

2016 USGS EAA
Nomination and Project Information Form

Date: March 10, 2016

Title of Nomination: Sea-Level Rise Modeling Handbook

Nominee Name: Thomas W. Doyle

Location: Southeast Region, Ecosystems Mission Area, USGS Wetland and Aquatic Research Center, Louisiana

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Project Date: August 2015

Submitter Information:

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Award Category: Climate Champion

Nominee Category: Individual

Abstract (250 character max)

Thomas Doyle led 20-plus interagency workshops that led to the publication of a comprehensive handbook entitled, "Sea-Level Rise Modeling Handbook," educating Federal land managers on the science and assumptions behind simulation models of sea-level change and ecological forecasting.

Project Description (5000 character max)

This project was conceived at the request of the coastal Landscape Conservation Cooperatives (LCC) to address the need for a literature synthesis that would provide Federal land managers with a comprehensive and condensed array of decision-support tools available for understanding the dynamics and impacts of sea-level rise (SLR) on our coastal ecosystems.

In 2012, Dr. Doyle began the process of conducting 20-plus training and feedback sessions with Federal, State, and nongovernmental organization (NGO) coastal managers and planners across the northern Gulf of Mexico coast to evaluate current scientific understanding and utilization of resource aids and modeling tools for sea-level rise assessment and planning purposes. In response to the findings from these sessions, the "Sea-Level Rise Modeling Handbook," was designed as a natural resource manager's guide of the science and simulation models for understanding the dynamics and impacts of sea-level rise (SLR) on our coastal ecosystems. The scope and content of the SLR Modeling Handbook was shaped from the training sessions, from online research, and from science publications.

The purpose of this guide was to describe and categorize the suite of data, methods, and models and their design, structure, and application for hindcasting and forecasting the potential impacts of sea-level rise in coastal ecosystems. The data and models cover a broad spectrum of disciplines involving different designs and scales of spatial and temporal complexity for predicting environmental change and ecosystem response. These data and models have not heretofore been synthesized, nor have appraisals been made of their utility or limitations. Some models are more accessible as publicly available online demonstration tools for non-experts, whereas others require more expert capacity to apply them to for any given park, refuge, or regional application. A simplified tabular context was developed to list and contrast a host of decision-support tools and models from the ecological, geological, and hydrological perspectives. Criteria were established to distinguish the source, scale, and quality of information input and geographic datasets; physical and biological constraints and relations; datum characteristics of water and land components; utility options for setting sea-level rise and climate change scenarios; and ease or difficulty of storing, displaying, or interpreting model output. Coastal land managers, engineers, and scientists have benefitted from this synthesis of tools and models.

The recent release (August 2015) of this synthesis product and USGS Professional Paper entitled “Sea-level Rise Modeling Handbook: Resource Guide for Coastal Land Managers, Engineers and Scientists” serves as a prime example of an exceptional resource and reference guide prepared specifically for the benefit and education of Federal land managers of coastal parks, reserves, and refuges. The SLR Modeling Handbook provides a comprehensive and condensed treatise for the layman to understand the history, factors, rates, and models of sea-level change and impacts on our coastal ecosystems. The Handbook highlights many decision-support tools and those produced by Dr. Doyle over the years to forecast the effects of climate, sea-level rise, and hurricanes on parks and refuges of the Department of the Interior (DOI), coastal roads, rails, and sector assets of the Department of Transportation (DOT), and carbon cycling and threats to energy facilities for the Department of Energy (DOE), among others.

Dr. Doyle has a career-long legacy of interagency climate change research including ecosystem modeling and tree-ring studies at the individual tree, species, and park scale to watershed applications of county, regional, and national scope. His collective science publications and presentations have focused solely on informing Federal land managers from a multi-agency and interdisciplinary context of coastal impacts of increasing atmospheric carbon dioxide, sea-level rise, and tropical storm events on our nation’s energy, transportation, and conservation assets. The Handbook is designed to be a primer to understanding sea-level rise and a practical synthesis of the current state of knowledge and modeling tools, as a resource guide for DOI land management needs, and facilitating Landscape Conservation Cooperative (LCC) research and conservation initiatives.

Project Results (3000 character max)

Coastal wetlands of the Southeastern United States are undergoing retreat and migration from increasing tidal inundation and saltwater intrusion attributed to climate variability and sea-level rise. Much of the literature describing potential sea-level rise projections and modeling predictions are found in peer-reviewed academic journals or government reports largely suited to reading by research scientists. Recognizing that various sea-level rise and coastal wetland

models have been developed (and applied at different designs and scales of spatial and temporal complexity) for predicting habitat and environmental change, training sessions were conducted to educate and to evaluate user needs and understanding of concepts, data, and modeling tools for projecting sea-level rise and its impact on coastal habitats and wildlife. The structure and outline of this handbook focuses on the science behind sea-level change, past and present, and the simulation models and projection of sea-level rise under climate change for assessing potential impacts to coastal habitat and associated wildlife.

The primary project results include the (1) USGS Professional Paper published in August 2015; (2) numerous presentations to resource staff of coastal refuges, parks, and reserves from Federal and State agencies across the northern Gulf Coast from Florida to Texas, including the U.S. Fish and Wildlife Service, National Park Service, and the National Oceanic Atmospheric Administration National Estuarine Research Reserves; and (3) a nationally advertised Webinar entitled "Sea-Level Rise Modeling Handbook: Resource Guide for Coastal Land Managers, Engineers, and Scientists" presented on July 1, 2014, as a part of the National Climate Change and Wildlife Science Center's Climate Change Science and Management Webinar Series. Over 300 participants from government, academic, and corporate entities registered for this presentation making it the most widely attended webinar to date. The video presentation was given by Dr. Thomas Doyle (USGS National Wetlands Research Center) and was posted at the following URL links:

<https://nccwsc.usgs.gov/webinar/332>

https://www.youtube.com/watch?v=asF2DNw34_I&list=PL517BAF587675141F&index=21

<http://gallery.usgs.gov/videos/825>

Publication citation:

Doyle, T.W., Chivoiu, Bogdan, and Enwright, N.M., 2015, Sea-level rise modeling handbook—Resource guide for coastal land managers, engineers, and scientists: U.S. Geological Survey Professional Paper 1815, 76 p., <http://dx.doi.org/10.3133/pp1815>.

Reproducibility (1500 character max)

The "Sea-Level Rise Modeling Handbook" highlights many decision-support tools and those produced by Dr. Doyle that forecast the effects of climate, sea-level rise, and hurricanes on parks and refuges of the DOI, transportation sector assets of the Department of Transportation, and carbon cycling and threats to energy facilities for the Department of Energy, among others. Dr. Doyle led USGS Climate and Land-Use Change research of coastal tidal forests that have; a first-ever comprehensive review of these unique ecosystems (published by Springer). This work highlights the interaction of storm tides and droughts as well as sea-level change as a major determinant of coastal land loss and retreat that has major implications on coastal restoration priorities and reforestation success. It also distinguishes his leadership of long-term cooperation and integrated research and outreach activity across the USGS. Dr. Doyle is a frequent speaker and convener of symposia on climate change themes at national and international forums and most recently, for the 2015 meeting of the Society for the Advancement of Chicanos and North Americans in Science. Dr. Doyle often represents the USGS at FEMA and White House sponsored workshops. He is an adjunct faculty with several universities including historically black colleges where he has co-published climate change work and mentored students for the next generation of science professionals.

References:

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**2016 USGS EAA
Nomination and Project Information Form**

Date: March 10, 2016

Title of Nomination: Environmental Achievement Maximized at WARC, Gainesville, FL

Nominee Name: Wetlands Aquatic Research Center (WARC)

Location: Southeast Region, Ecosystems Program, WARC, Gainesville, FL

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Project Date: FY 2015

Submitter Information:

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Award Category: Lean, Clean, and Green

Nominee Category: Team

Abstract (250 character max):

The USGS WARC in Gainesville, FL, has developed a community of practice for environmental stewardship resulting in an outstanding long-term record of energy saving programs that exceed USGS and Departmental goals for saving costs and providing beneficial environmental services.

Project Description (5000 character max)

This team award recognizes USGS Wetland and Aquatic Research Center (WARC) in Gainesville, Florida, employees for their long-term environmental stewardship and achievements. The WARC in Gainesville has corporately instituted a "Lean, Clean, and Green" energy program that has saved the Federal Government materials and costs and provided numerous beneficial environmental services. The tracking log initiated in 2007 and the Environmental Management System (EMS) initiated in 2008 provide nearly a decade long accounting of environmental compliance and energy savings. While it is the obligation of every USGS facility to comply with EMS goals and standards, this team unit has annually exceeded minimum expectations.

A summary of the various WARC achievements by EMS category follows:

- Employees have ridden bikes to work long before recent Government program incentives, accounting for over 41,000 pounds of carbon offset since tracking began in 2010.
- A long-term practice of recycling and reuse of paper, cans, glass, and plastics has evolved over the years to include anything and everything (e.g., metal, cordage, batteries, e-waste, lightbulbs, packing fill, printer toner cartridges, plastic grocery bags, film of all kinds,

pipette tips, and nylon gloves). In some cases, the WARC works with commercial recycling programs such as Kimberly Clark RightCycle® and Fisher Scientific for greater impact.

- In recent years, additional segregation and collection of waste items has included aerosol cans, pharmaceuticals, oil, gasoline, paint, batteries by type, car tires, ballasts, e-scrap, computers, printers, pallets, and more for maximum efficiency and stewardship.
- Actual waste diversion of spared landfill material has exceeded the Department of the Interior (DOI) Waste Diversion Goal of 50 percent every year of record and on average over the last decade by 75 percent (an outstanding environmental achievement).
- The WARC has incorporated energy and time saving initiatives to reduce mowing of periphery grounds and lawns by building native plant gardens to enhance wildlife and pollinators.
- For aesthetics benefits, bluebird houses have been constructed and installed to increase the presence of wildlife, benefit nature, and beautify the workplace.
- Energy efficiency at the facility level has been achieved with time-out and motion sensitive lighting features, high-efficiency ballast replacement and LED bulb technology.
- Significant water use reductions have been realized with low flow toilets and hands-free, motion-sensitive, short-blast, faucet design.
- Paper use reduction and health benefits have been realized with hands-free paper towel and air flow for drying hands in restrooms.

The level of environmental compliance and stewardship at the WARC in Gainesville is outstanding and exemplary at both the individual and team level, exceeding USGS and DOI goals and standards.

Project Results (3000 character max)

Project results are best considered in context by year and category to demonstrate the sustained and additive contributions to waste diversion that exceeds Bureau and Departmental goals. In each of the last 7 years, the DOI waste diversion goal of spared solid waste diverted from landfills has been exceeded annually at an average rate above 70 percent and at above 75 percent for FY2015 which is significantly greater than the DOI goal of 50 percent.

Energy Saving Performance Contract (ESPC) Project Information: The USGS issued Delivery Order No. G09PD00614 to Johnson Controls on March 6, 2009, employing the Department of Energy (DOE) Southeast Super ESPC as the contracting vehicle. The Delivery Order included the implementation of four Energy Conservation Measures (ECMs) at the USGS WARC, Gainesville, Florida. Listed below are significant milestones for the Project.

- ECM 4.1 HVAC and Control System Replacement
- ECM 5.1 Energy Efficient Lighting Upgrade
- ECM 6.1 Roof Upgrade
- ECM 11.1 Solar Energy Utilization

The work performed under ECM 4.1 was designed not only to relieve the USGS of the ever-increasing burden of maintaining older equipment but to also reduce the peak electrical demand and high summertime electricity costs. ECM 5.1 resulted in optimized lighting conditions in

occupied areas. In addition to the large reduction in peak electrical demand, the efficient lighting components reduce the interior cooling load, yielding chiller and pumping energy savings. ECM 6.1 was designed to improve the reliability of the roof to reduce the presence of existing leaks and mitigate damage to interior building components resulting from them. The minimal amount of associated cooling savings is predominantly offset by a slight increase in heating costs. ECM 11.1 provides green power that offsets some of the electricity used by this facility.

Total cost savings of the project to date:

Year Zero	\$13,569
Year One	\$109,619
Year Two	\$77,075
Year Three	\$80,582
Year Four	\$84,256
Year Five	\$88,110
Year Six	\$91,935
Total	\$545,147

Solar Panel Savings: To date, the WARC in Gainesville has generated 45,091 kWh and saved 76,655 lbs of CO2 generation.

The WARC purchased and installed approximately 12 National Audubon bluebird houses. The National Audubon is going green with its recycled series. This product is made of 90 percent recycled plastic, does not absorb water, and does not harbor mold or bacteria, thus ensuring a healthier environment for birds. The local bluebird population has increased and maximized the use of installed birdhouses which has improved the bird viewing experience and employee interest and morale when walking around the facility. The success of population size and density year after year has spurred discussion for other like kind conservation projects and initiatives among employees.

Reproducibility (1500 character max)

Reproducibility is achieved when new employees are hired and are swept into the WARC's community of practice, both at the individual and Center level. The recent merger of the USGS WARC with the former USGS National Wetlands Research Center will provide a template to match, even compete, to reach or sustain high environmental performance. Even as employees move on to other career opportunities, they take with them a cultural imprint and knowledge of material reuse and recycling, energy saving ideas and technology, and creative ways to reduce our carbon footprint. Other USGS Science Centers will consider the aesthetics and conservation value of installing recyclable materials and specifically birdhouses that bring many redeeming benefits to the workplace and surrounding environment.

References:

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**2016 USGS EAA
Nomination & Project Information Form**

Date: March 18, 2016

Title of Nomination: Fort Collins Science Center Green Team

Nominee Name: Fort Collins Science Center Green Team (Lead-Cynthia Melcher, Amy Yackel Adams, Lea Bonewell, Catherine Jarnevich, Jes Mallory, Holly Miller, Lindsay Reynolds, Helen Sofær, Patty Stevens, Earlene Swann)

Location: Southwest Region, Ecosystems Mission Area, Fort Collins Science Center

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Project Date: October 1, 2014 – September 30, 2015

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Award Category: Green Dream Team

Nominee Category: Team

Abstract (250 character max)

The FORT Green Team implemented programs in FY2015 that improved recycling/energy efficiency at the FORT, including a substantial increase in the Center's overall diversion rate to 52.26 percent, Platinum status in the city's ClimateWise program, and increased bicycle commuting.

Project Description (5000 character max)

The USGS Fort Collins Science Center's (FORT) Green Team, a volunteer group within the Center, implemented or completed a number of programs to improve recycling and energy efficiency at the FORT in FY2015. For example, changes to the FY2015 recycling/composting program and an innovative communication initiative on recycling (monthly recycling reminders) resulted in an increase in our overall diversion rate from 35.5 percent to 52.26 percent. They also started a battery and CFL bulb recycling program. Water bottle fillers were installed on all drinking fountains to reduce purchases of disposable plastic bottles of water. Several years ago the Green Team enrolled the FORT in the city's ClimateWise program, a voluntary program helping businesses identify best management practices and local resources to reduce greenhouse gas (GHG) emissions. Points are earned for actions, projects, innovative ideas, and educational events in the categories of Energy, Water, Waste, Transportation and Social Responsibility. Through a variety of Green Team activities in FY2015, the FORT improved from Silver to Platinum status. Recently the Green Team initiated a lighting audit to look at potential energy savings associated with replacing current fluorescent lights with LED tubes. Finally, the Green Team started a series of lunch-time seminars and discussion groups to encourage more bicycle commuting and participation in Federal and local bicycle commuting challenges.

Project Results (3000 character max)

The USGS Fort Collins Science Center's (FORT) Green Team implemented or completed a number of programs to improve recycling and energy efficiency at the center in FY2015. For example, changes to the recycling/composting program resulted in a substantial increase in the overall diversion rate from 35.5 percent to 52.26 percent with over 18,000 pounds of food waste and 21,000 pounds of grass clippings and plant material composted; and 11,000 pounds of scrap metal, 2,500 pounds of mixed electronics, and over 32,000 pounds of paper, cans, bottles and other materials recycled in FY2015. The Green Team also started a battery and CFL bulb recycling program. Personal water bottle fillers were installed on all drinking fountains to reduce the waste associated with purchasing water in plastic bottles. Counters in those fillers show over 8,000 plastic bottles saved. Several years ago, the Green Team enrolled the FORT in the city's ClimateWise program, a voluntary program helping businesses identify best management practices and local resources to reduce greenhouse gas (GHG) emissions. Through a variety of Green Team activities, the FORT improved from Silver to Platinum status, the highest level that can be achieved. Recently, the Green Team initiated a lighting audit to look at potential future energy savings associated with replacing current fluorescent lights with LED tubes. Finally, the Green Team started a series of lunch-time seminars and discussion groups to encourage more bicycle commuting and participation in Federal and local bicycle commuting challenges. Currently, the FORT has 14 individuals participating in the bicycle subsidy program; FORT volunteers helped staff the breakfast station for the Winter Bike to Work Day; teams from FORT entered the 2015 Federal Bike Month Challenge burning over 90,000 calories with 1,616 pounds of CO2 avoided as a result of bicycle commutes (one of those teams ranked first out of all Department of the Interior teams).

Reproducibility (1500 character max)

The general approach for a center Green Team could be replicated at most Federal facilities. Implementation of specific Green Team activities will depend on what services are available locally, such as compost pick up and city programs such as ClimateWise. FORT Green Team accomplishments are communicated to the center as a whole by email and to the Regional Office, other Regional centers, and Headquarters through the weekly highlights.

2016 USGS EAA Nomination & Project Information Form

Date: March 4, 2016

Title of Nomination: A Team Climate Champion – The USA National Phenology Network

Nominee Name: USA National Phenology Network (USGS Lead-Jake Weltzin; University of Arizona-Tucson: LoriAnne Barnett, Theresa Crimmins, Ellen Denny, Katharine Gerst, Patricia Guertin, Lee Marsh, Sharon Oliver, Erin Posthumus, Alyssa Rosemartin, Sara Schaffer, and Jeff Switzer)

Location: Ecosystems Mission Area

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Project Date: 2007 - present

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Award Category: Climate Champion

Nominee Category: Team

Abstract (250 character max)

With the goal of advancing science and supporting natural resource decision making at local to national scales, the USA National Phenology Network collects, organizes and distributes data and information about the response of plants, animals and ecosystems to variable and changing climates.

Project Description (5000 character max)

The USA National Phenology Network (USA-NPN; www.usanpn.org) is a national-scale, multi-taxa science and monitoring initiative focused on phenology, the study of seasonal life-cycle events such as leafing, flowering, reproduction and migration. Timely and widely-distributed phenological data and information are critical for understanding how plants, animals, and

landscapes respond to environmental variation and climate change. Specific applications include understanding and managing invasive species and agricultural pests, determining the risk and impact of changing frequency and extent of droughts and wildfires, and managing risks to human health and welfare, including allergies, asthma, and vector-borne diseases.

The USA-NPN was established in 2007 by USGS in collaboration with other governmental and non-governmental organizations (including NASA, NOAA, NSF, and DOI bureaus such as NPS and USFWS). The National Coordinating Office (NCO) of the USA-NPN is operated in collaboration with the University of Arizona (UA). The USGS provides 85 percent of the annual operating costs of the Network; other resources are provided by DOI bureaus, including NPS and

USFWS, as well as via grants secured by UA from other funding sources (e.g., NASA, NOAA, NSF). For the purpose of this application, 'team' refers to the cooperative operations of the USA-NPN NCO by USGS and UA.

The goal of the USA-NPN is to collect, synthesize, deliver and apply high-quality phenological data and information to address fundamental science and societal needs, and to facilitate decision-making relative to ecosystem services and climate change adaptation for natural resource management, agricultural systems, and human well-being. Since 2007, the USA-NPN team has established standardized protocols and infrastructure for collecting, storing, and sharing phenological data and information, engaged a wide range of Federal and non-Federal partners in both collecting and using these data, and created synthetic data products with the intent of advancing science and informing decisions in natural and managed ecosystems.

A basic, fundamental need for increasing knowledge of plant and animal response to changing climate conditions is national-scale observational data. A major activity of the USA-NPN is the collection and sharing of data and data products. The USA-NPN currently houses >6.5 M records of plant and animal phenology data from across the U.S., representing nearly 1,000 taxa of plants and animals. The USA-NPN actively encourages and supports continued observation of plant and animal phenology through *Nature's Notebook* (www.nn.usanpn.org), a plant and animal phenology observing system appropriate for scientists, professionals, and citizen scientists alike. These data provide the foundation for an increased understanding of relationships between plant and animal phenology and climate conditions - necessary first steps toward understanding appropriate actions for adapting to change.

Another activity of the USA-NPN, the creation and delivery of a wide range of data products to support scientific discovery and decision making, serves to increase understanding of drivers to phenology that can inform societal adaptation to climate change. To ensure that these data and data products are accessible and provided in formats that are most appropriate for scientific discovery, the USA-NPN regularly engages with the scientific and management communities via professional meetings, newsletters, and webinars and encourages feedback from data end-users. These data are regularly accessed and used by members of the scientific community; to date, 20 peer-reviewed manuscripts using contemporary observations of plant and animal phenology curated by the USA-NPN have been published (www.usanpn.org/biblio/contemporary-data). This is clear evidence that the existence and activities of the USA-NPN are increasing scientific knowledge and information on impacts and responses of wildlife and plants to changing climates.

Functioning as a network, the USA-NPN maintains relationships with a wide range of partner groups, including natural resource management agencies, tribes, NGOs, and more. At present, the USA-NPN has active relationships with 226 partnering organizations (www.usanpn.org/partner/current).

To assist managers in collecting data necessary to make decisions, the team (1) developed and published standardized phenology monitoring protocols; (2) offers a flexible and extensible system - called *Nature's Notebook* - for collecting, managing, visualizing, and downloading data; and (3) provides services and products to support individuals, groups, and organizations establishing and maintaining monitoring programs and activities. Since the establishment of *Nature's Notebook* in 2009, over 6,500 participants have submitted observations representing nearly 8,000 locations across the country. The wide range of partners using *Nature's Notebook* to

collect or access phenological data and data products demonstrates the importance of the niche the Network fills in the Federal and non-Federal science and management communities. Ultimately, however, the goal is to increase awareness as to how plants and animals are responding to changing climate conditions, and to contribute to an increased understanding of how these changes may be addressed through proactive resource management.

Project Results (3000 character max)

FY15: Outcome and achievement highlights include:

- Ten peer-reviewed publications use USA-NPN data or data products
- USA-NPN “Onset of Spring” product adopted as an Indicator in the US Global Change Research Program’s new National Climate Indicator System
- USA-NPN received FY14 USGS Shoemaker Award in Communications Excellence - Internet Product Category, for *Nature's Notebook*
- 22 USFWS National Wildlife Refuges, and 24 National Park Service units, used USA-NPN protocols or data management system to meet goals related to resource status and trends, adaptive management, and public engagement
- *Nature's Notebook* featured as case study in Federal Crowdsourcing and Citizen Science Toolkit, and described as “exemplary project” by John P. Holdren, Director, OSTP, during White House roll-out of toolkit
- PBS SciGirls airs episode featuring *Nature's Notebook* (“Flower Power” full episode)
- Metadata for our data and database made available as a “featured dataset” in USGS Science Data Catalog (thus consumable by data.gov)
- Data Product Catalog, a 5-year framework to guide development and delivery of data and data products
- *DOI Learn* on-line course (Technology Enabled Learning) for training DOI staff on phenology monitoring, applications and data analysis
- New data exploration, visualization and analysis tool released
- Published and released national gridded data product, the Spring Index, suitable for applications ranging from research, decision-making, and communication
- 157 partners including 2,523 observers track 10,857 organisms at 1,843 sites across the nation and contribute 1.8M records to the National Phenology Database

FY16 and beyond: The phenology monitoring infrastructure and resources, data, and information we provide are being used by a growing number of Federal and non-Federal partners to better understand and prepare for the impacts of climate change. Over the next several years, we will continue to focus on DOI Bureaus, in particular NPS and USFWS. For example, we will maintain our collaboration with NPS on the California Phenology Project (CPP), which is designed to document, understand, and communicate the impacts of climate change on National Park resources within the state of California. Since 2010, 1.1M phenology records collected across 7 Parks in the state have been used to demonstrate that the timing of plant activity may change dramatically and in opposite directions under warmer and drier conditions, with implications for dependent animal species and pollinators (Mazer et al., *Ecosphere*, 2015). As a second key example, we will continue to grow our collaboration with the USFWS National Wildlife Refuge System (NWRS), which has adopted phenological monitoring as a key focus of its new Inventory & Monitoring Program. Our collaboration is focused on ensuring that phenological monitoring conducted on Refuges follows standardized protocols, is scientifically

credible, and informs climate-related management decisions at multiple spatial and temporal scales. Applications will vary, depending on the management issues faced by each Refuge; for example, at Valle de Oro NWR in New Mexico, monitoring is focused on understanding habitat use by American Kestrels and on informing the timing of restoration activities to minimize biological invasions. Over the next 5-10 years, we will expand our collaborations across other programs within NPS and USFWS, and will lay a framework for increased collaboration with BLM and Tribes.

Reproducibility (1500 character max)

As described above, the infrastructure and resources created and maintained by the USA National Phenology Network have already been adopted by many DOI Bureau partners and external stakeholders faced with understanding and responding to increasingly variable and changing climates. This success likely stems from our service-oriented approach, outstanding teamwork, and excellent communication: First, *Nature's Notebook* – our on-line user interface was designed to be highly flexible, allowing users to implement it in ways that best suit their needs – from science to management to communication and engagement. Second, the USA-NPN coordinating staff has a “service-first” approach - offering quick responses to questions, and providing extensive training and support to *Nature's Notebook* participants and users. We encourage potential stakeholders and partners to adopt the program only if it meets their specific application; this follows the well-documented principle that humans are more likely to maintain an activity if they find it personally meaningful. Third, the team seeks regular input and feedback from users of the *Nature's Notebook* system, as well as from researchers and managers who rely on the data and data products produced by the Network; we constantly make changes and improvements in these systems and products to best meet the needs of our stakeholders. The rapid growth in the use of our system, data, and data products by a broad variety of stakeholders is evidence that we fill a critical niche for decision makers in need of information about the impacts of climate change on plants, animals and ecological systems.

References

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**2016 USGS EAA
Nomination & Project Information Form**

Date: 03/18/2016

Title of Nomination: Upgrade of 1973 HVAC Systems

Nominee Name: Rodney Paulson, Facilities Engineer

Location: Climate and Land Use Change Mission Area, Earth Resources Observation & Science
(EROS) Center

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Project Date(s): FY 2010 – FY2015

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Award Category: Sustainability Hero

Nominee Category: Individual

Abstract (250 character max)

The USGS EROS Center completed a major replacement of original 1973 constant air volume HVAC systems with new HVAC systems utilizing variable air volume and energy recovery wheels. The result is reduction of energy and maintenance costs while improving the comfort of occupants.

Project Description (5000 character max)

The Earth Resources Observation and Science (EROS) Center, a U.S. Geological Survey (USGS) Science Center, is the steward of Landsat satellite imagery and other land records, and the provider of land change science data, information, and knowledge to aid in the understanding of a changing Earth. The EROS Center is responsive to the Department of the Interior's goals for a scientific foundation for decision making and the USGS Climate and Land Use Change science strategy.

The original HVAC systems consisted of multiple constant air volume fans with cooling coils and humidifiers located in rooftop fan rooms. Heating was accomplished by reversing the flow through the coils. The return air was delivered through a ceiling plenum by fans also located in the fan rooms. Outdoor air volume was controlled by use of adjustable dampers located on the intake air louvers of the fan room walls. These systems were identified by a 2005 USGS Facility Condition Assessment as being in need of replacement due to being at end of life. In addition, this project was determined to be necessary in order to meet energy reduction goals for EROS Center established by various Energy Policy Acts and Executive Orders.

In 2011, using American Recovery and Reinvestment Act funding, an Architectural-Engineering (A-E) firm was selected to design a Life Cycle Cost effective replacement for the HVAC system. Mr. Paulson, Facilities Engineer for the EROS Center, was actively involved in the selection of the A-E firm and worked closely with the firm's engineers to evaluate and select the most cost effective solution. Various cost-effective technologies were evaluated. A design utilizing variable air volume and energy recovery wheels was selected.

A construction contract for approximately \$4.4 M was awarded in July 2013. It was the largest Deferred Maintenance and Capital Improvement project in the USGS for that fiscal year. Phasing of the work and the movement of personnel into a "swing" space allowed the contractor to continuously perform removal of the old systems and installation of the new systems while keeping the building operational throughout the process.

Project Results (3000 character max)

Upgrade of the HVAC systems was able to be completed in July 2015 with less than one-percent increase from the original cost due to Mr. Paulson's effective project management. Because upgrade of the Building Automation System was also included in this project, additional energy savings features will be able to be achieved through such features as optimal start and optimal stop which allows the HVAC to "learn" the operating requirements and allow the systems to start at a later time and stop earlier while maintaining the temperature required by the occupants.

Annual cost savings due to reduction of energy usage and maintenance were projected to be approximately \$100,000. This equates to a decrease of 8 percent. For the 4th quarter of FY 15, the EROS Center experienced an 18 percent degree increase in cooling days but only a slight (2 percent) increase in electrical consumption. It is anticipated that better results will be shown as time passes and more data becomes available. As a result, the EROS Center will be able to meet established energy reduction goals and contribute to the overall cost-effectiveness and carbon footprint reduction for the entire USGS.

Reproducibility (1500 character max)

This EROS Center HVAC systems upgrade project is a model for other USGS centers to follow, both in project management and improving energy efficiencies for their HVAC systems. Other facilities can use this project as an example to use for converting from constant volume air flow systems to variable air volume systems for improved energy efficiency. The USGS plans to submit this project for a Federal Energy Management Program energy award.

References:

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