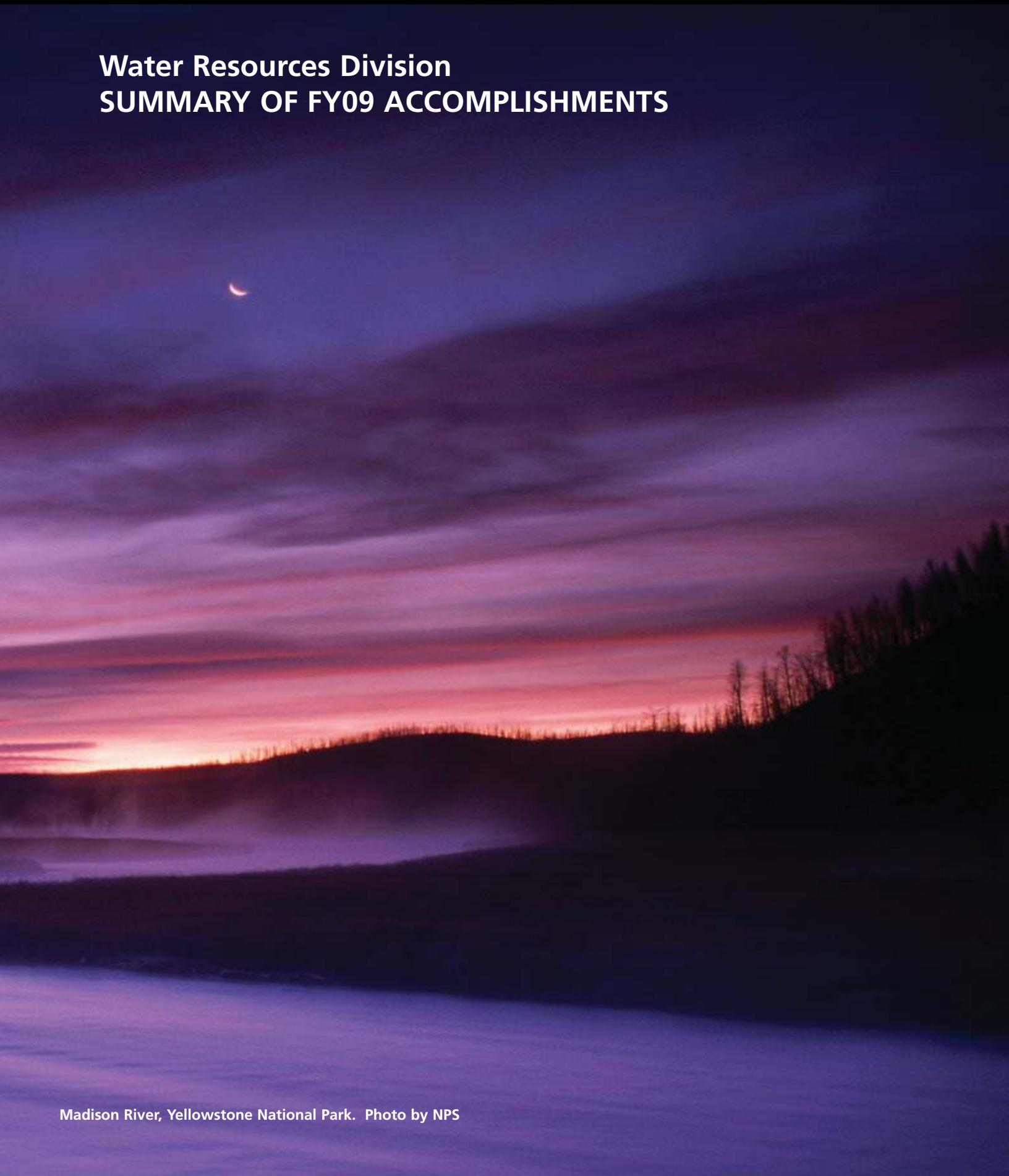
National Park Service
U.S. Department of the Interior

Natural Resource Program Center

Water Resources Division
SUMMARY OF FY09 ACCOMPLISHMENTS



Madison River, Yellowstone National Park. Photo by NPS

Grand Canyon National Park. Photo by Kevin Noon.

Water Resources Division
SUMMARY OF FY09 ACCOMPLISHMENTS

Natural Resource Program Center
1201 Oakridge Drive, Suite 250
Fort Collins, CO 80525

National Park Service

U.S. Department of the Interior
Washington, DC

Crater Lake National Park. Photo by Jim Harte

Contents

Dinner time for Grizzly Bear. Yellowstone National Park. Photo by NPS.

Grios Ventre River Floodplain, Grand Teton National Park. Photo by Gwen Gerber

Comments from the Division Chief

Bill Jackson, PhD

This report represents the 19th consecutive yearly summary of the accomplishments of the National Park Service Water Resources Division (WRD), including a full accounting of our budget and the services provided to the various units of the National Park System. The report is a collaborative effort of the entire WRD staff, and in preparing it, we have the opportunity to stand back and take stock of the number of parks and offices with whom we've worked and the breadth of issues with which we've been involved.

WRD is a Division of the Natural Resource Program Center (NRPC) within the Natural Resource Stewardship and Science Directorate (NRSS). We work in partnership with our sister NRPC Divisions and the NRSS leadership to support regions, networks, and parks in carrying out the National Park Service water and aquatic resource preservation, protection, and management mission.

In 2009 WRD continued to provide a high level of support to parks in addressing a wide variety of water and aquatic resources-related issues. In January, the Colorado Water Court issued a final decree quantifying the reserved water right for Black Canyon of the Gunnison National Park. This decree stemmed from a mediated settlement agreement with more than 2 dozen stakeholders, and ended an over 20-year struggle to quantify the park's water right. The first high flows under this water right were delivered in April of 2009.

WRD became heavily involved in 2009 reviewing a number of "fast tracked" solar energy development projects in the Mojave Desert. These were projects proposing to utilize solar-concentrating technology, a technology that can consume considerable quantities of ground water for cooling purposes. WRD's engagement in these projects lead to changes that would better insure protection of the regional ground water aquifers that support park aquatic habitats, including the pool at Devil's Hole – where the Devil's Hole Pupfish resides as an endangered species. During this period, NPS also requested cooperator status with the Bureau of Land Management in the preparation of a programmatic Environmental Impact Statement on Solar Energy development on public lands. WRD is now representing the Service in that effort.

2009 also saw final approval of the NPS Alaska Region Wetland Mitigation Banking Program. This program, in which WRD took a lead in crafting, allows Alaska parks to use various individual wetland mitigation banks to compensate for unavoidable adverse impacts on wetlands as required under NPS Director's Order.

Other examples of 2009 accomplishments include: the hosting of a service wide workshop to review prototype projects and development of revised project standards and guidelines for conducting WRD-funded Natural Resource Condition Assessments; continued support to the Vital Signs Water Quality Monitoring Program in 32 NPS monitoring networks, and continued development of the service wide STORET water quality database, which now contains over 5 million results from over 45,000 monitoring stations; hydrologeologic analyses and advice on well construction to 21 parks; support to wetland restoration projects in 12 parks; completion, with the support of the NPS Inventory and Monitoring Program, of marine benthic habitat maps for 5 parks in cooperation with partners; and participation on the Western Regional Panel of the Aquatic Nuisance Species Task Force to develop a quagga / zebra mussel action plan for the western United States.

2009 also saw WRD, in coordination with parks, Regions, and our sister Divisions in the Natural Resource Program Center craft an implementation plan for a new NPS Oceans and Coastal Resources Program, scheduled for initial funding in 2010. The implementation plan stemmed from input from a superintendent's workshop held in the fall, and a service wide ocean park managers workshop held in August. First year implementation of this plan will increase NPS capacity to address coastal and marine resource protection issues in 79 NPS ocean and Great Lakes parks.

As we look ahead to 2010 we can't help but be aware of the daunting challenge confronting parks in preserving and restoring park water and aquatic resources. America's water supplies are being stretched to their limits, and the pressure for increased water supply development will continue to challenge parks attempting to protect the availability of water to park aquatic ecosystems.

This water availability issue is compounded by the country's need to develop new energy resources and achieve a greater level of energy independence, as many forms of energy production are major water consumers. With the Great Lakes serving as the poster child, the issue of invasive aquatic nuisance species has become pervasive and complicates efforts to preserve and restore park aquatic resources. As a society, we're becoming ever more aware of the huge number of "emerging" or recently detected contaminants in our waters, including pharmaceuticals, personal care products, and exotic agricultural and industrial chemicals. We're only beginning to understand how these compounds affect aquatic wildlife.

Finally, all of these emerging and growing threats are overlaid by the reality of a changing climate. Changes in the hydrologic cycle and water quality, at all of its global, spatial, and temporal scales will be a central, vehicle by which climate warming will influence the landscapes and ecosystems of National Parks. These hydrology-induced changes loom as huge and have potential to influence all park aquatic ecosystems, not only those at limits of their climate ranges.

We look forward in 2010 to working with Parks, Regions, Networks, and out sister NRSS Programs on all of these emerging challenges.

As a final note, 2009 also saw the retirement of Mark Flora, a long time member of the Water Resources Division and Chief of the Division's Planning and Evaluation Branch. Mark's distinguished career resulted in his personally visiting and assisting over 100 National Park units. Mark leaves a strong legacy of accomplishment and will be missed by his friends throughout the National Park Service.

Yosemite Falls, Yosemite National Park (Photo by Kevin Noon)

Highlights of FY2009 Accomplishments Water Resources Division

- Completed the settlement of a reserved water right for *Black Canyon of the Gunnison National Park* through an agreement with more than two dozen stakeholders and, working with these stakeholders through the Department of Justice, secured a final decree from the Colorado Water Court for the right on December 31, 2008.

- Received favorable rulings from the Nevada State Engineer resulting from a 2007 NSE hearing in which NPS sought protection of Devils Hole, a detached unit of *Death Valley National Park*, (Ruling 5902 and Order 1197, Nov. 4, 2008) from wells moved closer to Devils Hole, and actively supported these decisions during the appeals phase.

- Responded to increased activity for renewable energy development on public lands by providing staff to serve as the NPS point of contact for the BLM's Solar Energy Programmatic Environmental Impact Statement and providing input to the BLM on ways to accomplish the Secretary's renewable energy objectives while preserving the environment.

- Provided oversight and technical assistance for ongoing development of Resource Stewardship Strategies at *Valley Forge National Park* and *Pecos National Historical Park.*

- Provided technical assistance in planning, design, and implementation of wetland restoration projects at *Sequoia National Park, Grand Teton National Park, Rocky Mountain National Park, Hubbell Trading Post National Historic Site, Palo Alto Battlefield National Historical Park, Great Sand Dunes National Park & Preserve, Channel Islands National Park, Death Valley National Park, Golden Gate National Recreation Area, Fire Island National Seashore, Redwood National* and *State Parks and George Washington Memorial Parkway.*

- Authored and obtained final approval for the *NPS Alaska Region Wetland Mitigation Banking Program: Umbrella Mitigation Bank Instrument.* The purpose is to allow Alaska parks to use various individual wetland mitigation banks to compensate for unavoidable adverse impacts on wetlands, as required under *NPS Director's Order #77-1: Wetland Protection.*

- Worked with the Western Regional Panel of the Aquatic Nuisance Species Task Force to develop a quagga /zebra mussel action plan for the western US.

- Represented the National Park Service on an interagency Incident Command Team charged with preventing extinction of the Devils Hole pupfish.

- Fully supported the Vital Signs Water Quality Monitoring program by providing full funding and support for the design and implementation of water quality monitoring programs in 32 networks.

- Initiated nine new-start water quality assessment projects through the NPS-USGS water quality partnership program. In addition, implemented revisions in the Partnership program that will significantly improve and strengthen the partnership and lead to closer coordination between the two agencies at the park and regional levels.

- Provided hydrogeologic analyses and advice on well construction to 21 parks to help them protect groundwater resources while still meeting their demand for potable water supplies for visitors and staff.

- Assisted the State of Montana Department of Environmental Quality by providing protective water quality measures for *Yellowstone National Park* during development of the Final Reclamation Design for the removal of the McLaren Tailings from Soda Butte Creek.

- Assisted parks in the completion of 13 floodplain statements of findings.

- Completed benthic habitat maps for *Golden Gate National Recreation Area, Virgin Islands National Park,* and *Virgin Islands Coral Reef National Monument*. Draft habitat maps were completed for *Glacier Bay National Park & Preserve, Biscayne National Park*, and *Dry Tortugas National Park*; final maps will be available in FY 2010.

- Completed resource condition assessments for *Acadia National Park, Sleeping Bear Dunes National Lakeshore, Fire Island National Seashore,* and *Lake Clark National Park and Preserve.*

- Working with the Geologic Resources Division, designed, developed, and conducted a workshop for 52 ocean and coastal park and region resource managers to distill lessons learned and best practices, forge effective Servicewide approaches, and draft guidance to strengthen NPS ability to address resource protection issues in ocean and coastal parks. A workshop report will be published in FY 2010

- Finalized an agreement between the National Oceanic and Atmospheric Administration (NOAA) and NPS to increase scientific and educational partnerships to support resource protection, and to improve relations, communication, and information exchange between the two agencies. The agreement was signed by acting NPS Director Dan Wenk and NOAA Administrator Jane Lubchenco.

- Nominated 10 ocean and coastal parks to the National System of Marine Protected Areas maintained by the NOAA Marine Protected Areas Center. Parks will benefit by sharing science, information, and technologies with state and federal partners.

Beachwalkers at Point Reyes National Seashore. Photo by NPS

Oceans and Coastal Resources Highlights

Jeffrey Cross, Branch Chief
Ocean and Coastal Resources Branch

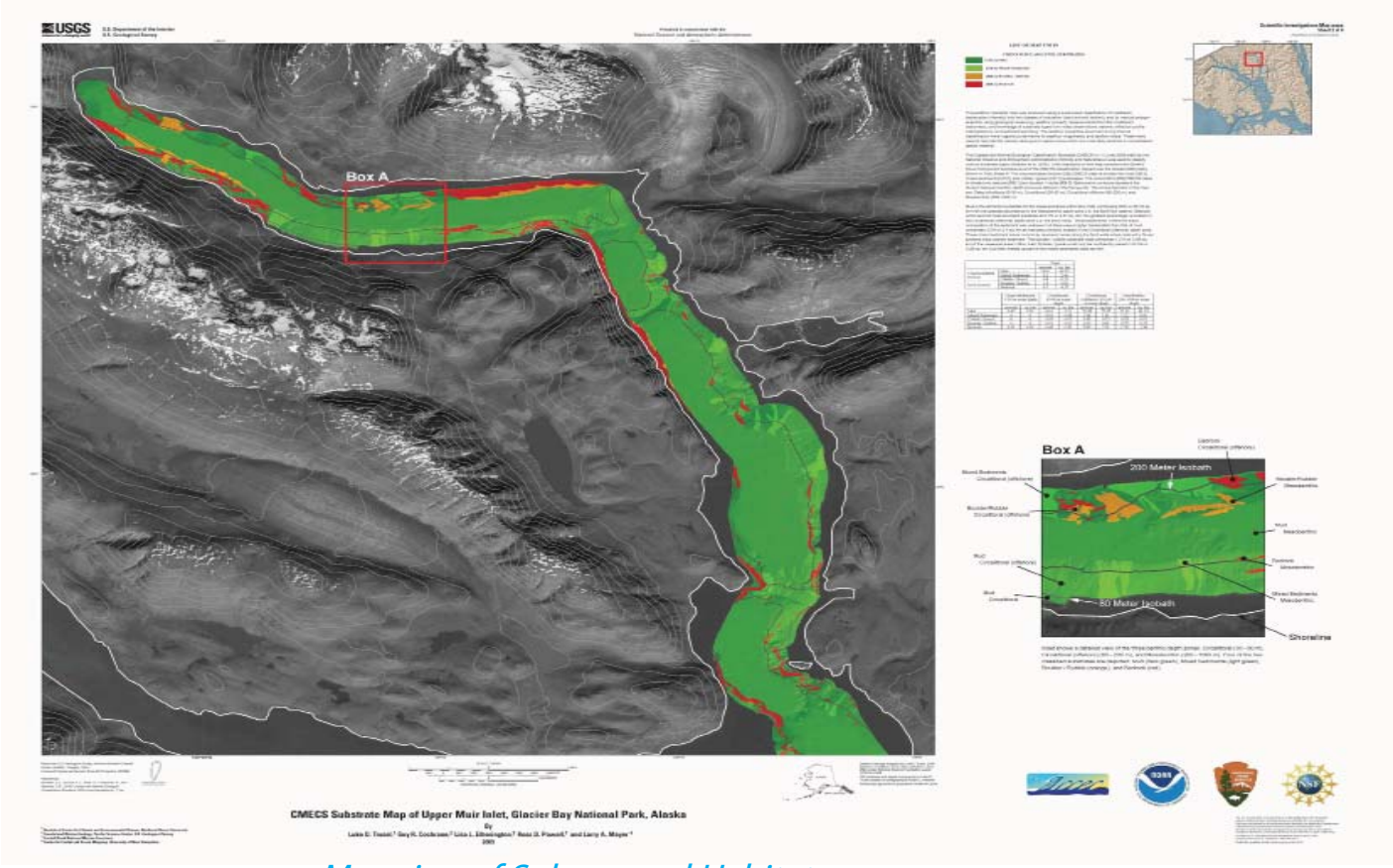
Cruise ship in Glacier Bay National Park & Preserve (Photo by Jeff Cross 2009)

The Ocean and Coastal Resources Branch (OCRB) is responsible for leadership and coordination of NPS ocean responsibilities, policies, and interests in the Natural Resource Stewardship and Science Directorate. The goals of the Branch are to acquire broad-based support in ocean and coastal sciences and technologies, develop servicewide ocean policies and programs, and provide technical assistance and support to parks.

The NPS *2006 Ocean Park Stewardship Action Plan* calls for increasing the organizational and scientific emphasis to manage over 5,100 miles of coast and more than three million acres of ocean and Great Lakes waters across 26 states and territories. The Ocean and Coastal Resources Branch provides the organizational structure and focus for coordination within the NRPC and with parks, regional offices, the Submerged Resources Center, and other entities to meet servicewide goals for ocean and coastal resource stewardship.

The branch provides leadership in developing short and long-term strategies for enhancing the NPS scientific, technical, and organizational capacity for ocean and coastal resource stewardship. The Branch works closely with the Geologic Resources Division on critical science and management needs related to shoreline processes and park resources. The Branch also works closely National Oceanic and Atmospheric Administration, the U.S. Geological Survey, other federal and state agencies, universities and private partners to further the goals of ocean and coastal stewardship.

During 2009, OCRB staff provided a variety of servicewide and park specific technical assistance, coordinated multiple Coastal Watershed Assessment and Benthic Habitat Mapping Program projects in ocean and coastal parks. These programs are described in separate articles. Significant accomplishments under the *Ocean Park Stewardship Action Plan* include development of regional and park-specific action plans by the NPS Northeast, Southeast, Great Lakes, Pacific West and Alaska Regions. For more information, see http://www.nps.gov/pub_aff/oceans/conserve.htm and http://www.nature.nps.gov/water/marine.cfm.



Submerged habitat map of upper Muir Inlet in Glacier Bay National Park & Preserve

Mapping of Submerged Habitats in Ocean and Great Lakes Parks

Parks face ever increasing impacts from coastal development, recreational use, land-based pollution, non-native species and climate change. To address these issues effectively, park managers need comprehensive knowledge about the type, geographic extent and condition of submerged resources within parks. Unlike terrestrial units, mangers of ocean and coastal parks cannot readily observe their resources. Their most spectacular topography and geographic features are hidden from casual view and can only be detected by systematic surveys that are logistically difficult and expensive, which explains why submerged resources remain unmapped for the majority of these units.

In 2008, the NRPC began a servicewide program to coordinate mapping of submerged habitats in ocean and Great Lakes parks. The objective of the program is to produce high-quality, standardized habitat maps that support resource assessments and management planning for parks with submerged resources. Geospatial information describing underwater habitats and the distribution and abundance of marine plants and animals is critical to understanding and improving the condition of ocean and coastal parks.

The NRPC has partnered with the U.S. Geological Survey (USGS) and the National Oceanic and Atmospheric Administration (NOAA) on pilot benthic mapping projects in the following ocean and coastal parks: Glacier Bay National Park & Preserve, Golden Gate National Recreation Area, Point Reyes National Seashore, Sleeping Bear Dunes National Lakeshore, Gulf Islands National Seashore, Virgin Islands National Park, Virgin Islands Coral Reef National Monument, Buck Island Reef National Monument, and Salt River Bay National Historic Park and Ecological Preserve.

The NRPC is also working with NOAA and NatureServe through the Federal Geographic Data Committee to develop a national mapping standard for classifying submerged habitats. Benthic habitat maps are needed to support resource assessment, management and conservation needs at park, region and national levels. The use of a standard national benthic habitat mapping classification scheme will ensure compatibility and widespread use of ocean and coastal habitat information at multiple geographic scales in the NPS and by other federal and state agencies.

Photos By NPS

NPS and NOAA Move Forward on Oceans, Climate and Marine Protected Areas

Cliff McCreedy

Ocean and Climate Science Agreement Signed

On Monday, June 22, 2009, National Oceanic and Atmospheric Administration (NOAA) Administrator Jane Lubchenco and NPS Acting Director Dan Wenk signed an interagency agreement on ocean and climate science and marine resource stewardship. The Ocean and Coastal Resources Branch coordinated development and approval of the agreement for NPS. The agreement states that NPS and NOAA "share common goals of conserving the natural and cultural resources and recreational values of oceans, coasts and uplands and of enhancing scientific and public understanding of the ecological, climatic, and oceanographic processes that affect these resources." The agencies are working together on marine mapping, resource assessments, climate and weather observations, education and other areas. However, NPS information needs will greatly expand for climate and ocean science. Climate change will require new approaches and partnerships to protect and restore the ecological and physical integrity of ocean and coastal parks, and to assess their adaptability to sea-level rise, ocean warming and acidification and other impacts. NPS will increase collaborations with NOAA, USGS and FWS as it moves forward with the Climate Change Response Program, regional Ocean Park Stewardship Strategies, and accomplishing the goals of the President's new National Policy for the Stewardship of the Ocean, Our Coasts, and the Great Lakes. Elements of the NPS-NOAA agreement include:

- Scientifically assess and promote the conservation of coastal and marine fauna, flora and habitat resources, including threatened and endangered species and impacts of aquatic invasive species

- Acquire climate observations and develop and deliver useful information, products, and services for the climate change research and monitoring needs of NPS

- Produce maps and digital geospatial data on coastal and marine habitats and ocean circulation

- Expand public awareness and education of ocean and coastal resources to inform and educate visitors, students, and the public

- Build upon existing agreements and collaborative programs regarding submerged cultural resources, such as shipwrecks and other cultural sites in parks and marine sanctuaries

The agreement provides a senior policy level endorsement and program framework to ensure that the NPS-NOAA partnership will flourish and expand.

Thirty-one Parks Proposed for National System of Marine Protected Areas (MPAs)

Marine protected areas (MPAs) are geographically defined places in the marine and coastal environment protected by federal, state, tribal, or local authorities. More than 2,500 MPA sites span the open ocean, coastal areas, inter-tidal zones, estuaries, and the Great Lakes, including 38 units of the National Park System that contain submerged resources. Executive Order No. 13158 requires federal MPA agencies to utilize MPAs more effectively as management tools, via establishment of "a scientifically based comprehensive national system of MPAs representing diverse marine ecosystems and the nation's natural and cultural resources." NOAA and the Department of the Interior are directed by Executive Order 13158 to assess the extent of the nation's marine ecosystems and cultural resources protected in existing MPAs, develop a gap analysis, and make recommendations for strengthening and expanding the National System.

On April 22, 2009 NOAA and the Department of the Interior announced the first step; formation of the National System of MPAs. The National System will encompass a wide variety of state and federal MPAs. However, the breadth of aquatic and terrestrial resources within their boundaries makes National Parks unique from other sites such as National Marine Sanctuaries, which contain only marine areas. Ocean and coastal parks encompass watersheds from headwaters to the open ocean, and islands from ridge to reef and kelp forest.

"You have to love it before you are moved to save it"

- SYLVIA EARLE

Coastal-Marine Natural Resource Condition Assessments for Four Parks Offer Insights

Eva DiDonato, Marine Pollution Ecologist, Ocean and Coastal Resources Branch

Efforts began in 2003 to assess coastal water resources and watershed conditions for coastal parks through the Natural Resource Challenge. Reports from these assessments characterize the relative health or status of upland, wetland, riparian, marine, estuarine and Great Lakes resources within the National Park System. Working through partnerships with universities in the Cooperative Ecosystem Studies Units, collaborations with other federal agencies and contracts with private organizations, 29 of these reports have been published, and 18 others are in progress. In FY09, assessment reports have been published in four coastal parks-Acadia National Park (ACAD), Lake Clark National Park and Preserve (LACL), Sleeping Bear Dunes National Lakeshore (SLBE) and Fire Island National Seashore (FIIS).

Assessment reports provide valuable insights into factors affecting the health of park resources for use by natural resource managers. Some important findings from the recently published reports include:

- ACAD-Atmospheric deposition of nitrogen, sulfur, mercury and other contaminants are producing multiple effects on both abiotic and biotic components of terrestrial and aquatic systems, including high mercury levels in fish and other animals, and chronically elevated nitrogen concentrations in streams.

- LACL-Within coastal LACL a decline in sockeye salmon productivity was associated at least in part with the effects of accelerated glacier melt and turbidity. This suggests that climate warming and attendant shifts in the timing and quality of streamflow within LACL have the potential to influence the spawning success of salmon within the park.

- SLBE-Aquatic invasive species are a major threat to SLBE resources. Aquatic ecosystems are threatened by the continued introduction of new exotic species, mainly through the discharge of ballast water from commercial ships.

- FIIS-Erosion hot spots associated with shore-line hardening on the bay side of Fire Island are a significant threat to the resources of FIIS. Sea-level rise will undoubtedly amplify this threat.

Looking Across the forzen Great South Bay from Talisman boardwalk, Fire Island Seashore. Photo by: Diane Abell, R.L.A.

Photo on the next page: Kaloko-Honokohau National Historical Park. Photo by Kevin Noon.

Planning and Evaluation Highlights

Mark Flora, Chief
Planning and Evaluation Branch

Planning and Evaluation Branch (PEB) activities in FY 2009 were focused on: (i) exploring ways to use new planning-related products to better integrate natural resource and science information into the National Park Service's Resource Stewardship Strategy process; (ii) adding flexibility to NPS Servicewide policy for protection of wetlands through the use of mitigation banking arrangements; (iii) providing programmatic oversight and funding accountability for WRD and NRPC-funded projects; and (iv) providing direct support to NPS units in water resources planning, wetlands protection and restoration, and fisheries restoration and management.

With the impending completion and publication of *Physical Resources Foundation Reports* for Pipe Spring National Monument, Big Thicket National Preserve and White Sands National Monument, the PEB's planning program continues to extend natural resource and science support to the NPS planning process. For these reports, the WRD collaborated with the Geological Resources Division and Air Resources Division to expand the scope of earlier efforts beyond water resources and encompass a full suite of physical resources including water, air, geology and soils. Building upon this success, the PEB has also begun to expand support to include biological resources in an integrated NRPC-wide effort to support and guide Resource Stewardship Strategies development in "pilot" efforts at Pecos National Historical Park and Valley Forge National Historical Park.

The Planning Program also began integrating the effects of climate change into the NPS planning process. PEB staff participated in pilot efforts to develop alternative climate change scenarios for use in the planning process at Assateague Island National Seashore and Wind Cave National Park. PEB staff were also selected to represent the Water Resources Division on both the *NPS Climate Change Planning Working Group* and the *NPS Climate Change Science Working Group*, furthering the ability to integrate the climate change dynamic into the planning process.

During the year, the PEB's Wetlands Protection Program provided extensive support to the field on wetlands regulatory issues, wetland condition and functional assessments, and wetlands restoration. A major accomplishment was development of the *NPS Alaska Region Wetland Mitigation Banking Program - Umbrella Mitigation Bank Instrument*, which establishes a prototype wetland mitigation banking program for the Alaska Region. Wetlands Program staff also began work on a Memorandum of Agreement with the National Park Foundation to create a trust fund for wetlands mitigation at Palo Alto Battlefield NHP and Padre Island NS. Funding for the mitigation would come from wetland compensation money generated by oil & gas activities at Padre Island NS.

In the regulatory arena, PEB wetlands specialists provided policy guidance and/or environmental compliance review for more than 20 proposed projects that could adversely affect wetland resources within NPS units. PEB wetlands specialists also worked closely with the Geologic Resources Division in using the NPS 9B regulatory process to assess potential wetland-related impacts from proposed exploration and drilling operations at Padre Island National Seashore and Big South Fork National River and Recreation Area.

The Wetlands Protection Program also provided programmatic oversight and technical support for wetlands restoration projects at Sequoia NP, Grand Teton NP, Rocky Mountain NP, Hubbell Trading Post NHS, Palo Alto Battlefield NHP, Great Sand Dunes NP, Channel Islands NP, Death Valley NP, Golden Gate NRA, Fire Island NS, Point Reyes NS, Redwood NP and the George Washington Memorial Parkway.

In FY 09, PEB's Fisheries Management Program provided technical assistance to more than 15 parks and regional offices. This included involvement in such high profile issues as management of the Devil's Hole pupfish at Death Valley National Park, response to the introduction of invasive quagga mussels into waters of the Intermountain and Pacific West Regions, and development of an emergency prevention and response plan for the potential introduction of Viral Hemorrhagic Septicemia into the Lake Superior.



Photos courtesy of Kevin Noon.

The Fisheries Management Program also continued a five-year program of native fish and fish habitat restoration through the Servicewide 20% Fee Funding Program. This year's efforts focused on research of coaster brook trout habitat at Pictured Rocks National Lakeshore, completing stream crossing mitigation and habitat restoration for endangered mussels at Big South Fork National River and Recreation Area, fish habitat restoration at Point Reyes National Seashore and Santa Monica Mountains National Recreation Area, and exotic fish removal / native fish restoration at North Cascades National Park.

A change in the Fisheries Management Program will occur in October, 2009 with the addition of Nic Medley to the program. Nic will be coming to the Water Resources Division from the New Mexico Interstate Stream Commission, where he has served as an Ecologist / Fisheries Biologist for the last several years. Nic brings extensive experience in applied fisheries research, impact assessment, habitat restoration and endangered species protection to the program.

During FY09, PEB staff provided programmatic oversight, technical review, and guidance for 48 funded projects totaling over $4.8 million, provided technical advice, policy review, and regulatory review for 10 Wetland Statements of Findings, provided Servicewide review and comment on 7 EIS/EA documents, and completed policy / technical review of the water-related aspects of 11 NPS planning documents including General Management Plans, Resource Stewardship Strategies and other planning studies.

PEB staff members are also proud of the numerous opportunities we've had during the year to directly serve parks by providing technical support at the request of regional, network and park staffs. In FY 2009, the PEB provided project oversight and/or technical assistance to all seven NPS regional offices and 91 individual units of the National Park System. The Planning and Evaluation Branch is proud to be part of the National Park Service and looks forward to providing continued
service to the NPS in FY 2010.

"...a national memorial in southern Pennsylvania worthy of commemorating the passengers and crew who courageously gave their lives to thwart an attack on the National Capital."

NPS Photo, 2009

Wetlands, Visitor Experience, and the Field of Honor – Flight 93 National Memorial

by Kevin F. Noon, PhD, Wetlands Specialist

The Flight 93 National Memorial Act authorized construction of a national memorial in southern Pennsylvania worthy of commemorating the passengers and crew who courageously gave their lives to thwart an attack on the National Capital. The memorial will encompass 1,355 acres comprised of the crash site, the debris field and areas where human remains were found, lands necessary for viewing and accessing the memorial, and a 30-acre wetland. The initially proposed design would destroy all 30 acres of the wetland. WRD staff worked with the memorial architects and the construction contractors to maintain the integrity of the design while preserving as much of the wetland as possible. The memorial designers agreed that preserving wetland habitat would be an opportunity to provide added value to the visitor'sexperience. WRD staff made recommendations and revised construction drawings in order to avoid and reduce the initially proposed wetland impact. Through a series of iterations, we recommended eliminating unnecessary fill in the wetland and using a boardwalk for the primary access across the wetland, which brought the total wetland impact from 30 acres down to 2 acres. In order to maintain our no-net-loss of wetlands policy and enhance the visitor experience, WRD staff designed a 2-acre created wetland that would expand the existing wetland and wrap around the proposed access road and walk way.

A Biosphere Reserve in Peril: Great Smoky Mountains National Park

Don Weeks, Hydrologist
David Vana-Miller,
Planning Program Leader,
Planning and Evaluation Branch

Voting during Scoping Workshop (Weeks, 2009)

Great Smoky Mountains National Park (GRSM) is faced with serious problems concerning its physical resources. Many of these problems center around the fact that 56% of GRSM streams monitored have acid neutralizing capacities < 50 µeq/L, making them extremely sensitive to acidification. This, coupled with the upper elevations in the park receiving some of the highest rates of acid deposition in North America is an equation for trouble. Nitrate (NO3) and sulfate (SO4), primarily from regional auto exhaust and coal-fired plants, are major pollutants in the park. During storm events, pH may drop as much as 2 full units, which can mobilize metals toxic to biota. Since the 1980s, six brook trout populations have been lost to what appears to be stream acidity.

GRSM requested assistance from the NPS Water Resources Division (WRD) in 2009 to prioritize the park's physical resource issues and assess the current direction of the park's natural resource programs. One of the major questions to answer is, "How well are the park's natural resource programs integrating with each other to adequately define and address the high-priority issues degrading priority park resources?"

In response to the technical assistance request, a physical esource team was assembled in 2009 with expertise in water, soils, geology, and air resources. The objective of the team is to produce a *Physical Resources Information and Issues Overview* report in 2010 that summarizes the current understanding of physical resources at the park, defines the priority issues, and provides some multi-discipline strategies to begin addressing select issues.

One of the important elements in producing this report is the outcome from a workshop held at the park in June 2009 with park staff and invited participants. Workshop participants included federal and state agency personnel, academicians, and others with expertise or knowledge on physical resources in and around the park. The workshop, facilitated by WRD, generated discussions focused on air, geologic, soil, and water resource issues at GRSM. At the end, workshop participants voted on what they felt were the most important issues facing the park. The issues and voting prioritization collected from the workshop will form the backbone of the analysis in this *Physical Resources Information and Issues Overview* report.

Water Operations Highlights

Gary W. Rosenlieb, Chief,
Water Operations Branch

The Water Operations Branch is responsible for providing technical assistance to the National Parks in the areas of water quality, floodplain and groundwater monitoring, restoration and management. Major programs supported, managed, or funded by WOB include Natural Resource Condition Assessments, Floodplain Compliance, USGS-NPS Water Quality Partnership, and Vital Signs Monitoring for water quality.

Notable achievements by WOB this year are described in the following articles. The findings from a joint International technical assistance effort in *Taroko National Park, Taiwan* with the Geologic Resource Division is described by Mike Martin who was invited by the Taiwanese Government to investigate and provide recommendations on the management of geologic hazards. WOB geohydrologist Larry Martin assisted with a restoration effort in support of the endangered Quitobaquito pupfish and the Sonoyta mud turtle that had promising results at Quitobaquito springs and pond in *Organ Pipe Cactus National Monument.* The springs and pond have experienced declining water levels in recent years. Rick Inglis discusses assessment work that he completed at *Hubbell Trading Post National Historic Site.* The assessment identified the geomorphic processes currently active and the future trend of the shape and pattern of the stream system which the park plans to use in its landscape interpretive program. Finally, Dr. Roy Irwin summarizes recent findings from numerous studies in and around parks on contaminants of emerging concern.

Major program accomplishments include the initiation Natural Resource Condition Assessments for 31 park units across the 7 NPS regions. The USGS-NPS Water quality partnership funded five new in FY2009 for a total of $451,300, and 10 new projects were selected for funding in FY2010.

The branch continued to provide technical assistance on a myriad of hydrology and water quality issues. A complete listing of the assistance is provided in an appendix to this report. Some of the more high-profile efforts included:

- Provided Assistance for the completion of 13 floodplain statements of findings.

- Organized and led a Natural Resource Condition Assessment pilot review process and meeting, resulting in draft revised project standards and guidance for FY09 and later-year NRCA project starts.

- Fully supported the Vital Signs Water Quality Monitoring program by providing full funding and support for the design and implementation of water quality monitoring programs in 32 networks.

- Increased the servicewide STORET database to more than 5 million results for 3,122 physical, chemical, or biological characteristics from 45,571 monitoring locations in support of 1,071 different projects conducted in or near 256 units of the National Park System.

- Provided hydrogeologic analyses and advice on well construction to 21 parks to help them protect groundwater resources while still meeting their demand for potable water supplies for visitors and staff.

- Provided assistance to the State of Montana Department of Environmental Quality by providing protective water quality measures for *Yellowstone National Park* for the development of the Final Reclamation Design for the removal of the McLaren Tailings from Soda Butte Creek.

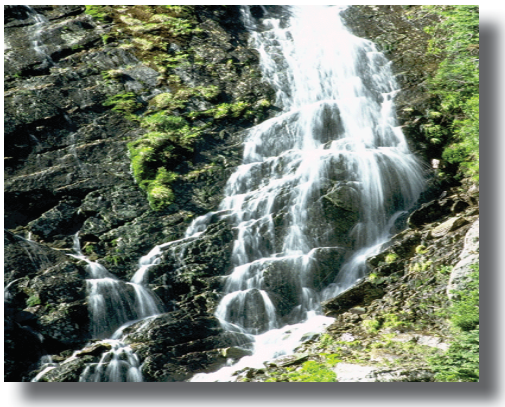
- Directed the stakeholder group in a technical evaluation of a groundwater model developed for the Pines Ash Landfill that concluded it was unsound and was not credible or usable in evaluating potential threats to park resources at *Indiana Dunes National Seashore.*

On behalf of our staff at WOB I will say that it is always and honor and privilege to assist with the protection and management of our nation's cultural and natural resources heritage.

NPS-USGS WATER QUALITY PARTNERSHIP PROGRAM

Barry Long, Hydrologist
Water Operations Branch

The NPS-USGS Water Quality Partnership Program was initiated under the Clean Water Action Plan and is funded by the USGS Water Resources Division Office of Water Quality. Since 1999, more than $22 million has been allocated for partnership water quality projects in parks. Through 2009, 150 partnership projects have been initiated in 107 national park units; 138 of these projects have been completed. Five new projects were funded in FY2009 for a total of $451,300, and 10 new projects were selected for funding in FY2010. Additional information on the program is available at http://water.usgs.gov/nps_partnership/.



Rocky Mountain National Park. Photo by NPS

Photo by NPS

USGS Water Quality Partnership Program Projects
Final Year Funded Projects - FY2009

NPS Region	Park	Project Title	FY2009 Funding $(000s)
Alaska	WRST	Water-Quality Monitoring in Support of the McCarthy Road	100.00
Intermountain	GLAC	Baseline Assessment of Water Quality and Aquatic Communities of the North Fork of the Flathead River	99.70
Intermountain	ROMO	Assessment of Nitrogen Saturation and Episodic Acidification Status	100.00
Intermountain	ROMO	Effects of Nitrogen Limitation and Biological Characteristics of High-Elevation Lakes	74.50
Intermountain	YELL	Continous Chloride Measurement as an Indicator of Geothermal and Volcanic Hazards	50.00
Midwest	MULTI	Determine Nutrient Conditions, Cycling, and Biological Effects in Two Riverine Parks, SACN and MISS	98.30
National Capital	ROCR	Organic Wastewater Chemicals in Rock Creek Park	100.00
Northeast	SAIR	Real-Time Monitoring of Sodium and Chloride	7.30
Pacific West	PRES	Analyze Sulfer and Mercury Biogeochemistry in Crissy Marsh	50.00
Southeast	CONG	Investigate Influence of Seasonal Flood Waters on Mercury Methylation	78.80
		TOTAL	758.60

Restoration of Quitobaquito Pond - Organ Pipe Cactus National Monument

Tim Tibbitts, Wildlife Biologist, Organ Pipe Cactus National Monument

Larry Martin, Hydrogeologist Water Operations Branch

Quitobaquito springs and pond are located in the southwest part of ORPI, a few hundred meters north of the international border. As one of the few reliable sources of water in a desert environment, the area has been inhabited and manipulated by humans for at least 11,000 years. The pond and surrounding area include multiple special-status cultural and natural resources, including the endangered Quitobaquito pupfish and the Sonoyta mud turtle.

The pond and berm were last renovated in 1962: the pond was dredged and the berm was constructed to its current configuration. This work included installation of an overflow pipe through the berm to control the high water level in the pond. This pipe is the reference mark for measuring the elevation of the pond surface.

Springflow was sufficient to maintain the pond surface elevation and provide overflow of excess water through the pipe until 1996 when the water level in the pond dropped a few inches below the outflow pipe. This decline was initially attributed to decreased flow from the springs due to a prolonged drought and encroachment of vegetation into the spring areas. From 1996 to 2005, the pond level fluctuated moderately, but generally remained within 3 to 4 inches of the overflow pipe. In July 2005, the pond level fell to 11.5 inches below the overflow pipe, a record low, but recovered with the onset of the summer monsoon. New record low levels occurred in: June 2006, -16.75 inches; July 2007, -20 inches; and July 2008, -28 inches. At this point, the pond had contracted to about half of its normal surface area and had a depth of 0.5 to 2 inches over most of that area. It was susceptible to encroaching vegetation and near total elimination by drying.

Hydrologic monitoring and investigations led to the conclusion that the most likely cause of the problem was leakage through the pond bottom and/or berm. In August 2009, a temporary cofferdam was constructed to allow repair work in the southeast part of the pond. This section was drained. Vegetation, including rotting tree roots, was removed from the berm. Several layers of fill and bentonite were laid down and compacted to create a low permeability layer on the bottom and sides of the pond. These efforts were at least partially successful. Water level in the pond continued to rise through autumn 2009, despite the continued low inflow (13 gpm) from the springs. The water level was 14 inches below the overflow pipe in mid-December 2009. However, the rate of water level rise has slowed. Additional work is needed to seal other areas of leakage from the pond bottom and berm, most notably in the vicinity of a leaning cottonwood tree.

Quitobaquito Pond in July 2008. Water level is 28 inches below overflow pipe. (Photo by Larry Martin, 2009)

Quitobaquito Pond in December 2009. Water level is 14 inches below overflow pipe. (Photo by larry Martin, 2009)

Rocks, Water, Visitors, and Gorges - NRPC Provides Technical Assistance to Taiwan's First National Park

Mike Martin, Hydrologist
Water Operations Branch

Taroko National Park is located on the east coast of Taiwan (http://www.taroko.gov.tw). It encompasses over 227,000 acres and spans an elevation range from sea level to 12,440 ft. Due to this great variation in elevation and the park's location near the Tropic of Cancer, there is a wide assemblage of vegetation and ecological zones within its boundaries.

The landscape of Taroko is some of the most dramatic in East Asia. Due to ongoing tectonic uplift, the east coast of Taiwan in the area of Taroko rises abruptly out of the Pacific Ocean, reaching immediate elevations in excess of 3000 feet and, ultimately, elevations over 12,000 feet, creating an alpine biome near the Tropic of Cancer. At odds with the tectonic uplift are powerful erosive forces that continually work in concert to produce an extremely geomorphically active landscape. Many of the common mass wasting processes, such as isolated rock-falls, debris flows, and slope failures, constantly re-shape the land surface.

These natural geomorphic processes have collided with human use of the gorge and the surrounding highlands. From a park management perspective, this conflict is exacerbated by over 5 million visitors, who annually visit Taroko for its scenic beauty and recreational opportunities. Unfortunately, some of the most popular tourist sites also have a high degree of associated geologic hazard. Many visitors incur substantial personal risk just by participating in the "standard stops".

In 2009, NPS staff from the Geologic and Water Resources Divisions of the NRPC traveled to Taroko National Park to provide technical consultation for geologic and hydrologic hazards associated with several popular tourist stops in the park. Specific recommendations to mitigate both rockfall and floodflows ranged from structural stabilization to improved visitor management. In addition, NPS personal also participated in four seminars and workshops on: park management in the United States, geologic hazard evaluation, disaster warning and response, and river management objectives. The culmination of this 20-day field exercise was a comprehensive set of recommendations presented formally to representatives of the Taiwanese Government and to park staff and informally in a final report.

Recognizing that the Jefferson collection was a national treasure, the committee on the Library acquired new materials across the subject range to maintain its comprehensiveness. Anticipating the argument that his library might be too comprehensive.

The east coast of Taiwan in the Taroko area (NPS 2009).

NRPC staff discussing rockfall hazard with the Taroko National Park staff along the Tunnel of Nine Turns hiking trail (NPS 2009).

A forest of exotic planis filled the Pueblo Colorado Wash shown here in 1996 (NPS photo by Nancy Stone)

Dynamic Stream Channels at Hubbell Trading Post National Historic Site

Rick Inglis, Hydrologist
Water Operation Branch

The mission of Hubbell Trading Post National Historic Site is to preserve and protect the continuum of trading post operations and its ties to the local community. Yet, the geomorphic history of the location is tied to the uses made of the landscape, which have changed over the last century.

An 1858 account described the Trading Post area as "a pretty creek running between steep earth banks ten or twelve feet high". By 1895 the gully had filled in. Photos taken in 1915 show a flock of sheep in a sandy steep-sided wash with a nearly level streambed next to the Trading Post. This is evidence that heavy grazing by sheep probably stripped the vegetation from the watershed, eroded a vast amount of sediment, and created the sandy wash.

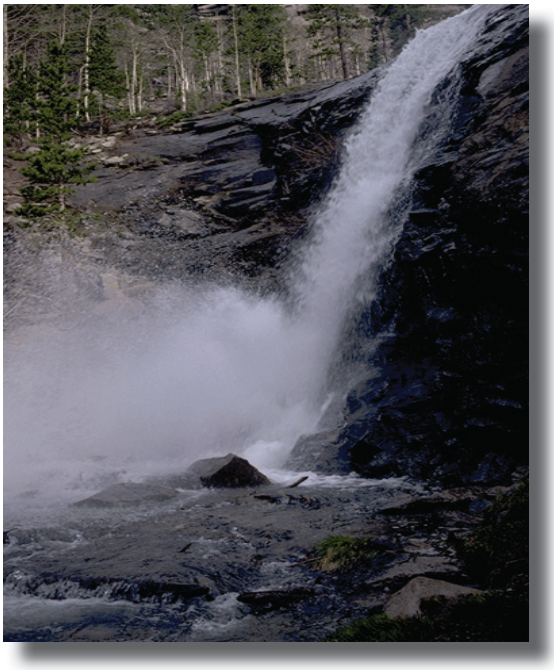
Early management efforts to reduce the erosion included plantings of tamarisk and Russian olive, which successfully anchored the streambanks but encroached into the channel. Runoff from floods was concentrated in the main channel and moved more sediment due to the higher energy of the stream flow. Sediment was scoured out of the channel, resulting in steeper and taller stream banks (stabilized by tamarisk and olive roots). The resulting gully effect was hidden in the overgrowth of invasive plants until the NPS implemented an eradication program about a dozen years ago. More recently, native vegetation has been planted to encourage biodiversity and natural processes, and a monitoring program has been established. The results indicate the stream channel is slowly evolving to the prevailing conditions of available water, sand, and plants.

WRD conducted an assessment of the gullies this past year and described the evolution of the drainage network through the park. The assessment identified the geomorphic processes currently active and the future trend of the shape and pattern of the stream system. The trend under current management is favorable to an expanding riparian zone of native plants and will not likely recreate the flat sandy wash of the historic period. The park hopes to include stories about the changing landscape to its interpretive efforts, including historic activities and how these activities, including grazing and its impacts on the watershed: loss of vegetation, erosion, and creation of a flat, bare, sand-filled, stream channel.

Removing exotic species from the wash. (NPS Photo)

Contaminants of Emerging Concern are Prevalent and Widespread in Parks

Roy Irwin, Senior Contaminants Specialist
Water Operation Branch



Bridal Falls, Rocky Mountain National Park (NPS Photo)

Emerging contaminants of increasing concern include endocrine disrupting compound (EDCs) and a broader group of pharmaceuticals and personal care products (PPCPs). In the National Park Service, concern about fish in Lake Mead first arose in a 1995 study that documented the presence of vitellogenin (a compound that induces egg production in females) in male carp. This was considered to e molecular or cellular level (biomarker) hint of exposure of the fish to an estrogenic compound.

In the last 15 years, there has been a great deal of research confirming the widespread presence of endocrine disruption in fish downstream of sewage treatment plant effluents. Additional oxidation steps, sometimes combined with other new technologies, can markedly reduce the amount of emerging contaminants coming out of the sewage treatment plants, although at additional expense. Persistent organochlorine EDCs have also been found in high altitude lakes in Rocky Mountain National Park and Glacier National Park Some male trout from those lakes had vitellogenin and in some there were also hints of intersex, a condition where a male is trying to produce eggs in portions of its reproductive organs (Schwindt et al. 2009).

The focus of research is shifting away from the occurrence of these types of cellular or organ-level (biomarker) effects in fish at specific geographical locations towards what is causing them and towards the potential long term impacts on fish populations. In one intriguing study in Canada, an entire lake was treated with a highly estrogenic compound, ethinyl estradiol (the active ingredient in the human birth control pill), which wiped out most of the fathead minnows in the lake in two years. However, determining exactly what combinations of EDCs and PPCPs might be causing endocrine disruption fish and other aquatic organisms at specific National Park locations, and the exact extent of population-level effects, will be the challenging focus of future work. WRD, the Air Resources Division, and park-based staff are continuing to work with collaborators in academia and other agencies to help answer these additional questions.

Reference:

Schwindt, A.R., Kent, M.L., Ackerman, L.K., Massey Simonich, S.L., Landers, D.H., Blett, T.F., Schreck, C.B. 2009. Reproductive Abnormalities in Trout from Western U.S. National Parks. Transactions of the American Fisheries Society 138:522–531

"When the well is dry, we know the worth of water."

BENJAMIN FRANKLIN, (1706-1790), Poor Richard's Almanac, 1746

WRD Finalizes Standards and Guidelines for Natural Resource Condition Assessments

Jeff Albright, Watershed Condition Assessment Program Coordinator
Water Operations Branch

Natural Resource Condition Assessment (NRCA) project work continued to ramp up in 2009, with new projects started for 31 park units across the 7 NPS regions, and 43 other park projects ongoing and at various phases of completion. National project standards and guidelines were revised in 2009 based on a "lessons learned" review process. The assessments synthesize existing scientific data and knowledge in order to report on current resource conditions in NPS park units: by important natural resources and indicators, by ecological attributes, and with overall conditions summarized by park areas. Spatial (GIS map-based) condition reporting is emphasized to enhance usefulness for park planning and decision making purposes, and to assist park reporting to government "resource condition status" accountability measures. Information and project reports are available at the NRCA Program website: http://www.nature.nps.gov/water/NRCondition_Assessment_Program/Index.cfm

Fall River Area, Roaring River Alluvial Fan, Rocky Mountain National Park. (NPS Photo)

Water Rights Highlights

Chuck Pettee, Branch Chief
Water Rights Branch

As usual, the WRB continued to participate in hearings in state administrative proceedings, support NPS claims in court proceedings, settle issues via stipulated agreements, collect and analyze hydrologic and water-related resource data, and assist parks by being indirectly involved in non-NPS led National Environmental Policy Act (NEPA) assessment proceedings. The more unusual work of the branch this year has been associated with the major milestones accomplished in previous years. Considerable effort in 2009 was spent to implement conditions that were attached to the protections earned earlier. In almost all cases, monitoring is a requirement. An article that follows describes the installation of the monitoring well network required in the water right decree for Great Sand Dunes NP. Even with the steady accumulation of protective court decrees and administrative decisions over the years, it is a rare treat to be able to affect an actual change in flow conditions within a park to benefit park resources. Such was the case when the Black Canyon of the Gunnison NP decree was implemented by the Bureau of Reclamation during the 2009 spring runoff season to produce a peak flow for the benefit of the park's canyon-related resources. Although not a large departure from normal, this flow release demonstrated a new factor in the Bureau of Reclamation's decision-making process for their Aspinall Unit Reservoirs. And, sometimes the final decision is not quite final yet. This was the case for the Nevada State Engineer Order establishing a protection zone around Devil's Hole. That Order has been appealed and the branch has been assisting our attorneys at the Office of the Solicitor and Department of Justice as the United States joined the lawsuit for the purpose of supporting the Nevada State Engineer.

The WRB collected scientific information to support claims for instream flow in streams and a spring at Great Basin NP as described in a following article. This was the first such claim made by the NPS under Nevada law. Other continuing studies in the vicinity of Great Basin NP are being conducted to describe the inter-relationship between groundwater and surface waters that are critical to maintain the park's water-dependent resources such as caves, streams, springs, riparian communities. We also have a small number of stream and groundwater level gauging stations with continuous measurement records for periods that vary from a few to many years. We are compiling these measurements into a high quality data record and plan to make those records publicly available.

We are finding that water decision-makers are relying more and more on numerical models to explore the potential effects of groundwater pumping proposals. In response, the NPS needs to increase its involvement in groundwater model development. That involvement may be in an advisory or commenting role, in a role to develop scientific interpretations to be used for model parameters, in the role of collecting water level or flow data for use in a model, or in conducting modeling directly by NPS staff or contractors. In 2009, WRB was actively involved in all of these roles. Contracting for model development is especially expensive. Because of the limitations of our budget, WRB partnered with other NPS budgets to address multiple project needs.

As always, any successes accrued by the WRB would not be possible without the professional work of park management and staff. We encourage field managers to call on the WRB whenever water rights issues are, or could be, affected by management decisions or proposals by park neighbors.

Water Rights Branch Contributes to Scientific Understanding of the Source of Furnace Creek Springs in Death Valley National Park.

Jennifer Back, Hydrologist
Water Rights Branch

Death Valley National Park. Photo by NPS

A review of the scientific evidence supporting the concept of interbasin flow as the source of Furnace Creek springs in Death Valley was published as an article in the Journal of Hydrology in 2009 (Belcher et al., 2009). This work reviews the preponderance of evidence supporting the concept of interbasin flow in the Death Valley region and the Great Basin. Interbasin flow has been established by scientific studies during the past century as a function of the hydraulic gradient between basins and hydraulic conductivity of the intervening rocks. The Furnace Creek springs in Death Valley, California are an example of large volume springs that are widely accepted as being the discharge points of regional interbasin flow. The flow path has been interpreted historically to be through consolidated Paleozoic carbonate rocks in the southern Funeral Mountains. However, recently a conceptual model of pluvial and recent recharge has been suggested by researchers at Brigham Young University as the source of the Furnace Creek springs. This work demonstrates that there is insufficient modern recharge and insufficient storage potential and permeability within the basin-fill units in the Furnace Creek basin for these to serve as a local aquifer. Further, the lack of high sulfate content in the spring waters argues against significant flow through basin-fill sediments and instead suggests flow through underlying consolidated carbonate rocks. The maximum temperature of the spring discharge appears to require deep circulation through consolidated rocks; the Tertiary basin fill is of insufficient thickness to generate such temperatures as a result of local fluid circulation. Finally, the stable isotope data and chemical mass balance modeling support the interbasin flow conceptual model. This publication contributes to the scientific evidence supporting the concept of interbasin flow and updates the current understanding of the source of water to the large springs in Furnace Creek.

Belcher, WR, Bedinger, MS, Back, JT and Sweetkind, DS. 2009. Interbasin flow in the Great Basin with special reference to the southern Funeral Mountains and the source of Furnace Creek springs, Death Valley, California. Journal of Hydrology, Volume 369, Issues 1-2, pp. 30-43.

Groundwater Monitoring Well Construction Completed at Great Sand Dunes National Park and Preserve

James Harte, Hydrologist
Water Rights Branch

Great Sand Dunes
National Park. (NPS Photo)

Acting pursuant to the Great Sand Dunes National Park and Preserve Act of 2000, the United States submitted a claim for the right to use, in-place, all groundwater in the unconfined aquifer underlying Great Sand Dunes National Park (GRSA). On August 4, 2008, the District Court, granted a decree approving the in-place right to ground water for GRSA. The water right entitles the National Park Service (NPS) to specific water table elevations at ten monitoring wells located near the south, west, and north park boundaries. The decree orders the NPS to install the wells, monitor the water table elevation for a period of 10 years, and return to court to present the ten-year record for the Judge's consideration.

On October 17, 2009, construction of the ten monitoring wells was completed under an Interagency Agreement with the US Geological Survey Central Region Research Drilling Project. The wells are designed to 1) define the Park's water right elevation along the Park boundary, 2) provide long-term monitoring sites in the unconfined aquifer, 3) provide early warning capability to the Park for water level changes that may impact Park resources, and 4) provide a means for the State Engineer to administer the Park's water right. The wells range in total depth from 76 feet to 400 feet and penetrate, or nearly penetrate, the entire thickness of the unconfined aquifer at their locations. The wells are screened throughout their entire depths to obtain a water table elevation representative of the entire thickness of the aquifer. The wells will be outfitted with electronics to continuously measure, record, and report water table elevation in the unconfined aquifer to the Colorado Division of Water Resources (CDWR) who will use the data to administer the Park's in-place groundwater right. The wells will help the Park comply with the Congressional mandate to obtain and exercise water rights to fulfill the purposes of the Park by maintaining groundwater levels, surface water levels, and stream flows on, across, and under the Park.

Decision Regarding an Application to Withdraw Groundwater Near Wind Cave National Park

Jeff Hughes, Hydrologist
Water Rights Branch

Marc Ohms of WICA reading the staff plate in Calite Lake within Wind cave, Photo by Jeff Hughes

During September, 2008, the NPS intervened in the matter of Water Permit Application 2633-2 by the Southern Black Hills Water System (SBHWS). This application proposed to withdraw 0.67 cubic feet per second (about 300 gallons per minute) of groundwater from the Madison aquifer, not to exceed 484 acre-feet per year, for rural water supply purposes. The proposed point of diversion is located within ¼ mile from the southeast boundary of Wind Cave National Park (WICA). The NPS is concerned that the withdrawal associated with this application, if approved, could lower the groundwater table in the Madison aquifer beneath WICA over time. The water levels in the Madison aquifer are responsible for the existence of several lakes within Wind Cave found at points approximately 500 feet below ground surface.

The NPS initiated negotiations with SBHWS to allow groundwater withdrawals while protecting park water resources. These negotiations eventually failed and a hearing date was set. On December 10, 2008, NPS Water Resources Division and Office of the Solicitor staff presented testimony at an administrative hearing before the South Dakota Water Management Board and staff from the South Dakota Department of the Environment and Natural Resources in Pierre, SD. At the end of the hearing, the Water Management Board approved application 2633-2 with qualifications. While none of the permit qualifications specifically address NPS concerns over groundwater withdrawals, the NPS may benefit from one qualification which states that the groundwater withdrawals may not have a significant adverse effect on water flow or water quality from Beaver Creek Springs, located downstream of the park.

As a result of this qualification, SBHWS is considering constructing a monitoring well near their production well that they would be able to estimate the impacts from their withdrawals on the flow at Beaver Creek Springs. The NPS anticipates being able to use information from the monitoring well to estimate impacts to the cave lakes. SBHWS has recently contacted NPS about sharing data from this well and other NPS needs related to their project.

John Reynolds of GRBA collecting survey data at the Rowland Springs Complex within Great Basin National Park. Photo by Jeff Hughes.

Applications Filed for Four State-based Instream Flow Water Rights for Great Basin National Park

Jeff Hughes, Hydrologist
Water Rights Branch

In order to protect its surface water resources from groundwater development proposed in nearby Snake Valley, four water right applications were filed with the State of Nevada for instream flows for three streams and one spring system within Great Basin National Park (GRBA). The park is concerned about the potential impacts to GRBA surface water sources from the groundwater withdrawals proposed by the Southern Nevada Water Authority (SNWA) located just east of the park.

Applications were filed for instream flow for Snake, Baker and Lehman creeks, and the Rowland Springs complex for recreation purposes, which include fish and wildlife uses. The NPS used the Tennant Method (Tennant, 1976) to quantify flows needed to support a fishery. This method required an estimate of mean annual flow for each of the water source. The mean annual flows were estimated using available precipitation, snowpack, and streamflow data from the park and surrounding region.

Water Rights maps were required to accompany each application and needed to be completed by a licensed Nevada water rights surveyor. NPS staff contracted with a Las Vegas, NV surveying firm during the summer of 2009 to collect the required GPS data in the park and to prepare the maps.

The applications were accepted as complete by the State in August, 2009. By the end of the public notice period, the NPS received two protests to each application from the same two parties: SNWA and Baker Ranches, Inc. The NPS has requested the State to hold the applications in abeyance (withhold action) until the completion of on-going hydrological data collection efforts by the NPS and other agencies. The NPS is in the process of preparing for a hearing concerning the SNWA applications to withdraw groundwater in Snake Valley and is involved with several studies to assist in determining the potential impacts to the water resources of GRBA from various pumping scenarios.

Reference: Tennant, D.L. 1976. Instream flow regimes for fish, wildlife, recreation, and related environmental resources. In: Instream flow needs, volume II: Boise, ID. Proceedings of the symposium and specialty conference on instream flow needs. May 3-9, American Fisheries Society, p 359 – 373.

Black Canyon Water Right - Decreed and Delivered

"Water is the breath of life in the arid lands of the west. "

- National Park Service

Mark Wondzell, Hydrologist
Water Rights Branch

Black Canyon of the Gunnison National Park was established in 1933 to preserve one of the most spectacular, steepest, and narrowest canyons in the country. Formed by the constant grinding of water and sediment of the Gunnison River, the 53-mile long Black Canyon is, in places, deeper than it is wide, with canyon walls towering more than 2,000 feet above the river. Immediately upstream is Curecanti National Recreation Area and the U.S. Bureau of Reclamation's Aspinall Unit with its three reservoirs (Blue Mesa, Morrow Point, and Crystal). These dams, completed between 1966 and 1976, regulate the flow of the Gunnison River through the Black Canyon and have effectively decreased the magnitude and frequency of high flows that once scoured the riverbed and formed the canyon.

On December 31, 2008, after a year-long negotiation and more than 30 years of controversy and legal wrangling, the Colorado Water Court issued a decree quantifying a 1933 federal-reserved water right for the Gunnison River through Black Canyon. The decreed water right mimics the natural, pre-dam hydrograph and includes a year-round minimum baseflow of 300 cubic feet per second (cfs), and variable peak and shoulder flows, the magnitudes of which are in direct proportion to annual snowpack conditions. The final settlement agreement was indeed a true compromise in that it recognized the importance of all private and public river management issues including existing upstream water users, the potential for downstream flooding, protection of downstream endangered fish habitat, and operation of the Aspinall Unit reservoirs and hydropower facilities.

Protecting and maintaining the character and natural integrity of the Black Canyon will require annual exercise of the decreed right at or near the target flows. In drier years, the peak and shoulder flows may be relatively small, but in average and wetter years the decreed flows may be quite large and thus require use of reservoir storage and result in lost hydropower generation.

Obviously, this will require annual coordination among the different federal bureaus to balance seemingly conflicting needs, while still protecting the unique riparian and riverine resources of the Black Canyon. Now, each spring, the National Park Service, Bureau of Reclamation, and other basin users will meet to define a target hydrograph for the upcoming year. On May 13, 2009, the flow of the Gunnison River through Black Canyon of the Gunnison National Park peaked at 7,340 cfs, thus satisfying one aspect of the newly decreed right, and ushering in a new era of reservoir operations that will protect the unique resources of the Park and restore and maintain the physical processes that carved this canyon.

Gunnison River at Red Rock Canyon, Black Canyon of the Gunnison National Park. Photo by NPS

Natural Resource Challenge Aquatic Resource Field Professionals Highlights

Funding from the Natural Resource Challenge helped support 15 field-based aquatic resource professional positions in FY09. The aquatic professional positions were developed to provide the National Park Service with both an extension of the functions and capabilities provided by the Water Resources Division and the handful of water and aquatic resource professional positions base-funded in parks and regions. the positions are designed to provide locally-based expertise to address water resource, fishery, and/or other aquatic issues that are substantial and ongoing in a particular watershed or area. The positions are unique in that they are designed to support the needs of multiple parks.

Examples of Field-based Aquatic Resource Professionals' AccomplishmentsFY 2009

- Assisted Death Valley National Park in reviewing EIS public scoping comments for a proposed solar energy development project in the vicinity of Devil's Hole.
- Represented NPS interests in Nevada at cooperative agency meetings on BLM managed EIS for Clark, Lincoln and White Pine Counties groundwater development pipeline project.
- Represented Great Basin National Park interests on an interagency, hydrologic technical review panel for the stipulated agreement to monitor, manage and mitigate potential impacts from groundwater withdrawals in Spring Valley, Nevada.
- Collaborated with Joshua Tree National Park and Pacific West Region to formulate a groundwater study request to the Federal Energy Regulatory Commission, outlining additional studies necessary to characterize the potential individual and cumulative impacts associ ated with a proposed groundwater pumped storage, electrical gen eration project adjacent to the park.
- Monitored progress on implementation of a Hydrologic Monitoring and Mitigation Program developed as part of the Virgin River Habi tat Conservation and Recovery Program to evaluate future ground water development impacts on surface water and groundwater resources in the Lower Virgin River Basin in Lake Mead National Recreation Area.
- Identified and mitigated current flood hazards at Mount Rainier Natonal Park and developed recommendations to minimize future flood damage.
- Field assessed, with Olympic National Park chronic aggradation and flooding issues at Finley Creek. Developed a long-term strategy to stabilize the watershed, and protect park infrastructure.
- Investigated bridge about to be undermined by flood flows at Whitman Mission National Historic Site, and developed measures to protect the structure. Provided guidance for long-term riparian recovery of newly acquired park property
- Identified need and obtained regional funding support for riparian cattle enclosures to improve riparian and wetland conditions at Appomattox Court House National Historical Park.
- Analyzed Acadia National Park's lake water quality monitoring program based on data dating to the 1940's. Obtained agreement from the coastal barrier network to allow their statistician to work on next steps for this project in 2010.
- Prepared NRPP Natural Resources Management funded proposal (PMIS 148528) "Assessment of Spawning Horseshoe Crabs within Mid-Atlantic Coastal NPS Units" to establish citizen based horseshoe crab monitoring at Fire Island National Seashore, Gateway National Recreation Area, and Sagamore Hill National Historic Site.
- Provided professional consultation to Fire Island National Seashore and partners regarding restoration opportunities and Habitat Evaluation Planning models for the USACE Fire Island to Montauk Point Draft Reformulation Plan.
- Provided a written assessment of potential impacts to water quality at Green Springs National Historic Landmark District associated with proposed waste water treatment development.
- Implemented ecological monitoring at Gateway National Recreation Area to evaluate restoration of 39 acres of salt marsh at Elders Point East.
- Worked with USGS and Gettysburg National Military Park staff to organize a water and sediment study for Rock Creek associated with potential contamination issues associated with an upstream wastewater treatment plant.
- Worked with Minuteman National Historical Park staff, state of MA, and Town of Lincoln staff to complete installation of a culvert to allow passage of flows and aquatic species for an ongoing stream daylighting project.
- Provided written review and organized NPS response to a Delaware River branch water extraction request for gas production from shale.
- Worked with USFWS to organize a DOI meeting with the Delaware River Basin Commission to discuss aquatic flow needs for the Delaware River and examine the flexible flow release plan.
- Provided technical support for the Natural Resources Condition Assessment and Resource Stewardship Strategy at Valley Forge National Historical Park.
- Provided technical support to Northeast Regional Director regarding Marcellus Shale development and Appalachian Trail research opportunities at the DOI Northeast Regional Directors' Workshop.
- Provided NPS comments to EPA on the water quality segment of the Executive Order for Chesapeake Bay restoration planning.
- Worked with regional aquatic ecologist and WRD Fishery Program Team Leader to write Experimental Use Permit waiver request for EPA in order for Isle Royale's NPS Ranger III to continue use of disinfection to treat for VHS and other aquatic invasive organisms.
- Assisted with zebra mussel monitoring at Isle Royale National Park at several docks around island following initial discovery at Windigo in September, 2009.
- Assisted with water quality data collection for Great Lakes Network and for Acadia National Park/Isle Royale National Park project to investigate nitrogen/phosphorous in inland lakes.
- Completed final report ("Water quality conditions and patterns on the Grand Portage Reservation and Grand Portage National Monument, Minnesota: Implications for nutrient criteria development and future monitoring") for the Grand Portage Band, Grand Portage National Monument, and the NPS Great Lakes Network.
- Worked with Indiana Dunes National Lakeshore staff to incorporate a re-draft of the Indiana Dunes Coastal Watershed Condition Assessment into the Great Lakes Restoration Initiative templates.
- Provided continued assistance to Isle Royale National Park superintendent on invasive species issues and ballast water treatment.
- Continued drafting final report on the spatial, seasonal, and long-term water quality trends at eight sites in and near Mississippi National River and Recreation Area.
- Analyzed preliminary results from the 2008 nitrogen source study on the Lower St. Croix River.

- With USGS partners, conducted historical data analysis to evaluate potential causes for avian botulism outbreaks since 1960 in Lake Michigan at Sleeping Bear Dunes National Lakeshore and drafted related manuscript ("Environmental correlates of historic type E botulism outbreaks in Lake Michigan, 1963-2008") for submission to Journal of Great Lakes Research.
- Assisted in the capture and re-introduction of Roundtail chub (Gila robusta) in Dinosaur National Monument; helped establish a refuge population of the species.
- Assisted Grand Canyon National Park in conjunction with the Bureau of Reclamation, the Grand Canyon Wildlands Council, the Arizona Game and Fish Department, and the U.S. Fish and Wildlife Service to translocate 300 juvenile humpback chub to Shinumo Creek within the park
- Surveyed Canadian River in Lake Meredith National Recreation Area for the threatened Arkansas River Shiner (Notropis girardi)
- Continued to serve as the Biology Committee representative to the multi-partnered Upper Colorado River Basin Recovery Program.
- Provided technical assistance for a project studying aquatic habitat in the upper Nuka River in Kenai Fjords National Park. Administered CESU agreement, coordinated with park staff, and reviewed and edited the final report.
- Provided project oversight and technical assistance for an ongoing research project studying the distribution and population structure of humpback whitefish within the Lake Clark drainage.
- Sampled resident fish and macroinvertebrates in watersheds impacted by the 2009 eruption of Mount Redoubt in Lake Clark National Park and Preserve in collaboration with USGS Alaska Science Center.
- Implemented the shallow lake monitoring plan in 30 lakes in Kobuk Valley National Park.
- Began development of interactive geodatabase for observing large scale lake drying and thermokarst events in Arctic Network parks. This is super cool and an excellent resource for demonstrating to the public the large-scale impacts of global warming on Alaska's parklands.
- Implemented the shallow lake monitoring plan in Wrangell-St. Elias National Park and Preserve, sampled 25 lakes, 2 lakes in Yukon-Charley Rivers National Park.
- Assisted Yukon-Charley Rivers National Park with Coal Creek rehabilitation and access corridor project.
- Maintained partnerships with University of Alaska Fairbanks faculty to investigate shallow lake dynamics in interior Alaska.
- Worked with cooperators at University of Georgia to develop spatial database of southeast fish and aquatic habitats in and surrounding Southeast Region park units
- Conducted research on breeding status of exotic Asian swamp eels in backwater marsh at Chattahoochee River National Recreation Area.
- Reviewed and provided and provided comments on the proposed mining permit from Burress Stone Construction, Inc. and possible hydrologic impacts along the park lands at Blue Ridge Parkway.
- Reviewed and provided assistance to park natural resource staff on developing appropriate mitigation measures to offset wetland impacts from the proposed Bonner Bridge replacement project at Cape Hatteras National Seashore.
- Conducted a site visit with the Southeast Region Wildlife Biologist to Cumberland Island National Seashore in August, 2009, to investigate the current condition of the freshwater wetland habitat at Willow Pond which been severely impacted due to the wild horses and feral hogs on the island
- Reviewed and provided comments on the Everglades National Park Swale EA and Wetland/Floodplain SOF.
- Reviewed the Draft Jean Lafitte National Historical Park and Preserve (JELA) paper "Inventory and Assessment of the Distribution of Submersed Aquatic Vegetation at JELA" and provided comments on the draft publication

Gill netting in Sequoia and Kings Canyon National Park. Photo by NPS.

APPENDIX A

TECHNICAL ASSISTANCE

TECHNICAL ASSISTANCE SERVICEWIDE

Servicewide

Organized symposium on endemic black bass in the southeastern US for American Fisheries Society Annual Meeting.

Attended NPS-WRD meeting on watershed condition assessments.

Served as the Biology Committee representative to the multi-partnered Upper Colorado River Basin Recovery Program.

As part of a multi-agency working group, reviewed "Guidance for Fire Suppression Activities" to avoid spread of aquatic nuisance species.

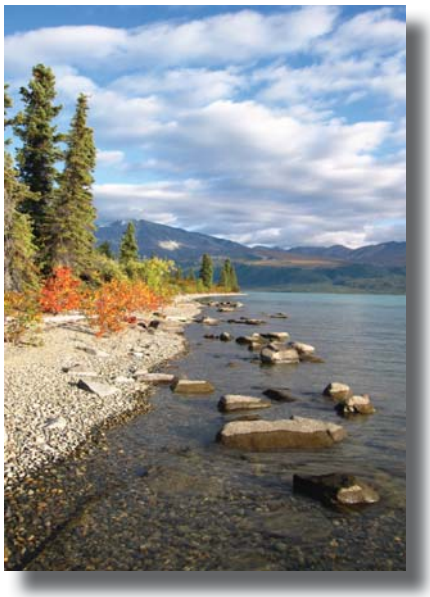
Participated in WASO group to develop fish consumption advisories for the National Park Service.

Served as panelist representing the Northeast Region to review and rank the FY2011 proposals for the Natural Resource Preservation Program Disturbed Lands Restoration.

Served as the Northeast Regional representative for the Inventory and Monitoring Advisory Committee.

Prepared request for NRPC region-wide assessment of potential park resource impacts associated with Marcellus Shale development. Provided substantive written reviews of the NRPC report. Provided written reviews and consultation on a water withdrawal for shale production in the Delaware River Basin.

Provided technical support to NPS Regional Director regarding Marcellus Shale development and Appalachian Trail research opportunities at the DOI Northeast Regional Directors' Workshop.



Lake Clark, Lake Clark National Park & Preserve. Photo by NPS.

Beaver Ponds on the Colorado River, Rocky Mountain National Park. Photo by NPS

Organized, reviewed, and ranked all NPS/USGS Water Quality Partnership Program proposals for the NE Region. Provided written reviews to Park and USGS applicants. Helped rewrite new WQPP national strategy which has been implemented for FY2010.

Provided NPS comments to EPA on the water quality segment of the Executive Order for Chesapeake Bay restoration planning.

Assisted with the interagency and international Northeast Air Quality Committee meeting preparation and discussions, which focused on current science and policies relating to northeast air and affected water quality and the future mission of NERAQC.

Provided written comment for EPA ballast exchange regulations within the Great Lakes and proposed mountain top mining regulation changes.

Briefed NPS WRD Water Quality Branch Chief on NER emerging contaminant pollution in waters. Presented emerging contaminant information to DOI solicitor, which led to a meeting and presentation with EPA, USGS, USFWS, and MA state representatives regarding future research and regulatory needs.

Served as GPRA Regional coordinator for 4 goals: Stream and Shoreline Desired Conditions, Restored Riparian Miles, Water Quality and Water Quantity Products.

Presented NPS NER needs at the USGS Leetown Genetics, Genomics, and Molecular Biology Meeting.

Represented NER through written and verbal comments in the evaluation of NRPP Natural Resource Management project reviews.

Quagga/Zebra Mussels. Photo by David Britton

Aquatic Invasive Species

Represented the National Park Service on the Western Regional Panel of the Aquatic Nuisance Species Task Force.

Worked with the Western Regional Panel of the Aquatic Nuisance Species Task Force to develop a quagga / zebra mussel action plan for the western US.

Reviewed and provided comments on a request to the Aquatic Nuisance Species Task Force to develop protocols to address ballast water in grounded vessels.

Climate Change

Represented WRD on the NPS *Climate Change Planning Working Group*, which serves the NPS *Climate Change Response Steering Committee*.

Represented WRD on the NPS *Climate Change Science Working Group*, which serves the NPS *Climate Change Response Steering Committee*.

Energy Development

Provided WRD support to the 9B Oil and Gas Compliance Team, guiding and evaluating wetland compliance on all 9B Plans of Operations for exploration and drilling.

Participated in the scoping meeting for the Environmental Impact Statement for the NPS 9B Oil and Gas Rule Revisions, providing guidance on the integration of Directors Order 77-1: Wetland Protection with the 9B regulatory process.

Fisheries Management

Represented the National Park Service on the Desert Fishes Habitat Partnership (DFHP), a candidate partnership under the National Fish Habitat Initiative.

Served as the National Park Service representative to the Western Native Trout Initiative.

Participated in a Department of Interior fish consumption advisory group.

Represented the National Park Service on the Reservoir Fisheries Partnership (RFHP).

Hydrology and Watershed Management

Served as coordinator for NRPC reviews of submissions to the Development Advisory Board and attended Line Item Construction meeting for NRSS.

Served on Technical Evaluation Panel for an Indefinite Quantities Contract awarded by the Denver Service Center for flood control and bank stabilization.

Represented WRD at the Servicewide I& M Advisory Committee meeting in Fort Collins, CO, in December 2008.

Served on the Restoration Technical Advisory Group.

Served on the Rivers/Dams workgroup.

Served on the Technical Assistance Call Software Development Task Group.

Participated in Dam Removal Workshop organized by BOR and USGS.

Information and Data Management

Provided support to the USGS on a U.S. Agency for International Development effort to assist Pakistan in developing water quality database management systems.

Represented NRPC on the DOI Climate Change Impacts Data Collection, Integration, and Management Workgroup and the Data Management Subcommittee.

Served on the Information Technology Technical Advisory Group.

Computed hydrographic statistics for all parks from the large-scale (1:24,000; 1:63,360 Alaska) National Hydrography Dataset (NHD) in geodatabase format.

Served on the Outreach and Technical Advisory Group.

Attended the USGS National Hydrography Dataset/National Watershed Boundary Conference in Denver, CO, in April 2009.

Coordinated the upgrade to Terrain Navigator Pro v.8.50 and v.8.51 and troubleshot issues for NRPC users.

Released NPSTORET v.1.74 which contained a series of Microsoft Access templates/forms for entering and documenting the results of water quality monitoring projects as per the National

Water Quality Monitoring Council's guidelines in a format compatible with uploading to modern STORET using the STORET Import Module.

Maintained NPSEDD v1.10, the NPS Electronic Data Deliverable specification used by parks and networks for contributing water quality data for inclusion in STORET.

Maintained version NPSCol2Row v2.11, a data formatting utility used to prepare data for the STORET Import Module, on the NPS' Vital Signs Water Quality Data Management and Archiving website and EPA's STORET Tools website (http://www.epa.gov/storet/otherapps.html) for anyone to download.

Assisted the EPA, several states, and Gold Systems Inc. in developing and debugging the Ambient Water Quality Monitoring System, a possible successor to the stand-alone copies of STORET.

Updated the Vital Signs Water Quality Data Management and Archiving website: http://www.nature.nps.gov/water/infoanddata/index.htm.

Updated webpages for the Servicewide I&M Program to explain the water quality and water resources inventories, (http://science.nature.nps.gov/im/inventory/waterquality/index.cfm and http://science.nature.nps.gov/im/inventory/water/index.cfm).

Attended the Servicewide I&M Data Manager's Meeting in Tucson, AZ.

Natural Resource Condition Assessment Program

Distributed and presented draft revised Natural Resource condition Assessment (NRCA) project standards and guidelines to NPS Regions and park staff.

Completed Natural Resource Condition Assessment project and published final report.

Provided support to the field for initiation of 6 NRCA projects involving 18 parks.

Initiated a collaborative project with NatureServe, the National Interagency Fire Center, and the Biological Resource Management Division to develop and pilot a set of landscape-scale interpretive products for use in NRCA projects at 10 park units.

Hosted NRCA pilot review process and meeting, resulting in draft revised project standards and guidance.

Natural Resource Planning

Participated in a meeting with Denver Service Center's Planning Division to start developing new tools for gathering and managing data on park resources (natural/cultural), visitation/utilization, and operations to improve their planning products/services.

Coordinated with the Denver Service Center in the organization and presentation of a concurrent session titled *Water for Life: Integrating Natural Resources, Planning, and Management* at the 2009 meeting of the George Wright Society in Portland, OR.

Represented WRD on the NRPC *Planning Technical Advisory Team* (PTAG).

Restoration

Compiled habitat restoration projects from all regional offices for potential funding under a proposed federal Economic Stimulus Bill.

Collaborated with members of the Restoration Technical Advisory Group to create an OFS request for $2.75 million per year for NPS Aquatic Resource Restoration and Management.

Served on the NRPC Restoration Technical Advisory Group (RTAG).

Strategic Planning

Served as servicewide goal coordinator for DOI Strategic Plan Goals for water quality and the health of streams and riparian zones.

Enhanced the software used to quality-assure, compile, and calculate hydrographic statistics in the Designated Use and Impairment Database.

Water Quality Management

Represented the National Park Service on the National Water Quality Monitoring Council.

Participated as a reviewer in the National Water Quality Monitoring Council Methods Board Sensor Workgroup to advance and foster a broader understanding and consistency of water quality sensor use.

Coordinate the NPS-USGS Water Quality Partnership Program as part of the Clean Water Action Plan funded by Congress.

Evaluated water quality analysis software and arranged for webinar reviews and training on software (Aquarius, StreamlineENV, and DataSight).

Wetlands Protections

Co-authored NPS comments on a Corps of Engineers proposal to suspend and modify Clean Water Act (Section 404) Nationwide Permit #21, which authorizes discharges of dredged or fill material into waters of the United States for surface coal mining activities.

Provided technical review and comment on the National Fish and Wildlife Foundation's *Business Plan for Sierra Nevada Meadow Restoration*.

Wild & Scenic Rivers Program

Participated in meetings with the DSC Planning Division, Alaska Regional Office, and WRD staff on *Wild & Scenic River* planning.

Elk, Rocky Mountain National Park.
Photo by NPS.

TECHNICAL ASSISTANCE

REGIONS AND PARKS

ALASKA REGION

Regionwide

Compiled and uploaded data from the USGS's reformatted National Uranium Resource Evaluation to STORET for ALAG, DENA. GAAR, GLBA, KATM, KEFJ, KLGO, LACL, SITK, WRST, and YUCH.

Obtained, entered, reformatted, and QA/QCed additional water quality data from BELA, CAKR, GAAR, and NOAT for upload to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

Wrote a successful proposal, "Understanding lake disappearance through time in northern Alaskan parks".

Attended the American Geophysical Union in San Francisco, CA, in December 2008.

Alaska Regional Office

Co-developed and recommended approval of the *NPS Alaska Region Wetland Mitigation Banking Program- Umbrella Mitigation Bank Instrument*.

Aniakchak National Monument

Uploaded water samples and field measurements collected in 1973 by the USGS and 1993 by Alaska Volcano Observatory researchers from springs in the vicinity of Surprise Lake to STORET.

Cape Krusenstern National Monument

Continued a cooperative agreement with East Carolina University to test a coastal lagoon monitoring strategy.

Denali National Park and Preserve

Collaborated with USGS to develop a lake classification scheme.

Maintained partnerships with University of Alaska Fairbanks faculty to investigate shallow lake dynamics in interior Alaska.

Continued discussions with USGS on the Yukon Basin Initiative.

Assisted with the Yukon Flats National Wildlife Refuge biological review.

Made recommendations to Yukon Flats and Nowitna National Wildlife Refuges for monitoring wetland dynamics.

Gates of Artic National Park and Preserve

Sampled 23 lakes.

Served as a member of the University of Alaska Fairbanks Graduate Committee for "Investigations on Old Man Char in Gates of the Arctic National Park and Preserve".

Assisted with Coal Creek rehabilitation and access corridor project.

Katmai National Park and Preserve

Assisted regional office staff in developing a Scope of Work and government estimate for a wetland delineation contract at Brooks Camp.

Participated on the NPS Resource Management Team and interagency Technical Working Group regarding the Pebble Mine, a proposed copper and gold mine in southwest Alaska; attended meetings, reviewed study plans, and commented on fisheries resource issues.

Partnership monitoring goals and mission.

Kenai Fjords National Park

Provided technical assistance for a project studying aquatic habitat in the upper Nuka River. Administered CESU agreement, coordinated with park staff, and reviewed and edited the final report.

Klondike Gold Rush National Historical Park

Reviewed Floodplain Statements of Findings for Dyea Area Plan.

Kobuk Valley National Preserve

Initiated cooperative agreement to track changes in lake surface area.

Lake Clark National Park and Preserve

Provided technical assistance support that included travel to park to meet with staff in determining best approach to establish baseline monitoring program for the Chulitna watershed prior to proposed Pebble Mine development.

Provided technical and policy review and assisted in the publication of a report titled *Assessment of Coastal Water Resources and Watershed Conditions at Lake Clark National Park and Preserve, Alaska* (Natural Resource Technical Report NPS/NRPC/WRD/NRTR – 2008/144).

Worked with park staff and the Alaska Regional Office to address NPS wetland compliance requirements for a proposed land exchange between the park and Tanalian, Inc.

Provided technical review of the final report for the BRMD-funded project *Conserving Sustainable Northern Pike Populations*.

Drafted proposal and received funding for water quality monitoring in the Chulitna River watershed, a watershed adjacent to the proposed Pebble Mine.

Provided project oversight and technical assistance for an ongoing research project studying the distribution and population structure of humpback whitefish within the Lake Clark drainage.

Provided project oversight, completed data analysis, and wrote progress and annual reports for a monitoring project estimating the 2009 escapement and population structure of Lake Clark sockeye salmon.

Provided technical assistance for interagency sockeye salmon research in the Kuskokwim River drainage in southwest Alaska including drafting proposals, reviewing reports, coordinating logistics, and assisting with sampling activities.

Reviewed and provided comments/edits for reports including a draft Environmental Assessment and a NPCA State of the Parks report.

Sampled resident fish and macroinvertebrates in watersheds impacted by the 2009 eruption of Mount Redoubt, in collaboration with USGS Alaska Science Center.

Supervised and provided technical assistance for a northern pike radio telemetry study in the Lake Clark watershed.

Wrangell-St.Elias National Park and Preserve

Uploaded water quality data to STORET from environmental geochemical investigations conducted between 1994 and 1997 to determine the extent of possible environmental hazards.

Provided guidance and recommendations to park staff concerning impacts to wetland resources resulting from off-road vehicle use.

Implemented the shallow lake monitoring plan.

Yukon-Charley Rivers National Preserve

Provided information on the relationship of mercury in fish to these cofactors: pH, dissolved organic carbon, and sulfates.

Sampled two lakes.

Assisted with Coal Creek rehabilitation and access corridor project.

Prepared Title 16 documentation for the park to gain access to Coal Creek Camp.

Provided comments on aviation program.

Initiated cooperative agreement to document impacts of 2009 spring flood on moose habitat, wetland communities, and structures.

Cored Ford and Six-mile lakes to track lake disappearance.

Deployed temperature loggers for USFWS project monitoring Yukon River water temperature.

INTERMOUNTAIN REGION

Regionwide

Provided advice on contaminants and how to choose an analytical laboratory.

Compiled and uploaded data from the USGS's reformatted National Uranium Resource Evaluation to STORET for ARCH, AZRU, BAND, BEOL, BICA, BIHO, BLCA, BRCA, CACH, CANY, CARE, CAVO, CAVE, CEBR, COLM, CORO, CURE, DETO, DINO, ELMA, ELMO, FLFO, FOLA, FOUN, FOBU, GICL, GLCA, GOSP, GRCA, GRKO, GRSA, GRTE, HOVE, HUTR, JODR, LIBI, MEVE, MOCA, NABR, NAVA, PECO, PEFO, PETR, PISP, ROMO, SAGU, SAPU, SAND, SCBL, SUCR, TICA, TONT, TUMA, TUZI, WACA, WABA, WHSA, WUPA, YELL, YUHO, and ZION.

Served as the Biology Committee representative to the multi-partnered Upper Colorado River Basin Recovery Program.

As part of a multi-agency working group, reviewed "Guidance for Fire Suppression Activities" to avoid spread of aquatic nuisance species.

Participated in WASO group to develop fish consumption advisories for the National Park Service

Arches National Park

Continue to monitor the DOE's Moab site groundwater remediation and construction activities, including the onset of rail car loadings and shipping of uranium mill tailings to the new repository at Crescent Junction, UT.

Investigated potential for construction of a new well at park headquarters.

Reviewed Floodplain Statements of Findings for Levee at maintenance facility.

Bent's Old Fort National Historic Site

Continued development of a *Water Resources Information and Issues Overview Report* for the park.

Big Bend National Park

Reviewed Floodplain Statements of Findings for Construction of New Housing and Operations Facilities in Rio Grande Village.

Bighorn Canyon National Recreation Area

Conducted hydrogeological analysis and recommendations for construction of a new water supply well at Horseshoe Bend.

Reviewed and commented on a proposal titled *Arid Land Spring Protection and Restoration* for the park.

Big Hole National Battlefield

Uploaded water quality data from the 1999 Level I Water Quality Inventory conducted by the USGS to STORET.

Big Thicket National Preserve

Reviewed site investigation work plans addressing characterization of contaminated soils and groundwater at multiple oil and gas sites.

Provided interpretation of floodplain locations to park staff regarding replacement of an abandoned gas line through park property.

Participated in candidate interviews and evaluation for hydrologist position.

Continued coordination of a *Natural Resources Foundation Report* for the park.

Canyonlands National Park

Advised park on progress at DOE's Moab site groundwater remediation and construction activities, including the onset of rail car loadings and shipping of uranium mill tailings to the new repository at Crescent Junction, UT.

Assisted in developing fluvial geomorphologic conditions assessment of Salt Wash relative to an existing road.

Capital Reef National Park

Assisted in evaluation of a water supply well at the Sleeping Rainbow Ranch.

Carlsbad Caverns National Park

Uploaded water quality data from Boston's 1999 Lechuguilla Cave - Red Lake contamination study to STORET.

Uploaded water quality data from Dawson's 1998 Hydrochemistry of Lechuguilla Cave, Final Report Summary to STORET.

Uploaded water quality data from Hunter's 2000 study on persistent coliform contamination in Lechuguilla cave pools to STORET.

Uploaded water quality data compiled by park staff from monitoring park seeps and springs from 1931 to 1991 to STORET.

Uploaded water quality data from Palmer's 1988 study *Water Chemistry in the Vicinity of Subaqueous Helictites in Pellucidar, Lechuguilla Cave, New Mexico* and other sources to STORET.

Uploaded water quality data from Oelker's 1986 *The Lechuguilla Cave Water Study* to STORET.

Uploaded water quality data from Turin and Plummer's various studies documented in the 2000 report *Lechuguilla Cave Pool Chemistry, 1986-1999* to STORET.

Chaco Culture National Historical Park

Reviewed two Floodplain Statements of Findings, one for Gallo Wash Campground and one for sewer, water, and flood control for visitor center renovation.

Chickasaw National Recreation Area

Reviewed and evaluated the impacts to wetland resources that would result from constructing a proposed boardwalk through a wetland in the park

Coronado National Monument

Reviewed a report titled *Evaluation of Interim Road Protection Measures* and reviewed and advised park staff on 30% design drawings for *Routes 10 and 200, East Montezuma Canyon Road Improvements for Coronado National Memorial.*

Dinosaur National Monument

Assisted with hardening a bank of the Yampa River at a boat put-in.

Advised staff of the potential relevance of apparent long term upwards trends of pH in the Yampa River to proposals for increased irrigation use.

Returned 137 roundtail chub (Gila robusta) to the Yampa River from USFWS Ouray National Fish Hatchery.

Releasing Roundtail chub (Gila robusta) into the Green River in Dinosaur National Monument (Mike Montagne, USFWS, 2009).

Florissant Fossil Beds National Monument

Assisted with evaluation of sustainable yield from the Sawmill Trail Well.

Fort Bowie National Historic Site

Reviewed Floodplain Statements of Findings for Dyea Area Plan.

Fort Davis National Historic Site

Finalized Flood Mitigation Plan technical memo.

Fort Union National Monument

Assessed potential for oil and gas test drilling to impact park resources.

Fossil Butte National Monument

Assessed the environmental impact of exporting water from Cundick Spring and identified potential sources of surplus water.

Provided technical assistance to Monument staff in managing use of "surplus water" from park springs for livestock watering on adjacent lands.

Glacier National Park

Commented on proposed gravel mine near park waters.

Provided information on endocrine disrupters and fish tissue contaminants issues.

Glen Canyon National Recreation Area

Assisted park staff in obtaining permits for existing wells.

Golden Spike National Historic Site

Provided review and comment on the park's draft General Management Plan project agreement.

Grand Canyon National Park

Continued discussions with Grand Canyon National Park's hydrologist to initiate a *Water Resources Information and Issues Overview Report*.

Assisted the BOR, Grand Canyon Wildlands Council, the Arizona Game and Fish Department, and the USFWS in translocating and monitoring 300 juvenile, transmitter-tagged humpback chub, an endangered species, to Shinumo Creek.

Grand Teton National Park

Provided advice on statistical issues, regular reporting issues, trend analyses alternatives, defining target populations to monitor, and autocorrelation issues.

Reviewed Floodplain Statement of Findings for Gros Ventre Campground rehabilitation.

Great Sand Dunes National Park and Preserve

Provided technical assistance to park staff regarding removal of 15 man-made fish ponds and restoration of the floodplain of Sand Creek.

Co-developed a proposal for a restoration design plan and coordinated obligation of park funding for the Sand Creek restoration project through the Rocky Mountains CESU and Intermountain Region.

Guadalupe Mountains National Park

Assisted in developing a groundwater monitoring plan.

Provided technical and policy review of a Natural Resources Technical Report titled *Physical Resources Stewardship Report – Guadalupe Mountains National Park* (Natural Resources Report NPS/NRPC/WRD/NRTR – 2008/121).

Hubbell Trading Post National Historic Site

Uploaded water quality data from the 1998 Level I Water Quality Inventory conducted by the USGS to STORET.

Prepared a proposal titled *Establish Native Wetland Plant Species to Enhance Channel Stability and Functional Condition in Pueblo Colorado Wash, Hubbell Trading Post National Historic Site.*

Developed nursery contract specifications for the native wetland plant species for the funded Pueblo Colorado Wash project, and assisted in the review of bids and selection of a contractor.

John D. Rockfeller, Jr. Memorial Parkway/ Grand Teton National Park

Analyzed hydrologic data from the Snake River Gravel Pit restoration site to determine if 2006 earthwork (removal of non-native sedge soil seedbank) altered site hydrology.

Assisted park staff in developing final planting specifications for the Snake River Gravel Pit restoration project.

Prepared a proposal titled "*Wetland Plant Propagation and Planting for Highest Priority Areas of the Snake River Gravel Pit Restoration Site, John D. Rockefeller, Jr. Memorial Parkway/Grand Teton National Park.*"

Lake Meredith National Recreation Area

Helped survey the Canadian River for the presence and relative abundance of the threatened Arkansas River Shiner (Notropis girardi), whose habitat has been damaged by ORV use.

Fisheries biologists from the National Park Service and Texas Tech University survey the Canadian River for the Arkansas River Shiner (Trammell 2009).

Little Bighorn Battlefield National Monument

Uploaded water quality data from the 1999 Level I Water Quality Inventory conducted by the USGS to STORET.

Lyndon B. Johnson National Historical Park

Uploaded water quality data collected from the Pedernales River by students of Lyndon B. Johnson High School in Johnson City, TX, as part of the Colorado River Watch Network to STORET.

Uploaded water quality data collected at two locations on the Pedernales River by the Lower Colorado River Authority to STORET.

Mesa Verde National Park

Provided recommendation s for the monitoring of the Far View Terrace gasoline groundwater plume and its cleanup under the Colorado Division of Oil and Public Safety spill remediation reimbursement program.

Advised park staff regarding wetland compliance requirements for a proposed culvert and ditch system associated with a water treatment facility.

Padre Island National Seashore

Reviewed Level II Site Investigation of spill-related contamination of the Dunn-Peach well pad.

Provided on-site technical review of a proposed boardwalk through wetland resources within the seashore.

Provided on-site technical review of a proposed 30-mile road alignment within the seashore.

Palo Alto Battlefield National Historic Site

Participated in wetland restoration assessment and evaluation.

Provided technical assistance to park staff in evaluating site specific data needs and in developing concepts for restoring the Palo Alto Resaca and adjacent wet prairie.

Prepared a proposal titled *Develop Final Restoration Design and Contract Specifications for the Palo Alto Resaca, Palo Alto Battlefield NHS, Texas.*

Prepared a paper titled *Concepts for a Proposed Memorandum of Agreement (MOA) between the National Park Service and the National Park Foundation to Create a Trust Fund for Wetlands Restoration at Palo Alto Battlefield National Historical Park, Texas.*

Pecos National Historical Park

Through the ongoing Pecos NHP NRCA, worked with the park, SOPN, IMR planning, and other NRPC programs to improve information and data sharing between NPS science and planning programs.

Reviewed data and file reports for University of New Mexico contractor related to contaminants in fish tissue.

Continuing involvement in a project to remove levees as a final step in restoration of wetlands along Glorietta Creek as a 20% fee project.

Gathered 1990 data and interpretation notes on contaminants in fish tissues and provided updated advice to a contractor working on a watershed assessment summarization.

Participated on a multi-disciplinary NRPC team which will assist the park in developing a *Resource Stewardship Strategy* pilot project.

Reviewed and commented on the draft technical report *Riparian Baseline Data Collection Prior to Opening the Pecos River to Fishing Access in Pecos National Historical Park.*

Provided a summary of Water Resources Division research and technical support at the park and provided relevant references to the University of New Mexico cooperators who are developing the *Pecos National Historical Park Natural Resource Condition Assessment*.

Petrified Forest National Park

Uploaded water quality data from a 1997 study to characterize baseline conditions in the Puerco River to evaluate potential impacts from a proposed casino/truck stop upstream/outside of the park to STORET.

Pipe Spring National Monument

Provided technical assistance for on-going studies of geology and hydrogeology and causes of spring flow reduction.

Provided programmatic oversight, technical support and peer review in the development of the *Information and Issues Overview Report – Pipe Springs National Monument* (Natural Resources Report NPS/NRPC/WRD/NRR – 2009/149).

Organ Pipe National Park

Continuing review of impacts related to construction of a pedestrian barrier fence along the international border.

Assisted with analyses of cause and remedial action of declining water levels at Quitobaquito Spring.

Rocky Mountain National Park

Reviewed current and proposed sediment monitoring proposal associated with the Grand Ditch failure.

Found new collaborators to advise park on environmental estrogen effects on trout in lakes.

Conducted inventory of wells and well permits for the Kawuneeche Valley area of the park.

Assisted in testing and monitoring a new well at Fall River Pass.

Participated in a Grand Ditch Science Team meeting at the park to identify data gaps that must be filled prior to designing restoration plans for areas impacted by the 2003 Grand Ditch breach (Lulu Creek, Colorado River, Lulu City wetland complex).

Reviewed and advised Rocky Mountain National Park on a USGS proposal titled *Water Quality Sampling to Monitor Possible Effects of Grand Ditch Restoration Activities.*

Timpanogos Cave National Monument

Completed flood hazard assessment and flood evacuation guideline report.

Tumacacori National Historical Park

Uploaded water quality data from a 1997 USFWS study by King et al., *Contaminants as a Limiting Factor of Fish and Wildlife Populations in the Santa Cruz River, Arizona,* to STORET.

Tuzigoot National Monument

Guided development of a proposal for managing the 100-acre Tavasci Marsh.

Reviewed and commented on a *Draft Tavasci Marsh Wetland Assessment: Wetland Vegetation Communities, Condition, and Functions*. The report is being developed to inform an upcoming Management Plan and Environmental Assessment for Tavasci Marsh.

White Sands National Monument

Provided technical support and peer review in the development of a *Physical Resources Foundation Report* for the monument.

Wilson's Creek National Battlefield

Uploaded additional analog data to STORET from *Macroinvertebrate Assemblages and Water Quality in Six National Park Units in the Great Plains* by Harris et al., Colorado State University, 1991.

Wind Cave National Park

Participated in a working group that developed a "pilot" climate change scenario plan for use in the park's *General Management Plan* planning process.

Wupatki National Monument

Served as point of contact, reviewing Annual Progress Report for NRPP project of spring restoration.

Yellowstone National Park

Served as key official in the awarding of a fourth year USGS contract to monitor impacted groundwater discharges to surface water from recent gravel mining operations at Sylvan Pass.

Provided recommendation to the Montana Department of Environmental Quality on the McLaren Tailings Final Reclamation Design, the Invitation for Bid package, and the groundwater model used to evaluate tailings dewatering.

Obtained funding for continuation of the USGS Montana Science Center's monitoring of specific conductance and turbidity parameters at the Silver Gate gauge on Soda Butte Creek.

Served as the DOI representative on the New World Mining district restoration activities and attended the annual New World Mine Geohydrology Workgroup and public meeting.

MIDWEST REGION

REGIONWIDE

Compiled and uploaded data from the USGS's reformatted National Uranium Resource Evaluation to STORET for FOUS, GWCA, and KEWE.

Uploaded biological data to STORET from *Macroinvertebrate Assemblages and Water Quality in Six National Park Units in the Great Plains* by Harris et al., Colorado State University, 1991, for AGFO, GWCA, HEHO, HOME, INDU, and PIPE.

Represented Midwest Region for Ocean and Coastal Stewardship program; participated in development of Midwest Region Oceans and Coastal Park Stewardship Action Plan.

Worked with parks APIS, GRPO, ISRO PIRO and SLBE to develop proposals for Great Lake Restoration Initiative. Acted as lead contact for Aquatic Invasive Species prevention projects for Lake Superior and for Restoration of Coastal and Fluvial Processes in Five Parks.

Assisted with Great Lakes Strategy Document finalization.

Participated in class, dockside and underwater training to acquire NPS Scuba certification.

Represented NPS at Great Lakes Fishery Commission Lake Superior Technical Committee meetings and at National Fish Habitat Initiative meetings and conference calls.

Represented region at Minnesota Pollution Control Agency Public meeting regarding ballast water permit system for State of Minnesota.

Reviewed Mount Rushmore condition assessment per request from Great Plains CESU Research Coordinator.

BRMD project review coordination. Reviewed USGS Eastern Region proposals. Reviewed additional USGS proposal for mussel investigations in SACN.

Reviewed proposal for habitat restoration effort in Pere Marquette River, per request/recommendation by SLBE Chief of Natural Resources.

Coordinated the SCC reviews for the USGS-NPS Water Quality Partnership funding source.

Performed GPRA duties for two land health goals.

Helped develop and coordinate FY10 and FY11 NPS proposal submissions for the Great Lakes Restoration Initiative; presented NPS plans for the Initiative to the Great Lakes Regional Working Group in Chicago; served as point of contact for Great Lakes Restoration Initiative Nearshore Health Projects.

Served as one of two points of contact for the Gulf Hypoxia Task Force Coordinating Committee, and provided NPS information for the FY08 and FY09 Operating Plans.

Provided assistance to the Northern Great Plains Network related to water quality monitoring.

Provided oversight on the NRPP-NRM spiny water flea project at ISRO, PIRO, SLBE, and VOYA.

Agate Fossil Beds National Monument

Assisted in analyses of groundwater monitoring data.

Apostle Islands National Seashore

Provided technical and policy review for the seashore's *General Management Plan / Environmental Impact Statement.*

Arkansas Post National Memorial

Uploaded water quality data from the 1999-2000 Level I Water Quality Inventory conducted by the USGS to STORET.

Badlands National Park

Provided floodplain information, interpretation, and advice regarding White River visitor center.

Buffalo National River

Provided review and comment on the park's *General Management Plan* project agreement.

Cuyahoga Valley National Recreation Area

Provided advice on the removal of two dams.

Reviewed and commented on a scoping letter for an Environmental Assessment for the proposed Boston Mills Historic District Sewer and Treatment System (constructed wetlands).

Effigy Mounds National Monument

Provided technical review and rating of the draft *Effigy Mounds National Monument Natural Resource Condition Assessment* (pilot report).

George Washington Carver National Monument

Uploaded water quality and invertebrate data from park monitoring during 1992-1994 to STORET.

Uploaded water quality data from Boyt's 1987 report *Water Quality Study for George Washington Carver National Monument* to STORET.

Uploaded water quality data from a study of mercury in springs and wells conducted near Diamond, MO, in 1985 to STORET.

Uploaded water quality data from a series of water quality monitoring efforts undertaken by students from Missouri Southern State College during the early 1980s to STORET.

Uploaded water quality data collected by the Newton County Health Department and the Missouri Stream Team to STORET.

Grand Portage National Monument

Completed hydraulic modeling of a short stream reach, developed design criteria for streambank stabilization, and completed a technical report.

Provided technical assistance on the Pines landfill CERCLA site which included an extensive review of a groundwater model developed for the Potentially Responsible Party and found the model was technically unsound and was not credible or usable in evaluating potential threats to park resources.

Completed final report ("Water quality conditions and patterns on the Grand Portage Reservation and Grand Portage National Monument, Minnesota: Implications for nutrient criteria development and future monitoring") for the Grand Portage Band and the NPS Great Lakes Network.

Provided assistance with a cultural resources project in Lake Superior nearshore waters.

Indiana Dunes National Lakeshore

Participated on an NRPC team that is advising park staff on developing a *Shoreline Management and Restoration Plan* (ARRA funding).

Reviewed comments on pollution discharge standards for Lake Michigan submitted to Indiana Pollution Control.

Worked with INDU staff to incorporate a re-draft of the INDU Coastal Watershed Condition Assessment into the Great Lakes Restoration Initiative templates.

Isle Royale National Park

Cooperated with BRMD in providing input on a variety of issues related to viral hemorrhagic septicemia and ballast water management.

Participated in several meetings and assisted Superintendent with various ballast water issues, including USCG STEP test protocols, commercial treatment options for Ranger III, and Michigan Department of Environmental Quality Discharge permit standards as they may pertain to Ranger III treatment.

Worked with regional aquatic ecologist and WRD Fishery Program Team Leader to write Experimental Use Permit waiver request for EPA in order for NPS Ranger III to continue use of disinfection to treat for VHS and other aquatic invasive organisms.

Assisted with Rhodamine dye test in Duluth Superior Harbor to determine ballast water dilution/dispersal aboard the vessel Indiana Harbor.

Helped develop revised northern pike regulations for inland lakes.

Provided opinion/input to NPS/MI DNR regarding Sivertson commercial fishery and request to extend license to additional licensee.

Worked on desired future conditions for fishery management plan.

Assisted with USGS problem statements – VHS vaccine and ballast water treatment for NPS Ranger III.

Presented information on Lake Trout genetics investigations starting in 2010 to Isle Royale Family and Friends meeting.

Worked with network and park to develop benthic mapping plan.

Assisted natural resource staff with finalization of voluntary creel survey.

Assisted with annual brook trout surveys with USFWS at Washington Harbor, Toben Harbor, and Siskiwit Bay.

Assisted with zebra mussel monitoring at several docks following initial discovery at Windigo in September 2009.

Collected water quality for Acadia National Park / Isle Royale National Park project to investigate nitrogen/phosphorous in inland lakes.

Provided continued assistance to superintendent on invasive species issues and ballast water treatment.

Co-authored proposals and/or pre-proposals on amphibian conservation genetics, rock pool ecology, boreal lakes climate change, and Lake Superior coastal embayments.

Analyzed data, assisted with site selection, coordinated logistics, and helped with field sampling on the ISRO/ACAD nitrogen critical loads project.

Mississippi National Recreational River

Reviewed and provided input to the park staff on the FERC environmental assessment for the Installation of Hydrokinetic Turbines at Lock Dam 2 on the Mississippi River.

Commented on Federal Energy Regulatory Committee environmental assessment for hydrokinetics project to be located below USACE lock and dam number 2.

Authored or co-authored two papers addressing water quality changes in Lakes Pepin and St. Croix (titled "Recent water quality trends and a comparison to sediment-core records for two riverine lakes of the Upper Mississippi River basin: Lake St. Croix and Lake Pepin", and "Twentieth-century eutrophication of the St. Croix River reconstructed from the sediments of its natural impoundment"), published in 2009 the Journal of Paleolimnology.

Authored a short article for Park Science on the Lake Pepin and Lake St. Croix work ("Reading the tale of two rivers: historical analysis in support of river park management").

Continued drafting final report on the spatial, seasonal, and long-term water quality trends at eight sites in and near MISS. Presented related poster ("Three decades of water quality change (1976-2005) in the Mississippi National River and Recreation Area") at the annual Mississippi River Research Consortium.

Missouri National Recreation River

Provided on-site technical review and evaluation of a proposed road alignment that will impact over 100 acres of wetlands along the river.

Mount Rushmore National Memorial

Conducted pumping test of a new water supply well.

Ozark National Scenic Riverways

Uploaded results from the park's long-term water quality monitoring program through mid-July 2009 from NPSTORET to STORET.

Provided technical and policy review for the *Ozark National Scenic Riverways Foundation Report.*

Pea Ridge National Military Park

Uploaded water quality data from the 1999 Level I Water Quality Inventory conducted by the USGS to STORET.

Pictured Rocks National Lakeshore

Continued providing advice on potential removal of several small dams and berms in the Beaver Basin area.

Completed the second year of a four year study by park staff and Northern Michigan University (NMU) to improve understanding of coaster brook trout life history and population dynamics at the lakeshore.

Worked on field planning and Detailed Implementation Plan for mussel/fish host project to begin in spring 2010.

Coordinated with USFWS on placement of additional passive integrated transponder antenna at Miner's Creek for brook trout monitoring.

Helped coordinate project planning and cooperative agreements for the vernal pools project.

Saint Croix National Scenic Riverway

Reviewed Fish Habitat History report for Namekagon River prepared by Notre Dame University.

Provided comments regarding implementation of large wood cover project proposed by State of Wisconsin.

Attended annual fisheries meeting in Grantsburg, WI, and provided support in discussions with the States of Wisconsin and Minnesota regarding fisheries issues.

Reviewed and updated fish species list.

Analyzed preliminary results from the 2008 nitrogen source study on the Lower St. Croix River; presented results at the St. Croix Research Rendezvous and the Mississippi River Research Consortium ("Exploring causes for increasing nitrate concentrations in the Lower St. Croix River"), as well as the North American Benthological Society meeting ("Nitrogen patterns and sources in an upper Mississippi River tributary: a stable isotope approach").

Gave a presentation on St. Croix macroinvertebrate ecology ("What lurks beneath: benthic macroinvertebrates of the St. Croix River") to local government officials on the lower St. Croix River.

Gave a presentation on St. Croix water quality ("Health of the St. Croix River") to a local church group as part of their environmental awareness lecture series.

Helped plan and implement the USGS SACN/MISS backwaters nutrient study and the USGS SACN mussel food quality study.

Co-authored a successful USGS-NRPP proposal to investigate effects of zebra mussels on native mussels, and the effects of fish predation on zebra mussels.

Participated in St. Croix Basin Water Resources Planning Team activities, particularly those of the Monitoring and Assessment Subcommittee.

Sleeping Bear Dunes National Lakeshore

Completed Natural Resource Condition Assessment project and published final report.

Provided assistance for the ongoing Glen Lake/Crystal River watershed planning activities, a stakeholder-based process to define water levels needed for balanced protection of lake and river resources.

Provided review of proposal to perform habitat restoration by placing significant amounts of woody material in the Platte River.

Reviewed plans for a new water quality laboratory at the park and technical assistance for Aral Marl Springs, a Platte River fish cleaning station, and the Tucker Lake dump.

Provided technical and policy review and assisted in the publication of a Natural Resources Technical Report titled *Assessment of Natural Resource Conditions – Sleeping Bear Dunes National Lakeshore.* (Natural Resources Report NPS/NRPC/WRD/NRR – 2009/097).

Assisted with botulism investigations and study design for goby monitoring.

Developed new net/trap method to capture round gobies.

Compiled commercial fishing statistics for the park's watershed condition assessment.

Reviewed Otter Creek brook trout restoration proposal submitted by Grand Traverse Band.

Contacted USFWS and Northland College to determine possible methods to sample Eurasian Ruffe in one of the Bass Lakes.

Contacted SLBE visitor who reported seeing round gobies in Platte River. Coordinated with visitor to provide collections of gobies to NR staff.

As part of the Lake Michigan botulism NRPP-NRM project, helped park staff monitor nearshore water quality and worked to develop and implement the study plan for goby population surveys.

Prepared a presentation on the Sleeping Bear Dunes botulism studies for the State of Lake Michigan meeting ("Exploring causes for recent botulism outbreaks at Sleeping Bear Dunes National Lakeshore: results from pilot studies").

With USGS partners, conducted historical data analysis to evaluate potential causes for avian botulism outbreaks since 1960 in Lake Michigan, and drafted related manuscript ("Environmental correlates of historic type E botulism outbreaks in Lake Michigan, 1963-2008") for submission to Journal of Great Lakes Research.

Developed Lake Michigan-related proposals for the FY10 and FY11 Great Lakes Restoration Initiative, including benthic habitat mapping, nearshore monitoring, paleolimnological studies, and so on.

Voyageurs National Park

Reviewed lands use trends and response of water quality and biology report for Lake Kabetogama.

Provided interpretation of mercury contaminants in fish.

Provided technical and policy review and assisted in the publication of a technical report titled *Impacts from Water-Level Regulation on Benthic Macroinvertebrate Community Structure in Namakan Reservoir and Rainy Lake of Voyageurs National Park, Minnesota* (Natural Resource Technical Report NPS/NRPC/WRD/NRTR – 2008/129).

Provided technical and policy review and assisted in the publication of a technical report titled *Wetland Vegetation Monitoring – Voyageurs National Park* (Natural Resource Technical Report NPS/NRPC/WRD/NRTR – 2009/202).

Reviewed an annual accomplishment report for the BRMD-funded project *Lake Sturgeon Population Characteristics, Movements, and Habitat Use in Namakan Reservoir* and approved release of FY09 funds.

Reviewed comments on pollution discharge standards for Lake Michigan submitted to Indiana Pollution Control.

Worked with INDU staff to incorporate a re-draft of the INDU Coastal Watershed Condition Assessment into the Great Lakes Restoration Initiative templates.

Assisted in coordination between the park and Michigan Tech University for spiny waterflea investigations.

Served as the review coordinator for reports and manuscripts related to the interdisciplinary lake levels project.

With the VOYA aquatic ecologist, prepared presentations on native zooplankton assemblages ("Zooplankton assemblages at Voyageurs National Park: establishing a pre-Bythotrephes baseline") for the Western Great Lakes Research Conference, and crayfish mercury patterns ("Implications of body size, trophic position, species identity, and lake water quality for crayfish mercury burdens in and near Voyageurs National Park") for the Ecological Society of America meeting

NATIONAL CAPITAL REGION

Regionwide

Compiled and uploaded data from the USGS's reformatted National Uranium Resource Evaluation to STORET for GWMP, MANA, PRWI, and WOTR.

Appalachian National Scenic Trail

Assisted with multi-agency proposal preparation, outreach, and environmental compliance needs for the Appalachian Trail MEGA-transect Atmospheric Deposition Effects Study. Presented the atmospheric deposition project at the George Wright Society Conference and the 41st Annual Air Pollution Workshop and Symposium.

Chesapeake and Ohio Canal National Historical Park

Advised park and regional staff regarding wetland compliance requirements for proposed dredging at a concessioner's boat rental operation.

Advised park staff regarding NPS wetland compliance requirements for a proposed sewer line in an existing right-of-way for the City of Cumberland, Maryland.

Reviewed and commented on a *Draft Environmental Assessment, Proposed Eel Ladder Construction at Dams 4 and 5 on the Potomac River, Chesapeake and Ohio Canal National Historical Park.*

George Washington Memorial Parkway

Participated in a series of five Dyke Marsh Science Team meetings as part of assistance in preparing an Environmental Impact Statement for restoration of Dyke Marsh.

National Capital Parks East

Evaluated a wetland delineation and worked with the DOI Solicitor's Office regarding wetland compliance requirements for a land conveyance at Poplar Point, Anacostia Park.

Reviewed and evaluated several chapters of the Draft Wetlands and Resident Canada Goose Management Plan/Environmental Impact Statement for Anacostia Park.

Reviewed construction drawings and evaluated the potential impacts to wetland resources resulting from the proposed shoreline stabilization at Piscataway Park.

National Mall

Reviewed Floodplain Statements of Findings for Potomac Park Levee Improvements.

Piscataway Park

Reviewed Floodplain Statements of Findings for Wetlands for Proposed Shoreline Stabilization.

Rock Creek Park

Completed Natural Resource Condition Assessment project and published final report.

Provided peer review and rating on the draft *Rock Creek Park Natural Resource Condition Assessment* (pilot report).

NORTHEAST REGION

Regionwide

Assisted the Geologic Resources Division in development of a report on the possible collateral effects of Marcellus shale gas development for the New England Region.

Compiled and uploaded data from the USGS's reformatted National Uranium Resource Evaluation to STORET for APCO, ASIS, BOWA, BOHA, COLO, FRSP, GEWA, LOWE, PETE, RICH, SAMA, and SHEN.

Acadia National Park

Completed Natural Resource Condition Assessment project and published final report.

Provided technical and policy review and assisted in publication of a report titled Assessment of natural resources and watershed conditions in and adjacent to Acadia National Park (Natural Resource Report NPS/NRPC/WRD/NRR – 2008/069).

Providing information helpful in interpreting mercury issues.

Analyzed the park's lake water quality monitoring program based on data dating to the 1940's. Obtained agreement from the coastal barrier network to allow their statistician to work on next steps for this project in 2010.

Provided guidance and mid-project review of an EPA funded, dual region project (ACAD/ISRO) entitled *Determine Critical Nitrogen Loads to Boreal Lake Ecosystems Using the Response of Phytoplankton.*

Appalachian National Scenic Trail

Prepared modification of USGS agreement for second year of the Level I water quality inventory.

Provided review and comment on the proposed Appalachian Trail MEGA-Transect Deposition Effects Study.

Appotomattox Courthouse National Historical Park

Identified need and obtained regional funding support for riparian cattle exclosures to improve riparian and wetland conditions.

Provided guidance on the park's Natural Resource Condition Assessment.

Assateague Island National Seashore

Uploaded water quality data from the park's ongoing ambient water quality monitoring program that commenced in 1987 to STORET.

Uploaded water quality data from the park's ongoing beach water quality monitoring program to STORET.

Participated in a working group that developed a "pilot" climate change scenario plan for use in the seashore's *General Management Plan* planning process.

Provided technical review and comments on PMIS 143837 "Restore Salt Marsh Ecosystem Function by Removing Relict Mosquito Ditches."

Booker T. Washington National Monument

Assisted with guidance and review of the park's Natural Resource Condition Assessment.

Colonial National Historical Park

Continued to help assess contaminants issues, including contamination of Ballard Creek.

Delaware Water Gap National Recreation Area

Completed an assessment of the need for groundwater monitoring in the park

Eisenhower National Historical Site

Reviewed and commented on the draft final report for the WRD-funded project *Evaluation of the Effects of Municipal Water Supply System Operations on Aquatic Habitat in Marsh Creek, Gettysburg, Pennsylvania.*

Fire Island National Seashore

Provided project oversight for NRPC funded project, Simulation of the Shallow Ground-Water Flow System.

Completed Natural Resource Condition Assessment project and published final report.

Served as key official for a CESU project titled *Restoration of salt marsh habitat at the Fire Island National Seashore Wilderness Area: Studying physical and ecological functions of mosquito ditches and presenting a restoration plan.*

Provided technical review and comment on the draft *Fire Island National Seashore Natural Resource Condition Assessment.*

Prepared NRPP Natural Resources Management funded proposal (PMIS 148528) "Assessment of Spawning Horseshoe Crabs within Mid-Atlantic Coastal NPS Units" to establish citizen based horseshoe crab monitoring at FIIS, GATE and SAHI.

Prepared implementation plan for FY10-FY12 NRPP Natural Resource Management funded project "Restoration of Bayside Sediment Processes at Sailors Haven, FIIS" (PMIS 14248).

Organized and conducted workshop of NPS, CESU cooperator, and partners to develop project design as well as the research and monitoring plan for "Restoration of Bayside Sediment Processes at Sailors Haven, FIIS" (PMIS 14248).

Provided professional consultation to FIIS and partners regarding restoration opportunities and Habitat Evaluation Planning models for the USACE Fire Island to Montauk Point Draft Reformulation Plan.

Provided technical review and written comments for the Department of Interior comments on the USACE Fire Island to Montauk Point Draft Formulation Plan.

Contributed technical expertise on coastal ecology and restoration as representative for FIIS on The Nature Conservancy's Blue Point Bottomlands Council to develop restoration and protection of the Great South Bay ecosystem.

Provided technical expertise on coastal resources for FIIS GMP meetings for alternatives development and natural resource management.

Provided coordination and logistical support to investigators conducting coastal research projects.

Conducted interpretive programs on horseshoe crabs.

Developed and conducted interpretive program on scientific sampling for Junior Ranger Day program.

Evaluated park staff concerns with mosquito treatments adjacent to NPS lands. Provided topic research with a written evaluation and identified subject matter experts for follow up as needed.

Flight 93 National Memorial

Provided on-site analysis and recommendations to minimize the proposed impacts to wetland resources at the park.

Provided technical and policy review and evaluation of several draft *Wetland Statements of Findings for Proposed Flight 93 National Memorial.*

Met with state and federal regulatory agents to discuss permit compliance requirements and to propose compensatory mitigation for the Flight 93 National Memorial.

Provided a written evaluation of proposed irrigation plan utilizing acid mine drainage ponds.

Green Springs National Historic Landmark District - Provided a written assessment of potential impacts to water quality associated with proposed waste water treatment development per request of DOI solicitor.

Gateway National Recreation Area

Implemented ecological monitoring to evaluate restoration of 39 acres of salt marsh at Elders Point East, GATE. Monitoring parameters include nekton, vegetation and avian species composition and abundance; above and belowground primary production; and macrobenthic infauna and epifauna

Prepared "Elders Point Marsh Restoration Monitoring Report: Project Year 2008".

Implemented National Fish and Wildlife Foundation funded project to determine if nitrogen loading has altered marsh function and sediment accretion in Jamaica Bay.

Contributed technical knowledge on ecosystem ecology and restoration as a member of the multi-agency Planning and Development Team to develop and implement salt marsh restoration at Elders Point West and Yellow Bar Hassock Marsh Islands, Jamaica Bay.

Provided technical expertise on estuarine resources at a GMP workshop to identify future desired conditions for Jamaica Bay.

Prepared salt marsh and shoreline sections for the report "A Vision for the Estuarine Resources of Jamaica Bay."

Co-authored and presented "Wetland loss- A Closer Look at Wetland Loss Research Activities in Jamaica Bay" at the State of the Bay Symposium co-sponsored by NPS and New York City Department of Environmental Protection, October 2009.

Presented "Monitoring and Adaptive Management of Salt Marsh Restoration in an Urban Park: Jamaica Bay, Gateway National Recreation Area, New York" at the George Wright Society meeting. March, 2009. Provided an interpretive program on marsh loss and restoration for the Jamaica Bay Wildlife Refuge.

Provided logistical support to researchers working in Jamaica Bay.

Gettysburg National Military Park

Worked with USGS-PA and park staff to organize a water and sediment study for Rock Creek associated with potential contamination issues associated with an upstream wastewater treatment plant.

George Washington Birthplace National Monument

Provided technical review and comment on the draft Natural Resources Condition Assessment.

Provided written and verbal comment on natural resource management for the General Management Plan.

Worked with NCBN and USGS to get LiDAR imagery for shoreline to help evaluate erosion monitoring methods.

Provided oversight and multiple reviews of a storm vulnerability report funded by the Geologic Resources Division entitled Shore Status, Evolution, and Storm Vulnerability Assessments. Organized presentation of this report to Park Superintendent and staff.

Harpers Ferry National Historic Park

Helped coordinate involvement of regional hydrologist and provided advice related to proposed removal of railroad berm.

Hopewell Furnace National Historic Park

Inspected conditions relevant to flooding in recent years and provided information on ACE study to be conducted FY10.

Uploaded results from the 2002 Pennsylvania State University Level I Water Quality Inventory to STORET.

Reviewed PMIS 138605 request for new and existing drainage system restoration. Coordinated with Park Superintendent and WRD staff to establish next steps for flood control and funding opportunities.

Johnstown Flood National Memorial

Reviewed and evaluated the *Wetland Identification and Delineation Report for Johnstown Flood National Memorial.*

Provided technical and policy review of several draft *Wetland Statements of Findings for the South Fork Dam and Lake Conemaugh and the South Fork of the Little Conemaugh River Sites, Johnstown Flood National Memorial.*

Worked with park and WRD staff to provide a statement of work and review of wetlands function and delineation project to establish potential impacts from a proposed fire-based vegetation management plan. Assisted park with creation of a wetlands statement of findings for WRD review.

Lakeview and Dexter Marsh National Natural Landmarks

Provided site reviews and identified project needs associated with Lake Ontario water level management and erosion.

Manassas National Battlefield Park

Reviewed and evaluated the potential impacts to wetland resources resulting from the proposed power line alignment at the park.

Martin Van Buren National Historic Site

Provided a statement of work and contacts for wetland delineation and riparian buffer funding opportunities.

Conferenced with NETN coordinator and superintendent to discuss potential for adding the park to NETN and defining water resource monitoring.

Minute Man National Historical Park

Provided review and rating of the draft Minute Man National Historical Park Natural Resource Condition Assessment (pilot report).

Worked with park staff, state of MA, and Town of Lincoln staff to complete installation of a culvert to allow passage of flows and aquatic species for an ongoing stream daylighting project.

Morristown National Historical Park

Uploaded results from Trama and Galloway's 1988 report *Morristown National Historical Park Watershed Study Phase II: Aquatic Resources* to STORET.

Uploaded results from 1988 through August 2009 from the park's ongoing ambient water quality monitoring program to STORET.

New River Gorge National River

Helped close out USGS contract agreement for fecal bacteria study.

Participated in the *Resources Stewardship Strategy* workshop for the park.

Richmond National Battlefield Park

Continued assistance related to developing a plan to provide bank stabilization in area of historic fort.

Identified current water resource needs with park staff and provided written suggestions along with professional contacts for research needs.

Organized and moderated meeting with USGS-VA Science Center Director and staff to assess opportunities for removing streams from the 303d impaired waters list.

Sagamore Hill National Historic Site

Uploaded results from the 1999-2000 Farris and Chapman Level I Water Quality Inventory to STORET.

Salem Maritime National Historic Site

Assisted with assessment and remediation of contaminated waterfront sediments at Derby Wharf Beach.

Saratoga National Historic Park

Provided advice on a proposed strategy to review Quality Assurance Project Plans and other technical documents relevant to PCB contamination at a Superfund site assessment at the park.

Shenandoah National Park

Provided statistical advice on advanced exploratory data analysis of potential effects of bisphenol A on aquatic life.

Uploaded the 2007-2008 results from an ongoing study of headwater streams and springs to STORET.

Uploaded the 1994 results from Chang's Ph.D. proposal on the effects of carbon and nitrogen on nitrification in Shaver Hollow to STORET.

Uploaded the 1995-2001 results from a study of the pre- and post-flood physical habitat, stream chemistry, and fish community in the Staunton River to STORET.

Uploaded the 2004 results from a project to study the distribution, abundance, and variability of mercury in fish to STORET.

Uploaded the 2003-2004 results obtained within the park by a project to study the impact of acidification on native brook trout to STORET.

Uploaded the 1979-March 2009 results obtained within the park by the Shenandoah Watershed Study conducted by the University of Virginia, Shenandoah National Park, and others to STORET.

Uploaded the 1992-1999 results obtained within the park by the Fish in Sensitive Habitats project conducted by the University of Virginia, Shenandoah National Park, and others to STORET.

Uploaded the 2000 results obtained within the park by the Virginia Trout Stream Sensitivity Study to STORET.

Uploaded the 1987 results obtained within the park by the Virginia Trout Stream Sensitivity Study to STORET.

Uploaded the 1987-2008 results obtained within the park by the Virginia Trout Stream Sensitivity Study conducted by the University of Virginia, Environmental Protection Agency, and others to STORET.

Tallgrass Prairie National Preserve

Developed design criteria for emplacement of a low water crossing.

Taunton National Scenic River

Reviewed materials submitted by Weavers Cove Energy to the Army Corps of Engineers as a permit application for a liquid natural gas offshore energy berth.

Upper Delaware Scenic and Recreational River

Provided assistance on the groundwater impacts of gas development from the Marcellus shale.

Upper Delaware Scenic & Recreational River/Delaware Water Gap National Recreational Area

Organized and led a workshop to discuss whole Delaware River needs and encourage sharing of management goals among units and along the entire Wild and Scenic River corridor.

Provided written review and organized NPS response to a Delaware River branch water extraction request for gas production from shale.

Provided written review, organized NPS response, and represented NPS regarding a USFWS report on the federally endangered Dwarf Wedgemussel.

Provided written comment to the Delaware River Basin Commission regarding the flexible flow management program.

Worked with USFWS to organize a DOI meeting with the Delaware River Basin Commission to discuss aquatic flow needs for the Delaware River and examine the flexible flow release plan currently in place.

Provided written comments and organized NPS response to The Nature Conservancy's evaluation of flow alterations entitled *An Historical Analysis of Water Supply Reservoir Management Impacts (1954-2008)*

Organized and wrote NPS review of NPS/USGS funded project entitled *Water Quality of the Upper Delaware Scenic and Recreational River and Tributary Streams.*

Valley Forge National Historical Park

Continued coordination of an effort to assist the park with development of its *Resource Stewardship Strategy*.

Provided on-site review and evaluation of wetlands and wetland issues at the park.

Provided technical support for the *Natural Resources Condition Assessment and Resource Stewardship Strategy*.

Provided funding to train park ecologist in stream restoration principles and techniques.

PACIFIC WEST REGION

Regionwide

Compiled and uploaded data from the USGS's reformatted National Uranium Resource Evaluation to STORET for CIRO, CRLA, CRMO, DEPO, DEVA, GRBA, HAFO, JOTR, JOMU, LAME, MIIN, MOJA, NEPE, PINN, SEKI, and YOSE.

American Memorial Park

Assess plans to use wetlands to treat polluted storm water runoff.

Provided technical assistance to park and regional office staff regarding proposed expansion of man-made wetlands in the park to improve stormwater treatment for the town of Garapan, Saipan, Commonwealth of the Northern Mariana Islands.

Cabrillo National Monument

Uploaded water quality data from Fairey et al. 1996 report *Chemistry, Toxicity and Benthic Community Conditions in Sediments of the San Diego Bay Region, Final Report 1996* to STORET.

Uploaded water quality data from the California State Mussel Watch Program to STORET.

Uploaded water quality data from Jan and Young's 1978 article "Chromium Speciation in Municipal Wastewaters and Seawater" to STORET.

Provided information on flame retardants (polybrominated diphenyl ethers or PBDEs) and marine paint–and their potential impacts on mussels and other park aquatic resources.

Channel Islands National Park

Completed final project boundary survey for restoration of Prisoners Harbor coastal wetland.

Provided programmatic oversight for the NRPC-funded project to restore coastal wetlands at Prisoners Harbor, Santa Cruz Island.

Co-authored wetlands, hydrology, geology, and "approach to restoration" sections (Chapter 3) of the *Draft Environmental Impact Statement for Restoration of Prisoners Harbor, Channel Islands National Park.* Reviewed and commented on the entire Draft EIS prior to release for public review.

Co-authored a proposal for funding titled *Restore Disturbed Coastal Wetlands at Prisoners Harbor, Santa Cruz Island* (PMIS 104693).

City of Rocks National Reserve

Uploaded water quality data from the 2000 Level I Water Quality Inventory conducted by the USGS to STORET.

Crater Lake National Park

Uploaded results from the first comprehensive assessment of the levels and distribution of petroleum hydrocarbons in Crater Lake water and sediment to STORET.

Craters of the Moon National Monument

Advised on pros and cons for water quality trend analysis options.

Devils Postpile National Monument

Assessment of hydrogeology and the need for a hydrologic monitoring program.

Death Valley National Park

Uploaded the results from a USGS study on deuterium content of water from wells and perennial springs to STORET.

Represented the National Park Service on the Incident Command (IC) team for the interagency effort to prevent the extinction of the Devils Hole pupfish (*Cyprinodon diabolis*).

Continued coordination efforts by the park, WRD and cooperator on the second phase of the *Death Valley National Park Water Resources Stewardship Report.*

Consulted with park staff and CESU cooperators on data collection needs and restoration concepts for Travertine Springs.

Participated in Amargosa Desert Managers Group meetings, an interagency work group established to discuss water resource concerns in the Amargosa Desert basin, including Devils Hole–a detached unit of Death Valley National Park.

Assisted park personnel in reviewing EIS public scoping comments for a proposed solar energy development project in the vicinity of Devils Hole.

Ebey's Landing National Historic Reserve

Alerted the park to work by the University of Washington to make environmental sense of the pharmaceutical and personal care products in Puget Sound waters.

Glen Canyon National Recreation Area

Helped interpret results for mercury in fish and on design of interagency studies.

Golden Gate National Recreation Area

Reviewed plans for restoration of Redwood Creek and associated riparian corridor.

Provide updates on information related to emerging contaminants issues and urban contamination issues.

Provide updates on information related to emerging contaminants issues and urban contamination issues.

Uploaded water quality data from the City and County of San Francisco's Ocean Outfall Monitoring Program to STORET.

Uploaded water quality data from the 2006 Level I Water Quality Inventory of pesticides conducted by the USGS to STORET.

Co-authored a proposal for funding titled *Restore Historic Wetlands Near the Mouth of Rodeo Lagoon at Golden Gate National Recreation Area, Marin County, California* (PMIS 146848).

Recommended the WRD Chief's signature on the final *Wetland Statement of Findings for the Marin Headlands and Fort Baker Transportation Infrastructure and Management Plan.*

Provided guidance and recommendations to park staff and the San Francisco Bay Area Environmental Coalition for restoring a golf course to a coastal stream and back-barrier lagoon system.

Grand Canyon National Park

Provided technical comments on potential pollution issues related to proposed Denison Mines permit.

Great Basin National Park

Uploaded water quality data from the 2006 Level I Water Quality Inventory of pesticides conducted by the park to STORET.

Provided technical and policy review and assisted in the publication of a technical report titled *Bonneville Cutthroat Trout Restoration Project – Great Basin National Park (*Natural Resource Technical Report NPS/NRPC/WRD/NRTR – 2008/055).

Assisted the NPS Water Resources Division in implementing an interagency supported field program near Great Basin National Park to characterize the potential for impacts to surface water and groundwater resources in and around the park from proposed groundwater development in Snake Valley Nevada.

Lincoln and White Pine Counties groundwater development pipeline project.

Represented NPS interests on an interagency, hydrologic technical review panel for the stipulated agreement to monitor, manage and mitigate potential impacts from groundwater withdrawals in Spring Valley, Nevada.

Participated in DOI agency strategy meetings in preparation for water rights hearing for SNWA applications in Snake Valley, Nevada.

Haleakala National Park

Provided programmatic oversight for the NRPC-funded project to restore rare plant species to three bogs in the park.

Joshua Tree National Park

Collaborated with park and Pacific West Region personnel to formulate a groundwater study request to the Federal Energy Regulatory Commission, outlining additional studies necessary to characterize the potential individual and cumulative impacts associated with a proposed groundwater pumped storage, electrical generation project adjacent to Joshua Tree National Park.

Assisted the NPS Water Resources Division in developing solar PEIS public scoping comments for proposed Solar Energy Study Areas surrounding Joshua Tree National Park.

John Muir National Historic Site

Conducted a hydrogeological assessment of the water-supply well at the maintenance facility.

Kalaupapa National Historic Park

Served as interim COTR on watershed condition assessment project.

Advised environmental consultants working for the park regarding wetland compliance requirements for a proposed dock rehabilitation project.

Provided technical review on Section 1.0 of the draft *Kalaupapa National Historical Park Natural Resource Condition Assessment.*

Kaloko Honokohau National Historical Park

Reviewed contaminants-related technical papers related to the Kohanaiki land use change permit documentation and the O'oma Wastewater proposal.

Provided project oversight for the WRD funded project, Determining Subterranean Groundwater Nutrient Input to Kaloko-Honokōhau National Historical Park's Coastal Ocean Ecosystem.

Reviewed and evaluated the proposed impacts to wetland anchialine pools that would result from constructing a road and visitor center at the park.

Lake Mead National Recreation Area

Represented the park in technical discussions at the Lake Mead Science Symposium. Prepared written summary of recommendations by USGS and other Lake Mead researchers regarding better understanding of endocrine disruption issues.

Supplied technical and management oversight on a USGS study being conducted to characterize the source of springs in the Black Canyon area below Lake Mead and evaluate their potential susceptibility to regional groundwater development impacts.

Implemented groundwater monitoring and management provisions of negotiated settlements with the Southern Nevada Water Authority and Vidler Water Company on NPS protests to water rights applications in Tule Desert Basin and Coyote Spring Valley.

Provided technical oversight on USGS agreement to operate and maintain stream gages at Rogers and Blue Point Springs in the park and the Virgin River near Overton, NV.

Monitored progress on implementation of a Hydrologic Monitoring and Mitigation Program developed as part of the Virgin River Habitat Conservation and Recovery Program to evaluate future groundwater development impacts on surface water and groundwater resources in the Lower Virgin River Basin.

Assessed potential groundwater development concerns in Mohave County, Arizona associated with proposed residential and solar energy development plans and provided recommendations for management actions by the park.

Assisted the NPS Water Resources Division to investigate and develop a response to a water rights abandonment notification from the Nevada State Engineer concerning a former water supply well at the Echo Bay Campground area.

Lake Roosevelt National Recreation Area

Completed Natural Resource Condition Assessment project and published final report.

Continued to provide updated guidance on fish advisories.

Provided review and rating of the draft *Lake Roosevelt National Recreation Area Natural Resource Condition Assessment* (pilot report).

Lewis and Clark National Historical Park

Advised park staff on NPS policy regarding acceptance of Clean Water Act, Section 404 mitigation money for restoration of park wetlands.

Provided programmatic oversight for the NRPC-funded project to restore Clatsup and Otter Point wetlands at the park.

Mojave National Preserve

Provided project oversight for the WRD funded project, Assessment of Groundwater Resources in the Mojave Network : Hydrogeological Framework.

Provided assistance to park staff regarding the Mtn. Pass Mine groundwater plume while permits were obtained from BLM for additional delineation in Wheaton Wash.

Reviewed and approved the final accomplishment report for the NRPP-T&E project *Lake Ecology Of Mojave Tui Chub.*

Partnered with WRD to monitor and evaluate potential water resource impacts to network parks from proposed solar energy development in the region: set up tracking system for solar projects; reviewed solar energy plans of development to assess potential water demands; helped formulate response documents to BLM; and participated in the California solar PEIS work group.

Collaborated with personnel from the Mojave Desert Network I&M Program and network parks to nominate surface water sites at Lake Mead NRA, Great Basin National Park and Death Valley National Park for possible long-term climate change monitoring by the USGS.

Attended the Nevada Water Resources Association annual conference to track new and existing water resource projects, studies and concerns throughout Nevada.

Attended the Devils Hole Workshop to track new and existing water resource concerns and studies in the Amargosa Desert basin.

Mount Rainier National Park

Served as WRD Point of Contact for fluvial geomorphologist position supported by the Natural Resources Challenge.

Identified and mitigated flood hazards.

Supervised dredging to return Kautz creek to its stream channel, after it jumped its bank in a flood and closed the park's main road.

Provided site-specific prescriptions to minimize future flood damages for the Carbon river road, the West-side road, the upper and lower Van Trump curves, Longmire work center, and the former Sunshine Point campground.

Floods, Fish, and Roads Anticipating Disasters to Protect Endangered Fish and Park Infrastructure" (PMIS #96364)—(MORA) Finished project to identify and prioritize road segments prone to flood and debris flow damage in the park and to develop a suite of options to protect these areas in a fish-friendly way.

Analyzed entire Nisqually road for Federal Highways, to identify current and future flood hazards.

Completed a field program to measure historic river aggradation rates as a basis to understand what the park must design for to protect infrastructure: organized summer effort to study the causes of increased debris flows at park with GeoCorps (for Geologist-in-Park or GIP) and a geomorphology technician and supervised post-flood aggradation surveys

Identified and mitigated flood hazards.

Supervised dredging to return Kautz creek to its stream channel, after it jumped its bank in a flood and closed the park's main road.

Provided site-specific prescriptions to minimize future flood damages for the Carbon River Road, the Westside Road, the upper and lower Van Trump curves, Longmire work center, and the former Sunshine Point Campground.

Floods, Fish, and Roads Anticipating Disasters to Protect Endangered Fish and Park Infrastructure" (PMIS #96364)—(MORA) Finished project to identify and prioritize road segments prone to flood and debris flow damage in the park and to develop a suite of options to protect these areas in a fish-friendly way.

Analyzed entire Nisqually road for Federal Highways, to identify current and future flood hazards.

Completed a field program to measure historic river aggradation rates as a basis to understand what the park must design for to protect infrastructure–organized summer effort to study the causes of increased debris flows with GeoCorps and a geomorphology technician and supervised post-flood aggradation surveys.

National Park of American Samoa

Advised park staff regarding NPS and Clean Water Act wetland compliance requirements and the limits of wetland boundaries along park beaches..

Nez Perce National Historical Park

Provided on-site assistance in the analysis of hydrology and wetland habitat conditions for the restoration of the Weippe Prairie Site.

Travelled to park and inspected conditions in a wetland area proposed for restoration.

Uploaded water quality data from the 1999 Level I Water Quality Inventory conducted by the USGS to STORET.

North Cascades National Park

Compiled three sets of survey data, reduced LiDAR and merged all of the above into a GIS model. Began building a detailed HEC-RAS model for floodplain analysis and channel evolution assessment.

Provided comments on water quality monitoring options for finding illegal marijuana crops on park lands.

Provided programmatic oversight and review of the annual accomplishment report for the NRPP project *Eradicate Non-native Fish from Seven High Priority Lakes in North Cascades National Park Service Complex.*

Approved funding for the park for completing the second of three years of non-native fish species removal activities from several targeted lakes.

Olympic National Park

Provided continuing assistance related to the proposed removal of two dams on the Elwha River, including finalization of the sediment monitoring plan, sediment management advisory team site visit, and improved approach to flood modeling.

Reviewed Floodplain Statements of Findings for Graves Creek and South Shore Road Rehabilitation.

Discussed potential impacts of contaminants related to asphalt and creosote use on trails and bridges.

Attended week-long field trip to assess Elwha Dam removal sediment monitoring.

Assisted with field assessment of chronic aggradation and flooding issues at Finley Creek. Developed a long-term strategy to stabilize the watershed and protect park infrastructure.

Along with park maintenance staff, developed self-mitigating flood protection measures in response to recent flood damage on the Quinault River and Graves Creek.

Finished project to identify and prioritize road segments prone to flood and debris flow damage Attended week-long field trip to assess Elwha Dam removal sediment monitoring.

Assisted with field assessment of chronic aggradation and flooding issues at Finley Creek. Developed a long-term strategy to stabilize the watershed and protect park infrastructure.

Along with park maintenance staff, developed self-mitigating flood protection measures in response to recent flood damage on the Quinault River and Graves Creek.

Finished project to identify and prioritize road segments prone to flood and debris flow damage and to develop a suite of options to protect these areas in a fish-friendly way.

Parashant National Monument

Responded to a technical assistance request to aid in the development of a phased study proposal to evaluate the source of Tassi and Pakoon Springs by meeting with park managers to discuss associated resource concerns and results of preliminary water resources research.

Provided hydrologic recommendations to Parashant NM and Lake Mead NRA personnel for diverting spring discharge away from historic resources at the Tassi Spring site.

Pinnacles National Monument

Uploaded water quality data from the 2006 Level I Water Quality Inventory conducted by the USGS to STORET.

Uploaded water quality from a 1960s USGS study of potential groundwater sources to meet increasing water demand to STORET.

Uploaded water quality from a lab data sheet documenting a water sample collected by the USGS in February 1965 to STORET.

Uploaded water quality data from W.B. Reed's 1979 survey of springs and wells to STORET.

Uploaded water quality data from Donald Lee Brown's 1962 thesis "Investigation and Development of Ground Water of Chalone Creek, (Pinnacles National Monument, California)" to STORET.

Uploaded water quality data from Moore's 1997 study to characterize and quantify stream dynamics, habitat value and vulnerability, and the presence and movement of pollutants in the Chalone Creek watershed to STORET.

Assessment of new water supply well in Bear Valley.

Point Reyes National Seashore

Consulted on issues related to contaminants and amphibians.

Uploaded 2007-2008 water quality data from the Tomales Bay Rangeland BMP Pathogen Total Maximum Daily Load Implementation Project to STORET.

Uploaded 2004-2008 water quality data from the NOAA Fisheries biological opinion on grazing to STORET.

Uploaded 1999-2007 water quality data from the park's beach monitoring program to STORET.

Uploaded 2000-2006 water quality data from the Horseshoe Pond Restoration Project to STORET.

Uploaded 1991-2008 water quality data from the park's ongoing ambient water quality monitoring program to STORET.

Uploaded 2003-2008 water quality data from the Olema Creek Pathogen Total Maximum Daily Load Monitoring Program to STORET.

Approved funding for completing the second of three years of non-native plant species removal (primarily cape ivy) to improve coho salmon habitat condition within coastal streams at the seashore.

Presidio of San Francisco

Uploaded water quality data from the 2006 Level I Water Quality Inventory of pesticides conducted by the USGS to STORET.

Redwood National and State Parks

Uploaded water quality data from the California State Mussel Watch Program to STORET.

Uploaded water quality data for Godwood Creek from 1968-1969 to STORET.

Uploaded water quality from NOAA's National Benthic Surveillance and Mussel Watch Projects to STORET.

Uploaded water quality data from flood history and sedimentation projects at the mouth of Redwood Creek to STORET.

Uploaded seasonal water quality monitoring results from the Klamath River estuary to STORET.

Uploaded water quality data from Winzler and Kelly's 1973 Redwood Creek sediment studies to STORET.

Uploaded water quality data from a 1969 USGS geohydrological reconnaissance to STORET.

Uploaded water quality data from a 1973 ecological study of Clam Beach County Park ponds to STORET.

Uploaded water quality from Sarah Beesley's thesis *Secondary Production of Paraleptophlebia (Ephemeroptera) Within Three Northern California Coastal Streams* to STORET.

Uploaded water quality from a joint 1973 NPS and USGS study of water chemistry and aquatic biology of Redwood Creek and its tributaries to STORET.

Uploaded water quality data from a 1988 study providing information on the timing of outmigration, seasonal densities, seasonal growth, and age structure of the steelhead population in Hurdygurdy Creek to STORET.

Uploaded water quality data from a 1980 electrofishing project on portions of May Creek, a tributary to Prairie Creek, to STORET.

Uploaded water quality data from a 1989 Prairie Creek salmon restoration project to STORET.

Uploaded water quality data from David G. Anderson's thesis *Juvenile Salmonid Habitat of the Redwood Creek Basin, Humboldt County, California* to STORET.

Uploaded water quality data from 1983 field notes collected by park staff to STORET.

Uploaded 1988 water quality data to STORET presented as part of a U.S. Army Corps of Engineers permit application to allow breaching at the mouth of Redwood Creek to manage surface water elevation to maintain summer/fall rearing habitat.

Uploaded water quality data to STORET from 1983 monitoring conducted to determine if and when estuarine water quality was limiting for juvenile salmonids.

Uploaded 2004 water quality data to STORET from a project to describe juvenile salmonid downstream migration and to determine emigrant population sizes.

Uploaded water quality data to STORET from the California Department of Water Resources Northern District's ongoing ambient water quality monitoring program.

Uploaded water quality data to STORET from a turbidity threshold sampling study of Godwood Creek.

Uploaded 2004-2005 water quality data to STORET from a study of assessing stream health following restoration of the Redwood Creek watershed.

Uploaded water quality data to STORET from water temperature monitoring to evaluate whether summer stream temperatures are a limiting factor for juvenile Coho salmon in Redwood Creek.

Provided technical review and on-site assistance with plans to restore streams and wetlands in the Strawberry Creek watershed. Delineated wetlands as part of regulatory compliance for the proposed restoration project.

San Juan Island National Historic Park

Provided interpretation of University of Washington study on pharmaceutical and personal care products in Puget Sound.

Coordinated with park staff and University of Washington CESU cooperators use of a WRD continuous monitoring sonde to monitor water quality in areas where eel grass beds were disappearing in Garrison Bay.

Santa Monica Mountains National Park

Sent updated information relevant to amphibian monitoring and protection.

Continued to work with park staff in the second year of a four-year project to remove non-native plant species in order to improve southern steelhead spawning habitat.

Sequoia and Kings Canyon National Parks

Served as COTR on a contract to design a restoration plan for the South Fork Kings River near the Cedar Grove Bridge. This restoration would be performed in association with the replacement of a bridge that has caused geomorphic impact to the river.

Provided on-site advice and consultation regarding a proposed stabilization technique to address channel incision in the lower Halstead Meadows.

Updated information on amphibians and other monitoring issues.

Reviewed Floodplain Statements of Findings for restoration of South Fork Kings River.

Assessment of environmental impacts of water withdrawal for public water supplies.

Co-authored a wetland restoration monitoring report titled First Summer Survival of Plantings, Upper Halstead Meadow, Sequoia National Park, CA.

Provided continued assistance to park staff in planning and designing the restoration of degraded wetlands in Lower Halstead Meadow.

War in the Pacific National Historical Park

Received the final report *Assessment of Reef Fish Diversity and Resident Spawning Aggregation Sites at the National Park Service-WPNHP, Guam* for a BRMD-funded project at the park.

Gaan Point, War in the Pacific National Historical Park. Photo by NPS.

Whiskeytown-Shasta-Trinity National Recreation Area

Uploaded water quality data to STORET for the project to monitor and restore the Paige-Boulder Watershed.

Assessed the potential to replace surface water sources with groundwater wells for public water supplies at several sites.

Provided information relevant to completing water quality report on Willow Creek.

Whitman Mission National Historic Site

Completed Natural Resource Condition Assessment project and published final report.

Investigated bridge about to be undermined by flood flows and developed measures to protect the structure.

Provided guidance for long-term riparian recovery of newly acquired park property.

Yosemite National Park

Provided specifications for a habitat studies on the South Fork Merced River and Tuolumne River. Consulted with the USFWS to help determine adequacy of existing Merced study.

Provided assistance for the review of a research permit proposal regarding assessing water quality impacts from stock and human use.

Tuolumne River, Yosemite National Park.
Photo by NPS

Reviewed and evaluated the *Wetland and Stream Delineation Report for the Tenaya Lake Comprehensive Plan, Yosemite National Park.* Comments were used to refine the delineation to include additional wetlands under NPS jurisdiction.

Reviewed and evaluated the *El Capitan Meadow Wetland and Stream Delineation Report, Yosemite National Park*

SOUTHEAST REGION

Regionwide

Compiled and uploaded data from the USGS's reformatted National Uranium Resource Evaluation to STORET for BLRI, CHAT, MACA, and NATR.

Assisted regional staff in interviewing candidates for the vacant WRD Aquatic Professional position assigned to the region.

Acted as Regional Goal Contact for FY 07-11 and FY 08-12 NPS Strategic Plan Goal 1a1H—Land Health -Acres in Condition,

Represented the NPS at the Gulf Of Mexico Alliance meetings and participated as a member on the Habitat Conservation and Restoration Team which developed a strategy for the second Governor's Action Plan for the Alliance.

Participated in regions role in administering the annual Servicewide Combined Call (SCC) by reviewing NRPP project proposals for regional selection including those that resulted in protection and/or restoration of wetland habitat.

Participated as a member of the SER Natural Resource Condition Assessment Team.

Organized symposium on endemic black bass in the southeastern US for American Fisheries Society Annual Meeting

Attended NPS-WRD meeting on watershed condition assessments

Performed collateral duty as Regional Coordinator for the NPS Research Permitting and Reporting System

Acted as Regional Goal Contact for FY 07-11 and FY 08-12 NPS Strategic Plan Goal 1a1D—Land Health-Riparian

Acted as Regional Goal Contact for FY 07-11 and FY 08-12 NPS Strategic Plan Goal 1a1J—Riparian Areas Restored

Attended Gulf States Regional Panel for aquatic invasive species semi-annual meetings as National Park Service representative

Attended Southeast Environmental Flows conference

Participated in regions role in administering the annual Servicewide Combined Call (SCC) by reviewing NRPP project proposals for regional selection

Represented NPS at Gulf State Marine Fisheries Commission-Fisheries Information Network annual meeting

Coordinated the region's implementation of WRD Watershed Condition Assessment Program

Represented NPS on advisory council to develop state plan for Georgia exotic, invasive species

Helped draft research priorities for ocean and coastal resources in southeast region

Worked with cooperators at University of Georgia to develop spatial database of southeast fish and aquatic habitats in and surrounding park units

Big Cypress National Preserve

Airboat. Big Cypress National Preserve. Photo courtesy of Ralph Arwood.

Provided review and comment on the draft *Big Cypress National Preserve General Management Plan//Wilderness Study/Off Road Vehicle Management Plan/EIS.*

Big South Fork National River and Recreation Area

Advised Denver Service Center staff on wetland compliance for an ARRA-funded project to plug abandoned oil and gas wells in the park.

Assisted park staff in developing a proposal to continue stream crossing improvements to better protect sensitive mussel habitat within the National Recreation Area.

Biscayne National Park

Provided comments on options being considered for using treated sewage water in cooling towers of Turkey Point Power Plant adjacent to the park and on the contaminants of potential environmental concern that might move from the cooling towers to the park.

Uploaded 2002-2004 water quality data to STORET collected for a project to characterize ground water in marine areas of the park.

Blue Ridge Parkway

Advised and assisted Park in the evaluation of Responsible Party contractor proposed site characterization and mitigation actions related to the Roanoke Valley Resource Authority's landfill discharges to surface and ground water in the park.

Provided programmatic oversight for the NRPC-funded project to develop a wetlands management plan and establish baseline data on parkway wetlands.

Reviewed and provided and provided comments on the proposed mining permit from Burress Stone Construction, Inc. and possible hydrologic impacts along the park lands.

Canaveral National Seashore

Participated in field sampling to provide data for hydrochemical model for Mosquito Lagoon. Served as point of contact for NRPP funded project, reviewed Annual Progress Report, and met with principal investigators to review progress.

Cape Hatteras National Seashore

Reviewed Floodplain Statements of Findings for Bodie Island Lighthouse (relocation of U.S. Coast Guard Station Complex).

Reviewed and evaluated the potential impacts to wetland resources resulting from the proposed Bonner Bridge replacement.

Reviewed and provided assistance to park natural resource staff on developing appropriate mitigation measures to offset wetland impacts from the proposed Bonner Bridge replacement project.

Provided assistance in the development and review of Wetland/Floodplain SOF for both the Bodie Island Coast Guard Station Relocation and the Ocracoke Multi-Use Trail projects.

Provided assistance and review of the CAHA ORV Management Plan/EIS in regard to wetland habitat impacts; Provided assistance to contractor who was developing the SOF and EIS.

Chattahoochee River National Recreation Area

Assisted with aspects of the proposed waste water treatment plant in Forsyth County that will discharge into the Chattahoochee River through diffuser pipes installed in the bed of the river.

Reviewed Floodplain Statements of Findings for Shakerag Water Reclamation Facility.

Provided technical/policy review and comment on a draft *Wetland/Floodplain Statement of Findings for the Forsyth County Shakerag Water Reclamation Facility Discharge Diffuser.*

Provided review and comment on the park's draft *Resources Stewardship Strategy* summary table.

Reviewed and provided comments on the DEA for proposed road widening project for State Route 20 which crosses the CHAT lands.

Reviewed the Draft SOF for the Forsyth County Water Reclamation Facility discharge diffuser which will impact wetland and floodplain habitat from the construction of the proposed facility.

Served as the NRPC Coordinator for CHATT Corporate Wetland Restoration Partnership Initiative at Johnson Ferry Unit.

Conducted research on breeding status of exotic Asian swamp eels in backwater marsh

Photo of an exotic Asian swamp eel which are breeding in the backwater marshes of Chattahoochee River National Recreation Area. Photo courtesy of the USGS.

Cowpens National Battlefield

Uploaded water quality data from the 2000-2001 Level I Water Quality Inventory conducted by the University of South Carolina-Upstate.

Cumberland Island National Seashore

Conducted a site visit with the SERO Wildlife Biologist to CUIS in August, 2009 to investigate the current condition of the freshwater wetland habitat at Willow Pond which been severely impacted due to the wild horses and feral hogs on the island. The field visit also included an assessment of the loss of Spartina marsh habitat due to overgrazing by the wild horses at the north end of the island, and recommendations were provided to the natural resource staff and park superintendent on restoring the marsh habitat.

Sampled Davis Branch for threatened blackside dace

Dry Tortugas National Park

Colorful Coral at Dry Tortugas National Park.
Photo by NPS.

Reviewed the Restoration Plan for Acropora cervicornis and the proposed study "Human fecal microflora as a source of coral pathogens: Are coral pathogens invasives or endemic?"

Provided technical review and comment on the draft *Dry Tortugas National Monument Natural Resource Condition Assessment.*

Everglades National Park

Provided advice related to mercury and endosulfan issues. Discussed pros and cons of different monitoring optimization approaches.

Recommended the WRD Chief's signature on the final *Wetland Statement of Findings for the Cape Sable Dam Restoration Project, Everglades National Park.*

Recommended the WRD Chief's signature on the final *Wetland Statement of Findings for the Pilot Spreader Swale Project at Everglades National Park.* The spreader swales are intended to increase flow from the L-29 canal into Northeast Shark River Slough.

Reviewed and provided comments on the EVER Swale EA and etland/ Floodplain SOF.

Fort Pulaski National Monument

Completed Natural Resource Condition Assessment project and published final report.

Reviewed Floodplain Statement of Findings for Cockspur Lighthouse.

Provided technical review and rating on the draft Fort Pulaski National Monument Natural Resource Condition Assessment (pilot report).

Provided assistance to contractor developing the Wetland/Floodplain SOF for Cockspur Island Lighthouse Project; reviewed and provided comments on the Draft and Final SOF

Great Smoky Mountains National Park

Uploaded water quality data collected during 1993-2008 by park staff and the University of Tennessee from NPSTORET to STORET.

Uploaded Noland Divide long-term water quality monitoring project data (1991-2008) from NPSTORET to STORET.

Uploaded water quality data to STORET collected by the University of Virginia as part of the Southern Appalachian Mountains Initiative in July 2000.

Initiated work on a *Physical Resources Information and Issues Overview Report* for the park. As part of the project effort, WRD staff facilitated a June workshop to focus on air, geologic, soil, and water resource issues at the park.

Provided park staff with two conceptual design plans to restore the physical and biological functions of the wetland resources within Cades Cove Valley.

Reviewed and commented on the detailed implementation plan for the NRPP T&E funded project *Recovery Evaluation of Introduced Endangered and Threatened Fish Species at Great Smoky Mountains National Park.*

The threatened Spotfin Chub.
Photo by NPS

Provided assistance to park staff in acquiring funds through WRD for the proposed wetlands inventory project which will target some of the smaller, yet globally rare wetland areas within the park.

Gulf Islands National Seashore

Reviewed a Wetlands Statement of Findings for Wetlands for the construction of a service road.

Uploaded 1991-1998 water quality data to STORET collected by park staff on Horn and Ship Islands as part of a Dauphin Island Sea Laboratory project.

Recommended the WRD Chief's signature on the final Wetland Statement of Findings for Installation of Utilities on West Ship Island, Gulf Islands National Seashore.

Provided review and comments on the *Draft Mississippi Coastal Improvement Plan*, which proposes barrier island restoration work (primarily sand replenishment) at Petit Bois, Horn, and Ship Islands.

Jean Lafitte National Historical Park and Preserve

Provided programmatic oversight for the NRPC-funded project to map submerged aquatic vegetation within the park.

Provided programmatic oversight for the NRPC-funded project to restore freshwater floating marshes by reclaiming abandoned oil and gas canals.

Reviewed the Draft JELA paper "Inventory and Assessment of the Distribution of Submersed Aquatic Vegetation at JELA" and provided comments on the draft publication.

Natchez Trace Parkway

Reviewed Floodplain Statements of Findings for Multi-use Trail Segment 3P16.

Provided technical and compliance review of the *Natchez Trace Parkway Multi-Use Trail, Sections 3P16 and 3P17, Wetland Delineation Report.*

Provided technical and policy review of several draft *Wetland Statements of Findings for the Natchez Trace Parkway Multi-Use Trail, 3P16.* Recommended alternative alignments that would reduce wetland impacts, and recommended approval of the final document.

Provided comments and recommendations on the NATR Multi-Use Trail Segment Wetland and Floodplain SOF which proposed to construct additional trails along the parkway and will impact several acres of wetlands and floodplain habitat.

Sand Creek Massacre National Historic Site

Worked with Colorado Division of Wildlife and park staff to determine presence or absence of the Arkansas darter. Results of this work will be used in discussions with the state and the Native American community regarding the feasibility of re-introducing the Arkansas darter to the Sand Creek system.

Timucuan Ecological and Historic Preserve

Reviewed and provided comments for a potential hydrologic impact analysis of the Lower Saint Johns River related to proposed flow alteration.

Vicksburg National Military Park

Uploaded water quality data to STORET from the U.S. Army Corps of Engineers Yazoo Diversion Canal Project Report 1999-2000.

Uploaded water quality data to STORET from the U.S. Army Corps of Engineers Yazoo Diversion Canal Deep Core 2003-2004.

Recommended the WRD Chief's signature on the final *Wetland Statement of Findings for Landscape Rehabilitation, Vicksburg National Military Park.*

Participated on conference calls and provided technical assistance/review on the proposed Cultural Landscape Report/EA which will result in impacts to wetlands and migratory bird habitat. This collaborative effort with WRD staff resulted in appropriate mitigation measures which will offset the loss of wetland habitat and will maintain a portion of the forested habitat for avian species.

Virgin Islands National Park

Advised Southeast Region staff regarding wetland compliance requirements for proposed treatment of an eroding shoreline road in the park.

TECHNICAL ASSISTANCE TO NETWORKS

Servicewide

Assisted parks with review of Aquarius data management software.

Facilitate webinars that demonstrated water quality monitoring products and provided purchase information.

Addressed network staff queries related to water quality monitoring, use of sondes, protocol content, and various other water quality vital signs topics.

Appalachian Highlands Network

Reviewed annual administrative report and work plan.

Helped assess alternative monitoring designs to get a representative sample of the many habitats along this lengthy trail.

Provided data formatting and import recommendations for water quality data received from USFS Air Resources laboratory.

Arctic Network

Served on technical advisory committees.

Continued a cooperative agreement with East Carolina University to test a coastal lagoon monitoring strategy for ARCN and Cape Krusenstern National Monument.

Implemented the shallow lake monitoring plan in 30 lakes in Kobuk Valley National Park and Noatak National Preserve.

Maintained water quality monitoring sondes in lakes.

Began development of interactive geodatabase for observing large scale lake drying and thermokarst events to demonstrate the large-scale impacts of global warming on Alaska's parklands.

Central Alaska Network

Collected methane, DOC, and DIC samples for USGS for inclusion in monitoring project in conjunction with the USGS Yukon Basin Initiative.

Maintained water quality monitoring sondes in six lakes.

Deployed water temperature loggers on seven tributaries to the Yukon River.

Served on technical advisory committees.

Cumberland/Piedmont Network

Uploaded all water quality data through 2008 from NPSTORET to STORET for 14 Network parks.

Eastern Rivers and Mountains Network

Reviewed annual administrative report and work plan.

Great Lakes Network

Continued to help network staff with monitoring issues, including suggestions on how to interpret QC precision results after switching labs and how to factor benthic macroinvertebrate results into monitoring assessments.

Uploaded the 2007-2008 water quality data for Apostle Islands National Lakeshore from NPSTORET to STORET.

Uploaded the 2006-2008 water quality data for Indiana Dunes National Lakeshore from NPSTORET to STORET.

Uploaded the 2007-2008 water quality data for Isle Royale National Park from NPSTORET to STORET.

Uploaded the 2006-2008 water quality data for Mississippi National River and Recreation Area from NPSTORET to STORET.

Uploaded the 2007-2008 water quality data for Pictured Rocks National Lakeshore from NPSTORET to STORET.

Uploaded the 2007-2008 water quality data for Saint Croix National Scenic Riverway from NPSTORET to STORET.

Uploaded the 2007-2008 water quality data for Sleeping Bear Dunes National Lakeshore from NPSTORET to STORET.

Uploaded the 2006-2008 water quality data for Voyageurs National Park from NPSTORET to STORET.

Greater Yellowstone Network

Uploaded all 2006-2008 water quality data for Grand Teton National Park from NPSTORET to STORET.

Gulf Coast Network

Reviewed annual administrative report and work plan.

Provided advice on optimal ways to do field and lab QC checks for nutrients and other measures.

Uploaded water quality data to STORET from a study of the primary production of epiphytic algae in Mississippi seagrass beds.

Uploaded water quality data to STORET from a study of the trophic importance of epiphytic algae in Mississippi seagrass beds.

Uploaded water quality data to STORET from a study of the effects of water column nutrient enrichment on three seagrass species.

Uploaded 1968 water quality data to STORET from a preliminary study to characterize the chemical and physical nature of Ft. Pickens Pond on Santa Rosa Island.

Uploaded water quality data to STORET from a 1993 study to characterize the major characteristics of Center, East, and West Ponds on Santa Rosa Island.

Uploaded water quality data to STORET from a 1993 study to observe and document biodiversity and ecological features of pond and lagoon environments.

Uploaded water quality data to STORET from a 1981 baseline survey of the benthic macroinvertebrate assemblages within the Ranger Lagoon ecosystem.

Uploaded water quality data to STORET from a 1989 study of the epibenthic macroinvertebrate composition of five permanent ponds and their reaction to varying salinity levels.

Uploaded water quality data to STORET from a 1983 study to determine whether fish assemblages in pools were persistent and/or stable over a short time period.

Uploaded water quality data to STORET from a 1975 study describing seasonal and annual variations in fish species composition within the surf zone of Horn Island.

Uploaded water quality data to STORET from a 1978 study that evaluated seasonal and diel standing crop of fishes and two species of epibenthic macroinvertebrates occurring in a barrier island surf zone.

Uploaded water quality data to STORET from a 1976 study to assess the possibility of using hatchery-reared seed oysters in future planting and mariculture operations in Mississippi Sound.

Uploaded water quality data to STORET from a 1988 study to confirm the existence of Lepomis spp. in the ponds on Horn Island.

Uploaded water quality data to STORET from a 1956 study to identify Mollusca species found in Mississippi Sound and discuss what is known of their distribution, abundance, and habits.

Uploaded water quality data to STORET from a 1991 study to characterize the ecology of East Pond.

Uploaded water quality data to STORET from a 1965 study to ascertain what species compose the fish population in the brackish and fresh waters on Horn Island and their relative abundance.

Uploaded water quality data to STORET from a 1996 study to compare baseline macrobenthic data with post-hurricane data.

Uploaded water quality data to STORET from a 1989 study to determine if, after one year of post-spill observations, there were any recognizable deleterious effects of an oil spill on the supratidal, intertidal, and shallow subtidal invertebrate sand dwelling communities on Horn Island.

Uploaded water quality data to STORET from the Mississippi Department of Environmental Quality's ongoing beach monitoring program.

Uploaded water quality data to STORET from the Alabama Department of Environmental Management's ongoing beach monitoring program.

Uploaded water quality data to STORET from a 1993 macrobenthic inventory intended to provide a comprehensive baseline against which to gauge effects of future impacts to Gulf Island National Seashore aquatic resources.

Heartland Network

Continued to serve as the WRD contact and provided information useful in interpretation of monitoring issues.

Inventory and Monitoring Network Support

Participated in three year review of NETN program and on the networks advisory committee.

Worked with ERMN and MIDN and park staff to assess water quality monitoring needs and establishment of their monitoring programs.

Klamath Network

Attended water quality monitoring planning meeting and advised staff on monitoring design, statistical, water quality, and Quality Control issues.

Uploaded water quality data from the 2005 Level I Water Quality Inventories conducted by the USGS's Western Ecological Research Center at three Network parks.

Mediterranean Coast Network

Network contact for WRD. Sent information relevant to amphibian monitoring.

Mid-Atlantic Network

Provided background and support for implementing NPSTORET through the University of Virginia.

Incorporated recommended enhancements into NPSTORET.

Reviewed annual administrative report and work plan.

Provided advice on exploratory data analysis, autocorrelation, and annual report issues.

Mojave Desert Network

Advised staff on technical issues related to monitoring ions and nutrients, such as monitoring frequency and data comparability.

National Capital Region Network

Provided review and comments on the network's data collection and processing standard operating procedure.

Provided review and comments on the network's NPSTORET implementation.

Prepared trip report with suggestions for improvements and changes to water quality monitoring program after site visit to park.

North Coast and Cascades Network

Reviewed annual administrative report and work plan.

Northern Colorado Plateau Network

Provided support and recommendations on mapping the networks water quality database to the NPSTORET schema.

Ran partial autocorrelation function on network pH data to help determine how many sequential data points were autocorrelated.

Worked jointly with network hydrologist Dave Thoma and other Water Resource Division staff to prepare a paper for publication discussing quality control measures taken to assess instrument sensitivity under lab and field (in situ) monitoring conditions.

Northeast Temperate Network

Continue to provide network staff with summaries related to statistical issues and monitoring and advice on Appalachian Trail monitoring design tradeoffs.

Northern Great Plains Network

Continued serving as the network contact to WRD and provided advice to the network on various technical and statistical issues.

Pacific Island Network

Continued to provide updated guidance on monitoring water quality while serving as WRD contact.

Rocky Mountain Network

Continued to provide suggestions related to practical field QC issues, basic statistical issues, and monitoring design tradeoffs.

San Francisco Bay Area Network

Reviewed annual monitoring report and provided comments on contaminants, ammonia, and water quality issues.

Provided advice on how to handle non-detect values in statistical analyses.

Uploaded the 2006-2008 ambient water quality monitoring program data from NPSTORET to STORET.

Uploaded the 2003-2005 pilot water quality monitoring program data from NPSTORET to STORET.

Provided review and comment on the Network's 2007 Freshwater Quality Monitoring Report and the data management section of the flow measurement standard operating procedure.

Sierra Nevada Network

Reviewed network's lake monitoring protocol and statistical power analysis.

Reviewed annual administrative report and work plan.

Sonoran Desert Network

Uploaded water quality data from the 2002-2003 Level I Water Quality Inventories conducted by the USGS at eight Network parks.

South Florida/Caribbean Network

Continued to provide updated guidance relevant to water quality monitoring.

Southeast Coast Network

Uploaded all probabilistic water quality data from 2007 and/or 2008 from NPSTORET to STORET for Cumberland Island National Seashore, Fort Frederica National Monument, Fort Pulaski National Monument, and Timucuan Ecological and Historic Preserve.

Consulted on technical issues and provided updated guidance on nutrients and sondes.

Reviewed draft protocol narrative and standard operating procedures.

Southern Colorado Plateau Network

Reviewed network's draft water quality monitoring protocol.

Uploaded water quality data from the 2005 Level I Water Quality Inventories conducted by the USGS at 13 Network parks.

Provided advice and recommendations on NPSTORET deployment and how to link user-specific tables.

Reviewed annual administrative report and work plan.

Southwest Alaska Network

Reviewed annual administrative report and work plan.

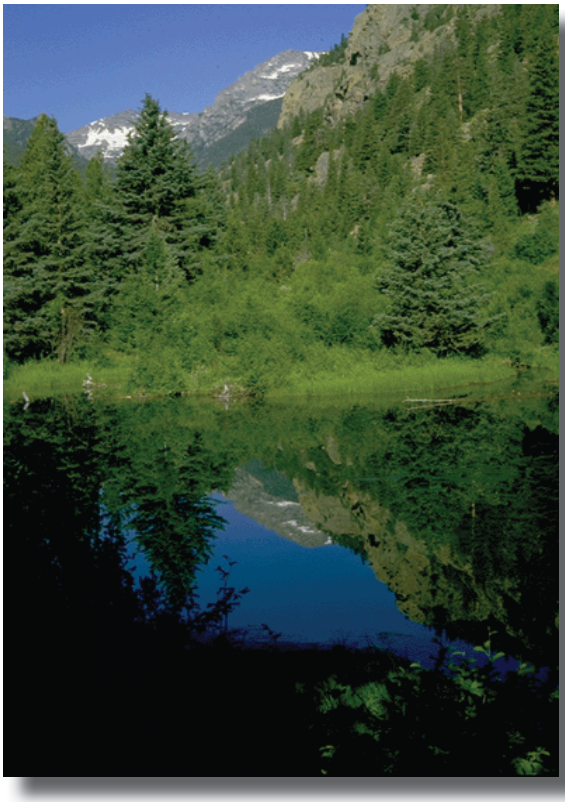
Reviewed monitoring protocols and annual reports, and provided technical assistance with various fish and water resource projects.

Upper Columbia Basin Network

Provided recommendations on handling data from multi-probe data loggers collecting continuous water quality data.

Provided detailed comments on protocol narrative and various QC and monitoring design issues, including zone of inference vs. target populations.

Coordinated WRD's purchase of a water quality data analysis package for evaluation by the UCBN using a representative suite of its FY08 monitoring data.



Fern Lake, Rocky Mountain National Park.
Photo by Nps.

APPENDIX B

SUMMARY OF WATER RESOURCES DIVISION FUNDING

FY 2009 base funding for the Water Resources Division was $12,472,000 (see Figure 1). These funds are distributed among five principal categories: Water Resource Projects (Water Resource Protection; Competitive Projects; and Other); Water Quality Monitoring; WaterResource Protection – Aquatic Resource Professionals; Natural Resource Condition Assessment Program (including projects); and Water Resource Technical Assistance (see Figure 2).

Figure 1: Water Resources Program

	Funding $(000)
FY 2008 allocation	12,399.00
Classified Pay Increase	$114.00
Net FY 2008 Decrease	<$197.00>
Total Available in FY 2008	12,316.00
FY 2009 allocation	12,316.00
Classified Pay Increase	$173.00
Net FY 2008 Decrease	<$17.00>
Total available SUMMARY OF WATER RESOURCES DIVISION FUNDING	12,472.00

Figure 2: Water Resources Program Funding by Catagories

Water Resources Projects		Funding $(000)
Water Resource Protection		817.80
Other Projects		14.20
Water Quality Vital Signs Monitoring		2,737.90
Natural Resource Condition Assessment Program		2,202.70
Natural Resource Condition Assessments Projects	1,849.00	
High Priority Projects	266.10	
Other Projects	87.60	
Water Resource Protection--Aquatic Resource Professionals		1,290.00
Legacy High Priority Projects		67.70
Water Resource Technical Assistance		5,341.70
Total		12,472.00

A summary of accomplishments derived from the FY 2008 base budget and the FY 2009 increase is provided below

Water Resource Protection Projects

The Natural Resource Challenge resulted in an increase of $832,000 in the water resource protection projects budget beginning in FY 2001. As shown in Table 1, FY 2009 expenditures for the majority of this budget increase continued the NPS's capability to fund data collection and analyses that can be used to describe surface and ground water flow regimes and investigate the dependence of park resources upon water in support of the Department of Interior Water Quantity Strategic Goal. These efforts are targeted toward development of scientific information that will contribute to decisions that protect or restore surface or ground water systems. Decisions are made by federal managers, court judges, or state administrators such as state engineers. Priorities are determined by the requirements of federal or state law. Presentation of results may occur in state or federal regulatory process documents, such as rights-of-way and Clean Water Act permits, state water rights process documents, such as applications, protests, or administrative hearing records, or federal or state court process documents, such as adjudication claims, objections, or court hearing records. Results are also intended to support settlement negotiations, which are conducted to avoid contested case hearings, litigation, contested land use decisions, or to support the implementation of settlements.

Studies are conducted by scientists with expertise in fields that are appropriate for the park resources being examined. Hydrologic characterization is a need common to all water resources protection issues addressed by this budget. The majority of FY 2009 project funds were used to support ongoing studies designed to characterize surface or ground water flow systems. In the western U.S., ongoing projects are developing modeling capabilities for predicting effects of large-scale development in regional ground water flow systems. In the eastern U.S., hydrologic studies are developing information on the effects of impoundments on surface river systems. These tools are needed by decision makers to understand the potential for impacts to park water resources in the future from a number of existing water development proposals. In addition, hydrologic data is often required to implement settlement agreements.

Project funds are also used to study the relationships between water quantity and flow timing and water-dependent park resources. In FY 2009, water-dependent resources that were studied include riparian/wetland vegetation, fish migration, water-related fish habitat requirements, anchialine ponds, and geomorphology. These results are needed by decision makers to understand the potential effect on the water-dependent resource of potential changes in stream or ground water flow.

The results of these studies must be presented to decision makers in written or verbal format, often in a forum dictated by law or regulation. For this reason, a portion of the water resource protection project funds were used to support the Department of the Interior Office of the Solicitor in providing legal advice and representation to the National Park Service.

Many of the issues being studied are also of concern to the programs of other federal managers, such as the endangered species and National Wildlife Refuge programs of the U.S. Fish and Wildlife Service, the Southern Nevada Public Lands Management Act and other programs of the Bureau of Land Management, and the water supply programs of the Bureau of Reclamation and U.S. Army Corps of Engineers, and the research program of the U.S. Geological Survey (USGS). In many cases, these other federal programs and partners also provide funding for studies that are useful for resolving National Park Service issues. When this occurs, National Park Service coordinates its water resources protection funding with that of the other agencies to avoid duplicating studies.

To increase the effectiveness of its water resource protection funding, the National Park Service partners with other non-federal entities. Some studies occur as a result of collaboration with state or private entities with common science objectives. For example, hydrologic data collected by NPS studies for Lake Mead National Recreation Area, Death Valley National Park, and Great Basin National Park are shared with the Nevada State Engineer, southern Nevada water purveyors, and private developers, thereby contributing to the larger-scale knowledge of regional aquifers and ground water availability in southern Nevada. In another example, data and other science information collected at Chickasaw National Recreation Area contributes to an on-going state-federal study of the Arbuckle-Simpson Aquifer in southeastern Oklahoma. In yet another example, hydrogeologic analyses conducted for Great Sand Dunes National Park and Preserve is being used in conjunction with work being conducted by The Nature Conservancy and local water conservation districts to support implementation of the recently decreed water rights protection for the park.

Table 1: Water Resource Protection Projects -- FY 2009

Park	Region	Project Title	FY 2009 Funding $(000)
ALL	ALL	Support to the Office of the Solictor	195.0
CHIC	IMR	Hydrologic Data Collection	2.2
MOCA	IMR	Hydrologic Data Collection for Verde River Adjudication	43.9
LAME	PWR	Hydrologic Data Collection and Groundwater Modeling	5.0
KAHO	PWR	Investigation of Hydrology and Water Dependent Values	141.1
GRSA	IMR	Hydrogeologic Data Analysis	134.4
PORE	PWR	Protection of Instream Flows	4.3
GRTE	IMR	Investigation of Hydrology of the Gros Ventre River	11.6
GRBA	PWR	Investigation of Hydrogeology and Hydrologic Data Collection	207.9
NIOB	MWR	Investigation of Water Dependent Resources	42.2
ALL	ALL	Technical Support to all Projects and Technical Assistances	30.1
		TOTAL	817.7

Water Quality Monitoring

In FY 2009, the Water Resources Division received $2,737,900 for the Water Quality Monitoring component of the Natural Resource Challenge. This was the 8th year of funding for a program specifically intended to track and support the attainment of water quality standards in units of the National Park System as required by the NPS and DOI Strategic Plans and to monitor long-term status and trends in the nation's most pristine watersheds. The program is "fully-funded," minus rescissions and across the board cuts.

The National Park Service is committed to a Servicewide and DOI strategic goal to significantly reduce the number of stream and river miles and acres of lakes and marine areas that do not meet water quality standards. As part of this goal, the NPS is also committed to protecting unimpaired water quality in parks from future impairment, including waters classified as Outstanding National Resource Waters (ONRW) or state-equivalent listed waters. Additionally, the NPS is committed to working with state Clean Water Act programs, as well as taking appropriate management actions within parks, to support the restoration of impaired water bodies in parks to an unimpaired condition. Presently, about 120 park units have one or more water bodies that do not meet state water quality standards for one or more pollutants on approximately 1,500 miles of rivers and streams and 929,000 acres of lakes, reservoirs, estuaries and marine areas. Planning and design of the program continues to be implemented in full integration with the NPS Park Vital Signs Monitoring Program. This is because water quality is a key vital sign in determining overall aquatic ecosystem health. In addition, by fully integrating the design of these programs, considerable cost efficiencies have been and will continue to be realized in staffing, planning and design, administration, implementation, data management, and reporting.

Full program funding was allocated to all 32 Park Vital Signs Networks in FY 2009 (Table 2). In addition, funds supported the development of an NPS Servicewide water quality data management program within the U.S. Environmental Protection Agency (EPA) STORET national water quality database. While not shown in Table 2, WRD reallocated 10 work months involving five Division staff to support program administration and the development of program technical guidance, technical protocols, detailed study plan and Quality Control/Quality Assurance Plan guidance, and database management.

Table 2: Allocation of Water Quality Park Vital Signs Monitoring Funding -- FY 2009

Network	Region	Number of Affected Parks	FY 2009 Funding $(000)
Central Alaska	Alaksa	5	94.2
Heartland	Midwest	15	78.8
NE Coastal and Barrier	Northeast	8	86.5
National Capital	National Capital	11	68.2
Cumberland/Piedmont	Southeast	14	56.7
Appalachian Highlands	Southeast	4	67.2
North. Colorado Plateau	Intermountain	16	103.7
Greater Yellowstone	Intermountain	3	68.2
Sonoran Desert	Intermountain	11	61.5
North Coast & Cascades	Pacific West	7	78.8
San Francisco Bay	Pacific West	6	67.2
Mediterranean Coast	Pacific West	3	73.0
Southwest Alaska	Alaska	5	133.6
Northeast Temperate	Northeast	10	57.7
Southern Colorado Plateau	Intermountain	19	119.1
Pacific Lakes	Pacific West	9	145.1
Great Lakes	Midwest	9	118.2
Gulf Coast	Southeast	8	85.5
Rocky Mountain	Intermountain	6	58.6
Sierra Nevada	Pacific West	3	60.6
Eastern Rivers and Mountains	Northeast	9	60.6
Artic	Alaska	5	144.1
Klamath	Pacific West	6	73.0
Southeast Coast	Southeast	17	116.3
Upper Columbia Basin	Pacific West	8	48.0
Southern Plains	Intermountain	10	27.9
Mojave Desert	Pacific West	6	76.9
Southeast Alaska	Alaska	3	40.4
South Florida/Caribbean	Southeast	6	141.3
Mid-Atlantic	Northeast	11	42.3
Chihuahuan	Intermountain	6	70.2
Northern Great Plains	Midwest	13	77.9
TOTAL: 2009 Network Monitoring	7 NPS Regions	272	2601.3
Servicewide Data Management			136.6
GRAND TOTAL			2,737.9

Vital Signs Monitoring Networks: In FY 2009, 32 Park Vital Signs Monitoring Networks fully committed their water quality funding to compilation of background information, analysis of issues and threats, detailed program planning, and supporting synoptic-level field assessments, and five networks have initiated field-level monitoring. Network planning approaches included personnel hiring, in-house allocation of staff, university cooperative agreements, and USGS Interagency Agreements. In addition, some equipment acquisitions were made. All 32 Networks accomplished one or more of the following activities:

- Historic data compilations and analyses
- Information on state-listed impaired waters and park "outstanding" waters
- Documentation of significant water quality stressors/threats
- Synoptic inventory studies in support of detailed statistical design
- Database management and GIS support programs
- Development of water quality monitoring protocols
- Field monitoring

Individual network accomplishments are summarized in Appendix A (detailed budgets are provided in individual NPS Network Administrative Reports).

Servicewide Data Management: The Water Resources Division continued to support network water quality monitoring programs by providing national program administration and reporting, establishing baseline inventories and analyses of available water quality data, supporting digitization of legacy data from analog reports and other archival materials, maintaining a Servicewide water quality database in the EPA-STORET national water quality database, and enhancing the transfer of physical, chemical, and biological data from the Networks into STORET. Four water quality research associates and a student worked to support the database development, management, and reporting activities through cooperative agreements with Colorado State University. The Servicewide STORET database has served as the starting point for most network water quality data compilation and analysis efforts and also WRD's Baseline Water Quality Data Inventory and Analysis Reports. In addition to data from states and other entities, this archive now hosts more than 5 million results for 3,100 different physical, chemical, or biological characteristics from 45,500 monitoring locations in support of 1,071 different projects conducted in or near 256 units of the National Park System.

Much effort went into enhancing NPSTORET, a series of Microsoft Access-based templates for entering, managing, reporting, and analyzing water quality data (projects, stations, metadata, and results) in a STORET compatible format. NPSTORET also includes import routines to allow users to import their own data or stations as well as data and stations from the three major national water quality databases. Additional capabilities added to NPSTORET v.1.74 this year included comparing water quality data to user-defined, state, or national water quality standards and the ability to display the results of water quality analyses spatially using Google Earth. NPSTORET was used by the U.S. Geological Survey to assist Pakistan in developing a water quality database infrastructure. WRD staff cooperated with the EPA, states, and others on developing a STORET database replacement which was made available in June. WRD staff continued to help facilitate stewardship of the National Hydrography Dataset in sub-basins containing NPS lands. Staff also continued to populate the Designated Use and Impairment database which contains hydrographic statistics and water resource impairment data for all parks.

Grand Prismatic, Yellowstone National Park.
Photo by NPS.

NATURAL RESOURCE CONDITION ASSESSMENT PROGRAM

The Water Resources Division received $2.20 million in FY 2009, as part of the Natural Resource Challenge, to assess watershed resource conditions in parks. WRD's Natural Resource Condition Assessment (NRCA) Program provides technical guidance and accountability oversight for this effort. The NRCA Program is working toward the goal of funding a "natural resource condition assessment" project for each of the 270-plus parks in the NPS Vital Signs Monitoring Program.

Parks receiving these assessments will be in an enhanced position to 1) define natural resource conservation indicators and targets via park planning, and 2) report to "resource condition status" accountability measures (e.g., land health goals in the Department of Interior's Strategic Plan). Relying on existing data from multiple sources and best professional judgment, each assessment provides an interdisciplinary synthesis and report-out on current condition status, critical data gaps, and existing or emerging vulnerability/risk factors for important park natural resources. Assessments also strive to develop overall condition ratings for park areas, at the geographic scale(s) requested by the receiving park (e.g., by park watersheds, habitat types, or management zones).

FY 2009 projects benefited greatly from academic partnerships with universities in Cooperative Ecosystem Studies Units (CESUs), as well as from collaboration with federal agencies that provided essential expertise in varied aspects of ecological assessment and reporting.

Significant program accomplishments in FY 2009 are described below. Table 3 shows the budget allocation in FY 2009 for the NRCA Program.

Table 3: Natural Resource Condition Assessment Program -- FY 2009 Budget

Program Element	FY 2009 Funding $(000)
Natural Resource Condition Assessments	1,849.0
NRCA Funding for WRD High Priority Projects	266.1
Other Projects	87.6
Total	2,202.7

Implementation of Program Plan

One full-time staff member provided dedicated support to implement the program plan to fund, during the time frame of FY 2006 – FY 2014, a natural resource condition assessment for nearly all of the 270-plus parks served by the NPS Vital Signs Monitoring Networks. This plan is being implemented in close coordination with other NPS programs and activities related to resource planning, strategic planning and performance reporting, inventory and monitoring, and disturbed lands restoration. In FY 2009, the NRCA Program provided funding to support 50 new or ongoing park condition assessments. This includes 31 parks associated with project startup in FY 2009 as well as 19 parks for which an ongoing assessment project received additional funding (Table 4).

Table 4: Natural Resource Condition Assessment Project Funding -- FY 2009

Region	Agency, Cooperator/Partner, or Contractor	State	Parks	FY 2009 Funding $(000)
Alaska	Pacific Northwest CESU/Saint Mary's University of Minnesota	AK	DENA, KLGO	148.0
Intermountain	Desert Southwest CESU/Aquatic Sciences Program, Sonoran Institute	AZ	MOCA, TUZI, TUMA GICL, TONT	102.0
	Rocky Mountain CESU/Colorado Heritage Program, Colorado State University	CO	GRSA	70.0
	Rocky Mountain CESU/Colorado State (geospatial products for use in multiple Intermountain region projects)	Multiple	Multiple	203.0
Midwest	Great Rivers CESU/Saint Mary's University of Missouri (*) DETO is in the Intermountain Region	MN, NE, SD, WY	JECA, MNRR, WICA DETO (*)	312.0
	NPS Heartland I & M Network	IA, MO (ongoing project)	EFMO, OZAR	15.0

Table 4 Continued: Natural Resource Condition Assessment Project Funding -- FY 2009

Region	Agency, Cooperator/Partner, or Contractor	State	Parks	FY 2009 Funding $(000)
National Capital	Chesapeake Watershed CESU/ University of Maryland	MD, VA	MONO, MANA, ANTI (ongoing project)	74.0
Northeast	Southern Appalachian CESU/ Virgina Tech Program, Sonoran Institute	VA	APCO, BOWA, PETE RICH (ongoing project)	44.0
	Chesapeake Watershed CESU/ University of Maryland	VA	COLO	51.0
	Chesapeake Watershed CESU/ University of Maryland	VA	ROVA, MORR, SARA	127.0
Pacific West	Californian CESU/ University of California, Berkeley	CA	SEKI (ongoing project)	166.0
	Californian CESU/ University of California, Santa Barbara	CA	SOMO, PINN, JOMU (ongoing project)	43.0
	Yosemite National Park	CA	YOSE, DEPO (ongoing project)	90.0
	Northwest Management, Inc.	ID, MT	CRMO, CIRO, HAFO BIHO (ongoing project)	108.0
Southeast	Piedmont - South Atlantic Coast CESU/ University of Georgia	FL, LA, MS, TN	GUIS, JELA, NATR SHIL, VICK	271.0
	Piedmont - South Atlantic Coast CESU/ North Carolina State University	AL, FL, GA, NC, SC	CHAT, CONG, KEMO, MOCR, OCMU, HOBE, CAHA, CALO, CUIS, TIMU	25.0
TOTAL			50 Parks	1,849.0

Coastal Park Natural Resource Assessments

In FY 2003, the WRD began an effort to assess coastal water resources and watershed conditions in 53 parks with significant ocean and Great Lakes resources by FY 2014. Since FY 2003, assessments have been initiated in 47 coastal and Great Lakes parks, and final reports have been published for 29 parks. Reports from these assessments characterize the relative health or status of upland, wetland, riparian, marine, estuarine, and Great Lakes resources within the National Park System. Comprehensive assessments are achieved through academic partnerships in Cooperative Ecosystem Studies Unit Networks and collaborations with federal agencies to engage experts in oceanography, systems ecology, hydrology, geographic information systems (GIS), and marine and estuarine sciences.

Completed Reports

In FY 2009, resource condition assessment reports associated with prior-year projects were published for Acadia National Park, Fire Island National Seashore, Fort Pulaski National Monument, Lake Clark National Park, Rock Creek Park, and Sleeping Bear Dunes National Lakeshore. These reports and additional information about the natural resource condition assessments and the coastal park assessment series can be accessed at: http://www.nature.nps.gov/water/NRCondition_Assessment_Program/Index.cfm

WRD High Priority Projects

In FY 2009, WRD funded a number of projects that addressed emerging, high priority, park watershed condition issues that, because of the applicable timeframes, could not be appropriately directed through the competitive project funding program. Table 5 shows the funding allocated from the NRCA Program to support these projects.

Table 5: High Priority Project Funding-- FY 2009

Region	State	Park	Project Title	FY 2009 Funding $(000)
Southeast	FL, USVI	BISC, DRTO, BUIS	Rapid Assessment Surveys and Protocols for Potential Lionfish Invasions in Select National Parks	50.0
Pacific West	NV	GRBA	Development of Hydrogeologic and Numerical Groundwater-Flow Model Analyses to Determine Potential Groundwater Withdrawal Impacts to Great Basin NP Resources	73.4
iintermountain	CO	GRSA	Court-Ordered Installation of Ten Ground Water Monitoring Wells at Great Sand Dunes National Park and Preserve	55.2
Intermountain	TX	PAAL	Develop final restoration design and contract specifications for the Palo Alto Resaca, Palo Alto Battlefield NHP, Texas	47.5
Servicewide	Multiple	Multiple	Watershed Attributes and Their Influences on Impaired Waters in the National Park System	40.0
Total		6+ Parks		266.1

See Appendix B for a summary of High Priority Projects that were funded in FY 2009, including the above-listed projects as well as additional projects funded through WRD's Legacy funding source.

Rocky Mountain National Park. Photo by NPS.

OCEANS AND COASTAL RESOURCES PROGRAM

Coastal park natural resource assessment activity continued in FY 2009 (see Natural Resource Condition Assessment section). The Ocean and Coastal Resources Program contribute project management oversight for this ongoing effort.

Other Projects

Submerged Habitat Mapping in Ocean and Coastal Parks

A submerged habitat mapping program for ocean and Great Lakes parks was initiated in 2007 with funding from Inventory and Monitoring Program. The program is developing habitat maps and reports to support informed management and protection of three million acres of submerged National Park System natural and cultural resources. Submerged habitat mapping of National Parks has the following resource management objectives: 1) understanding and predicting the spatial distribution of resources; 2) detecting change associated with anthropogenic and environmental impacts; 3) supporting spatially-explicit management decisions, such as marine zoning (e.g., marine protected areas, anchoring locations, vessel hazards); and 4) designing efficient sampling strategies to evaluate the efficacy of resource management actions.

In FY 2009, habitat mapping projects were initiated for submerged lands in Buck Island Reef National Monument and Salt River Bay National Historical Park and Ecological Preserve. A gap analysis was initiated in FY 2009 for coral reef parks in the Caribbean (Buck Island Reef National Monument, Virgin Islands National Park, Salt River Bay National Historical Park and Ecological Reserve, and Virgin Islands Coral Reef National Monument) and in the Pacific (War in the Pacific National Historical Park, National Park of American Samoa, Kalaupapa National Historical Park, and Kaloko-Honokohau National Historical Park). The objectives of the gap analysis are to: 1) obtain and evaluate available ecological, oceanographic, socio-economic, cultural, and remote sensing datasets; 2) synthesize relevant available datasets into a common integrated system; and 3) provide a custom web portal to access data and metadata resources.

In FY 2009, habitat maps were completed (studies were initiated in FY 2008) for the submerged lands of Golden Gate National Recreation Area, Virgin Islands National Park, and Virgin Islands Coral Reef National Monument. The Golden Gate submerged habitat maps integrate existing seafloor maps, such as the San Francisco Bay anthropogenic habitat disturbance and geology maps, with results from numerous surficial sediment surveys. The Virgin Islands National Park and Virgin Island Coral Reef submerged habitat maps identify the locations of significant habitats, including coral reefs, seagrass meadows, and mangrove forests using satellite imagery and digital aerial photography.

Dry Tortugas National Park. Photo by NPS

WATER RESOURCE PROTECTION - Aquatic Resource Professionals

In FY 2009, the NPS received $1,290,000 to fund aquatic resource specialists in the field. Fifteen positions were fully funded in FY 2009, although three of the positions were vacant for part of the fiscal year. Twelve of the positions are duty-stationed in parks and one each is located in the Sonoran Network Office, the Center for Urban Ecology in the National Capitol Region, and the Utah State Office. The specific aquatic resource disciplines represented by the new professionals, their duty stations, and their primary areas of focus are identified in Table 6.

Table 6: Water Resource Protection - Aquatic Resource Specialists

Region	Duty Station/Discipline	Geographic Focus Area
AKR	Yukon-Charley Rivers NP Aquatic Ecologist	Central and NW Alaska Network Parks
AKR	Lake Clark NP - Fishery Biologist	SW and SE Alaska Network Parks
IMR	Utah State Coord Office - Fishery Biologist	Upper Colorado River Basin Parks
IMR	Sonoran Desert Network - Groundwater Hydrologist	Arizona and New Mexico Parks
IMR	Grand Teton NP – Hydrologist	Vacant
IMR / MWR	Big Thicket NP- Hydrologist	Southern Plains, Heartland Network Parks
MWR	Saint Croix NSR - Aquatic Ecologist	Great Lakes Network Parks
MWR	Isle Royale NP - Fishery Biologist	Great Lakes Network Parks
NER / NCR	Center for Urban Ecology - Aquatic Ecologist	Vacant
NER	Delaware Water Gap NRA - Hydrologist	East. Rivers & Mountains / NE Coastal & Barrier Network Parks
NER	Fire Island NS - Marine Ecologist	NE Temperate / NE Coastal & Barrier Network Parks
PWR	Point Reyes NS - Aquatic Ecologist	San Fran. Bay / Sierra / Klamath/ Mediterranean Coast Network Parks
PWR	Mount Rainier NP - Geomorphologist	North Coast & Cascades / Klamath Network Parks
PWR	Lake Mead NRA - Groundwater Hydrologist	Mojave Desert Network Parks
SER	Chattahoochee River NRA - Fishery Biologist	SE Coast / Gulf Coast / Appalachian Highlands / Cumberland-Piedmont Network Parks
SER	Chattahoochee River NRA - Wetlands Ecologist	SE Coast / Gulf Coast / Appalachian Highlands / Cumberland-Piedmont / S. Florida – Caribbean Network Parks

WATER RESOURCES PROTECTION – Water Resource Technical Assistance

This was the fundamental component of the Water Resources Program before the Natural Resource Challenge, and it and has not been expanded with Challenge funding. Through this effort, the Water Resources Program provides direct assistance to parks on high priority needs, using a combination of its own staff and expertise acquired through cooperative agreements. Over 160 parks obtained technical assistance from the Water Resources Division in 2009. Examples of technical assistance accomplishments are:

- Completed hydraulic modeling of a short stream reach, developed design criteria for stream bank stabilization, and completed a technical report of the findings for Grand Portage National Monument.
- Reviewed and commented on site investigation work plans addressing characterization of contaminated soils and ground water at multiple oil and gas sites at Big Thicket National Preserve.
- Identified serious deficiencies in the preliminary Remedial Investigation report and ground water model developed for the Pines landfill adjacent to Indiana Dunes National Lakeshore and convinced the Environmental Protection Agency to seek a third party assessment of the groundwater model which confirmed NPS characterization of the model as technically unsound and inappropriate for use in the Remedial Investigation and as a basis for the Ecological Risk Assessment.
- Through the ongoing Pecos National Historical Park Natural Resources Condition Assessment and working with the park, the Sonoran Desert network, Intermountain Region Planning Office developed procedures to improve information and data sharing between NPS science and planning programs.
- Uploaded water samples and field measurements collected in 1973 by the U.S. Geological Survey and 1993 by Alaska Volcano Observatory researchers from springs in the vicinity of Surprise Lake to STORET for Aniakchak National Monument.
- Provided technical review of the Turkey Point Units 6 and 7 Site Certification Application and provided comments to Biscayne National Park on several options being considered for using treated sewage water in cooling towers of the Turkey Point Power Plant concerning contaminants of potential environmental concern that might eventually move from the cooling towers to the park.
- Inspected watershed conditions and a dam that may be relevant to flooding that has been experienced in Hopewell Furnace National Historic Park and initiated technical support to the Army Corps of Engineers floo study that will be conducted this fiscal year.
- Working with the NPS Lands Office, WRD completed a digital map for Salem Maritime National Historic Site and worked with park staff to develop a PMIS proposal to get a Preliminary Assessment and Site Investigation funded for a submerged contaminated site.
- Provided technical review of two documents on coral reef restoration for Dry Tortugas National Monument.
- Provided continuing assistance to Olympic National Park on the proposed removal of two dams on the Elwha River including 1) assisting in the finalization of the sediment monitoring plan, 2) made a site visit with sediment management advisory team, and 3) consulted on improving approach to flood modeling.
- Assisted with organizing and participated in a meeting with staffs of the Niobrara National Scenic River and the US Fish & Wildlife Service to evaluate the opportunities and impacts of removing Cornell Dam.
- Conducted a hydrogeological analysis and provided recommendations for construction of a new water supply well at Horseshoe Bend at Big Horn Canyon National Recreation Area.
- Assisted with the formulation of remedial actions for declining water levels at Quitobaquito Spring in Organ Pipe Cactus National Monument.
- Reviewed current and proposed sediment monitoring associated with the Grand Ditch failure in Rocky Mountain National Park and worked with park staff to develop recommendations for future water quality monitoring with the court settlement funds.
- Supported the NPS 9B regulatory process by providing wetlands assessments for proposed exploration and drilling operations at Big Thicket National Preserve, Padre Island National Seashore, Big Cypress National Preserve, Big South Fork National River and Recreation Area, and Lake Meredith National Recreation Area.
- Provided on-site analyses and recommendations to minimize impacts on wetland resources for the Flight 93 National Memorial. Worked with project engineers to reduce wetland impacts from 30 acres to less than 2 acres, assisted with regulatory compliance, provided a preliminary design for the required wetland compensation, and suggested construction methods to protect existing wetlands
- Provided technical assistance and obtained funding for the project "Establish Native Wetland Plant Species to Enhance Channel Stability and Functional Condition in Pueblo Colorado Wash, Hubbell Trading Post National Historic Site."
- Cooperated with the Midwest Region, Great Lakes NPS units, and the NRPC Biological Resources Management Division to provide input on viral hemorrhagic septicemia and ballast water management issues.

- Provided technical support for fish habitat restoration projects at Big South Fork National River and Recreation Area, Pictured Rocks National Lakeshore, Santa Monica Mountains National Recreation Area, Point Reyes National Seashore and North Cascades National Park.
- Developed a Webinar series to increase Servicewide communication on important ocean and coastal resource issues. Held Webinars on water quality, ocean acidification, fishery management, and marine invasive species, each of which was viewed by more than 40-60 people.
- Hired a marine pollution ecologist to manage the Coastal Watershed Condition Assessment Program and develop a program to help ocean and coastal parks with marine pollution issues.
- Completed eight water rights assessments to provide parks with critical information as they consider decisions to protect water-related resources.
- working in partnership with the Bureau of Reclamation and other stakeholders, applied the terms of the Black Canyon of the Gunnison National Park federal reserved water right to produce the decreed flows for the benefit of park resources.
- Represented Kaloko-Honokohau National Historical Park as a participant in the North Kona Water Round Table, a stakeholder group with a broad water use scope and led discussions of the smaller Kaloko-Honokohau Working Group, a stakeholder group focused on park concerns about diversions of seaward flowing fresh groundwater by municipal water development.
- Assisted Chickasaw National Recreation Area in providing information and comments to the Oklahoma Water Resources Board concerning state management options for the Arbuckle-Simpson aquifer which is the source of water for park springs and streams.
- Directed the installation of monitoring wells at Great Sand Dunes National Park and Preserve which are required by the Park's recent water rights decree for the purpose of implementing the administration of those rights.

Acadia National Park. Photo by NPS

APPENDIX C

AWARDS/PUBLICATIONS/PRESENTATIONS/WEBINARS

AWARDS

Star award to Jen Back from Chickasaw National Recreation Area for her water resources protection efforts.

Star award to Jim Harte for his extraordinary work as project leader in planning, designing and constructing ten boundary piezometers for Great Sand Dunes National Park and Preserve.

Cliff McCreedy received an award for working with NOAA for 1.5 years to develop an umbrella agreement that supports and clarifies the agencies' mutual goals for ocean stewardship and climate science. The agreement that establishes policy level support to continue and accelerate many existing NPS-NOAA partnerships and to establish new agreements in light of new Administration and DOI interests in oceans, climate change, and energy. The agreement was signed by the NPS Acting Director and the new NOAA Administrator.

Eva DiDonato received an award for developing a Webinar series on topics of general interest to ocean and coastal parks and regions. She researched the software, purchased a license, and secured permission from the office of the CIO to install the software on an NPS computer. Eva hosted four servicewide webinars in 2009 on topics including in situ data loggers, ocean, commercial and recreational fishing, and invasive species. Attendance has been 20-40 people for each Webinar, each of which was recorded for offline viewing.

PUBLICATIONS

Alexander, J.S., R.B. Zelt, and N.J. Schaepe. 2009. Geomorphic segmentation, hydraulic geometry, and hydraulic microhabitats of the Niobrara River, Nebraska—Methods and initial results. Scientific Investigations Report 2009-5008, U.S. Dept. of the Interior, U.S. Geological Survey, 51 pp.

Auble, G.T., Wondzell, M., and Talbert, C., 2009, Decision support system for evaluation of Gunnison River flow regimes with respect to resources of the Black Canyon of the Gunnison National Park: U.S. Geological Survey Open-File Report 2009–1126, 25 pp.

Belcher, W.R., M.S. Bedinger, J. T. Back, D. S. Sweetkind. 2009. Interbasin Flow in the Great Basin with Special Reference to the Southern Funeral Mountains and the Source of Furnace Creek Springs, Death Valley, California. Journal of Hydrology, Volume 369, Issues 1-2, 5 May 2009, Pages 30-43.

Back, J.T., 2009. Guidance document for field technicians on Standard Operating Procedures for operating and maintaining the Design Analysis waterloggers at CHIC. Fort Collins, CO: National Park Service, Water Resources Division.

Converse, K. 2009. Streamflow records for Water Year 2007 for Station No. 343856111450701, Montezuma Well at Montezuma Castle National Monument, Arizona. National Park Service, Water Resources Division, Fort Collins, CO.

Cooper D.J., E.C. Wolf and J. Wagner. 2008. First Summer Survival of Plantings, Upper Halstead Meadow, Sequoia National Park, California. Report to Sequoia National Park by Colorado State University, Department of Forest, Rangeland and Watershed Stewardship and the NPS Water Resources Division. 8 pp.

Corman, S.S. 2009. Salt Marsh Mosquito Ditches on Fire Island, NY: Sedimentation Rate, Nekton Community, and Implications for Restoration. MS Thesis, Graduate School of Oceanography, University of Rhode Island, Narragansett, RI. 122 pp.

Cutillo, P.A., 2009. Status Report – Water-Quantity Protection at Kaloko-Honokohau National Historical Park. Fort Collins, CO: National Park Service, Water Resources Division, 16 pp.

Cutillo, P.A., 2008. Preliminary Analysis in Regard to Application for Beneficial Water Use Permit No. 30043627-76LJ for The O'Hare Living Trust. Fort Collins, CO: National Park Service, Water Resources Division, 3 pp.

Cutillo, P.A., 2009. Preliminary Analysis in Regard to Application for Beneficial Water Use Permit No. 30044213-76LJ for Jody M. Miller and Dale E. Horton. Fort Collins, CO: National Park Service, Natural Resource Program Center, 3 pp.

Cutillo, P.A., 2009. Simulation of Large-Scale Pumping in Snake Valley, White Pine County, Nevada. Fort Collins, CO: National Park Service, Natural Resource Program Center, 42 pp.

Cutillo, P.A., 2008. Peer Review of Long-Term Monitoring Protocol for Ground-Water Hydrology within the National Park Service Pacific Island Network, Version 1.0. Fort Collins, CO: National Park Service, Water Resources Division, 2 pp.

Cutillo, P.A., 2009. Review of responses to NPS comment regarding the `O`oma Beachside Village Draft Environmental Impact Statement, January 5, 2009. Fort Collins, CO: National Park Service, Water Resources Division, 6 pp.

Cutillo, P.A., 2009. Review of Palani Well No.1 Draft Environmental Assessment May 6, 2009. Fort Collins, CO: National Park Service, Water Resources Division, 8 pp.

DiDonato, G.T., E.M. DiDonato, L.M. Smith, L.H. Harwell, and J.K. Summers. 2009. Assessing coastal waters of American Samoa: Territory-wide water quality data provide a critical "big-picture" view for this tropical archipelago. Environmental Monitoring and Assessment 150:157-165.

Edlund, M. B., D.R. Engstrom, L. Triplett, B. M. Lafrancois, and P. R. Leavitt. 2009. Twentieth-century eutrophication of the St. Croix River (Minnesota-Wisconsin, USA) reconstructed from the sediments of its natural impoundment. Journal of Paleolimnology 41:641-647.

Faber, D.M. 2008. Loss of Spawning Habitat due to Isostatic Rebound and Subsequent Effect on the Commercial East Alsek Sockeye Fishery, Alaska. MS Thesis. University of Alaska Fairbanks. Fairbanks, AK. 126 pp.

Gerber, G. 2009. Investigators Annual Report for Reporting Year 2008, Lower Gros Ventre River Hydrology, Diversions, and Water Budget Investigation, Grand Teton National Park, WY. Fort Collins, CO: National Park Service, Water Resources Division, 2 pp.

Gerber, G. 2009. Investigators Annual Report for Reporting Year 2008, Lower Gros Ventre River Hydrology, Diversions, and Water Budget Investigation, Grand Teton National Park, WY. Fort Collins, CO: National Park Service, Water Resources Division, 2 pp.

Gerber, G. and Inglis, R. 2008. Trip Report for Travel to San Francisco Bay Area Network for Review of Stream Gaging Protocol, November 4-6, 2008. Fort Collins, CO: National Park Service, Water Resources Division, 14 pp.

Hansen, W.R. and J. Harn. 2009. Wild and scenic rivers program, 2007-2009 accomplishments. U.S. Dept. of the Interior, National Park Service, Wild and Scenic Rivers Program, 8 pp.

Hughes, J.C. and P.A. Cutillo, 2008. Report on an Aquifer Test at Wind Cave National Park, on September 9 – 11, 2008. Fort Collins, CO: National Park Service, Water Resources Division, 13 pp + appendices.

Hughes, J.C. and J.T. Back and T. Smith, 2009. Report on GPS Survey of locations in and around Wind Cave National Park on July 28 - 30, 2008. Fort Collins, CO: National Park Service, Water Resources Division, 21 pp.

Hughes, J.C., 2009. Basis for instream flow State water right Applications for Great Basin National Park. Fort Collins, CO: National Park Service, Water Resources Division, 13 pp.

Hughes, J.C., 2009. Evaluation of City of Crossville-Lake Tansi Water Harvesting Proposal on Stream Discharge within Obed Wild and Scenic River. Fort Collins, CO: National Park Service, Water Resources Division, 10 pp + appendices.

Jaeger, K. 2009. Channel Dynamics in Canyon de Chelly National Monument, AZ, with Emphasis on the Effect of Invasive Plants. PhD Dissertation, Colorado State University, Fort Collins, CO. 260 pp.

Lafrancois, B. M., S. Magdalene, D. K. Johnson. 2009. Recent water quality trends and a comparison to sediment-core records for two riverine lakes of the Upper Mississippi River basin: Lake St. Croix and Lake Pepin. Journal of Paleolimnology 41:603-622.

Lafrancois, B. M., M. Watkins, and R. Maki. 2009. Water quality conditions and patterns on the Grand Portage Reservation and Grand Portage National Monument, Minnesota: Implications for nutrient criteria development and future monitoring. Natural Resource Technical Report NPS/GLKN/NRTR—2009/223. National Park Service, Fort Collins, Colorado.

Martin, L. 2008. Surplus water at Fossil Butte National Monument. NPS NRPC Water Resources Division, Fort Collins, CO.

Martin, L. 2009. Groundwater monitoring, Delaware Water Gap National Recreation Area. NPS NRPC Water Resources Division, Fort Collins, CO.

Matthews, M., F. Usrey, S.W. Hodges, J.L. Harris and A.D. Christian. 2009. Species richness, distribution, and relative abundance of freshwater mussels (Bivalvia: Unionidae) of the Buffalo National River, Arkansas, *Journel of the Arkansas Academy of Science, Vol. 63, 19 pp.*

McEwen, D. C. and M. G. Butler. 2008. Impacts from water-level regulation on benthic macroinvertebrate community structure in Namakan Reservoir and Rainy Lake: Voyagers National Park, Minnesota. NPS/NRPC/WRD/NRTR—2008/129.

McEwen, D.C. and M.G. Butler. 2008. Impacts from Water-Level Regulation on Benthic Macroinvertebrate Community Structure in Namakan Reservoir and Rainy Lake – Voyageurs National Park. Natural Resource Technical Report NPS/NRPC/WRD/NRTR – 2008/129. Natural Resource Program Center, National Park Service, Fort Collins, CO. 88 pp.

Mechinich, Christine, D.J. Mechenich, S. W. Szczytko, J. E. Cook and G.J. Kraft. 2009. Assessment of Natural Resource Conditions – Sleeping Bear Dunes National Lakeshore. Natural Resources Report NPS/NRPC/WRD/NRR – 2009/097. Natural Resource Program Center, National Park Service, Fort Collins, CO. 351 pp.

Meeker, J.E. and A.G. Harris. 2009. Wetland Vegetation Monitoring – Voyageurs National Park. Natural Resource Technical Report NPS/NRPC/WRD/NRTR – 2009/202. Natural Resource Program Center, National Park Service, Fort Collins, CO. 216 pp.

Morgan, K.L., M.L. Granstaff and T.H. Roberts. 2009. Inventory and Classification of Wetlands at Little River Canyon National Preserve (Alabama). Center for the Management, Utilization and Protection of Water Resources. Tennessee Technological University. Cookeville, TN. 28 pp. + app.

Nagorski, Sonia, Eran Hood, Sanjay Pyare and Ginny Eckert. 2008. Assessment of Coastal Water Resources and Watershed Conditions – Lake Clark National Park and Preserve. Natural Resources Technical Report NPS/NRPC/WRD/NRTR – 2008/144. Natural Resource Program Center, National Park Service, Fort Collins, CO. 138 pp.

Nimmo, K., and E.M. DiDonato. 2009. Water quality and nuisance species management in the Fort Pulaski National Monument moat. Natural Resource Report NPS/SECN/NRR-2009/134. National Park Service, Fort Collins, Colorado.

Poirrier, M.A., K. Burt-Utley and E. A. Spalding. 2009. An Inventory and Assessment of the Distribution of Submerged Aquatic Vegetation at Jean Lafitte National Historical Park and Preserve (Louisiana). Final Report to Jean Lafitte National Historical Park and Preserve. Department of Biological Sciences, University of New Orleans, New Orleans, LA. 57 pp.

Pollen-Bankhead, N., A. Simon, K. Jaeger, and E. Wohl. 2009. Destabilization of Streambanks by Removal of Invasive Species in Canyon de Chelly National Monument, Arizona. Geomorphology 103: 363-374.

Prudic, D.E., and P.A. Glancy. 2009. Geochemical investigation of source water to Cave Springs, Great Basin National Park, White Pine County, Nevada: U.S. Geological Survey Scientific Investigations Report 2009-5073.

Reynolds, Lindsay V. 2009. Causes and Management of Exotic Riparian Plant Invasion in Canyon de Chelly National Monument, Arizona. PhD Dissertation. Graduate Program in Ecology, Colorado State University, Fort Collins, CO. 129 pp.

Sharrow, D. 2009. Pipe Springs National Monument Physical Resources Information and Issues Overview Report. Natural Resource Tech. Rpt. NPS/NRPC/WRD/NRR – 2009/149. NPS Natural Resource Program Center, Ft. Collins, CO. 121 pp.

Shultz, S. 2009. Economic and social values of recreational floating on the Niobrara National Scenic River, University of Nebraska at Omaha, Omaha, Nebraska, 38 pp.

Sobczak, R.V., R.E. Clark, D.P. Weeks. 2008. Partnerships empower hydrology program at Big Cypress. Park Science, vol. 25, no. 1. NPS Natural Resource Program Center, Office of Education and Outreach. Lakewood, CO. pp. 23-25.

Soiseth, Chad, Craig Murdoch, and Derrek Faber. 2008. Meteorological and Hydrological Monitoring Results for the Dry Bay Preserve, Glacier Bay National Park: 2005 & 2006. Final Project Report. Glacier Bay National Park & Preserve, Gustavus, AK. 44 pp.

Smith, S.M., C.T. Roman, M.J. James-Pirri, K. Chapman, J. Portnoy, and E. Gwilliam. 2009. Responses of plant communities to incremental hydrologic restoration of a tide-restricted salt marsh in southern New England (Massachusetts, U.S.A.). Restoration Ecology 7 (15):606-618.

Stevenson, S.A., and Gable, C. 2009. Water Level records for Water Years 1996 for Station No. 362629116495601, Travertine Springs in Furnace Creek Wash, Death Valley National Park. National Park Service, Water Resources Division, Fort Collins, CO.

Stevenson, S.A., and Gable, C. 2009. Water Level records for Water Years 1997 for Station No. 362629116495601, Travertine Springs in Furnace Creek Wash, Death Valley National Park. National Park Service, Water Resources Division, Fort Collins, CO.

Stevenson, S.A., and Gable, C. 2009. Water Level records for Water Years 1998 for Station No. 362629116495601, Travertine Springs in Furnace Creek Wash, Death Valley National Park. National Park Service, Water Resources Division, Fort Collins, CO.

Vaux, P.J., S. J. Nelson, Nishi Rajakaruna, Glen Mittelhauser, Blaine Kopp, John Peckenham, and Gordon Longsworth. 2008. Assessment of Natural Resource Conditions in and adjacent to Acadia National Park. Natural Resource Report NPS/NRPC/WRD/NRR – 2008/069. Natural Resource Program Center, National Park Service, Fort Collins, CO. 256 pp.

Wanner, G.A, M.A. Pegg, D.A. Shuman, and R.A. Klumb. 2009. Niobrara River fish community downstream of Spencer Dam, Nebraska, 2008 Progress Report, Dept. of the Interior, U.S. Fish and Wildlife Service, Great Plains Fish and Wildlife Conservation Office, Pierre, S. Dakota and University of Nebraska, Lincoln, School of Natural Recourses, 57 pp.

PRESENTATIONS

Back, J.T. Hydrologic Setting of Springs and Flowing Wells in the Vicinity of Chickasaw. Sulphur-Chickasaw Natural Resource Protection Group Meeting, May 2009, Sulphur, OK. 27 slides.

Christensen, P.K. 2009. Protecting natural resources at Saguaro National Park through water rights. In Rethinking Protected Areas in a Changing World: 2009 George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites, March 2-6, 2009, Portland, Oregon, Program & Abstracts, p. 37.

Cooper D.J., E.C. Wolf, A. Demetry, and J. Wagner. 2009. The Restoration of Halstead Meadow, Sequoia National Park. Paper presented at the 30th Annual Conference of the Society of Wetland Scientists, Madison, WI (presentation and published abstract).

Corman, S.S. and C.T. Roman. 2009. Salt Marsh Mosquito Ditches as Habitat for Nekton and Implications for Restoration. Paper presented at New England Estuarine Research Society, Salem, MA, April 2-4, 2009.

Cross, J.N. 2008. Benthic Habitat Mapping in Ocean and Coastal Parks. I&M Advisory Committee Meeting. Fort Collins, CO.

Cross, J.N. 2009. Ocean and Coastal Resources Program Overview. NPS Hydropower Meeting. Fort Collins, CO.

Cross, J.N. 2009. Ocean and Coastal Resources Program Briefing. Meeting with Kit Batten, Science Advisor to the DOI Secretary. Fort Collins, CO.

Cross, J.N. 2009. Climate Change Impacts on Ocean and Coastal Parks. Front Range Community College Biology Program Seminar. Fort Collins, CO.

Cross, J.N. 2009. Implementation of the FY2010 Ocean's Base Increase. Ocean and Coastal Park Workshop. Boulder, CO.

Cutillo, P.A., 2008. Ground-Water Models, 4th Meeting of the Kaloko-Honokohau NHP Ground Water Working Group, November 3, 2008, Kona, HI. Fort Collins, CO: National Park Service, Water Resources Division, 16 slides.

Cutillo, P.A., 2008. Expert Witness Testimony, In the Matter of Water Permit Application No. 2633-2 filed by the Southern Black Hills Water System in Custer County, December 10, 2008, Pierre, SD, 15 slides.

Cutillo, P.A., 2008. An Inconvenient Park, Urban Development and Resource Protection at Kaloko-Honokohau National Historical Park, Colorado State University, November 12, 2008. Fort Collins, CO: National Park Service, Water Resources Division, 28 slides.

DiDonato, E. 2009. Making the most of Water Quality Data in National Parks. The George Wright Society Conference, Portland, Oregon, March 1-5, 2009.

DiDonato, E. and K. Keteles. 2009. Ocean Acidification: Osteoporosis of our Marine Resources. The George Wright Society Conference, Portland, Oregon, March 1-5, 2009.

DiDonato, E. 2009. A Farout Experience: Living and Working in American Samoa. Brown Bag Seminar, Fort Collins, Colorado, June, 2009

Gerber, G. 2009. Gros Ventre River Hydrology, Diversions, and Water Budget, Grand Teton National Park, WY. Grand Teton National Park 2009 Resource Symposium. Colter Bay, WY.

Gerber, G., and Chafey, J., 2009. Hydrology, Diversions, and Water Rights Investigation of the Lower Gros Ventre River, Grand Teton National Park, WY. Gros Ventre River Research Meeting, Jackson, WY.

Gerber, G., Chafey, J., and Hansen, B., 2009. Preliminary Results of Hydrologic Investigations on the Lower Gros Ventre River, Grand Teton National Park, WY. Gros Ventre River Stakeholders Meeting. Jackson Hole, WY.

Gerber, G., and Chafey, J., 2009. Hydrology, Diversions, and Water Rights Investigation of the Lower Gros Ventre River, Grand Teton National Park, WY. Gros Ventre River Research Meeting. Jackson, WY.

Gerber, G. 2009. Gros Ventre River Hydrology, Diversions, and Water Budget, Grand Teton National Park, WY. Grand Teton National Park 2009 Resource Symposium. Colter Bay, WY.

Grossman, E., K.L. Knee, A. Paytan, S. Beavers, L. Marrack, and P. Cutillo, 2009. Process studies of the flux, fate, and importance of submarine groundwater discharge to Kaloko-Honokohau National Historical Park, Hawaii. In Rethinking Protected Areas in a Changing World: 2009 George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites, March 2-6, 2009, Portland, Oregon, Program & Abstracts, p. 37.

Hansen, W.R., G. Gerber and J. Chafey. 2009. Preliminary Results of Hydrologic Investigations on the Lower Gros Ventre River, Grand Teton National Park, WY. June 16, 2009 Gros Ventre River Stakeholders Meeting. Jackson Hole, WY.

Harte, J. and A.Valdez. 2009. Science in support of a historical in-place ground water right for Great Sand Dunes National Park and Preserve, Colorado. In Rethinking Protected Areas in a Changing World: 2009 George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites, March 2-6, 2009, Portland, Oregon, Program & Abstracts, p. 37.

Harte, J., Valdez, A and S. Stevenson. 2009. An investigation of surface water/ground water interactions, Great Sand Dunes National Park and Preserve, Colorado. In Rethinking Protected Areas in a Changing World: 2009 George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites, March 2-6, 2009, Portland, Oregon, Program & Abstracts, p. 37.

Kennard, P. 2009. Rivers gone wild – Alluvial landscape response to climate change in Mount Rainier. Climate Impacts Group, Joint Institute for the Study of the Atmosphere and Ocean, University of Washington. May 5, 2009.

Lafrancois, B. M., A. Ballmann, D. Blehert, H. Bootsma, R. Getchell, J. Glase, K. Hyde, K. Keteles, J. Leonard, C. Otto, S. Riley, E. Tyner, and H. Van Sumeren. 2009. Exploring causes for recent botulism outbreaks at Sleeping Bear Dunes National Lakeshore: results from pilot studies. Presented at the Joint Conference of the 6th Biennial State of Lake Michigan Meeting and 9th annual Great Lakes Beach Association Conference, September 29-October 1, 2009, Milwaukee, Wisconsin.

Lafrancois, B. M., and R. Maki. 2009. Implications of body size, trophic position, species identity, and lake water quality for crayfish mercury burdens in and near Voyageurs National Park. Presented at the 94th annual meeting of the Ecological Society of America, August 2-7, 2009, Albuquerque, New Mexico.

Lafrancois, B. M., and T. Lafrancois. 2009. What lurks beneath: benthic macroinvertebrates of the St. Croix River. Presented at the Lower St. Croix "View from the River" Workshop, June 17, 2009, Hudson Cruise Lines, Hudson, Wisconsin.

Lafrancois, B. M., B. Karns, W. Miller, B. Schuetz, W. Daniels, and E. Peterson. 2009. Nitrogen patterns and sources in an upper Mississippi River tributary: a stable isotope approach. Presented at the 57th annual meeting of the North American Benthological Society, May 17-22, 2009, Grand Rapids, Michigan.

Lafrancois, B. M., S. Magdalene, and D. K. Johnson. 2009. Three decades of water quality change (1976-2005) in the Mississippi National River and Recreation Area. Presented at the 41st annual meeting of the Mississippi River Research Consortium, April 30-May 1, 2009, La Crosse, Wisconsin.

Lafrancois, B. M., B. Karns, W. Miller, B. Schuetz, E. Peterson, and W. Daniels. 2009. Exploring causes for increasing nitrate concentrations in the Lower St. Croix River. Presented at the 41st annual meeting of the Mississippi River Research Consortium, April 30-May 1, 2009, La Crosse, Wisconsin.

Lafrancois, B. M. 2009. Health of the St. Croix River. Presented as part of the "G3 (Go Green with God)" Lecture Series, April 19, 2009, Trinity Lutheran Church, Stillwater, Minnesota.

Lafrancois, B. M., B. Karns, W. Miller, B. Schuetz, E. Peterson, and W. Daniels. 2008. Exploring causes of increasing nitrate concentrations in the Lower St. Croix River. Presented at the 20th annual St. Croix Research Rendezvous, October 21, 2008, Warner Nature Center, Stillwater, Minnesota.

Lafrancois, B. M., B. Karns, W. Miller, B. Schuetz, E. Peterson, and W. Daniels. 2008. Exploring causes of increasing nitrate concentrations in the Lower St. Croix River. Presented at the 20th annual St. Croix Research Rendezvous, October 21, 2008, Warner Nature Center, Stillwater, Minnesota.

Larsen, A. and D. Verbyla. 2008. Interpreting the Spatial Heterogeneity of Lake Drying in the Minchumina Basin, Central Alaska. Park Science in the Arctic Section, 2008 Alaska Park Science Symposium, Beringia Days 2008 International Conference. October 14, 2008.

Lord, E.H. 2009. Water Rights and Land Acquisition. National Park Service, Land Resources Division Conference. Palm Desert, CA.

Maki, R., B. Lafrancois, J. Elias, M. Thabes Kitson, and D. Branstrator. 2009. Zooplankton assemblages at Voyageurs National Park: establishing a pre-Bythotrephes baseline. Presented at the 7th annual Western Great Lakes Research Conference, April 1-2, 2009, Ashland, Wisconsin.

McGlothlin, D.J., 2009. Case study: solar energy development proposed near Devils Hole - does it really need to threaten the pupfish? Natural and Cultural Resources Law and Policy for Superintendents, July 28, 2009, Shepherdstown, WV. Fort Collins, CO: National Park Service, Water Resources Division, 25 slides.

Oki, D., G.W. Tribble, and P. Cutillo, 2009. Numerical modeling of the ground-water-flow system in and near Kaloko-Honokohau National Historical Park, Hawaii. In Rethinking Protected Areas in a Changing World: 2009 George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites, March 2-6, 2009, Portland, Oregon, Program & Abstracts, p. 37.

Roemer, G.A., D. Cave, C. Gutmann, and R.K. Waddell, 2009. Numerical flow model of selected hydrographic basins within the Colorado regional ground-water flow system, Nevada Water Resources Association Annual Conference, February 4, 2009, Reno, NV, Program & Abstracts, 23 slides.

Trammell, M. 2009. Fish management in National Parks along the Colorado River. Colorado River Science Symposium, Scottsdale, AZ, November 2009.

Trammell, M. 2009. Implementation of nonnative fish control strategy in the Upper Basin Recovery Implementation Program. George Wright Society, Portland, OR, March 2009.

Vana-Miller, D. 2009. Introduction to Session – Overview and Context. Concurrent Session: Water for Life: Integrating Natural Resources, Planning, and Management. March 4, 2009. The George Wright Society Biennial Conference. Portland, OR. (Presentation and publ. abstract)

Wagner, J., A. Demetry, D.J. Cooper, and E.C. Wolf. 2009. A New Approach to Wet Meadow Restoration at Halstead Meadow, Sequoia National Park. Rethinking Protected Areas in a Changing World: George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites, Portland, OR. March, 2009. (Presentation and publ. abstract)

Weeks, D.P. 2008. Water Resources Management in our National Parks from Florida to Alaska. University of Arkansas Geosciences Dept. Oct. 3, 2008 Colloquium (invited speaker). Fayetteville, AR.

Weeks, D.P. 2009. Foundation Statement and Resources Stewardship Strategy). Concurrent Session: Water for Life: Integrating Natural Resources, Planning, and Management. March 4, 2009. The George Wright Society Biennial Conference. Portland, OR. (Presentation and publ. abstract)

Weeks, D. P. and D. Vana-Miller. 2009. Integrating Science, Planning and Management. Role and Contributions of the Water Resources Division's Planning Program. Poster presentation and published abstract. The George Wright Society Biennial Conference, March 2 - 6, 2009, Portland, OR.

Weeks, D.P. and D. Vana-Miller. 2009. Physical Resources Information and Issues Scoping Workshop. Great Smoky Mountains National Park, June 25, 2009, Gatlinburg, TN.

WEBINARS

The Ocean and Coastal Resources Branch hosted several servicewide webinars in FY '09. These Webinars were:

- A database application for Managing and Reporting Continuous Water Quality Data.
- Ocean Acidification: Osteoporosis of our Marine Resources.
- Fishery Management: A look at commercial, recreational and traditional issues facing our ocean and coastal resources.

Each of these Webinars were recorded and are available for viewing at: http://www1.nrintra.nps.gov/wrd/marine/webinars.cfm

APPENDIX D

STAFF

OFFICE OF THE DIVISION CHIEF STAFF

Bill Jackson: Division Chief, PhD in Hydrology. Specialty areas include sedimentation processes, fluvial geomorphology, and river assessment, restoration, and management.

Sharon Kliwinski: Water Resources Wash¬ington Liaison, BS in Environmental and Pollution Sciences. Specialty areas include environmental legislation and regulations, natural resource policy issues, and mining laws, policies, and programs.

Debi Cox: Program Analyst, EEOCounselor, BA in Anthropology. Specialty areas include coordination of interagency and cooperative agreements and project funding.

Kris Parker: Lead Administrative Assis¬tant, EEOCounselor. Specialty areas include conference and meeting planning and coor¬dination, PMIS, and report coordination and editing.

Carol Liester: Purchasing Assistant. Spe¬cialty areas include procurement, property management, and GSA vehicle coordination.

Laura Pascavis: Colorado State University Archivist, Web Developer, MA in Archival Science, BA in History with specialization in environmental and western history.

Glenn Patterson: Colorado State University Research Associate serving as advisor to the NPS Water Resources Division for USGS Water Activities. Specialty areas include hydrology, water quality, sedimentation, and program coordination.

OCEAN AND COASTAL RESOURCES BRANCH STAFF

Jeffrey Cross: Branch Chief, PhD in Marine Fisheries, MS and BS in Zoology. Speciality areas include marine and freshwater ecology, fisheries biology, and natural resource management.

Eva DiDonato:

Kristen Keteles: Texas A&M University Coastal Watershed Condition Assessment Coordinator, PhD in Zoology, BS in Marine Science. Specialty areas include aquatic toxi¬cology, marine ecology, assessment of coastal water resources, and trace metal contamina¬tion.

Cliff McCreedy: Marine Management Specialist, BA in Political Science with career emphasis on regulatory and ocean policy. Specialty areas include marine resource management and planning, marine protected areas, coral reefs, coastal watershed assess¬ment, and interagency marine partnerships.

PLANNING AND EVALUATION BRANCH STAFF

Mark Flora, Branch Chief, Hydrologist, MS in Environmental Science (Water Resources). Specialty areas include water resources planning, water quality and watershed management.

Joel Wagner, Wetlands Program Team Leader, MS in Environmental Science (Water Resources). Specialty areas include wetlands science, hydrology, restoration and regulatory issues.

Kevin Noon, Wetland Specialist, PhD in Wetland Ecology. Specialty areas include wetland evaluation, management, restoration, and regulatory issues.

John Wullschleger, Fisheries Program Team Leader, MS in Fish and Wildlife Science. Specialty areas include freshwater invertebrates, marine intertidal biota, fluvial ecology, and stream habitat restoration.

Jeff Wagner, Fisheries Biologist (SCEP), BS in Aquatic Biology with a minor in fisheries biology. Specialty areas include native fish restoration and stream habitat restoration.

David Vana-Miller, Water Resources Planning Program Team Leader, MS in Marine Biology. Specialty areas include water resources planning, aquatic and marine resources management, water quality, and measures of biotic integrity.

Don Weeks, Hydrologist, MS in Geology (Hydrogeology). Speciality areas include water resources management planning, ground-water monitoring, and wetland management.

Lael Wagner, Administrative Assistant.

Jeff Wagner, Fisheries Biologist (SCEP), BS in Aquatic Biology with a minor in fisheries.

WATER OPERATIONS BRANCH STAFF

Gary Rosenlieb: Branch Chief, Water Quality Program Team Leader, MS in Water Resources. Specialty areas include water quality (chemistry and microbiology), ground-water quality, and hazardous materials management.

Jeff Albright: Watershed Condition Assessment Program Coordinator, MS in Watershed Management. Specialty areas include hydrology data collection and data man¬agement protocols, watershed assessments, integration of science and policy in resource protection/restoration programs.

Gary Smillie: Hydrology Program Team Leader, Hydrologist/Hydraulic Engineer, MS in Civil Engineering. Specialty areas include flood frequency analysis, open channel hydraulics, floodplain management, and sedi¬ment transport.

Dean Tucker: Information Management Program Leader, Natural Resource Special¬ist, PhD in Forestry. Specialty areas include data management and reporting, hydrographic analysis, computer graphics, and water resources applications in GIS.

Larry Martin: Hydrogeologist, MS in Hydrology. Specialty areas include ground-water management, ground-water modeling, surface-water/ground-water interactions, water supply development, and source water protection.

Pete Penoyer: Hydrogeologist, Associate in Hazardous Materials, MS in Geology, Professional Degree in Hydrogeology. Specialty areas include ground-water analysis, ground-water contamination, site assessments under CERCLA, and water quality monitoring.

Rick Inglis: Hydrologist, BS in Watershed Science. Specialty areas include field hydro¬logic data collection and analysis, watershed condition and riparian zone assessment and management, and stream restoration.

Michael Martin: Hydrologist, BS in Environmental Geology, MS in Watershed Science. Specialty areas include open channel flow, geomorphology, flood analysis, wetlands hydrology, geochemistry, and water quality.

Barry Long: Hydrologist, BS in Watershed Sciences, MS in Forest Hydrology. Specialty areas include physical-chemical aspects of water quality.

Roy Irwin: Senior Contaminants Specialist, PhD in Biology. Specialist in environmental contaminants, ecological/biological aspects of water quality, monitoring study design and development, measurement uncertainty, and QA/QC issues.

Mike Matz: Colorado State University Research Associate, Water Quality Database Manager, MS in Civil Engineering. Specialty areas include water quality planning and management, inventory and monitoring, and data analysis.

Nathan Elder: Colorado State University Research Associate, STORET Database Project, BS in Watershed Science.

Paula Galloway: Colorado State University Research Associate, NPSTORET Database Project, PhD in Chemical Engineering.

Caroline Goughis: Colorado State University Research Associate, STORET Database Project, MS in Marine Sciences.

Jia Ling: Impaired Waters Database Manager. B.S. in Wildlife Biology and presently a Master's Degree Candidate in Forest Science. Specialty area is GIS.

Pat Wiese: Colorado State University Ad¬ministrative Assistant, BS in Biology, MA in Public Administration. Specialty areas include editing and report production.

WATER RIGHTS BRANCH STAFF

Chuck Pettee: Branch Chief, Supervisory Hydrologist, MS in Watershed Science. Specialty areas include water rights establishment and protection and water resources policy.

Bill Hansen: Supervisory Hydrologist, Adjudication Program and Information Management Program Leader, BS in Watershed Science, MS in Hydrology. Specialty areas include water rights policy and adjudication, surface-water hydrology, and wild and scenic rivers.

Dan McGlothlin: Supervisory Hydrologist, Monitoring and Enforcement Program Leader, BS in Watershed Hydrology. Specialty areas include water rights establishment and protection and water resources policy.

Jennifer Back: Hydrologist, MS in Watershed Science. Specialty areas include ground- and surface-water interactions and stable isotopes.

Paul Christensen: Hydrologist, MS in Geology. Specialty areas include hydrogeology, water resources, and water rights.

Paula Cutillo: Hydrologist, PhD in Hydrogeology. Specialty areas include subsurface hydrodynamics and hydrogeologic modeling.

Chris Gable: Hydrologist, BS in Watershed Science. Specialty areas include surface- water hydrology, field methods, instrumentation, and data analysis.

Gwen Gerber: Hydrologist, BS and MS in Geology. Specialty areas include hydrogeol¬ogy and surface-water data collection.

Jim Harte: Hydrologist, BS in Forestry/Watershed Sciences. Specialty areas include surface-water hydrology, sediment transport, and watershed management.

Jeff Hughes: Hydrologist, MS in Watershed Sciences. Specialty areas include water rights and surface-water hydrology.

Eric Lord: Water Rights Specialist, BS in Mineral Land Management, JD, MS in Forestry.

Bill Van Liew: Hydrologist, BS in Civil Engineering, BS in Geology, MS in Ground-Water Engineering/Environmental Hydrogeology. Specialty areas include ground-water hydrol¬ogy and ground-water/surface-water interac¬tions.

Mark Wondzell: Hydrologist, BS in Forestry, MS in Agricultural Engineering.

Joseph Chafey: Colorado State University Research Assistant, BS in Natural Resource Management with a minor in Watershed Science. Specialty areas include ground- and surface-water data processing.

Kathryn Converse: Hydrology SCEP, BS in Earth Sciences, Masters Degree Candidate in Anthropology, International Development. Specialty areas include ground- and surface-water data collection and processing.

Mallory Hall: Colorado State University Student Assistant. Bachelor's Degree Candidate in Geology with a minor in Watershed Sciences.

Flora Romero: Colorado State University Administrative Assistant. Associates Degree in Business. Specialty area is water rights quantification and protection projects.

Sharla Stevenson: Colorado State University Research Assistant, BS in Agriculture, Masters Degree Candidate in Watershed Science. Specialty areas include hydrologic modeling and geographic information systems.

Water Resources Division
Summary of FY09 Accomplishments
September 2010

National Park Service

Director	Jonathan Jarvis

Natural Resource Stewardship and Science

Associate Director	Bert Frost
Deputy Associate Director	Beth Johnson

Natural Resource Program Center

Director	George Dickison
Chief, Air Resources Division	Christine Shaver
Chief, Biological Resources Management Division	Jerry Mitchell
Chief, Environmental Quality Division	Tamara Whittington
Chief, Geologic Resources Division	Dave Steensen
Chief, Water Resources Division	Bill Jackson

Credits

Editing	Lael Wagner/Pat Wiese
Project Coordinator	Kris Parker
Layout and Design	Laura Pascavis

Published electronically on the World Wide Web. Please see www.nature.nps.gov/water/wrdpub.cfm.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated island Communities.

National Park Service
U.S. Department of the Interior

Natural Resource Program Center

Water Resources Divison
National Park Service
1201 Oakridge Drive, Suite 250
Fort Collins, CO 80525

EXPERIENCE YOUR AMERICA™