Climate Change Response Program *News*
September / October 2012

National Park Service
U.S. Department of the Interior

Climate Change Response Program

SCIENCE • ADAPTATION • MITIGATION • COMMUNICATION

Youth Engaging in Climate Change Across the Service

This issue of *Climate Change Response Program News* highlights the great work of a talented group of young people who are passionate about our National Parks and about understanding, and acting on, the effects of climate change. This year's George Melendez Wright (GMW) Climate Change Interns and Fellows have brought their deep commitment, creative ideas, and hard work to dozens of parks and programs. We are delighted to present some of their stories from the field.

Through the GMW Internship program, the CCRP funds university students for 12 weeks to help parks and programs understand and respond to climate change in many different ways. The projects are developed in advance by parks and programs and submitted for consideration via a competitive proposal process. Some interns, like Andrew Maurer at Gulf Islands NS, conducted field research and developed models to understand the vulnerability of protected species to climate change impacts in the parks. Others, like Bridgette Rivers at Manassas NBP, researched and produced innovative interpretation products to educate visitors about climate change and park resources. Overall, the 26 interns this year contributed to cultural and natural resource stewardship, interpretation and education, communication, planning, and adaptive management in parks throughout the country.

The GMW Fellowship program supports Masters and Ph.D. students for one year conducting independent research with the potential to inform solutions to resource management problems related to climate change. Proposals are submitted by students, with the endorsement of resource management leaders in each park, and evaluated by a diverse panel of internal and external scientists. Among this year's fellows are Lisa Marrack from UC Berkeley who is helping parks predict how sea level rise may alter fish communities in coastal pools that are important to native Hawaiian cultures and are protected by several park units in Hawaii.

As *A Call to Action* reminds us, the NPS has an exemplary record of ensuring the stewardship and public enjoyment of the national parks, and an obligation to make parks more relevant to broader and younger audiences. The George Melendez Wright Climate Change Internship and Fellowship program aims to meet that obligation. Science and service are great ways to connect people to parks and simultaneously foster the next generation of park stewards and NPS professionals.

The following stories and profiles reveal young people connecting with national parks as they work on research, education, communication, and management projects related to the greatest ongoing threat the national parks have ever faced. These projects reflect the energy, creativity, and commitment that students and NPS staff bring to a thoughtful and effective response to climate change. It is a pleasure to share and celebrate them with you.

In this Issue

This is a special issue of the Climate Change Response Program newsletter featuring the work of our 2012 George Melendez Wright Climate Change Interns and Fellows. For more information on this program or any of the projects highlighted here, contact: Tim_Watkins@nps.gov

Above: The lakes of Voyageurs National Park are being carefully monitored as moose populations respond to climate change. See page 6 for more details.

Monthly Climate Change Webinar Series

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

Next Webinar: Nov 8, 2012
Informing Collaborative Management of National Parks through Ice Patch Archeology

Dr. Craig Lee, Research Scientist with the Institute of Arctic and Alpine Research (INSTAAR) at the University of Colorado-Boulder will present his latest work conducting ice archeology in Glacier NP in collaboration with the Confederated Salish Kootenai Tribes and the Blackfeet Nation.

Follow this link to register for the November webinar:
https://www1.gotomeeting.com/register/304322689

Upcoming Webinar

December 13, 2012
The NPS Climate Change Action Plan and What it Means for You

Dr. Leigh Welling, Chief of the Climate Change Response Program, will present an overview of the recently completed Servicewide Climate Change Action Plan, and how parks and programs can become involved.

Follow this link to register for the December webinar:
https://www1.gotomeeting.com/register/646009144

Interpreting Climate Change at Point Reyes

As a Climate Change Intern with Point Reyes National Seashore in California, Willis Logsdon developed and delivered a public presentation on the effects of climate change in the park. Point Reyes is fortunate to house NOAA's "Science on a Sphere" technology, which is an animated, room-sized globe that is used to display different oceanic and atmospheric data sets. Willis used "Science on a Sphere" to illustrate to park visitors some of the ways climate change may impact the flora and fauna of Point Reyes.

Willis met with scientists in the park to discuss the effects of climate change on specific flora and fauna. After researching the impacts of climate change, he created a series of visuals including maps and data sets to be displayed dynamically on the sphere. Willis delivered his presentation to park visitors throughout the final week of his internship. His presentation will act as the standard "Science on a Sphere" climate change presentation in Point Reyes and is now available for other park interpreters to present.

Willis' summer at Point Reyes was a tremendous opportunity to learn about climate change, while developing valuable communication skills.

Preserving the Karner Blue Butterfly in Indiana Dunes

Over the summer, Tatyana Liakhova worked with NPS and USGS scientists in hopes of preserving populations of the federally endangered butterfly species called Karner Blue. As a GMW Intern, she was not only able to watch Karner Blue grow from a tiny egg to a full grown adult, but also work on helping to prevent the extinction of these beautiful butterflies. Tatyana collected field data on temperature variations, slope aspect, canopy cover, and shading in order to model and predict the specific effects of climate change on the lifecycle of the Karner. Based on the Karner's response to the documented temperature variations, it will be possible to recreate the most suitable conditions in order to stop further population loss.

Another important part of her internship was to educate the public about climate change research and the importance of diversity preservation at Indiana Dunes by creating field signs and information for the park's educational websites. Tatyana reports, "Indiana Dunes National Lakeshore is a fascinating place teeming with diverse plant and animal life. Overall, knowledge gained through this internship has broadened my understanding about climate change and the ways to fight it. It has solidified my decision to become an environmental chemist in hopes of preventing further climate change."

Investigating Salamander Skin in Shenandoah

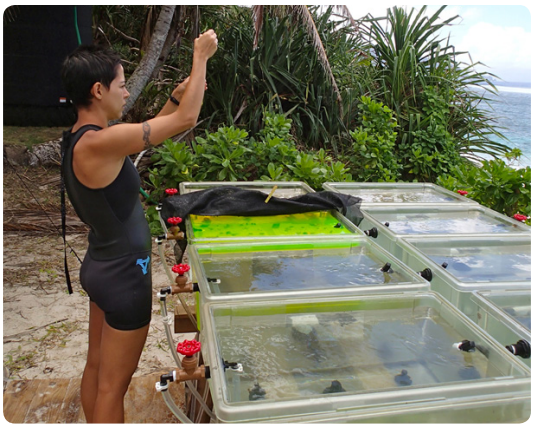
All animals live in close association with non-harmful bacteria that provide numerous services to the host, including disease protection. The focus of Carly Muletz's research fellowship is to determine how climate change may alter amphibian skin microbial communities and host-pathogen disease dynamics. Studying amphibian skin microbial ecology is critical for understanding how amphibians are protected from skin infections by the fungal pathogen *Batrachochytrium dendrobatidis* (*Bd*). Carly, a student at the University of Maryland, is working in the Appalachian Mountains in Shenandoah National Park, a global hotspot of salamander biodiversity. She is sampling the skin of two salamander species, one declining and one non-declining, along an elevation gradient, which will allow her to predict distributional changes in symbiotic bacteria and *Bd* with changes in temperature. She is using both traditional culturing methods to identify protective bacteria that inhibit *Bd* growth and new high-throughput sequencing methods to characterize the entire bacterial community per species. This research will reveal important ecological interactions on amphibian skin that can be used to identify conservation priorities and guide policy to protect and manage amphibian biodiversity in Shenandoah National Park.

Coral Growth in a Dynamic Coral Reef

For over a decade scientists have been amazed by a coral reef ecosystem off the shore of a small island in the south Pacific because the corals are exposed to variable and sometimes extreme environmental conditions. This coral reef is part of the National Park of American Samoa on Ofu Island. Lupita Ruiz-Jones, a graduate student in the Biology Department of Stanford University, has been working with members of Dr. Steve Palumbi's lab to study one of the corals found there in the genus *Acropora*. As researchers around the world seek to understand the impacts corals will face due to climate change, it has become increasingly apparent that in certain coral reef ecosystems natural environmental variability can span pH and temperature values that are predicted for the future. And as we work towards predicting climate change impacts it may be informative to understand the influence this natural environmental variability has on corals.

In September, Lupita spent four weeks on Ofu (where the primary available fruits are papaya and banana and the population is ~200) working on her fellowship project. The goal of her project is to investigate the influence of natural environmental variability on coral calcification, by comparing the amount of linear growth that occurs during a six-day period of moderate variability to growth that occurs during a six-day period of pH and temperature extremes. To address this question she used the fluorescent dye Calcein to stain the coral skeleton at the start and end of each growth period. The next step will be to analyze the samples with fluorescence microscopy. The ultimate goal of her work is to help promote the resilience of corals worldwide by identifying effective management actions under increasing acidity and temperatures.

Lupita became interested in coral reefs during her undergraduate studies at Chaminade University of Honolulu and internships at the University of Hawai`i's Kewalo Marine Lab. Coral reefs are threatened worldwide and Lupita hopes to continue studying these beautiful ecosystems and the organisms that compose them.



Surveying Pools on the Big Island of Hawaii

Lisa Marrack spent the summer hiking through lava fields on the arid west coast of the Big Island of Hawaii surveying biotic and abiotic features at 195 brackish anchialine pools, some of which have never been mapped before. This doubles the number of pools previously surveyed by the NPS. These groundwater fed pools stretch throughout the 175 mile Ala Kahakai National Historic Trail (ALKA) coastal corridor which includes Hawaii Volcanoes, Kaloko-Honokōhau, and Pu`uhonua O Hōnaunau. Anchialine pools support endemic invertebrate communities, are important Hawaiian cultural resources, and face multiple threats (ie. sea level rise, introduced species, land-use practices). Lisa is using the field data along with spatial modeling techniques to predict: 1) resources that will be lost due to inundation; 2) resources that will be threatened by invasive fish dispersal as sea levels rise; and 3) future locations of high quality habitat. Her ultimate goal is to share the results with private and public land managers along the ALKA corridor to target conservation actions and planning so this unique ecosystem will persist as sea levels rise.

Natural Resource Education in a Cultural Park

During her internship at Manassas National Battlefield Park, Bridgette Rivers worked to develop natural resource education in a park that traditionally focused education around the historical and cultural aspects of the area. She worked with Natural Resource Program Manager Bryan Gorsira to develop interpretive programs that could be run with minimal park support well after her internship ended. One such program was a free cell phone tour, launched September 29, which allows visitors to dial into 14 different stops along the Stone Bridge Loop trail. Each stop gives the listener natural resource information related to climate change and tailored to their location, and there are separate tours for children and adults in English and Spanish.

Another project Bridgette is continuing to work on is a Junior Ranger booklet specifically focused on environmental education. Along with other parks in the DC area, Bridgette is working with the Blue Ridge Parkway Foundation's Kids in Parks program to put in a kid-friendly Track Trail at Manassas, due to launch this winter. In addition, website enhancement and partnering with local community members rounded out the projects she completed at Manassas.

Bridgette is a second year geography master's student at Virginia Tech and aims to continue working with the NPS in the future.

Encouraging Community Monitoring of Coral Reefs on Guam

Coral reefs in War in the Pacific National Historical Park (Guam) are threatened by warming waters caused by climate change. Chris Gibson identified areas susceptible to bleaching and is helping develop a community monitoring program to increase public awareness. He monitored reefs for bleaching over the summer and used his observations to identify susceptible areas to be monitored by the community. He deployed temperature and light loggers to monitor environmental conditions on the reef, used GPS to mark areas containing bleaching susceptible species, and generated a GIS map of key areas for bleaching monitoring in the National Park.

Combating Coral Bleaching in American Samoa

Coral reefs are diverse ecosystems, providing homes for thousands of species and food for millions of people. Rachael Bay, a PhD student at Hopkins Marine Station of Stanford University is working on Ofu Island in the National Park of American Samoa, researching mechanisms corals might use to increase their heat tolerance. Because they are so sensitive to environmental change, increasing ocean temperatures associated with climate change threaten coral reefs worldwide. Stress associated with temperatures can cause a condition called bleaching, when corals expel symbiotic algae which provide them with nutrients, ultimately resulting in the death of the coral.

During her fellowship, Rachael focused on how individual corals might 'learn' to withstand higher temperatures, a process known as acclimation. To test whether corals acclimate to increasing temperatures, Rachael set up a series of experimental tanks with different water temperature regimes; after a few weeks, she subjected corals to a tank of even hotter water. Preliminary results indicate that the corals exposed to warmer temperatures could survive the intense heat while other corals bleached. With this experiment, Rachael will be able to learn how different temperature regimes increase a coral's heat tolerance, which can help predict how corals will respond as climate change proceeds, in order to develop management actions to combat coral death.

Coral Reefs on the Island of Molokai

Emilia Sogin's graduate research seeks to investigate metabolite production in reef building corals over temperature gradients using a novel metabolite profiling technique, which is new to coral biology. She will be working at Kalaupapa National Historical Park on Molokai and comparing metabolite profiles between corals collected along a temperature gradient within and outside the park. Kalaupapa is extremely isolated from surrounding populations and receives minimal impact; therefore it has potential to be used as a reference site for reefs outside of the park. She anticipates her work will enable us to understand the impacts of temperature on metabolite production so we can better model reefs into the future. Emilia will begin work on Molokai in April 2013, when winter waves will cease and safe sampling will be possible along the northern exposures of her study area.

Understanding Diatom Communities in Lassen

Kerry Howard, a PhD student in the department of Geological Sciences at the University of Nevada, Reno, is investigating the effects of environmental change on diatom community composition in the small subalpine lakes of Lassen Volcanic National Park. (Diatoms are an important type of plankton that help form the foundation of the marine food chain.) Changes in diatom community composition may be attributed to increasing temperatures (climate change), modifications in landscape, increases in atmospheric nutrient deposition, or a complex interaction of these forcing factors, particularly where multiple forcing factors affect the region.

Kerry is examining modern diatom community composition in park lakes and the associated physical and chemical parameters in these lakes. She has also extracted sediment cores from several lakes to study algae community composition changes and environmental changes through time. Since both regional and local environmental changes impact lake ecosystems on differing scales, her work will help park resource managers approach resource management decisions from multiple perspectives. Data from her study are being merged with lake monitoring data from the park so managers can also gain a more detailed picture of the status of park lakes.

Kerry's research is directed toward improved knowledge of diatom community response to environmental change and the varying nature of water resources in small subalpine watersheds. She is also a middle school science/math teacher.

Brook Trout at the St. Croix Riverway

Patrick Shirey is a PhD candidate at the University of Notre Dame in the Department of Biological Sciences. In his dissertation research, he takes an interdisciplinary approach to informing ecological restoration and environmental policy by merging the disciplines of ecology, history, and law. Patrick worked with NPS personnel at St. Croix National Scenic Riverway to review the fish habitat history of the cold-water zone of the wild and scenic Namekagon River to determine probable causes for the decline of brook trout (*Salvelinus fontinalis*) in the system. Because of the added legal protection under the Wild and Scenic Rivers Act, the Namekagon River offers a special opportunity to protect the unique biological resources and native species provided by cold-water river systems in Wisconsin, including the brook trout.

Based on historic descriptions of brook trout abundance and the relatively low populations at present, they were able to infer that brook trout were abundant in the mainstem of the Namekagon River before logging in the late 1800s and declined soon thereafter. In Patrick's research on the history of the Namekagon, he noticed a gap in historical temperature records, demonstrating a need for a survey of system-wide temperature to inform NPS management efforts directed at protecting and restoring cold-water habitat for brook trout.

Temperature is a limiting factor for brook trout that could be compromised by land-use change and climate change affecting groundwater inputs. However, brook trout can move to find thermal refuge in summer, if cold-water refuge is present in groundwater-fed pools or tributaries. By identifying areas of thermal refuge for brook trout populations, the research can inform NPS plans to protect, restore, and manage brook trout habitat in the face of a changing climate. In addition to deploying 95 temperature loggers, the Notre Dame field crew and NPS surveyed fish populations in tributaries to determine areas that currently serve as refuge for brook trout and other cold-water species. The brook trout are just one of the many species important to maintaining a healthy ecosystem on the Namekagon.

Communicating the Effects of Climate Change at Boston Harbor Islands

Because of its coastal location, Boston Harbor Islands National Recreation Area (BOHA) is particularly sensitive to issues such as sea level rise and increased storm activity. The goal of Caroline Owens' internship at BOHA this summer was to continue to build the park's climate change communication and education efforts.

With help from Dawn Tesorero and Boston Public Schools teacher Jennifer Felicetti-Magsino, Caroline developed a park-themed 6th grade science curriculum exploring 'weather, water, and warming' on the islands. It is available on the park website at **http://www.nps.gov/boha/forteachers/curriculummaterials.htm**.

She updated the park website with new environmental content. One of the most exciting features she created was an online training module for rangers, volunteers, and teachers that explains the specific impact of climate change to BOHA.

Caroline is continuing her internship into the school year by working to publicize important ongoing research in BOHA. Scientists from many fields are currently engaged in various projects in the park. Over the course of the winter, Caroline will write a series of articles aimed at rangers, teachers, and the general public explaining the relevance of these scientists' research in the context of climate change.

Climate Change and Culture in Northern Alaska

In Northern Alaska, the experiences of native Iñupiaq Alaskans are deeply affected by the environment. Their close connection with nature has allowed them to perceive changes in the environment over generations, thus providing them with personal stories about the impact of these changes on their culture over time.

This interface of climate change and culture is what intern Simona Clausnitzer, a geology student at Bryn Mawr College, investigated during her summer in Kotzebue, Alaska. In Kotzebue and in the Western Arctic National Parklands, she documented the effects of climate change including sinkholes formed by melting permafrost, coastal erosion, melting sea ice, and rising sea levels. But of equal importance, she documented how the effects of climate change are influencing the native culture. Local members of the native communities told her of the subsistence practices they so heavily rely on and how, in recent years, their ability to hunt and fish has been changing with the shorter sea-ice seasons. In addition, Simona saw how the very ground beneath the communities in Northern Alaska is eroding and falling into sinkholes due to rising sea levels and melting permafrost. Through interviews, Simona gathered information to write articles and create film segments to communicate the interconnectedness of climate change and the Iñupiaq culture. For native cultures in northern Alaska, the urgency of addressing climate change is becoming increasingly clear.

Wildfire Patterns and Forest Transitions in the Rockies

For national parks and wilderness areas in the northern Rocky Mountains, the combination of warmer climate and altered fire regimes (fire frequency, size, and severity patterns) will likely cause rapid, widespread, and lasting changes in vegetation and wildlife habitat. Fire frequency and annual area burned have steadily increased in recent decades, but very little is known about how spatial patterns of fires may be changing. Are fires becoming less "patchy" with more uniform burn severity patterns? What climatic, topographic, or biological factors are related to spatial patterns of burn severity? Where are spatial patterns of burn severity changing fastest? How do these changes in fire regime and post-disturbance climate potentially interact to affect tree regeneration in common northern Rockies forest types?

These are some of the questions that Climate Change Fellow Brian Harvey seeks to answer through his doctoral research. Brian is a third year PhD student at the University of Wisconsin and is combining extensive field data with satellite remote sensing to test for changes in burn severity patterns and postfire forest reestablishment in Yellowstone, Grand Teton, and Glacier National Parks and surrounding wilderness areas. His research will generate new understanding that is directly relevant for managing fire-prone forested landscapes in national parks in the face of climate change.

Researching Moose Habitat in Voyageurs

Samantha Hasek spent her summer at Voyageurs National Park in Minnesota researching the refugia available to the local moose population. As moose adjust to climate change, they will have to adapt their browsing and thermoregulatory behaviors to optimize their energy expenditure. Beaver ponds and lakes throughout the park will become increasingly important as thermoregulatory aids, and they may also be important sources for food. Samantha helped to explore the connection between thermal refugia and aquatic browse by recording the abundance of various plants such as pondweeds, lilies, and bladderworts in many beaver ponds of different size and age and in several lake bays. As water temperature grows close to air temperature, moose will no longer utilize the ponds. To provide a seasonal timeframe for utilization of the water, she helped prepare and deploy temperature loggers in each of the aquatic sites. The results of the study will help managers make decisions regarding habitat management of moose populations in the park and elsewhere throughout the country.

Documenting Local Knowledge at Wrangell–St. Elias

The Alaskans who live in and around national parks have a great deal of traditional knowledge that provides perspective on changes in the land. In Wrangell–St. Elias National Park and Preserve, park residents, many of whom pre-date the establishment of the Alaska park system in 1980, offer a unique contribution to phenological monitoring, or keeping track of "nature's calendar." With roughly 5,200 residents claiming subsistence rights, Wrangell–St. Elias is an ideal location to utilize local knowledge and observations.

Margot Higgins' research seeks to understand who is making observations to help the park create a more systematic phenological monitoring program, as well as examine what current phenological observations

say about changing vegetation patterns in Wrangell–St. Elias.

Margot completed the majority of her field work this summer, conducting 53 interviews in the park and focusing in particular on communities that can access the park by road where people are most likely to rely on park resources for subsistence purposes. She has found that a wide array of local knowledge exists including site-specific observations of glacier melt, changing patterns of big game species (including moose and dall sheep), changing bird migration patterns, longer growing seasons, changes in vegetation and hydrology, and permafrost loss.

Looking to Fossils to Manage Lakes in Isle Royale

Lake ecosystems are prominent features of many parks in the national park system. One of the most ecologically important features of lakes is the vertical gradient in lake temperature, with warmer water near the surface and cooler water near the bottom. Changes in temperatures can alter the availability of cold water refuge required by certain fish species, influence nutrient cycling, and modify productivity and diversity of plankton. In Isle Royale National Park, researchers discovered that the depth of warm water in Siskiwit Lake has more than doubled over the last century. This can have detrimental effects on many freshwater organisms that have specific tolerance thresholds and cannot adapt to a rapidly changing environment.

This summer, Kristin Strock investigated whether these changes 1) fall within the range of natural variability; 2) affect food quality at the base of the aquatic food web, and 3) are occurring more broadly across lakes in the park. To address these questions, she is using fossils preserved in lake sediments to reconstruct lake habitat for thousands of years.

Observations suggest changes in physical lake habitat are already occurring in Isle Royale and in boreal ecosystems throughout the Northern Hemisphere. The results of Kristin's research will be used to evaluate these modern changes in the context of past variability and to develop effective management plans required to protect these freshwater resources and the biota that rely on them.

Fire in the Glades at Buffalo National River

The Buffalo National River in Arkansas has a large amount of glade habitat which is home to many rare, fire-dependent plant species. Because most of this glade habitat has not previously been located and managed, cedar trees have encroached and are threatening the existence of the rare glade plants that need an open canopy to survive. The main focus of Terra Fondriest's internship has been to locate and quantify glade habitat through the use of ArcGIS in order to promote better management of these areas, mainly through the use of fire. She identified over 700 polygons totalling 3800 acres of glade habitat and created accompanying maps pinpointing the polygons or burn units of highest priority for prescribed burning. By locating many of the higher quality or natural glades, Terra can suggest coordinates for potential plot establishments that could monitor plant phenology changes due to climate change.

As she finishes her internship in the upcoming months, Terra will be creating a video for the Buffalo National River web page highlighting the glades of the park, putting an emphasis on why they are important, what steps we take to manage them, and how we plan to monitor them for signs of climate change.

Vulnerability to Climate Change at Wupatki

Sean Patrick Berry is working on developing a vulnerability assessment for archaeological resources at Wupatki National Monument. His project focuses on the potential effects of climate change on archaeological sites and establishes baseline conditions from which changes and impacts can be monitored. To ascertain the exposure of archaeological remains to climate change, Sean and NPS employees used projections from 16 General Circulation Models, downscaled to a 0.5 degree resolution and reviewed climate change studies for Wupatki, the Colorado Plateau, and the southwestern region of the United States. Sean is also performing field documentation of the current conditions from a sample of the 2696 known archaeological sites of Wupatki. The overall goal of the project is to assist in developing management recommendations for completing an Environmental Improvement Plan.

Since starting his 12 week internship at Wupatki, Sean gained valuable first-hand experience on assessing the condition of archaeological sites, making treatment recommendations based on the current condition, and using a Trimble GeoXT GPS unit. This skill set will provide Sean with valuable experience in pursuing a career in cultural resource management both in the federal and private sectors. He currently attends graduate school at Northern Arizona University and hopes to apply his experience as an intern to a future job within the National Park Service.

Nesting Sea Turtles

Andrew Maurer is an Eckerd College graduate with degrees in Environmental Studies and Spanish. In May he started his internship at Gulf Islands National Seashore, stationed at the Mississippi branch of the park. He worked with Dr. Matthew W. Johnson, Marine Ecologist, on research focused on sea turtle nesting site selection. In his research on Horn Island, he used surveying tools to generate three dimensional profiles of beach sites with sea turtle nesting activity. He compared the profiles to determine what elements were consistent among nest sites. Results suggested that sea turtles were choosing to nest on steeper slopes. These results will aid in barrier island management in a future that will be affected by climate change and sea level rise and help to ensure the availability of suitable nesting habitat for sea turtles. Beyond the nesting research, Maurer worked on GIS tasks and helped other Resource Management projects which allowed him to frequent the Mississippi barrier islands. His future plans include more work experience, hopefully continuing at Gulf Islands, and eventually graduate school.

Historic Saint-Gaudens

This summer, Eric Stein was a Climate Change Intern at Saint-Gaudens National Historic Site in Cornish, New Hampshire. During his internship he collected online articles, conversed with climate change experts across the country, and interviewed various professionals while compiling a paper on the effects of climate change on cultural resources including archaeological sites, historic monuments, historic structures and cultural landscapes. He observed that climate change can affect cultural resources in both conspicuous and subtle ways. For example, sea level rise can completely decimate a site, while more frequent changes in temperature can create freeze-thaw cycles that gradually erode stone structures. While wildfires in the Western United States can spall (peel off) petroglyphs on Native American rock formations, Eric witnessed the spalling of marble on one of the Saint-Gaudens monuments due to precipitation-related factors driven by climate change. Eric has come to realize that climate change can affect nearly everything, both natural and man-made. A final report of his work is forthcoming.

Creating Training Videos at Great Smoky Mountains

Regan Alsup interned with the NPS Climate Change Response Program's Washington office to help develop a climate change video series targeted towards interpretive park rangers. The ultimate goal is to better train park rangers on the topic of climate change science and how the parks are being affected by climate change. Regan planned, filmed, and edited a nine-minute instructional video on that topic at Great Smoky Mountains National Park. She interviewed phenology experts and spent a week filming in the mountains. She also filmed other segments for the video series, including interviews with Director Jarvis and other members of the National Leadership Council. Regan reports, "I have been treated by NPS as a young professional and been trusted with the full responsibility that comes along with that designation. I could not have asked for a more fruitful experience."

More Information

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