



SCIENCE • ADAPTATION • MITIGATION • COMMUNICATION

Jewel Cave Earns Climate Friendly Park Status

Jewel Cave National Monument recently earned the National Park Service's Climate Friendly Park (CFP) status. The Monument joined the ranks of about 70 CFP sites of the more than 400 park sites across the country. The CFP program urges parks to measure and reduce greenhouse gas emissions. It also seeks to educate park staff and visitors about climate change and engage the public with ideas on taking action. To be a part of this unique program, the Monument completed a Greenhouse Gas Emissions Inventory to calculate the park's baseline emissions from 2008 – 2011. Monument staff also composed an action plan to detail steps to reduce those emissions by 2016.

Jewel Cave initiated CFP with the goal of implementing sustainable practices into park operations. Practices ranged from simple actions, such as saving office paper and turning off lights, to more complex facility projects, such as the installation of a water bottle filling station at the visitor center that uses a digital counter to track the number of plastic bottles saved from landfill disposal. Other actions involved upgrades to equipment and facilities, including the transition from gas powered utility carts to electrical models, replacement of inefficient water heaters with energy efficient models in staff housing, and replacement of fluorescent bulbs in the cave elevators with LEDs.

Superintendent Larry Johnson organized a park-staffed Green Team in the fall of 2010 to explore

sustainability ideas. Working across program areas, the team developed an annual work plan that addressed areas of interest. One area of attention is enhancement of public education and outreach efforts. Johnson comments, "This effort is about being good stewards of our natural resources. We will work hard to do our part and continue to work with our visitors to help make Jewel Cave a model of sustainability. We owe that to our future generations of park enthusiasts."

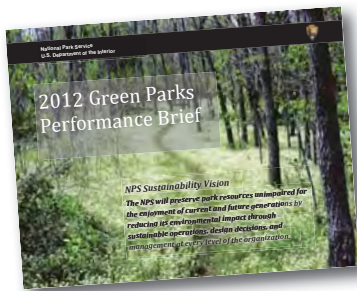
The Jewel Cave CFP Action Plan is online at www.nps.gov/jeca, within the Management quicklink. Jewel Cave commits to reducing its greenhouse gas emissions by 3% from the 2008 baseline level by 2016, and to reducing solid waste by 5% over the next three years, which amounts to a decrease of 1.5 tons of landfill matter. The Monument also plans to conduct at least one sustainability activity each academic year with its Adopt a Classroom partnership with the nearby Custer School District.

Green Team Chair Rene Ohms states, "Jewel Cave is proud to be recognized as a Climate Friendly Park. Through this program, we've made ambitious commitments to reducing our greenhouse gas emissions, decreasing waste, and educating our staff and public on the importance of environmental stewardship. We look forward to fulfilling these goals and carrying our sustainable practices into the future."

In this Issue

Jewel Cave named Climate Friendly Park	1
National Updates	
Green Parks Brief	2
USFWS Climate Strategy	2
Monthly Webinar	2
Regional Highlights	
Pacific West Region	3
Midwest Region	3
Alaska Region	5
Earth Day Events	6

Above: Although underground treasures such as Jewel Cave may seem like a world apart, they are not immune from the effects of climate change. Encouraging Climate Friendly Parks is just one way the NPS is responding to this global issue. NPS Photo.



Follow this link to access the 2012 Green Parks Performance Brief: <http://greenparksplaninside.nps.gov/>

Monthly Climate Change Webinar Series

2nd Thursday of every month
2:00 pm - 3:30 pm EDT

Next Webinar: July 11th, 2013

The July presentation will feature Monica Turner, Professor of Ecology, University of Wisconsin and Erin Drake, Wilderness Stewardship, National Park Service.

They will discuss changing fire regimes, management, and people in Yellowstone and the southern Sierras

Follow this link to register for the July webinar: <https://www1.gotomeeting.com/register/898051576>

Upcoming Webinar

August 8th, 2013

Richard Rood, Atmospheric, Oceanic, and Space Sciences, University of Michigan and Norbert Psuty, Professor Emeritus, Institute of Marine and Coastal Sciences, Rutgers University will discuss post Sandy Recovery.

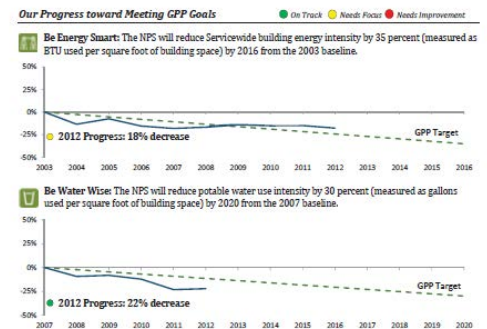
Follow this link to register for the August webinar: <https://www1.gotomeeting.com/register/826825096>

Green Parks Plan Performance Brief Available

On Earth Day 2012, the National Park Service (NPS) released the NPS Green Parks Plan (GPP). The GPP defines a strategic roadmap for sustainable operations within the National Park System, and challenges NPS staff to meet required and ambitious goals. The NPS must evaluate progress in achieving these goals over time. On April 30th, a year after GPP publication, NPS Director Jon Jarvis delivered the Green Parks 2012 Performance Brief summarizing progress to date.

The Performance Brief provides a collective view of progress to date, and helps to chart future actions for the NPS on sustainability performance. The Service-wide brief summarizes the regional briefs created for each region over the past year, and includes feedback from regional meetings that celebrate accomplishments, share more information across the Service, and optimize existing and new funding.

Overall, the NPS is making good progress in many GPP goal areas, especially through leadership at the park and regional level. Specifically, the NPS has collectively reduced GHG emissions, reduced energy and water consumption and reduced the amount of waste sent to landfills. Still, while progress has been made with respect to many GPP goals, there is more work to be done. Moving



forward, the NPS will need to work toward reducing fleet fuel consumption; increasing the amount of municipal waste diverted from landfills through recycling, composting and reuse; reducing energy consumption, especially through simple conservation and efficiency measures, increasing overall buildings sustainability and improving energy management through the Financial and Business Management System (FBMS).

Continued evaluation and monitoring – using these briefs coupled with innovation, on-the-ground actions of NPS staff and strategic investments – will ensure that the NPS continues to meet the GPP goals, advancing mitigation efforts outlined in the NPS Climate Action Plan.

Release of the National Fish, Wildlife and Plant Climate Adaptation Strategy

In March 2013, the U.S. Fish and Wildlife Service (USFWS), announced the National Fish, Wildlife, and Plants Climate Adaptation Strategy. The purpose of the Strategy is to inspire and enable natural resource professionals and other decision makers to take action to conserve the nation's fish, wildlife, plants, and ecosystem functions, as well as the human uses and values these natural systems provide, in a changing climate. The Strategy is a comprehensive, multi-partner response to the threat of climate change in the United States. It is a call to action—a framework for effective steps that can be taken, or at least initiated, over the next five to ten years based on climate change projections for the next century. It is designed to be a key part of the nation's larger response to a changing climate, and to guide responsible actions by natural resource managers and other decision-makers at all levels of government. USFWS, along with the National Oceanic and Atmospheric Administration (NOAA), and the New York Division of Fish, Wildlife, & Marine Resources (representing state fish and wildlife agencies more broadly) co-lead development of the Strategy. NPS representatives participated in the Steering Committee, and on the technical teams for the Strategy. The



Association of Fish and Wildlife Agencies also provided support for the effort.

The Strategy is available at: www.wildlifeadaptationstrategy.gov

PWR Rolls out Climate Change Response Strategy

On May 1, 2013, the Pacific West Region unveiled its Climate Change Response Strategy and Action Plan. Developed by the regional Climate Change-Coordination Committee (C4), the Strategy sets broad goals for addressing climate change mitigation and adaptation in every program area. Its accompanying Action Plan sets specific actions for each division of the Regional Office to carry out in support of the Strategy goals.

Rolling out the Strategy includes a variety of activities to invigorate and stimulate thought and action surrounding climate change response. As a first step, park superintendents participated in a conference call led by Regional Director Chris Lehnertz on April 2 that introduced the Strategy and discussed expectations. Subsequently, in a memo announcing the Strategy and Action Plan, Ms. Lehnertz outlined some of her own personal commitments to climate change response, including improving regional fleet efficiency, identifying performance expectations, and celebrating

regional successes in climate change response. Emphasizing the relationship between the Strategy and PWR staff at all levels, Lehnertz wrote, “The Strategy provides a vision and goals we can embrace together to complement our strengths as climate change leaders.” The Strategy document was then distributed to all superintendents on May 1 with the intent that park based strategies and actions will also support the goals of the regional Strategy.

In addition, the C4 group is developing programs to enhance the regional support system for taking action on climate change. A network of climate change champions is being assembled; staff from parks and regional offices that have a specific background or interest in climate change can be nominated as champions, and will act as catalysts and advocates for implementation of actions in their park or office. For more information contact Amanda Schramm at amanda_schramm@nps.gov.

Southern Sierra Change Adaptation Workshop

Sequoia and Kings Canyon National Parks partnered with other land managers to spearhead a 2.5 day workshop that brought nearly 170 land managers, conservation practitioners, researchers, and educators together from across the southern Sierra Nevada. Participants addressed the question: Given uncertain and rapidly changing conditions in the 21st century, how do we best achieve our shared conservation goals for the Southern Sierra Nevada Region?

After hearing keynote talks about agents of change, natural resource conditions, and human dimensions, participants tested a change adaptation framework (Fig. 1) through a series of exercises. They identified shared values, discussed resource vulnerabilities, assessed current objectives in light of these vulnerabilities, and brainstormed potential revised climate-smart objectives. Participants described management strategies for both the persistence of valued resources, as well as ways to facilitate desired transformation when persistence is not possible. Speakers from agencies, universities, and non-governmental organizations presented talks on vulnerability assessments, adaptation strategies, and more. Line officers or representatives from several agencies also spoke on a panel about shared regional values, facilitating an open and informative discussion of the challenges ahead.

By the end of the workshop, participants had identified shared values within the southern Sierra, described vulnerabilities of six focal resource-

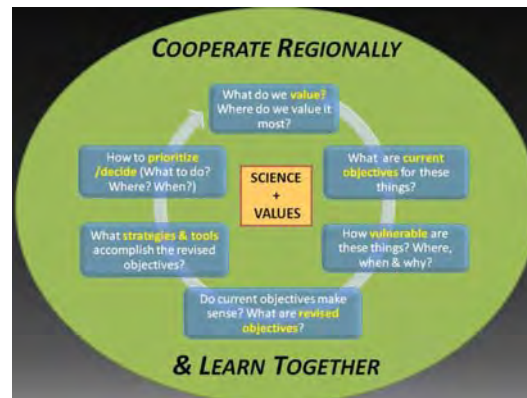


Figure 1: The change adaptation framework tested in the workshop.

es to climate change and other stressors, drafted objectives for these resources, and identified potential strategies and management tools to meet these objectives (see box). Results indicate that current management actions alone are not likely to accomplish current objectives, especially under rapidly changing conditions. In some cases, the current objectives were still deemed acceptable, but participants recommended changing how management is conducted. In other cases, current objectives were revised in light of changing conditions. The suggestions for on-the-ground management actions and for policy changes focused on resistance or resilience strategies. In contrast, research/monitoring and education actions generally focused more on facilitating transformation to novel conditions or planning for extreme events.

Green Roof Guidance

Technical Preservation Services has launched new web-based guidance, **Green Roofs on Historic Buildings**, with information the construction of green roofs, special considerations for installations on historic structures, and guidance for meeting the Secretary's Standards for Rehabilitation. The guidance is accessible from the 'Sustainability' section of the TPS website, but the direct link to the overview page is www.nps.gov/tps/sustainability/new-technology/green-roofs.htm.

Participant Responses

Top values for the southern Sierra Nevada:

- 1) Hydrologic resources (e.g., water quality and quantity)
- 2) Human connections to the environment
- 3) Biodiversity

Top criteria used to establish values:

- 1) Public support
- 2) Cross-regional benefits
- 3) Vulnerability of value/ability to triage

Top stressors:

- 1) Fire (both lack of fire and fuel buildup)
- 2) Pollution (air and land based)
- 3) Non-native species, recreational use, and climate change

Top strategies:

- 1) Managed fire
- 2) Education
- 3) Experimentation and monitoring

Constraints to Implementation:

- 1) Cost (i.e., sustained financial support)
- 2) Agency regulations and culture
- 3) Public concerns

Tools to Overcome Constraints:

- 1) Public support
- 2) Collaboration
- 3) Education

Emergent Themes:

- Protecting single species versus managing for the ecosystem.
- Focusing on at-risk areas/values versus investing in those likely to persist in spite of change.
- Some agencies can do certain strategies more easily than others.
- Certain strategies accomplish multiple resource objectives (co-benefits).



Water was a topic on the minds of many at the workshop. How will snowpack change in the Sierras and what does that mean to the plants, wildlife, and people that depend on it?

Southern Sierra Change Adaptation Workshop *Cont'd*



Several themes emerged from the workshop. Examples include:

- Should managers focus effort on conserving species versus ecosystems?
- Should managers protect locations/values that are most at-risk or those that are most likely to persist?
- Are these really trade-offs or can multiple objectives be accomplished over a regional landscape?

Participants acknowledged that agencies have varying abilities to carry out certain strategies and that some strategies benefit multiple resource objectives. By working regionally, participants can take advantage of differences and co-benefits.

This workshop represented the first of many steps in adapting to changing conditions in the southern Sierra. Overall, participants and members of the planning committee agreed that the workshop represented a good starting point, but that more effort, dialogue, and process development is needed to plan for and implement change adaptation strategies, especially from a regional perspective. In the post-workshop survey, many

participants noted that the change adaptation framework would be useful to their planning efforts, but it will require further development before integration. Planners expect to modify the approach using lessons learned.

Public engagement will be a critical next step in creating a successful change adaptation strategy. Future workshops will most likely apply an improved change adaptation framework to a particular resource across the region.

The California Climate Commons website will host workshop materials, including a final report, as an online forum to facilitate future discussion (www.climate.calcommons.org).

This workshop was made possible by the National Park Service, US Forest Service, Bureau of Land Management, US Geological Survey, and the California Landscape Conservation Cooperative.

For more information, contact Koren Nydick at koren_nydick@nps.gov.

Climate Change Camp and Eco-Expo in Mariana Islands

In February 2013, over President's Day weekend, nine 7th and 8th graders attended American Memorial Park's first Climate Change Mini Camp on Saipan in the Commonwealth of the Northern Mariana Islands. For 3 days these students reviewed and learned about climate change facts, risks and threats to their island community. Working in two teams, they coordinated, produced and presented "Climate Change ADAPTATION for Pacific Islands" power points and tri-fold exhibits to Park Superintendent, Barbara Alberti. The students expressed ideas for changes on the island which they could propose, enact, or in the future, legislate.

Acting as Climate Change Ambassadors, the students presented their recommendations to approximately 1,500 4th and 5th graders at the annual 3 day ECO-EXPO April 16-18, 2013.

Events such as these support the NPS Call to Action item, "Live to Learn." Offering regular education programs such as this helps American Memorial Park develop as a learning center of the natural world while retaining the focus of the park's enacting legislation.



Indiana Dunes hosts Climate Change Workshop

Indiana Dunes National Lakeshore presented a climate change workshop for formal and informal educators on March 23 in partnership with the Great Lakes Research and Education Center, Dunes Learning Center, and Chicago Wilderness.

The eight-hour workshop highlighted a regional update on climate change from the Chicago Wilderness Climate Change Task Force. Keynote Speaker, Alejandro Grajal, Senior Vice President for Conservation and Education of the Chicago Zoological Society spoke about the role of visitors' values, beliefs and emotions in developing effective practices for climate change education in informal learning settings.

Participants also tried their hands at climate-change games and activities, including a climate jeopardy game. In demonstrating how everyone can make positive impacts, workshop sponsors shared climate-friendly actions underway by the Department of the Interior, the National Park Service, the National Parks and Conservation

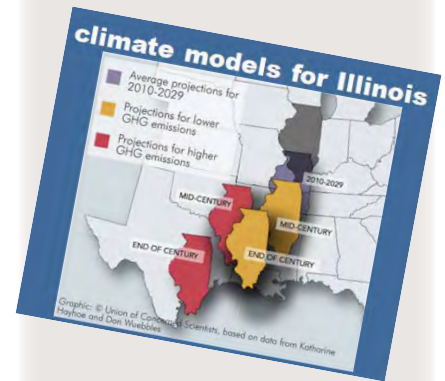
Association, Indiana Dunes National Lakeshore, Earth Partnership for Great Lakes Schools, and schools in the Northwest Indiana and Chicago areas.

Educators shared their own experiences in an open discussion of strategies, lesson plans and challenges for teaching climate change and engaging people in conversation and stewardship.

The group was encouraged to participate in a variety of citizen science phenology projects.

To cap off the event, participants explored the sugar bush at Indiana Dunes National Lakeshore and learned about a new high school program empowering students to collect data to monitor the health of the park's sugar maple trees.

For more information contact Christine Gerlach, education programs specialist, Indiana Dunes National Lakeshore. Christine_gerlach@nps.gov



Permafrost Features Mapped, Future Models Developed

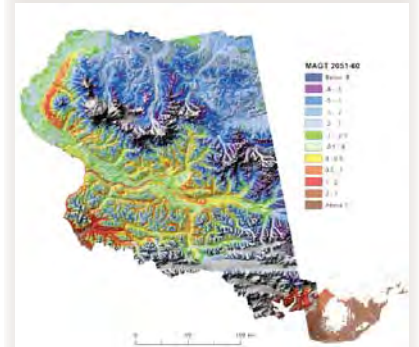
Roughly 80 percent of Alaska is permafrost—ground that is permanently frozen. As the climate warms, permafrost is expected to melt and change the landscape. Climate change monitoring funds supported several projects intended to provide a more complete understanding of current permafrost conditions in Alaska's national parks and to predict future conditions.

The first, a collaboration with partners at the University of Alaska Fairbanks, uses existing NPS soils and landcover inventory data and NPS weather data as inputs to develop maps of current permafrost conditions and model future conditions in all parks (Romanovsky et al. 2012). This project will produce maps of current and likely future permafrost conditions for all parks in the

Arctic and Central Alaska Networks. Phase one of the project is scheduled for completion in 2014.

To expand upon the work previously done in the Arctic Network parks, two additional projects were funded in Yukon-Charley Rivers and Wrangell-St. Elias. Permafrost related features were inventoried and mapped in specific areas within the park units (Wells 2013a and 2013b). The projects in Yukon-Charley and Wrangell-St. Elias focus on areas of importance to the parks and will serve as management tools for future actions.

For more information contact Sara Wesser, Regional Coordinator for the Alaska I&M Program.



Predictive permafrost maps such as this one for Wrangell-St. Elias National Park and Preserve for 2051-60 are currently being produced for all parks in Alaska by partners at the University of Alaska Fairbanks Geophysical Institute.

Satellite Data Tracks Seasonal Patterns in Alaska

Globally, leaf-out and flowering dates are occurring earlier in the spring, and fall colors are turning later due to warmer temperatures. The Alaska I&M Program, in partnership with the Geographic Information Network of Alaska (GINA), synthesized ten years of MODIS satellite data for the state of Alaska showing NDVI, a measurement of greenness and snowcover. This

data is now publicly available and is being used to analyze trends in the timing of green-up and fall senescence, as well as total snow days. This work greatly contributes to other ongoing state-wide phenology-focused monitoring projects. For more information, contact Amy Miller with the Southwest Alaska Network.



MODIS satellite imagery now allows NPS scientists in Alaska to track phenology events, such as spring green up. Pictured: aspen leaf out in central Alaska NPS photo

Making a Game of Climate Change

Big posters crammed with facts and photos, brochures and flyers strewn across a table, and smiling faces under wide-brimmed hats is a standard arrangement for the National Park Service to present science at fairs and festivals. After all, at a park visitor's center, NPS staff stand by displays while visitors enter the space to ask questions about a resource. This is rarely the case at fairs and festivals. Most fairgoers make a beeline for food, crafts, rides, or games. They don't look for information; they seek entertainment.

Once the Pacific Island Network Inventory & Monitoring Program made this realization, they tweaked their methods for engaging people at public events. They made games.

Kids are usually attracted to the game first. They are invited to play. The games always require parents and friends to join in, as people will spend more of their time if they play as a group. At this point, the information transfer can occur. For example, if players are asked if they want to save a native bird from marauding mosquitoes by whacking the bugs with beanbags, most people will accept the challenge. The challenge includes a time element or some sort of certain doom possibility (people tend to work together to avoid a shared menace). The players can achieve incremental success by answering easy but thoughtful

questions. Even simple questions often lead to deeper inquiry and the realization that the participants are truly affected by the resources being discussed.

So how does this climate change game work? Developers started by recreating a generic alpine mountain in Hawaii. They added a widely identifiable honeycreeper (iiwi), forced to live at a high elevation to escape the malaria-laden mosquitoes just below. As the climate warms, the mosquitoes ascend the mountain and chase the iiwi upslope until there is no habitat left and the survival of the species is at risk. The players are told that if they correctly answer true or false questions about climate change, they will be given beanbags to throw at the mosquitoes to knock them off of the game and save the bird. If they answer incorrectly, the bird and mosquitoes move higher up the mountain. . . but they can only go so high before all is lost.

Although it is a challenge to win, players never actually lose.

The participants learn (and share) a lot about climate change along the way. The game experience is relevant and meaningful, but flexible. And everyone goes away happy, proud of themselves, and a little more savvy about climate change.



Electronic Waste Collection at Point Reyes

Point Reyes National Seashore hosted an electronic waste (e-waste) recycling collection event on Earth Day to help the surrounding community recycle their old electronics safely and responsibly. Computers, TVs, printers, and other related items were collected at the Bear Valley Visitor Center. The collected e-waste went to Renew Computers in San Rafael, CA, where items get refurbished for reuse or recycled locally.

Point Reyes Engineering Techs Dale Dualan (Left) and Sara Hammond (Right) collect Electronic Waste at the Bear Valley Visitor Center.



Climate Change Response Program Earth Day Booth

As part of DOI's 2013 Earth Day activities, the Climate Change Response Program hosted a climate change booth in front of the Department of Interior. In a collaborative effort for the Natural Resource Stewardship and Science Directorate, representatives from the Water Resources, Climate Change Response Program, Environmental Quality Division and the Geological Resources

Division coordinated and ran the Earth Day booth.

NPS hosts provided materials related to climate change from all the directorates. Visitors from the public, other federal agencies and sister bureaus visited the booth. For more information, please contact Doug Parsons douglas_parsons@nps.gov.

More Information

This newsletter is a quarterly forum to share the latest actions relating to NPS efforts to manage our parks in a changing climate.

Dr. Leigh Welling, Chief Climate Change Response
Leigh_Welling@nps.gov

Comments, Submissions:
Angie_Richman@nps.gov

The Climate Change Response Program websites:

External: <http://www.nps.gov/climatechange>

Internal: <http://www1.nrintra.nps.gov/climatechange>