time and tens of thousands of dollars versus the cost of biological assessments prepared for multiple, localized areas. Most importantly, the information gathered from the WAA is key to effectively strategize focused, follow-up investigations, help make remedial decisions, implement remedial actions and perform long-term monitoring associated with underwater munitions.

Throughout FY17, the Navy also led stakeholder site visits, supported a munitions safety event for local schoolchildren and sponsored a tour and briefing of the Vieques cleanup for the Secretary of the Interior.

## cultural resources management

This award recognizes efforts to promote cultural resources stewardship in the DoD by highlighting outstanding examples of cultural resources management. Awards are designed to showcase DoD's extensive cultural resources including archaeological sites and cultural landscapes. Desired initiatives include

partnering with external stakeholders such as native Americans, State Historic Preservation Officers and local communities; and internal stakeholders such as master planning, public works and range management. Nominations may be from the military departments or defense agencies for any U.S. military active or closing installation worldwide.

## LARGE INSTALLATION

### Naval Air Station Whidbey Island, Washington

NAS Whidbey Island is the sole naval aviation support in the Pacific Northwest. The installation manages nearly 2,000 buildings and structures with 28 structures eligible for listing in the National Register of Historic Properties.

During the awards period, the cultural resources management team completed an MOA for alternatives to the proposed demolition of eight historic farmhouses. The farmhouses are the original homes of Dutch settlers who homesteaded and farmed the area that would eventually become NAS Whidbey Island.



A 1946 aerial shot of Whidbey Island shows historic farms around the periphery of the airfield. Hangar 1 is shown in lower right foreground.

# Naval Air Station Jacksonville documented the history and demolition of the hangars in its Landplane Hangar Historic District in a hardcover book.

A 10-mile segment of the Oregon Trail runs through NWSTF Boardman. An Oregon Trail Management Plan is in development incorporating tribal input. Oregon Trail ruts may be seen in the left foreground of trail marker.

*Stephen Beckham*



A diverse range of studies and consultations were also accomplished during the awards period. The cultural resources team initiated a consultation under Section 106 of National Historic Preservation Act (NHPA) on the development of an agreement to address the effects of maintenance on historic properties on the island. An early Euro-American settlement study and context report was completed during FY17. This report identifies potential historic landscapes and archaeological concerns for pre-military sites that remain on the installation.

Consultation took place with the Swinomish Indian Tribal Community to bring a Navy archaeological collection into compliance with federal requirements and a cooperative agreement with the Confederated Tribes of the Umatilla Indian Reservation was completed for tribal ethnographic study contributing to the

Management Plan for the Oregon Trail at Naval Weapons System Training Facility (NWSTF) Boardman.

## Naval Air Station Jacksonville, Florida

Currently occupying nearly 4,000 acres, NAS Jacksonville's cultural resources include 37 archeological sites, five historic districts and seven buildings individually eligible for listing in the National Register of Historic Places.

In 2015, one of the historic buildings on the station, the married officers quarters, was irreparably destroyed by fire. Working with the public/private venture partner, the state and the Indian tribes, the cultural resources team reached an agreement that was approved to demolish the unit and monitor for archeological resources. A green space on the river with an informa-

tional sign and picture about the district will be installed in its place.

The team also signed an MOA with the Florida State Historic Preservation Office regarding the demolition of hangars in the Landplane Hangar Historic District. The MOA outlines mitigation requirements including documentation of the demolition.

NAS Jacksonville documented the history and demolition of the hangars in its Landplane Hangar Historic District in a hardcover book. Additionally, a three-dimensional representation of the district using salvaged parts from the hangars is displayed in the Jacksonville Museum of Science and History along with a fly-through video of the hangars and their history.



A communication command offered this Western Electric switchboard with 1950 instruction manual to the NAS Jacksonville cultural resources team. The team then offered the artifact to the Naval History and Heritage Command.

*Angela Glass*



NAS Jacksonville's Natural Resources Interpretive Center displays replica artifacts from various locations. Three cases display artifacts from prehistoric times through World War II. Hundreds of students from surrounding counties visit the center annually.

*Angela Glass*

## environmental excellence in weapon system acquisition

The Environmental Excellence in Weapon System Acquisition awards recognize efforts to incorporate Environment, Safety and Occupational Health (ESOH) requirements into the weapon system acquisition program's system engineering, contracting and decision-making processes.

### LARGE PROGRAM

#### Naval Air Systems Command 4.3.4 Environmental Safety and Occupational Health Team

Located in Patuxent River, Maryland, the Naval Air Systems Command (NAVAIR) 4.3.4 ESOH team began restructuring in February 2017 to form cross-functional, government teams focused on a particular ESOH discipline. The realignment is consistent with NAVAIR's streamline initiatives and the new structure exceeds the 2017 guidance from the Office of the Assistant Secretary of the Navy (Energy, Installations & Environment).

During FY17, the NAVAIR ESOH team developed a NEPA/Executive Order 12114 brief that significantly



NAVAIR provides lifecycle support to naval aviation aircraft, weapons and systems operated by Sailors and Marines. Here, CNO Admiral John Richardson views an E-2D Advanced Hawkeye at NAS Patuxent River.

*MCI Nathan Laird*

increased decision-makers' basic understanding of the acquisition application and the importance of environmental laws and statutes. The NAVAIR 4.3.4 ESOH team also developed a searchable repository of NEPA documents which has improved the team's efficiency and response times to requests for NEPA documentation and enhanced consistency in decisions.

The same team also pioneered the creation of government-furnished equipment Hazardous Material Management Program Reports, resulting in a template for additional Acquisition Category 1 programs. Finally, the team created actionable lists that influence how programs address hazardous material minimization, guiding the utilization of finite program resources to target the most impactful hazardous materials.

#### Naval Air Systems Command PMA365 Green Hornet Team

Also located in Patuxent River, Maryland, the Green Hornet team's superior ESOH execution and risk management is reflected in an aircraft with sustained Class A mishap-free operations and the first U.S. Navy jet fighter aircraft to demonstrate the feasibility of noise reduction technologies without degradation of jet performance.

## The Green Hornet's ESOH team continued to prove that VEN chevrons jet noise reduction technology is an engineering solution to noise-induced hearing loss. }

In FY17, the Green Hornet's ESOH team continued to prove that variable exhaust nozzle (VEN) chevrons jet noise reduction technology is an engineering solution to noise-induced hearing loss experienced by flight deck personnel. The team also collaborated with the scientific research community to find transferable solutions for DoD-wide common ESOH risks such as hexavalent chromium and aircraft noise and continued to allocate funds and aircraft assets for other science and technology solutions to hazardous materials and energy efficiency (e.g., alternative material demonstrations and tests).

### for more information

For more background on the use of VEN chevrons to reduce jet engine noise, read our story "F/A-18 Program Explores the Use of Exhaust Nozzle Chevrons to Reduce Engine Noise: Innovation Demonstrates Proactive Acquisition Program Management by Fighter Jet Team" in the winter 2015 issue of *Currents*. You can browse the *Currents* archives at the Department of the Navy's Energy, Environment and Climate Change web site at <http://navysustainability.dodlive.mil/currents-magazine>.



VEN chevrons installed on an F/A-18E Super Hornet. Tests demonstrated integration of VEN chevrons onto the F414/F404 engine can achieve upwards of a 3-decibel reduction over much of the frequency range. VEN chevrons help mix the jet plume faster to reduce noise.





The F/A-18E/F Super Hornet (left) and EA-18G Growler (right) programs are managed by PMA265. The Super Hornet is a combat-proven platform with demonstrated capabilities in multiple warfighting roles, while the Growler is a mission-changing electronic attack aircraft.

**afloat**

This category includes five competitive sub-categories.

**LARGE DECK COMBATANT**

**USS George H.W. Bush (CVN 77)**

USS George H.W. Bush is homeported in Norfolk, Virginia. The crew of 2,992 personnel is augmented by an additional 1,795 personnel from Carrier Air Wing Eight, Carrier Strike Group 2 and Destroyer Squadron 22. Accomplishments this past fiscal year include the successful completion of a compressed pre-deployment training cycle and a record-setting 208-day deployment in support of Operation INHERENT RESOLVE. In all endeavors, CVN 77 maintained a sterling record of environmental stewardship and natural resource protection.

During the award period, USS George H.W. Bush recovered and transferred 11,000 pounds of refrigerant and recycled over 250 gallons of hydraulic fluid every month through internal filters within the ship's four aircraft elevators. Every day at sea, over 2,000 pounds of burnable waste and 2,500 pounds of food and paper were properly processed.

Training emphasizes that plastics are never discharged to the sea and all plastic disks are held onboard the ship for proper offload and disposal while in port or during replenishment at-sea. In addition, the Hazardous Material Minimization Center issue and re-utilization process ensures that any material used more than once is repackaged and re-issued until completely expended.

USS George H.W. Bush arrives at Naval Station Norfolk.  
*MC Specialist Seaman  
Cameron Stoner*



Champion used 1,512 gallons of fuel below class average due to outstanding maintenance practices and aggressive management of fuel consumption. }

### LITTORAL OR AMPHIBIOUS WARFARE

#### USS Champion (MCM 4)

USS Champion is a mine countermeasures (MCM) ship, manned by 99 Sailors and homeported in San Diego, California.

During FY17, Champion conducted over 100 fuel and oily waste transfers and unloaded 250,000 gallons of fuel in port with zero spills. As whale migrating season was underway, the crew adopted the new, more complex marine mammal reporting requirements during their 500 hours of operations at sea.

Limitations in recycling and storage capabilities on this small ship made tracking and managing solid waste challenging. Through meticulous record keeping, Champion achieved its goal of zero inadvertent discharges.



A typical oily waste separator like this one helps Champion's crew separate waste oil from water to prevent contaminated water from being discharged at sea.

In addition, Champion used 1,512 gallons of fuel below class average due to outstanding maintenance practices and aggressive management of fuel consumption. This saved 850,000 pounds of carbon dioxide from being released into the atmosphere.

### MILITARY SEALIFT COMMAND

#### USS Frank Cable (AS 40)

Homeported at Apra, Guam, USS Frank Cable is an Emory S. Land class submarine tender with a crew of 950 Navy Sailors and 156 civilian mariners from the Military Sealift Command (MSC).

Cable steamed over 9,400 nautical miles during the awards period and transited to Vigor Shipyard in Portland for an extended planned maintenance period. During the 49 million dollar dry dock maintenance period, all facets of Pollution Prevention Afloat equipment were either repaired or replaced.

The engineering department replaced over 3,000 fluorescent bulbs with light emitting diodes throughout the ship. Three air conditioning and reefer (ship) plants were completely overhauled, during which numerous small leaks were found and corrected, minimizing accidental refrigerant release.

USS Champion arrives at Naval Base San Diego.  
MC2 Jennifer S. Kimball





USS Frank J. Cable in dry dock in Portland, Oregon.  
*MC Specialist Seaman Heather C. Wamsley*

Through careful source reduction techniques and close monitoring from “cradle-to-grave,” the command saves \$250,000 of procurement costs annually. The Navy and MSC supply departments were both rated as “excellent” overall during the FY17 supply maintenance inspection and supply assist visit.

Cable personnel organized a comprehensive trash collection and recycling campaign with more than 400 participants that resulted in over 12,000 aluminum cans being removed from the waste stream. Ten Sailors donated 60 hours of their off-duty time to collect trash and preserve

trails along the Columbia Gorge in Portland, while 54 Sailors donated over 162 hours in preservation of polluted areas in the vicinity, including community centers, animal shelters and orphanages, which enhanced community relation throughout the island of Guam.

**SUBMARINE**  
**USS Tennessee (SSBN 734)**

Homeported in Kings Bay, Georgia, USS Tennessee is a ballistic missile submarine carrying over 350 Sailors between its two crews.



Through source reduction techniques and careful monitoring of hazardous waste, Frank Cable saves \$250,000 of procurement costs yearly.  
*MC Seaman Randall W. Ramaswamy*



USS Tennessee returns to homeport at Naval Submarine Base Kings Bay.  
*MC1 James Kimber*

## The oil spill response team held frequent drills, helping Decatur achieve its record of zero hazardous substance spills.

As a fast attack submarine, this class of vessel has an especially short upkeep period. Sailors are required to prepare to turn over or refit the vessel even before it returns to port. Given this shortened time window, it's even more difficult to meet environmental stewardship goals.

During FY17, the ship was assessed "at or above" standards for hazardous materials management during type command supply management inspection.

The most recent Naval Safety Center Survey in March 2017 yielded an "above" standards rating. In this survey, the crew was able to decrease repeat discrepancies by 27 percent. These positive evaluations are due in part to the 1,500 hours of environmental awareness training which the crew completed during the awards period.

USS Tennessee had six refit periods during FY17 and successfully offloaded thousands of pounds of hazardous waste without incident.

### SURFACE COMBATANT

#### USS Decatur (DDG 73)

Homeported in San Diego, USS Decatur is an Arleigh Burke class destroyer carrying 338 personnel. Throughout the awards period, Decatur demonstrated strict adherence to approved procedures such as fuel and energy-saving measures, use of a certified oil water separator system and the continual use of a shredder and plastic emulsifier to minimize waste. The oil spill response team held frequent drills, helping Decatur achieve its record of zero hazardous substance spills.

In FY17, a valve maintenance program was initiated to enhance shipboard environmental protection and awareness. The program requires documentation of maintenance performed on all valves in order to increase ownership, identify degraded valves and avoid overboard discharges due to damaged or degraded valves.



USS Decatur prepares to depart Naval Base San Diego.  
*MC Specialist Seaman Kelsey L. Adams*

For additional information about the Navy's energy, environment and compatibility initiatives, visit <http://navysustainability.dodlive.mil/home>.

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### the awards process

The annual CNO Environmental Awards program recognizes installations, individuals, teams and Navy ships that demonstrate environmental excellence and are the first step in a three-part competition within the DoD. Winners at the CNO level become nominees, along with Marine Corps nominees, at the Secretary of the Navy (SECNAV) level of competition. With the exception of the small ship and environmental planning categories, which have no equivalent at the Secretary of Defense (SECDEF) level, winners at the SECNAV level become nominees at the SECDEF level of competition.

## Join SERDP & ESTCP for an Upcoming Webinar

Promoting the Transfer of Innovative, Cost-Effective & Sustainable Solutions

**THE STRATEGIC ENVIRONMENTAL** Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP) continue to offer their webinar series to promote the transfer of innovative, cost-effective and sustainable solutions developed by both programs.



The series targets end users, including practitioners, the regulatory community and researchers. The primary objective of the series is to provide these end users with cutting-edge and practical information from sponsored research and technology demonstrations in an easily accessible format at no cost to participants.

Most webinars feature two 30-minute presentations and interactive Q&A sessions. Participants must register in advance for all webinars. To register and view the most up-to-date schedule for upcoming webinars and access archived files of past webinars, visit [www.serdp-estcp.org/Tools-and-Training/Webinar-Series](http://www.serdp-estcp.org/Tools-and-Training/Webinar-Series). Dates and topics for upcoming webinars are included below but are subject to change.

- June 14, 2018  
Approaches to Managing Threatened, Engendered and At-Risk Bird Species
- June 28, 2018  
Environmental Restoration Program Area Webinar
- July 12, 2018  
Energy and Water Program Area Webinar
- August 16, 2018  
Resource Conservation and Resiliency Program Area Webinar
- September 6, 2018  
Environmental Restoration: Chlorinated Solvents

- September 20, 2018  
Resource Conservation and Resiliency: Longleaf Pine
- October 4, 2018  
Chlorinated Solvents Workshop Overview and Feature Projects
- October 18, 2018  
Forecasting Effective Site Characterization and Early Remediation Performance
  - Dr. Michael C. Kavanaugh, Geosyntec Consultants
  - Dr. David A. Reynolds, Geosyntec Consultants
  - Dr. Kevin G. Mumford, Queen's University
- November 1, 2018  
Resource Conservation and Resiliency Program Area Webinar
- November 15, 2018  
Environmental Restoration Program Area Webinar
- December 13, 2018  
Energy and Water Program Area Webinar



Following the completion of each live webinar, archives of the presentation and audio will be available online. [📎](#)

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## Register Now for the 2018 SERDP & ESTCP Symposium

Program Includes Technical Sessions & Training Opportunities

**THE STRATEGIC ENVIRONMENTAL** Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) Symposium will be held November 27–29, 2018 at the Washington Hilton in Washington, D.C. The Symposium will highlight the programs’ recent efforts to enhance mission capabilities, reduce costs in times of increasing fiscal constraints and improve environmental and energy performance.

An introductory plenary session will be followed by a comprehensive technical program consisting of concurrent technical sessions and short courses covering a variety of scientific and technical topics. Technical sessions will highlight research and innovative technologies that improve the Department of Defense’s (DoD) environmental performance, reduce costs and enhance

mission capabilities. Short courses will offer unique training opportunities on emerging technologies and methods in environmental restoration and munitions response. Professional development hours will be offered for participation in short courses. Attendance for these short courses will be limited and advanced registration for each short course is required.

For additional information  
or to register for  
the Symposium, visit  
[www.symposium.serdp-estcp.org](http://www.symposium.serdp-estcp.org).

Attendees will have numerous opportunities to tour more than 450 posters and exhibit booths and network with approximately 1,000 environmental professionals. Technical exchange networking receptions will be held both Tuesday and Wednesday evening in conjunction with the poster sessions.

### The Basics About SERDP & ESTCP

SERDP IS DoD’s environmental science and technology program, executed in partnership with the Department of Energy and the U.S. Environmental Protection Agency. SERDP invests across a broad spectrum of basic and applied research and advanced development. ESTCP is DoD’s environmental and installation energy technology demonstration and validation program. The program’s goal is to identify and demonstrate cost-effective technologies that address DoD’s highest priority environmental and installation energy requirements. Both programs address DoD environmental and installation energy needs in the following areas:

1. Environmental Restoration
2. Installation Energy and Water
3. Munitions Response
4. Resource Conservation and Resiliency
5. Weapons Systems and Platforms



For additional information or to register for the Symposium, visit [www.symposium.serdp-estcp.org](http://www.symposium.serdp-estcp.org). 

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## Updated Environmental Restoration Program Manual Now Available

Radiological Contamination & Per- and Polyfluoroalkyl Substances Among Topics of Interest

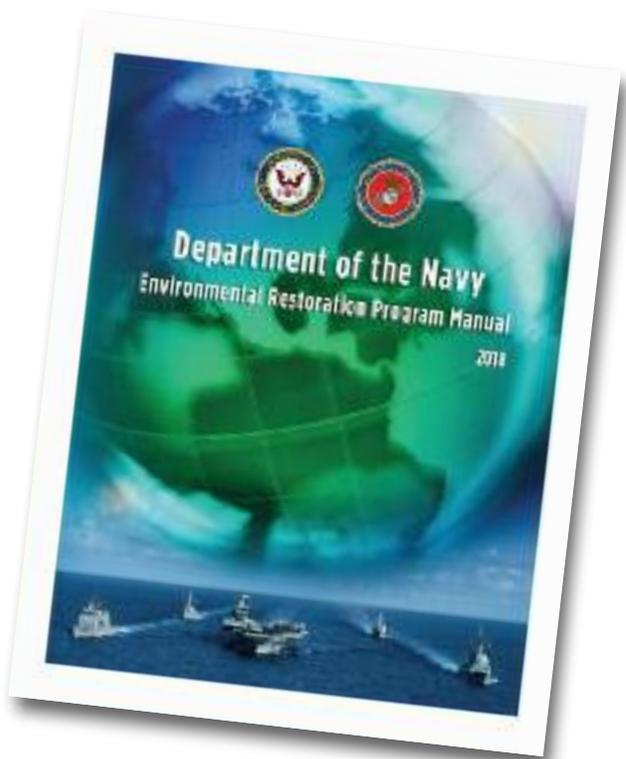
**NAVAL FACILITIES ENGINEERING** Command (NAVFAC) personnel have just released an update to the Department of the Navy (DON) Environmental Restoration Program (NERP) manual. This 2018 version updates and replaces the 2006 NERP manual and applies to DON Environmental Restoration sites on active and Base Realignment and Closure (BRAC) installations in the United States and territories of the United States. It is a comprehensive policy and guidance tool for Remedial Project Managers (RPM) and other professionals working to support DON Environmental Restoration.

This 2018 version updates and replaces the 2006 manual and applies to DON Environmental Restoration sites on active and BRAC installations.

To ensure a complete update of this comprehensive document, subject matter experts from the NAVFAC Engineering and Expeditionary Warfare Center (EXWC), NAVFAC Headquarters, NAVFAC Atlantic and Pacific, each of the NAVFAC Facilities Engineering Commands (FEC), support organizations throughout the DON, legal counsel and leadership all provided reviews, updates and resource material. Just as an RPM's job is interdisciplinary and requires proficiency in many different areas, so the NERP manual required expertise in a broad range of disciplines to support the update.

Some of the many areas that have been updated include current topics of interest such as radiological contamination, emerging contaminants including per- and polyfluoroalkyl substances, munitions response and optimization.

The 2018 NERP manual reflects significant changes made to the Environmental Restoration program since 2006 including:



- Elimination of the October 1986 Active Base Installation Restoration Program funding eligibility date.
- Elimination of the September 2002 Active Base Military Munitions Response Program funding eligibility date.
- Establishment of the new Department of Defense Environmental Restoration Program goals based on the Response Complete milestone.
- Establishment of the Marine Corps Installations Command.

As a comprehensive guidance, the NERP manual covers many different topics, so some familiarity with the document contents may be helpful to a new user:

- The first three chapters provide an overview of the relevant laws, organizational roles and responsibilities and the role of stakeholders.
- Chapter four gives important information on the budgeting process and Environmental Restoration, Navy funding eligibility.
- Chapters five through eleven include details on each of the phases of the Environmental Restoration process.



- Chapters 12 through 19 cover numerous unique topics such as munitions response, petroleum storage sites, radiological sites, emerging contaminants, property transactions, recordkeeping, community involvement and health and safety.

- There are several appendices, the first of which is a reference table organized by topic, so that the user can quickly locate additional resources on a given topic of interest.

The 2018 NERP manual is available for download on the NAVFAC Environmental Restoration and BRAC (ERB) website at [www.navfac.navy.mil/go/erb](http://www.navfac.navy.mil/go/erb). You will find the announcement and link in the center of the page. The new manual is also posted on the Guidance, Policy and Regulations page of the ERB. Limited hard copies have already been shipped to users. Additional hard copies may be available through NAVFAC EXWC. [↓](#)

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## TELL YOUR STORY IN CURRENTS

Do you have some good news to share about your energy or environmental program? *Currents* is just the place to tell your story. *Currents*, the Navy's official energy and environmental magazine, has won first place in the Navy's Chief of Information (CHINFO) Russell Egnor Navy Media Award program three times. *Currents* was most recently awarded a second-place medal in the "Digital Publication" category in the 2017 Navy Media Award competition. And it's people like you and the stories you submit that make *Currents* a continual award-winner.

If you have a story that you'd like to promote in our fall 2018 issue, submit your text and images by Friday, July 20, 2018. Any submissions received after this date will be considered for our winter 2018-19 issue.

You can get a copy of the *Currents* article template by sending an email to Bruce McCaffrey, our Managing Editor, at [brucemccaffrey@sbcglobal.net](mailto:brucemccaffrey@sbcglobal.net). This template has proven to be a tremendous asset in helping us edit and track your article submissions. Bruce is also available at 773-376-6200 if you have any questions or would like to discuss your story ideas.

And don't worry. If writing isn't one of your strengths, we'll handle all of the editing necessary to get your submission into publishable form.

As a reminder, your Public Affairs Officer must approve your article before we can consider it for inclusion in the magazine.

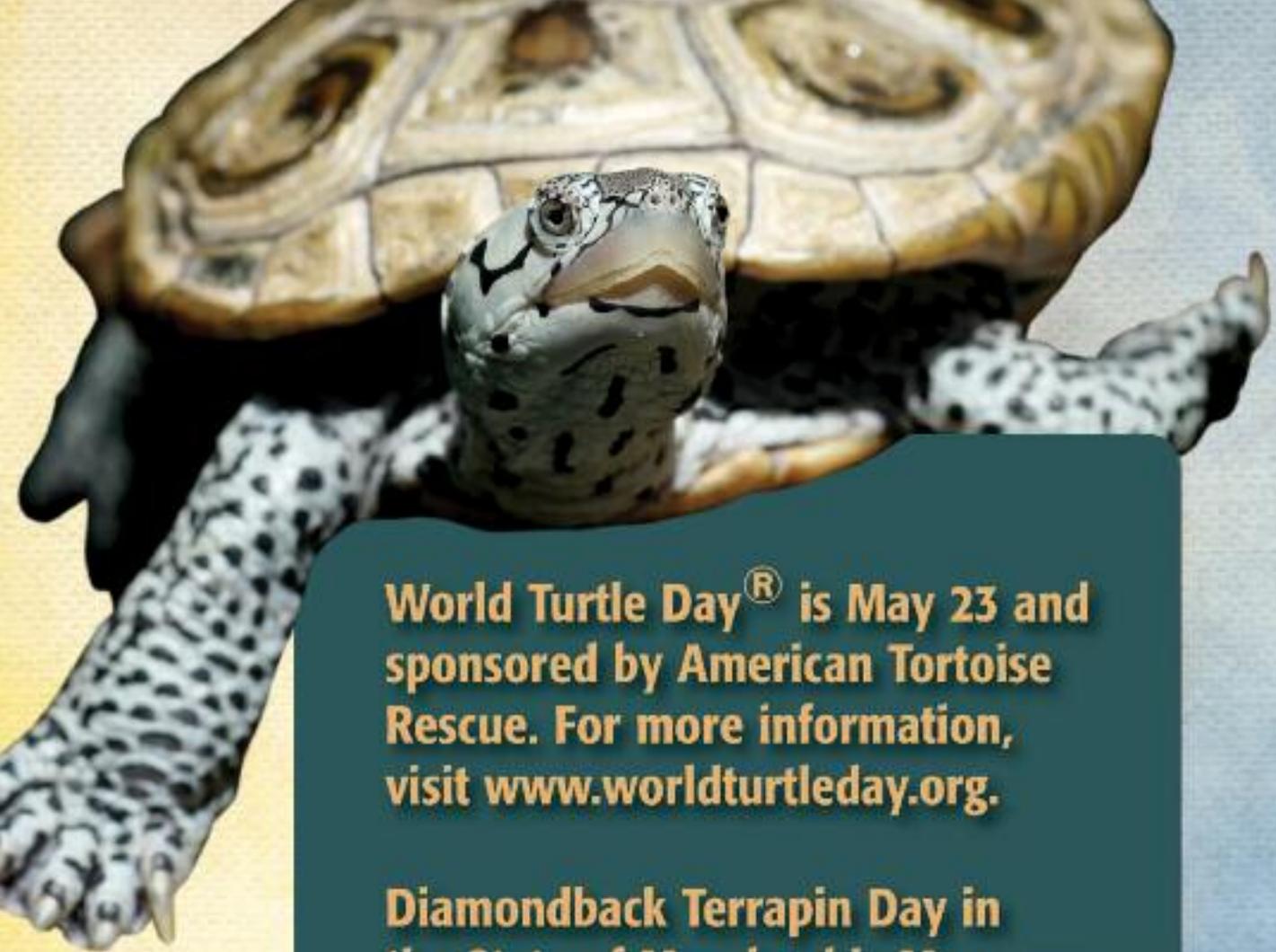
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### CURRENTS DEADLINES

Fall 2018	July 20, 2018
Winter 2018-19	October 20, 2018
Spring 2019	January 18, 2019
Summer 2019	April 19, 2019

**Currents Recognizes World &  
Diamondback Terrapin Turtle Days!**





**World Turtle Day<sup>®</sup> is May 23 and sponsored by American Tortoise Rescue. For more information, visit [www.worldturtleday.org](http://www.worldturtleday.org).**

**Diamondback Terrapin Day in the State of Maryland is May 13. For more insights into the U.S. Navy's efforts to survey and protect this tiny turtle, read our story "Helicopters & Terrapins Share Space at NAS Patuxent River" at [navysustainability.dodlive.mil/currents-magazine/currents-magazine-2017/spring-2017](http://navysustainability.dodlive.mil/currents-magazine/currents-magazine-2017/spring-2017).**



# Currents

# NESDI Program Launches New Projects

## Efforts Include Using Biochar to Remove Regulated Contaminants from Dry Dock Discharges

**THE NAVY ENVIRONMENTAL** Sustainability Development to Integration (NESDI) program launched 14 new initiatives in fiscal year 2018 to address some of the Navy's most pressing environmental operational challenges. These projects range from testing the efficacy of biochar to remove regulated contaminants from shipyard dry dock discharges to eliminating hexavalent chromium

from magnesium conversion coating processes at the Navy's Fleet Readiness Centers (FRC).

Each year, the NESDI program collects environmental needs from across the Navy's shore community. Based on selected needs, project teams are formed to demonstrate, validate and integrate innovative technologies, processes and materials into fleet operations. In late 2017, the program gave the green light to the following 14 "new start" projects listed in the table on the next page.

The first seven projects in the table were highlighted in the winter 2017-18 issue of *Currents*. The second set of seven projects are described in the sections below.

### Learn More

**TO READ MORE** about the first seven projects included in the table on the next page, read our article "NESDI Program Initiates Several New Projects" in the winter 2017-18 issue of *Currents*. You can browse the entire *Currents* archive at <http://navysustainability.dodlive.mil/currents-magazine>.

### Biochar Adsorption for Dry Dock Effluent (project no. 560)

This NESDI project will establish the efficacy of biochar in removing regulated contaminants from shipyard dry dock discharges.

Navy shipyard dry docks generate industrial process water that may contain metal particulates as well as nutrients from stormwater runoff, non-contact cooling systems and other activities that are regulated under the National Pollutant Discharge Elimination System (NPDES) program. NPDES permit requirements at Navy shipyards are becoming increasingly more restrictive—particularly with respect to the concentrations of metals and nutrients allowed in point source discharges.



NO.	PROJECT	TITLE	PRINCIPAL INVESTIGATOR
1.	553	Study of Waste Management and Minimization for AFFF Wastewater	Daniel Edwards (NAVFAC EXWC)
2.	554	Addressing Temporal Variability in Industrial Buildings during Vapor Intrusion Assessments	Trish Venable (NAVFAC EXWC)
3.	555	Demonstrating the Effectiveness of Novel Treatment Technologies for the Removal of Poly- and Perfluoroalkyl Substances from Groundwater	John Kornuc (NAVFAC EXWC)
4.	556	Enterprise-wide Hazardous Material Standardization and Minimization of General Use Consumables	Renata Laing (NAVSUP WSS)
5.	557	Initiation Decision Report of Laser Coating Removal on Naval Aircraft Components	Stephen Starnes (FRC-SE)
6.	558	In-situ Automatic Stormwater Sampling Device for Use at Tidally Impacted Sampling Locations	Ernie Arias (SSC Pacific)
7.	559	Background Analysis and Tracer Study to Identify Metal Contaminant Source Contributions to Stormwater Runoff	Jim Leather (SSC Pacific)
8.	560	Biochar Adsorption for Dry Dock Effluent	Lewis Hsu (SSC Pacific)
9.	561	Development and Demonstration of a Portable, Temporary Barrier to Aid in Cargo and Equipment Inspections to Prevent Brown Treesnake Dispersal	Jean Pan (NAVFAC EXWC)
10.	562	Elimination of Hexavalent Chromium from Magnesium Conversion Coating Processes at Fleet Readiness Centers	Alan Grieve (NAWC AD Pax River)
11.	563	Low VOC Primers for Ground Support Equipment Application	Michael Brindza (NAWC AD Pax River)
12.	564	Implementation of Biotic Ligand Model-Based Water Quality Standards for Copper at Navy Sites	Gunther Rosen (SSC Pacific)
13.	566	Source Metal Particle Removal for Stormwater Compliance	Jim Howell (NSWC Carderock)
14.	567	Business Processes and Requirements Enabling Technology Integration	Martin McMorrow (NAVFAC EXWC)

Due to these stringent limits (on the order of parts per billion) and the limited capacity to treat large-volume continuous flows, shipyards may be at risk for exceeding NPDES permit limitations for metals such as copper, zinc and aluminum among others.

There are four dry docks at Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility (PHNSY&IMF), six dry docks at Puget Sound Naval Shipyard and additional

docks at other Washington State and California installations with similarly restrictive permit levels.

The State of Hawaii is aware of the significant challenges imposed by NPDES permit limitations and has granted PHNSY&IMF a Schedule of Compliance and interim permit limits for pollutants such as copper.

Although PHNSY&IMF can consistently attain its current interim limit for copper, the facility continues to

struggle to meet the final permit limitation, which will go into effect by October 2022. Best management practices (BMP) have helped to significantly lower metal and nutrient concentrations from the end-of-pipe discharge but do not appear adequate to meet long-term goals. There are presently no additional measures or opportunity to remove contaminants from discharges passing through the dry dock drainage system.

Recent testing has indicated that the use of biochar can be an effective means of removing metals and nutrients from stormwater and process water streams.

Recent testing has indicated that the use of biochar can be an effective means of removing metals and nutrients from stormwater and process water streams. A carbonaceous byproduct of bioenergy production, biochar is an inexpensive, highly porous filtration media with high contaminant retention rates.

This project team will place weirs within existing dry dock drainage troughs which will result in the temporary pooling of process water. This water will then be forced to flow up through a biochar device to provide adequate contact time and sequestration of contaminants. This upflow configuration has been found to be more effective than cross flow or other schemes. Lessons learned from previous studies indicate that rinsing the biochar prior to use increases the contaminant holding capacity and this practice will be implemented during the demonstration.

Other deployment strategies to be tested include the use of biochar as a treatment step within the dry dock sand trap and utilizing clarifying inserts being developed under another NESDI project (project no. 543: Preventative Management of Contaminated Silt). In this case, biochar will be a drop-in media filtration component in the clarifying inserts. Remedy effectiveness will be laboratory tested via U.S. Environmental Protection Agency (EPA) approved methods.



A submarine awaits repair in dry dock.  
MCS1 Amanda R. Gray

The data from this demonstration will be made available to end users to determine if this technology is a good fit at their respective sites. If so, the passive filtration fixtures used may be fabricated by shipyard tradespeople or contractors using commercially available biochar. Coordination with shipyard personnel and commercial biochar manufacturers will aid in the integration of this technology and provide an effective and useful means of deploying it. A final report including recommended testing and design criteria will be prepared to assist in future implementations.

Regulators will have access to the data from this demonstration as evidence of BMP improvement efforts targeting permit violation reductions. If successful, this technology will be included in future updates to BMPs found in shipyard Dry Dock Water Pollution Control Plans and future NPDES permits if applicable.

### Development and Demonstration of a Portable, Temporary Barrier to Aid in Cargo and Equipment Inspections to Prevent Brown Treesnake Dispersal (project no. 561)

The goal of this project is to create and demonstrate a portable, temporary barrier to help prevent the spread of brown treesnakes (BTS) through cargo shipments in the Pacific.

The brown treesnake (*Boiga irregularis*) is an invasive species with the largest current and potential impact to DoD activities in the Pacific. Since the late 1940s, the treesnake has caused the extinction or extirpation of many endemic species on Guam, including 10 of 12 forest birds. Were the treesnake to successfully invade other locations, particularly the Commonwealth of the Northern Mariana Islands (CNMI) and Hawaii, it could wreak both biological and economic havoc. Given the increased military activities in the region and military construction on Guam from the Guam and CNMI military relocation, there is a high risk of the treesnake being dispersed into these areas through the Department of Defense (DoD) transportation network.

Currently, the DoD spends millions of dollars a year on the management and control of the BTS. Much of this funding goes toward overseeing inspections of all outbound cargo and equipment from Guam for BTS stowaways. Inspection of cargo at inbound locations may also be required, depending on the location. The primary BTS inspection method is canine inspection followed by

human visual inspection. Cargo is inspected when it arrives at the outbound site and then daily until it is loaded onto a departing vessel. The speed at which cargo and equipment can be loaded and unloaded is limited by the number of canine teams and the time it takes for them to inspect each piece of cargo. If the canine teams fall behind cargo loading and off-loading, this can delay cargo and equipment transport and military missions.

To reduce delays for DoD shipments and military missions, this project team plans to use portable, temporary barriers to prevent the movement of BTS. Cargo and equipment that have passed an initial canine inspection can be stored within these barriers until the day of loading or transport, where they can undergo a final canine inspection before being moved. A portable, temporary barrier can also be used as a rapid response tool during the inspection process at a receiving jurisdiction when a canine alerts on the cargo item, but the BTS is not immediately visible. The barrier would serve as a quarantine structure until the BTS can be found and removed.



Brown treesnake.

While such barriers exist and are in use by the DoD, existing designs require ground penetration or disturbance (e.g., posts, walls, rebar) inserted into the soil, to be able to withstand local environmental conditions. This requirement for temporary barriers is problematic on Guam and the CNMI due to unexploded munition and cultural resource issues.

Utilizing some of the design elements of other temporary barriers, the team will design and test a new prototype barrier under controlled conditions. The successful design will then be field tested on Guam to determine its effectiveness against BTS and its ability to withstand environmental conditions. Following the successful deployment of

these tasks, a full-size barrier will be built and utilized in realistic transportation situations.

The team will transition this technology to a variety of audiences (e.g., end-users, DoD personnel, regulators). For long-term technology transition, the Naval Facilities Engineering Command Marianas team member will transition this technology within the DoD, at transportation venues and with regulators on Guam, CNMI and Hawaii. The team will also produce a guidance document on how to use the barrier, as well as in-person training and a training video.

### Elimination of Hexavalent Chromium from Magnesium Conversion Coating Processes at Fleet Readiness Centers (project no. 562)

This project will evaluate the use of hexavalent chromium (hex chrome) -free conversion coatings on magnesium alloys and demonstrate their effectiveness as a drop-in replacement.

Metal finishing processes are performed at all major Navy FRCs. Conversion coatings are the most common of these processes. They are thin films on a metal surface generated by reaction between the metal and a chemical solution. They are applied to alloys to provide some measure of corrosion protection and to promote adhesion between the alloy and subsequent surface treatments. While process specifications vary among FRCs, all current processes for applying conversion coatings to magnesium alloys use hex chrome-based chemistries, long established as both toxic and carcinogenic.

At the FRCs responsible for processing magnesium parts, the total magnesium conversion process tank volume exceeds 3,200 gallons, meaning that at any given time there is over 3,200 gallons of solution containing some level of hex chrome. At a single FRC, the cost associated with cleaning to limit heavy metal exposure to personnel exceeds \$1 million per year. Similar costs are borne across other FRCs—and this does not even include the further costs associated with management of associated hazardous waste. Elimination of hex chrome from magnesium finishing processes would be of great benefit toward the Navy's goal of reducing heavy metal usage.

Several hex chrome-free conversion coating formulations were evaluated by the Navy for use on magnesium alloys.

## All current processes for applying conversion coatings to magnesium alloys use hex chrome-based chemistries, long established as both toxic and carcinogenic.

Laboratory results showed comparable performance to the hex chrome-based formulas. Attempts to transition these technologies for use on magnesium alloys were not successful for various reasons. One of the primary issues inhibiting implementation was the lack of an observable color change. The presence of hex chrome conversion coatings is readily apparent due to their characteristic iridescent gold color, making it simple for artisans to assess the efficacy of a coating process. In contrast, none of the hex chrome-free coatings were observable, making process assessment very challenging.

The project team will first compare the processes in place at each FRC such that any new process, at a minimum, meets existing requirements. Next, extensive laboratory tests will be conducted using metrics such as coating weight/thickness and appearance to identify two to three potential candidates. The evaluation of color additives will be an integral part of this process. These candidates will be subjected to corrosion resistance testing. If successful, a pilot process line will be established at a suitable FRC using the chosen formulation. Corrosion/adhesion

performance will remain the primary metric, but effectiveness of the color additive will also be critical to assess the performance of the modified process.

To be successful, replacement coatings need to perform at least as well as the current coatings and exhibit similar process characteristics. If successful, demonstration at a second FRC will begin at the beginning of year three. A secondary goal is to generate sufficient data and know-how for the possible future development of a detailed specification for a non-hex chrome conversion coating process with the aim of aligning processes across FRCs.

If the demonstration and validation proposed here proves to be successful, implementation will begin at the demonstration site(s) immediately, before transitioning to other FRCs. This technology could be of value to other services, in particular the Army. Army engineers have already expressed interest in the proposed program and possible future collaboration.

### Low-VOC Primers for Ground Support Equipment Application (project no. 563)

The objective of this effort is to laboratory test, demonstrate, validate and qualify low-volatile organic compound (VOC) primers for use on ground support equipment (GSE).

There is a push both at the federal and local levels for the continual reduction of VOCs and hazardous air pollutants (HAP) associated with painting operations. Many of the military specification (mil-spec) primers have not changed significantly, whereas local and federal environmental regulations are continually changing. Two of these regulations, the Code of Maryland Regulations “Control of VOC Emissions from Vehicle Refinishing” (rule no. 26.11.19.23) and the Ventura County (California) Air Pollution Control District Rule “Motor Vehicle and Mobile Equipment Coating Operations” (rule no. 74.18) have the most stringent regulations in the nation with a primer maximum VOC limit of 250 gallons per liter (2.1 pounds per gallon). The current mil-specs for aircraft GSE primers have a maximum VOC requirement of 340 gallons per liter



Components of the H-53 and other helicopters are target applications for a non-hex chrome conversion coating process.

*Ismael Ortega*

## Failure to identify low-VOC primer alternatives can adversely affect Navy GSE coatings operations and increase the compliance cost of current and future local and EPA environmental legislations.

(2.8 pounds per gallon), meaning they are out of compliance with these current regulations.

While these rules currently affect only two jurisdictions (the State of Maryland and Ventura County), environmental regulations are traditionally broadly adopted and likely to be adopted elsewhere. The effects on the Maryland jurisdiction is significant because the primary overhaul facility for aviation support equipment is located in Solomons Island, MD.

Failure to identify low-VOC primer alternatives can adversely affect Navy GSE coatings operations and increase the compliance cost of current and future local and EPA environmental legislations.

According to the Naval Air Systems Command, the preferred primer for Navy GSE are products qualified to the Army-maintained MIL-PRF-53022 specification. Acceptable alternate primers are products qualified to MIL-PRF-23377 Class N (the mil-spec for the non-chrome class of primers). This effort will identify, test and qualify GSE-acceptable

primers to the MIL-PRF-23377 specification that are both HAP-free and VOC-compliant. Modified low-VOC formulations of qualified MIL-PRF-23377 Class N primers will be evaluated, as will metal-rich primer technologies and other potential low-VOC primers.

Laboratory testing will be performed on both steel and aluminum substrates with pretreatments and surface preparations that will capture the varying requirements of MIL-PRF-23377 and MIL-DTL-53022, and the capabilities of the GSE rework locations. Testing will include but not be limited to viscosity, spraying properties, pot life, dry time, adhesion, corrosion resistance, flexibility, fluid resistance, strippability as well as compatibility to qualified topcoats.

Upon successful laboratory testing, demonstration and validation of the low-VOC primers is anticipated to occur at FRCs in North Island, CA and Solomons Island, MD. The low-VOC primers will be applied on both land-based and shipboard GSE. The coating(s) will be evaluated for application characteristics and user friendliness. The durability of the new coating systems will be evaluated by photo documentation and direct visual inspection. Land-based evaluation intervals will be every six months for a total of two years. Shipboard GSE will similarly be evaluated as close to the six-month interval as ship schedules permit.



Primer is applied to GSE such as this mid-range tow tractor (left) and fire truck (right).

*Atish Gupta*

The proposed primers must pass the rigorous performance requirements that are currently asked of MIL-PRF-23377 products and perform satisfactorily to many of the performance requirements of MIL-DTL-53022.

Upon successful laboratory testing and field demonstration, MIL-PRF-23377 will be revised and the Qualified Products List will be populated with low-VOC and HAP-free products. If an acceptable primer(s) is identified that satisfies both GSE and aerospace requirements, the “Cleaning and Corrosion Control” manual (NAVAIR 01-1A-509) and the “Airborne Weapons and Associated Equipment” manual (NAVAIR 01-1A-75) will be updated at their next revision or Interim Rapid Action Changes will be generated.

### Implementation of Biotic Ligand Model-Based Water Quality Standards for Copper at Navy Sites (project no. 564)

This project will provide guidance and empirical evidence of the utility to Navy end users towards imminent EPA approval of an update to the Estuarine/Marine Copper Aquatic Life Ambient Water Quality Criterion.

Copper is a ubiquitous contaminant in and around Navy-relevant water bodies. Currently, states use national water quality criteria (WQC) to establish standards by which to regulate copper discharges under NPDES permits. Navy managers are required to either use the default national WQC or conduct and approve costly site-specific studies involving extensive toxicity testing, chemical analyses and rulemaking.

The EPA recently released a draft criterion document that incorporates a simple, scientifically defensible Biotic Ligand Model (BLM) towards calculation of water-body-specific water quality standards without the need to conduct costly laboratory-based studies. Based on comments by nearly four dozen stakeholders nationwide, including the Navy, the consensus was that the document included overly high levels of conservatism, improper assumptions and incorrect use of peer reviewed data available, potentially making compliance with a BLM-based standard more challenging than intended.

Concerns expressed by the stakeholders are currently being evaluated by EPA, with the expectation that issues will be addressed and Navy compliance will improve if the concerns are incorporated. However, if the finalized BLM-based standard is overly stringent, it will not improve copper compliance at Navy facilities, and the Navy will likely be required to continue down a path of uncertain and costly means of achieving compliance.

This project will provide scientific contributions towards finalizing EPA’s saltwater copper criterion document and provide examples based on historical and ongoing data collection regarding whether or not the new criterion should be used as a regulatory tool for environmental compliance at Navy sites.

The BLM is a metal bioavailability model that uses receiving water body characteristics and monitoring data to develop site-specific WQC. The BLM for copper has already been developed and validated for protection of the most sensitive EPA-accepted test mechanisms (e.g., *Mytilus galloprovincialis* mussel embryos).

The first task for this project will be the consultation and closure of data gaps with key personnel (EPA headquarters) regarding their remaining concerns associated with the draft final criterion document. As soon as EPA releases the final WQC document, the project team will collect any available historical data sets for affected Navy sites and run them through the BLM to determine whether the Navy would be expected to be compliant.

In addition to EPA concurrence of the saltwater BLM for copper, objectives of this work include development of a Navy document that will guide end users towards integration of an overdue update to copper compliance in marine environments. This will occur based on consultation with the Copper Development Association and International Copper Association which have been working on implementation of the freshwater BLM for copper and continue to support this need for saltwater. The freshwater BLM has been implemented in multiple states and provides examples towards implementation of the marine BLM.

This project will provide scientific contributions towards finalizing EPA’s saltwater copper criterion document.

The results of the analysis and documents produced by this project will be transitioned to end users in a consolidated technical document geared towards implementation by states and permit writers. This document will be shared through webinars directed to Navy end users summarizing the findings, which will be in part developed through peer review and participation in at least one high visibility national technical conference.



## Source Metal Particle Removal for Stormwater Compliance (project no. 566)

This project is demonstrating a new surface cleaning vehicle capable of removing metal particulate from stormwater discharge.

Metal particles (such as copper, zinc, nickel and iron) in stormwater can lead to violations or exceedances for Navy facility stormwater discharges related to Clean Water Act and NPDES permits. This can be a serious issue for industrial areas such as metal processing/reworking facilities, metal storage facilities, recycling yards and pier areas where paint stripping and sand blasting activities occur.

San Diego area Navy installations (Naval Base San Diego (NBSD), Naval Base Coronado (NBC) and Naval Base Point Loma) are having an increasingly difficult time meeting new California metal benchmarks/Numerical Action Limits (NAL) for their stormwater discharges, which are now at 33.2 parts per billion (ppb) for copper and 260 ppb for zinc. Between 2011 and 2014, NBC had 87 copper and 221 zinc benchmark exceedances, as well as 96 exceedances for acute toxicity.

These installations employ BMPs directed at reducing source metal particles from pier and metal processing areas; however these practices are ineffective in meeting

## The Basics About the NESDI Program

**THE NESDI PROGRAM** seeks to provide solutions by demonstrating, validating and integrating innovative technologies, processes, materials and filling knowledge gaps to minimize operational environmental risks, constraints and costs while ensuring Fleet readiness. The program accomplishes this mission through the evaluation of cost-effective technologies, processes, materials and knowledge that enhance environmental readiness of naval shore activities and ensure they can be integrated into weapons system acquisition programs.

The NESDI program is the Navy's environmental shoreside (6.4) Research, Development, Test and Evaluation program. The program is sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division and managed by NAVFAC out of the Naval Facilities Engineering and Expeditionary Warfare Center in Port Hueneme, California. The program is the Navy's complement to ESTCP which conducts demonstration and validation of technologies important to the tri-Services, EPA, and the Department of Energy.

For more information, visit the NESDI program web site at <https://epl.navfac.navy.mil/nesdi> (Common Access Card required).



the new limits. Recent discharge sampling data (from December 2016) show NAL exceedances for copper and zinc at all three installations. Sustained, high concentrations of these pollutants in industrial stormwater discharges are elevating acute toxicity levels beyond permit limits at an increasing rate.

San Diego metro Navy installations spend over three million dollars a year on stormwater compliance monitoring and reporting including expensive phased studies that are required under new NPDES permit requirements when discharges exceed benchmarks. In addition to these costs, exceeding benchmarks on a regular basis increases the potential for lawsuits from non-governmental agencies.

This project was formed to evaluate a new surface cleaning technology—the Municipal Cleaning Vehicle (MCV). This multi-purpose surface cleaning vehicle is based on the Mobile Cleaning, Recovery and Recycling System developed by Naval Surface Warfare Center Carderock Division (NSWCCD). The MCV is a closed loop, surface power washing, filtration, recovery and recycling system that can recover ferrous and non-ferrous solids ranging in size from sub-micron to two inches and can clean up to 10,000 square feet of surface area per hour. The system provides total suspended solids control and a physical barrier to larger particles. It leaves no discernable solids residue and its performance exceeds the individual cleaning capabilities of pressure washing, vacuuming and sweeping.

After initial discussions with NBSD, NSWCCD has identified numerous high-risk outfall locations that are exceeding benchmark limits. Two outfalls at Naval Amphibious Base (NAB) Coronado will be the site for the technology demonstration. The MCV will be deployed for a period of approximately three months, during which time training of the vehicle and its systems will be conducted, along with the actual surface cleaning and sampling at the targeted outfalls.

NSWCCD has already made a site visit to the targeted hot-spot areas at NAB Coronado and will soon be working with NAVFAC Southwest and San Diego metro installation representatives to develop a test and sampling plan that will best show the effectiveness of the MCV technology.

If the MCV cleaning technology is shown to be effective in removing problematic metal particulate, then San Diego metro representatives can work with their in-house departments to procure MCV platform(s) as desired.



The Municipal Cleaning Vehicle.  
Courtesy of Triverus

NBSD/NBC environmental offices and stormwater/surface cleaning operations personnel will be part of the testing and evaluation process as well as any technology transfer follow-up actions.

### **Business Processes and Requirements Enabling Technology Integration (project no. 567)**

This project will produce a systems engineering process and manual that provides clarity on the actions and activities required for completing successful technology integration.

Navy facility commands need a framework that allows facility or installation stakeholders and technology advocates to collaborate and advance cost-effective solutions to their environmental challenges. When a technology, techniques, tools (TTT) solution has been validated through the NESDI and other programs, the conventional approach to technology integration has focused only on advertising the technical data and fact sheets related to that technology and seeking to sell the TTT as a package

This vehicle is a closed loop, surface power washing, filtration, recovery and recycling system that can recover ferrous and non-ferrous solids.

that presumably fits with every Systems Command. While this approach reflects a genuine desire for integrating technologies, it neglects a more holistic business plan and strategy for customizing TTT solutions for different installations and stakeholders. What's needed is an enduring system of actions and activities that enable the successful integration of TTT solutions, as well as a method for identifying where additional needs for a particular technology exist.

This project will propose a systems engineering process (a sequence of events that functions together to produce the capability that satisfies a particular need) to enable effective and efficient technology integration across NAVFAC.

Technology transition programs for weapons systems and platforms have formal processes to smooth and speed the path to operational adoption. Examples include the Navy Shore Energy Technology Transition and Integration (NSETTI) program and the Energy Systems Technology Evaluation Program (ESTEP). Each of these programs has a multi-gate project review process to ensure early consideration of stakeholder needs and administrative processes. It is the intention of this project team to create a similar system for Navy facilities use.

The system engineering process and accompanying manual will be based on the Shore Facilities Planning System and Office of the Chief of Naval Operations (OPNAV) instructions, along with information acquired from internet literature searches addressing stakeholder engagement business practices. A case study analysis of completed and/or ongoing



A basic technology transfer process.

approved real property work will be conducted in accordance with the framework to validate the process and associated manual.

A guide for potential stakeholders and users of TTT solutions and backup documentation required by stakeholders will be produced. Methods will include mining environmental Notice of Violation and military construction databases. To ease the transition, the team will determine what data (i.e., cost estimates, analysis of alternatives) stakeholders will need. The process and manual will be transitioned as follows:

- Provided to the Naval Civil Engineers Corps Officer School for insertion and use as a training module during environmental training and other courses.
- Distributed throughout the NAVFAC enterprise via each of the NAVFAC businesses participating and contributing in development

of the final deliverable and posted on the NAVFAC portal.

- Offered to other System Commands for guidance and implementation.
- Presented during annual NAVFAC business line specific workshops/conferences.
- Incorporated into Naval Postgraduate School curriculum.

One-page fact sheets of all NESDI projects are available for download via the program's web site at <https://ep1.navy.mil/nesdi> (Common Access Card required). Select "Projects" to browse available fact sheets for NESDI-sponsored projects. [🔗](#)

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# SECNAV Announces 2017 Energy Conservation Award Winners

## Program Recognizes Outstanding Accomplishments in Energy Procurement, Storage & Delivery

**THE SECRETARY OF** the Navy (SECNAV) has announced the winners of the 2017 Energy Conservation Awards competition. The program recognizes Navy ships, installations and squadrons for outstanding accomplishments in the areas of procurement, storage and delivery of energy to naval forces. Access to secure, reliable sources of energy enhances Navy readiness and mission capability.

For the 2017 competition, nominations from commands around the world were received for consideration

in 12 Navy-specific award categories based on fiscal year 2016 accomplishments. A panel of experts reviewed the nominations and selected winners for each of the award categories, pending SECNAV endorsement.

For the details behind USS Monterey's award, read our article "USS Monterey Earns Top Secretary of the Navy Energy Conservation Award" in this issue of *Currents*.

### Platinum Level of Achievement

The Platinum level of achievement indicates an outstanding energy

conservation program and an exceptional year for energy project execution. The following commands demonstrated platinum level of achievement:

1. Naval Support Activity Souda Bay
2. Fleet Readiness Center Southwest
3. USS Sterett (DDG 104)
4. USS Sentry (MCM 3)
5. USS Bonhomme Richard (LHD 6)
6. USS Pearl Harbor (LSD 52)
7. USNS Tippecanoe (T-AO-199)

### 2017 SECNAV ENERGY CONSERVATION AWARD WINNERS

Category	Winner	Award
Navy Large Shore	Naval Base Kitsap	\$40,000
Navy Small Shore	Naval Station Everett	\$30,000
Other Shore	Naval Undersea Warfare Center, Division Keyport	\$20,000
Large Ship	USS Monterey (CG 61)	\$30,000
Medium Ship	USS Wayne E Meyer (DDG 108)	\$25,000
Small Ship	USS Champion (MCM 4)	\$20,000
Amphibious Large Ship	USS Bataan (LHD 5)	\$30,000
Amphibious Medium/Small Ship	USS Comstock (LSD 45)	\$20,000
COMNAVAIRLANT	Fleet Logistics Support Squadron Four Zero (VRC-40)	\$25,000
COMNAVAIRPAC	Fleet Air Reconnaissance Squadron Four (VQ-4)	\$25,000
Military Sealift Command	USNS Lewis & Clark (T-AKE-1)	—
Navy Expeditionary	Naval Mobile Construction Battalion Four	\$25,000

## Access to secure, reliable sources of energy enhances Navy readiness and mission capability.

With the exception of USNS Tippecanoe, all Platinum level winners received a \$5,000 award.

### Gold Level of Achievement

Gold level of achievement indicates a very good to outstanding energy conservation program. The following commands demonstrated gold level of achievement:

1. Joint Base Pearl Harbor Hickam
2. Joint Expeditionary Base Little Creek-Fort Story
3. Naval Air Station Corpus Christi
4. Naval Air Station Pensacola
5. Naval Air Station Sigonella
6. Naval Air Station Whidbey Island
7. Naval Air Station Whiting Field
8. Naval Base Coronado
9. Naval Base Guam
10. Naval Construction Battalion Center Gulfport
11. Naval Hospital Bremerton
12. Naval Magazine Indian Island
13. Naval Shipyard Base Operating Support Portsmouth
14. Naval Station Great Lakes
15. Naval Station Newport Naval Station
16. Norfolk Naval Submarine Base Kings Bay
17. Naval Submarine Base New London
18. Naval Support Activity Bahrain
19. Naval Support Activity Mechanicsburg
20. Naval Support Activity Monterey
21. Naval Support Activity Naples



USS Wayne E Meyer (DDG 108).  
MCS3 Ryan M. Breeden



USS Monterey (CG 61).  
MCS Seaman Bill Dodge

- |   |  |
|---|--|
| 22. Naval Surface Warfare Center Philadelphia                       | 10. Naval Air Station Kingsville                     |
| 23. Naval Weapons Station Seal Beach                                | 11. Naval Air Station Meridian                       |
| 24. Norfolk Naval Shipyard  | 12. Naval Air Station Oceana                         |
| 25. Pacific Missile Range Facility Barking Sands                    | 13. Naval Air Station Patuxent River                 |
| 26. Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility | 14. Naval Air Station/Joint Reserve Base Fort Worth  |
| 27. Puget Sound Naval Shipyard & Intermediate Maintenance Facility  | 15. Naval Air Station/Joint Reserve Base New Orleans |
| 28. USS Curtis Wilbur (DDG 54)                                      | 16. Naval Air Weapons Station China Lake             |
| 29. USS Jason Dunham (DDG 109)                                      | 17. Naval Base Point Loma                            |
| 30. USS Michael Murphy (DDG 112)                                    | 18. Naval Base Ventura County                        |
|   | 19. Naval Station Guantanamo Bay                     |

### Blue Level of Achievement

Blue level of achievement indicates a well-rounded energy conservation program. The following commands demonstrated blue level of achievement:

1. Camp Lemonnier Djibouti
2. Commander Fleet Activities Sasebo
3. Commander Fleet Activities Yokosuka
4. Joint Base Anacostia Bolling
5. Naval Air Facility Atsugi
6. Naval Air Facility El Centro
7. Naval Air Station Fallon
8. Naval Air Station Jacksonville
9. Naval Air Station Key West



USS Champion (MCM 4).  
MCS2 Jennifer S. Kimball



USS Comstock (LSD 45).  
MCS3 Trevor Welsh

All of these efforts to optimize energy use enable the Navy to improve readiness and ensure a more capable and lethal fighting force.

—Vice Admiral D. R. Smith

- 20. Naval Station Mayport
- 21. Naval Station Rota
- 22. Naval Support Activity Andersen
- 23. Naval Support Activity Annapolis
- 24. Naval Support Activity Crane
- 25. Naval Support Activity Hampton Roads
- 26. Naval Support Activity Mid-South
- 27. Naval Support Activity Orlando
- 28. Naval Support Activity Panama City
- 29. Naval Support Activity Saratoga Springs
- 30. Naval Support Activity South Potomac
- 31. Naval Support Activity Washington
- 32. Naval Surface Warfare Center Corona Singapore Area Coordinator
- 33. USS Leyte Gulf (CG 55)
- 34. USS Pinckney (DDG 91)
- 35. USS Vella Gulf (CG 72)
- 36. Weapons Station Earle Colts Neck
- 37. Weapons Station Yorktown

All of these efforts to optimize energy use enable the Navy to improve readiness and ensure a more capable and lethal fighting force. Bravo Zulu to all of the award recipients,” said Vice Admiral D. R. Smith. 



USS Bataan (LHD 5).  
MCS3 Raymond Minami

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# ENERGY WARRIOR PROFILE

## CARI SCHROEDER

HOMETOWN: San Diego, CA



ENERGY PROGRAM MANAGER  
NAVAL BASE POINT LOMA

“*Raising awareness is a way we can get everybody to reduce their usage. And it makes a difference.*”

### **Q: HAVE YOU SEEN AN IMPROVEMENT IN ENERGY CONSERVATION SINCE YOU STARTED WORKING WITH THE NAVY? DO YOU THINK CULTURE CHANGE PLAYS A ROLE IN THIS?**

Absolutely, culture and behavioral change play a huge role in energy conservation. We really do need everybody to play their part. We don't always have the funds to put automatic controls into every single building to turn off the lights or air conditioning when no one is around.

And yes, when I started working with the Navy about 15 years ago, turning off the lights was a completely foreign idea. We would walk into buildings after hours and lights would always be on. Turning off the lights was not second nature to anybody—at home or at work.

Today, when I walk through an office at the end of the day, most lights are turned off. That wasn't always the case.



## ENERGY EFFICIENCY INCREASES

## Q: WHERE ELSE IN THE NAVY HAVE YOU WORKED?

I've supported almost every base in Navy Region Southwest at some point or another by conducting various data analyses and project reviews. I've worked on-site at Navy installations at Seal Beach, Lemoore, Coronado and San Diego. Naval Base San Diego was actually my first assignment. A few years back, I got an opportunity to move to Japan and work for the U.S. Air Force. That was the first time that I realized the importance of raising awareness. The command in Japan had little or no funding for any energy projects, but we still had a job to do—help conserve energy. We were being asked “to save in other ways” so I had to get creative. I thought, well, awareness is free.

Raising awareness is a way we can get everybody to reduce their usage. And it makes a difference. So that's what we did. We produced public service announcements on energy conservation and the various ways you can save energy. And it worked. I got comments from coworkers and building tenants saying they either saw a commercial or heard our radio interviews. They made sure to tell me they were shutting off lights or turning down the heat.

## Q: WHAT DO YOU LIKE MOST ABOUT YOUR JOB?

The thing I like most about this job is that it is so varied. I can spend half of my day in the office, doing reports and developing projects—a challenge I enjoy. While the other half of my day is spent working with our construction team outdoors and on the rooftops—talking to tenants about energy conservation and raising awareness. It's so varied, you never know what you're going to get. Also, I feel really appreciated in this job, and that inspires me.

## Q: WHAT DOES BEING AN ENERGY WARRIOR MEAN TO YOU?

An Energy Warrior is someone that consciously thinks about energy. When they walk by the break room and no one is in it, they turn out the lights. Basically, it's someone who thinks about the various ways to save energy from day-to-day.



Make sure you check out the Energy Warrior YouTube Channel at [www.youtube.com/channel/UCkjiid-zKaaD525DZHuEOsg](http://www.youtube.com/channel/UCkjiid-zKaaD525DZHuEOsg).



You can also follow Energy Warrior on Instagram (@energy.warrior) and download the Energy Warrior app from iTunes.

# SERDP & ESTCP Announce 2017 Projects of the Year

## Notable Efforts Include Research on Management of Fluorochemical Contamination & Unexploded Ordnance in the Underwater Environment

**THE STRATEGIC ENVIRONMENTAL** Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP) have selected nine “Projects of the Year” in recognition of outstanding research and technology developments that will benefit the Department of Defense (DoD). These efforts are helping DoD enhance its mission capabilities, improve its environmental performance and reduce costs. The following are recipients of this honor and descriptions of their award-winning projects.



### Environmental Restoration SERDP Project-of-the-Year Award

#### Characterization of the Fate and Biotransformation of Fluorochemicals in AFFF-Contaminated Groundwater at Fire/Crash Testing Military Sites

*Professor Jennifer A. Field,  
Oregon State University*

Per- and polyfluoroalkyl substances (PFAS) are common contaminants at sites where aqueous film forming foam (AFFF) was used. Up until 2011, the understanding of the composition of individual PFASs and their precursors in AFFF formulations and their impact on priority pollutant biotransformation was limited

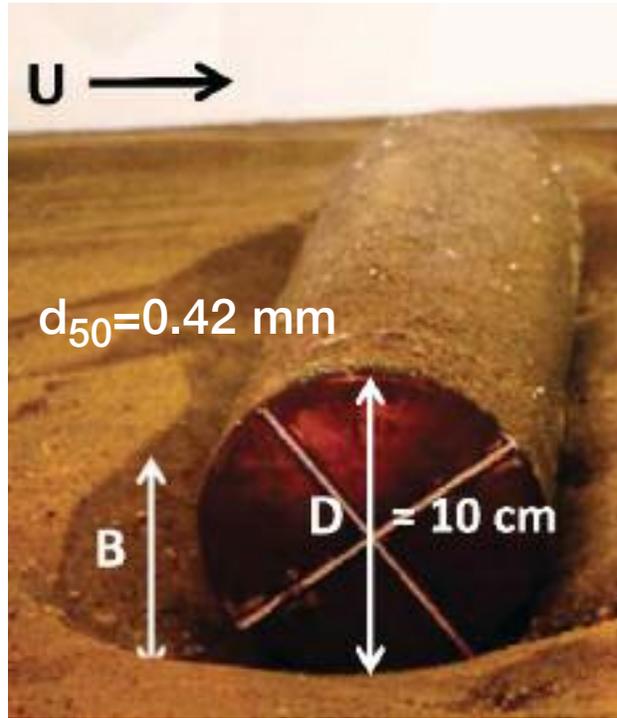
Professor Jennifer Field from Oregon State University and her team led a project that aimed to fully delineate the PFASs that persist in AFFF-contaminated groundwater, sediment and soil and evaluate their impact on priority pollutant biotransformation. The study developed analytical tools and provided analytical advances for a more complete characterization of AFFF-contaminated media. Over the course of the project, over 50 classes of PFASs comprised of several individual homologs were identified.

A complete characterization of AFFF-impacted sites leads to a better understanding of the effectiveness of treatment technologies. Biotransformation pathways of these

The study developed analytical tools and provided analytical advances for a more complete characterization of AFFF-contaminated media.



Characterization of AFFF-impacted sites will lead to more effective remediation strategies.



Parametrized models help predict the behavior of munitions underwater.

These models provide an improved and unified understanding of fundamental parameters in the interactions of munitions-sized objects with sediments.

compounds also provide a framework for understanding the fate of the precursors and insight into the conditions that leads to high concentrations of persistent fluorotelomer sulfonates.

### Munitions Response SERDP Project-of-the-Year Award

#### Simple Parameterized Models for Predicting Mobility, Burial and Re-exposure of Underwater Munitions

*Dr. Carl Friedrichs  
Virginia Institute of Marine Science*

SERDP has been sponsoring development of a simple, engineering model of mobility, burial and re-exposure of unexploded ordnance (UXO) and UXO-like objects for a number of years. An essential first step in construction of

the model was the compilation of existing measurements on items ranging from UXO and UXO-like objects to river cobbles from across the DoD, engineering and scientific community and development of a simple framework to reconcile and understand the totality of the prior work. This framework would have the added benefit of guiding the measurements to be made via SERDP.

Dr. Carl Friedrichs from the Virginia Institute of Marine Science and his team developed simple, parameterized models for predicting munitions' behavior underwater. These models provide an improved and unified understanding of fundamental parameters in the interactions of munitions-sized objects with sediments. The parameterized model relations have been incorporated into more complex tools designed to guide DoD installation personnel in the management of underwater UXO sites.

## Resource Conservation and Resiliency SERDP Project-of-the-Year Award

### Assessing Climate Change Impacts for DoD Installations in the Southwest United States during the Warm Season

*Dr. Christopher L. Castro  
University of Arizona*

Over the past sixty years, there have been important long-term changes in atmospheric conditions during the annual monsoon period in the southwestern United States. Given the potential impact of these changes and the risk they pose to infrastructural limits and operational capabilities of the many DoD facilities in the region, the DoD requested an evaluation of the changes in extreme weather during the late summer. As a result, this research directly supports DoD's requirement to manage installation assets to sustain the national defense mission (DoD Directive 4715.1).

Dr. Christopher Castro from the University of Arizona and his team evaluated how warm season extreme weather events in the Southwest will change with respect to occurrence and intensity. The project addressed several key questions including the consideration of existing operational protocols for weather and climate related decision making, creation of climate change projection information at an appropriate spatial scale and consideration of extreme weather and climate events. The data was gathered and then used to inform adaptation strategies.

This project resulted in a physically robust and computationally efficient methodological approach to the projection of extreme event weather in the Southwest that could be easily adapted for other regions of the United States and the world. A convective permitting modeling approach adds substantial value to the projection of extreme weather by pinpointing the spatial locations within the Southwest with a high degree of accuracy where precipitation is becoming more intense.

This project resulted in a physically robust and computationally efficient methodological approach to the projection of extreme event weather in the Southwest that could be easily adapted for other regions of the United States and the world.



A better understanding of the changes in extreme weather events will help DoD manage infrastructure and operations in the Southwest.

## Weapons Systems and Platforms SERDP Project-of-the-Year Award

### MEMS-Enabled Reliable Submunition

*Mr. Charles H. Robinson & Mr. Jeffrey R. Smyth  
U.S. Army Armament Research,  
Development and Engineering Center*

Contamination of military ranges from low order detonation and unexploded submunitions is a significant environmental and personnel safety concern for DoD. Even the acceptable failure rate of submunitions results in a significant number of items that must be removed from DoD training ranges.

Mr. Charles Robinson, Mr. Jeffrey Smyth and their team from the U.S. Army Armament Research, Development and Engineering Center (ARDEC) addressed this issue by focusing on the development of microelectro-mechanical system (MEMS) enabled safety and arming submunition fuze-technology. Research into this technology stems



MEMS-enabled reliable submunitions reduce the instances of UXO and low order detonations on DoD ranges.

from an updated DoD policy on reducing the rate of UXO for all submunitions to less than one percent by 2018. The technology eliminates causes of submunition unreliability and also contributes to alternative concepts to comply with DoD policies to reduce or eliminate lead energetic materials from fuze components. Physical dimensions of MEMS devices can vary in size between several millimeters to smaller than one-micron. An improved detonation propagation mechanism was demonstrated in MEMS-scale fuzing devices. This provides an improvement over legacy lead-based initiator technologies with less-reliable direct-contact initiation mechanisms that may require unreliable mechanical air gaps.

Development was aided through leveraging efforts by the Joint Services Small Arms Program, the Small Arms Grenade Munition Program and the Cluster Munition Replacement Program. The MEMS-enabled reliable submunition program and output-technology provides a transferrable solution for improved munition-fuze reliability, reduced UXO and improved safety that can lead to submunition designs that comply with DoD policy.

Contamination of military ranges from low order detonation and unexploded submunitions is a significant environmental and personnel safety concern for DoD.

### Energy and Water ESTCP Project-of-the-Year Award

#### Geothermal Heat Pumps with Underground Thermal Energy Storage

*Mr. Charles Hammock  
Andrews, Hammock & Powell, Inc.*

Conventional geothermal heat pumps (GHP) heating, ventilating and air conditioning (HVAC) systems are considered one of the most efficient active HVAC systems. GHPs use 25 to 50 percent less electricity and offer energy savings of up to 40 percent compared to the conventional heating or cooling systems. They are quieter, last longer, need little maintenance and do not depend on the tempera-

ture of the outside air. However, conventional GHP ground-source designs are susceptible to performance deterioration in applications where annual heating and cooling loads are imbalanced. In facilities that are cooling dominant, which applies to most DoD installations, this load imbalance can lead to higher supply water temperatures over time and cause the operating efficiencies of the water-cooled GHP to decrease.

Mr. Charles Hammock from Andrews, Hammock & Powell, Inc. and his team demonstrated the performance and savings of an innovative system design, which couples a GHP system with underground thermal energy



By combining a GHP with underground thermal energy storage, DoD is able to realize significant reductions in energy and water use for the heating and cooling of buildings.

## Conventional geothermal heat pumps use 25 to 50 percent less electricity and offer energy savings of up to 40 percent compared to the conventional heating or cooling systems.

storage (UTES). This system demonstrates higher energy savings not only by capturing the waste heat of cooling systems and the waste cool of heating systems, but also by capturing out-of-season winter's "cold" or summer's "heat," if needed, in cooling-dominated or heating-dominated buildings respectively. The demonstration of this project included installation of two types of GHP-UTES HVAC systems installed at two different locations—Borehole Thermal Energy Storage (BTES) System, installed at the Marine Corps Logistic Base (MCLB) in Albany, Georgia and the Aquifer Thermal Energy Storage (ATES) installed at Fort Benning, Georgia.

The technology demonstration was successful resulting in the reduction of HVAC energy by nearly 50 percent and the elimination of cooling tower water use—a reduction of 4.2 million gallons a year. Impressed by these results, MCLB's (Albany, Georgia) Installation & Environment Division funded three new BTES systems to serve an additional 10 buildings at MCLB. In addition to the improved energy and water performance of the new BTES systems, the bid for these projects came in under the budget for the traditional GHP system designs.

### Environmental Restoration ESTCP Project-of-the-Year Award

#### 1,4-Dioxane Remediation by Extreme Soil Vapor Extraction

*Dr. Rob Hinchee,  
Integrated Science & Technology, Inc.*

1,4-Dioxane, a cyclic diether used as an additive in chlorinated solvents, is a common and persistent groundwater contaminant. While conventional soil vapor extraction (SVE) can remove some 1,4-dioxane, a substantial residual source is left behind causing long-term groundwater contamination. Due to the compound's complete miscibility in water, 1,4-dioxane becomes sequestered in the vadose zone pore water, which serves as a long-term source of groundwater contamination.

Dr. Rob Hinchee from Integrated Science & Technology, Inc. and his team led a project that aimed to evaluate and demonstrate the efficacy of enhanced or extreme soil vapor extraction (XSVE) designed specifically to remove 1,4-dioxane from the vadose zone by incorporating enhancements such as increased air flow, increased temperature and focused vapor extraction. (Note: The vadose zone is the Earth's terrestrial subsurface that extends from the surface to the groundwater table.)

A screening-level mass and energy balance model, HypeVent XSVE, was developed to simulate the remediation of 1,4-dioxane by XSVE.

The study results indicate that 1,4-dioxane concentrations in the treatment zone decreased about 95 percent and soil moisture decreased about 45 percent. Downward migration of 1,4-dioxane due to condensation was not observed. HypeVent XSVE adequately simulated 1,4-dioxane removal, soil moisture and soil temperatures observed during the demonstration. Sensitivity analyses showed that 1,4-dioxane removal benefited considerably from heated air injection.

XSVE has been demonstrated to be a cost-effective remediation approach for 1,4-dioxane in the vadose zone,



XSVE was demonstrated as an effective remediation approach for 1,4-dioxane contaminated groundwater.

The study results indicate that 1,4-dioxane concentrations in the treatment zone decreased about 95 percent and soil moisture decreased about 45 percent.

which may reduce the need for long-term groundwater remediation. HypeVent XSVE has been demonstrated to be a useful feasibility assessment and design tool for XSVE of 1,4-dioxane.

### Munitions Response ESTCP Project-of-the-Year Award

#### Development of Blast-Barge Technology for Underwater Munitions Demolition

*Mr. Timothy W. Shelton  
U.S. Army Corps of Engineers  
Engineer Research and Development Center*

Disposal of underwater UXO encountered during a munitions response is commonly conducted using two primary methods—tow-to-shore and blow in place. Tow-to-shore operations require transporting UXO from an underwater site to the shore for disposal. This process requires evacuating the surrounding area and endangers DoD personnel who handle and transport UXO. In many places, shore access is not available. Blow in place or in situ remediation of underwater UXO present challenges as well. Blow in place operations expose the marine environment to potential damage and are not allowed at many remediation sites.



Blast barge technology has been demonstrated as a safe and sustainable solution for disposal of underwater UXO.

Mr. Timothy W. Shelton with the U.S. Army Corps of Engineers, Engineer Research and Development Center (ERDC) and his team developed and demonstrated a mobile blast barge system to provide improved remediation options to DoD personnel. The system consists of a blast box that can withstand the blast environment created during UXO disposal fitted to a standard barge. The blast barge system can be constructed using commercially available parts, is reusable and is easily transportable to various locations.

Mr. Shelton and his team used a combination of numerical modeling, scaled simulations, subscale experiments and field demonstrations to mature a robust platform. Fifty-five experiments were conducted from 2016 to 2017, during which time the blast box has not shown any signs of damage and scaled explosive weights used during testing have far exceeded anticipated prototype weapon sizes.

In addition to developing a robust platform, hydrophone data has been collected from every explosive event during experiments and testing. Data collected from these events will be used to quantify sound wave propagation from an explosive detonation occurring above the water and determine the potential impacts of these disruptions to marine mammals. Data collected will also help researchers determine the path for continued development of the blast barge technology. These data sets will be used to validate numerical models that will predict sound impacts beyond the limits of the explosive masses tested during the demonstrations.

The blast barge system can be constructed using commercially available parts, is reusable and is easily transportable to various locations.



eDNA was demonstrated to be an effective technology for managing aquatic species on DoD lands.

**Resource Conservation and Resiliency  
ESTCP Project-of-the-Year Award**

**Environmental DNA as a Tool for Inventory and Monitoring of Aquatic Vertebrates**

*Dr. Alexander Fremier &  
Dr. Caren Goldberg  
Washington State University*

Detection of amphibian and fish species using conventional survey methods is not always possible. At least 22 at-risk amphibian species and over 40 at-risk fish species are known to occur on DoD lands. For elusive species, such as many amphibians and fishes, lack of reliable monitoring data can lead to an underestimate of the species' distribution. An efficient alternative to traditional field surveys is the use of environmental deoxyribonucleic acid (eDNA) to detect species presence. Animals shed cells with their DNA into the environment regularly through the shedding of skin, mucous and excrement. By sampling this shed DNA, researchers can infer a species' presence in the sampled environment using existing genetic methods.

Dr. Alexander Fremier, Dr. Caren Goldberg and their team from

Washington State University led an ESTCP-funded project that demonstrated the effectiveness of environmental DNA techniques for monitoring sensitive aquatic vertebrate species and their invasive threats at three DoD installations. The team developed and validated eDNA sampling protocols for a variety of aquatic species, including frogs, salamanders, fish and disease-causing pathogens. In addition, the eDNA protocol results were compared to traditional field sampling with respect to sensitivity, detection probabilities and cost efficiency.

This demonstration showed that eDNA can be a sensitive and cost-effective technology for monitoring aquatic species under a range of conditions that included factors expected to limit eDNA detection. Techniques used during this demonstration are helping inform ongoing natural resource management activities including development of species-specific endangered species management plans, Section 7 consultations with the U.S. Fish and Wildlife Service and early detection and control of invasive aquatic species that may prey on or hybridize with native species.

**Weapons Systems and Platforms  
ESTCP Project-of-the-Year Award**

**Zirconium Oxide Pretreatment for Military Coating Systems**

*Mr. Fred L. Lafferman  
U.S. Army Research Laboratory*

Finishing systems for military vehicles require pretreatments that enhance adhesion and provide resistance to corrosion. These treatments either



The use of zirconium oxide pretreatments will result in a significant reduction in DoD's usage of hexavalent chromium and other hazardous materials.

## About SERDP & ESTCP

**SERDP AND ESTCP** are DoD's environmental research programs, harnessing the latest science and technology to improve DoD's environmental performance, reduce costs and enhance and sustain mission capabilities. SERDP and ESTCP respond to environmental technology requirements common to all of the military Services, complementing the Services own research programs. The programs promote partnerships and collaboration among academia, industry, the military Services and other Federal agencies. Investments are managed in five program areas:

1. Energy and Water
2. Environmental Restoration
3. Munitions Response
4. Resource Conservation and Resiliency
5. Weapons Systems and Platforms

SERDP and ESTCP are independent programs managed from a joint office to coordinate the full spectrum of efforts, from basic and applied research to field demonstration and validation.

SERDP is DoD's environmental science and technology program, planned and executed in partnership with the Department of Energy and the U.S. Environmental Protection Agency, with participation by numerous other federal and non-federal organizations. The program focuses on cross-service requirements and pursues solutions to the Department's environmental challenges while enhancing and sustaining military readiness.

ESTCP is DoD's environmental technology demonstration and validation program. Project researchers conduct formal demonstrations at DoD facilities and sites in operational settings to document and validate improved performance and cost savings. Demonstration results are subject to rigorous technical reviews to ensure that the conclusions are accurate and well supported by data.

For more information, visit [www.serdp-estcp.org](http://www.serdp-estcp.org).

## This study provides an alternative to both zinc-phosphate with chromate post-rinse for ferrous substrates or hexavalent- and trivalent-chromium containing etch-primers and conversion coatings for aluminum substrates.

directly contain toxic metals or require a sealer or other rinse products that do.

To address this issue, Mr. Fred Lafferman and his team at the U.S. Army Research Laboratory demonstrated a zirconium-pretreatment technology as a replacement for existing aluminum and steel pretreatments at military depots. This provides an alternative to both zinc-phosphate with chromate post-rinse for ferrous substrates or hexavalent- and trivalent-chromium containing etch-primers and conversion coatings for aluminum substrates. Demonstrations were conducted at the Anniston Army Depot, Letterkenny Army Depot and Marine Depot Maintenance Command-Production Plant, Albany.

Performance testing of the demonstration parts and panels from the three demonstrations, including

laboratory accelerated corrosion testing and seacoast environmental testing, have confirmed that the zirconium technology provides performance that is equal to both zinc phosphate and the aluminum conversion coatings. Due to the performance of this technology, it is anticipated that it will be qualified to a number of military specifications. This qualification will allow this technology to be transitioned into DoD facilities. This advancement increases the sustainability of DoD platforms and reduces risk of exposures to the warfighter and maintenance personnel. [↴](#)

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# USS Monterey Earns Top Secretary of the Navy Energy Conservation Award

## Cruiser Prioritizes Energy Efficiency While Deployed

**GUIDED MISSILE CRUISER** USS Monterey (CG 61) earned the Secretary of the Navy (SECNAV) Energy Conservation Award—Large Ship category for exceptional energy management for fiscal year 2016. This is a significant achievement as

21 cruisers (CG class) and 62 destroyers (DDG class) worldwide are eligible to compete in the Large Ship category. Monterey achieved the lowest fuel burn rate of any ship in the CG and DDG classes and had the third lowest burn rate for all ships fleet-wide during the fourth quarter. Out of more than 90 Navy and Marine Corps commands recognized, Monterey was only one of three cruisers to win.

“Both at sea and in port, Monterey’s obligation to energy conservation was

extensive,” former Monterey Commanding Officer, Capt. C.P. DeGregory said. “All hands took water and energy management seriously on a daily basis and made the effort to train their shipmates in conservation-mindedness.”

In June 2016, Monterey departed on a seven-month deployment with the USS Dwight D. Eisenhower (CVN 69) Carrier Strike Group to the U.S. 5th and 6th Fleet areas of operation. While deployed, the Monterey travelled great distances—including transatlantic



LCDR Myron Lind (Chief Engineer), CAPT Dave Stoner (Commanding Officer), LT John Smith (Energy Conservation and Environmental Protection Manager) pose with the Secretary of the Navy Energy Flag.



The guided-missile cruiser USS Monterey.  
*Paul Farley*

## Monterey achieved the lowest fuel burn rate of any ship in the CG and DDG classes.

crossings—and still achieved substantial energy and fuel efficiency. Energy efficiency initiatives included:

- Limiting ship speed and reducing fuel burn when feasible.
- Operating in waters deeper than 25 fathoms to prevent grounding.
- Performing hull cleaning to limit drag.
- Replacing 40 percent of overhead lights with light-emitting diodes (LED).

Monterey successfully completed 26 underway fuel transfers and received more than four million gallons of fuel without incident or spill.

### Naval Energy Efficiency

**EFFICIENCY IS A** critical component of energy security for the U.S. Navy as it ensures ships and crew can operate forward for greater periods of time and deliver more fire-power, humanitarian assistance or other missions as required. Since energy is a key enabler for mission capability, efficient energy use directly supports one of the four key lines of effort identified in Chief Naval Operations John Richardson's "Design for Maintaining Maritime Superiority"—specifically, strengthening naval power at and from the sea.



Sailors aboard USS Monterey heave the fuel line during a fuel at sea replenishment.

Photographer's Mate Airman Michael D. Blackwell II

## Monterey successfully completed 26 underway fuel transfers and received more than four million gallons of fuel without incident or spill.

In addition, Monterey's crew took steps to prevent energy waste by setting thermostats on fan coil units ship-wide to heat during the winter and cool during the summer. This action ensured adjacent spaces did not heat or cool others through conduction when unnecessary. Ventilation equipment, including filters, fans and diffusers, were cleaned and checked regularly to ensure they were operating at maximum efficiency.

Because U.S. Navy ships produce their own potable water, water use and treatment

requires energy. To keep water and energy use low, Monterey's crew actively sought and repaired potable water leaks while limiting shower length and water waste from culinary use.



Monterey's achievements result from a crew that is dedicated to wise energy management, innovation and environmental stewardship. As Navy ships adopt these best practices and reap the benefits of lower fuel burn rates, reduced refueling frequency and recognition from their peers, this culture of considering energy use on a day-to-day basis can ultimately create



The guided-missile cruiser USS Monterey (CG 61).  
 MCS3 Casey J. Hopkins/Released

### The Basics About USS Monterey

**USS MONTEREY IS** a Ticonderoga-class guided-missile cruiser and the fourth vessel named after the Battle of Monterey that occurred during the Mexican-American War in 1846. The ship was designed to fight in a multi-threat environment and possesses a long-range strike capability with Tomahawk and Harpoon cruise missiles. Monterey has earned two Battle “E” awards. Monterey was commissioned on June 16, 1990 and is homeported in Norfolk, Virginia.

Monterey is currently on a surge deployment, its second deployment in 10 months, to the U.S. 5th and 6th Fleet areas of operation.

For more information, visit [www.public.navy.mil/surflant/cg61](http://www.public.navy.mil/surflant/cg61).



greater flexibility for ship commanders and a more capable maritime force.

“Monterey is the epitome of ‘the quiet professional;’” Vince Marshall, Auxiliaries Program Manager, Naval Surface Force Atlantic wrote. “They consistently get the job done without a lot of fanfare.”

As a SECNAV Energy Conservation Award winner, Monterey received \$30,000 and is authorized to fly the SECNAV Energy Flag for one year. Monterey also won the 2016 Chief of Naval Operations (CNO) Environmental Award—Afloat category for outstanding performance in environmental stewardship. (For descriptive summaries of all 2017 CNO Environmental Award winners, read our article “CNO Recognizes Award Winners for Exceptional Environmental Leadership” in this issue of *Currents*.)

The SECNAV Energy Conservation Awards recognize Navy and Marine Corps installations, ships and squadrons for outstanding commitment to energy and water conservation and excellence in energy management. For additional information, visit <http://greenfleet.dodlive.mil/energy/awards-2>.

For a complete listing of all SECNAV Energy Conservation Award winners, read our article “SECNAV Announces 2017 Energy Conservation Award Winners” in this issue of *Currents*.) [↕](#)

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# Naval Base Kitsap-Bremerton Replaces Historic, Declining Trees

## Century-Old Poplars & Other Ornamentals Being Brought Down Over Safety Concerns

**A PROJECT TO** evaluate, remove and replace historic trees in significant decline at Naval Base Kitsap-Bremerton (NBK-Bremerton) is underway addressing ongoing safety concerns. Nearly 20 trees, some more than 100-years-old, are being swapped with in-kind or similar species.

A certified arborist from Total Landscape Corporation of Seattle, Washington performed a tree survey onboard NBK-Bremerton which identified trees in significant decline and that posed a safety hazard in 2016. The trees are located within four historic districts which were listed in 1990 on the National Register of Historic Places. The trees and surrounding landscapes are characteristic features of each district.

The Puget Sound Radio Station Historic District is significant because of the buildings associated with radio communication at the Puget Sound Naval Shipyard from 1894 to 1941. The Officer's Row Historic District contains residences built from 1896 to 1913 to

provide housing for shipyard officers. The landscape includes natives, ornamentals, as well as apple, pear and cherry trees.

The adjacent Hospital Reservation Historic District is significant for buildings associated with the Puget Sound Naval Shipyard Navy hospital. The

Marine Reservation Historic District residences were constructed from 1911 to 1914.

Trees in this area include Lombardy poplars, Douglas firs and other mature ornamental trees. Some of the Lombardy poplars are 80-feet tall and 10-feet thick at the base.



Amanda Bennett, Cultural Resources Specialist, NAVFAC Northwest, explains how 100-year-old Lombardy poplars, like this one, pose a potential danger to passing motorists and pedestrians during wind storms because branches have been known to break and fall.

*Phil Guerrero*



A 3-D tomography survey found that some of the trees onboard NBK-Bremerton are hollow with limited rind thickness in places that bring their structural soundness into question. Lombardy poplars, like this one, have aggressive root systems and brittle branches.

*Phil Guerrero*

## Taking Root Onboard Naval Base Kitsap-Bremerton

AT THE TIME these trees were taking root onboard NBK-Bremerton, the following events were happening around the world:

- The “Zimmermann Telegram” was sent from Germany to Mexico, stating in the event of the U.S. entering World War I (WWI) on the allied side, Mexico would be given Texas, Arizona and New Mexico. Intercepted by British intelligence and partially deciphered the next day. Its release shifted U.S. public opinion in favor of the war against Germany.
- The U.S. declared war on Germany entering WWI.
- The U.S. Congress passed the Selective Service Act, authorizing the federal government to raise a national army for the American entry into WWI through compulsory enlistment.
- The first units of the American Expeditionary Force, commanded by General John J. Pershing, were ordered to France.
- The British Royal Family, which had strong German ties since George I, renounces its German names and titles and adopts the name Windsor.
- The 18th Amendment of the U.S. Constitution, authorizing the prohibition of alcohol, is approved by the U.S. Congress and sent to the states for ratification.
- Babe Ruth beats the New York Yankees, pitching a three-hit, 10 to 3 win for the Boston Red Sox.
- T.E. Lawrence joins the forces of the Arabian sheik Feisal al Husayn, beginning his adventures that will lead him to Damascus by October of 1918. Lawrence is known as “Lawrence of Arabia.”
- Loretta Walsh becomes the U.S. Navy’s first female Petty Officer.

“These poplars were likely planted soon after the homes were built,” said Terri Jones, Regional Forester, Naval Facilities Engineering Command (NAVFAC) Northwest. “Just like people, trees don’t live forever. Trees in the historic district are getting old and are periodically monitored with the intent to keep them as long as possible. However, sometimes tree decline becomes significant enough that hazards such as falling large limbs or excessive brittleness present safety concerns that result in the need to remove and replace the tree with another tree appropriate to the historic district.”

The large Lombardy poplars are located adjacent to the sidewalk on NBK-Bremerton at Doyen and Decatur Streets.

“During wind storms, branches have been known to break and fall causing potential hazard to pedestrians,” said Amanda Bennett, Cultural Resources Specialist, NAVFAC Northwest. “A three-dimensional (3-D) tomography (the Ultra-sound used on trees) survey found that some of the trees are hollow with limited rind thickness in places



Historic homes onboard NBK-Bremerton are still in use today by military officers. The Marine Reservation Historic District residences were constructed from 1911 to 1914.  
*Phil Guerrero*



Julia Stockton photographs a Lombardy poplar to be taken from NBK-Bremerton. The “T” spray painted on the tree signifies that this tree is to be “taken” and replaced.  
*Phil Guerrero*

that bring the structural soundness into question. In at least one case, a swarm of bees has taken up residence in the hollow stem.”

“Because the Lombardy poplars have aggressive root systems and tend to have brittle branches, the trees are no longer used to line busy streets,” said Julia Stockton, Biologist, NAVFAC Northwest. “In place of the poplars, the Navy will plant either Columnar hornbeams or an appropriate Aspen species. The replacements are drought resistant, long-lived and disease-resistant varieties.”

The work was reviewed by the Washington State Historic Preservation Officer at the Department of Archaeology and Historic Preservation. The consultation is required under Section 106 of the National Historic Preservation Act of 1966. The state agreed the tree removal and replacement will have no adverse effect on the historic properties listed on the National Register of Historic Places.

“The change in species will eventually contribute to regaining the visual integrity of the historic district and reduce potential hazards,” concluded Jones. 📍

### For More Information

FOR MORE INFORMATION about Navy Region Northwest, call 360-396-1630 or visit:

- [www.homeportnorthwest.wordpress.com](http://www.homeportnorthwest.wordpress.com)
- [www.cnic.navy.mil/regions/cnrnw.html](http://www.cnic.navy.mil/regions/cnrnw.html)
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# SOME OF YOUR Best Shots



A sperm whale raises its flukes to descend on a deep dive after being tagged, potentially to forage for food.  
*Jacqueline Bort Thornton*



Attaching a digital acoustic recording tag on a whale.  
*Lucía Martina Martín López*

The Navy's Living Marine Resources (LMR) program funds a portion of a collaborative international project—3S3: Behavioral Responses of Cetaceans to Naval Sonar. Team members on the 2017 field study, which took place in the North Atlantic, captured shots of some of the work and tools involved in collecting the data needed to evaluate how sonar may affect whales. The effort includes watching for species of interest such as sperm whales, listening for vocalizations and tagging the whales to collect data on their behavior during the use of active sonar.

Fact sheets summarizing this project (no. LMR-29) and other LMR-funded projects are available for download at <http://greenfleet.dodlive.mil/environment/lmrprojects>.

Jacqueline Bort Thornton, one of the photographers included here, is from the Naval Facilities Engineering Command, Atlantic and participated in the field study and can be reached at [jacqueline.bort@navy.mil](mailto:jacqueline.bort@navy.mil).

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