

2018 USGS Environmental Achievement Award
Nomination & Project Information Form

All of the following fields must be completed. Only nominations for which there is a completed nomination form will be eligible for consideration.

Date: 3/23/18

Title of Nomination: USGS National Center Sustainability Program

Nominee Name:

USGS National Center Operations Branch:

Kenny Thayer

Derek Briggs

Ken Earp

Calvin Graves

Mike Copsy (contractor)

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Project Date(s): FY 2017, going back to FY 2015

Submitter Information (Must be a USGS employee)

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Award Category (Select one)(see Attachment 1 for category specific criteria):

- Cultural Resources Protection
- Environmental Champion
- Environmental Dream Team
- Environmental Justice
- Environmental Partnership
- Environmental Quality
- Environmental Remediation
- **Environmental Stewardship**
- Good Neighbor

Nominee Category (Select one):

- Individual
- **Team**
- Partner

Abstract (250 character max) – Provide a brief synopsis of the project.

The USGS National Center Operations Branch has established a successful National Center Sustainability Program that in FY 2017 implemented energy and water efficiency measures to reduce annual energy use by 8.6% and water consumption by 11.9% when compared to FY 2016.

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Project Description

In FY 2017, the National Center (NC) Operations Branch enhanced the results and reach of the National Center Sustainability Program by continuing upon the success of an Energy Savings Performance Contract (ESPC). This was achieved by fine-tuning and enhancing implemented energy conservation measures (ECMs) and installing additional projects.

The NC ESPC was awarded in FY 2014 and installation of the ECMs was completed near the end of FY 2016. Three ECMs were not fully implemented per the design and required extensive coordination and perseverance by NC Operations Branch to correct.

The first was a chiller demand flow project that used control algorithms to sequence and control the entire chilled water plant. To implement the algorithms, the contractor installed variable frequency drives (VFDs) on all primary chilled water pumps and condenser water pumps. By means of these control algorithms, temperature set points for chilled water and condenser water were optimized and maintained. Also, the speed of all pumps and tower fans were controlled to optimize energy expended for a given tonnage load. The NC Operations Branch experienced numerous problems with this ECM, the new equipment and control strategies. These issues also impaired the run-time operation of the plate and frame heat exchanger in the chiller plant that provides significant savings on the chilled water energy use. The NC personnel worked diligently with the contractor throughout FY 2017 to resolve the issues and then optimized savings by pushing the chilled water supply temperature just above 50°F before placing a chiller on-line. These actions achieved an estimated savings of 892,700 kWh and \$66,000.

Another ECM that was problematic was the replacement of motors and installation of VFDs on two return air fans, two supply air fans, and the chilled and condenser water pumps on the plate frame heat exchanger. The new devices did not fully achieve savings as they were reliant upon the proper operation of the chiller plant which was experiencing difficulties due to the chiller demand flow project. Once the demand flow project was corrected, the anticipated EMC savings of 170,343 kWh and \$12,700 was achieved in FY 2017.

An ECM to install low flow plumbing fixtures throughout the site was also included in the ESPC. The automated low flow flush valves that were installed on the toilets required significant adjustments to the sensitivity settings on all devices. When first installed, they were automatically flushing two to three times versus only once. The NC Operations Branch worked to fine-tune the sensitivity settings on the flush valves to achieve a one-flush rate saving roughly 1,265,264 gallons and \$5,300.

In FY 2017, the NC Operations Branch began an in-house project to replace fluorescent lamps with light emitting diode (LED) lamps. As part of the ESPC, the parking lot lights were retrofit to LED lamps. Due to the success of this ECM, 375 compact fluorescents bulbs were replaced both in outdoor lights and in common areas, elevator lobbies, and the main entrance lobby. In addition, 4-foot fluorescent tubes were retrofit with LED lamps in the hallways, bathrooms and a few offices of one building. The energy savings of this project was roughly 9,000 kWh and \$675.

The NC continued its quest for additional energy and water savings in FY 2017, by performing an energy and water evaluation to highlight additional ECMs for savings. Ten additional ECMs

were highlighted with an implementation cost of \$2.2M and annual savings of \$270,000. The NC management is currently analyzing each ECM for potential implementation.

These FY 2017 projects are an example of the NC sustainability mindset to continuous operational improvement from an energy and water savings perspective, financial benefit, and positive environmental impact. The NC Operations Branch has a long track record of implementing energy and water efficiency projects to achieve optimal savings. In FY 2014, they took a new step and entered into a performance contract to make wide scale changes at the site.

The FY 2014 ESPC was a three-site \$12 million (M) task order under the DOE ESPC with a 21-year term contract and an estimated annual energy savings of \$650,000 or 15% of USGS total annual energy use. Water savings were estimated at \$18,000 per year, a 5% decrease in potable water use. The NC portion of the ESPC was roughly \$9M of implementation costs and \$512,900 of annual energy and water savings.

The NC ECMs included:

- ASC chiller addition
- Chiller plant improvements (Demand Flow)
- Energy management control system upgrades
- Constant air volume system to variable air volume HVAC conversions
- Laboratory HVAC and fume hood modifications
- Outdoor parking lot lighting retrofit to LED
- Reflective solar window tinting
- Energy efficient motors and synchronous drive belts
- Kitchen hood VAV conversion
- Solar PV system installation
- Domestic water low flow retrofits

Even with the favorable economics of the ESPC, the NC management pushed for extra savings and paid for separate upgrades on a few of the ECMs to ensure maximum savings. For example, the NC added funding to the ASC chiller ECM to provide feasible economics on the ECM for the contract. They knew the value of the chiller placement at the building to not only improve energy efficiency, but to reduce maintenance spending on the old piping distribution system that was problematic. The NC also provided additional funding to the LED parking lot project to enhance project finances and to the low flow plumbing ECM to include automated flush valves.

The NC Operations Branch will continue to pursue energy and water efficiency at the Center. Future projects under analysis include LED lighting throughout the entire campus, central plant enhancements including chiller capacity right-sizing and a combined heat and power boiler, and additional VFD applications.

Project Results

The energy and water savings achieved by the NC Operations Branch is impressive as shown in Table 1, *National Center Energy & Water Savings*. From FY 2016 to FY 2017, total annual

energy use was reduced by 8.6% and costs by 1.6%. Annual water consumption in that same period was reduced by 11.9% and costs by 13.4%.

From FY 2014, the ESPC baseline year, to FY 2017, total annual energy use was reduced by 21.4% and water use by 19.2%. Remarkably, these substantial savings were realized even though the NC occupancy increased by 21% from FY 2014 to FY 2017 due to local lease consolidations required by OMB's Reduce the Footprint Initiative.

It should be noted that one of the ESPC ECMs was the installation of a dedicated chiller in the ASC building to increase efficiency in cooling the energy intensive building and reduce issues with the supply of chilled water from the central chiller plant to the building. In doing so, the energy use in the ASC building increased from the chiller operation, but the overall energy use at the facility was reduced by a greater amount due to an overall efficiency improvement. In addition, the occupancy in the ASC building increased by four times in FY 2015 causing an increase in natural gas consumption as well.

Table 1, National Center Energy & Water Savings

Electricity in kWh	FY 2014 ESPC Base	FY 2016	FY 2017	FY 2017 savings vs FY 2016	% savings	FY 2017 savings vs FY 2014	% savings
JWP/Power	20,092,800	19,354,143	17,803,312	(1,550,831)	-8.0%	(2,289,488)	-11.4%
ASC	817,344	1,201,152	1,010,608	(190,544)	-15.9%	193,264	23.6%
Physics	315,072	270,528	233,932	(36,396)	-13.5%	(81,140)	-25.8%
Total Electricity	21,225,216	20,825,823	19,047,852	(1,777,971)	-8.5%	(2,177,364)	-10.3%
Natural Gas in MCF							
JWP/Power	78,490	58,252	53,032	(5,220)	-9%	(25,458)	-32.4%
ASC	633	1,078	1,017	(61)	-5.7%	384	60.7%
Total Natural Gas	79,123	59,330	54,049	(5,281)	-8.9%	(25,074)	-31.7%
Total Energy in MMBtu							
JWP/Power	149,087	125,803	115,156	(10,647)	-8.5%	(33,932)	-22.8%
ASC	3,438	5,204	4,492	(713)	-13.7%	1,053	30.6%
Physics	1,075	923	798	(125)	-13.5%	(277)	-25.8%
Total Energy	153,601	132,110	120,728	(11,383)	-8.6%	(32,873)	-21.4%
Total Energy Cost in 1000 \$	\$1,698.45	\$1,822.7	\$1,793.74	(\$20)	-1.6%	\$95	5.6%
Water in kGal							
JWP	4,425	2,826	2,717	(109)	-3.9%	(1,708)	-38.6%
Power	9,876	10,112	8,567	(1,545)	-15.3%	(1,309)	-13.3%
ASC	119	107	78	(29)	-27.1%	(41)	-34.5%
Physics	7	6	8	2	33.3%	1	14.3%
Total Water	14,427	13,231	11,652	(1,579)	-11.9%	(2,775)	-19.2%
Total Water Cost in 1000 \$	\$46.49	\$56.3	\$48.77	(\$8)	-13.4%	\$2	4.9%

JWP – J.W. Powell Building Power – Power Plant ASC – Advanced Systems Center Physics – Physics Building

The environmental benefit of the energy savings is equally impressive. The energy savings from FY 2016 to FY 2017 equates to greenhouse gas emissions of 895 metric tons of carbon dioxide equivalent (MTCO₂e), which is roughly the same as removing 192 passenger vehicles from the road or transforming 97 homes to net-zero energy. Comparing the energy savings from FY 2014 to FY 2017 increases the greenhouse gas emissions savings to 2,219 MTCO₂e or 475 passenger vehicles and 240 homes.

In FY 2017, the NC Operations Branch participated in a demand side management program. The EnerNOC Demand Response program provides payments to participants in exchange for agreeing to reduce electricity consumption during times of exceptionally high demand with a 30-minute notice. In FY 2017, the NC Operations Branch received a \$6,286 credit to their electricity bill for participation in this program.

The success of the ESPC and the NC Operations Branch's ability to maximize the savings of the ECMs and complement those ECMs with additional projects, maintains momentum for the team to continue to push for additional savings and brainstorm new projects. The growth from here moves into larger-scale projects with enhanced technologies such as a central plant upgrade with a small-scale combined heat and power. However, the team is cognizant of standard technology improvements in the areas of lighting, pumping and controls that are important complements to large-scale projects.

The NC Operations Branch has proven a mindset of focusing on day-to-day operational improvements, awareness of technology advancements, and a fearlessness of large-scale improvements that may create a one-step back, but two-step forward situation.

Reproducibility

Being the largest USGS site by far, both in size and utility use; 35.4% of the square footage, 33.2% of the energy and 36% of the water, the NC has the opportunity to lead by example and is consistently used as a role model by the USGS Energy and Water Management Program.

The success of the EPSC project, the diligence to achieving optimal savings, and the continuation of new project implementation is a successful model for other USGS energy and water efficiency programs. In conjunction with the focus on energy and water efficiency, the NC Operations Branch includes other areas in their Sustainability Program such as waste prevention, environmental and electronic stewardship, and fleet efficiency.

Outreach is an important aspect of the NC Sustainability Program. The NC Operations Branch holds a large Earth Day expo and provides targeted efficiency and action information for Energy Awareness Month, World Water Day, America Recycles Day, and more. When outreach tools such as posters, stickers and brochures are developed for the NC they are shared electronically and often distributed to other USGS sites for dissemination.

Due to NC's larger size, the Operations Branch has been able to implement certain projects that are more challenging to smaller Bureau sites. These include solar PV arrays, plate frame heat exchanger, laboratory fume hood controls, and advanced airflow systems. These projects become

important case studies for the smaller USGS sites and enable information and technology transfer within the Bureau. Details on the projects are shared through the design and construction branch and the USGS energy and water efficiency newsletter that is distributed to facility managers throughout the nation.

Supported by: Richard Isensee, Energy Program Manager, 608-212-4813

Roseann Gonzales-Schreiner, AD for Administration

2018 USGS Environmental Achievement Award
Nomination & Project Information Form

All of the following fields must be completed. Only nominations for which there is a completed nomination form will be eligible for consideration.

Date: March 6, 2018

Title of Nomination: The Interagency Grizzly Bear Study Team – a Conservation Success through Partnership

Nominee Name: The Interagency Grizzly Bear Study Team (IGBST)

Location (Region, Program, Science Center, office): Northwest, Ecosystems, Northern Rocky Mountain Science Center, Frank van Manen – USGS lead

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Project Date(s): 1973-current (Yellowstone grizzly bear delisting effective 6/22/2017)

Submitter Information (Must be a USGS employee)

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Award Category (Select one)(see Attachment 1 for category specific criteria):

- **Environmental Dream Team**

Nominee Category (Select one):

- **Team**

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Abstract (250 character max) – Provide a brief synopsis of the project.

The Interagency Grizzly Bear Study Team (IGBST) is an interdisciplinary team that achieved conservation success through production and communication of science to inform the management of a threatened species, resulting in population recovery and removal from the Endangered Species list.

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Project Description (5000 character max) Describe the project including how the project was conceived and implemented, what strategies and technologies were deployed, who was involved, and an appropriate project timeline. Explain clearly and concisely how these accomplishments or actions have contributed to improvement or protection of the environment.

The IGBST is an Environmental Dream Team as described by researchers at the John F. Kennedy School of Government at Harvard University: the IGBST is “a boundary organization that can bridge science and policy and ensure that science input is credible, salient, and broadly viewed as legitimate.” Members of the IGBST work across organizational and jurisdictional boundaries to conduct the logistically challenging work of long-term research and monitoring of a species with a high public and political profile. Multiple partners leverage limited resources that results in accomplishing work that one entity cannot accomplish alone. Whereas the entities represented in IGBST membership all have different missions and roles in grizzly bear recovery, the team is a model example of mutual respect and effectiveness. The collaborative, co-produced science approach produces rigorous and defensible research and fosters communication and stakeholder acceptance in applying the findings of the IGBST toward conservation and recovery of the Yellowstone Grizzly Bear.

Members of the IGBST are representatives from the U.S. Geological Survey (coordinating agency), National Park Service, U.S. Fish and Wildlife Service, U.S. Forest Service, the Eastern Shoshone and Northern Arapaho Tribal Fish and Game Department, and the States of Idaho, Montana, and Wyoming. Following its established Memorandum of Understanding, the IGBST leader is a USGS employee.

The IGBST was formed by the Department of the Interior in 1973 as a direct result of controversies surrounding the closure of open-pit garbage dumps within Yellowstone National Park during 1968–1972. Population declines throughout the American West and high mortality associated with the dump closures in Yellowstone National Park led to Endangered Species Act listing of grizzly bears in the lower 48 states in 1975. Following listing, the team found that the population continued to decline into the 1980s, which resulted in the formation of the Interagency Grizzly Bear Committee in 1983. The Committee consists of state agency directors and federal regional directors and was formed to help ensure recovery of the grizzly bear through coordination of policy, planning, management, and research. The establishment of the Committee provided a direct link for dissemination of scientific findings from the IGBST into effective policy and management decisions. The USGS IGBST leader serves as a technical and science advisor to the Interagency Grizzly Bear Committee and the Yellowstone Ecosystem Subcommittee.

The work of the IGBST has provided the foundation for sound management and conservation of the Yellowstone grizzly bear. Implementation of key conservation measures based on IGBST science ultimately led to population recovery in the Greater Yellowstone Ecosystem and delisting in 2017. The team continues its important work to support ongoing management efforts by the states of Wyoming, Montana, and Idaho to ensure that the Yellowstone Grizzly Bear population will not need to be listed again.

The interagency approach ensures consistency in data collection and allows for combining limited resources to address information needs throughout the Greater Yellowstone Ecosystem. In addition to the science, management, and stakeholder team approach, the IGBST employs cutting-edge research techniques and emerging technologies in its scientific studies. These tools, ranging from statistics and tracking technology to remotely sensed data and geospatial analysis, have evolved significantly over the past 45 years. The team has been able to take advantage of these innovations and advance the science that provided crucial insights into the demographic dynamics of the bear population and the complex relationships with habitats, food resources, other species, and humans.

The main objectives of the team are to 1) monitor the status and trends of the grizzly bear population in the Greater Yellowstone Ecosystem, 2) determine patterns of habitat use by bears, and 3) understand the relationship between land management activities and health of the grizzly bear population. To meet these objectives, the team focuses on four main research areas: tracking trends in numbers of unique females with cubs-of-the-year; estimating demographic rates; documenting the number and causes of grizzly bear mortalities; and monitoring key food sources.

As management authority for Yellowstone grizzly bears has returned to the states, IGBST monitoring of the Yellowstone grizzly bear population, range, habitats, and food resources will continue and was formalized in the *2016 Conservation Strategy*. With management authority outside the national parks returned to the states, increased management flexibility contributes to improved mitigation of human-bear conflicts, while maintaining a healthy and sustainable grizzly bear population.

Grizzly bear conservation in the Greater Yellowstone Ecosystem is a success due to partnerships among Federal, State, and Tribal agencies, and the involvement of local stakeholders. These collaborations provided a conservation umbrella for many other species and served as a catalyst for conservation of the ecosystem as a whole. The recovered bear population provides unique wildlife viewing opportunities for millions of public land visitors and substantial positive impacts on the local economy. The Greater Yellowstone Ecosystem now hosts the full complement of pre-European settlement wildlife and is considered one of the last strongholds of the wild American West. The rapidly growing human population and increasing recreational use in the region are creating new challenges for managers, however, as grizzly bears now occupy some areas where they were absent for decades or more. Ensuring the future viability of grizzly bears in the Greater Yellowstone Ecosystem will require continued collection of reliable scientific data and new studies by the IGBST so that wildlife managers can make informed decisions.

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Project Results (3000 character max) Describe the project results and achievements to date focusing not only on outputs but also on intermediate and long-term outcomes, and potential future outcomes. Include relevant information which may include quantitative data, such as reductions in waste generation, energy and/or water consumption for example. Do not cite results of any environmental compliance audits.

Scientific information produced by the IGBST indicated that low survival of adult females caused continued decline of the Yellowstone grizzly bear population through the 1970s and early 1980s. These findings led to the formation of the Interagency Grizzly Bear Committee and informed conservation approaches that were applied by member agencies. These actions included the establishment of food storage orders on public lands, opportunistic closures of sheep grazing allotments, and implementing criteria for secure habitat. Population trends reversed in the mid to late 1980s and ultimately resulted in the biological recovery of the Yellowstone grizzly bear population. This outcome is the direct result of a carefully designed research and monitoring program that quantified population demographics over time and assessed important habitat needs, allowing managers to reduce mortality and achieve recovery goals. Science from the IGBST also facilitated the evolution of the public perception and understanding of bears – from bears at garbage dumps in Yellowstone National Park or nuisance predators on livestock to a species whose ecology inspires awe in people and has become an icon of one of the last wild landscape in the lower 48 states.

In 2007, Yellowstone grizzly bears were delisted but placed back under protection in 2009 due to inadequate information on how declining whitebark pine, an important fall food source for grizzly bears, would impact the population. In 2012, the IGBST was tasked by the Interagency Grizzly Bear Committee and the U.S. Fish and Wildlife Service to conduct a comprehensive synthesis of existing data to characterize the importance of whitebark pine to grizzly bear diets, resulting in 10 USGS products. In addition to analysis of grizzly bear responses to changing food resources, 106 USGS products on ecology, population characteristics, genetics, connectivity, and human-bear conflict issues were cited in the 2017 decision to delist the Yellowstone grizzly bears (82 FR 30502).

The scientific outputs of the IGBST in three key areas of study (demographics, habitats, food resources) were instrumental in the biological recovery of the Yellowstone grizzly bear population and provided the scientific underpinnings for the final delisting rule prepared by the U.S. Fish and Wildlife Service. Given the high public profile of Yellowstone grizzly bears, policy decisions are often challenged in court. Without the comprehensive body of scientific work produced by the IGBST, the Interagency Grizzly Bear Committee would not have supported and pursued delisting. The IGBST has been tasked to continue coordinated research and monitoring of the Yellowstone grizzly bear population after delisting and play an important role providing objective science to many stakeholders, including the states of Montana, Wyoming, and Idaho that now have management authority.

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Reproducibility (1500 character max) Explain how the project has been replicated or has a high potential to be replicated at other federal facilities and how this knowledge has been shared with colleagues in other locations, such as Centers, organizations, or agencies.

Since the formation of the IGBST, similar collaborative approaches have been implemented for grizzly bear studies in other ecosystems, such as the Northern Continental Divide Ecosystem, as well as other species, such as the gray wolf. The success of the IGBST supports the notion that some species and systems are best studied through an independent, interagency approach: each participating entity – federal, state, and tribal – serves as a connection back to each member agency, thus bridging the often critical gap between science and management. For example, each state has a Grizzly Bear Management Plan that is founded on the scientific work of the study team. In an article in the technical journal *Environmental Management*, Lynch et al. (2008) introduced the notion of “boundary organizations”, or institutions that can facilitate the communication, translation, and mediation of scientific information necessary to successfully resolve management issues. They presented the IGBST as a model and promising approach to initiate a boundary organization.

The IGBST is an inherently replicable system because of its inclusive nature and the clear governance structure as formalized in a Memorandum of Understanding. Lessons learned from the formation, maturation, and evolution of the IGBST continue to be invaluable moving forward in species and ecosystem conservation. The Interagency Grizzly Bear Committee, formed to implement IGBST science, now oversees grizzly bear conservation in four additional ecosystems – the Bitterroot, North Cascades, Northern Continental Divide and Selkirk/Cabinet-Yaak. The IGBST model is especially valuable as an approach to replicate in addressing complex scientific and conservation issues that require Federal and State collaboration.

References:

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