



Photo Credit (Jane Jackson, 2009)

**Water Resources Division**  
Natural Resources Program Center  
1201 Oakridge Drive, Suite 250  
Fort Collins, CO 80525





# Water Resources Division

## SUMMARY OF FY08 ACCOMPLISHMENTS





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

National Park Service

U.S. Department of the Interior  
Washington, DC

Front page photo: Lily Lake at Sunset, Rocky Mountain National Park (NPS, 2008)

Photos located to the next page: Acadia National Park (NPS 2008), Dry Tortugas National Park (NPS 2008), Black Canyon of the Gunnison National Park (NPS 2008), Lake Mead National Recreation Area (NPS 2008), Virgin Islands National Park (Laura Pascavis, 2008)

This entire publication, including useful embedded hyperlinks, is available in PDF format at: <http://www.nature.nps.gov/water/wrdpub.cfm>



Canoeing in Acadia National Park (Manski, 2008)

*The Water Resources Division of the National Park Service Natural Resource Program center is responsible for providing water resources management policy and guidelines, planning, technical assistance training, and operation support to units of the National Park System. Program areas include water rights, water resources planning, regulatory guidance and review, hydrology, water quality, watershed management, ground water, fishery and marine resources management, and aquatic ecology.*

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River Otter, Rocky Mountain National Park (NPS, 2007)



## Comments from the Division Chief

Bill Jackson, PhD

For 18 consecutive years as standard business practice, the National Park Service's Water Resources Division (WRD) has developed a full accounting of its fiscal year budget, including a summary of accomplishments and services provided to the various units of the National Park system. This report provides that accountability for FY08. 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.

The activities of the Division include: water resources policy formulation and guidance; securing and protecting NPS water rights and water resources; planning assistance and regulatory reviews; water resource inventories and monitoring; identification, evaluation, and mitigation of existing and potential threats to park water quality and quantity; floodplain and flood hazard analyses and delineation; natural resource condition assessment and watershed management; protection and restoration of wetland and riparian habitats; assessment and management of fish and aquatic resources; ocean and coastal resource management; river assessment and restoration; locating and testing surface and ground water sources for potable water needs; and conducting and funding projects and studies in support of water resource needs.

In FY08, WRD hosted what has become a regular biennial gathering of park, network, and region-based water and aquatic resource professionals from throughout the National Park Service. This meeting highlighted the continuing strength and accomplishments of long-standing WRD water resources programs, such as water rights protection and wetland compliance and restoration. What was particularly noteworthy, however, is the extent to which the NPS water resources mission has expanded, both in scope and in field based capacity.

Six years ago, WRD supported no park-based professional positions; we now support over a dozen. Six years ago, WRD supported no continuing monitoring of water quality in parks; we now support water quality monitoring efforts in all 32 Inventory and Monitoring Program Networks. As recently as the past two years, WRD has established a new branch of Ocean and Coastal Resource Management and participated in the formation of a new NPS Wild and Scenic Rivers Program. We recently formalized relationships with NOAA and strengthened our partnerships with USGS. Finally, WRD has gone to great effort to think outside our organizational box and to treat park water resource issues in a more interdisciplinary context. We've worked hard to expand the scope of water resources planning to be more interdisciplinary, and we have expanded the concept of watershed conditions to include the overall natural resource (or ecological) conditions of watersheds.

As we look forward to FY09 and beyond, we can't help but to be humbled by the even greater demand that will be placed upon the National Park Service to protect park water resources. Climate change will challenge previous assumptions about the availability of water to park ecosystems and highlight the need to manage for resiliency and adaptation. We also know that climate change, as well as a push to be less dependent upon foreign energy resources, will increase water demands for energy production (both traditional and renewable), thereby increasing the challenge of protecting park water resources. As an organization, we will view climate change, ocean resource management, energy independence, population growth, and water development as reasons to strategically address organization and staffing issues. We want to insure that the WRD of the future is well-positioned to support the core NPS mission in a changing world.

While the scope of issues addressed by WRD continues to expand and the capacity of our agency strengthens, the primary focus of WRD is, as it has always been, on providing the highest level of support possible to parks in addressing their water and aquatic resources related issues. Our greatest sense of satisfaction comes from knowing that our efforts have helped parks make a difference in the condition of resources "on the ground" (or "in the water"). Knowing that we helped make a difference is made all the more rewarding by the opportunity we have to work with such a great group of park managers and natural resource specialists. We thank all of you for the opportunity to work with you.

Examples of significant accomplishments of the Division for FY08 are listed in the sidebar to these comments. Several short articles follow that provide additional information on several of the most interesting or significant of the Division's 2008 activities. A listing of all WRD accomplishments, and those of our field-supported aquatic resource professionals, is included in Appendix A. brary also included works on architecture.



## Examples of Significant FY08 Accomplishments of the Water Resources Division

- Completed the publication of the Bandelier National Monument Water Resources Foundation Report and the Guadalupe Mountains National Park Physical Resources Stewardship Report.
- Revised and reissued NPS Procedural Manual #77-1: Wetland Protection.
- Participated in negotiations with other Federal agencies, including the Bureau of Reclamation, U.S. Fish and Wildlife Service, Western Area Power Administration, and Bureau of Land Management, as well as the State of Colorado, county and city governments, and private water users to quantify the park's Federal water right and to develop a Gunnison River management strategy that protects private property, Federal and State river management interests, and natural resources at Black Canyon of the Gunnison National Park .
- Provided technical support and funding for wetland restoration projects in several NPS units, including Sequoia National Park, Grand Teton National Park, Point Reyes National Seashore, Rocky Mountain National Park, Channel Islands National Park, Fire Island National Seashore and Lewis and Clark National Historical Park.
- Represented the National Park Service on the Incident Command Team for the interagency effort to prevent the extinction of the Devils Hole pupfish (*Cyprinodon diabolis*).
- Completed and co-authored the publication of the *Fishery Management Analyses for Reef Fish in Biscayne National Park: Bag and Size Limit Alternatives*.

- Provided technical support and funding to Incident Command Teams in the development of the Emergency Prevention and Response Plan for Viral Hemorrhagic Septicemia within the Lake Superior Basin and the Quagga Mussel Planning and Response Guide for NPS units in the Intermountain and Pacific West Regions.
- Secured a water right decree from the Colorado Water Court that protects all groundwater within Great Sand Dunes National Park.
- Facilitated the creation of the Wild and Scenic Rivers Program Steering Committee and provided leadership for the development and implementation of a Program Action Plan.
- Coordinated and cooperated with the Southern Nevada Water Authority (SNWA), USFWS, BLM, and BIA to develop a groundwater monitoring, management, and mitigation plan that will protect water-related resources at Lake Mead National Recreation Area while the SNWA withdraws water from aquifers in the Delamar, Dry Lake, and Cave Valleys of Nevada for municipal water supply.
- Through the Natural Resource Challenge Vital Signs Monitoring Program, initiated a water quality monitoring program in 32 monitoring networks that focuses on the support of protected uses through water quality standards as developed by the states and the characterization and determination of trends in water quality conditions due to influences like climate change and urbanization.
- Provided technical and policy support for 18 Floodplain Statements of Findings that included Halstead Meadows Road Reconstruction at Sequoia and Kings Canyon National Parks and the Oconaluftee Visitor Center at Great Smokey Mountains National Park.
- Through the USGS-NPS Water Quality Partnership Program, selected five projects for funding in FY09 at Kaloko-Honokahu National Historical Park, Yosemite National Park, Sequoia and Kings Canyon National Parks, Hopewell Furnace National Historic Site, Wind Cave National Park, and Everglades National Park.
- Established a new Ocean and Coastal Resources Branch in the Water Resources Division, Natural Resources Program Center and hired Dr. Jeff Cross to head up the new program.
- Worked with NPS Director on announcement and coordination of servicewide Ocean Park Stewardship Action Plan. Established an NPS oceans website. Re-established an NPS ocean park task force and supported development of regional ocean strategies in Northeast and Southeast Regions.
- In coordination with the NPS Geologic Resources Division, hosted a workshop on benthic habitat mapping to help recommend benthic inventory standards and protocols, and initiated prototype benthic habitat mapping projects in five parks.



## 2008 NPS Aquatic Professionals Meeting

Barry Long, Hydrologist  
Water Operations Branch



In order to facilitate more integrated program planning, implementation, and accountability and to promote technology transfer and professional collaboration among park aquatic professionals, WRD periodically holds an aquatic professionals meeting. The 2008 meeting was the seventh time this meeting has been held; the last one was in November 2004. In past years, the opportunity to get together and discuss issues, programs, and technical projects with our NPS professional colleagues has proven to be both fun and extremely valuable to the participants. The key to the success and usefulness of these meetings has been the ability to participate in discussions and share project work with others.

The 2008 meeting, titled Challenges to NPS Water Resources Management Across the Headwaters to Oceans Continuum, was held in Fort Collins on February 12-14. The plenary and technical sessions explored a variety of important topics to parks, including 1) adapting aquatic science to changing conditions in upland and coastal environments; 2) integrating aquatic science, management, and planning; 3) responding to threats and emerging issues; and 4) using new technologies to address those issues. About 160 park professionals and guests participated.

Several prominent speakers gave presentations and/or participated on panels, including Dr. Charles Hawkins from Utah State University, Dan Kimball from Everglades National Park, Dr. N. LeRoy Poff from Colorado State University, Dr. Alexander MacDonald from NOAA, Bob Krumenaker from Apostle Islands National Lakeshore, Patrick Malone and Nat Kuydendall from the Denver Service Center, George Dickison from the NRPC, Dave Reynolds from the Northeast Region, and Dr. Bert Frost, the NPS Associate Director for Natural Resources Stewardship and Science.

In addition to presentations on the themes above, there were sessions on Vital Signs water quality, wetland restoration, surface water hydrology, coastal resources, aquatic biology, water rights and water quantity protection, watershed condition assessment, groundwater, water quality and data management, adaptive marine management, fisheries and aquatic ecology, and wild and scenic river management. A poster session was held in the evening on the first day. The meeting presentations can be viewed at [http://www.nature/water/Aquatic\\_Professionals/index.cfm](http://www.nature/water/Aquatic_Professionals/index.cfm).

Photo Credits from left to right: Glen Canyon National Recreation Area (NPS, 2008); Great Blue Heron, Everglades National Park (NPS, Rodney Cammauf); Black Canyon of the Gunnison National Park (NPS, 2008); Lake Trout, Yellowstone National Park (NPS, 2008)

# Ocean and Coastal Resources Branch Highlights

Jeffrey Cross, Chief  
Ocean and Coastal Resources Branch

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, developing servicewide ocean policies and programs, and providing technical assistance and support to parks.

On December 1, 2006, the Director released the Ocean Park Stewardship Action Plan, which was developed in consultation with park superintendents and the National Leadership Council. The 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 in the National Park System. 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.

Rebecca Beavers, Coastal Geology Coordinator in the Geologic Resources Division, and Julia Brunner, Policy Specialist in the Geologic Resources Division, were the acting branch chiefs from October 2007 to June 2008. Jeff Cross became the permanent branch chief in June 2008. The acting and permanent branch chiefs provided 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 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. Partnership strategies were identified as priorities in the 2006 Ocean Park Stewardship Action Plan.

During 2008, OCRB staff provided a variety of servicewide and park specific technical assistance, coordinated multiple Coastal Watershed Assessment projects, and began a Benthic Habitat Mapping Program in five 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/conserv.htm](http://www.nps.gov/pub_aff/oceans/conserv.htm) and <http://www.nature.nps.gov/water/marine.cfm>.

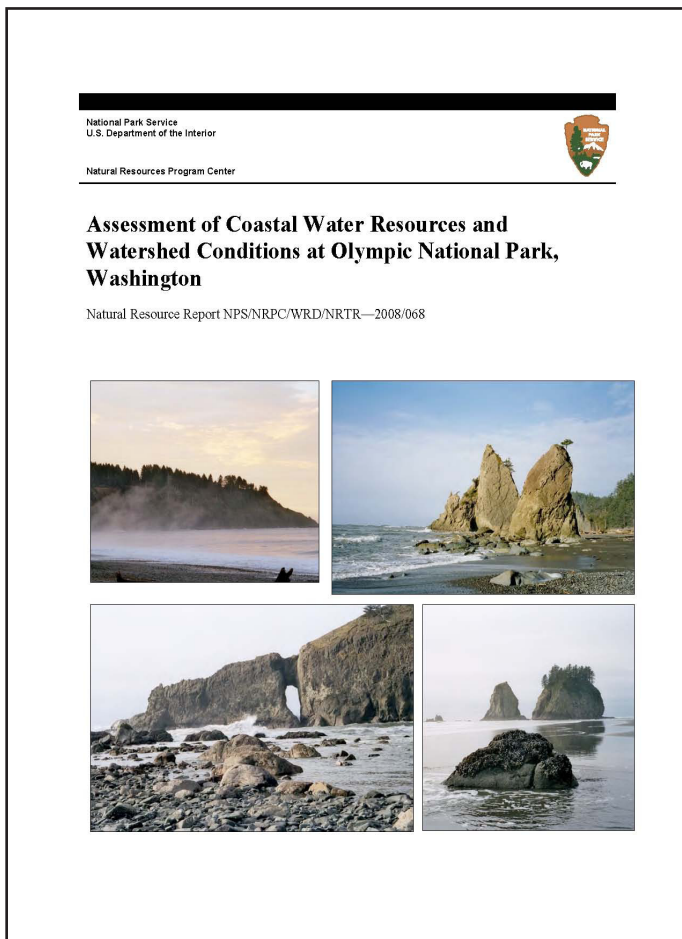


Acadia National Park. Photo credits listed above.

# Coastal-Marine Natural Resource Condition Assessment for Olympic National Park Offers Insights

Eva DiDonato, Marine Pollution Ecologist  
Planning and Evaluation 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, 25 of these reports have been published, and 22 others are in progress. In FY08, one assessment report for Olympic National Park (OLYM) was published, and assessments were initiated in four coastal parks—Assateague Island National Seashore, Canaveral National Seashore, Kalaupapa National Historical Park, and Isle Royale National Park.



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

- Inadequate marine water quality monitoring data limits the ability of NPS to detect water quality problems related to water quality standard exceedances.
- Areas of concern for OLYM coastal resources include: harmful algal blooms, non-native and invasive species, harvest and collection of organisms, aquaculture, shoreline development, recreation, habitat modification, coastal erosion, marine debris, fuel and oil spills, land use practices, tsunamis, sea level rise, and climate change.
- Projected climate change impacts on water resources in the Pacific Northwest (such as increased winter stream flow, reduced snowpack, earlier snowmelt, earlier peak runoff, and reduced summer stream flow) present potential management implications.

# Mapping Submerged Habitats in Ocean and Great Lakes Parks

Jeff Cross, Chief

Oceans and Coastal Resources Branch

In 2008, the Water Resources Division and the Geologic Resources Division 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.

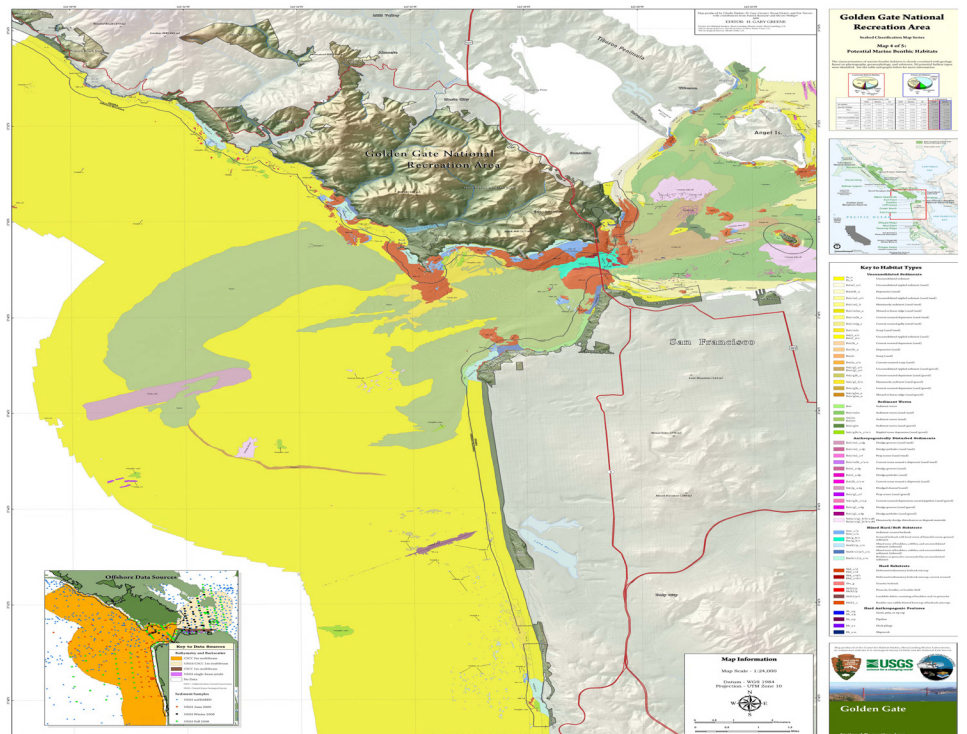
Park managers face ever increasing impacts from coastal development, recreational use, land-based pollution, non-native species, and climate change. To address these issues effectively, comprehensive knowledge about the type, geographic extent, and condition of submerged resources within parks is necessary. Unlike terrestrial units, managers 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.

The general lack of resource knowledge accentuates the need for a servicewide program that helps ocean and coastal park managers meet the minimum standards for submerged resource information. Due to the specialized nature of data acquisition for mapping submerged resources, a dedicated program is needed to acquire this information.

In 2008, the NRPC partnered with USGS and NOAA on pilot benthic mapping projects in Glacier Bay National Park and Preserve, Golden Gate National Recreation Area, Sleeping Bear Dunes National Lakeshore, Gulf Islands National Seashore, Virgin Islands National Park, and Virgin Islands Coral Reef National Monument. These projects mark the beginning of a servicewide ocean and Great Lakes habitat mapping program that provides technical guidance to parks and I&M networks in partnership with USGS, NOAA, states, and academia.

The NRPC is also working with NOAA and NatureServe through the Federal Geographic Data Committee process 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. Developing a classification scheme that can support site-specific maps (high level of detail) and national maps (lower level of detail) is important and is a primary challenge of this program.

*Submerged habitat map for Golden Gate National Recreation Area shows that benthic habitats are closely related to the geology of San Francisco Bay and the Pacific Ocean.*



# PLANNING AND EVALUATION BRANCH HIGHLIGHTS

Mark Flora, Chief

*Planning and Evaluation Branch (PEB) activities in FY08 were focused upon: (i) expanding upon recent efforts to implement a new suite of planning products that better integrate natural resource and science information into the NPS planning process, (ii) providing and updating Servicewide policy and guidance for the protection of NPS wetlands and fisheries resources, (iii) providing programmatic oversight and funding accountability for WRD and NRPC funded projects, and (iv) providing direct support to NPS units in the areas of water resources planning, wetlands and restoration, and fisheries restoration and management.*

With the completion and publication of the Bandelier National Monument Water Resources Foundation Report and the Guadalupe Mountains National Park Physical Resources Stewardship Report, PEB's planning program continued efforts to extend natural resource and science support to the NPS planning process. For these reports, WRD collaborated with the Geological Resources Division and Air Resources Division to expand the scope of earlier efforts beyond water resources and successfully encompass a full suite of physical resources, including water, air, geology, and soils. Building upon this success, the PEB initiated efforts to further expand support to include biological resources in an integrated NRPC-wide effort to support and guide Resource Stewardship Strategies development in pilot efforts targeted at Pecos National Historical Park and Valley Forge National Historical Park.

Technical support was also provided by the Planning Program leading to the completion of a Water Resources Information and Issues Overview for Katmai National Park and Preserve and Alagnak Wild and Scenic River. This report provides a compilation and synthesis of pre-existing data pertaining to water resources to gain a better understanding of water related management issues affecting these Alaskan parks.

During the year, the PEB's Wetlands Protection Program provided extensive support to the field relating to wetlands regulatory issues, wetland condition and functional assessment, and wetlands restoration. A major accomplishment in FY08 was the revision and re-issuance of NPS Procedural Manual #77-1: Wetlands Protection. This procedural manual, originally developed in 1998 for use by the National Park Service in carrying out its responsibilities to protect wetlands under Executive Order (E.O.) 11990, has been the guiding procedural document for the last decade for policies, requirements, and standards for implementing the executive order. The revision and re-issuance of the procedural manual provided an opportunity to incorporate information and lessons learned in administering this program over the last ten years.

In the regulatory arena, PEB wetlands specialists worked closely with the Alaska Regional Office to develop a Wetland Mitigation Banking Program and Umbrella Mitigation Bank Instrument for Alaskan parks within the Alaska Region of the National Park system. PEB wetlands specialists also worked closely with Padre Island National Seashore to assure appropriate wetlands compliance was undertaken as part of a significant increase in proposed oil and gas related activities within these units.

The Wetlands Protection Program also provided technical assistance 1) to National Capital Parks-East to develop a wetlands management plan for several large emergent wetland complexes along the Anacostia River, 2) to Sequoia National Park to complete the Upper Halstead Meadow restoration project, 3) to Ebey's Landing National Historical Reserve to complete a resource condition assessment / feasibility study for restoring a 600 acre pocket estuary, and 4) to Fire Island National Seashore, Channel Islands National Park, Lewis and Clark National Historical Park, and Point Reyes National Seashore in efforts that will lead to the restoration of coastal wetland resources.

In FY08, PEB's Fisheries Management Program provided technical assistance to more than 15 parks and regional offices, including involvement in such high profile issues as the management of the Devils Hole pupfish at Death Valley National Park, the response to the introduction of the invasive quagga mussel into waters of the Intermountain and Pacific West Regions, the development of an emergency prevention and response plan for the potential introduction of Viral Hemorrhagic Septicemia into the Lake Superior, and the restoration of native greenback cutthroat trout in Rocky Mountain National Park.

The Fisheries Management Program also continued a five year program of native fish and fish habitat restoration within low-fee collection parks under the Servicewide 20% Fee Funding Program. FY08 efforts focused upon research of coaster brook trout habitat at Pictured Rocks National Lakeshore, stream crossing mitigation and habitat restoration efforts for endangered mussels at Big South Fork National River and Recreation Area, fish habitat restoration efforts at Point Reyes National Seashore and Santa Monica Mountains National Recreation Area, and exotic fish removal / native fish restoration activities at North Cascades National Park.

A big loss to the Fisheries Program in FY08 occurred with the retirement of Jim Tilmant after more than 40 years of federal service. However, Jim's position was filled by John Wullschleger, who worked with Jim in this program for the past ten years.

The responsibility of the programmatic oversight and completion of coastal assessments (initiated in FY04 and FY05) and natural resource condition assessments for coastal parks (initiated in FY06-08) was transferred to the newly established Ocean Coastal and Resources Branch in February 2007. PEB continues to support the OCRB by providing programmatic oversight and technical assistance in the completion of Natural Resource Condition Assessment pilot studies at Acadia National Park and Sleeping Bear Dunes National Lakeshore, which are planned for publication in FY09.

During the course of FY08 PEB, staff has provided: programmatic oversight, technical review, and guidance for 63 active NRPC funded projects totaling over \$5.7 million dollars of multi-year Natural Resource Challenge funding; technical advice, policy review, and regulatory review for seven wetlands statement of findings / wetland compliance reviews; servicewide review and comment on six EIS/EA environmental compliance documents; and policy review of the water related aspects of eight 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 have had during this year to directly serve parks by providing technical support at the request of regional, network, and park staffs. In FY08, PEB provided project oversight and/or technical assistance to all seven NPS regions offices, three Inventory and Monitoring Program Network offices, and 82 individual park units. The Planning and Evaluation Branch is proud to be part of the National Park Service and looks forward to being of continued service to the units of the National Park system throughout FY09!



Wild Basin Area, Thunder Lake, Rocky Mountain National Park (NPS, 2008)

## Expanding the Integration of Science into Park Planning and Management

Don Weeks, Hydrologist

David Vana-Miller, Planning Program Leader

Planning and Evaluation Branch

Voiced by Denver Service Center planners, park superintendents, and resource management staff is the need to bring sound science early to the planning table to help guide parks towards appropriate management of their priority resources.

The Water Resources Division teamed with the Geologic Resources Division in 2008 on a NRPP funded project that expands the Natural Resource Program Center's ability to assist parks with the integration of science into park planning and management. The project brings in natural resource staff from parks and regions to support a park's Foundation for Planning and Management (Foundation Statement), with oversight by NPRC staff.

The park Foundation Statement is a pre-General Management Plan planning document that defines the legal and policy requirements that mandate the park's basic management responsibilities.



The Foundation Statement also describes the resources, values, and priorities that are fundamental to achieving the park's purpose and maintaining its significance. This is the first step in the park planning framework and sets the stage for a park's GMP and Resource Stewardship Strategy.

In working with the NPS Intermountain Region, three parks in line to develop Foundation Statements were selected, and NPS staff with expertise in geologic and/or water resources was selected for these three efforts: White Sands National Monument—Jeff Bennett (Big Bend National Park) and Doug Wilder (NPS Midwest Region), Pipe Springs National Monument—Dave Sharrow (Zion National Park), and Big Thicket National Preserve—Bob Sobczak (Big Cypress National Preserve).

Park meetings, field trips, and the accumulation of park-specific natural resource information were accomplished in 2008. In 2009, the information collected and knowledge gained in 2008 will be used to produce a Physical Resources Foundation Report for each of the three NPS units, concentrating on water and geologic resources. This report will serve the unique information needs for water and geologic resources once the park's Foundation Statement effort begins.



Photo credits: Above, White Sands National Monument (Weeks, 2008); to the left, Big Thicket National Preserve (Sobczak, 2008)

## NPS Issues Revised Wetland Protection Procedures

Joel Wagner, Wetlands Program Lead  
Planning and Evaluation Branch

The Wetlands Program is responsible for developing the NPS wetland protection policies and procedures found in Director's Order #77-1, Procedural Manual #77-1, and NPS Management Policies ([www.nature.nps.gov/policiesguidance/index.cfm](http://www.nature.nps.gov/policiesguidance/index.cfm)). These documents include a "no-net-loss of wetlands" policy, which requires avoiding, minimizing, and compensating for adverse wetland impacts resulting from activities on NPS-managed lands. If a proposed action would have such impacts, then compliance with these policies and procedures must be recorded in a Wetland Statement of Findings (WSOF).

One of the most important Wetlands Program functions is to the review and certification of WSOFs by the WRD Chief. During this process, staff members advise parks on ways to avoid or minimize wetland loss, and help identify opportunities for wetland compensation. For 56 WSOFs certified by WRD since 2001, wetland impacts were limited to a total of 132 acres, and commitments to restore damaged or lost wetlands as compensation exceeded 298 acres. This compensation ratio of more than 2:1 has helped assure consistency with the NPS no-net-loss of wetlands policy.

By 2007, the existing version of Procedural Manual #77-1 had been in place for 10 years—long enough for WRD to learn where some clarifications would be helpful and where some information and procedures needed to be updated or streamlined. In fall 2007, WRD completed a draft revision and solicited review from a panel of 10 NPS subject matter experts and frequent users of the manual. The panel included representatives of all 7 Regions plus the Denver Service Center. The excellent input from the respondents was carefully considered and addressed in the final draft, which was released for Servicewide review in early winter 2008.

The final revision of Procedural Manual #77-1 was issued in February 2008. Changes and additions included:

- a flow chart to help guide users through the wetland compliance process
- guidance on how to delineate wetlands so that both NPS and Clean Water Act wetland definitions and compliance processes are addressed
- a new "excepted action" for minor stream crossings for underground utility lines
- clarification of the required content for WSOFs

- recommended qualifications for wetland delineators
- clarification of public review and signature procedures for WSOFs (conformity with the revised DO-12 and the DO-12 Handbook procedures)
- updated guidance on wetland mitigation banking.

WRD will continue to monitor implementation of NPS wetland protection policies and procedures, with an eye toward future updates, clarifications and streamlining, as needed.



Volunteers from Wildlands Restoration (Boulder, CO) install native wetland plants at the former Glacier Creek Livery site, Rocky Mountain National Park (NPS, 2006). Removal of the livery facilities and restoration of former wetlands there served as compensation for unavoidable wetland impacts at other park locations.



## NPS Alaska Region Wetland Mitigation Banking Program

Kevin Noon, Natural Resource Specialist, Planning & Evaluation Branch  
Glen Yankus, Environmental Protection Specialist, Alaska Regional Office



NPS Alaska Region Wetland Mitigation Program: ORV Damage - Wetland Restoration Opportunity, Wrangell-St.Elias National Park and Preserve (Kevin Noon, 2008)

The NPS has adopted the goal of “no net loss of wetlands” in our national parks. To achieve this goal, WRD implements the Director’s Order #77-1: Wetland Protection, which states that adverse impacts to wetlands caused by development project activities on NPS lands must be compensated.

Most parks have a continuous need to alter their landscapes (and sometimes impact wetlands) resulting from a variety of development projects, including facility and infrastructure expansion, road improvements, etc. By carefully working through the alternatives, most projects can be completed with minimal impact to wetland resources. Compensating for necessary wetland impacts in parks in the lower 48 requires an effort to identify degraded areas within the park that can be restored as replacement for the lost wetlands. Because most of our parks have a pre-park development history, finding restoration opportunities is not a difficult task. Restoring the hydrology and vegetation of a drained wetland farm field is an example of a compensation opportunity.

However, finding degraded wetlands that could be restored as compensation for development project impacts is often problematic for Alaska parks. Unlike parks in the lower 48, Alaska parks do not have an extensive pre-park land development history—there are very few wetland restoration opportunities.

Therefore, it is difficult for most Alaska parks to find compensation for each project impact. So, the Alaska Regional Office requested help in resolving this dilemma and, with WRD, developed an NPS Alaska Region Wetland Mitigation Bank Instrument. WRD worked with the region and park staffs to identify the most appropriate, remaining, restoration opportunities that could serve as wetland mitigation banks. The completed restoration becomes the bank, and any Alaska park development project can debit, from the bank, the amount of wetland credit needed. The purpose of the Bank Instrument is to certify and manage the use of the NPS wetland mitigation banks (individual restoration projects) that could provide any Alaska park the means to complete the required wetland compensation (when local park options are unavailable). The instrument was signed by the Alaska Regional Director and the WRD Chief in December 2008.

## Desert Fishes Habitat Partnership

John Wullschlegler, Fisheries Program Lead  
Planning and Evaluation Branch



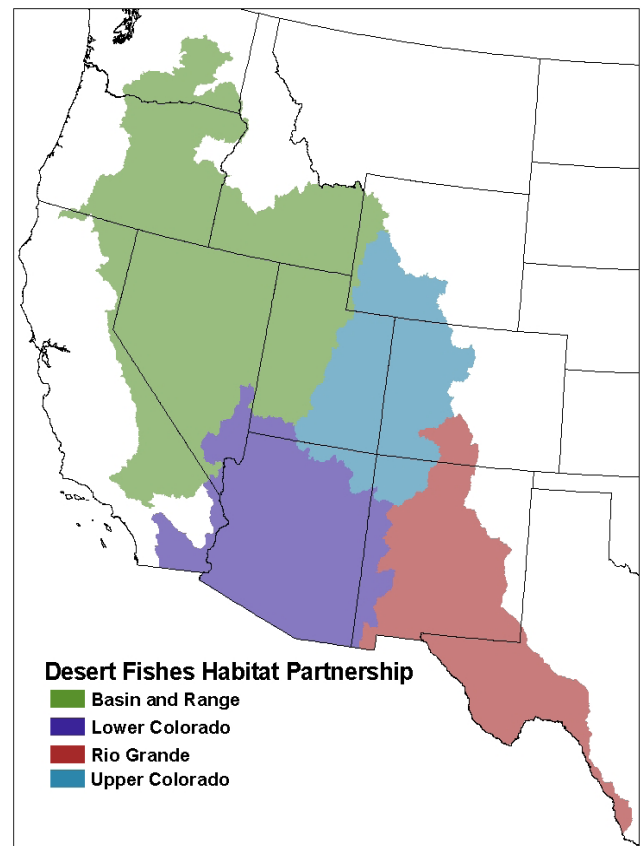
Longfin dace - Aravaipa Canyon (John Wullschlegler, 2008)

About one third of the fish taxa that are native to the fresh waters of North America are found in the desert regions of the southwestern United States and northern Mexico. Because many of these desert fishes are endemic to small, isolated aquatic habitats, they are vulnerable to both local and global environmental change. Extended drought, overgrazing, invasive species, and water development associated with human population growth are all factors that put many of these species at risk. In fact, 39% of the fishes that are listed under the United States Endangered Species Act are native to the Great Basin, Sonora, Chihuahua, or Mojave Deserts.

Many of the NPS units in these arid regions include waters that serve as refuges for desert fishes. However, inclusion within an NPS unit does not guarantee that aquatic habitats, or the native fishes that depend upon them, are immune from impacts and will be secure in the future. Fish populations and the aquatic habitats they occupy may be affected by activities that occur outside park boundaries and outside NPS jurisdiction. Ensuring protection of these resources often requires cooperation with the state agencies, federal agencies, and/or private entities that manage adjacent lands.

The Desert Fishes Habitat Partnership (DFHP) was established to restore and conserve aquatic habitats across the Great Basin, Sonora, Chihuahua, and Mojave deserts inside the United States. Within these desert regions, the DFHP seeks to bring together state and federal agencies, tribes, conservation organizations, and various local partners to establish conservation priorities for species and habitats, to coordinate efforts to maximize efficiency, and to achieve objectives across political boundaries. The DFHP is a candidate partnership under the National Fish Habitat Action Plan (NFHAP; <http://www.fishhabitat.org/>). The NFHAP was developed by a group of fisheries interests for the purpose of preventing the decline of the nation's fish habitats. The NFHAP works primarily through partnerships like the DFHP. These partnerships may be formed around important aquatic habitats, distinct geographic areas, "keystone" fish species, or system types.

development of the DFHP Framework for Strategic Conservation of Desert Fishes. The DFHP website is currently hosted by the NPS Fisheries Program at [http://www.nature.nps.gov/water/DFH\\_partnership.cfm](http://www.nature.nps.gov/water/DFH_partnership.cfm). The Framework and a list of priority species can be downloaded from the site. The DFHP is likely to be recognized as an official partner under the NFHAP in 2009. As the DFHP begins working toward the goals identified in the Framework, it will provide new opportunities for NPS managers to establish relationships with other agencies and organizations and, thus, to leverage resources and increase effectiveness in conserving the desert fishes and aquatic habitats.



The NPS is a member of the DFHP and was involved in the

## Stream Ford Protection Program Big South Fork National River and Recreation Area

Jeff Wagner, Biological Science Technician-Fisheries  
Planning and Evaluation Branch

Steve Bakaletz, Wildlife Biologist  
Big South Fork National River and Recreation Area



Big South Fork National River and Recreation Area (BISO) contains outstanding aquatic features, but it is also a favorite location for horseback riding, bicycling, and hiking. 450 miles of trails meander through 125,000 acres. Inevitably, the trails cross some of the 475 miles of streams, and the crossings are often unprotected fords. In crossing these fords, visitors inadvertently crush organisms, increase erosion, and increase sediment loads. Inhabiting the waters of the Big South Fork River are 128 fish species and 31 mussel species, of which 10 mussel species and three fish species are endangered. To preserve these aquatic species while maintaining the trail system, an innovative stream crossing system was devised by park staff.

The new crossings were made of hardened concrete planks 8 feet by 16 inches laid side by side across the stream atop a bed of gravel and/or rock. Each plank is held in place with a buried steel cable, engineered to withstand high flow events and remain out of sight.



Nine crossings have been installed; 250 more are planned. Monitoring efforts have documented a drastic reduction in the number of specimens crushed and decreased sediment load.



Photo credits top to bottom: BISO workers installing tri-lock block (NPS, 2007); BISO workers installing concrete planks for crossing

## Improving Coho Salmon Habitat at Point Reyes National Seashore

Jeff Wagner, Biological Sciences Technician–Fisheries,

Planning and Evaluation Branch

Ellen Hamingson, Vegetation Biologist, Point Reyes National Seashore



Lagunitas Creek prior to cape-ivy removal (NPS)



Initial cape-ivy removal at Glenbrook Creek. (NPS)

Native Fisheries Restoration Projects have improved fisheries habitat in six parks servicewide in less than three years. The projects have been as diverse as the park habitat and fish species they support, including removal of non-native plant and fish species, construction of stream crossings, and initiation of studies to investigate interactions between invasive and native species. One example is the removal of a non-native plant, cape-ivy, at Point Reyes National Seashore (PORE) in 2007-2008. The project improved Central California Coast coho salmon (*Oncorhynchus kisutch*) habitat by protecting native riparian vegetation along Lagunitas and Glenbrook Creeks.

Cape-ivy (*Delairea odorata*), a vine native to the cape area of South Africa, was introduced to the United States as an ornamental. It has spread to many coastal watersheds in California, where it grows rapidly from fragments as small as 1/4 inch and takes over riparian areas, climbing trees and other plants. Dense mats are formed that block available sunlight, killing the underlying vegetation. Reducing the native riparian vegetation decreases bank stabilization and increases solar radiation exposure, decreasing water quality and raising water temperature, thus reducing habitat for young of the year salmon and other stream inhabitants, including the federally endangered California freshwater shrimp (*Syncaris pacifica*).

Initial cape-ivy removal was conducted at PORE and Golden Gate National Recreation Area between 1999 and 2006 with NRPP funding. This required a multi-year, labor-intensive process. Crews cleared invaded areas to bare ground, removing both above- and below-ground cape-ivy

parts and, where necessary, cutting lower limbs of native trees. All cape-ivy infested vegetative debris was consolidated into piles that were covered with black landscape fabric. Riparian sites were revisited several times a year for at least three years to kill new sprouts before they could spread.

Federal Lands Recreation Enhancement Act 20% Fee Funds have allowed PORE to dedicate part of an AmeriCorps intern's time to seasonal follow-up in Lagunitas and Glenbrook Creeks. After two years, the areas of primary interest have been cleared with little expansion to new areas. The goal of the continued funding is to monitor and control future invasions and to keep riparian vegetation and, in turn, stream health strong for future coho salmon spawning.



Interns, staff and volunteers work on cape-ivy follow-up at Glenbrook Creek (NPS)

# WATER OPERATIONS BRANCH HIGHLIGHTS

Gary W. Rosenlieb, Chief



Grand Teton National Park, (NPS, 2008)

Multyear technical assistance efforts involving the use, and sometimes the misuse, of hydrologic models on some technically contentious issues highlight the Water Operations Branch's (WOB's) efforts this year. For almost five years, WOB has been involved with one groundwater contamination issue that threatens the Great Marsh in Indiana Dunes National Seashore. Pete Penoyer provides an interesting summary of the effects that anthropogenic, topographic alterations can have on reversing groundwater flow and contaminant pathways. Failure to properly detect and calibrate for subtly induced reversals in groundwater models can lead to misleading and erroneous conclusions when they are used to conduct natural resources risk assessments. Mike Martin provides a technical summary of a flood investigation at Little Pine Island Bayou in Big Thicket National Preserve. Mike's work in the field, and associated modeling efforts, supported a decision by the park superintendent not to remove woody debris from the active channel contrary to the desires of the local community. At Cape Cod National Seashore where restoration of tidal flows to East Harbor Lagoon is being considered, Larry Martin constructed a model of the groundwater flow system underlying the Beach Point barrier beach to evaluate the potential for groundwater to flow toward, and discharge to, the East Harbor Lagoon under both existing conditions and with restoration of tidal flow to the lagoon. He was able to demonstrate that contaminant from septic systems and other developed areas would flow away from East Harbor. Hydraulic restoration of wetlands and streams continues to provide numerous challenges to the WOB Hydrology group. Gary Smillie discusses one such effort at Drewry's Bluff in Richmond National Battlefield Park.

Funded servicewide programs managed by the Water Operations Branch include the Watershed Condition Assessment Program, Vital Signs Water Quality Monitoring, and the USGS-NPS Water Quality Partnership. Jeff Albright successfully stewarded the implementation of the Watershed Assessment Program, including initiation of natural resource condition assessments at 35 parks and providing supplemental funding to four park assessments started in previous years.

The Vital Signs Water Quality Monitoring Program provided support, full funding, and technical assistance to all 32 networks. Dean Tucker added new capabilities to NPSTORET this year, including the abilities to compare water quality data to user-defined, state, or national water quality standards and to display the results of water quality analyses spatially using Google Earth. NPSTORET gained increased use outside the NPS among other government entities, including the USGS, the U.S. Agency for International Development, and the Northwest Indian Fisheries Commission. WRD staff cooperated with the EPA, states, and others on developing a STORET database replacement, which should be unveiled next year.

The branch continued to supply technical assistance on a myriad of hydrology and water quality issues. Technical and policy support was provided for 18 Floodplain Statements of Findings. The WOB water quality group provided assistance for the development of a DOI guideline on fish advisories and continued to provide assistance with contaminant and water quality assessments for oil and gas contamination at Big Thicket National Preserve and Padre Island National Seashore.

I can speak for WOB staff in saying that we enjoy working with parks on any water resources management issue. We are available to assist you through a phone call, email, or a visit to your park.

## Landfill Effects on Groundwater Flow Town of Pines Superfund Site and Indiana Dunes National Lakeshore

Pete Penoyer, Hydrogeologist  
Water Operations Branch

Industrial or municipal landfills in close proximity to park resources have the long term potential for groundwater contamination of park resources. It is common practice in the design and construction of industrial and/or municipal waste landfills to not only bury waste below grade, but also to extend construction of the landfill above the land surface to form significant mounds (topographic highs). In humid/higher rainfall areas of the country where the water table may be shallow, organic debris in municipal landfills and finer-grained industrial waste (such as byproducts from coal combustion) tend to develop groundwater mounds beneath these topographic highs. The water table highs develop due to the capillary (upward wicking) effect of materials that are highly organic or are sand to clay size. Radial groundwater flow of contaminant-laden leachate from the landfill site may then develop in this area where unidirectional groundwater flow occurred previously. This local change in the direction of groundwater flow can have unintended consequences as areas that are newly down gradient become impacted from groundwater contaminated by metals and/or organics. When such flow reversals occur, adjacent land owners and natural resources that rely on surficial aquifers become at risk.



Landfill gate. Indiana Dunes National Lakeshore (3008)

The Town of Pines CERCLA site in Indiana lies adjacent to Indiana Dunes National Lakeshore and the Grand Marsh. Here groundwater flow reversals were caused by the construction above grade of the Yard 520 fly ash landfill. Domestic water supply wells that historically were hydraulically up gradient of the North Landfill cell were shown to be down gradient after water level monitoring established the existence of a groundwater high under the fly ash mound and a radial flow pattern away from the site. Due to groundwater flow reversals in the Town of Pines area, Indiana Dunes National Lakeshore and the Grand Marsh are now down gradient of the Yard 520 fly ash landfill.

## Timber for the Stream–Woody Material in a Gulf Coast Bayou

Mike Martin, Hydrologist  
Water Operations Branch

WRD and Intermountain Regional Office staff traveled to Big Thicket National Preserve to perform an on-site reconnaissance of timber blow-down from Hurricane Rita, specifically, to assess its potential to increase flooding conditions along Little Pine Island Bayou (LPIB). Due to the thick riparian vegetation and the numerous sloughs, bogs, and wetland areas that are characteristic of the Big Thicket, the only way to directly observe the flow hydraulics in LPIB was to navigate the channel with small watercraft. The focused intent of floating the bayou was to identify and locate any substantial channel obstructions, specifically woody debris collections that could possibly produce a backwater effect and increase upstream flood elevations.

During our reconnaissance, the water level in the bayou was somewhat elevated due to precipitation on the previous evening. Nevertheless, it was obvious that a large amount of woody debris was present in the channel of LPIB. Most of this woody material was of the brush/branch size with some large logs and living timber also present in the active channel. However, we did not observe any extensive collections of woody debris that could create complete blockages of the active channel and result in substantial increases in flood stage.

The woody debris, brush, and living trees that we did observe in the active channel of LPIB certainly adds to the hydraulic roughness and reduces flow conveyance, raising the stage of flows within a given range. However, this effect is largely contained within the channel during more frequent flows with a diminished overall effect on higher magnitude floods. Infrequent, out-of-bank flows (the types that cause flooding) would only be slightly affected by this in-channel material. Alternatively, woody material in a fluvial system, especially within the active channel, provides several important ecological functions, such as habitat, refuge, and a food/nutrient base. Consequently, we concluded that since no extensive log-jams were present that could affect out-of-bank flows, woody debris within the active channel should remain in the LPIB stream system to support a naturally functioning ecosystem.



One of the more extensive collections of woody debris observed in Little Pine Island Bayou during the reconnaissance trip (NPS, 2007)

## Simulation of Groundwater Flow at Beach Point Cape Cod National Seashore

Larry Martin, Hydrogeologist  
Water Operations Branch



East Harbor, Cape Cod National Seashore (NPS)

Tidal flow to the East Harbor Lagoon (aka Pilgrim Lake) was abruptly cut off in 1868 with the construction of a dike across the inlet between the lagoon and Cape Cod Bay. There is concern that increased development of Beach Point could affect water quality in the East Harbor Lagoon. As small, seasonal cottages are converted to larger, more permanent residences, water use and wastewater effluent increase. Wastewater disposal for residences on the barrier beach is by infiltration through on-site disposal systems (leachfields). Nutrients and contaminants in the wastewater stream would tend to flow toward local groundwater discharge zones. Computer modeling of the groundwater flow system underlying the Beach Point barrier beach was conducted to evaluate the potential for groundwater to flow toward, and discharge to, the East Harbor Lagoon under both existing conditions and with restoration of tidal flow to the lagoon.

The elevation of the water table in the barrier beach fluctuates in response to tides in Cape Cod Bay. The amplitude of tidal fluctuation of the water table decreases with increasing distance from the bay. At high tide, water from the bay infiltrates into the barrier beach, causing the water table to rise. At low tide, groundwater drains from the barrier beach to the bay, lowering the water table. High tide in the bay is about 5 feet above mean sea level (msl). The water surface elevation in the lagoon is about 1.2 feet msl. Computer modeling was conducted to determine whether the hydraulic gradient toward the lagoon at high tide would be persistent enough to cause groundwater from the developed areas of the barrier beach to flow to the lagoon. If that occurred, there would be a potential groundwater pathway for nutrients and contaminants in the wastewater to discharge to the lagoon.

Simulations of groundwater flow showed that the net flow of groundwater is toward Cape Cod Bay under current conditions of restricted tidal flow to the East Harbor Lagoon. Additional simulations of groundwater flow were conducted to evaluate the potential effects of restoring tidal flow to the East Harbor Lagoon. The net flow of groundwater is from the lagoon toward the bay for all conditions that were evaluated.



## Analysis of Bank Erosion at Drewry's Bluff Richmond National Battlefield Park

Gary M. Smillie, Hydrologist  
Water Operations Branch

Drewry's Bluff is a historically important area along the James River in a unit of Richmond National Battlefield Park. The bluff was the location of Fort Darling, a Confederate post overlooking the James River that was used to defend Richmond from Union vessels. The bank of the river is presently experiencing accelerated erosion, and cultural resources are increasingly being threatened. The park is considering stabilizing the banks in this area and asked WRD for advice in developing the least visually and cultural resource obtrusive means possible



Drewry's Bluff, Richmond National Battlefield Park (NPS, 2008)

This portion of the James River is low gradient and subject to tidal influences. The banks here are quite high, estimated to be 60–80 feet. Most of the active erosion is located along the upper third of the bank and occurs as mass failure. While it is impossible to definitively determine the causes for bank instability with a short inspection, it appears that the failures are predominantly caused by pore pressure from groundwater following large precipitation events. The slope is very steep for the present vegetative condition and it is essentially laying back over time to a less steep slope.

The reasons that the slope of the bank is flattening out rapidly at this time may be related to the lack of large trees near the bank. Large trees with their massive root systems can provide structural stability to a steep stream bank. Areas along the top of the bank that had a large tree present appear to be somewhat more stable than other areas of the bank with smaller vegetation.

WRD staff believes the correct course of action to take at this time is to reduce groundwater in the bluff and to plant vegetation to help provide structural strength to the bank over the long-term. A monitoring program should be developed to document changes in the bank. More heavy handed engineering solutions, such as bank revetment, are not recommended until it is determined that the drainage/revegetation option is ineffective.

## Watershed Condition Assessment Program

Jeff Albright, Hydrologist, Water Operations Branch



During 2008, financial and logistical support was provided to Natural Resource Condition Assessment (NRCA) projects underway across all seven regions. Most of the projects started in 2006-07 were nearly complete, and 12 new projects (involving 35 park units) were started. The program also funded studies for 15 high priority, watershed condition issues or emergency actions, including stabilizing the water level of Quitobaquito Pond at Organ Pipe Cactus National Monument, evaluating potential causes of type E botulism on bird populations at Sleeping Bear Dunes National Lakeshore, and repairing erosion features prior to restoration planting at Upper Halstead Meadow in Sequoia National Park.

Photo credits: Organ Pipe Cactus National Monument at sunrise (NPS); Plant restoration at Sequoia National Park (NPS); The Whaleback at Sequoia National Park (NPS).

# WATER RIGHTS BRANCH HIGHLIGHTS

Chuck Pettee, Chief

While working on NPS water rights issues, one gets accustomed to the fact that it often takes a long time to achieve major milestones. Thus, 2008 was a noteworthy year because there were a number of major milestones in protecting NPS resources achieved by the Water Rights Branch (WRB) staff with strong support by affected parks and regions. Standing out amongst the usual outstanding production of science and protective management decisions were:

- A Nevada State Engineer Order establishing a protection zone around Devils Hole, a detached unit of Death Valley NP and home to the endangered Devils Hole pupfish,
- A water right decree for maintaining groundwater beneath Great Sand Dunes NP by the Colorado Water Court, and
- A water right decree for flows in the Gunnison River through Black Canyon of the Gunnison NP by the Colorado Water Court which was based on an agreement reached through negotiations that resolved issues raised by many stakeholder groups to the controversial 2001 federal reserved water right claim.

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 assessment proceedings. Articles follow describing examples of settled issues related to claims filed by Cooke City, MT, near Yellowstone NP and the Southern Nevada Water Authority, upgradient from Lake Mead National Recreation Area. Another article describes the Nevada State Engineer's Order increasing protection for Devils Hole. That Order relies, in part, on previous hearing testimony given by WRB and park staff.

WRB staff continued efforts to collect data and make analyses, investigating the potential for threats to park water-related resources from proposed ground water pumping adjacent to Chickasaw National Recreation Area in Oklahoma, Wind Cave National Park in South Dakota, Niobrara National Scenic River in Nebraska, Great Basin National Park, Lake Mead National Recreation Area, and Death Valley National Park in Nevada, and Kaloko-Honokahu National Historical Park in Hawaii. An article follows that describes data collection and analyses at Kaloko-Honokahu National Historical Park, where such information is critical to protect park water-related resources.

The WRB collected scientific information to support claims for water rights under state and federal law. Examples are: 1) an article below summarizes an assessment of flows required to fulfill an instream flow claim previously filed on Rincon Creek in Saguaro National Park, 2) information collected in preparation for the adjudication of water rights at Montezuma Castle National Monument, and 3) information collected and presented to the Colorado Water court in support of the above-mentioned decree for in-place use of ground water at Great Sand Dunes NP which is described in yet another of the articles that follow.

New in 2008 for the WRB was a share of the NPS-wide leadership responsibility in a newly invigorated Wild and Scenic Rivers Program. Bill Hansen is the national co-lead along with Joan Harn of the Conservation and Outdoor Recreation Programs office under the Associate Director for Partnerships, Interpretation and Education, Volunteers and Outdoor Education.

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.



Black canyon of the Gunnison National Park (NPS)

## New Level of Protection for Devils Hole

Dan McGlothlin, Team Leader, Water Rights Branch

The Nevada State Engineer (NSE) issued two significant decisions in 2008 concerning the movement of groundwater pumping closer to Devils Hole, Death Valley National Park. In Ruling 5902, the primary applicant was required to come into full compliance with existing law and implement a monitoring program, in consultation with NPS, before any water right permits would be granted. Simultaneous to the first decision, the NSE issued Order 1197 that stated any applications within a 10-mile radius of Devils Hole for new wells would be denied and any application within 25 miles that proposes to move pumping closer would be denied. Certain exceptions apply to the 25-mile zone and generally apply to small uses or projects that do not result in increased drawdown at Devils Hole.

These two decisions acknowledge the need for stricter water management in the Amargosa Desert. The Ruling and Order are the result of NSE hearings in 2006 and 2007 at which WRD and park staff testified that the Amargosa Desert, the groundwater basin in which Devils Hole is located, is over-appropriated and the water level decline in Devils Hole is due, partially, to pumping in this area.

These decisions are the result of a multi-year effort by NPS to obtain more restrictive water rights administration in the Amargosa Desert and to provide significant additional protections for Devils Hole and the adjacent Ash Meadows National Wildlife Refuge. The Ruling and the Order have been appealed by the applicant and Nye County, NV. The Office of the Solicitor has requested that Department of Justice intervene in support of the NSE's decisions.



Devils Hole, Death Valley National Park (NPS)

## Groundwater Right Decreed for Great Sand Dunes National Park

James Harte, Hydrologist, Water Rights Branch

On August 4, 2008, Judge O. John Kuenhold signed a historic decree approving an in-place groundwater right for Great Sand Dunes National Park (GRSA). The water right is the first of its kind in Colorado and concludes a decade of work by the NPS, State, and local community to protect water and water-dependent resources in the San Luis Valley.

GRSA was threatened by proposals to export groundwater to the Colorado Front Range. In 2000, Congress passed the Great Sand Dunes National Park and Preserve Act of 2000. The Act expanded Great Sand Dunes National Monument and recognized the surface and groundwater systems are critical to preserving the dunes and associated ecosystems. Congress directed the Secretary of the Interior to acquire 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.

On December 30, 2004, the U.S. filed a claim to all unappropriated water in the unconfined aquifer underlying the park. Eight statements of opposition were filed, and seven were settled. Trial was scheduled to hear the remaining opposer's arguments. The day of trial, the opposer agreed to a proposed decree, and following presentation of a "prima facie" case by the U.S., the decree was signed. The water right entitles the NPS to specific water levels at ten monitoring wells and allows the park to challenge changes to existing water rights and applications for new rights.



Elk at Big Spring, Great Sand Dunes National Park (NPS)

## Water Rights Agreement Finalized with Yellowstone National Park

Jeff Hughes, Hydrologist  
Water Rights Branch

Cooke City is a small community located just outside the northeast entrance of Yellowstone National Park (YELL) in the Soda Butte Creek drainage. Soda Butte Creek flows through Cooke City and then into YELL. YELL has water rights for instream flow in Soda Butte Creek as described in the State of Montana – United States, National Park Service Water Rights Compact, signed in 1994, subject to valid existing rights.

In 2004, the Cooke City Park County Water District (Cooke City) filed an application to change the point of diversion for their municipal water supply from a spring source to a series of shallow wells near Soda Butte Creek. The amount of water requested to be changed by Cooke City was based on two pre-Compact water rights—a claim filed in the Montana water rights adjudication and a State-granted permit—totaling 101.85 acre-feet per year. Montana water law limits the amount of water to be changed to that amount historically used by the applicant, which can be different from the amount claimed and/or permitted. The NPS objected to the Cooke City application on the grounds that the amount requested to be changed was in excess of the amount historically used by Cooke City.

Several years of negotiations ensued between engineering consultants for Cooke City and the Water Resources Division, with no agreement. Finally, after the State of Montana set a date for an administrative hearing on the matter, Cooke City obtained legal representation, and an agreement was reached between Cooke City and the NPS in December 2007. NPS has withdrawn its objection to the change application. Cooke City is now limited to withdrawing 69 acre-feet of water for its municipal needs from the Soda Butte Creek drainage.

## Agreement and Decision on Groundwater Development Protects Lake Mead National Recreation Area Springs

Dan McGlothlin, Team Leader, Water Rights Branch

The NPS, USFWS, BLM, BIA, and Southern Nevada Water Authority (SNWA) continued their cooperative approach for resolving the bureaus' protests of groundwater applications that support SNWA's planned Clark, Lincoln, and White Pine Counties Groundwater Development Project (the Project). The Project proposes to deliver to Las Vegas by 2015 groundwater pumped from five basins in rural Nevada via a 300 mile pipeline network. In 1989, the bureaus protested applications requesting a combined 35,000 acre-feet per year (afy) in Dry Lake, Delamar, and Cave Valleys (DDC). In January 2008, the DOI and SNWA completed an agreement that removed the bureaus' protests, and in July 2008, the Nevada State Engineer ruled on the applications.

The DDC pumping is located in the same regional aquifer system that supplies water to springs at Lake Mead National Recreation Area. However, DDC is a considerable distance upgradient from the park, and the pumping is closer to USFWS and BLM managed resources. NPS interests were focused on the potential cumulative effects of regional aquifer system pumping.



Lake Mead National Recreation Area (NPS)

Similar to previous DOI-SNWA agreements, the DDC agreement requires a monitoring system (managed by hydrologic and biologic technical groups) and an executive committee to facilitate decisions that cannot be resolved by consensus. One major difference from the previous agreements was the intent to integrate previous agreements into an overall process that will evaluate and manage the cumulative effects of SNWA's groundwater development projects.

In July 2008, the Nevada State Engineer granted 19,000 afy to SNWA from the DDC. It also required an approved, comprehensive, monitoring and mitigation program and that baseline data be collected for a minimum of two years prior to any export of groundwater from the basins. In 2009, NPS will focus on the Snake Valley basin adjacent to Great Basin National Park, the last of the Project basins to be decided by the Nevada State Engineer.



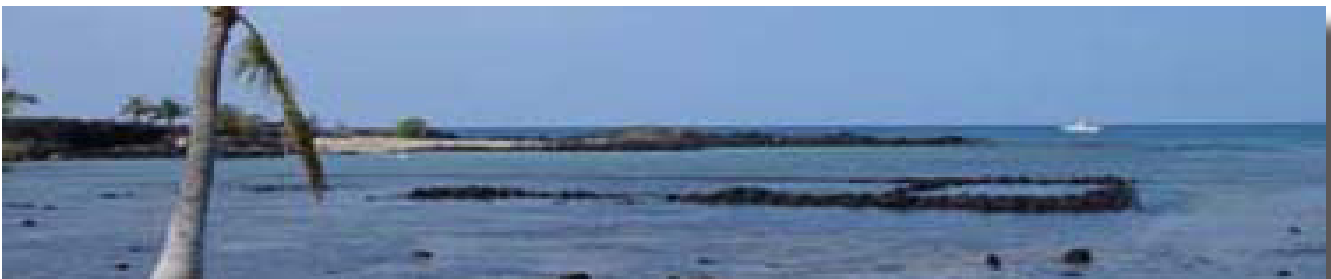
## Kaloko-Honokohau National Historical Park Focuses Attention on Groundwater Sustainability

Paula A. Cutillo, Hydrologist  
Water Rights Branch

Kaloko Fish Ponds, Kaloko-Honokohau National Historical Park (NPS)

In 2008, Kaloko-Honokohau National Historical Park and the Water Rights Branch organized four stakeholder meetings in Kona, HI, to address serious concerns over the increasing demand for fresh water due to rapid population growth and land development surrounding the park. Sustainable development of groundwater is essential to maintaining the park's water and water-dependent resources for the enjoyment and appreciation of traditional native Hawaiian activities and culture. Efforts to form a stakeholder working group were initiated by the NPS at the suggestion of the staff of the State of Hawaii Commission on Water Resource Management as an alternative to state administrative control of groundwater withdrawals. Attendees included federal, state, and county agencies, developers, native Hawaiian stakeholders, and community and environmental groups.

These efforts triggered the formation of the Kona Roundtable—an informal public forum to present and discuss scientific information on the status and use of water resources in Kona—by the County of Hawaii Department of Water Supply and the USGS. Stakeholder meetings have also resulted in a collaborative effort between the Water Rights Branch and USGS to develop a 3-D groundwater model to better understand the nature of groundwater flow in the area of the park, to aid the park in evaluating threats to aquatic resources, and to aid state agencies in effectively managing groundwater development in the area of the park. The most recent stakeholder meeting ended with a challenge to other stakeholders to contribute data or financial resources in order to model development, to broaden its geographical scope to include all of Kona, and to participate in an effort to design a regional groundwater monitoring network capable of tracking changes in the water budget and documenting aquifer response to pumping.



Aiopio Fishtrap, Kaloko-Honokohau National Historical Park (NPS)



## Protecting Natural Resources at Saguaro National Park through Water Rights

Paul Christensen, Hydrologist, Water Rights Branch

Gwen Gerber, Hydrologist, Water Rights Branch

Bill Hansen, Supervisory Hydrologist, Water Rights Branch



Rincon Creek, Saguaro National Park (NPS, 2003)

In 1998, the NPS acquired lands adjacent to the east unit of Saguaro National Park near Tucson, AZ. These lands included an intermittent stream called Rincon Creek. Associated with the creek is biota dependent on water in the creek and in an adjacent alluvial aquifer. In 2002, the NPS filed a water right application for instream-flow maintenance with the Arizona Department of Water Resources (ADWR) to protect the water and biota from future water diversions. This was the NPS's first attempt to obtain an instream-flow water right through administrative proceedings in Arizona.

ADWR asked that the NPS prepare and submit an assessment report to defend the request for water. Consequently, the NPS collected groundwater and surface water data. The NPS also acquired the services of experts on 1) hydrogeology, to determine groundwater surface water relationships, and 2) selected biota, to determine the relationship between water and biota (aquatic herpetofauna, aquatic macroinvertebrates, and bottomland vegetation).

The assessment report, submitted to ADWR September 2008, asserts that water is available for appropriation and requested minimum daily discharge values or the natural flow, whichever is less, for each month of the year. The requested discharge values were based on the water quantification developed by biologic experts to maintain biologic viability. The assessment report was accompanied by expert reports, both hydrologic and biologic. The NPS waits for ADWR's response to the water right application. If ADWR grants a permit, the NPS will apply for a certificate of water right.

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## Natural Resource Challenge Aquatic Resource Field Professionals Highlights



River Otter (Hutchinson, NPS, 2008)

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Funding from the Natural Resource Challenge helped support 15 field-based aquatic resource professional positions in FY08. The aquatic resource professional positions were developed to provide the National Park Service with both an extension and an expansion 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. Table 7 in Appendix B lists all currently supported positions, and accomplishments stemming from these positions are included in Appendix A.



Photos (NPS, 2008)

## APPENDIX A

### TECHNICAL ASSISTANCE TO PARKS AND REGIONS

#### SERVICEWIDE

Reviewed lake monitoring protocol and statistical power analysis.

Assisted with the survey of streamgaging needs in the NPS and contacted USGS personnel to encourage funding for NPS streamgages.

Planned and served as session coordinators, panelists, and speakers for the NPS Aquatic Professionals Meeting held in Fort Collins, CO, on February 12-14, 2008. One hundred and twenty NPS staff, cooperators, and contractors attended.

Represented WRD on the Restoration Technical Advisory Group.

Represented WRD on the Outreach Technical Advisory Group.

Represented WRD on the NRPC Technical Assistance Call Task Group.

Participated in the “Fire in the Southwest” conference as a Burned Area Emergency Response team member (BAER). Remained qualified as a BAER Hydrologist to assist in restoration of wildfires.

Participated in the Natural Resources Stewardship group of the NPS Global Climate Change effort.

Surplused WRD’s excess hydrologic equipment to aquatic professionals in the parks.

Participated in a meeting with DSC planners and the NRPC climate change program. The purpose of the meeting was to explore where climate change and scenario planning should be discussed and accomplished in the NPS planning framework.

Provided comments on the draft *Oil Shale and Tar Sands Resource Management Plan Amendments to Address Land Use Allocations in Colorado, Utah, and Wyoming and Programmatic Environmental Impact Statement*.

Regularly participated in monthly NPS DSC Planning Division meetings, providing liaison with the NRPC.

Continued coordination with DSC Planning and with staff associated with the development of DO 2.I.

Participated in the “Connect the Dots” workshop (Washington, DC) and assisted with follow-up preparation of deliverables that were presented at the March NRAG meeting.

Co-authored a proposal to NRPC Management that describes the process to assist a park with a “Connect the Dots” approach to completion of its RSS.

Participated in the “Lessons Learned from the Pilot Resource Stewardship Strategy (RSS) Projects for Improving the Park Planning Program” survey, which was completed September 2008.

Participated in and lead a discussion at a meeting of NRPC and IMR personnel on how to implement Connect-the-Dots.

Co-authored a successful NRPP servicewide proposal with GRD and Leigh Welling that increases the capacity of the NRPC to provide assistance to parks with their planning-related needs.

Presented on the use of ICS in developing the NPS quagga / zebra mussel prevention and response plan at the annual meeting of the 100th Meridian Initiative in Las Vegas, NV.

Assisted in organizing and participated in an NPS nationwide invasive species interdiction workshop in St. Paul, MN.

Participated in monthly conference calls of the Western Regional Panel of the Aquatic Nuisance Species Task Force.

Assisted in organizing the 2008 Western Regional Panel of the Aquatic Nuisance Species Task Force annual meeting in Fort Collins, CO.

Provided text and a photograph of Asian carp for Western Regional Panel of the Aquatic Nuisance Species Task Force *Threats to the West* brochure.

## **STRATEGIC PLANNING**

Served as coordinator for NRPC reviews of submissions to the Development Advisory Board.

Continued to assist Branch Chief as the GPRA goal coordinator for the servicewide water quality goals 1a4A and 1a4B and helped draft the new water quality goal 1a4E for the FY08-FY12 planning period.

NPS goal coordinator for the two DOI Land Health Strategic Goals related to streams and riparian zones.

## **WATER RESOURCES PLANNING**

Represented WRD on the WASO Rivers/Dams Workgroup.

Commented on proposed amendments to Office of Surface Mining Regulation and Enforcement rules regarding affected waters as related to mountaintop removal.

Attended Designated Use and Impairment program meetings and advised Research Associate on updating the status of park listed and protected waters and NHD coverage for those waterbodies.

Helped develop consistent desired future condition guidance and policy.

## **NATURAL RESOURCE CONDITION ASSESSMENT**

Collaborated with George Mason University and the Chesapeake Watershed CESU to finalize and launch a Compendium of Ecological Assessment Methods website, to be used by parks and the general public for a wide variety of condition assessment, risk assessment, and resource restoration projects (<http://assessmentmethods.nbii.gov/>).

Coordinated with Watershed Condition Assessment (WCA) Program leads at regional offices to refine guidance for FY08 project starts.

Increased park, network, and regional office involvement in NRCA projects through park resource manager workshops in the National Capital Region, the Northeast Region, and the Pacific West Region and through the Heartland Network three-year review meeting.

Worked with external partners (USFS, National Parks and Conservation Association, Key National Indicators Initiative, and Interagency Conference on Research in the Watersheds) to increase collaboration on ecological resource assessment and reporting.

Provided technical assistance to initiate 11 new NRCA projects (involving a total of 25 park units) in FY08.

Coordinated NPS Coastal Watershed Condition Assessments—served as ATR, managed and tracked program budget, reviewed proposals and made final selections for 11 FY08 project starts.

## **WATER QUALITY MANAGEMENT**

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

Attended a USGS Water Quality Workshop in Galveston, TX, on November 5 - 9, 2007.

Represented NPS on the National Water Quality Monitoring Council (NWQMC). Hosted the council meeting in Fort Collins, CO, on July 21 - 24, 2008.

Participated on the planning committee for the 2008 NWQMC Annual Conference in Atlantic City, NJ, on May 19 - 22, 2008. Five WRD staff moderated sessions and/or presented talks.

Represented NPS on Sensor Quality Control, Emerging Contaminants, and Statistical subgroups of the NWQMC Methods and Data Comparability Board.

Represented NPS on the Consortium for Research and Education on Emerging Contaminants (pharmaceuticals and personal care products).

Worked with USGS and EPA staff on potential joint initiatives on both emerging contaminants and statistical analyses issues.

## **WETLANDS PROTECTION**

Revised *NPS Procedural Manual #77-1: Wetland Protection* and coordinated the March 2008 reissue by the Associate Director, Natural Resources Stewardship and Science.

Coordinated servicewide review of the *Federal Geographic Data Committee Proposed Wetland Mapping Standards*.

Worked with BRMD staff to respond to the White House Council on Environmental Quality's data request for the President's 2008 Earth Day report.

Worked with the NPS Office of Policy and the U.S. Army Corps of Engineers to write a section regarding cooperation on Clean Water Act Section 404 issues for a proposed Partnership Agreement.

Prepared a proposal titled "Enhance Visitor Recreation and Enjoyment by Restoring Degraded Wetland and Riparian Resources."

Served on the selection committee for the Environmental Law Institute's National Wetlands Awards.

Reviewed and commented on draft *NPS Interim Technical Guidance on Defining Measurable Natural Resource Management Targets, Including Measures for Desired Conditions*.

## **FISHERIES MANAGEMENT**

Provided technical review and publication support of the report *A Field Manual for the Use of Antimycin A for the Restoration of Native Fish Populations* (Natural Resource Report NPS/NRPC/NRR-2008/033).

Assisted with the completion and distribution of the NPS Catch and Release Fishing brochure.

Represented the NPS on the Desert Fishes Habitat Partnership, a candidate partnership under the National Fish Habitat Initiative.

Represented the NPS on the Western Native Trout Initiative, a partnership under the National Fish Habitat Initiative.

## **OCEAN AND COASTAL RESOURCES MANAGEMENT**

Developed program goals and briefing papers for FY10 overtarget request to OMB for NPS oceans funding. Submitted revised FY09 servicewide oceans crosscut budget and narrative to DOI budget office and OMB under the Oceans Act.

Coordinated implementation of Ocean Park Stewardship Action Plan. Coordinated conference calls of Ocean Park Stewardship Task Force to exchange information and develop regional ocean strategies with regional staffs and superintendents.

Coordinated interagency agreement with NOAA. Coordinated briefings and October 2008 meeting between NPS Director and NOAA Administrator.

Partnered with NOAA on Benthic Habitat Classification. Partnered with NOAA Gulf Coast Services Center and Geologic Resources Division to apply the Coastal Ecological Mapping Classification Standard (CMECS) to benthic maps being developed for SLBE, GLBA, GOGA, GUIA, VIIS and VICR.

Coordinated NPS Response to Marine Protected Areas (MPA) Executive Order 13158 and Seamless Network Agreement.

Worked with USFWS and NOAA National Estuarine Reserves and National Marine Sanctuary staff to implement inter-agency Seamless Network Agreement.

Worked with Rutgers University and NPS Jamaica Bay Research Learning Center to plan New York –New Jersey Bight Seamless Network regional meeting.

Worked with NOAA MPA Center to review and comment on proposed nomination process for National System of MPAs under EO 13158.

Coordinated Marine Recreational Stewardship Fee Project. Coordinated program to prevent and mitigate recreational impacts on marine resources in coastal Parks. Initiated social science survey for marine uses. Assisted with planning for buoy and navigational aids at DRTO and BISC. Produced educational materials for responsible boating at FIIS and national NPS catch and release fishing brochure.

Commented on ballast water legislation, NOAA Sanctuaries Act testimony, and other issues working with Office of Congressional Affairs.

Developed Ocean Education and Communication Activities. Worked with Office of Outreach and Education to design new 'Coral Reefs in the National Parks' Web site.

Participated in planning of Ocean Education Workshop in Boston for park staffs and provided presentation on resource stewardship programs for marine recreational uses.

Coordinated U.S. Coral Reef Task Force & International Coral Reef Symposium (ICRS) Activities. Assisted NPS, DOI, and NOAA with preparations and on-site logistics for Coral Reef Task Force meetings in March 2008 in Washington, D.C., and October 2008 in Kona, HI.

Represented Natural Resource Stewardship & Science on NPS Dive Control Board.

Collaborated with BRMD on NRPP funded Migratory Species Framework with University of Montana, migratory marine fishes, invasive species workgroup.

Co-funded GRD term hire of graduate-level law students to develop annotated catalogue of laws and regulations for ocean and coastal park superintendents.

## **INFORMATION AND DATA MANAGEMENT**

Represented WRD on the NRPC Information Technology Technical Advisory Group.

Represent WRD at NRPC Integrated Resource Management Applications meetings.

Produced quarterly Capital Planning and Investment Control reports and the Office of Management and Budget's Exhibit 300-1, documenting WRD's STORET investment.

Prepared the 2007 Annual Administrative Reports and Workplans for the water quality and water resources inventories.

Attended the Servicewide Inventory Coordinators meetings in Denver, CO, during February 2008 and hosted the meeting in Fort Collins, CO, during July 2008.

Represented WRD at the Servicewide Inventory and Monitoring Advisory Committee meeting in Charleston, SC.

Developed inventory fact sheets for the water quality and water resources inventories.

Chaired a six-member NPSTORET User Board to help oversee the development and implementation of NPSTORET and conducted two meetings.

Attended the EPA's STORET/WQX national conference in Austin, TX, and gave a presentation.

NPSTORET Vital Signs water quality database version 1.50 was released in October 2007 and version 1.70 was released in October 2008.

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.

Continued to upload long-term thermographic data logger results to STORET for the Florida Keys National Marine Sanctuary for 20 stations near national park units in south Florida.

Uncovered problems with the EPA's National Aquatic Resource Survey Data from SWIM in STORET and worked with EPA and Research Triangle Institute to identify the issue.

Updated webpages (<http://science.nature.nps.gov/im/inventory/waterquality/index.cfm> and <http://science.nature.nps.gov/im/inventory/water/index.cfm>) for the Servicewide Inventory and Monitoring Program to explain the water quality and water resources inventories.

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

Provided review and comment on the development of the Water Quality Designated Use and Impairment Database and brought National Hydrography Dataset (NHD) data glitches to the attention of the USGS. Hired and began training replacement database manager.

Attended the NHD Management Team meeting in Denver, CO, in December 2007 to help refine the strategic direction of NHD.

Continued developing the software procedures begun by Horizon Systems and Research Triangle Institute to produce Baseline Water Quality Data Inventory and Analysis Reports for parks.

Coordinated the upgrade to Terrain Navigator Pro v.8.00 and v.8.50 and troubleshoot issues for Natural Resource Program Center users.

Moved hard copy maps (with meaningful notations on WRD work) to GIS. Archived or donated the rest to an educational institution.

## **WILD AND SCENIC RIVERS**

Participated on the NPS Wild and Scenic Rivers Steering Committee to develop an organizational structure and program action plan to improve NPS management of Wild and Scenic Rivers.

Served as co-chair of the NPS Wild and Scenic Rivers Steering Committee and provided servicewide guidance on WSR issues, including state-administered and partnership rivers.

Served as a member of the Colorado River Technical Committee.

Member of the NPS User Capacity Work Group.

## ALASKA REGION

Co-authored and managed the development of the draft NPS *Alaska Region Wetland Mitigation Banking Program Umbrella Mitigation Bank Instrument*.

### ***Cape Krusenstern National Monument***

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

### ***Denali National Park and Preserve***

Provided review of the Wetland Statement of Findings for the Headquarters Area Plan, Denali National Park and Preserve.

Reviewed *Floodplain Statement of Findings for New Wastewater Plant*.

Compiled and uploaded data from J.S. Leventhal's 1970 study entitled *Tritium Fallout in the Pacific United States* to STORET.

### ***Glacier Bay National Park and Preserve***

Initiated benthic habitat mapping project in partnership with USGS Coastal and Marine Geology and participated in initial scoping meeting.

Provided updated information on nutrient monitoring, harmful algae blooms, and other aquatic monitoring issues.

Received and accepted the final completion report for the BRMD funded project "Compile and Analyze Sockeye data from the East Alsek River."

Accepted final completion report for WRD funded project "Evaluate E. Alsek River Sockeye Habitat."

### ***Katmai National Park and Preserve and Alagnak Wild River***

Provided technical and policy review and supported the completion and publication of the *Katmai National Park and Preserve/Alagnak Wild River Water Resources Information and Issues Overview Report* (Natural Resources Technical Report NPS/NRPC/WRD/NRTR – 2007/057).

### ***Lake Clark National Park and Preserve***

Reviewed the draft report *Natural Resource Condition Assessment of Coastal Water Resources in Lake Clark National Park and Preserve*.

Reviewed the annual accomplishment report and approved release of FY08 funds for the BRMD funded project "Conserving Sustainable Northern Pike Populations."

### ***Wrangell-St. Elias National Park and Preserve***

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

Provided programmatic oversight and support leading to the completion of the National Wetlands Inventory mapping.

Evaluated mitigation bank wetland restoration opportunities.

### ***Yukon-Charley Rivers National Preserve***

Provided advice on how to pick technical labs.



## INTERMOUNTAIN REGION

Assisted region staff in developing example wetland impact thresholds that can be used for NEPA training.

### ***Arches National Park***

Continue to monitor DOE's Moab site construction activities.

Reviewed Statement of Findings for repairs to Delicate Arch Trail.

### ***Bandelier National Monument***

Completed and published the *Bandelier National Monument Water Resources Foundation Report (Natural Resources Technical Report NPS/NRPC/WRD/NRTR – 2007/060)*.

### ***Bent's Old Fort National Historic Site***

Conducted issues scoping and initiated efforts intended to lead to the development of a Water Resources Information and Issues Overview Report.

### ***Big Bend National Park***

Participated in initial discussions with Rio Grande Science Team to frame instream flow needs and issues, and flow requests from the Rio Conchos (Mexico) to Rio Grande.

Prepared water rights portion of water resources issue overview report.

Prepared public comment on Far West Texas regional water plan.

Worked with the State of Texas to create groundwater model runs using the state's Groundwater Assessment Model to evaluate potential impacts to park springs and rivers from proposed groundwater development.

Consulted on a tamarisk removal project related to a study on vegetation encroachment on the channel of the Rio Grande due to flow reduction and invasive plants.

Reviewed *Floodplain Statement of Findings to Construct New Housing and Operations Facilities at Panther Junction*.

### ***Big Thicket National Preserve***

Assisted with water rights regarding acquired lands.

Provided assistance in determining instream flow needs on the Neches River.

Provided continuous input to NEPA team regarding environmental assessment on effects of hurricane debris removal. Researched and commented on local concerns for briefing the regional director.

Reviewed and commented on site investigation work plans addressing characterization of contaminated soils and groundwater and a proposed Plan of Operations for closure of the Buford Curtis oil production well site.

Initiated planning and discussions in preparation for the initiation of a Natural Resources Foundation Report.

### ***Bighorn Canyon National Recreation Area***

Submitted annual water use report for park as required by the NPS-Montana Water Rights Compact.

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

### ***Black Canyon of the Gunnison National Park***

Evaluated water rights applications in Water Division 4 to determine impact of diversions on park water rights.

Provided technical input to the park and region pertaining to flow recommendations for endangered fish and the Aspinall Project EIS.

Provided technical assistance to the park, region, and DOI in support of settlement discussions to secure water rights in Water Division 4.

***Bryce Canyon National Park***

Reviewed and evaluated the proposed impacts to wetland resources that would result from resurfacing a road through a wet meadow.

***Capitol Reef National Park***

Assisted with a WRD funded project to remove obstructions from stream channels.

Funded removal of obsolete utility crossings in two streams as part of the Stream Obstruction Removal Project and the Twenty Percent Fee Demo Program.

***Carlsbad Caverns National Park***

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

Reviewed methods of installing barriers to upstream migration of nonnative fish into Rattlesnake Springs and provided input on pertinent sections of a draft Management Plan.

***Chaco Culture National Historical Park***

Developed a floodplain model, showing inundation of the 5-, 10-, 25-, 50-, and 100-year floods and the probable maximum flood near the Gallo Wash Campground.

***Chickasaw National Recreation Area***

Assisted with a federal-state partnership to study the aquifer characteristics of the Arbuckle-Simpson Aquifer.

***Chiricahua National Monument***

Completed hydraulic model to assess flood hazard of administrative building. Authored report describing procedures and results.

***Colorado National Monument***

Evaluated water rights applications in Water Division 5 to determine impacts of diversions on park water rights.

Uploaded water quality data from the 2000-2001 Level I Water Quality Inventory conducted by the USGS to STORET.

***Curecanti National Recreation Area***

Evaluated water rights applications in Water Division 5 to determine impacts of diversions on park water rights.

Provided input to the park and region on flow recommendations for endangered fish and the *Aspinall Project EIS*.

Evaluated the maintenance of the Elk Creek Ditch, which will be used to create habitat boundaries for the endangered Gunnison prairie dog.

***Dinosaur National Monument***

Reviewed a final report on a telemetry study of brown trout in the Green River in Lodore Canyon and outside park boundaries.

Reviewed a draft final report on smallmouth bass in Yampa Canyon.

Evaluated water rights applications in Water Division 6 to determine impacts of diversions on park water rights.

***El Morro National Monument***

Assisted the Office of the Solicitor and DOJ in responding to motions regarding the quiet title action and water right claim preparation for the Zuni River Adjudication.

***El Malpais National Monument***

Assisted the Office of the Solicitor and DOJ in responding to motions regarding the quiet title action and water right claim preparation for the Zuni River Adjudication.

Assisted new park staff by interpreting a FY07 Disturbed Lands project for removing several dams and dikes.

***Florissant Fossil Beds National Monument***

Evaluated water rights applications in Water Division 1 to determine impacts of diversions on park water rights.

***Fort Bowie National Historic Site***

Assisted in remediation of biofouling at water-supply well.

***Fort Davis National Historic Site***

Provided on-site advice and consultation in drafting the park's Flood Mitigation Plan and completed a technical memo.

***Fort Union National Monument***

Collaborated with a multidisciplinary team to write a report on the impacts of wagon rut erosion on the Santa Fe Trail.

***Fossil Butte National Monument***

Assessed environmental impacts from the management practice of exporting water from Cundick Spring to adjacent BLM land and identified potential sources of surplus water.



Installing new flow meter at Fort Bowie National Historic Site (Reber, 2008)

***Gila Cliff Dwellings National Monument***

Completed indirect discharge estimates of a recent flood.

Provided site-specific, floodplain hazard information based largely on an old floodplain analysis done by the USFS, which was found in the files in Fort Collins.

***Glacier National Park***

Provided advice to the park on the floodplain of North Fork Flathead River in the Big Prairie area related to development of private residences.

Reviewed *Floodplain Statements of Findings for Logan Pit Rehabilitation and for McDonald Creek Bank Stabilization on Going-To-The-Sun Road*.

Compiled and uploaded data from the USGS's reformatted National Uranium Resource Evaluation to STORET.

Represented the park in Blackfeet Tribe Compact Negotiations, coordinated reviews of settlement proposals with the Office of the Solicitor, and briefed management on implications of settlement proposals.

Submitted annual water use report for park as required by the NPS-Montana Water Rights Compact.

***Glen Canyon National Recreation Area***

Consulted on ongoing zebra/quagga mussel prevention efforts.

***Grand Canyon National Park***

Participated in discussions with the park hydrologist regarding the need for a Water Resources Information and Issues Overview Report.

Provided the opinion of Oak Ridge National Laboratory on the potential radiological effects of uranium ore exploration in the vicinity of the park.

Reformatted, QA/QCed, and uploaded to NPSTORET and STORET water quality data for 12 different projects conducted by the park and/or contractors or cooperators.

#### ***Grand Teton National Park***

Reviewed *Floodplain Statement of Findings for Pacific Creek Road Repair*.

Reviewed the progress report and approved the release of funds for a study to determine the effects of diversions on cut-throat trout in the Gros Ventre River.

Conducted studies to develop a water budget for the Lower Gros Ventre River.

Provided assistance to develop instream flow and water rights protection strategies for the Lower Gros Ventre River.

Provided funding for a streamgage on the Gros Ventre River.

Received and reviewed a report on Snake River cutthroat trout (*Oncorhynchus clarkii*), rainbow trout (*O. mykiss*), and hybrid cutthroat x rainbow trout in the Gros Ventre River.

Provided technical and policy review and evaluation of the *Pacific Creek Road Wetland Delineation Report*.

Reviewed *Statement of Findings for Wetlands for the Pacific Creek Road Stabilization Project, Grand Teton National Park*.

#### ***Great Sand Dunes National Park and Preserve***

Provided final technical and policy review on a *Wetlands Statement of findings for the Great Sand Dunes National Park General Management Plan and Wilderness Study*.

Collected field data and oversaw data collection/compilation for 13 shallow groundwater monitoring wells located in Big Spring, Little Spring, and Medano Creeks.

Assisted the Department of Justice in filing motions to resolve the NPS protest of the Beck water right application.

Coordinated evidence preparation, expert witness deposition, and testimony to support the NPS in-place groundwater claim in District Court, Water Division No. 3, Colorado.

Attended Closed Basin groundwater model meetings.

Evaluated applications in Colorado Water Division 3 to determine impacts of diversions on park water rights.

#### ***Guadalupe Mountains National Park***

Participated in Resource Stewardship Strategy workshops.

Co-authored and published the *Physical Resources Stewardship Report: Guadalupe Mountains National Park* (Natural Resources Technical Report NPS/NRPC/WRD/NRTR – 2007/121).

#### ***Hovenweep National Monument***

Submitted annual water use report for reserved water rights at springs to the State of Colorado.

Evaluated water rights applications in Water Division 7 to determine impacts of diversions on park water rights.

#### ***Hubbell Trading Post National Historic Site***

Completed a functional assessment and suggested desired conditions for the Pueblo Colorado Wash riparian zone.

Worked with Southern Colorado Plateau Network I&M staff, Southwest Conservation Corps staff, and Navajo Nation interns to install 12 shallow monitoring wells to guide the vegetative recovery of the riparian zone in the Pueblo Colorado Wash.

***John D. Rockefeller, Jr., Memorial Parkway***

Worked with park staff, the Federal Highway Administration, and cooperators from Colorado State University to complete a final wetland restoration design for the “Pond 5” site.

Worked with park staff and cooperators from Colorado State University to complete a revised planting plan for the Snake River Gravel Pit restoration.

***Little Bighorn Battlefield National Monument***

Submitted annual water use report as required by the NPS-Montana Water Rights Compact.

***Lyndon B. Johnson National Historical Park***

Completed fluvial and riparian assessment and authored report addressing on-going hydrologic and riparian issues.

***Mesa Verde National Park***

Assisted with wetland compliance for a proposed wastewater treatment facility near the park entrance

Advised park staff on the Corrective Action Plan modification and “next steps” of the ARAMARK proposal to develop a newly formulated, risk-based approach to remediation of the Far View Terrace gasoline plume.

Evaluated water rights applications in Water Division 7 to determine impacts of diversions on park water rights.

Assisted with preparation of annual water use reports for the District Water Commissioner.

***Montezuma Castle National Monument***

Reviewed and commented on the draft General Management Plan.

Provided funding and oversight for USGS study of the source and flowpaths of groundwater in Montezuma Well.

Provided oversight for park operation of two streamgages at Montezuma Well and operation of a streamgage on Wet Beaver Creek.

Funded USGS streamgaging station on Beaver Creek at the Castle Branch.

Worked with the US Department of Justice, Office of the Solicitor, and park management to develop water-rights strategy for the Verde River Adjudication.

***Navajo National Monument***

Conducted hydrogeological analysis and recommendations for construction of a new water-supply well.

***Organ Pipe Cactus National Monument***

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

Reviewed plans to construct a pedestrian barrier fence along the international border. Assisted with the development of a monitoring plan to document likely geomorphic changes in and around washes due to the fence.

Uploaded water quality data from the 2001-2002 Level I Water Quality Inventory conducted by the USGS to STORET.

***Palo Alto Battlefield National Historic Site***

Reviewed Texas Gas Service’s request for a Special Use Permit to access its pipeline across the park.

Reviewed wetland delineation and evaluated the potential wetland impacts from a proposed utility corridor for a new maintenance facility.

***Padre Island National Seashore***

Review technical documents assessing hydrocarbon spills and provided perspective on contaminants in natural gas condensates.



Youth Conservation Corps installing water wells at Hubbell Trading Post National Historic Site (NPS, 2008).

Reviewed the draft Supplemental *Oil and Gas Management Plan/Environmental Impact Statement, Padre Island National Seashore*.

Reviewed wetland compliance issues for a draft *Padre Island National Seashore General Management Plan and Environmental Impact Statement*.

Assisted GRD, the region, and the park in responding to a letter from BNP Petroleum and Cinco Natural Resources Corporation challenging the National Park Service's approach to wetlands delineation and compliance for oil and gas development in the park.

Provided technical comments on a Sampling and Analysis Plan to address potential soil and groundwater contamination at the Dunn-Peach well pad site.

Reviewed the *Floodplain Statement of Findings for Dunn-McCampbell Natural Gas Wells and Water Well and the Floodplain Statement of Findings for Construction of Communication Tower*.

Reviewed the *Wetland Statement of Findings for the BNP Petroleum Corporation ST 991 #1, Dunn-McCampbell 12A, Dunn-McCampbell 11A Natural Gas Wells and Dunn-McCampbell A8 Water Well*.

Reviewed several drafts of the *Plan of Operations for the BNP Petroleum Corporation Dunn McCampbell 16-1, 16-2, 16-3 wells*.

#### ***Pecos National Historical Park***

Participated in a Foundation Planning Workshop.

Helped initiate a Natural Resource Condition Assessment, which, along with an Environmental Histories Study, will help document natural resource conditions associated with the historic period, events, and cultures of the park.

Initiated a coordinated approach to natural resources support for developing a Park Resource Stewardship Strategy.

#### ***Pecos National Historical Park***

Funded initial phase of levee removal under Stream Obstruction Removal Project. Removal of the levees will be the final step in restoration of wetlands along Glorietta Creek.

#### ***Petrified Forest National Park***

Provided additional information to the State of Arizona for transferring ownership of BLM water rights to NPS as a result of recent land transfer.

Participated in water-right settlement discussions for the Little Colorado River Adjudication.

#### ***Pipe Spring National Monument***

Assisted park staff in maintaining a record of spring flows in a long-term monitoring effort related to the declining spring flow.

Provided technical assistance for on-going studies of geology and hydrogeology and causes of springflow reduction and assisted in testing of new water-supply well.

Assisted park hydrologist in the initiation of a Physical Resources Foundation Report.

#### ***Rio Grande Wild and Scenic River***

Prepared public comment on Far West Texas regional water plan.

#### ***Rocky Mountain National Park***

Continued to assist a wetlands restoration project located near the Roaring Fork/Fall River confluence.

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

Provided assessment of well at the "Betty Dick" property.

Provided assistance in developing a plan to acquire resource information needed to guide the restoration of wetland and fluvial conditions impacted by the 2003 breach of the Grand Ditch.

Continued restoration of the Colorado River channel and Lulu City wetlands caused by sedimentation from the breach of the Grand Ditch.

Evaluated water rights applications in Water Divisions 1 and 5 to determine impacts of diversions on park water rights.

Assessed the channel integrity of the Fall River (where it has returned to its original alignment in order to reduce sedimentation of the Fan Lake wetland) and field-evaluated the wetland restoration.

Uploaded results from water samples to STORET collected in 2000 from the southwest corner of the park to assess the impact of snowmobiles on aquatic resources.

Provided advice needed to help formulate answers to the public related to Cryptosporidium outbreaks.

Continued to advise park staff and collaborators on the potential meaning of biomarker (estrogenic) effects seen in trout.

### ***Saguaro National Park***

Completed scientific studies and reports on hydrology, hydrogeology, groundwater/surfacewater relations, and relationships between selected biota and the occurrence of water to support the water-right application for the instream-flow maintenance in Rincon Creek.

Completed the required assessment report for the water-right application for instream flow maintenance in Rincon Creek.

### ***Salinas Pueblo Missions National Monument***

Uploaded water quality data from the 2000-2001 Level I Water Quality Inventory conducted by the USGS to STORET.

### ***Tuzigoot National Monument***

Reviewed and commented on the draft General Management Plan.

Determined Tavasci Marsh water budget and discharge from Shea Spring by using a weir to measure inflow, making streamflow measurements in the outflow ditch, and using data collected from a climate station.

Completed a water resources assessment for the Verde River Adjudication.

### ***Walnut Canyon National Monument***

Uploaded water quality data from the 2001-2002 Level I Water Quality Inventory conducted by the USGS to STORET.

### ***Washita Battlefield National Historic Site***

Coordinated publication of Geomorphic Adjustment of the Washita River, Washita Battlefield National Historic Site, Oklahoma (NPS/NRPC/WRD/NRTR – 2007/070).

### ***White Sands National Monument***

Provided expertise in water and geologic resources in the initiation of a Physical Resources Foundation Report.

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

### ***Wupatki National Monument***

Served as point of contact, reviewing Detailed Implementation Plan for NRPP project of spring restoration.

Uploaded water quality data from the 2001-2002 Level I Water Quality Inventory conducted by the USGS to STORET.

### ***Yellowstone National Park***

Provided a scope of services for a wetland delineation and functional analysis.

Served as WRD point of contact and project coordinator for investigations evaluating the effects of the shallow groundwater system at the Norris Geyser Basin on visitor safety.

Served as key official in the awarding of a third year USGS contract and coordinated with the USGS to monitor impacted groundwater discharges to surface water from legacy gravel mining operations at Sylvan Pass.

Organized the Sylvan Pass Mitigation/Restoration Workshop, October 10-12, 2007, which involved Federal Highways staff, Yellowstone National Park staff, and invited experts.

Co-authored a proposal and implemented a stable isotope study recommended by EPA in the Sylvan Pass watershed to determine the proportional contributions of various water sources and the implications those results may have on interpreting turbidity of impacted streams from gravel mining.

Co-authored the report *Recommendations for Restoration and Rehabilitation of Turbidity and Sediment Impacts to the Sylvan Pass Hydrologic System at Yellowstone National Park* (Natural Resource Report NPS/NRPC/NRR – 2008/054).

Attended the annual New World Technical Meeting and continued to participate on the Hydrogeology Work Group steering committee. Provided comments on the New World Mine restoration FY08-09 project documents generated by the USFS.

Worked with Montana DEQ to generate a request for proposal, to screening proposals, and to select a final contractor to remove the McLaren Tailings from Soda Butte Creek and build a new tailings repository on an adjacent property.

Provided additional funding to the USGS Montana Science Center to upgrade the Silver Gate gauge on Soda Butte Creek with new infrastructure to support a continuous turbidity monitoring capability.

Coordinated with the Montana Bureau of Mines and Geology and the Department of Natural Resources and Conservation regarding abandonment of a geothermal well owned by the Church Universal and Triumphant. Closure was a challenge because of significant corrosion, multiple casing breaks, a collapsed borehole, and considerable artesian pressure.



Closure of thermal well near Mammoth, WY in Yellowstone National Park by pressure grouting (NPS 2008).



Pre-closure, downhole video of break in casing thermal well in Yellowstone National Park (NPS 2008).

Evaluated water rights applications to determine impacts on park water rights and filed objections when needed.

Assisted the Office of the Solicitor in negotiating Final Stipulated Settlement Agreement concerning the water right change application by Cooke City Park County Water District and withdrew NPS objection of Cooke City water right application.

Provided oversight for the completion of USGS study discharge measurement methods on Reese Creek

### ***Zion National Park***

Evaluated water rights applications to determine consistency with the Zion Water Rights Agreement and to evaluate impacts of diversions on park water rights. Filed one protest.



## MIDWEST REGION

Participated in an Incident Command System process to develop a Viral Hemorrhagic Septicemia Plan for Lake Superior parks.

Reviewed and provided input on an application for an emergency exemption under FIFRA for the use chlorine and Virkon for the treatment of ballast water in commercial vessels and disinfection of recreational boats.

Compiled additional analog data to be uploaded to STORET from the report entitled *Macroinvertebrate Assemblages and Water Quality in Six National Park Units in the Great Plains* (Harris, Kondratieff, and Boyle 1991).

### *Agate Fossil Beds National Monument*

Assisted in implementation of a groundwater monitoring plan.

### *Apostle Islands National Lakeshore*

Facilitated the incorporation of 1:12,000 scale Bayfield County hydrography into NHD.

### *Buffalo National River*

Continued serving as WRD point of contact and project coordinator for geologic mapping related to karst groundwater studies.

### *Cuyahoga Valley National Park*

Reviewed *Floodplain Statement of Findings for Fitzwater Bridge Replacement*.

Uploaded the 2007 water quality data collected by the park from NPSTORET to STORET.

Consulted on possible new emerging contaminants initiative.

Reviewed final project completion report entitled *Determining Ohio EPA Use Classifications for Primary Headwater Streams in Cuyahoga Valley National Park* (PMIS#81130).

### *Effigy Mounds National Monument*

Reviewed and commented on draft *Effigy Mounds National Monument General Management Plan*.

Provided recommendations on excessive sediment discharge into Founders Pond and drafted a letter to the Corps of Engineers proposing mitigation measures and addressing Clean Water Act Section 404 jurisdictional issues.

### *Fort Union Trading Post National Historic Site*

Constructed groundwater monitoring wells to determine the amount of canal seepage that may be related to the bank erosion along the Missouri River.

### *George Washington Carver National Monument*

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

### *Grand Portage National Monument*

Completed detailed channel and bridge survey to support hydraulic modeling for developing design criteria for streambank stabilization.

Provided technical assistance regarding use of streambank bioengineering techniques to treat excessive erosion on Grand Portage Creek.

### *Herbert Hoover National Historic Site*

Evaluated a flood study of West Branch, the community that surrounds the park.

### *Indiana Dunes National Lakeshore*

Provided guidance to park management in dealings with EPA and Responsible Parties so that the CERCLA investigation would provide credible data to evaluate threats posed by a groundwater plume migrating toward the park from beneath the Yard 520 fly ash landfill.

Provided technical comments on USGS study plan to address effects of wetland restoration.

Obtained supplemental WRD funding for construction of wetland revegetation islands within the Great Marsh.

Provided technical review and comment on the draft *Assessment of Coastal Water Resources and Watershed Conditions at Indiana Dunes National Lakeshore, Indiana*.

Reviewed the *Wetland Statement of Findings for INDU 211(1), Rehabilitation of East State Park Road, Realignment of Mt. Baldy Entrance, and Miscellaneous Improvements*.

#### ***Isle Royale National Park***

Reviewed Task Agreement for Natural Resource Condition Assessment to contracting and conducted scoping meeting with contractor and park, region, and network staffs.

#### ***Knife River Indian Villages National Historic Site***

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

#### ***Lincoln Boyhood National Memorial***

Uploaded water quality data from the 2001-2002 Level I Water Quality Inventory conducted by the USGS to STORET.

#### ***Missouri National Recreation River***

Provided technical and policy assistance to the park, Nebraska State Park, and the Army Corps of Engineers in hydrology related to releases from dams on the Missouri River and geomorphology pertaining to alternatives for bank stabilization proposals.

#### ***Mount Rushmore National Memorial***

Uploaded water quality data from the 2001 Level I Water Quality Inventory conducted by the USGS to STORET.

#### ***Niobrara National Scenic River***

Funded studies to evaluate the hydrology, fisheries, and economic benefits of recreation on the Niobrara River.

Assisted with continuing a partnership with the State of Nebraska to protect instream flows in the Niobrara River. Prepared responses to legislative proposals and helped the park develop and implement strategies.

#### ***Ozark National Scenic Riverways***

Assisted park in updating nutrient detection limits in NPSTORET and uploaded 2007 data to STORET.

Provided feedback on horses as a source of endocrine disrupting compounds.

#### ***Pictured Rocks National Lakeshore***

Advised on issues related to fluvial conditions and identified a candidate project for the Stream Obstruction Removal Project.

Worked closely with the park and the Northern Michigan University to assess coaster brook trout restoration requirements.

#### ***Saint Croix National Scenic Riverway***

Reviewed a study on sediment dynamics and mussel habitat (Detailed Implementation Plan for funded project).

#### ***Sleeping Bear Dunes National Lakeshore***

Initiated benthic habitat mapping project in partnership with USGS Great Lakes Science Center and participated in initial scoping meeting.

Assisted park with ongoing Glen Lake/Crystal River watershed planning activities, a stakeholder-based process to define water levels for protection of lake and river resources.

Provided National Hydrography Dataset GIS files, hydrographic and impairment statistics, and data processing guidance.

Provided the results of pilot scale studies and gap analyses of missing data for Lake Michigan.

### ***Tallgrass Prairie National Preserve***

Completed detailed survey, hydraulic model, and floodplain analyses for two proposed development sites within the park.

### ***Theodore Roosevelt National Park***

Surveyed established cross sections on the Little Missouri River to detect floodplain evolution and channel movement.

### ***Voyageurs National Park***

Reviewed a report entitled *Impacts from Water-Level Regulation on Benthic Macroinvertebrate Community Structure in Namakan Reservoir and Rainy Lake of Voyageurs National Park, Minnesota*.

Reviewed and approved the implementation plan for the NRPP funded project "Lake Sturgeon Population Characteristics, Movements, and Habitat Use in Namakan Reservoir.

Consulted on possible new emerging contaminants initiative.

Reviewed the draft Wetland Vegetation Monitoring Report.

### ***Wilson's Creek National Battlefield***

Provided updated information on nutrient monitoring, emerging contaminants, and other sewage treatment plant-related issues.

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

### ***Wind Cave National Park***

Briefed new superintendent on water rights issues and threats to park water resources.

Reviewed USGS project proposal to characterize karst groundwater flow to assess water quality impacts in the park.

Evaluated a water right application by the Southern Black Hills Water System and filed a letter of intervention in opposition to the application with the South Dakota Chief Engineer. Prepared evidentiary materials, coordinated with the Office of the Solicitor, and presented testimony in an administrative hearing concerning this application (2633-2).

Analyzed effects of pumping at the Streeter Well by the Southern Black Hills Water System.

Prepared comments on a draft geochemical report by the Southern Black Hills Water System.

Conducted a meeting with the park, the Office of the Solicitor, and the Southern Black Hills Water System to explore potential settlement opportunities.

Assisted park and region on EA prepared by the Rural Utilities Service for a funding grant to the Southern Black Hills Water System.

Provided oversight of a geochemical study by the USGS and presented preliminary results of the study at Western South Dakota Hydrology Conference.

Performed an aquifer test on Well #2, prepared report on results, and continued water level monitoring at this well.

Collected GPS survey data for water resources in and around the park.

Evaluated a water right application by the Fall River Water Users District.

## **NATIONAL CAPITAL REGION**

### ***Anacostia Park***

Conducted hydraulic modeling of Anacostia River to assess effects of removal of sheet pilings and consulted with park staff regarding wetland preservation and creation.

Provided technical review and evaluation of a wetland functions and values assessment methodology proposed for use by the contractor in analyzing wetlands.

Reviewed wetland management alternatives and revised the draft *Wetlands and Resident Canada Goose Management Plan/ Environmental Impact Statement for Anacostia Park*.

***Chesapeake and Ohio Canal National Historical Park***

Reviewed *Floodplain and Wetland Statements of Findings for Power Plant Water Line Right-of-Way and for Georgetown University Boathouse*.

***Piscataway Park***

Reviewed potential impacts to wetland resources resulting from the repair or expansion of boardwalks, parking areas, trails, a canoe launch site, and shoreline stabilization.

***Prince William Forest Park***

Performed simple floodplain analysis of a newly acquired parcel.

Completed an on-site wetland assessment of a proposed campground site within a new property acquisition.

***Wolf Trap National Park for the Performing Arts***

Provided an on-site analysis and recommendations to reduce hill slope erosion on an unpaved parking area while maintaining the integrity of the agricultural scene and the wetland resources.

**NORTHEAST REGION**

Participated and presented at the Northeast Region Natural Resource Managers Workshop held in Shepherdstown, WV.

Attended the Energy Epicenter Conference in Denver on shale gas development and developed a better understanding of the new threats and challenges that parks will face near park boundaries from the higher infrastructure and water resource demands unique to this type of development.

Advised GRD on a report on primary concerns that will be faced by New England parks from rapidly expanding Marcellus shale gas development.

***Acadia National Park***

Reviewed the draft report *Assessment of Natural Resources and Watershed Conditions in and Adjacent to Acadia National Park*.

Continued consultation on impacts of culverts and impoundments on fish passage and geomorphic impacts.

Advised park and regional staff on statistical analyses, including exploratory data analysis and functional data analysis. Provided updated summaries related to mercury issues.

Review paper entitled "Citizen Scientists Collect Reliable Mercury Data During Long-term Monitoring at Acadia NP"

Consulted with park on horses as a source of endocrine disrupting compounds.

***Allegheny Portage Railroad National Historic Site***

Reported on an assessment of the stability of two ponds in the Staple Bend Tunnel Unit that are proposed to be used to neutralize acid mine drainage.

Uploaded results to STORET from a study entitled *Chemical and Hydrological Data for the Staple Bend Unit of the Allegheny Portage Railroad National Historic Site, which evaluated options to mitigate acid loading in the Little Conemaugh River*.

Uploaded water quality, benthic macroinvertebrate, and fish data from the 2004-2005 Level I Water Quality Inventory conducted by Pennsylvania State University to STORET.

***Appalachian National Scenic Trail***

Participated in discussions with park, Northeast Temperate Network staff, and USGS scientists to initiate a Level I water quality inventory.

Prepared GIS coverage and water quality databases documenting monitoring locations and data within 20 miles of the trail's centerline from Modern STORET, Legacy STORET, and NWIS to help inform the Level I Inventory effort.

Reviewed revised edition of Palmerton Zinc Quality Assurance Project Plan.

***Appomattox Court House National Historical Park***

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

***Cape Cod National Seashore***

Provided programmatic oversight for the completion of the project titled "Monitoring Vegetation and Salt Marsh Development Processes in Restoring Hatches Harbor Salt Marsh."

Conducted numerical modeling of groundwater flow in a barrier beach at East Harbor.

Conducted analyses of potential impacts of restoring tidal flow in the Herring River system on adjacent, private, domestic wells.

Provided updated information on nutrient monitoring and harmful algae bloom issues.

***Colonial National Historical Park***

Reviewed several U.S. Navy contractor documents and provided risk assessment strategy advice to protect wetland resources from potential mercury impacts.

***Delaware Water Gap National Recreation Area***

Prepared draft Groundwater Monitoring Plan.

Sent technical updates on nutrient and statistical issues and the results of pilot scale studies and gap analyses of missing data for the Delaware Estuary.

***Fire Island National Seashore***

Reviewed draft *Assessment of Coastal Water Resources and Watershed Conditions at Fire Island National Seashore, New York*.

Produced boater educational brochure under Marine Recreational Stewardship fee monies.

Provided project oversight for NRPP funded project "Simulation of the Shallow Ground-Water Flow System at Fire Island National Seashore."

Reviewed *Floodplain Statement of Findings for Patchogue Ferry Terminal*.

Served as ATR in the initiation of a CESU project entitled "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."

***Flight 93 National Memorial***

Conducted hydrogeological analysis and recommendations for a new water-supply well at the proposed visitor center.

Provided technical review and comments on a draft wetland delineation report prepared by a contractor.

***Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park***

Uploaded water quality data collected by park staff during 2007 to STORET.

***Gateway National Recreation Area***

Uploaded the 1999 data from the park's ongoing ambient water quality monitoring program to STORET.



Streamgage at Booker T. Washington National Monument (Ellsworth, 2008).

***George Washington Birthplace National Monument***

Uploaded water quality data from the 1998-1999 Level I Water Quality Inventory conducted by the USGS to STORET.

***Harpers Ferry National Historical Park***

Provided programmatic oversight leading to the completion project titled “Enhanced Wetland Inventory of Harpers Ferry National Historical Park.”

***Johnstown Flood National Memorial***

Advised on wetland compliance requirements for a proposal to use fire to maintain wetlands in an early successional state.

Reviewed and evaluated a draft Scope of Work request for a wetland delineation and function assessment.

Reviewed and evaluated the need for a Wetland Statement of Findings based on proposed impacts to wetland resources.

Uploaded water quality, benthic macroinvertebrate, and fish data from the 2004-2005 Level I Water Quality Inventory conducted by the Pennsylvania State University to STORET.

***Marsh-Billings-Rockefeller National Historical Park***

Uploaded water quality data from the 1998-1999 Level I Water Quality Inventory conducted by staff from Cape Cod National Seashore to STORET.

***Minute Man National Historical Park***

Funded a Stream Obstruction Removal project to remove a culvert that acts as a barrier to fish passage.

Uploaded water quality data from the 1998-1999 Level I Water Quality Inventory conducted by staff from Cape Cod National Seashore to STORET.

***New River Gorge National River***

Worked with park staff to identify guidance related to spraying *Bacillus thuringiensis* bacteria as a purportedly more environmentally benign alternative to spraying pesticides.

***Petersburg National Battlefield***

Conducted hydrogeological analysis and recommendations for a new water-supply well at Five Forks.

Uploaded water quality data from the 1998-1999 Level I Water Quality Inventory conducted by the USGS to STORET.

***Richmond National Battlefield Park***

Completed on-site evaluation of three large wetland systems, their hydrology, and the potential to enhance the wetland functions of each area.

Provided assistance related to several hydrologic issues, including how to treat an eroding bank of the James River, known as Drewry’s Bluff, while maintaining its historic appearance.

Advised on technical issues related to an asphalt plant release permit.

Uploaded water quality data from the 2001-2002 Level I Water Quality Inventory conducted by the USGS to STORET.

***Sagamore Hill National Historic Site***

Uploaded water quality data from the 1999-2000 Level I Water Quality Inventory conducted by staff from Cape Cod National Seashore to STORET.

***Saratoga National Historical Park***

Continued to provide feedback on PCB contamination issues.

***Thomas Stone National Historic Site***

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

### ***Upper Delaware Scenic and Recreational River***

Completed independent review of QUAL2K (water quality model) analyses on the Upper Delaware River.

Reviewed an engineered flood control channel proposed for park lands.

Provided programmatic oversight in the completion of a study evaluating flow and temperature regime requirements for the federally endangered dwarf wedge mussel.

Provided programmatic oversight in the completion of a study evaluating fish host suitability for the federally endangered dwarf wedge mussel.

### ***Valley Forge National Historical Park***

Initiated development of Resource Stewardship Strategies.

Consulted with park staff on the invasion of rusty crayfish in Valley Creek.

### ***Weir Farm National Historic Site***

Uploaded water quality data from the 1998-1999 Level I Water Quality Inventory conducted by staff from Cape Cod National Seashore to STORET.

Participated and presented at the Pacific West Region Natural Resource Managers Workshop held at the Marconi Center in Marin County, CA.



Delaware River endangered mussel study (Jennifer Kagel, USFWS, 2008).

## **PACIFIC WEST REGION**

Reviewed water rights applications near California NPS units for potential impact to park water rights and resources.

Prepared briefing statement on Southern Nevada Water Authority development plans for in-state groundwater resources.

Prepared briefing statement on NPS water resource concerns associated with solar thermal energy proposals in southern Nevada.

Prepared report on water rights information from DOI bureaus regarding selected groundwater applications in the Death Valley, Colorado, and Upper Great Salt Lake Desert Groundwater Flow Systems of Nevada.

Assisted in completion of stipulated agreement between the Southern Nevada Water Authority and DOI bureaus concerning groundwater applications in Delamar, Dry Lake, and Cave Valleys.

Attended Nevada Water Resources Association Annual Conference and presented a talk for the conference's Regional Tour of the Carbonate System in eastern Nevada.

### ***Big Hole National Battlefield***

Collected and analyzed data on condition of ditches.

Prepared objections to non-NPS water rights claims in the Big Hole River Adjudication.

### ***Cabrillo National Monument***

Provided updated information relevant to protecting park aquatic resources, including contacts and information on San Diego Bay pollution sources.

### ***Channel Islands National Park***

Edited and revised the Results of *Wetlands Mapping at Prisoner's Harbor* report.

Co-authored a proposal for funding titled "Restore Rare Coastal Wetland Habitat at Prisoners Harbor, Santa Cruz Island, Channel Islands National Park."

Provided project management oversight, including task scheduling, EIS preparation, and cost estimates, to the “Prisoners Wetland Restoration Project at Channel Islands National Park.”

#### ***Crater Lake National Park***

Coordinated and conducted seepage investigation of Annie Creek.

Compiled and uploaded data to STORET from a variety of digital and/or analog datasets including the park’s long-term water quality monitoring program.

#### ***Death Valley National Park***

Collected scientific data and presented expert interpretation of the data to the State of Nevada at hearings and other meetings to inform the Nevada State Engineer about the park’s water right and public interest needs.

Consulted with park staff regarding floodplain compliance of school site and performed cursory flood flow analysis.

Coordinated efforts by the park, WRD, and cooperator on the second phase of the park’s Water Resources Stewardship Report.

Represented NPS on the Incident Command Team for the interagency effort to prevent the extinction of the Devils Hole pupfish (*Cyprinodon diabolis*).

Co-authored a presentation on the status of the Devils Hole pupfish recovery effort for the annual meeting of the Desert Fishes Council in Ventura, CA.

Contributed to development of a population model for the pupfish population in Devils Hole.

Prepared a draft hydrologic monitoring plan and briefed park management on recommended modifications to WRD-support monitoring stations.

Provided oversight for USGS project to construct an embedded mesh model for the area encompassing Devils Hole and to update the DURGS model.

Initiated a study of the effects of pumping Army Well 1 on Devils Hole.

Prepared comments for BLM on proposed solar energy projects in the Amargosa Desert.

Provided oversight for the operation and data management of five spring flow and water level monitoring gages at Devils Hole and Texas, Travertine, and Nevares Springs.

Provided oversight for the publication of a paper on historic water levels on Devils Hole in the NPS NRPM technical report series.

Participated in Amargosa Basin DOI Coordination Meeting and 2008 Devils Hole Workshop.

#### ***Devils Postpile National Monument***

Reviewed the draft Wetland Inventory and Condition Assessment.

#### ***Ebey’s Landing National Historical Reserve***

Review final project report entitled Functional Assessment and Historical Analysis of Crockett Lake.

#### ***Golden Gate National Recreation Area***

Provided water right guidance for the resolution and acquisition of land and water rights from the Zen Center on Green Gulch.

Initiated benthic habitat mapping project in partnership with USGS Coastal and Marine Geology.

Worked on desired conditions for Golden Gate National Recreation Area’s water resources.



Obtained funding and coordinated completion of a CESU Task Agreement for the project “Rodeo Beach Wetland Complex Final Restoration Design.”



Rodeo Lagoon wetland complex at Golden Gate National Recreation Area.

Reviewed the draft report *Hydrologic regime, vegetation, impact analysis, and restoration concepts for the Rodeo Beach wetland complex: Golden Gate NRA, CA.*

Reviewed the *Environmental Assessment for the Tennessee Hollow Upper Watershed Revitalization Project at The Presidio of San Francisco.*

Reviewed a preliminary design for the Quartermaster Reach stream and marsh restoration project, located at the confluence of Tennessee Hollow Creek and Crissy Marsh at The Presidio of San Francisco.

Reviewed the draft *Wetland Statement of Findings for the Marin Headlands/Fort Baker Transportation Management Plan and reviewed a compensatory wetland mitigation plan.*

Reviewed the final for the NRPP Disturbed Lands project “Complete Restoration of Salmonid Habitat at Banducci.”

Provided comments on proposed designs of habitat restoration in Tennessee Hollow watershed, specifically, Quartermaster Creek between already restored Thompson Reach and Crissy Marsh.

Assisted in developing a scope of work for stream channel relocation at Big Lagoon, including design of geomorphic character.

Uploaded water quality data to STORET collected by park staff during 2002 to determine possible impacts of equestrian facilities on the Rodeo and Redwood Creek watersheds.

Provided updated information on emerging contaminants issues and provided advice on oil spill sampling.

Sent results of pilot scale studies and gap analyses of missing data for San Francisco Bay.

### ***Great Basin National Park***

Completed revisions and published the report *Bonneville Cutthroat Trout Restoration Project, Great Basin National Park* (Natural Resources Report NPS/NRPC/NRR – 2008/055).

Provided advice and recommendations for metadata entry into NPSTORET.

Collected scientific data and presented expert interpretation of the data to the State of Nevada at hearings and other meetings to inform the Nevada State Engineer about the park’s water right and public interest needs.

Evaluated Nevada water right applications for potential impacts to park resources and water rights and prepared protests of applications where needed.

Evaluated Utah Nevada water right applications in basins adjacent to the park for potential impacts to park resources and water rights; coordinated preparation of protests with BLM, USFWS, and the Office of the Solicitor coordination preparation for hearing on protest of application by Beaver County.

Coordinated preparation of plan of work by USGS and UNR scientists to evaluate basin-full aquifers and assess their connection to surface-waters and regional aquifer, as funded by BLM land sale proceeds under the Southern Nevada Public Lands Management Act.

Collaborated with USGS and presented briefing to Congressional staff concerning NPS water resource protection concerns for proposed pumping by the Southern Nevada Water Authority (SNWA).

Provided oversight for completion of a USGS report that responds to questions by the SNWA regarding USGS conclusions about susceptibility of park water resources to adjacent pumping.

Implemented provisions of the SNWA-DOI Spring Valley stipulated agreement, including participation in meetings and conference calls as part of an overall effort to implement the hydrologic 3M Plan of the agreement.

Coordinated with DOI liaison on SNWA Spring Valley groundwater development project.

Provided oversight of an agreement with USGS to operate and maintain the Lehman Creek streamgage.

Provided oversight for the completion of a USGS study of the source of Cave Springs.

#### ***Hagerman Fossil Beds National Monument***

Uploaded water quality data from the 1999-2001 Level I Water Quality Inventory conducted by park staff to STORET.

Uploaded water quality data from the a 2001 Journal of Environmental Quality article entitled *Movement of Coliform Bacteria and Nutrients in Ground Water Flowing through Basalt and Sand Aquifers* to STORET.

Uploaded 2004-05 water quality data from a University of Idaho thesis entitled *Water Quality and Chemical Analysis to Determine the Hydrology Affecting Springs within the Hagerman Fossil Beds National Monument* to STORET.

#### ***Joshua Tree National Park***

Provided preliminary review and advice for the Denver Service Center regarding a proposed floodplain analysis.

#### ***Kalaupapa National Historical Park***

Assisted with drafting Request for Proposals, reviewing proposals, and selecting contractor for Natural Resource Condition Assessment.

#### ***Kaloko Honokahu National Historical Park***

Led the water working group for exchange of technical information and searched for opportunities to work with park neighbors to ensure that park water-dependent resources are protected as adjacent development occurs.

Advised park staff on developing contaminants issues and on recommended labs and detection limits for new generation pesticides and nutrients.

Provided advice on the different types of nutrients being monitored.

Provided project oversight for WRD funded project "Determining Subterranean Groundwater Nutrient Input to Kaloko-Honokahu National Historic Park's Coastal Ocean Ecosystem."

Evaluated Hawaii water-right applications for potential impacts to park resources.

Reviewed the plans for groundwater pumping adjacent to the park and provided comments and recommendations to Hawaii County regarding the potential for impact to park resources.

Submitted comments to the Hawaii Commission on Water Resources on an application for a new water well adjacent to the park.

Provided oversight of salinity monitoring in the park.

Assisted park staff in a meeting with "The Shores at Kohanaiki" developer to discuss status of wells and aquifer testing.

Participated in meetings of the Kona Roundtable group to exchange information on water resources of the Kona area.

Collaborated with park staff, the Office of the Solicitor, and the meeting facilitator to conduct meetings with stakeholders to discuss management options for groundwater development in North Kona.

Prepared comments on draft Environmental Assessments for water developments adjacent to the park.

#### ***Lake Mead National Recreation Area***

Collected scientific data and presented expert interpretation of the data to the State of Nevada at hearings and other meetings to inform the Nevada State Engineer about the park's water right and public interest needs.

Evaluated Nevada water right applications and filed protests to protect park water rights and resources.

Provided technical oversight and conduct review of progress of work by GeoTrans, Inc., to develop a numerical groundwater flow model of 13 selected basins within the Colorado Flow System.

Provided technical oversight of a USGS study to quantify groundwater discharge by evapotranspiration within the area of the groundwater flow model.

Provided oversight of work by USGS Geologic Discipline to provide advice and support services to modeling contractors regarding the geologic-framework model, which is part of the numerical groundwater flow model.

Directed contractor's work on a hydrogeologic review of the numerical groundwater flow model prepared by the SNWA.

Provided technical oversight on USGS agreements to operate and maintain streamgages at Rogers and Blue Point Springs and the Virgin River near Overton, NV.

Continued implementation of monitoring and groundwater management provisions of negotiated settlements with SNWA and with Vidler Water Company, Inc.

Provided technical oversight on a USGS study of the hydrogeology of hot springs in the Black Canyon area of the Colorado River below Hoover Dam within the park, including field reconnaissance of potential discharge gaging sites.

Responded to questions concerning proposals for groundwater development in the Mohave County area.

Provide national perspective on water pollution, endocrine disruption, and data mining issues. Provided updated mercury guidance.

#### ***Lake Roosevelt National Recreation Area***

Reviewed two USGS project proposals pertinent to the park's shoreline management plan. One proposed to monitor trace element input to Lake Roosevelt from the Columbia River, and the other proposed to investigate pathogens in near-shore habitats of the lake.

Provided updated guidance from EPA on fish concerns about mercury, other metals, and organic compounds.

#### ***Lewis and Clark National Historical Park***

Reviewed report *Assessment of Coastal Water Resources and Watershed Conditions at Lewis and Clark National Historical Park, Oregon and Washington* (Natural Resource Technical Report NPS/NRPC/WRD/NRTR – 2007/055).

#### ***Mojave National Preserve***

Provided programmatic oversight and accepted the annual accomplishment report for the NRPP Threatened & Endangered project "Lake Ecology and Population Dynamics of Mohave Tui Chub."

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

Participated in conference calls and technical discussions with Lahontan Regional Water Quality Control Board, BLM, and Molycorp (the Responsible Party) to ensure that characterization of the Mountain Pass Mine groundwater plume was sufficient to protect park resources.

### ***Mount Rainier National Park***

Served as Point of Contact for position supported by the Natural Resources Challenge, Fluvial Geomorphologist.

Provided National Hydrography Dataset GIS files, hydrographic, and impairment statistics and data processing guidance.

Reviewed and accepted the final accomplishment report for the BRMD funded project “Assess Status of Native Bull Trout and Cutthroat Trout Populations.”

Reviewed a lab report pertaining to bull trout genetics.

### ***North Cascades National Park***

Provided programmatic oversight for the NRPP funded project entitled “Eradicate Non-native Fish from Seven High Priority Lakes in North Cascades National Park Service Complex (NOCA), Washington.”

Provided information on “North Cascades Mountain Lakes Fishery Management Plan” in response to legislation that would allow fish stocking to continue in historically fishless lakes.

Provided updated guidance on benthic macroinvertebrate, statistical, and other biomonitoring-related issues.

### ***Olympic National Park***

Reviewed report entitled *Assessment of Coastal Water Resources and Watershed Conditions at Olympic National Park, Washington* (Natural Resource Technical Report NPS/NRPC/WRD/NRTR – 2008/068).

Provided continuing assistance related to the proposed removal of two dams on the Elwha River.

Provided partial funding for an experimental bed load sensor through the Stream Obstruction Removal Project.

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

Discussed the importance of QA/QC issues and monitoring design detectability issues regarding fish monitoring protocols. Advised park on contaminants issues related to wood preservatives.

### ***Point Reyes National Seashore***

Consulted on issues related to contaminants, including Brown Apple Moth spraying, and flow measurement quality control.

Continued to provide funding and oversight for a project to remove non-native plant species, primarily cape ivy, along coho salmon habitat in Lagunitas Creek.

### ***Pinnacles National Monument***

Field-evaluated the ground water resources, wetlands, geomorphology, and aquatic habitats of new park lands.

Obtained, entered, reformatted, and QA/QCed Level I Water Quality Inventory data collected by the USGS for upload to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

Provided surface water quality data and reports for use in preparing the park’s General Management Plan.

Conducted hydrogeological analysis and recommendations for construction of a new water-supply well in Bear Valley.

### ***Redwood National Park***

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

Uploaded data from the park’s Hydrologic Monitoring Program to STORET.

### ***San Juan Island National Historical Park***

Jointly purchased new water quality sonde and sensors with the park to facilitate the water parameter monitoring component of the investigation of loss of eel grass.

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

*Santa Monica Mountains National Recreation Area*  
Transmitted national and regional amphibian issue updates.

Compiled and uploaded data from J.S. Leventhal's 1970 study entitled Tritium Fallout in the Pacific United States to STORET.

Continued to provide funding and programmatic oversight for the second year of a project of non-native species removal to improve habitat for southern steelhead spawning habitat.

*Sequoia and Kings Canyon National Parks*



Sunset Meadow headcut before restoration (Demetry, 2008).



Sunset Meadow headcut after restoration (Demetry, 2008).

Reviewed *Floodplain Statement of Findings for Halstead Meadows Road Reconstruction*.

Assisted park staff in preparing a proposal for funding titled "Restore Critical Wetlands in Lower Halstead Meadow."

Conducted a site visit at lower Halstead Meadow to identify appropriate methods for restoration.

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

Co-directed a crew of international volunteers from American Conservation Experience (ACE) in repairing minor erosion features after an exceptionally wet winter.



International volunteers moving fill material for minor erosion repair at Upper Halstead Meadow, Sequoia National Park (Demetry, May 2008).



Filling minor erosion channels with coconut fiber logs and dirt, Upper Halstead Meadow, Sequoia National Park (Demetry, May 2008). Large logs were placed in 2007 to slow water flow.



WRD staff and volunteers treating minor erosion channels at Upper Halstead Meadow after a wet winter, Sequoia National Park (Wolf, May 2008).

Planting seedlings in Upper Halstead Meadow, Sequoia National Park (Wagner, June 2008).

Upper Halstead Meadow replanted with 57,000 seedlings (mostly *Scirpus microcarpus*), Sequoia National Park (Wagner, June 2008).

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

Provided national updated information related to amphibian and other monitoring issues.

Determined environmental impacts of water withdrawal for public water supplies.

***Yosemite National Park***

Evaluated the Poopenaut Valley wetland data collection and assessment proposal and recommended data collection needs in order to achieve project objectives and to define river management strategies.

Reviewed the draft report *Yosemite Valley: Hydrologic Regime, Soils, Pre-Settlement Vegetation, Disturbance, and Concepts for Restoration*.

***Whiskeytown-Shasta-Trinity National Recreation Area***

Provided updated technical information on monitoring lakes and streams.



Photos left to right: Pucinella Project - Caltrans engineers installing a road underdrain above Spring 1 (E. Wolf, 2008); Measuring Pucinella growth (NPS, 2008).

Assisted the park in restoring a rare salt spring that provides the only known habitat for the endemic wetland plant *Puccinellia howellii* (Howell’s alkali grass).

## SOUTHEAST REGION

### ***Big Cypress National Preserve***

Provided final review of the *Wetland Statement of Findings for the Tamiami Trail Welcome Center*.

### ***Big South Fork National River and Recreation Area***

Provided programmatic oversight for a habitat restoration and continued to work with the park to produce a report on the project.

Reviewed *Floodplain Statement of Findings for Plugging and Reclaiming Two Oil-Gas Wells*.

### ***Biscayne National Park***

Provided technical and policy review and assisted with the publication of a Natural Resources Technical Report entitled *Fishery Management Analysis for Reef Fish in Biscayne National Park: Bag and Size Limit Alternatives* (Natural Resource Technical Report NPS/NRPC/WRD/NRTR-2007/064).

Reviewed draft coastal wetlands rehydration demonstration project, which will restore more natural flow through wetlands to south Biscayne Bay and provided feedback on options for endocrine stressor identification approaches using passive samplers.

Coordinated review of proposals, selected investigator, and obligated funds for social science surveys of marine recreational uses. Developed program goals, activities, and budgets for buoys and navigational aids, including funding of contract for Environmental Assessment.

### ***Blue Ridge Parkway***

Assisted in the evaluation of Responsible Party contractor proposed site characterization and mitigation actions related to discharges to surface and groundwater from an adjacent landfill.

Provided technical review for an NRPP-NRM proposal “Develop Wetlands Management Plan and Establish Baseline Data on Blue Ridge Parkway Wetlands.”

### ***Canaveral National Seashore***

Reviewed proposals, assisted with selecting investigator, and coordinated kick-off meeting for Natural Resource Condition Assessment.

Served as point of contact for a NRPP funded project.

### ***Cape Hatteras National Seashore***

Identified criteria necessary for evaluating the proposed *activities in the Cape Hatteras National Seashore ORV Management Plan and EIS* and the need to complete individual wetland statements of findings.

Reviewed report for *Phase II coastal natural resource assessment project “Investigation of Pollutant Drainage on South Bodie Island.”*

Reviewed *Floodplain Statement of Findings for Ocracoke Island Multi-Use Trail*.

### ***Cape Lookout National Seashore***

Provided assistance in drafting a response to a request by the North Carolina Marine Fisheries Commission to open a commercial beach seine fishery for striped bass on the Core Banks.

### ***Chattahoochee River National Recreation Area***

Reviewed *Floodplain Statement of Findings and Wetlands Statement of Findings for McGinnis Ferry Road Bridge Replacement Project*.

Provided review and comment on a portion of the draft *Chattahoochee River National Recreation Area Resource Stewardship Strategies*.

### ***Chickamauga and Chattanooga National Military Park***

Provided review and comments on a draft Wetland/Floodplain Statement of Findings for Bank Stabilization at Moccasin Bend National Archeological District.

### ***Coral Reef National Monument***

Initiated benthic habitat mapping project in partnership with NOAA National Ocean Service Center for Coastal Monitoring and Assessment

### ***Cumberland Gap National Historical Park***

Uploaded data collected from 2003-2007 from an ongoing park-based water quality monitoring program encompassing 49 streams and springs to STORET.

### ***Cumberland Island National Seashore***

Uploaded water quality, macroinvertebrate, fish, and continuous data logger data from the 1999-2000 Level I Water Quality Inventory conducted by the USGS to STORET.

### ***De Soto National Memorial***

Uploaded results from 1999 and 2000 stormwater runoff samples collected to investigate potential impacts from adjacent residential areas on park resources, especially its mangroves.

### ***Dry Tortugas National Park***

Assisted with identifying and moving funding to USGS for joint USGS-NPS-State of Florida research project on fish distribution and potential restoration benefits of no-take zone.

Coordinated review of proposals, selected investigator, and obligated funds for social science surveys of marine recreational uses.

### ***Everglades National Park***

Provided advice related to mercury and endosulfan.

Reviewed the *Wetlands and Floodplains Statements of Findings for Proposed Tamiami Trail Modifications, Modified Water Deliveries to Everglades National Park Project, Limited Reevaluation Report, and Environmental Assessment*.

Reviewed the *Floodplain Statements of Findings for Commercial Services Plan and for Tamiami Trail Project*.

### ***Fort Pulaski National Monument***

Helped implement a study to address water quality issues in a historic moat.

Evaluated the potential impacts to wetland resources and reviewed the draft *Wetland/Floodplain Statement of Findings for Proposed Bank Stabilization of the Cockspur Island Lighthouse*.

### ***Great Smoky Mountains National Park***

Discussed with park staff the future development of a Water Resources Information and Issues Overview Report.

Reviewed the *Wetland and Floodplain Statements of Findings for [the proposed?] Oconaluftee Visitor Center*.

Uploaded water quality data collected during 1993-2007 by park staff and the University of Tennessee from NPSTORET to STORET.

Uploaded Noland Divide long-term water quality monitoring project data (1991-2007) from NPSTORET to STORET.

Completed an on-site evaluation of wetland restoration opportunities at Cades Cove.

### ***Gulf Islands National Seashore***

Initiated benthic habitat mapping project in partnership with USGS Florida Integrated Science Center.

Advised park and Denver Service Center staff regarding wetland compliance requirements for a proposed utility trench on West Ship Island.

Reviewed *Floodplain Statements of Findings to Reconstruct Park Buildings on West Ship Island and Reconstruct Horn Island Facilities*.



Obtained, entered, reformatted, and QA/QCed Level I Water Quality Inventory data collected by the USGS for upload to STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

#### ***Natchez Trace Parkway***

Reviewed *Floodplain and Wetland Statements of Findings for the Natchez Trace Multi-Use Trail, Old Canton Road to Reservoir Overlook Parking Area.*

Provided technical and compliance review of the *Natchez Trace Parkway Multi-Use Trail, Old Canton Road to Reservoir Overlook Parking Area, and from Kansas City Southern Railroad Bridge to Traceway Park Parking Area, Wetland Delineation Scope of Services.*

#### ***Obed Wild and Scenic Riverway***

Reviewed draft reports and provided comments to the USGS regarding on-going hydrologic investigations.

Provided technical oversight of an underwater video habitat assessment as part of the Cumberland's Habitat Conservation Plan through the CESU-University of Tennessee.

#### ***Salt River Bay National Historical Park and Ecological Preserve***

Reviewed the *Wetland Statement of Findings for the Proposed Marine Research and Education Center and Abandoned Hotel Demolition Salt River Bay National Historical Park and Ecological Preserve, St. Croix, U.S. Virgin Islands.*

#### ***Shiloh National Military Park***

Compiled and uploaded data to STORET from a variety of digital and/or analog datasets in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

#### ***Stones River National Battlefield***

Uploaded water quality data from the 2000-2001 Level I Water Quality Inventory conducted by the USGS to STORET.

#### ***Timucuan Ecological and Historic Preserve***

Commented on a water quality modeling analysis of the Lower Saint Johns River related to proposed drinking water withdrawals.

#### ***Virgin Islands National Park***

Initiated benthic habitat mapping project in partnership with NOAA National Ocean Service Center for Coastal Monitoring and Assessment.

Provided review and comments on the park's water quality database in NPSTORET.

## **TECHNICAL ASSISTANCE TO NETWORKS**

### **Servicewide**

Provided technical review for plan and protocol development, fiscal oversight, and administration to 32 networks for Water Quality Vital Signs Monitoring Program.

Ensured that GPRA goals for reporting water information (1a4a, 1a4b, and 1a4c) were addressed and given proper weight during the monitoring plan and water/aquatic protocol (narrative) document review process. Also, verified that networks had consulted WRD's Designated Use and Impairment website (303d listing) and compared it with other sources when listing impaired waterbodies.

Updated the WRD web page with Vital Signs related information.

Extensively revised Part B lite protocol and SOP guidance.

Initiated a search of available water quality analysis software and arranged for webinar reviews and introductory training.

Continued to stay abreast of water quality instrument advances; updated WRD web page with information on instrument pricing, new sensor availability, and other water quality related guidance and announcements.

### ***Arctic Network***

Provided latest interagency guidance on flow and flow quality control methods for big rivers.

Compiled and uploaded data from the USGS's reformatted National Uranium Resource Evaluation to STORET.

### ***Chihuahuan Desert Network***

Provided Baseline Water Quality Data Inventory and Analysis Reports and associated data files in digital format.

Provided review and comment on the data management chapter of the network's Phase III Report.

### ***Cumberland/Piedmont Network***

Uploaded all water quality data through 2007 from NPSTORET to STORET.

Incorporated recommended enhancements into NPSTORET.

### ***Great Lakes Network***

Reviewed various draft water quality monitoring protocols and SOPs. Provided information related to the use of Cobaltus Chloride in field work.

Provided customized guidance on how to import spreadsheet data into NPSTORET.

Incorporated recommended enhancements into NPSTORET.

Uploaded the 2006 and 2007 water quality data for Indiana Dunes National Lakeshore and Voyageurs National Park from NPSTORET to STORET.

Uploaded the 2007 water quality data for Apostle Islands National Lakeshore, Isle Royale National Park, Pictured Rocks National Lakeshore, and Saint Croix National Scenic Riverway from NPSTORET to STORET.

### ***Greater Yellowstone Network***

Reviewed stream flow data analysis protocol adopted from The Nature Conservancy.

Provided latest interagency guidance on flow and flow quality control methods for big rivers.

Provided review and comment on the Grand Teton National Park NPSTORET back-end database.

Provided data from USGS' Moose, Wyoming monitoring station in NPSTORET format for Grand Teton National Park.

Incorporated recommended enhancements into NPSTORET.

### ***Heartland Network***

Provided several Excel spreadsheets containing water quality data from a variety of sources for George Washington Carver National Monument.

### ***Klamath Network***

Continued providing updates on monitoring design issues.

### ***Mediterranean Coast Network***

Provided review and comments on the network's data management standard operating procedure.

Reviewed lengthy draft Freshwater Quality Monitoring Protocol Narrative and Attached SOPs for Vital Signs monitoring.

### ***Mid-Atlantic Network***

Provided technical assistance to explain the relationship between sensitivity as a method detection limits and precision quality control.

Provided background and support for implementing NPSTORET through the University of Virginia.

Incorporated recommended enhancements into NPSTORET.

### ***National Capital Region Network***

Provided review and comments on the network's data management standard operating procedure.

Provided comments on State of Maryland biomonitoring protocol SOPs to make them fully acceptable for NPS vital signs monitoring.

Reviewed multiple Water Quality Protocols and SOPs.

Participated in a extensive review of the Surface Water Dynamics Protocol.

### ***North Coast and Cascades Network***

Provided advice related to zooplankton monitoring.

### ***Northeast Coastal and Barrier Network***

Provided nutrient issue updates.

### ***Northeast Temperate Network***

Consulted on statistical issues.

### ***Northern Colorado Plateau Network***

Provided background information on the NPS Electronic Data Deliverable file specifications for reporting water quality data versus using NPSTORET.

Helped review draft network SOPs for sensitivity QC and general adequacy.

### ***Northern Great Plains Network***

Provided review and comments on the data management chapter of the network's Phase III Report.

Reviewed Phase III Vital Signs Network Monitoring Report and continued providing advice on various technical and statistical issues.

### ***Pacific Island Network***

Helped revise draft water quality monitoring plan, while serving as WRD contact.

### ***Rocky Mountain Network***

Provided guidance on practical field quality control issues, as well as basic statistical issues

Attended technical committee meeting held in Glacier National Park to review water quality program development and monitoring issues.

### ***San Francisco Bay Area Network***

Provided advice on several technical monitoring and contaminants issues.

Provided review, comment, and troubleshooting of existing data entered in NPSTORET.

Incorporated recommended enhancements into NPSTORET.

### ***Sierra Nevada Network***

Provided review and comment on water quality and wetlands databases and mapping data elements to the NPS electronic data deliverable format specifications.

Reviewed lake monitoring protocol and statistical power analysis.

### ***South Florida/Caribbean Network***

Provided funding to complete existing benthic habitat maps at Dry Tortugas National Park and Biscayne National Park.

Provided initial review and comment on coral reef temperature data.

Provided review comments on a “roadmap,” summarizing the network’s basic approach and reviewed the phase III monitoring plan and associated documents.

***Southeast Alaska Network***

Provided review and comments on the data management chapter of the network’s Phase III Report.

***Southeast Coast Network***

Consulted with network monitoring staff on various technical issues and passed on updated guidance related to nutrients and sondes.

***Southwest Alaska Network***

Provided information on the status of National Hydrography Dataset and the data model. Brought to the attention of the USGS the issue of connected lakes with different names in NHD.

Provided latest interagency guidance on flow and flow quality control methods for big rivers.

***Upper Columbia Basin Network***

Provided review and comment on the technical and data management sections of the network’s integrated water quality monitoring protocol narrative and standard operating procedures.

Reviewed quality control aspects of camas monitoring protocol.

Purchased a water quality data analysis package for the network to evaluate, using a representative suite of its FY08 monitoring data.

**TECHNICAL ASSISTANCE PROVIDED BY  
NATURAL RESOURCE CHALLENGE  
AQUATIC RESOURCE FIELD PROFESSIONALS**

**SERVICEWIDE**

Provided comments on the revised DO 77-1 Procedural Manual

Reviewed manual on the use of Antimycin A to restore native fish populations (NPS publication NPS/NRPC/NRR—2008/033

Attended the American Geophysical Union meeting December 10-14, 2007, in San Francisco, CA.

**ALASKA REGION**

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

***Arctic Network***

Served on technical advisory committee.

Established a cooperative agreement with East Carolina University to design a coastal lagoon monitoring strategy for the network and Cape Krusenstern National Monument.

Responded to reviewers’ comments for monitoring shallow lakes.

***Bering Land Bridge National Preserve***

Sampled 15 lakes as part of the shallow lake monitoring plan.

***Central Alaska Network***

Served on technical advisory committee.

Responded to reviewers' comments for monitoring shallow lakes.

Maintained water quality monitoring sondes in four lakes.

Collected methane, dissolved organic carbon, and dissolved inorganic carbon samples for monitoring project with the USGS Yukon Basin Initiative.

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

Reviewed "Geography of Alaska Lake Districts: Identification, Description, and Analysis of Lake-rich Regions of a Diverse and Dynamic State."

Continued discussions with USGS on the Yukon Basin Initiative.

Graduate Committee member at the University of Alaska, Fairbanks, for studies titled "Investigations on Old Man Char in Gates of the Arctic National Park and Preserve" and "Methane dynamics in Arctic Alaska."

#### ***Denali National Park***

Collaborated with USGS to develop a lake classification scheme.

Implemented the shallow lake monitoring plan and sampled 92 lakes.

#### ***Kenai Fjords National Park***

Provided technical assistance for a project studying aquatic habitat in the upper Nuka River.

#### ***Lake Clark National Park and Preserve***

Participated on the NPS Resource Management Team and interagency Technical Working Group for the proposed Pebble Mine.

Collaborated with Alaska Department of Fish and Game personnel to submit research proposals for sockeye salmon projects in the Kuskokwim River drainage in southwest Alaska.

Supervised and implemented a northern pike radio telemetry study in the Lake Clark watershed.

Continued to provide project oversight and technical assistance for a research project studying the distribution and population structure of humpback whitefish.

Reviewed and provided comments on the draft *Lake Clark National Park and Preserve Coastal Watershed Assessment*.

#### ***Yukon-Charley Rivers National Preserve***

Assisted with Coal Creek rehabilitation and access corridor.

Wrote proposal titled "Understanding lake disappearance through time in northern Alaskan parks."

Sampled two lakes as part of the shallow lake monitoring plan.

## **INTERMOUNTAIN REGION**

Developed nonnative fish removal strategy and priorities as part of Recovery Program nonnative fish sub-committee

As a member of an interagency team, developed recommendations and species information for technical guidelines to avoid spread of aquatic nuisance species during fire suppression.

Actively represented NPS to the Biology Committee of the Upper Colorado River Endangered Fish Recovery Program.

#### ***Aztec Ruins National Monument***

Worked with three geophysical groups to develop plans and cost estimates for an underground survey.

Developed annual report for ongoing hydrology study and presented overview project work and results at IMR resources conference.

### ***Chiricahua National Monument***

Initiated and developed a Natural Resource Condition Assessment and met with principal investigators from Arizona-Sonora Desert Museum and Sonoran Institute.

### ***Coronado National Memorial***

Evaluated potential impact of groundwater pumping during US-Mexico border pedestrian fence construction, installed continuous water level monitoring hardware, collected data, and presented pumping recommendations and potential resource impacts to the superintendent.

Initiated and developed a Natural Resource Condition Assessment and met with principal investigators from Arizona-Sonora Desert Museum and Sonoran Institute.

### ***Dinosaur National Monument***

Helped develop and participated in pilot program to remove small-bodied nonnative fishes from the Green River below the park for the Upper Colorado River Endangered Fish Recovery Program.

### ***Fort Bowie National Historic Site***

Initiated and developed a Natural Resource Condition Assessment and met with principal investigators from Arizona-Sonora Desert Museum and Sonoran Institute.

Developed status report of water quality and water supply issues and made recommendations regarding management of the water supply system.



Collecting Water Sample at Fort Bowie National Historic Site (Reber, 2008).

Developed specifications for, purchased, and supervised installation of electromagnetic flow meter and flow control valve in the potable water system. Specified and purchased sediment traps and cartridge filter hardware for installation at residences.

Initiated work with region engineers to develop Statement of Work for next phase of water supply well rehabilitation.

Developed proposal to region Small Park funding call for mitigation of soil erosion. Proposal was funded for FY10.

Continued direction and data analysis of the hydrological monitoring program. Replaced critical Apache Spring flow meters damaged by flooding.

### ***Gila Cliff Dwellings National Monument***

Coordinated acquisition of bridge mounted water level sensor stream gage for the Gila River and met with USGS staff to finalize plans.

### ***Grand Canyon National Park***

Coordinated federal, state, and private agencies to implement collection of juvenile humpback chub from the Little Colorado River for translocation into Shinumo Creek in the park.

Assisted in developing Desired Future Conditions for humpback chub and for sediment and presented to the Adaptive Management Program Technical Working Group.



Taking Discharge measurement at Grand Teton National Park (NPS,2008)



Water sampling at Montezuma Well (Reber, 2008).



Taking discharge measurement at Saguaro National Park (NPS,2008).

***Montezuma Castle National Monument***

Developed a proposal to the Desert Southwest Cooperative Ecosystem Study Unit to provide complete documents for submittal to the Arizona DEQ to nominate Montezuma Well as an Outstanding Arizona Water. Proposal was funded and initiated with the University of Arizona.

***Organ Pipe Cactus National Monument***

Investigated potential causes of aquatic resource threat of water leakage at Quitobaquito Pond.

Supported water quantity monitoring at the Quitobaquito management area.

***Pecos National Historical Park***

Assisted in developing plot fishing program.

***Saguaro National Park***

Collaborated with region Facilities Management engineers to develop Statement of Work and engineering estimate for new water supply well at Tucson Mountain District.

***Sonoran Desert Network***

Continued ongoing groundwater monitoring and data analysis.

Developed groundwater monitoring protocol.

Wrote sampling and analysis plan for water quality program.

Identified and recommended water quality constituents for sampling by the network

Guided selection process for contracting FY09 laboratory services for the water quality program and coordinated program requirements with laboratory project manager.

Provided oversight for project with the University of Arizona to interpret baseline water quality results and determine information needed for water quality trend detection and minimum detectable change.



Sonoran Institute interns training in discharge measurement at Tumacácori National Historical Park (Reber, 2008).



Examining ruins for water damage at Tonto National Monument (Reber, 2008).

***Tonto National Monument***

Planned a study of soil moisture impacts at Lower Cliff Ruins.

Relocated solar panel powering Cave Canyon spring monitoring instrumentation to provide greater efficiency.

***Tumacácori National Historical Park***

Coordinated with the Arizona Department of Water Resources for 2009 installation of continuous groundwater monitoring equipment (with online data access) at two wells in the park.



## MIDWEST REGION

Coordinated the regional pre-proposal and SCC reviews for the USGS-NPS Water Quality Partnership funding source.

Performed GPRA duties for two land health goals.

Participated on Incident Management Team related to the emerging fish virus VHSV and co-authored VHSV Response Plan for Lake Superior Parks and the Grand Portage Band.

Co-authored "Conserving National Park Resources on America's Freshwater Coast," a regional contribution to the NPS Ocean Park Stewardship Action Plan.

With the regional fishery biologist and a WRD water quality specialist, coordinated NPS comments and drafted responses to two new vessel discharge permits (State of Minnesota and EPA).

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.

Prepared study plan and provided oversight on the NRPP-NRM spiny water flea project.

### *Grand Portage National Monument*

Completed analysis of tribal water quality data and began drafting report for the Grand Portage Band.

### *Indiana Dunes National Lakeshore*

Provided continued assistance with the Coastal Natural Resource Condition Assessment.

### *Isle Royale National Park*

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

Co-authored proposals on amphibian conservation genetics, nitrogen critical loads in boreal lakes, and ballast water treatment technologies.

Provided assistance with the Blue Ribbon Panel, an external research review.

### *Mississippi National River and Recreation Area*

Continued drafting a report on the spatial, seasonal, and long-term water quality trends at eight sites.

### *Northern Great Plains Network*

Provided assistance related to water quality monitoring.

### *Saint Croix National Scenic Riverway*

Designed and completed a nitrate source study on the Lower Saint Croix River.

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

Participated in St. Croix Basin Water Resources Planning Team activities and, with USGS partners, prepared pre-proposal statements for the annual SCC.

Assisted with zebra mussel monitoring in Lake St. Croix.

### *Sleeping Bear Dunes National Lakeshore*

Monitored nearshore water quality and evaluated potential causes for avian botulism outbreaks, using funding from the WRD Contingency Program.



NPS divers Brenda Moraska Lafrancois and Byron Karns prepare to collect zebra mussels as part of a nitrogen source study on the Lower St. Croix National Scenic Riverway (Daniels,2008).



NPS Fishery Biologist Jay Glase displays a net he designed to capture invasive round gobies from Lake Michigan as part of the SLBE type E botulism investigations (Moraska Lafrancois,2008).



NPS aquatic ecologist Brenda Moraska Lafrancois collects benthic samples from Lake Michigan as part of a SLBE nearshore food web study (Bootsma, 2008).

With cooperators from the Great Lakes WATER Institute (UW-Milwaukee), conducted a pilot study to characterize food webs in nearshore Lake Michigan waters.

Provided assistance to investigators writing the SLBE Natural Resource Condition Assessment.

With USGS and NPS staff from GLKN and NRPC, helped develop a pilot benthic habitat mapping project for South Manitou Island.

Voyageurs National Park

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

With the VOYA aquatic ecologist, coordinated taxonomic work for the inland lakes native zooplankton project, funded by the WRD Contingency Program in FY07.

## NATIONAL CAPITAL REGION

Regional contact for two Government Performance and Results Act goals dealing with Streams and Shorelines in Desired Condition.

### *George Washington Memorial Parkway*

Continued semi-annual monitoring of nine Surface Elevation Tables in Dyke Marsh in a cooperative effort with the USGS Patuxent Wildlife Research Center to study sedimentation and degree of subsidence.

Provided site assessments, soil surveys, and hydrologic opinions regarding flooding occurring in median strips of the parkway.

### *National Capital Parks – East*

Provided site assessments, biological opinions, hydrologic evaluations, and storm-water management suggestions regarding flooding of urban communities outside park boundaries.

### *National Capital Region Network*

NPS team-lead for the cooperative agreement titled “Spatiotemporal Data Explorer: An integrated spatiotemporal data warehouse for visualization driven knowledge discovery in water resources management”.

Provided technical assistance to the water monitoring program, including interpretation of results, statistical analysis of data, and installation and operation of stream gages and Hydrolab continuous water quality monitoring equipment.

### *Rock Creek Park*

Water resources and GIS team lead for the Natural Resource Condition Assessment project.

### *Urban Ecology Center*

Continued technical support and advice for the cooperative agreement “Development of a spatially explicit participatory model to explore anthropogenic off-site threats to resources of the Potomac Gorge.”

Provided technical support relating to www technologies for the Rock Creek Park / Urban Ecology Research Learning Alliance project “Field Guide to the Natural Communities of the National Capital Region - Rock Creek Park Prototype Website.”

## NORTHEAST REGION

Coordinated assessment and submission of region’s USGS-NPS Water Quality Partnership Program proposals.

Organized and led the annual international Northeast Regional Air Quality Committee.

Identified need for a region wide assessment of potential park impacts associated with development of natural gas from the Marcellus Shale geologic formation. Wrote a technical assistance request on behalf of the NERO for a multidisciplinary analysis of the issue by the NRPC.

Presented NPS regional research needs to USGS-BRD regional staffs at a five year planning workshop on ecological flow research at the Leetown Science Center.

Served as talent for the development of a video podcast on Jamaica Bay.

Provided written reviews and verbal consultation for FY10 ARD ecological effects proposals and funding selection.

Wrote briefing on Great Lakes ballast water exchange issue for the NERO Director.

Wrote letter on behalf of the NERO Director in support of continuation and enhancement of the National USGS-NPS Water Quality Partnership Program.

Regional contact for two Government Performance and Results Act goals dealing with Streams and Shorelines in Desired Condition.

#### ***Acadia National Park***

Reviewed report entitled *Assessment of Potential for Nutrient Enrichment in Estuaries at Mt. Desert Island, Maine from Shallow Ground Water using Aerial Thermal Imagery*.

Reviewed \$299,964 USGS-BRD study proposal entitled *Fate of nitrogen in urban-impacted versus un-impacted estuaries at Acadia National Park*.

Provided guidance on best management practices and erosion mitigation for eroding hillslope.

Worked with University of Maine cooperator, Midwest Region Aquatic Ecologist, and the NPS ARD to develop, create implementation plan, and ultimately obtain funding from the EPA for a \$99,688 dual region project (ACAD/ISRO) entitled *Determine critical nitrogen loads to boreal lake ecosystems using the response of phytoplankton*.

Provided written assessment of MOU development for facilitation of cooperative monitoring and protection of air quality by NPS and Maine DEP.

Continued working on draft report for the statistical review of the park's Freshwater Monitoring Program.

#### ***Allegheny Portage Railroad National Historic Site***

Provided guidance on next steps for acid mine drainage mitigation at the Staple Bend Tunnel unit.

#### ***Appalachian National Scenic Trail***

Provided written comments on water resource condition and needs reports.

Assisted with request for additional funding from WRD and development of a team and direction for a Level I water quality resources inventory.

Developed 10 person team to define and participate on a \$750,000 + project entitled *Appalachian Trail MEGA-transect Deposition Effects Assessment*.

#### ***Appomattox Court House National Historical Park***

Provided a site review of park water resource issues and verbal guidance.

#### ***Booker T. Washington National Monument***

Provided site assessment of potential water resource impacts from external development and internal operations. Contacted Virginia DEQ regarding water resource impacts on behalf of park.

Provided written trip report describing development issues and assessment of completed NERO funded project entitled *Provide Environmentally Improved Watering Alternatives for Interpretive Farm Livestock*.

#### ***Delaware Water Gap National Recreation Area***

Reviewed report entitled *Importance of small wetlands to the diversity of amphibian assemblages in Delaware Water Gap National Recreation Area*.

Provided professional guidance for park at Delaware River Basin Commission scenic river monitoring program meetings and flexible flow management meetings.

Wrote NPS position paper on special protection waters anti-degradation classification, which was supported by the affected federal agencies and passed this year to include the lower basin of the river.

Provided verbal and written guidance for an ongoing resource condition assessment.

#### ***Eastern Rivers and Mountains Network***

Provided written review and consultation on USGS-NY water quality monitoring plan.

Provided comment on benthic macroinvertebrate protocol development.

### ***Farmington National Wild and Scenic River***

Met with Farmington River Watershed Association, USGS-CT, and NPS Wild and Scenic River representatives to discuss water quality projects for a river assessment. Worked with USGS-CT to develop a WQPP proposal for submission to the region.

### ***Fire Island National Seashore***

Developed project proposal “Restoration of Bayside Sediment Processes at Sailors Haven, FIIS,” which was selected for FY10 NRPP Natural Resource Management funding (\$227,346).

In conjunction with the USGS- NY, developed a proposal, “Development of a Long-Term Ground-Water Monitoring Program for Fire Island National Seashore, New York” for \$141,800 for consideration under FY09 USGS-NPS Water Quality Assessment and Monitoring Program.

Consulted on the Army Corps of Engineers project “Fire Island to Montauk Point Reformulation Planning” to develop breach management procedures and restoration projects.

Reviewed Smith Point County Park Beach Nourishment Environmental Assessments.

Represented park on The Nature Conservancy’s Blue Point Bottomlands Council to develop restoration and protection of the Great South Bay ecosystem.

Provided logistical support to investigators for coastal research projects.

### ***Gateway National Recreational Area***

Supervised and managed ecological monitoring of the Elders Point Marsh Restoration project.

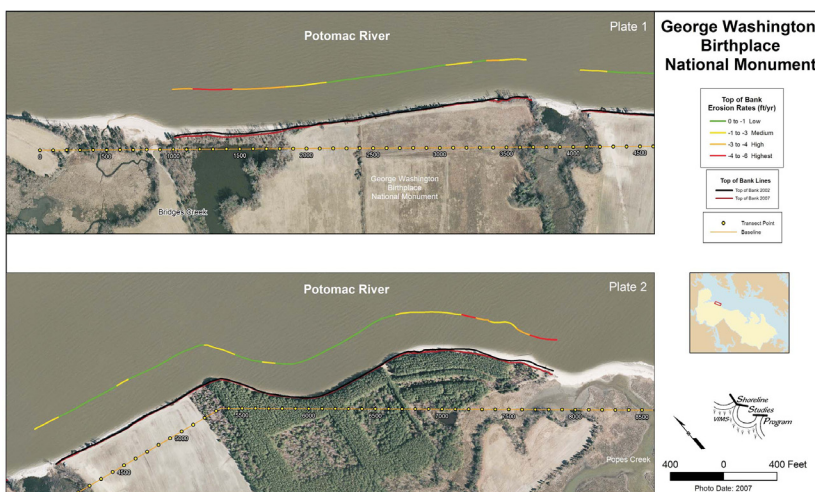
Prepared \$200,000 proposal entitled “Long-term Restoration of Jamaica Bay” for submission by the Jamaica Bay Unit to the National Fish and Wildlife Foundation Dissolved Oxygen Environmental Benefit Fund to facilitate the development of a long-term plan to guide partner activities in Jamaica Bay.

Developed proposal that was awarded \$132,285 for FY09-FY10 from the National Fish and Wildlife Foundation Dissolved Oxygen Environmental Benefit Fund for a collaborative NER NPS and Stony Brook University School of Marine and Atmospheric Sciences project to determine if nitrogen loading has altered marsh function and sediment accretion in Jamaica Bay.

Provided professional consultation and review in the development of sediment criteria.

Participated in multi-agency Planning and Development Team for the development of restoration design plans for Elders Point West and Yellow Bar Marsh Islands, Jamaica Bay, GATE.

Led interpretive marsh walk for the Jamaica Bay Wildlife Refuge.



Rate of change at the top of the bank along GEWA's Potomac River shoreline. The estimated top of bank was digitized from ortho-rectified aerial photos in 2002 and 2007 and the annual rate of change calculated. This method is subject to error since the top of bank is difficult to identify due to the presence of trees and shadow on the bank. It is inferred that the bank erosion was the result of two storms that impacted the shoreline during the time frame, Hurricane Isabel and Tropical Storm Ernesto.

### ***George Washington Birthplace National Monument***

Wrote report Shoreline erosion alternatives for George Washington Birthplace National Monument, which provides the park with process recognition and management and design alternatives

Preliminary shoreline erosion analysis at George Washington Birthplace National Historic Site (Virginia Institute of Marine Science, 2008).

Provided regional oversight of the storm vulnerability assessment being performed under contract by the Virginia Institute of Marine Sciences by writing funding proposal, obtained funding, coordinating project with Mid-Atlantic Network and WASO, and managing the timeline for deliverables.

Reviewed natural resource condition assessment project.

Participated in General Management Plan planning meeting and reviewed planning documents.

***Hopewell Furnace National Historic Site***

Coordinated research proposal entitled *Fate and transport of arsenic and other toxic metals in the aquatic environment, Hopewell Furnace National Historic Site, Berks and Chester Counties, Pennsylvania*, which was funded for \$213,000 through the USGS-NPS Water Quality Partnership Program.

***Johnstown Flood National Memorial***

Reviewed proposed fire management plan and provided guidance on development of a statement of work for a wetlands delineation that was determined to be necessary as a result of the review.

***Mid-Atlantic Network***

Reviewed water resource monitoring protocols.

Provided coordination and guidance for continuation of sediment monitoring gage located in Valley Creek at Valley Forge National Historical Park.

***Minute Man National Historical Park***

Provided advice for natural resource condition assessment.

Coordinated with park, region, state, and local township to obtain funding, identify and hire a contractor, and complete phase III of a stream restoration project.

***Richmond National Battlefield Park***

Coauthored trip report regarding potential improvement of the Crewes Channel wetland complex and Drewery's Bluff erosion issues.

Reviewed industrial release into Drewery's Bluff tributary.

Provided review and written comment on a neighboring industrial wastewater permit.

Provided written review of stormwater drainage design for adjacent development.

***Roosevelt-Vanderbilt National Historic Site***

Provided statement of work materials for a wetland delineation project.

***Upper Delaware Scenic and Recreational River***

Represented Delaware River flow interests as NPS representative on the Delaware River Basin Commission subcommittee for ecological flows, which proposed a flow assessment to the commission's flow advisory committee.

Provided a review of the Callicoon Creek alteration design for stormwater management.

Organized review, comments and receipt of report entitled *Predicting flow and temperature regimes at three Alasmidonta heterodon locations in the Delaware River*, by Cole and others. This work provides minimum flow targets for protection of the federally endangered dwarf wedge mussel in the upper Delaware River.

Reviewed thesis entitled *Evaluation of Fish Host Suitability for the Endangered Dwarf Wedgemussel Alasmidonta heterodon*.

***Valley Forge National Historical Park***

Finalized receipt of report entitled *Characterization of sediment storage and remobilization in Valley Creek, Valley Forge National Historical Park*.

Worked with multidisciplinary team to begin development of a Resource Stewardship Strategy.

Reviewed proposal entitled *A Molecular Investigation of the Cambarus (Puncticambarus) acuminatus Species Complex: Assessing the Distinctiveness of a Recently Discovered Population from Valley Forge National Historical Park*.

Provided assistance with the development of an emergency technical assistance request to examine an invasive crayfish in Valley Creek.

## **PACIFIC WEST REGION**

Finalized a two-year WRD funded project to inventory and characterize wetlands in ten small parks in the region.

Co-taught a BLM class entitled “Measuring and Monitoring Plant Populations.”

Drafted NPS memo to state agencies regarding redesign of state regulations regarding definitions of wetlands.

Participated in an interagency workgroup with the USGS and the BLM) to create a framework for long-term, landscape-scale ecological monitoring in the Great Basin and Mohave ecoregions.

### ***Channel Islands National Park***

Assisted with designing and conducting compliance for a coastal restoration project at Prisoners Harbor, Santa Cruz Island.

### ***Golden Gate National Recreation Area***

Assisted planning wetland restoration projects, including Big Lagoon Wetland Restoration and Crissy Marsh Expansion.

### ***John Day Fossil Beds National Monument***

Assisted with creating an agreement between NOAA fisheries and the monument to initiate streambank restoration along Bridge Creek within the park’s watershed.

### ***Mount Rainier National Park***

Identified and mitigated flood hazards.

Co-principal investigator for project to clarify Holocene environmental patterns and identify prehistoric human habitats through GIS modeling of paleo-glaciers.

Continued storm damage assessments stemming from the November 2006 flood event.

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.

Continued project “Floods, Fish, and Roads-Anticipating Disasters to Protect Endangered Fish and Park Infrastructure” 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.

Studied river aggradation and debris flow initiation mechanisms.

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 (Geologist-in-Park), Student Conservation Corps, and Oregon State University.

Supervised post- flood aggradation surveys.

### ***North Cascades National Park***

Participated in week-long field survey of large wood loading in the Stehekin River, Chelan, WA.

### ***Olympic National Park***

Developed site-specific recommendations to reduce erosion hazards to park infrastructure, while maintaining wilderness aquatic and riverine values.

### ***Pinnacles National Monument***

Helped initiate a Watershed History Study to address management concerns regarding water availability.

### ***Point Reyes National Seashore***

Assisted with planning and data collection for the Giacomini Wetland Restoration Project.

Assisted with conservation and monitoring of an endangered wetland plant.

Drafted park Foundation for Planning Statement.

Worked with park staff towards completion of a Resource Stewardship Strategy.

### ***San Francisco Bay Area Network***

Assisted with efforts to create and initiate long-term ecological monitoring programs for amphibians and reptiles, rare plants, and wetlands.

### ***Sequoia and Kings Canyon National Parks***

Reviewed final designs for re-contouring a bridge-induced eroded floodplain on the South Fork Kings River.

### ***Yosemite National Park***

Assisted park with design and implementation of a riverbank monitoring program to evaluate effects of high visitor use on the banks of the Merced River in Yosemite Valley.

## **SOUTHEAST REGION**

Acted as Regional Goal Contact for FY07-11 and FY08-12 NPS Strategic Plan Goal 1a1D—Land Health-Riparian, Goal 1a1H—Land Health -Acres in Condition, and Goal 1a1J—Riparian Areas Restored.

Represented the NPS at the Gulf of Mexico Alliance meetings and participated as a member on the Habitat Conservation and Restoration Team.

Reviewed and provided comments, along with developing summaries for the ARD Resource Stewardship and Science in regard to the Louisiana Coastal Protection and Restoration Project.

Participated as a member of the region's Natural Resource Condition Assessment Team.

Reviewed and provided comments on the Area Contingency Plan Annex, which addressed hazardous spill impacts and impacts to wetland habitat for four coastal parks.

Reviewed and provided comments on the draft *Director's Order and Action Plan for the Wild and Scenic River Program*.

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

Attended Gulf States Regional Panel for aquatic invasive species semi-annual meetings as NPS representative.

Guest lectured at Lovett School on the health of the watershed of the Chattahoochee River.

Administered the region's annual Servicewide Combined Call.

Coordinated dissemination of information related to Executive Order on recreational fishing in federal waters.

Represented NPS at Southeastern Association of Fish and Wildlife Agencies.

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



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

Helped obtain and administer \$273,000 in funding from FWS Fish Passage and National Fish Habitat Initiative projects.

Reviewed proposed critical habitat designation for staghorn and elkhorn coral.

Drafted research priorities for ocean and coastal resources in southeast region.

Attended Southeastern Fishes Council meeting in Chattanooga, TN.

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***

Reviewed and provided comments on the draft Statement of Findings for the Tamiami Trail Welcome Center Construction Project.

***Big South Fork National River and Recreation Area***

Developed Floodplain Statement of Findings for Plugging and Reclamation Operations Project.

***Biscayne National Park***

Worked toward completion of the park's Fisheries Management Plan.

Helped develop management alternatives to recover fish stocks.

***Blue Ridge Parkway***

Assisted with a PMIS proposal, which was approved and will receive funding for FY10, to develop a Wetlands Management Plan and Implement Adaptive Management for Wetland Habitat along the Parkway.

***Canaveral National Seashore***

Reviewed proposals for conducting a Coastal Watershed Condition Assessment.

***Cape Hatteras National Seashore***

Provided assistance in delineating wetlands and floodplain habitat and in the development and review of Wetland/Floodplain Statement of Findings for both the Bodie Island Coast Guard Station Relocation and the Ocracoke Multi-Use Trail projects.

Provided assistance and review of the ORV Management Plan Statement of Findings and Environmental Impact Statement for wetland habitat impacts.

***Chattahoochee River National Recreation Area***

Coordinated pond renovation project at Chattahoochee Nature Center to prevent the spread of the Asian swamp eel.



Asian swamp eel (Long, 2008).



Underwater photograph of the bed of the Chattahoochee River (LaFleur, 2008).

Reviewed and provided comments on the Wetlands and Floodplain Statement of Findings for the McGinnis Ferry Bridge Replacement project.

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

***Chickamauga and Chattanooga National Military Park***

Reviewed and provided comments on the *Wetlands/Floodplain Statement of Findings for Bank Stabilization at Moccasin Bend National Archeological District*.

***Congaree National Park***

Assisted with FERC re-licensing by helping develop an ecologically sustainable flow prescription for Saluda Dam.

Initiated study on the spatial linkage between flooding and recruitment of redbfin pickerel.

***Everglades National Park***

Reviewed and provided comments on the Flamingo Commercial Plan Wetland/Floodplain Statement of Findings.

***Fort Pulaski National Monument***

Assisted contractor in developing the Wetland/Floodplain Statement of Findings for the Cockspur Island Lighthouse Project.

***Great Smoky Mountains National Park***

Participated with WRD and GRD staff in conducting a field visit to determine appropriate techniques for the Cades Cove Stream/Wetland Restoration project.

Participated in Lynn Camp Prong southern brook trout restoration.



Mixing Antimycin A for use in brook trout restoration in Great Smoky Mountains National Park (Kulp, 2008).

Provided assistance, review and comments on the Wetlands/Floodplain Statement of Findings for the Oconaluftee Visitor Center Project.

Reviewed and provided comments on the Wetlands/Flood Statement of Findings for the Sparks Culver Replacement Project.

***Gulf Islands National Seashore***

Provided comments and assistance in the development of Wetland/Floodplain Statement of Findings for the West Ship and Horn Island Reconstruction Projects.

***Jean Lafitte National Historical Park and Preserve***

Provided assistance and review during the development of the EA and Wetlands/Floodplain Statement of Findings for the Replacing Hurricane Katrina Destroyed Visitor Center Project.

Conducted a site visit to investigate the wetland impacts resulting from the proposed Louisiana Coastal Protection and Restoration Project.

***Ocmulgee National Monument***

Reviewed and provided comments on the *Interchange EA Draft Wetlands/Floodplain Statement of Findings*.

***Salt River Bay National Historic Site and Ecological Preserve***

Assistance contractor in developing EA and Wetland Statement of Findings for the proposed Marine Research and Education Center.

***Vicksburg National Military Park***

Coordinated invasive fish eradication project with Mississippi State University cooperators.

## APPENDIX B

### SUMMARY OF WATER RESOURCES DIVISION FUNDING

FY08 base funding for the Water Resources Division (WRD) was \$12,316,000 (Figure 1). These funds were distributed among five principal categories: Water Resource Projects (Water Resource Protection Projects and Other Projects); Water Quality Vital Signs Monitoring; Watershed Condition Assessment Program (including projects); Water Resource Protection – Aquatic Resource Professionals; and Water Resource Technical Assistance (Figure 2). WRD also co-administers the NPS-USGS Water Quality partnership program that was initiated under the Clean Water Action Plan and is funded by the USGS Water Resources Discipline. This program provided \$1,881,400 for projects in FY08.

FY07 allocation	\$12,325,000
Classified Pay Increase	74,000
Net FY07 Decrease	0
Total Available in FY07	12,399,000
FY08 allocation	12,399,000
Classified Pay Increase	114,000
Net FY08 Decrease	-197,000
Total available in FY08	12,316,000
Change from FY07	-83,000

Figure 1. Water Resources Program

<b>Water Resource Projects</b>	
Water Resource Protection Projects	\$ 911,900
Other Projects	14,250
Water Quality Vital Signs Monitoring Program	2,737,900
Watershed Condition Assessment Program	2,454,300
Natural Resource Condition Assessment Projects <sup>1</sup> ,	406,800
Coastal Park Natural Resource Assessment Projects	440,300
Watershed Condition Assessment High Priority Projects	225,300
Other Projects	381,900
Water Resource Protection—Aquatic Resource Professionals	1,205,000
Water Resource Technical Assistance	4,992,650
<b>Total</b>	<b>12,316,000</b>

Figure 2. Water Resources Program Funding by Categories

## WATER RESOURCE PROJECTS

The projects category includes two areas, Water Resource Protection Projects and other projects that are non-competitive. Water Resource projects are funded in the areas of general water resources, water quality, wetlands protection, and water rights.

### Water Resource Protection Projects

The Natural Resource Challenge resulted in an increase of \$823,000 in the water resource protection projects budget beginning in FY01. As shown in Table 1, FY08 expenditures for this budget increase continued the NPS's capability to fund data collection and analyses that can be used to describe surface- and groundwater 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- and groundwater 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 the implementation of settlements.

Table 1. Water Resource Protection Projects - FY08

Park	Region	Project Title	FY08 Funding \$(000s)
ALL	ALL	Support to the Office of the Solicitor	190.0
CHIC	IMR	Hydrologic Data Collection	13.6
WICA	IMR	Groundwater Study	59.9
MOCA	IMR	Hydrologic Data Collection for the Verde River Adjudication	63.4
LAME	PWR	Hydrologic Data Collection and Groundwater Modeling	29.7
MEVE	IMR	Hydrologic Data Collection	1.6
KAHO	PWR	Investigation of Hydrology and Water Dependent Values	82.8
GRSA	IMR	Hydrogeologic Data Analysis	120.6
BIBE	MWR	Collection of Hydrologic Data	28.7
DEVA	PWR	Participation in Groundwater Model Development	75.4
GRTE	IMR	Investigation of Hydrology of the Gros Ventre River	14.4
GRBA	PWR	Investigation of Hydrogeology and Hydrologic Data Collection	124.4
TUZI	PWR	Hydrogeology Study	27.5
NIOB	MWR	Investigation of Water Dependent Resources	50.0
OBRI	SER	Investigation of Water Dependent Values	20.0
ALL	ALL	Technical Support to All Projects and Technical Assistancess	9.9
		<b>Total</b>	<b>911.9</b>

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 FY08 project funds were used to support ongoing studies designed to characterize surface- and groundwater flow systems. In the western U.S., ongoing projects are developing modeling capabilities for predicting effects of large-scale development in regional groundwater 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 FY08, water-dependent resources that were studied include riparian/wetland vegetation, fish migration, an-chialine 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 groundwater flow.

Finally, 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 NPS.

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, the water supply programs of the Bureau of Reclamation and the 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 NPS issues. When this occurs, NPS 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, NPS 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 groundwater 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 water rights protection for the park.

#### *Other Projects*

Cooperative Academic Program for Fisheries: Because of the limited professional fishery expertise within the NPS, this program uses a small amount of WRD base funding to further develop and increase cooperative relationships between the academic community and the NPS fisheries program. Funds are set aside to help foster graduate student research at National Park system units and to help cooperatively fund fishery students engaged in NPS park projects. Potential high priority projects suitable for graduate student research are identified through the NPS PMIS project need data system and matched to student availability through discussions with fishery professors. The program helps introduce top caliber fishery students to NPS programs, as well as expand the level of expertise made available to parks.

#### *Assessment of cutthroat survival and growth in irrigation ditches off the Gros Ventre River and population connections to the Snake River, Grand Teton National Park*

The objectives of this two-year WRD Fisheries-funded study (initiated in 2007) are to examine the individual growth and survival of cutthroat trout in irrigation ditches and to examine the connection between the Gros Ventre cutthroat and mainstem Snake River cutthroat groups to determine whether the Gros Ventre is leaking rainbow alleles into the main Snake River cutthroat trout population.

Three fish population surveys (early May, early August, and late September) were conducted in the Lower Gros Ventre in collaboration with Wyoming Game and Fish Department. Additional fish were captured and tagged using hook and line and electrofishing techniques. A total of 480 fish were tagged in 2008.

Fin clips collected during 2007 were analyzed to determine the degree to which cutthroat trout in the lower Gros Ventre are hybridized with rainbow trout. Additional loci were included to distinguish population structure and look for rare alleles. These data will allow cutthroat trout captured in the Snake River to be assigned to their population of origin and to evaluate the connection of the Gros Ventre and larger Snake River systems. Funds expended or obligated in FY08: \$14,250.

## WATER QUALITY VITAL SIGNS MONITORING PROGRAM

NPS 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 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 waterbodies that do not meet state water quality standards for one or more pollutants on approximately 1,800 miles of rivers and streams and 1,066,000 acres of lakes, reservoirs, estuaries, and marine areas. Planning and design of the program continues to be implemented in full integration with the NPS 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 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 Vital Signs Networks in FY08 (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 Vital Signs Monitoring Funding - FY08

Network Funding	Region	Number of Affected Parks	FY08 Funding \$(000s)
Central Alaska	Alaska	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 Islands	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
Arctic	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
<b>Total: FY08 Network Monitoring</b>	<b>7 NPS REGIONS</b>	<b>272</b>	<b>2601.3</b>
Servicewide Data Management			136.6
<b>GRAND TOTAL</b>			<b>2,737.9</b>

## Vital Signs Monitoring Networks

In FY08, 32 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

## Service-wide Data Management

WRD 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 service-wide 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 service-wide 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 3.45 million results for 1,800 different physical, chemical, or biological characteristics from 26,570 monitoring locations in support of 882 different projects conducted in or near 227 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.1.70 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 gained increased use outside the NPS among other government entities, including the USGS, the U.S. Agency for International Development, and the Northwest Indian Fisheries Commission. WRD staff cooperated with the EPA, states, and others on developing a STORET database replacement which should be unveiled next year. WRD staff continued to help facilitate stewardship of the National Hydrography Dataset in subbasins 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.

## WATERSHED CONDITION ASSESSMENT PROGRAM

WRD received \$2.45 million in FY08, as part of the Natural Resource Challenge, to assess watershed resource conditions in parks. WRD’s Watershed Condition Assessment Program (WCAP) provides technical guidance and accountability oversight for this effort. By FY14, the WCAP hopes to fund 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 improved position to 1) define natural resource conservation indicators and targets via park planning and 2) report to “overall resource condition” performance 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).

FY08 projects benefited greatly from academic partnerships with universities in Cooperative Ecosystem Studies Units (CE-SUs), as well as from collaboration with Federal agencies that provided essential expertise in varied aspects of ecological assessment and reporting.

Significant program accomplishments in FYo8 are described below. Table 3 shows the budget allocation in FYo8 for the WCAP.

Table 3. Watershed Condition Assessment Program - FYo8

Program Element	FY08 Funding \$(000s)
Natural Resource Condition Assessments	1,406.8
Coastal Park Natural Resource Assessments	440.3
Watershed Condition Assessment High Priority Projects	225.3
Other Projects (Including Staff)	381.9
<b>Total</b>	<b>2,454.3</b>

### Implementation of Program Plan

One full-time staff member provided dedicated support to implement the program plan to fund (during the time frame of FYo6-FY14) a natural resource condition assessment at each of the 270-plus parks in the NPS Vital Signs Monitoring Networks. In addition, one full-time staff member and a Coastal Resource Analyst were funded from the WCAP to work on a series of condition assessments for coastal and marine parks (see Oceans and Coastal Resources Program section). The WCAP 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 FYo8, the WCAP initiated natural resource condition assessments at 35 parks and provided supplemental funding to four park assessments started in previous years (Table 4).

Table 4. Natural Resource Condition Assessment Project Funding - FYo8

Region	Agency, Cooperator/Partner, or Contractor	State	Parks	FY08 Funding \$(000s)
Alaska	Pacific Northwest CESU/Saint Mary's University of Minnesota	AK	WRST	174.0
	Desert Southwest CESU/Arizona-Sonora Desert Museum, Sonoran Institute	AZ	CHIR, CORO, FOBO	190.0
Intermountain	Colorado Plateau CESU/Natural Heritage New Mexico, University of New Mexico	NM	PECO, FOUN	94.3
	Rocky Mountain CESU/Utah State University	WY	GRTE (supplemental funding)	25.0
Midwest	Upper and Middle Mississippi Valley CESU/University of Missouri	MO, AR	GWCA, WICR, PERI	193.8
National Capital	Chesapeake Watershed CESU/University of Maryland	MD, VA	MONO, MANA, ANTI	53.2
Northeast	Chesapeake Watershed CESU/Penn State University	PA	VAFO, HOFU	80.2
	Southern Appalachian CESU/Conservation Management Institute at Virginia Tech	VA	RICH, PETE	78.7



Pacific West	Humboldt State University	CA, OR	REDW, WHIS, ORCA (supplemental funding)	20.0
	Northwest Management, Inc.	ID, MT	BIHO, CIRO, CRMO, HAFO	57.0
	Californian CESU/University of California Santa Barbara	CA	SAMO, PINN, JOMU	102.0
	Yosemite National Park	CA	YOSE, DEPO	40.0
	Pacific Northwest CESU/ University of Washington	OR, WA	EBLA, FOVA, LEWI, SAJU	93.0
Southeast	Piedmont – South Atlantic Coast CESU/ University of Georgia	KY,NC, SC, TN, VA	BLRI, CUGA, BISO, KIMO, COWP, NISI	205.6
<b>Total</b>			<b>39 parks</b>	<b>1406.8</b>

#### Coastal Park Natural Resource Assessments

In FY03, the WCAP began an effort to assess coastal water resources and watershed conditions in 53 parks with significant ocean and Great Lakes resources by FY14. Since FY03, the WCAP initiated assessments in 47 coastal and Great Lakes parks, and final reports have been published for 25 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. Completed reports are available at: [http://www.nature.nps.gov/water/watershed\\_reports/WSCondRpts.cfm](http://www.nature.nps.gov/water/watershed_reports/WSCondRpts.cfm).

In FY08, one coastal resource assessment report for Olympic National Park was published. In addition, assessments were initiated in four coastal parks, and supplemental funding was provided to assessments started in previous years in four other parks (Table 5).

Table 5. Coastal Watershed Condition Assessment Funding - FY08

Region	Agency, Cooperator/Partner, or Contractor	State	Parks	FY08 Funding \$(000s)
Northeast	North Atlantic CESU/ University of Maine, Orono, University of Rhode Island	MA, RI	BOHA, CACO, SAIR (second-year and supplemental funding)	77.3
	North Atlantic CESU/ University of Maine, Orono	MA	ACAD (supplemental funding)	8.0
	Chesapeake CESU/University of Maryland Center for Environmental Science	MD	ASIS	100.0
Midwest	Great Lakes-Northern Forest CESU/University of Wisconsin, Stevens Point	WI	ISRO	90.0

<b>Southeast</b>	South Florida – Caribbean CESU/Florida Tech	FL	CANA	90.0
<b>Pacific West</b>	Contracting services – Fung & Associates	HI	KALA	75.0
<b>TOTAL</b>			<b>8 parks</b>	<b>440.3</b>

### Watershed Condition Assessment High Priority Project Funding

In FY08, WRD funded 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. Examples of FY08 projects include emergency actions to stabilize water level and water-dependent resources within Quitobaquito Pond at Organ Pipe Cactus National Monument, evaluating potential causes of type E botulism on bird populations at Sleeping Bear Dunes National Lakeshore, and repairing erosion features prior to restoration planting at Upper Halstead Meadow in Sequoia National Park. Partnering with other Federal agencies, state agencies, and/or local watershed groups in carrying out these projects was emphasized. Table 6 shows the funding allocated from the WCAP to support these projects

Table 6. Watershed Condition Assessment High Priority Project Funding - FY08

Region	State	Park	Project Title	FY08 Funding \$(000s)
Intermountain	AZ	ORPI	Emergency Actions to Stabilize Quitobaquito Pond, and Related Activities	13.4
Intermountain	NM	PECO	Remove Artificial Levee and Connect Glorieta Creek to its Recently Restored Floodplain at Pecos National Historical Park	5.9
Intermountain	MT	YELL	Closure of Geothermal Well Located Within the Yellowstone Controlled Groundwater Area	35.0
Intermountain	WY	YELL	Application of Stable and Radioactive Isotope Sampling to Determine the Sources of Water that Recharges the Talus Aquifer and Discharges at Mammoth Crystal Springs	14.0
Midwest	MI	Multiple	Develop a VHS Prevention and Response Plan for Lake Superior Parks	15.0
Midwest	MI	SLBE	Preliminary Water Balance Model for the Glen Lake and Crystal River Watershed	2.0
Midwest	MI	SLBE	Factors Contributing to Large-Scale Outbreaks of Type E Botulism at Sleeping Bear Dunes National Lakeshore	12.5
Midwest	MI	SLBE	Benthic Habitat Mapping at Sleeping Bear Dunes National Lakeshore	20.0

Midwest	IA	EFMO	Integrating NPS science and Planning in Developing a Resource Stewardship Strategy for Effigy Mounds National Monument	38.0
Pacific West	CA	WHIS	Oversee Construction of Caltrans Mitigation Measures for Damage to Rare Salt Spring Habitat and Monitor Effectiveness	9.0
Pacific West	CA	SEKI	Repair Erosional Features Prior to Planting at the Upper Halstead Meadow Pilot Restoration Project	8.0
Pacific West	CA	SEKI	Sunset Meadow Headcut Treatment at Sequoia and Kings Canyon National Parks	6.5
Pacific West	CA	OGA	Rodeo Beach Wetland Complex Final Restoration Design, Golden Gate National Recreation Area	15.0
Service-wide	Multiple	Multiple	Funding for USGS-NPS Liaison to Facilitate Inter-agency Partnerships and Project Support	20.0
Service-wide	Multiple	Multiple	NPS Regulation and Policy Handbook for Superintendents of Ocean and Coastal Parks	11.0
<b>Total</b>		<b>12 + Parks</b>		<b>225.3</b>

## WATER RESOURCE PROTECTION - AQUATIC RESOURCE PROFESSIONALS

In FY05, the NPS received \$1,205,000 to fund aquatic resource specialists in the field. Fifteen positions were fully funded in FY08, 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 7.

Table 7. Water Resource Protection - Aquatic Resource Specialists

Region	Duty Station/Discipline	Geographic Focus Area
AKR	Yukon-Charley Rivers National Preserve - 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	Chickasaw NRA - Groundwater Hydrologist	Vacant: position to be relocated to Big Thicket National Preserve
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	Currently 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	Currently vacant

## NPS-USGS WATER QUALITY PARTNERSHIP PROGRAM

The NPS-USGS Water Quality Partnership Program was initiated under the Clean Water Action Plan and is funded by the USGS Water Resources Discipline Office of Water Quality. Since 1999, more than \$20 million has been allocated for partnership water quality projects in parks. Through 2008, 145 partnership projects had been initiated in 104 National Park units; 122 of these projects have been completed. Nine new projects were funded in FY08 for a total of \$746,600, and five new projects were selected for funding in FY09. Additional information on the program is available at [http://water.usgs.gov/nps\\_partnership/](http://water.usgs.gov/nps_partnership/).

Table 8. USGS Water Quality Partnership Program Projects Final Year Funded Projects - FY08

Region	Park	Project Title	FY08 Funding \$(000s)
Alaska	DENA	Limnology and Water Quality of Wonder Lake and Other Selected Lakes	100.00
Midwest	OZAR	Assess Threats to Water Quality	86.00
Northeast	UPDE	Define Existing Water Quality in Streams for Development of Special Protection Waters Standards	100.00
Pacific West	OLYM	Construct a Nutrient Budget for Lake Crescent to Assess the Impact of Human Nutrient Enrichment	70.00
Pacific West	OLYM	Monitoring Suspended Sediment in the Elwha River	46.00
<i>Pacific West</i>	YOSE	Water-Quality Monitoring in Support of Establishing User Capacities	100.00
<b>TOTAL</b>			<b>502.00</b>

Table 9. USGS Water Quality Partnership Program Projects New and Continuing Funded Projects - FYo8

Region	Park	Project Title	FYo8 Funding \$(oos)
Alaska	DENA	Evaluate Water Quality of Streams Draining Abandoned and Reclaimed Mined Lands in the Kantishna Hills	100.00
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	99.50
Intermountain	ROMO	Assessment of Nitrogen Saturation and Episodic Acidification Status	99.30
Intermountain	ROMO	Effects of Nitrogen Limitation and Biological Characteristics of High-Elevation Lakes	97.60
Intermountain	YELL	Continuous 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	96.80
Midwest	SACN	Monitor Progress Toward Nutrient Reduction Goals at Norway Point near Grantsburg	50.00
Midwest	VOYA	Nutrient Cycling and Relation to Changes in Water Levels for Kabetogama Lake	99.20
National Capital	ROCR	Organic Wastewater Chemicals in Rock Creek Park	100.00
Northeast	FIIS	Characterizing Submarine Groundwater Discharge to Great South Bay	100.00
Northeast	SAIR	Real-Time Monitoring of Sodium and Chloride	7.10
Pacific West	MORA	Developing Critical Loads for Atmospheric Deposition of Inorganic Nitrogen in Network Lakes	100.80
Pacific West	OLYM	Nearshore Effects of Residential Wastewater-Influenced Groundwater on Lake Crescent	49.00
Pacific West	GOGA	Analyze Sulfur and Mercury Biogeochemistry in Crissy Marsh	50.00
Pacific West	YOSE	Occurrence and Distribution of Current-Use Pesticides in Amospheric Deposition	100.00
Southeast	CONG	Investigate Influence of Seasonal Flood Waters on Mercury Methylation	80.10

**TOTAL 1379.40**

\*New Projects in FYo8

## APPENDIX C

### PRESENTATIONS/PUBLICATIONS/AWARDS

#### PRESENTATIONS

Albright, J. 2008. Session Chair, Watershed Condition Assessment (WCA) Program : Highlights from Four WCA Pilot Projects: Study Approach, Example Products, and Challenges / Recommendations for Future Projects. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

Albright, J. 2008. Watershed Condition Assessment Program. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

Back, J.T. 2008. Geochemical Investigations of Ground-water Flow Paths in the Madison Aquifer, Wind Cave National Park, South Dakota. Western South Dakota Hydrology Conference in Rapid City, SD, April 17, 2008.

Back, J. 2008. The Use of Age Dating and Environmental Tracers to Characterize Groundwater Flow at Wind Cave National Park. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

Barrett, P.J., J. Wullschleger and J. Sjoberg. 2007. Setbacks and progress in recovery of the Devils Hole pupfish during 2007. Annual Meeting of the Desert Fishes Council. Ventura, CA. November 14-18, 2007.

Beavers, R. (Acting OCRB Chief). 2008. Assessing the Storm Vulnerability of Natural and Cultural Resources in Coastal Parks. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

Beavers, S. and P.A. Cutillo. 2008. Urban Development and Resource Protection at Kaloko-Honokohau NHP, Coral Reef Task Force 20th Meeting, August 23-29, 2008, Kona, HI.

Cutillo, P. 2008. Can Hawaii's Public Trust Doctrine Protect Ground Water Dependent Ecosystems from Salt Water Intrusion? NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

Ellsworth, A. 2007. Monitoring and Adaptive Management of Salt Marsh Restoration in Jamaica Bay, Gateway National Recreation Area, New York. Poster presentation in NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

Ellsworth, A. 2007. Monitoring Salt Marsh Restoration at Elders Point, Gateway National Recreation Area. Poster presentation in NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

Gerber, G. 2008. Session Chair, Groundwater. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

Gerber, G. 2008. Session Chair, Water Rights / Water Quantity Protection. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

Gerber, G. and B. Long. 2008. Seeps and Springs. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

Gerber, G. 2008. Hydrology and Water Rights Investigation of the Lower Gros Ventre River, Grand Teton National Park, WY. Gros Ventre River Research Meeting at Grand Teton National Park, December 16, 2008.

Hansen, W. R. 2008. Wild and Scenic Rivers Management: What Does the New Program Mean to the Field? Interdisciplinary Water Resources Seminar, Colorado State University, Fort Collins, CO, February 28, 2008.

Hansen, W. R. and J. Harn. 2008. Session Co-Chairs, Wild and Scenic River Management : What Does the New Program Mean to the Field? NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

Hansen, W. R., and D. McGlothlin. 2008. The National Park Service's Experience in Applying Science in Water Rights Determinations. Interdisciplinary Water Resources Seminar, February 28, 2008, Colorado State University, Fort Collins, CO.

Harte, J.J., Valdez, A., and S.A. Stevenson, 2008. An Investigation of Surface Water/Ground Water Interactions - Great Sand Dunes National Park and Preserve. Poster presentation in NPS Aquatic Professionals Conference, Hilton Hotel, Fort Collins, CO, February 12-14, 2008.

- Harte, J.J., 2008. Introduction to Western Water Rights and Seepage Investigation Field Methods, Colorado State University Field Practicum, Great Sand Dunes National Park and Preserve, CO, August 31, 2008.
- Irwin, R. 2008. Control of Sensitivity, Precision, and Bias at Two Levels: QC and Survey Design. National Water Quality Monitoring Council Annual Conference, Atlantic City, NJ, May 19-22, 2008.
- Irwin, R. 2008. Minimum Detectable Differences and Recent Guidance Changes, Fixed Versus Probabilistic Designs. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Irwin, R. 2008. Quality Control and Minimum Detectable Difference Issues. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Irwin, R. 2008. Session Chair, Water Quality Vital Signs Protocols and SOPs. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Irwin, R. 2008. Session Chair, Aquatic Biology / Fisheries Vital Signs Protocols. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Jackson, W. 2008. Follow-up from 2004 : Aquatic Resource Professionals and Coordination among WASO, Parks, Regions and Networks. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Jackson, W., C. McCreedy, and K. Keteles. 2008. Session Co-Chairs, The Oceans and Coastal Resources Branch : What Does the New Branch Mean to the Field? NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Kennard, P. 2008. Alluvial landscape response to climate change in glacial rivers and the implications to transportation infrastructure. 2008 National Hydraulic Engineering Conference, August 26-29, Portland, ME.
- Kennard, P. 2008. Alluvial Landscape Response to Climate Change in Glacial Rivers and the Implications to River Restoration. 2008 Northwest Stream Restoration Design Symposium, Skamania, WA.
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- Keteles, K. 2008. Session Chair, Assessment of Coastal Resources. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Keteles, K. 2008. Troubled waters: potential links between invasive species and type E botulism outbreaks at Sleeping Bear Dunes National Lakeshore. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Keteles, K. 2008. A collaborative approach to assessing watershed conditions in coastal National Parks. Ocean Sciences Meeting.
- Larsen, A. 2007. Interpreting the Spatial Heterogeneity of Lake Drying in the Minchumina Basin, Central Alaska. American Geophysical Union Fall Meeting, San Francisco, December 2007.
- Larsen, A. 2008. Shallow Lake monitoring Project VS Monitored: water quality, macroinvertebrates and water quantity. Cape Krusenstern National Monument Three Year Review Meeting, January 2008.
- Long, B. 2008. Session Chair, Water Quality Programs and Data Management. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Long, B. 2008. Water Quality Protocols for Vital Signs Monitoring in National Parks. National Water Quality Monitoring Council Annual Conference, Atlantic City, NJ, May 19-22, 2008.
- Martin, L. 2008. Spring Flow Decline at Pipe Spring National Monument: "We have met the enemy and he is us" (Walt Kelly, Pogo). NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.

- McCreedy, C. 2008. Introduction: Adaptive Marine Management – Fish or Fowl? NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- McCreedy, C. 2008. Session Chair, Adaptive Marine Management : Hang On To Your Habitat! NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Penoyer, P. 2008. Lessons Learned on Sondes. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Penoyer, P. 2007. PowerPoint presentation: Sylvan Pass Mitigation and Restoration - Topics for Consideration. Sylvan Pass Mitigation/Restoration Workshop, October 10-12, 2007.
- Penoyer, P. 2008. Session Chair, Water Quality Vital Signs. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Penoyer, P. and G. Rosenlieb. 2008. Continuous Monitoring of a Unique Hydrologic System: Sylvan Pass, Yellowstone National Park. National Water Quality Monitoring Council Annual Conference, Atlantic City, NJ, May 19-22, 2008.
- Roemer, G.A., Cave, D., Gutmann, C, and Waddell, R.K. 2008, Status of numerical flow model of selected hydrographic basins within the Colorado Regional Ground-Water Flow System: Verbal powerpoint presentation given at the annual conference of the Nevada Water Resources Association, Mesquite, NV, March 6, 2008.
- Rosenlieb, G. 2008. Water Quality Vital Signs Monitoring Program. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Rosenlieb, G., P. Penoyer, K. Noon, M. Wireman, and J. Thackston. 2008. Recommendations for Restoration and Rehabilitation of Turbidity and Sediment Impacts to the Sylvan Pass Hydrologic System : Yellowstone National Park. Natural Resource Report NPS/NRPC/NRR-2008/054. National Park Service, Fort Collins, CO.
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- Tucker, D. 2008. NPSTORET: A Water Quality Database Management and Analytical System for National Park Units, Networks, and Others. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Tucker, D. 2007. NPSTORET: A Water Quality Database Management and Analytical System for National Park Units, Networks, and Others. EPA STORET/WQX National Conference, Austin, TX, November 2007.
- Tucker, D. 2008. Water Quality Database Management Using NPSTORET. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Van Liew, W. 2008. Depletion of Surface Water Resources in Great Basin National Park due to Groundwater Withdrawals in Adjacent Valleys – Can Drawdown Effects Propagate Uphill? NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
- Van Liew, W.P. 2008. The water resources of Great Basin National Park, the hydrogeologic setting, and the basis for the NPS's concern. Briefing to staff of Senator Harry Reid, Washington, D.C., February 5, 2008.
- Van Liew, W.P. 2008. Depletion of surface-water resources in GRBA due to ground-water withdrawals in adjacent valleys – Can drawdown effects propagate uphill? PowerPoint presentation given at the biennial NPS Water Professionals Meeting, Fort Collins, CO, February 13, 2008.
- Van Liew, W.P. 2008. Overview of progress of hydrogeologic investigations by U.S. Department of the Interior bureaus in selected areas of the Colorado Regional Ground-Water Flow System in southeastern Nevada. Annual conference of the Nevada Water Resources Association, Mesquite, NV, March 5, 2008.
- Vana-Miller, D. 2008. Session Chair, Integrating Water Science, Management and Planning: How Are We Doing? NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.



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- Weeks, D. 2008. Water Resources Planning Program. NPS Aquatic Professionals Meeting, Fort Collins, CO, February 2008.
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- Weeks, D. P. and D. L. Vana-Miller. 2008. The National Park Service Water Resources Planning Program. Poster Presentation, 2008 National Park Service Aquatic Professionals Meeting, Ft. Collins, CO, February 12-14, 2008.
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- Cole, J. C. 2007. Predicting Flow and Temperature Regimes at Three Alasmidonta heterodon Locations in the Delaware River. M.S. Thesis. Frostburg State University, Frostburg, MD.
- Cooper, D.J., 2008. United States' Disclosures of David J. Cooper Pursuant to Colo. R. Civ.P.26(a)(2) In the Matter of the Application for Water Rights of the United States of America. District Court, Water Division No. 3, Alamosa, CO.
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## AWARDS

Paul Christensen received a Star Award for his outstanding work in preparing the assessment report for the Arizona Department of Water Resources in support of the NPS instream flow application on Rincon Creek in Saguaro National Park.

Bill Hansen received a Star Award for performance substantially exceeding job requirements for his leadership of the new NPS Wild and Scenic Rivers Program.

Jim Harte received a Star Award for his outstanding work as project leader in securing an in-place groundwater right at Great Sand Dunes National Park and Preserve.

Barry Long received a Time-off Award for serving on the planning committee for the NPS Aquatic Professionals Meeting.

Kevin Noon was recognized with a Non-monetary Recognition Award from the Intermountain Regional Office for his support in efforts to scope out and identify habitat restoration opportunities within the Intermountain Region for consideration for the Economic Stimulus Plan.

Dave Vana-Miller received a Time-off Award in recognition of his substantial contribution in planning, organizing, and hosting the 2008 NPS Aquatic Professionals Meeting.

Don Weeks received a Quality Step Increase in recognition of his sustained exceptional performance in developing a process to better integrate science into NPS planning and management decision making and in providing technical support and guidance to teams developing Resource Stewardship Strategies at Guadalupe Mountains National Park and Monocacy National Battlefield.

John Wullschleger received a Performance-based Cash Award in recognition of his exceptional performance in serving as the Acting Fisheries Program Lead and his participation in two Incident Command System teams that responded to emergency situations—implementing extraordinary efforts to prevent the extinction of the Devils Hole pupfish in DEVA and developing a plan to address viral hemorrhagic septicemia in NPS units located within the Lake Superior Basin.

## 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 Washington 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, EEO Counselor, BA in Anthropology. Specialty areas include coordination of interagency and cooperative agreements and project funding.

**Kris Parker:** Lead Administrative Assistant, EEO Counselor. Specialty areas include conference and meeting planning and coordination, PMIS, and report coordination and editing.

**Carol Liester:** Purchasing Assistant. Specialty 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. Specialty areas include marine and freshwater ecology, fisheries biology, and natural resource management.

**Kristen Keteles:** Texas A&M University Coastal Watershed Condition Assessment Coordinator, PhD in Zoology, BS in Marine Science. Specialty areas include aquatic toxicology, marine ecology, assessment of coastal water resources, and trace metal contamination.

**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 assessment, 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). Specialty areas include water resources management planning, ground-water monitoring, and wetland management.

**Lael Wagner:** Administrative Assistant.

## 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 management 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 sediment transport.

**Dean Tucker:** Information Management Program Leader, Natural Resource Specialist, PhD in Forestry. Specialty areas include data management and reporting, hydrographic analysis, computer graphics, and water resources applications in GIS.



**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 hydrologic 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.

**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.

**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.

**Hashem Faidi:** Colorado State University Research Associate, Clean Water Act Designated Use and Impairment Database Manager, MS in Water Resources Engineering, PhD in Ground Water Engineering. Specialty areas include GIS applications in water resources and ground-water and contaminant transport modeling.

**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 Administrative 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 hydrogeology 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 hydrology and ground-water/surface-water interactions.

**Mark Wondzell:** Hydrologist, BS in Forestry, MS in Agricultural Engineering.

**Mohamed Aldhamari:** Colorado State University Research Associate, PhD in Civil Engineering/Ground-Water 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.

**Justin Scharton:** Colorado State University Research Technician, BS in Natural Resource Management, MS in Natural Resource Stewardship. Specialty areas include natural resource management, legislation, and policy.

**Jennifer Stegman:** Colorado State University Research Assistant. PhD Candidate in Human Dimensions of Natural Resources. Specialty areas include ground- and surface-water data processing.

**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 FY08 Accomplishments

July 2009

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