



**2000 Annual Report**  
**Water Resources Division**  
**Natural Resource Program Center**  
**National Park Service**



The National Park Service Water Resources Division is responsible for providing water resources management policy and guidelines, planning, technical assistance, training, and operational 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, groundwater, fishery management, and aquatic ecology.

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**2000 ANNUAL REPORT**  
**Water Resources Division**  
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# Table of Contents

<b>A Word from the Associate Director .....</b>	<b>I</b>
<b>Comments from the Division Chief .....</b>	<b>I</b>
<b>Washington Program Coordination Office Highlights .....</b>	<b>3</b>
<b>Planning and Evaluation Branch Highlights .....</b>	<b>4</b>
Colorado Pikeminnow in Lodore Canyon, Dinosaur National Monument	
NPS Reports Wetland Conservation Activities on Over 64000 acres of Wetlands	
The First Survey of Aquatic Macrofauna from Laufuti Stream, National Park of America Samoa	
Water Resources Issues Overview for Olympic National Park	
Taking on the Restoration of our Native Salmonids	
An Update on the Coral Reef Initiative	
<b>Water Operations Branch Highlights.....</b>	<b>15</b>
Sampling for Snowmobile Contaminants at Rocky Mountain National Park	
Flood Conditions at Moose, Wyoming – Grand Teton National Park	
Resource Protection vs. Public Water Supplies	
Inventorying and Monitoring Program and Water Resource Division Target Additional Parks for Field Level Water Quality Inventories	
The National Hydrography Dataset: A Consistent, Seamless Framework for Sharing, Managing, and Modeling Park Hydrographic Data	
USGS Demonstrates Simple Techniques for Assessing Contamination at Oil and Gas Operations	
Water Resources in the National Parks Reference Collection	
<b>Water Rights Branch Highlights.....</b>	<b>22</b>
Reporting Water Use for Federal Reserved Water Rights at Mesa Verde National Park and Hovenweep National Monument	
Resource Sustainability in the Arid Southwest	
<b>Support Provided to Regions, Parks, and Other NPS Organizational Units .....</b>	<b>26</b>
<b>Publications .....</b>	<b>79</b>

<b>WRD Financial Status and Sponsored Projects .....</b>	<b>83</b>
<b>Organization and Staff .....</b>	<b>92</b>
<b>Awards .....</b>	<b>98</b>
<b>Credits.....</b>	<b>99</b>

## **A Word from the Associate Director, Natural Resource Stewardship & Science: Mike Soukup, Ph.D.**

This Annual Report provides a summary of the accomplishments of the Water Resources Division (WRD) of the National Park Service (NPS) in 2000. WRD provides servicewide technical assistance and advice with respect to the preservation, protection, and management of water and aquatic resources of units of the National Park System. The Division carries out a broad-based water resources program involving leadership in a variety of activities in the areas of water rights; water quality; floodplain management; groundwater analysis; watershed and wetlands protection; water resources management planning; fisheries management; policy, legislative, and regulatory analysis; information management; and training. The Division's workplan is developed from an annual call to the field to identify park needs which in turn determines WRD's priorities. In addition to national program responsibilities, the Division provides day-to-day support to parks, support offices, regional offices, and the Washington Office (WASO) in addressing water resources issues and concerns facing NPS. The Division is located in Fort Collins, Colorado, with additional offices in Denver, Colorado, and Washington, D.C.

I am extremely pleased with the accomplishments of WRD reflected in this Annual Report. These accomplishments are indicative of the professionalism of the Division and the ability of the Division to work cooperatively with management and staff of parks, support offices, regional offices, and WASO to address water resource issues in parks. I believe WRD provides a model for cost effective centralized support for parks that do not have the range of technical expertise they need. Identifying, requesting, and providing technical support from a centralized program requires consummate professionalism at all levels of NPS. This collective effort has created the environment necessary to begin to match the level of technical expertise to the magnitude of water-related issues facing national parks in a changing landscape.

I would also like to highlight the water resources component of the Natural Resource Challenge (NRC) that began to be implemented in 2000. I believe the NRC provides an unprecedented opportunity to increase our ability as an agency to address natural resource management issues facing the parks. The NRC action plan for water resources, developed by a team of NPS water and natural resource specialists and superintendents, includes budget increases for water quality monitoring, water resource protection and restoration projects, watershed condition assessments, and additional park-based aquatic resource professionals. I am very pleased with the leadership role that WRD has played in developing this action plan and WRD's continuing role in guiding implementation of this important component of the NRC.

### **Comments from the Division Chief: Dan Kimball**

The past year was one in which the Water Resources Division (WRD) of the National Park Service (NPS) endeavored to provide the highest level of support possible to parks in addressing a wide variety of water and aquatic resource-related issues. This also was a year in which we worked as diligently as possible with Washington, regional, and park management and staff to begin implementation of the water resources component of the Natural Resource Challenge. In FY2001, significant funding increases were received to support additional water quality monitoring and water rights projects in parks, two important needs identified in the water resources action plan of Natural Resource Challenge.

Examples of significant WRD accomplishments in 2000 include:

- Completion of water resource management plans for Acadia National Park, Chattahoochee River National Recreation Area, and the Cold Harbor and Gaines' Mill Units of Richmond National Battlefield Park, a water resources issues overview for Olympic National Park, and water resources scoping reports for Hagerman Fossil Beds National Monument and Amistad National Recreation Area.
- Completion of the revegetation phase of a riparian, wetland, and stream restoration project at Glorieta Creek in Pecos National Historical Park.
- Participation on the National Coral Reef Task Force to develop a National Plan of Action to Conserve Coral Reefs.

- Significant assistance on endangered fish management issues at Dinosaur National Monument and Canyonlands National Park as part of the Upper Colorado River Recovery Implementation Program.
- Implementation of 31 park-based water quality monitoring and assessment projects through NPS's Water Quality Assessment and Monitoring Partnership Program with the U.S. Geological Survey.
- Provided 22 additional parks with a complete inventory and analysis of all available and applicable water quality data. (This brings to 207 the total number of parks with completed water quality databases.)
- Participated in watershed stabilization activities following the Cerro Grande Fire at Bandelier National Monument.
- Provided major floodplain assessment support at Glacier National Park, Grand Teton National Park, and Congaree Swamp National Monument.
- Provided significant assistance to Lake Mead National Recreation Area (contaminants assessments); Golden Gate National Recreation Area (evaluation of ground water-surface water interactions); Death Valley National Park (assessment of water supply alternatives at Furnace Creek); Arches and Canyonlands National Parks (uranium mill tailings reclamation); Grand Canyon National Park (flood flow research capability as part of the Colorado River Surplus Criteria EIS); and Olympic National Park (analysis of water treatment alternatives associated with removal of the Elwha Dam).
- Continued assistance with respect to major water rights protection issues at Dinosaur National Monument, Black Canyon of the Gunnison National Park, Lake Mead National Recreation Area, Death Valley National Park, Mojave National Preserve, Joshua Tree National Park, Crater Lake National Park, and a number of parks in the Little Colorado River Basin in Arizona.
- Completed water rights settlement agreements for Cedar Breaks National Monument and Hovenweep National Monument in Utah and Rocky Mountain National Park in Colorado.
- Provided assistance in evaluating the water resources aspects of projects considered by the Development Advisory Board.
- Held a national NPS Water and Aquatic Resources Professionals Meeting in Fort Collins and participated in the "Natural Resources Law for Superintendents" course.

The Division's efforts continue to be greatly enhanced by the vigilance of park resource management staff in recognizing water resource issues and then contacting the Division for assistance. Our efforts are also supported by key staff in regional and support offices and by park-based water resource specialists.

WRD will strive to remain focused on our principal mission, providing technical support to the parks. We will also focus on implementation of the water resource component of the Natural Resource Challenge and continue to function in budget and policy arenas at the national level to insure that we are fully aware of, and appropriately influence, emerging programs and opportunities. Finally, we will endeavor to foster partnerships, and develop and implement new and more innovative ways to support parks in preserving, protecting, and managing water resources in units of the National

## **Washington Program Coordination Office Highlights**

By Sharon Kliwinski, Washington Liaison

The year 2000 in Washington was busy with supporting initiatives of President Clinton's administration. With the 8-year administration coming to an end, major policy initiatives were being wrapped up and put into place. Some of these policy initiatives had the potential to directly affect NPS natural resources and natural resource programs.

A long-standing effort to revise and enhance the existing Executive Order on Floodplain Management was re-invigorated. The Washington Program Office participated in high-level policy meetings to significantly enhance the natural resource protection mandates in this important executive order. Although the revised executive order was never finalized, it provides an excellent starting point for the new administration to improve the management and protection of our nation's floodplains.

Relating to the floodplain management executive order, the Washington Office became involved in the flood map revisions for the Congaree River. These map revisions could allow for development along the Congaree River that has the potential to impact downstream Congaree Swamp National Monument. The potential impacts to the monument led to national level discussions regarding the consequences of flood map revisions and how such revisions could create an incentive for development in undeveloped floodplains.

The Washington Office also participated in several other issues during the last several months of the Clinton administration including snowmobile management and monitoring of snowmobile impacts in parks; revision to the NPS Management Policies; and development of the an "impairment" standard for NPS activities inside park boundaries.

At the close of the administration, the Unified Federal Policy for Watershed Management, a key action under President Clinton's Clean Water Action Plan, was agreed to by eight federal entities, including the Departments of Interior, Energy, Defense, Agriculture, and Commerce, and EPA, TVA, and the Army Corps of Engineers. The goal of the policy is to reduce water pollution from federal activities and foster a unified, watershed-approach to federal land and resource management. Interagency workgroups have been established to address the objectives of the policy such as consistent procedures for delineating, assessing and classifying watersheds; protecting and restoring priority watersheds; and working with states and tribes to improve watershed health.

With the new administration in place, the Washington Office will continue to pay close attention to new policy initiatives that may have a bearing on NPS water resources.



## Planning and Evaluation Branch Highlights

By Mark Flora, Chief

I am pleased to report on a highly rewarding and productive year for the Water Resources Division Planning and Evaluation Branch (PEB). During the year, PEB, working cooperatively with park staff and other agency cooperators, was able to complete water resources management plans for three NPS units: Acadia National Park, Chattahoochee River National Recreation Area and the Cold Harbor and Gaines' Mill units of Richmond National Battlefield Park. A water resources issues overview was completed for Olympic National Park. New water resources management planning efforts began at the following units: Richmond National Battlefield Park (seven units), Voyageurs National Park, Katmai National Park & Preserve, Chesapeake and Ohio Canal National Historical Park, and Boston Harbor Islands National Recreation Area. WRD also provided funding support and technical assistance for continuing efforts to complete water resources planning activities at 10 other park units. Other activities included: 1) assisting five park units in the formulation of either project statements for water resources management plans or technical assistance requests for water resources scoping reports; 2) reviewing project agreements, general management plans, or other planning efforts at five park units; 3) providing comments on Chapter 4 (draft) of RM-18, Wildland Fire Management; 4) presenting a paper at WRD's 2000 Aquatic Resources Professionals meeting; and 5) participating on a panel that reviewed applicants for the vacant hydrologist position at Mojave National Preserve.

The Planning and Evaluation Branch's capacity to provide park-specific support continues to be enhanced through the WRD's Hydrological Affiliates Program. Utilizing this program of cooperative resource sharing between WRD and park personnel having specialized water resource skills, WRD was able to support the effort by Jon Reidel (North Cascades National Park) to develop a water resources scoping report for Hagerman Fossil Beds National Monument, and Carol Purchase at Big Bend National Park to provide a water resources scoping report for Amistad National Recreation Area. This program continues to be a win-win situation for WRD, parks, and the affiliates.

It was also a productive year for the Division's Wetlands Program. Wetlands staff approved study plans and funding for five new wetland restoration projects at Buffalo National River, Rocky Mountain National Park, Santa Monica Mountains National Recreation Area, Palo Alto Battlefield National Historic Site, and Cape Cod National Seashore. In addition, we obtained one-time funding from the 20% Fee Demonstration Program to conduct a multi-park project titled "Enhanced Wetland Mapping and Digital Data for NPS Units." Through extensive ground truthing by wetland specialists, "enhanced" inventories provide a high level of wetland location and classification accuracy and document wetland attributes (e.g., plant communities, fish and wildlife use, and threats) for improved resource management. All projects will provide data in digital formats for use in Geographic Information Systems. In 2000, enhanced wetland inventories began at Lake Clark National Park & Preserve, Timucuan Ecological and Historic Preserve, Jean Lafitte National Historic Park & Preserve, Point Reyes National Seashore, Yosemite National Park, and Sequoia and Kings Canyon National Parks.

Wetlands staff also worked closely with parks on a broad range of wetland technical assistance projects. One important milestone was completion of the revegetation phase of the Lower Glorieta Creek riparian/wetland restoration project at Pecos National Historic Park. After earthmoving was completed, wetlands staff joined project cooperators in planting over 1000 native willow and cottonwood cuttings and about 9000 native herbaceous wetland plants (e.g., sedges, rushes, and bulrushes). Other notable technical assistance activities included a report on riparian/wetland condition in response to cattle grazing at Dinosaur National Monument, development of a draft Wetland Mitigation Bank for the Alaska Region, and assistance to Padre Island National Seashore in developing the park's Oil and Gas Environmental Impact Statement/Minerals Management Plan.

During FY 2000, a high level of activity and interest in marine resources was continued within the Department, which translated to a continued focus on marine resources within WRD's Fisheries Program. The National Coral Reef Task Force met three times during the year and adopted a *National Action Plan to Conserve Coral Reefs*. The plan calls for increased understanding of coral reef ecosystems and reduced adverse impacts of human activities. NPS responsibilities under this plan include increased inventorying, monitoring, protection, and public outreach. An additional \$2 million was

added to the coral reef parks base funding, bringing the total to \$3.6 million in base increase over the past two years. Each of the parks have been able to hire additional permanent positions dedicated to their coral reef and marine resources and a marine resource coordinator position was established at the Cooperative Park Studies Unit at the University of Hawaii. Fisheries Program staff is assisting these parks in developing and implementing these new programs. In addition to the Coral Reef Task Force activities, a new Executive Order calling for increased protection and coordination among all federal and state marine protected areas was issued in May, 2000, and has required additional evaluation and input from NPS marine resource units. WRD Fisheries Program staff has taken the lead on coordinating NPS response to the Marine Protected Area E.O.

Fisheries staff involvement in Upper Colorado River endangered fish issues increased during FY 2000. The Upper Colorado River Recovery Implementation Program (UCRRIP) completed and adopted flow and temperature recommendations for the Green River downstream of Flaming George Dam. The dam has altered flow and river habitat in Dinosaur National Monument and Canyonlands National Park; changes to improve conditions for endangered fish have the potential benefit river dependent species in both parks. The Bureau of Reclamation is now conducting the NEPA process to determine how the dam will be re-operated to meet the flow recommendations. Fisheries Program staff is representing National Park Service interests within this process. In addition, Fisheries Program staff is representing the National Park Service on the UCRRIP Biology Committee.

In addition to the marine resource and Colorado River issues, technical assistance with management of aquatic and biological resources and fishery issues was provided to 29 parks during the year. High priority issues this year included restoration of native species including reduction of exotic species affecting native and endangered species, restoration of aquatic habitat (particularly for anadromous salmon populations), and developing cooperative fish management plans between park units and state management agencies. Fisheries Program staff also participated in a workshop to identify long-term inventory, monitoring, research, and restoration needs at Mesa Verde National Park and will be taking an active role in the Natural Resource Program Center's Fire Technical Advisory Group. Several parks were assisted through the Fisheries Affiliates Program again this year, including the development of fishermen creel surveys at Redwood National Park, stream treatment to remove exotic brook trout at Crater Lake National Park, and removal of exotic salmonids at Great Smoky Mountains National Park.

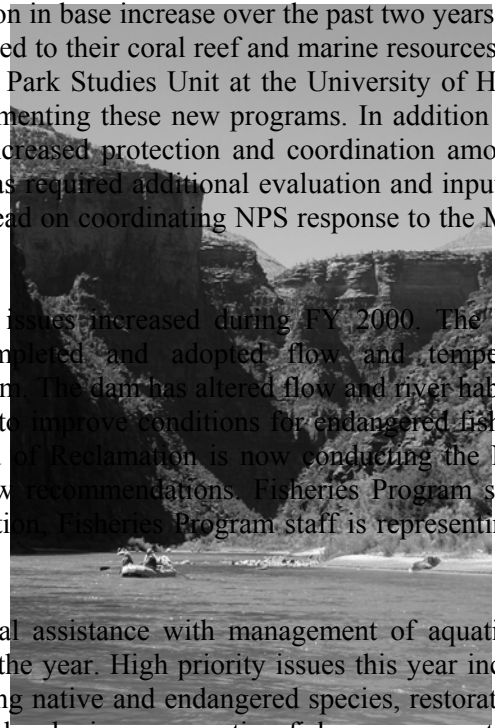


Figure 1. Rafters on the Green River in Lodore Canyon, Dinosaur National Monument.

## Colorado Pikeminnow in Lodore Canyon, Dinosaur National Monument

by John Wullschleger, Water Resources Division; Tim Modde, U.S. Fish and Wildlife Service; and Chris Kitcheyan, U.S. Fish and Wildlife Service

Dinosaur National Monument, which was established in 1915 for the purpose of protecting an extraordinary deposit of fossilized dinosaur bones, was expanded in 1938 to encompass the spectacular canyons carved by the Green and Yampa Rivers above and below their confluence. While Yampa River flows have remained largely unaltered since the expansion of the monument, the hydrograph of the Green River has been modified by Flaming Gorge Dam, which was completed by the Bureau of Reclamation in 1962. The dam has reduced peak flows, elevated base flows, and restricted the range of annual variation. At the same time, releases through turbines to meet daily patterns of power use have increased the magnitude and frequency of daily flow fluctuations. Of equal biological importance, summer water temperatures in the river have been reduced by releases from the cold hypolimnion of the reservoir.

These changes have affected the distribution and abundance of the Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and bonytail (*Gila elegans*), four endangered fish species that occupy the Green and Yampa Rivers. In fact, the effects of dams are believed to be the primary reason for the decline of these fish throughout the Colorado River system. All four species disappeared from Lodore Canyon in Dinosaur National Monument following the completion of Flaming Gorge Dam. Their absence and the unsuitability of the modified flow and temperature regimes were important reasons that the canyon was not among the reaches designated as critical habitat by the U.S. Fish and Wildlife Service (USFWS). The installation of a multi-level outlet structure and re-operation of the dam based on a 1992 Biological Opinion improved conditions for native fish and is probably the reason

that some pikeminnow have been captured in Lodore Canyon in recent years. Nonetheless, flow recommendations adopted by the Upper Colorado River Recovery Implementation Program in 2000 will primarily benefit river reaches downstream of Lodore Canyon and Dinosaur National Monument. Concern that future dam operations will continue to suppress endangered fish populations within the monument has provided the impetus for the National Park Service to fund studies that will provide information for management and protection of these species.

During 2000, the Water Resources Division provided funding to USFWS's Vernal Field Station to conduct an investigation of Colorado pikeminnow in Lodore Canyon and Dinosaur National Monument. Study objectives include determining whether pikeminnow are year round residents in the canyon, documenting pikeminnow migration to previously unknown spawning sites within the canyon or known sites in other river reaches, identifying the timing of spawning, and distance upstream from its confluence with the Colorado, with the Yampa River, and the distance upstream from its confluence with the Green; L indicates locations within Lodore Canyon; "not tagged" indicates that a fish had not yet been tagged; "no contact" indicates a tagged fish for which no signal was received.

**Table 1. Locations of Colorado pikeminnow implanted with radio transmitters, at the time of capture and during three aerial surveys conducted during 2000 (GRM = Green River Mile, the distance upstream from its confluence with the Colorado; YRM = Yampa River Mile, the distance upstream from its confluence with the Green; L indicates locations within Lodore Canyon; "not tagged" indicates that a fish had not yet been tagged; "no contact" indicates a tagged fish for which no signal was received).**

Adult pikeminnow were captured by electrofishing and angling and surgically implanted with 149 megahertz transmitters with a 24-month battery life. Only healthy adult fish that were not stressed by capture were considered for implantation. Monitoring of tagged fish was conducted with a stationary telemetry logger, located in the Green River at the Yampa confluence (Green River Mile 345.4), and by aerial surveys from a fixed-wing aircraft. The telemetry logger was deployed on 7 August; aerial surveys were conducted on 7 July, 17 August, and 13 November.

**Table 2. Locations of Colorado pikeminnow captured during 2000 (GRM = Green River Mile, the distance upstream from its confluence with the Colorado; YRM = Yampa River Mile, the distance upstream from its confluence with the Green; L indicates locations within Lodore Canyon; "not tagged" indicates that a fish had not yet been tagged; "no contact" indicates a tagged fish for which no signal was received).**

FISH #	CAPTURE	LOCATION
26	GRM 347.5 (L)	GRM 330.7
29	GRM 349.4 (L)	GRM 357.7 (L)
28	GRM 348.6 (L)	YRM 0.5
27	GRM 346.8 (L)	GRM 348.7
31	GRM 349.4 (L)	GRM 303.6
27	GRM 343 (L)	GRM 341.6
		GRM 331.4
		GRM 285.4

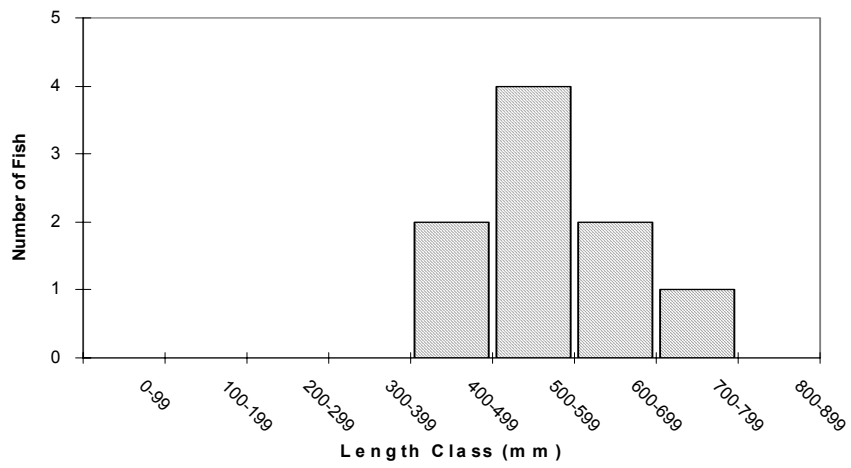
A total of nine pikeminnow ranging from 415 - 701 mm in total length were captured in Lodore Canyon during 2000. One pikeminnow was captured during April and six were captured during August; of these, two fish were unsuitable to receive radio transmitters. The fish captured in April had moved downstream to Island Park (Green River Mile 330.7) by the time of the 7 July flight. It is possible that this fish moved out of Lodore Canyon to migrate to one of the known spawning sites in the Yampa River or Desolation Canyon; it returned to Lodore Canyon later in the summer, then moved into the Yampa River during the first two weeks of November. Three of four fish that were tagged prior to the 17 August flight were found in Lodore Canyon; the fourth fish was not located. However, by 13 November, six of seven tagged fish were located outside of Lodore Canyon. In addition to the fish that moved into the Yampa River, five fish were located on the Green River from Whirlpool Canyon (Green River Mile 341.6), immediately downstream from the Yampa confluence, to Horseshoe Bend (Green River Mile 285.4). One fish was not contacted during either of the two flights, and its transmitter is presumed to have malfunctioned.

Similar fall movement patterns have been observed for pikeminnow in the Duchesne River. During a previous study, migration of pikeminnow out of the Duchesne and into the mainstem Green River coincided with declining water temperatures. Because the temperature logger that was deployed in the Green River during 2000 was only operated through August it is not known whether temperatures were declining during the period when tagged pikeminnow moved out of Lodore Canyon. In 2001, permanent temperature loggers will be deployed at Gates of Lodore at the upstream end of the canyon, immediately upstream of the Yampa / Green confluence and in the Yampa River.

In 2001, USFWS plans to implant transmitters in four additional pikeminnow. Attempts will be made to capture pikeminnow upstream of Lodore Canyon in Brown's Park as well as in the canyon itself. If any transmitters are successfully implanted in fish from Brown's Park, a second telemetry logger will be deployed at the upstream end of the canyon. Radio transmitters implanted during 2000 should remain operational throughout 2001. In addition to tracking by fixed wing aircraft, USFWS will monitor movements of individual fish by boat and from the riverbank in order to obtain data on habitat use. Positions of radio-tagged fish will be determined within 0.25 m by triangulating on the signal with a bi-directional yaggi antenna. Habitat use over a 24-hour period will be monitored by determining positions at two-hour intervals.

The study will be completed in 2001. It is anticipated that the results will provide the park with information on the importance of Lodore Canyon to pikeminnow recovery of the species, identify current habitat deficiencies, and suggest additional actions that may be needed for restoration.

Figure 2. Length frequency of Colorado pikeminnow captured in Lodore Canyon, CO, April - August, 2000.



## NPS Reports Wetland Conservation Activities on Over 64,000 Acres of Wetlands

By Leslie Krueger, Natural Resource Protection Specialist



In recognition of the 25<sup>th</sup> anniversary of the Clean Water Act, the Clinton Administration issued the “Clean Water Action Plan” in 1998. The Plan included a strategy to reverse the historic pattern of wetland losses in the U.S. and achieve a net gain of 100,000 acres of wetlands annually, beginning in 2005. A prerequisite to achieving any goal of this type is to ensure that reliable procedures exist to collect and analyze the pertinent information. In this case, procedures had to be in place to inventory the nation’s wetland gains and losses and to evaluate the impact of federal policies and programs on the 100,000-acre/year goal.

The federal government currently supports two major wetland inventories: the U.S. Fish and Wildlife Service (FWS) “Wetlands Status and Trends” report and the Natural Resources Conservation Service (NRCS) “National Resources Inventory.” Unfortunately, these studies have had different objectives and used different analytical techniques, resulting in inventories that are difficult to compare. One of the key actions of the Plan was to develop a single Federal Wetlands Status and Trends Report. In 2000, the FWS and NRCS produced

this joint report ([www.nwi.fws.gov/bha/SandT/SandTReport.html](http://www.nwi.fws.gov/bha/SandT/SandTReport.html)) as the authoritative wetland status and trends summary for the United States.

The other objective, evaluating the roles of federal programs in achieving the 100,000-acre annual goal, required agencies to report on their wetland conservation activities. The Committee for Defining and Tracking Wetlands Gains and Losses was formed to develop definitions, tracking systems, and reporting protocols. For this first year, the committee agreed on definitions and an interim tracking system, and requested that each agency report results for FY2000. In response, the Water Resources Division (WRD) surveyed NPS units regarding five categories of wetland activities: Establishment, Reestablishment, Rehabilitation, Enhancement, and Protection/ Maintenance (definitions can be found at [www.cleanwater.gov/conservationcategories/definitions.html](http://www.cleanwater.gov/conservationcategories/definitions.html)). Only “Establishment” of new wetlands and “Re-establishment” of severely degraded or former wetlands count as “net gain.” For this prototype survey, WRD decided that a Servicewide call to the field would create an unnecessary burden on parks. Instead, we contacted the Regional Water Resource Coordinators for help in identifying parks where relevant wetland activities had occurred in FY 2000. Park resource managers were then contacted individually based on the recommendations of the coordinators.

The report to the White House, titled “Federal Wetlands Conservation Activities Final Report FY 2000,” showed that the NPS conducted wetland conservation activities on over 64,000 acres of wetland habitat in 39 NPS units. The largest contribution came from Big Cypress National Preserve (46,899 acres), where all but 6 acres came from the Preserve’s prescribed burning program (Rehabilitation category). Over 15,000 acres were reported in the wetland Protection/Maintenance category, most from land acquisition in Northeast Shark Slough, Everglades National Park. Other reported actions included hydrologic restoration, fill removal, exotic plant removal, native species plantings, and similar activities. NPS contribution to “net gain” of wetland habitat (Establishment and Re-establishment categories only) in FY 2000 was 337 acres.

Clearly this initial survey was an underestimate of NPS wetland conservation activities due to the limited number of field contacts. NPS may be called upon again in FY 2001 to report wetland conservation activity acreage, and we hope that a simplified reporting system will allow a more comprehensive survey.

## The First Survey of Aquatic Macrofauna from Laufuti Stream, National Park of America Samoa

By Robert Cook, Cape Cod National Seashore and David Vana-Miller, Planning Program Leader

The National Park of American Samoa comprises three widely separate units on the islands of Tutuila, Ta'u and Ofu in the Territory of American Samoa. About 60 miles of open ocean separate Tutuila from the Manu'a Islands of Ofu, Olosega, and Ta'u. National park lands on Ta'u are largely remote, inaccessible, and covered by tropical forest vegetation. There would appear to be no development pressure within or adjacent to park boundaries.



Laufuti stream, on the island of Ta'u, is a complex, interrupted stream that includes a perennial spring-fed lower section at sea level, an intermittent middle section, and a perennial upper section that percolates into permeable volcanic rock. Sheer cliffs/canyon walls that act as waterfalls under flowing conditions separate these stream sections. The stream courses across the floor of a collapsed caldera, separated into sections by faulting. The mouth of Laufuti is a combination of surface flow across and seepage through a steep boulder and cobble field beach, and it is 2 meters above the tidal range. As a result of the geologic history and youth of Ta'u (ca. 100,000 years), the pattern of physical zonation exhibited by Laufuti differs from that found in most tropical Pacific island streams.

Laufuti Stream was surveyed for macrofauna from 1996 to 1997. As part of a scoping trip to assess park water resource issues, the junior author participated in the survey of lower Laufuti stream in 1996. The senior author has developed a manuscript detailing the results of this survey that WRD is now considering for publication in its Technical Reports series.

Although the Territory contains many freshwater streams, studies of them have been few. The only known macrofaunal survey occurred around 1981 on 37 of Tutuila's streams. Because park plans call for improving trail access to Laufuti Stream, baseline information is needed to assess potential impacts and possibly develop a monitoring program.

The stream's macrofauna consists primarily of amphidromous species that are relatively common and widespread. However, at the community level, Laufuti is unusual. Its shrimp community is diverse (seven species) and abundant with greater species richness than 89 percent of Tutuila streams. The most unusual aspect of Laufuti's shrimp community is the prominence of *Macrobrachium latimanus*, a species that is neither widespread nor abundant on Tutuila. It also supports a relatively diverse (six species, dominated by gobies and gudgeons), exotic-free freshwater fish community, including *Anguilla megastoma*, a species of limited occurrence on Tutuila. Fish species richness of Laufuti equals or exceeds 78 percent of Tutuila streams. Additionally, the lack of estuarine conditions at the mouth of Laufuti apparently acts as a barrier to species typical of the freshwater-marine interface on Tutuila and the series of falls acts as a barrier limiting most species to the lower section. As a result, fish community zonation in Laufuti differs from many other tropical Pacific island streams.



Freshwater fish communities of the Australo-Pacific region are relatively depauperate and tropical Pacific islands tend to be even more depauperate, the result of insularity, island size, and distance from centers of origin coupled with the volcanic origin of most tropical Pacific islands. When young, the uneroded, Pacific volcanic islands lack well-developed estuarine habitats, have low stream habitat diversity and are characterized by high velocity streams with many waterfalls. Typical of Laufuti, these conditions favor successful colonization by gobies and gudgeons, noted for their ability to climb or crawl. While weathering eventually leads to greater habitat diversity, the already established gobies and gudgeons are better positioned to exploit the newer habitats and, through adaptation and speciation, tend to occupy the majority of freshwater niches to the general exclusion of other fish families.

## **Taking on the Restoration of Our Native Salmonids**

by Jim Tilmant, Fisheries Program Leader

Early management practices within the National Park System not only allowed but also encouraged the stocking of non-native fish, especially non-native trout species, to enhance recreational fishing opportunities. In 1916, there was very little understanding of the potential effects of stocking. To enhance public enjoyment, many “improvements” and manipulations of fish and wildlife were made in parks. Aquaculture and the stocking of fish to enhance recreational fishing were considered appropriate and hatcheries were established within parks and adjacent to parks at many locations for just that purpose. Stocking activities did not consider potential impacts to native aquatic species and frequently the intent was to enhance native fisheries with additional popular non-native sport fish. High alpine and sub-alpine, naturally fishless, lakes were also a frequent target for establishing additional fishing opportunities. By the early 1950’s much concern was being expressed over NPS stocking practices but, pressure from state fish and game agencies resulted in continued stocking in many parks until a policy to phase out all fish stocking programs in NPS natural areas was officially adopted in 1969.

The liberal stocking policies of early NPS managers has left a monumental task with regards to our legislated mandates and current NPS Policies, which call for the elimination of non-native plants and animals and restoration of our aquatic systems to their natural unimpaired condition wherever feasible. Nearly every NPS unit with significant aquatic habitat is faced with non-native fish populations that have or are in the process of displacing native species, are causing hybridization or genetic loss, or occupy waters that were historically fishless. Non-native salmonid populations are perhaps the biggest fishery problem facing the NPS. Nearly every large park with cold-water habitat is faced with controlling and/or eliminating non-native trout species. Restoring native trout populations requires removing the non-native species that have contributed to their decline. Typically, non-natives are removed by treating the stream or lake with a chemical that subsequently can be neutralized and will break down rapidly in the environment.

During recent years, a number of parks have begun to address their non-native salmonid issues and to reestablish populations of native trout species. WRD has been providing technical assistance and funding to provide parks technical expertise needed for the treatment and restoration of streams. During 2000, native trout restoration gained substantial momentum. Crater Lake has been one of the leaders in native trout restoration efforts and during 2000 the park completed a large native bull trout restoration project on Sun Creek. A multi-agency team of biologists came together at Crater Lake to complete the final year treatment of approximately 6 miles of stream habitat to remove brook trout and reestablish native bull trout within this stream. A new restoration project was initiated at Great Smoky Mountains National Park where non-native rainbow and brown trout are being removed from selected stream reaches above natural barriers and native brook trout are being restored. This past year’s work was concentrated on Sam’s Creek where non-native trout were removed above a waterfall that is a natural barrier to fish movement and potential reinvasion from downstream. Great Basin also initiated native Bonneville cutthroat trout restoration work within the park during 2000. Great Basin staff was able to treat Strawberry Creek to remove non-native rainbow trout and prepare this stream for native trout introduction next year. They were also able to reintroduce native trout to the South Fork of Big Wash, which historically held trout but was currently without a trout population. The Great Basin restoration program is part of a larger state-federal interagency effort to reestablish native Bonneville cutthroat throughout the Great Basin region. Other restoration efforts are underway in Yellowstone for the fluvial grayling populations and westslope cutthroat trout, and within Isle Royale and Pictured Rocks for Coaster brook trout. Many other parks have small-scale restoration projects.

To date, native trout restoration has been completed in only a fraction of historically occupied habitat within the national parks. However, the work initiated during 2000 and earlier has laid the groundwork for additional parks to undertake native fish restoration actions. Through these projects, NPS has developed a source of staff expertise in the treatment and restoration of native fish populations that can be made available to assist other parks in planning and implementing future restoration activities.

# Water Resources Issues Overview for Olympic National Park

by Don Weeks, Hydrologist

The diversity of water resources at Olympic National Park (OLYM) is unmatched in the lower 48...from glacial to coastal environments with a rain forest in between...lakes, rivers, hot springs...creating complex environments with many management challenges.



Rialto Beach - Olympic National Park

To begin a process toward better understanding and managing these diverse water resources, OLYM staff requested technical assistance from the Water Resources Division (WRD) to summarize the park's high priority water-related issues. In this particular case, a Water Resources Issues Overview (WRIO) was elected as the appropriate WRD product. The WRIO is a quick response document with a minimal turn-around time that provides a preliminary identification of the park's major water resource issues and management concerns.

The overview identified several high-priority issues including:

- ◆ Kalaloch Creek Erosion: On the Pacific coast, where Kalaloch Creek enters the ocean, stream bank erosion is threatening several cabins and a lodge that are privately owned and operated in the park. Stream/tidal erosion does not appear to be the main reason for bank instability since the creek's watershed is small (approximately 21 mi<sup>2</sup>), the gradient of the creek is low at this site, and tidal water extends into the creek further reducing the gradient and its ability to erode laterally. The main reason for bank instability appears related to the removal of large woody vegetation many years ago to accommodate visitor use. With the clearing of natural vegetation, saturation of the oversteep bank material appears to be the primary reason for bank instability. To further complicate this issue, as the tree roots left from the original clearing continue to rot below ground surface, erosion could accelerate even more. WRD recommendations for addressing this issue include: 1) monitoring erosion rates; 2) directing surface runoff away from the bluff line; 3) allowing woody vegetation to reestablish; and 4) relocating structures near the eroding bank.
- ◆ Rialto Beach Erosion: In 1932, a jetty was constructed immediately south of the Quillayute River mouth as part of the Quillayute River Navigation project. Over the years, the project was modified to increase the channel dimensions and provide a "mooring basin." A large gravel and sand spit extends from the mouth of the river to James Island protecting the navigation channel and the town of LaPush. The U.S. Army Corps of Engineers (COE) actively maintains the spit with dredged material and armored it in the 1980s and 90s with tons of rock in response to breaches from high river discharge and ocean waves. Preliminary observations suggest that Rialto Beach, immediately north of the Quillayute River mouth, is experiencing accelerated erosion as a result of this construction. This construction likely interrupted the sediment transport pathways and led to accelerated erosion due to a reduction in nearshore sediment supply. WRD recommendations for addressing this issue include: 1) building from these theories and observations, quantify the relationship(s) between the navigation project and beach erosion, and 2) develop and communicate to the COE an overall statement of policy or management philosophy that defines the conditions under which the park would tolerate Quillayute channel manipulation within the park's boundary.

With the completion of an issues overview, the park now has the foundation for more comprehensive WRD products such as a Water Resources Scoping Report and Water Resources Management Plan. The WRIO may also serve the park in other areas, such as a reference document for Olympic's revised GMP efforts that begin in FY01.

## An Update on the Coral Reef Protection Initiative



by Jim Tilmant, Fisheries Program Leader

Two years ago (*1998 Annual Report*) we reported on a new initiative under Presidential *Executive Order 13089* to increase protection and management of our nation's coral reef resources. This E.O. was issued in response to an internationally recognized decline in the health and abundance of coral reef resources. The E.O. called for all federal agencies to increase their efforts to preserve and protect coral reefs and established a cabinet level Coral Reef Task Force to oversee implementation of the E.O.

The Coral Reef Task Force has met two or more times a year since its creation and, through its working groups, has now completed a *National Action Plan to Conserve Coral Reefs*. The *National Action Plan* lays out a comprehensive strategy to address the future conservation of coral reef resources and incorporates two fundamental themes: 1) Understanding coral reef ecosystems, and 2) Reducing the adverse impacts of human activities. To improve the national understanding of coral reef resources, the plan calls for a nationally coordinated program of mapping, inventory, assessment, and monitoring, along with strategic research focused on the determinants of reef health and the human dimensions of successful coral reef conservation. To reduce the adverse impacts of human activities, the *National Action Plan* calls for expansion and strengthening of our network of coral reef marine protected areas; reduced impacts from extractive uses, habitat destruction, pollution, global threats, and international trade; the restoration of damaged reefs; improved interagency accountability and coordination; and, the development of a better informed public. All federal agencies are expected to contribute toward carrying out the *National Action Plan* and are required to report on their accomplishments annually. The units of the National Park System with coral reef resources can contribute substantially to the *National Action Plan* in the areas of protection, public outreach, inventory and monitoring, and mapping. The parks also provide excellent opportunities for coral reef research under natural conditions.

The National Park Service was successful in getting base funding increases in FY 2000 and FY 2001 to help coral reef parks implement the requirements of the E.O. and to implement their share of the *National Action Plan*. A total of \$2.6 million in park base increases have been provided to the coral reef parks over the past two fiscal years. Each of the Pacific area coral reef parks has used this funding to hire a marine resource specialist to oversee coral reef research and resources management. In addition, a position has been established at the University of Hawaii Cooperative Studies Unit to coordinate coral reef activities among the parks and help attract researchers to do park work. South Florida and Caribbean coral reef parks have used the funding increases to improve marine law enforcement, expand coral reef inventory and monitoring, and to enhance public education and outreach. In addition, Dry Tortugas National Preserve has been successful in proposing a large new "no-take" reserve (Research Natural Area) within the park boundary. This research natural area is adjacent to the National Marine Sanctuary's newly approved no-take area. Following completion of the EIS process in March 2001, the combined areas will provide over 157,000 acres of fully protected marine and coral reef habitat.

Over the last two years, the coral reef initiative has focused on the evaluation of ongoing activities, development of the *National Action Plan* to direct future management efforts, and securing funding and positions needed to effectively implement the E.O. With this accomplished, it is now time for implementation of the plan and agency actions that will ensure the continued health and viability of our nation's coral reefs. The National Park Service is responsible for protecting some of our nation's most spectacular coral reefs. Sound management is imperative to ensure that we fulfill our mandate to prevent impairment and protect these coral reefs for future generations. This will likely become increasingly difficult in light of continued coastal development, increasing recreational and commercial marine resource use, and offshore oil and gas exploration. Successful management will require new and innovative approaches as well as good scientific data and understanding of these resources and their response to change. The Water Resources Division will continue to provide technical assistance to parks in fulfilling their responsibilities and facing these challenges and will provide a lead for the NPS on future Coral Reef Task Force activities.

## **Water Operations Branch Highlights**

By William L. Jackson, Ph.D., Chief

The Water Operations Branch (WOB) in FY 2000 continued its program of senior-level technical assistance to parks in the areas of water quality/aquatic contaminants, surface water hydrology, stream management, ground water assessment, GIS, and data management. In addition, WOB provided a broad array of support to servicewide program initiatives, policy guidance, and strategic planning.

Budget-related efforts by NPS leadership in FY 2000 resulted in \$1.275 million being secured in 2001 for additional water quality monitoring to support NPS Strategic Plan goals. This new program will be coordinated by WOB and implemented in close integration with the new NPS Park Vital Signs Monitoring Program. Twelve Vital Signs monitoring networks representing over 100 parks have obtained funding in FY 2001 to begin planning for and implementing water quality monitoring. In addition, a permanent servicewide water quality database function is being established in WOB to support management of NPS water quality information as part of the EPA National water quality database.

WOB also secured one-time funding through the NPS fee demo program to conduct an assessment of water quality issues associated with snowmobile use in parks. That study is being designed in close coordination with snowmobile use parks. In addition, roughly 35 park-based water quality monitoring and assessment projects continue to be supported through the \$2.2 million Clean Water Action Plan partnership with the U.S. Geological Survey, 30 Level I water quality inventory projects are being implemented with support from the NPS Servicewide Inventory and Monitoring Program, and 18 park-based water quality and hydrology projects are being coordinated as part of the NPS Natural Resources Program Unified Project Program.

WOB's core program continues to be one of direct technical assistance to parks on hydrology and water quality issues. A complete listing of WOB's FY 2000 technical assistance accomplishments is provided elsewhere in this report. Following are some examples of several significant FY 2000 Branch accomplishments:

- A quantitative analysis of community well impacts on baseflows in Redwood Creek at Golden Gate National Recreation Area
- An analysis of water supply alternatives at the Furnace Creek area of Death Valley National Park
- An analysis of springflow declines at Oak Springs at Big Bend National Park
- Technical Assistance to Colorado River Parks in developing a proposal for additional flood-flow research in Grand Canyon National Park to be included as part of the Colorado River Surplus Criteria EIS being prepared by the Bureau of Reclamation
- Continued assistance to Lake Mead National Recreation Area is evaluating endocrine disruption compounds in Las Vegas Wash Bay, and in evaluating alternative city of Las Vegas sewage treatment plant discharge points in the lake
- Small stream restoration assessments at El Malpais National Monument, Golden Gate National Recreation Area, and Whiskeytown National Recreation Area, and major floodplain assessments at Grand Teton National Park and Glacier National Park
- Significant support to Congaree Swamp National Monument in evaluating floodplain redelineation and development proposals on private properties upstream from the park
- Active participation in watershed stabilization activities following the Cerro Grande fire at Bandelier National Monument
- Participation on the Value Engineering Study for downstream water supply treatment alternatives associated with Elwha Dam removal at Olympic National Park
- Technical Review of the proposed alternative waste repository sites for New World Mine restoration near Yellowstone National Park

These and the many other activities summarized in this report and the articles that follow reflect the wide range of issues that find their way to the WOB, and the breadth of the staff's expertise. I am somewhat concerned as we enter 2001 that new funding and project initiatives will demand significant support by WOB staff and that management of workloads will

become even more challenging. However, our capabilities have been enhanced considerably by the addition of Pete Penoyer to our staff. Pete is a ground water hydrologist with specialized expertise in ground water contamination issues - especially those associated with energy development and hazardous wastes.

As we enter 2001, we will continue to seek and value your input as to how we can be of the most assistance to you, and we'll continue to make ourselves as readily accessible to you as possible.

## **Sampling for Snowmobile Contaminants at Rocky Mountain National Park**

By Mark VanMouwerik, Research Associate, Colorado State University



In an effort to begin defining possible environmental contamination from snowmobiles at Rocky Mountain National Park, WRD staff collected snow, water, sediment, and soil samples at the park. A total of 25 samples were collected before and after the 2000 spring melt from two sites on and near a heavily traveled snowmobile trail on the west side of the park. At one site, the trail passed by a small pond and at the other it passed by and over the Colorado River. The samples were analyzed for the snowmobile contaminants methyl tertiary butyl ether (MTBE), benzene, toluene, ethyl benzene, xylenes (collectively, BTEX), and polycyclic aromatic hydrocarbons (PAHs).

Sample results showed only one MTBE concentration was above detection level. At this level, MTBE, therefore, was not a concern to aquatic life or human health. BTEX concentrations were very low and well below concern levels for both aquatic life and human health. PAHs were above background levels in snow (2-3 orders of magnitude higher) and possibly in soil as well. PAHs in water and sediment appeared to be much higher in the pond than in the river, possibly because the anaerobic nature of the pond sediment slowed biodegradation and allowed it to accumulate over the years and/or PAHs entering the river were dispersed and diluted with the flow of the river or degraded more quickly in the river. PAHs exceeded some of the lower aquatic-life concern levels found in the literature, so adverse effects of PAHs on aquatic life at either site cannot be ruled out. PAHs in water were significantly less than human health criteria for consumption of fish and drinking water. Puddle water in the middle of the trail was much higher in BTEX and PAHs than the pond or river and could possibly be a risk to wildlife.

Future research should focus on PAHs in sediment, soil, and especially water. More extensive sampling could better develop these very preliminary conclusions. More background samples, in particular, would better define the source of these contaminants.

## **Flood Conditions at Moose, Wyoming - Grand Teton National Park**

By Michael Martin, Hydrologist

The developed area at Moose, Wyoming, in Grand Teton National Park is located on the west bank of the Snake River about 15 miles upstream of Jackson. Floodplain maps previously produced by FEMA depict a portion of the park infrastructure within the 100-year floodplain. However, this floodplain boundary was not derived through detailed methods, and therefore, is less than ideal for planning purposes. The flood hazard in the Moose area is of special concern because the developed area contains the headquarters, visitor's center, maintenance facility, and substantial park housing. Furthermore, the presence of Jackson Lake Dam, about 25 miles upstream, adds another dimension to the flood hazard. Consequently, WRD staff has completed a detailed floodplain analysis for the Moose area that includes the 100- and 500-year recurrence interval floods, and, two more extreme floods, the Probable Maximum Flood (PMF) and the dam-break flood. This analysis, which normally would have been very complicated due to the size of the Snake River, represents a multi-agency effort, utilizing original over bank topographic data supplied by the Park, channel bathymetry data collected by the Bureau of Reclamation, design floods produced by FEMA and the Bureau of Reclamation, and hydraulic modeling and floodplain mapping conducted by WRD.



The Snake River displays a highly variable morphology throughout its length from the headwaters on Two Ocean Plateau to the town of Jackson. Most of this reach is a braided river with an overabundance of coarse bedload and woody debris. The reach adjacent to Moose, however, is a single thread channel constricted between terrace deposits. Throughout the river corridor, both up and downstream of Moose, the active channel is constrained between a series of unpaired glacio-fluvial terraces associated with the different advances of the Pinedale Glaciation. These terraces vary in height above the Snake River channel from several feet to over 200 feet. The developed area at Moose is located on one of the lower terraces

immediately adjacent to the channel, and varies from about 10 to 15 feet above the bottom of the channel. Of particular note in this fluvial-lacustrine system is Jackson Lake, which is about 25 miles upstream of the Moose developed area. This piedmont lake, which is naturally over 20 miles long and close to 400 feet deep, was formed during the Jackson Lake advance of the Pinedale Glaciation. Since the retreat of the Pinedale ice sheets, Jackson Lake has provided natural sediment storage and flood attenuation. The hydrologic storage capacity of the lake was substantially increased with the construction of Jackson Lake Dam in 1917. Presently the Bureau of Reclamation operates the dam for irrigation, flood control, and, to a lesser extent, recreation purposes.

Flood conditions on the Snake River throughout most of Grand Teton generally follow those associated with other large braided streams. As discharge increases, flow accesses more of the braided channels and the overall stream width increases faster than the depth. Rapid shifting of the main flow through channel avulsion is common, and this process is usually accompanied by substantial mid-channel bar and bank erosion. The area of Moose, however, experiences substantial depth changes with increased discharge due to the single thread channel. Exacerbating these conditions is the presence of a high terrace on the opposite side of the river. Overbank flows are forced to the lower, right bank terrace where park infrastructure is located. However, in spite of the apparent flood hazard associated with the low-terrace location of Moose, hydraulic modeling indicates that the area is not highly flood prone to even low frequency, high magnitude floods like the 100- and 500-year recurrence interval floods. In the case of a dam break, however, the developed area of Moose could be greatly affected. The quantitative floodplain analysis and the resulting floodplain maps should be a valuable park management tool derived at minimal cost through interagency cooperation.

## **Resource Protection vs. Public Water Supplies**

By Larry Martin, Hydrogeologist

The need to provide potable drinking water for park staff and visitors can sometimes conflict with the NPS mandate of resource protection. In the mid-1980s, a water supply well at Big Meadows in Shenandoah National Park was abandoned because pumping from the well was adversely affecting the hydroperiod of adjacent wetlands. In 2000, staff of the Water Operations Branch assisted several parks with well construction and water supply problems. At Fort Bowie National Historic Site, construction of a new well near the developed area of the park will allow the park to abandon and remove  $\frac{3}{4}$  mile of pipeline and electrical conduit which connected the old well in Siphon Canyon with the developed area of the park. In addition to being a visual intrusion, the aboveground pipeline crossed through an archaeological site. At Chiricahua National Monument, a new well was constructed to comply with current construction standards. Sealing of the well casing into bedrock formations will eliminate interconnection with surface water and allow the park to continue to operate the water system as being from a true groundwater source. Continued use of the old well would have required treating the water as if it came from a surface source due to the interconnection of the shallow alluvial groundwater supplying the well with surface water in the adjacent Bonita Creek.

## **Inventorying and Monitoring Program and Water Resources Division Target Additional Parks for Field Level Water Quality Inventories**

By Mike Matz, Research Associate, Colorado State University and Gary Rosenlieb, Hydrologist

Since FY98, WRD has identified parks with a lack of surface-water quality data and targeted them to receive funding to complete Level I Water Quality Inventories through the Servicewide Inventorying and Monitoring (I&M) Program. Level I field inventories primarily focus on collecting basic chemical, physical, and bacteriological information on key water bodies within parks. The targeted parks also have the latitude to seek pollutants that may be present because of adjacent land uses. Through FY01, using information gathered from WRD’s Water Quality Data Inventory and Analysis Project and the Environmental Protection Agency’s national water quality database STORET, 72 parks have been invited through the annual program call to develop a Level I Water Quality Inventory plan because they lacked water quality data sufficient to describe the condition of their surface-water resources. Of the 72 parks identified as eligible for Level 1 funding, 33 have submitted plans for conducting their inventories. Draft or final data reports have been received from 10 parks that received funding in FY98 or FY99.

WRD, through its Water Quality Data Inventory and Analysis Project, has actually assisted the I&M Program since 1995 by identifying parks with the least water quality information with respect to park surface-water resources. By January 2001, this WRD project had completed water quality data inventories for 228 of approximately 270 parks. A park cannot become a potential candidate for I&M Level I funding until WRD completes the park’s water quality data inventory. After this step is completed parks are targeted to receive Level I Water Quality Inventory funding based on the following factors: (1) the number of water quality observations that have been collected in the park; (2) the number of water quality observations in the study area (which includes the park); (3) the number of missing and old “Level I” water quality parameters in the study area; (4) whether the park participated in the process of identifying and uploading water quality data to STORET; and (5) whether the park has PMIS Statements that deal with water quality.

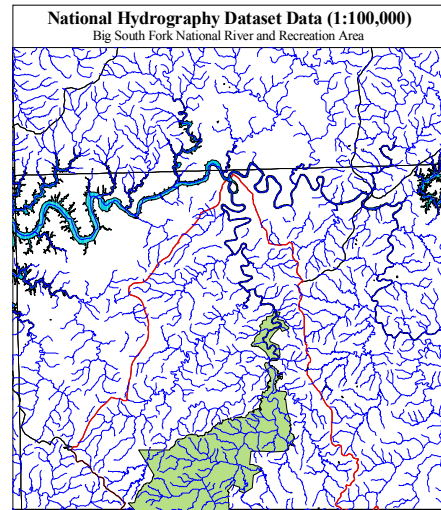
## **The National Hydrography Dataset: A Consistent, Seamless Framework for Sharing, Managing, and Modeling Park Hydrographic Data**

By Dean Tucker, Hydrologist

<b><i>Benefits of the NHD</i></b>
Reach Addresses
Modeling
Centerlines
Watershed-Based
Edgematched
Named Features
Stream Levels
Flow Relations
Improved Cartography
New USGS Standard

Most parks have some type of hydrography (surface water) layer in their Geographic Information Systems (GIS). Typically, this layer has been obtained by either manually digitizing hydrographic features from 1:24,000-scale U.S. Geological Survey (USGS) topographic quadrangles or importing the 1:24,000-scale USGS Digital Line Graph (DLG) hydrography files. While these sources of hydrographic data provide an adequate cartographic backdrop in a GIS, they do not lend themselves to data exchange and modeling. As a result of these weaknesses, the USGS and the Environmental Protection Agency (EPA) have developed the National Hydrography Dataset (NHD). NHD is a geographic database that interconnects and uniquely identifies all the stream segments or “reaches” that comprise the nation’s surface water drainage system. It is based initially upon the content of the USGS 1:100,000-scale DLG hydrography data integrated with reach-related information from the EPA’s River Reach File Version 3.0. The NHD provides a national framework for assigning reach addresses to water-related entities, such as industrial dischargers, drinking water supplies, fish habitat areas, state-designated beneficial uses, wild and scenic river status, STORET water quality stations, and the like. Reach addresses establish the locations of these entities relative to one another within the NHD surface water drainage network in a manner similar to street addresses.

Once linked to the NHD by their reach addresses, the upstream/downstream relationships of these water-related entities and any associated information about them can be analyzed. Moreover, since the NHD provides a nationally consistent framework for addressing and analysis, water-related information linked to reach addresses by one entity can be shared with other organizations and easily integrated into many different types of applications. In addition to reach addresses and modeling, NHD is superior to DLG hydrography on several other accounts including the fact that NHD is watershed-based, edgematched, has Geographic Names Information System (GNIS) names for hydrographic features, and carries stream level and flow-relation attributes. Moreover, NHD is easier to work with cartographically and is the new USGS standard supplanting DLG.



The USGS is beginning to produce high resolution (1:24,000-scale or better) NHD data for the U.S. Alaska (at 1:63,360-scale) and Hawaii should be completed in FY2002. The U.S. Forest Service will be converting its 1:24,000-scale national hydrographic dataset (Cartographic Feature File) to NHD format and several states (e.g. Texas, Georgia, Kentucky, North Carolina, Kansas, and Minnesota) are gearing up to convert 1:24,000-scale DLG data to high resolution NHD format. For its myriad benefits, high resolution NHD should be the hydrographic base layer in park GIS's. For more information on the National Hydrography Dataset, see <http://nhd.usgs.gov>.

## USGS Demonstrates Simple Techniques for Assessing Contamination at Oil and Gas Operations

By Pete Penoyer, Groundwater Hydrologist and Mark VanMouwerik, Research Associate, Colorado State University



Dr. James Otton and Dr. Robert Zielinski of the U. S. Geological Survey demonstrated recently developed protocols for Federal land managers to simply and cost-effectively assess impacts from oil and gas operations. The demonstration, assisted by WRD, GRD and local NPS staff was conducted at oil and gas sites at Padre Island National Seashore to detect releases to the environment of hydrocarbons, salts, and radionuclides. The methods developed permit park staff to employ field-portable instruments that provide real-time data to assess site contamination from releases of hydrocarbons (oil and condensate), produced water, and naturally occurring radioactive material (NORM).

Equipment includes a photoionization detector (PID) and hand-held soil auger to semi-quantitatively determine the presence of hydrocarbons in soils (or shallow groundwater) and the spatial distribution of contamination as reflected in the measurement of volatile organic compounds (VOCs) in soil gas at various depths. A field conductivity meter and/or chloride titration strips are used to identify areas of chloride contamination of soil or groundwater related to saline produced water.

A micrometer (scintillometer) is employed to detect the presence of NORM in site equipment and soils. NORM is largely due to radium-bearing scale that can be deposited on oil production piping or tanks that handle large volumes of formation water that commonly is produced along with the oil or gas. It also be present where large volumes of produced water have been disposed of or injection wells.



White tip (moisture filter) of hand-held PID (Yellow) is inserted into blue cap of plastic tube that is lowered into augered hole for measurement of VOCs at various depths.

may  
in pits

These methods provide a relatively simple, quick, and cost-effective way to begin defining contamination at either active or abandoned sites. Coupled with in-park knowledge of site histories, they could be especially useful in prioritizing sites for further assessment or cleanup in parks that contain multiple abandoned sites.

## **Water Resources in the National Parks Reference Collection**

By Rick Inglis, Hydrologist and Pat Wiese, Colorado State University

Water Resources in the National Parks Reference Collection is the new name of a unique and extensive asset of thousands of reports, books, maps, and data found in the Resource Room in WRD's offices in Fort Collins, Colorado. The purpose of the collection is to provide technical information in support of the water resource management activities of the Water Resources Division. It was started in 1984 when the Regional Water Program Coordinators were reorganized as part of the WASO-based Water Resources Lab in Fort Collins. Most regional water resource files were transferred to Fort Collins at that time. Subsequently, the collection was further organized and a Procite database (summarizing the collection) was constructed. Today there are over 6,000 entries in the database, not counting an approximate 6,000 un-accessioned items (2,000 reports and publications and 4,000 data files). The database is being brought up to NRBIB standards and should be available on the NPS intranet in 2001 for use within the agency.

The collection contains individual articles, entire publications, unpublished reports, water resources management plans, water quality data, well logs, slides, photos, and maps. Information can be found on an individual park's water quality, ground water resources, flood risks, and special water-related studies. This information often serves as a good starting point when addressing site-specific water resources issues as well as more broadly based water resource management planning projects. Diverse examples from the collection include:

- an original copy of the 1912 Hetch Hetchy proposal for Yosemite National Park;
- Hydrologic data collected during the 1994 Lake Mills drawdown experiment, Elwha River, Washington (Olympic National Park);
- Hydrogeologic Investigation of Sinking Spring (done by a volunteer at Abraham Lincoln Birthplace National Historic Site);
- a 1903 map of the original 33 springs at Platte National Park (now Chickasaw National Recreation Area); and
- well information, including driller logs, yield tests, etc.

New material is welcome (if it meets the scope of the collection) and will be added to the collection as time allows. Funding will be provided in FY01 to help better maintain the collection. Please contact WRD if you want assistance in tracking down information from the collection on a particular park water resource.

## **Water Rights Branch Highlights**

By Chuck Pettee, Chief

The heated economy and a Colorado River that is nearing complete allocation have ensured that The Water Rights Branch (WRB) workload wasn't lacking for issues in the year 2000. As population and economic growth put pressure on community infrastructures in the southwestern United States, demand for municipal and industrial water supplies has resulted in an increased number of water development proposals. The States of Nevada and Arizona have now reached their limits on use of the Colorado River established by the Colorado River Compact at the same time that the Las Vegas area is one of the fastest growing in the US. Additionally, Interior Secretary Babbitt persuaded water users in Southern California they need to live within their Compact entitlement – which means reducing their River use by 24% - while their

population is also growing. Hemmed in from all sides, southern Nevadans and Californians are looking to boost water supply from their backyard, the desert. On the surface, the desert looks to be very dry but under the surface is a vast system of interconnected groundwater basins that have been very slowly collecting water over the eons. Large pools of underground water with relatively very small rates of recharge and discharge characterize this system. The large pools lure water developers but it is the very small discharge that supplies water to park springs. Park units in southern Nevada and California include Lake Mead National Recreation Area, Death Valley National Park, Mojave National Preserve, and Joshua Tree National Park. At issue for the NPS is the flora and fauna at springs in these parks that are dependent upon regionally extensive groundwater flow systems.

In Nevada, WRB has, over the past decade, been actively monitoring water rights applications and, through protests, participated in the Nevada process for considering water right applications. In many areas the amount of water being proposed for development is much greater than the amount annually discharged. The year 2000 signaled a turning point for WRB Monitoring and Enforcement workload because the Nevada State Engineer has recognized the issue raised by the many applications and begun to set hearing dates in 2001, to resolve the issue of water availability and potential impacts to uses such as park springs.

In their search for alternative sources of water supply, the Municipal Water District of Southern California has proposed storing large amounts of surplus Colorado River water in desert groundwater basins near desert parks. In the long term, they are also looking to supplement the stored river water with withdrawal of indigenous ground water from these same desert basins. Here also, WRB has been assisting parks with protecting park springs from impacts due to the proposed storage and withdrawal projects.

In addition to the desert issues, WRB, with assistance from the Office of the Solicitor and Department of Justice, has been continuing to address water right issues in ongoing water right adjudications. This year WRB completed settlement agreements for two more park units in Utah – Cedar Breaks National Monument and Hovenweep National Monument – and made good progress with several parties in the Little Colorado River adjudication in Arizona. Rocky Mountain National Park staff also completed a settlement agreement in Colorado. While settlement agreements are major milestones and save a lot of time and money, they must still go through the court process to become final decrees. The NPS currently has settlement agreements in four states (Idaho, Montana, Colorado, and Utah) that are moving through the adjudication court approval processes and which are supported by both the federal and state governments.

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

## **Reporting Water Use for Federal Reserved Water Rights At Mesa Verde National Park and Hovenweep National Monument**

By Jeffrey C. Hughes, Hydrologist

On July 31, 1997, Mesa Verde National Park (MEVE) and Hovenweep National Monument (HOVE) were awarded a decree from the Colorado Water Division 7 Water Judge that quantified Federal reserved water rights for springs, seeps, and a perennial stream. MEVE received Federal reserved water rights for 120 springs and seeps, and for the Mancos River, which flows through the eastern edge of the park. HOVE received Federal reserved water rights for 12 springs within the Colorado portion of the monument.

The Federal reserved water rights may be used for many purposes, including insitu uses, which are tied to the purposes for which each park unit was established and the National Park Service Organic Act. The purposes include, but are not limited to, water for the support of aquatic and land vegetation; the development, conservation and management of resident and migratory wildlife and wildlife resources; and the preservation of educational, historic, scientific, scenic, aesthetic and other public values and habitat protection and management. The decrees grant the full discharge of each spring to the United States.



The State of Colorado requires that annual usage for all water rights be reported to the water court. Monitoring surface and ground water discharge at seeps and aprings, especially at MEVE, will be difficult due to their remote location and low rate of discharge. Some do not have visible surface water flow and therefore would not have an adequate measurement point to obtain a satisfactory surface water discharge measurement. Additionally, the difficulty of reporting is increased by the fact that discharge at many of these springs could vary widely throughout the year. This will make it unlikely that an instantaneous discharge measurement would reflect an “average” water discharge for a spring.

Considering these difficulties, the NPS agreed to make measurements, described below, when possible and submit these to the State on an annual basis. These measurements would include determining the approximate surface area under the influence of the spring discharge. This value will then be used in the modified Blaney-Criddle evapotranspiration equation to estimate the amount of water consumed by vegetation for this source. This will serve as an estimate of the amount of spring flow where surface measurement is not possible. Instantaneous discharge measurements will be collected at springs where surface measurement is possible. These measured flows will vary by season and by year. Text descriptions for the sites will be included in the “Comment” field of the report form. The NPS will report such items as “area is subirrigated” or “no surface flow” for springs where this is appropriate.

The surface water measurements at HOVE will be collected at least once a year. Due to the number of sites at MEVE and the difficulty of access, all sites will not be surveyed each year. Rather, a subset of the sites will be visited each year and the annual report will contain information collected for this subset. Each year a different subset will be visited until all the sites have been visited, hopefully within 3-4 years. This process will then start over once all the sites have been visited.

The State has agreed to the NPS proposal. This procedure will be reviewed and modified if needed as the NPS submits annual reports over the years.

## **Resource Sustainability in the Arid Southwest**

by Chuck Pettee, Chief and Bill Van Liew, Hydrologist

The demand for new water supplies in the arid southwest has increased greatly in the 1990's in response to rapid population growth in the region. For example, the Las Vegas area had the highest percentage growth rate in the country during the decade. Additionally, a recent agreement by the Colorado River basin states will require water users from California to reduce their use of Colorado River water. As the major surface waters are becoming fully utilized, commercial and municipal water users are increasingly proposing to tap ground water to meet their needs for future water supply. Primarily, they are focusing on the vast ground-water reservoirs that are accessible in the basins of the arid southwest. Of concern to several parks in the southwest, including Death Valley National Park, Lake Mead National Recreation Area, and Mojave National Preserve, is the fact that these ground-water reservoirs are a part of regional ground-water flow systems that are the source of desert springs and baseflow



to streams in parks. The proposals to increase ground-water pumping have the potential to reduce or eliminate the flow of springs and impair associated water-dependent biological resources. The ground-water reservoirs exist in basin-fill sediments and in underlying bedrock, which in some areas are hydraulically continuous between adjacent topographic basins, and form extensive regional ground-water flow systems. Recharge occurs mostly in the higher elevation mountains while discharge areas are primarily at lower elevation springs and streams.

Much has been learned in the 20<sup>th</sup> century about managing surface-water flow systems in a sustainable manner. Many of the major western rivers were developed to maximize water storage and diversion capabilities to avoid shortages during drought. Only later in the century was it realized that naturally occurring resources that depend upon river flow must also be considered if we want to sustain the uses and a viable environment. The reaction to protect instream values has caused some of the notorious western “water wars” as those who thought they had all of the water tied up in storage for diversions began to realize that some of that water may be wrestled from their grip. Now, as eyes turn toward larger withdrawals of ground water, the NPS and others must learn to understand how resources depend upon regional groundwater flow systems and apply the lessons learned so that ground-water flow systems can be sustained.

In some respects, ground-water flow systems of the arid southwest can be compared to rivers, such as the Colorado River, which have a continuous but variable annual flow with large reservoirs where a portion of the annual flow is stored. Municipal, commercial, and agricultural water demand is constant or increasing from year to year, so the demand can only be met by that amount of the annual flow that is consistently available every year. In the arid southwest, annual flows vary so much that the consistently available supply from the natural river flow is much less than the average flow. The objective of the river storage is to save some of the river’s flow during periods of high runoff to augment the consistently available river flow with withdrawals from storage. On the Colorado River, reservoirs are capable of storing enough water that the average annual flow can be considered consistently available for diversion or instream purposes. If the amount of water necessary for these uses exceeds the average annual flow of the Colorado River, water will be removed from storage faster than it can be replaced and, sometime in the future, the consistently available supply will again drop below the average annual flow, leaving some uses without a consistent supply of water. On the Colorado River, this “lag” time is on the order of decades; if water is removed from storage faster than it can be replenished, the effects of a lowered water supply might not be realized for decades. When the effects do manifest themselves, it will take additional time to recover the original enhanced level of consistent water supply. The length of time before effects are realized is a function of the ratio of the amount of water in storage to the amount of the annual river flow; four times the amount of annual flow is stored on the Colorado River. In groundwater flow systems of the southwest, the ratio of storage to annual flow is orders of magnitude larger than even highly controlled river systems such as the Colorado River. Furthermore, while it might take thousands of years for a drop of water to physically move through the ground-water system from its point of recharge to its point of discharge, pressure changes caused by pumping move much faster. Therefore, the impacts to spring discharges in parks from the withdrawal of water from the regional ground-water flow system outside the parks can occur from within one year to centuries later.

In order to sustain municipal, commercial, agricultural, and environmental purposes, one must manage ground-water flow systems in a sustainable manner. For NPS managers, that means trying to ensure that the cumulative ground-water use is not greater than the annual flow through the regional ground-water flow system. That may be easily stated but doesn’t seem possible without an army of lawyers and scientists. A problem occurs when development interests are looking for relatively quick approvals for ground-water projects. It took decades of experience to learn how to sustain a surface-water system while it may take hundreds of years to completely understand a ground-water system. Since most users are unwilling to wait hundreds of years, there is a growing trend to use numerical ground-water flow models solved by computers to simulate hundreds of years of ground-water flow. While models have many limitations, no other feasible tools are available. Models depend upon actual data to constrain the solution so that they produce believable results, which means that pumping aquifers may be necessary to develop a suitable model.

WRB has been working with parks throughout the arid southwest for several years to protect water and water-related resources from ground-water withdrawals. The NPS has filed many protests with the Nevada State Engineer to water rights applications throughout the regional ground-water flow systems of Nevada. Additionally, the NPS has worked with the Bureau of Land Management to protect ground-water dependent resources through the National Environmental Policy Act process. The consistent theme presented by the NPS is that withdrawing water, by either a small number of large withdrawals, or an accumulation of a large number of small withdrawals, can overdraft the regional flow system and impair park resources. Park resources that depend upon the ground-water flow system must be considered a protected use and, over the long term, use of the flow systems must be sustainable.

# Support Provided to Regions, Parks, and Other National Park Service Organizational Units



### Planning and Evaluation Branch

Provided information to the Region on wetland training opportunities and materials.

Developed a draft wetland mitigation bank document to be used by Alaska parks to compensate for unavoidable wetland impacts from projects in parks.

#### *Denali National Park and Preserve*

- Reviewed and approved a wetland Statement of Findings for the “Toklat Borrow Processing Site/Toklat River Excavation Site.” WRD signature certified the technical adequacy of the wetland analyses and the project’s consistency with Director’s Order #77-1: Wetland Protection.
- Reviewed and approved a wetland Statement of Findings for the “Construction of Access to Spruce #4 Inholding in Kantishna.” WRD signature certified the technical adequacy of the wetland analyses and the project’s consistency with Director’s Order #77-1: Wetland Protection.
- Reviewed and approved a wetland Statement of Findings for the “Primrose Overlook Improvements.” WRD signature certified the technical adequacy of the wetland analyses and the project’s consistency with Director’s Order #77-1: Wetland Protection.
- Provided technical review and comments on a wetland Statement of Findings for the “Alaska Railroad Depot Expansion and Park Road Realignment.” WRD signature certified the technical adequacy of the wetland analyses and the project’s consistency with Director’s Order #77-1: Wetland Protection.
- Provided NPS wetland compliance information to the park on installation of a water supply line at Wonder Lake.

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

- Reviewed and approved a wetland Statement of Findings for the “Entrance Road Rehabilitation” project. WRD signature certified the technical adequacy of the wetland analyses and the project’s consistency with Director’s Order #77-1: Wetland Protection.

#### *Katmai National Park and Preserve*

- Assisted Katmai National Park & Preserve in holding an interagency meeting on the development of a Cooperative Fisheries Management Plan for the park.
- Provided technical review and comment to Katmai National Park & Preserve on the final study proposal to develop an Alagnak River Management Plan.
- Reviewed and approved a wetland Statement of Findings for the “Lake Camp Boat Launch and Day Use Facilities.” WRD signature certified the technical adequacy of the wetland analyses and the project’s consistency with Director’s Order #77-1: Wetland Protection.
- Assisted park staff in initial planning phase for a Water Resources Management Plan.
- Reviewed and commented on project statement entitled “Prepare a comprehensive freshwater monitoring plan for Katmai National Park and Preserve”.

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

- Reviewed and approved the final study plan for the WRD-funded project “Complete National Wetland Inventory Mapping-Phase I.”

- Completed a final draft Lake Clark National Park and Preserve Water Resources Scoping Report.

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

- Provided technical assistance to park staff regarding preparation of a draft wetland Statement of Findings for the “Ten-Year Mining Plan of Operations: Big Eldorado Creek Claim Group.”
- Continued to provide technical assistance regarding NPS and Corps of Engineers compliance and functional assessment for wetlands impacted in the Gold Hills Mining District

### **Water Operations Branch**

#### *Aniakchak National Monument and Preserve*

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

#### *Bering Land Bridge National Preserve*

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

#### *Cape Krusenstern National Monument*

- Continued to provide technical support in evaluating the water resources-related impacts of the Red Dog Mine Project.
- Obtained, entered, reformatted, and QA/QCed a variety of water quality data for upload to new STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

#### *Denali National Park and Preserve*

- Coordinated WRD funded project on development of floodplain delineation techniques for streams.
- Provided park staff with information on hazards of wood preservatives
- Reviewed a proposal to construct a pedestrian bridge over Rock Creek near the park headquarters and provided comments on erosion control and long-term monitoring.

#### *Gates of the Arctic National Park and Preserve*

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

#### *Kenai Fjords National Park and Preserve*

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

#### *Klondike Gold Rush National Historic Site*

- Provided consultation on a riverbank stabilization effort proposed by the Alaskan Department of Transportation that would have affected park resources.

#### *Kobuk Valley National Park*

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

*Noatak National Preserve*

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

*Wrangell-St. Elias National Park and Preserve*

- Reviewed Floodplain Statement of Findings for project.
- Obtained, entered, reformatted, and QA/QCed a variety of water quality data for upload to new STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

**Water Rights Branch**

*Sitka National Historic Park*

- Continued cooperative data collection program with Sheldon Jackson College to investigate streamflow and diversions on Indian River.
- Provided funding to park to support water rights investigations by park staff on Indian River.

**INTERMOUNTAIN REGION**

**COLORADO PLATEAU CLUSTER**

**Planning and Evaluation Branch**

- Provided an overview of issues related to Colorado River endangered fish recovery efforts to the Regional Director. Presented an overview of Colorado River endangered fish and Colorado River Recovery Implementation Program issues for WASO staff and representatives from the DOI Solicitor's office.
- Represented NPS at meetings of the Colorado River Recovery Program Biology Committee.
- Represented NPS in the Flaming Gorge Dam EIS process including meetings of the Cooperating Agencies and the Interdisciplinary Team, and reviewed and provided comments on draft Recovery Goals for Colorado pikeminnow, razorback sucker, humpback chub, and bonytail.
- Provided input to the Yampa River Management Program on NPS interests affected by the Program and the Yampa River Programmatic Biological Assessment.

*Dinosaur National Monument*

- Continued to provide assistance to Dinosaur National Monument in dealing with Flaming George Dam water releases and endangered fish species issues.
- Reviewed and provided comments on a study to determine the relationship of Colorado pikeminnow in Lodore Canyon to the pikeminnow population in the Green and Yampa rivers.

- Presented preliminary results of flow modeling studies in Island Park and an assessment the Colorado River Recovery Implementation Program flow recommendations at the Dinosaur National Monument Research Conference
- Provided advice on a proposal to establish a population of Colorado River cutthroat above a barrier on a tributary to Jones Hole Creek.
- Provided technical review and comments on the draft final report *Flow and Temperature Recommendations for Endangered Fishes in the Green River Downstream of Flaming Gorge Dam*.

#### *El Morro National Monument*

- Discussed possible future wetland restoration activities at the park.

#### *Glen Canyon National Recreation Area*

- Provided wetland compliance information concerning construction at the Wahweap wastewater treatment plant.

#### *Grand Canyon National Park*

- Provided assistance to the Denver Service Center and the park in reviewing and commenting on wetland issues on two draft Environmental Assessments for the project “Improvements for Desert View Wastewater Treatment System.”

#### *Petrified Forest National Park*

- Provided review and comment on the Petrified Forest National Park General Management Plan Project Agreement.

#### *Sunset Crater Volcano National Monument*

- Reviewed draft General Management Plan/Environmental Impact Statement.

#### *Zion National Park*

- Reviewed and approved the final study plan for the project “Evaluation of Virgin River Restoration Alternatives.”
- Provided technical review and comments on the EA and wetland Statement of Findings for the “Shunes Creek stream diversion reconstruction.” WRD signature certified the technical adequacy of the wetland analyses and the project’s consistency with Director’s Order #77-1: Wetland Protection.
- Reviewed and approved the Investigator’s Annual Report for the WRD funded project titled “Inventory Wetlands and Riparian Vegetation.”

## **Water Operations Branch**

#### *Arches National Park*

- Conducted wellhead protection planning.

#### *Canyonlands National Park*

- Assessed potential effects of leachate from the Atlas Mine tailings on downstream resources in the Colorado River. Provided detailed technical comments on Draft Work Plan: “For the geochemical and hydrologic characterization of the Atlas Site, Moab, Utah.” Participated in several interagency technical discussion meetings on developments at the Atlas site.
- Conducted wellhead protection planning.

### *Cedar Breaks National Monument*

- Advised on construction of a water supply well to replace the spring source.

### *Chaco Culture National Historical Park*

- Prepared a data report on the establishment of permanent cross-sections across Chaco Wash which included procedures for resurveys and conducting a stability analysis.

### *Colorado National Monument*

- Coordinated project and funding calls for the initiation of Level I water quality inventory.

### *Dinosaur National Monument*

- Rehabilitated water supply well at Echo Park.
- Reviewed the draft final report for the USGS project to study a potential upward trend in pH in the Green River.

### *El Malpais National Monument*

- Coordinated project funding with the park and the use of a consultant through a cooperative agreement to begin the development of a restoration plan for Aqua Fria Creek.

### *Fossil Butte National Monument*

- Assessed and documented an abandoned petroleum well to initiate the proper sampling for hazardous wastes.
- Evaluated the completion of the removal of an earthen dam and the reconstruction of the natural channel.
- Revised a draft project statement for the stabilization critical headcuts in park drainages.
- Drafted a letter to be sent to county commissioners with recommendations on replacing a large culvert in the park's entrance road.
- Coordinated soil sampling near a potentially contaminated abandoned oil well and interpreted sampling results.
- Constructed and tested a new water supply well.

### *Golden Spike National Historic Site*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *Grand Canyon National Park*

- Evaluated effects of developing regional water supplies on South Rim springs.
- Provided recommendations on the implementation of the Burned Area Emergency Rehabilitation plan for an area above a critical road crossing located on the North Rim.

### *Hovenweep National Monument*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.



- Conducted wellhead protection planning.

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

- Evaluated a stream restoration project and provided suggestions for effective monitoring of changes to channel structure and riparian vegetation.

#### *Mesa Verde National Park*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- Evaluated T-Walk procedures for suitability for park to use on the Mancos River to collect biologic and physical data and reviewed field methods on site with park staff.
- Participated on an interdisciplinary team for a park wide planning effort to restructure the natural resource program and incorporate ongoing fire rehabilitation.

#### *Natural Bridges National Monument*

- Conducted wellhead protection planning.

#### *Navajo National Monument*

- Coordinated project and funding calls for the initiation of Level I water quality inventory.

#### *Pipe Spring National Monument*

- Investigated hydrogeology related to springflow reduction.
- Assisted park in developing design and scope of work for rehabilitation of Tunnel Springs.

#### *Timpanogos Cave National Monument*

- Assisted park staff in determining suitable equipment and methods for monitoring stage of pools located in the caves.
- Assisted in evaluating sedimentation issues associated with the potential decommissioning and removal of a hydroelectric dam on the American Fork River.

#### *Walnut Canyon National Monument*

- Coordinated project and funding calls for the initiation of Level I water quality inventory.

#### *Wupatki National Monument*

- Conducted spring restoration assessment.

#### *Yucca House National Monument*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

#### *Zion National Park*

- Provided recommendations for restoration of North Fork Virgin River near Zion Lodge.

- Inspected performance of new highway retaining wall in area of landslide.
- Performed survey and hydraulic analysis of Sammy's Canyon in the area of the newly constructed bus maintenance facility.
- Evaluated potential impact from pumping wells outside park boundary (Instone Founders LLC).
- Conducted floodplain and channel survey of Sammy's Canyon.
- Provided fiscal and technical management and guidance for WRD Funded Project: Assessment of Bacterial Water Quality and Threats to Recreationists.

## **Water Rights Branch**

### *Aztec Ruins National Monument*

- Initiated quantification of water rights for the San Juan Basin Adjudication.
- Assisted park in evaluating water rights associated with land acquisitions.

### *Bryce Canyon National Park*

- Finalized report estimating park existing and future consumptive uses.

### *Canyonlands National Park*

- Installed and maintained a stream gage on the Green River to assist hydraulic modeling efforts.
- Calibrated reach length 2d hydraulics model for the Green River in the Fort Bottom area.
- Provided funding and staff support to the USGS-BRD for a riparian vegetation study in the Fort Bottom area on the Green River.
- Provided funding and staff support for the development of a flow routing model for evaluating Green River flow scenarios.
- Coordinated agency comments to USFWS on a flow recommendations for the Green River.
- Coordinated a meeting for regional and WRD staff and the USFWS regarding flow recommendations and management of Green River.
- Attended BoR's working group meetings for Flaming Gorge Dam.
- Attended USFWS biology committee meetings and commented on Green River flow recommendations.
- Participated in a agency scoping meeting/field trip for BoR's EIS on Flaming Gorge Dam.
- Assisted BoR in preparing a videotape on park resources affected by Flaming Gorge Dam.
- Prepared Hydrologist's Report on Green River floodplain inundation modeling.
- Coordinated a training course on the use of a flow routing model developed for the Green River.

### *Cedar Breaks National Monument*

- Drafted and finalized Federal reserved water rights settlement.
- Assisted park in filing change application for Blowhard and Twin Springs.

### *Chaco Culture National Historical Park*

- Continued surface and ground water investigations on Chaco Wash to develop evidence for the San Juan adjudication.
- Installed, maintained, and trained park staff in the operation of surface water and ground water data collection sites.
- Provided a briefing to park staff and management about filing of water rights claims in the San Juan Adjudication.
- Coordinated water rights strategy sessions with the park, SOL, and DoJ.
- Completed park-wide surface water source inventory.

### *Colorado National Monument*

- Reviewed Colorado water right resumes for Water Division 5 to determine if protests were necessary to protect park water rights and resources.
- Assisted the park during discussions related to the future of the Town of Fruita's water pipeline.

### *Dinosaur National Monument*

- Reviewed Colorado water right resumes for Water Division 6 to determine if protests were necessary to protect park water rights and resources.
- Maintained a stream gage on the Green River to assist hydraulic modeling efforts.
- Calibrated reach length two-dimensional hydraulics model for the Green River in the Island Park area.
- Repeated channel surveying and flow field measurements for Island Park during high flow event.
- Assisted park with site photography and observations during a high flow event.
- Provided funding and staff support for a cottonwood regeneration study in Island Park area.
- Contracted with FWS to complete an endangered fish utilization study for Island Park area.
- Provided funding and staff support for the development of a flow routing model for evaluating Green River flow scenarios.
- Provided training to interpretive staff about geomorphology of the Yampa River.
- Attended FWS biology committee meetings and commented on Green River flow recommendations.
- Attended Yampa River Basin water resources meetings.
- Cooperated with the USGS in the development and testing of experimental sediment scour/fill measurement technology to support endangered fish spawning studies on the Green River.
- Reviewed and commented on physical habitat and endangered fish studies conducted by the USGS-BRD.
- Participated in a agency scoping meeting/field trip for BoR's EIS on Flaming Gorge Dam.
- Assisted BoR in preparing a videotape on park resources affected by Flaming Gorge Dam.
- Prepared Hydrologist's Report on Green River floodplain inundation modeling.

- Coordinated a training course on the use of a flow routing model developed for the Green River.

#### *Glen Canyon National Recreation Area*

- Assisted park in securing water rights for the Lone Rock area.

#### *Grand Canyon National Park*

- Participated in settlement discussions and status conferences for the Little Colorado River Adjudication.
- Revised draft stipulations with State Parties to resolve water rights in the Little Colorado River Adjudication.
- Reviewed water covenants for Canyon Forest Village.
- Attended North Central Arizona Water Supply Study Group meetings.
- Briefed park staff and management, SOL, and DoJ on water right issues.
- Assisted park in developing and continuing the spring monitoring program on the South Rim.
- Provided assistance to the park in coordinating water resource and water rights issues with the Grand Canyon Trust and the Havasupai Tribe.
- Provided contract administration of USGS studies to finalize a geohydrology report and bibliography for the C-Aquifer.
- Processed topographic survey data and produced a topographic mesh for a 2km reach of the Little Colorado River.
- Produced and calibrated a 2d flow model for a riparian vegetation study on the Little Colorado River.

#### *Hovenweep National Monument*

- Revised draft Federal reserved water rights settlement with the State of Utah.
- Reviewed Colorado water right resumes for Water Division 7 to determine if protests were necessary to protect park water rights and resources.

#### *Hubble Trading Post National Historic Site*

- Participated in settlement discussions and status conferences for the LCR Adjudication.
- Revised draft stipulations with State Parties to resolve water rights in the LCR Adjudication.
- Provided funding to the USGS to continue a well monitoring program designed to monitor water levels and protect water rights in the LCR basin.
- Assisted park in reviewing documents to join the Ganado Water Users Association.

#### *Mesa Verde National Park*

- Reviewed Colorado water right resumes for Water Division 7 to determine if protests were necessary to protect decreed water rights.
- Assisted park in preparing annual water use reports for the Water Commissioner.

#### *Petrified Forest National Park*

- Participated in settlement discussions and status conferences for the Little Colorado River Adjudication.
- Revised draft stipulations with State Parties to resolve water rights in the Little Colorado River Adjudication.
- Provided contract administration of USGS studies to finalize a geohydrology report and bibliography for the C-Aquifer.
- Filed an amended water rights claim in the Little Colorado River Adjudication.
- Provided funding to the USGS to continue a well monitoring program designed to monitor water levels and protect water rights in the LCR Basin.

#### *Pipe Spring National Monument*

- Assisted with request for information concerning the water use agreement between the NPS, local cattlemen, and the Kaibab Indian Tribe
- Evaluated water right implications of decline in spring discharge
- Evaluated water right applications near park to determine impacts of diversions on park water rights.

#### *Rainbow Bridge National Monument*

- Prepared draft water rights settlement agreement with the State of Utah to recognize Federal reserved water rights.
- Assisted park in coordinating Tribal review of the proposed water rights settlement.

#### *Sunset Crater Volcano National Monument*

- Participated in settlement discussions and status conferences for the Little Colorado River Adjudication.
- Revised draft stipulations with State Parties to resolve water rights in the Little Colorado River Adjudication.
- Provided contract administration of USGS studies to finalize a geohydrology report and bibliography for the C-Aquifer.
- Filed an amended water rights claim in the Little Colorado River Adjudication.
- Provided funding to the USGS to continue a well monitoring program designed to monitor water levels and protect water rights in the Little Colorado River Basin.

#### *Timpanagos Cave National Monument*

- Prepared draft settlement agreement with the State of Utah for Federal reserved and state appropriative water rights.
- Coordinated review by Forest Service of draft water rights settlement agreement.

#### *Tumacacori National Historic Park*

- Assisted park in identifying water rights issues associated with the restoration of flows in the Santa Cruz River.

#### *Walnut Canyon National Monument*

- Participated in settlement discussions and status conferences for the Little Colorado River Adjudication.
- Revised draft stipulations with State Parties to resolve water rights in the Little Colorado River Adjudication.

- Provided contract administration of USGS studies to finalize a geohydrology report and bibliography for the C-Aquifer.
- Provided funding for the crest-stage gaging program with the city of Flagstaff to determine the frequency and magnitude of high flows in the park.
- Provided funding to the USGS to continue a well monitoring program designed to monitor water levels and protect water rights in the Little Colorado River Basin.
- Filed an amended water rights claim in the Little Colorado River Adjudication.
- Provided assistance to the park, the SOL, and DoJ in settlement discussions with the City of Flagstaff to resolve water rights issues in the Little Colorado River Adjudication
- Coordinated with the Forest Service in the preparation of water rights abstracts and settlement language for a water rights agreement between the United States and the City of Flagstaff.
- Assisted park and the regional lands office evaluate land exchange proposals by Warren Smith.

#### *White Sands National Monument*

- Assisted park, region, and the SOL finalize land transfer and water rights protection agreements with the State of New Mexico and White Sands Air Force Base to protect the water supply from Dog Canyon.

#### *Wupatki National Monument*

- Participated in settlement discussions and status conferences for the Little Colorado River Adjudication.
- Revised draft stipulations with State Parties to resolve water rights in the Little Colorado River Adjudication.
- Provided contract administration of USGS studies to finalize a geohydrology report and bibliography for the C-Aquifer.
- Provided funding to the USGS to continue a well monitoring program designed to monitor water levels and protect water rights in the Little Colorado River Basin.
- Filed an amended water rights claim in the Little Colorado River Adjudication.
- Filed water rights applications for Peshlaki and Heiser Springs.

#### *Zion National Park*

- Assisted park in preparing an EA to assess the impacts of the modification of an existing diversion structure on Shunes Creek.
- Assisted park in evaluating water rights applications to determine consistency with the Zion Water Rights Agreement and to evaluate impacts of diversions on park water rights.
- Evaluated Lee land exchange proposal for water rights implications.

## **ROCKY MOUNTAIN CLUSTER**

### **Planning and Evaluation Branch**

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

- Provided assistance to the Denver Service Center with wetland compliance for the removal of an irrigation pond and the restoration of the natural spring source at the park.

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

- Reviewed and commented on a consultant's report titled "Delineation of Wetlands and Waters of the U.S. for the Union Telephone and Commnet Steamboat Mountain Cellular Site and Underground Power Lines."
- Continued work on the reclamation design for the Snake River Gravel Pit.

*Rocky Mountain National Park*

- Participated in an annual fishery planning and consultation meeting between park staff and the US Fish and Wildlife Service.
- Reviewed and approved the final study plan for the WRD-funded project "Investigate Potential Willow Habitat and Restoration Needs."
- Continued to provide assistance to the park with wetlands compliance issues for the McGraw Ranch rehabilitation.

*Washita Battlefield National Historic Site*

- Provided technical review and comment on the park's General Management Plan.

*Yellowstone National Park*

- Provided assistance to the park by reviewing and commenting on the wetlands element of their Resource Management Business Plan.
- Provided assistance to the park with wetland compliance questions for the Heart Lake trail reroute project.

## **Water Operations Branch**

*Bighorn Canyon National Recreation Area*

- Advised on rehabilitation and testing of water supply well.
- Provided advice to park management regarding the potential effects of changes in water delivery operations.

*Curecanti National Recreation Area*

- Provided review and comment on a proposal to upgrade State of Colorado water quality standards for the park.
- Provided park staff with summary information on benzene, toluene, ethyl benzene, and xylene (BTEX) compounds and other advice related to designing a two-cycle engine contaminant study.

*Devils Tower National Monument*

- Conducted flood elevation survey and provided floodplain advice to DSC.

*Florissant Fossil Beds National Monument*

- Assisted with reviewing and critiquing a decision support model for removal or retention of dams and inspecting its application in the field.

### *Glacier National Park*

- Performed hydraulic analysis of North Fork Flathead River near Polebridge, Montana, to assist park in determining implications to floodplain resources from proposed actions by an inholder.
- Provided interpretation of State of Montana Water Quality Standards as they relate to permits on Divide and Snyder Creek.
- Provided park staff with summary information on deicers.

### *Grand Teton National Park*

- Assisted in construction of new water supply well at Moran Junction.
- Rectified survey data, provided input to channel design, executed vegetation plot surveys, installed staff gage, and collected seed bank samples for Snake River gravel pit restoration.
- Supervised hydraulic modeling and completed draft technical report for Moose Area flood hazard analysis.
- Provided advice to park staff regarding encroachment of Pilgrim Creek into water well pumphouse.
- With Bureau of Land Management and State of Wyoming personnel, developed plan for hosting a workshop on Properly Functioning Condition.

### *Grant-Kohrs Ranch National Historic Site*

- Obtained, entered, reformatted, and QA/QCed a variety of water quality data for upload to new STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.
- Compiled a summary for the park of field observations and recommendations related to an irrigation diversion pump with sediment and dewatering problems.

### *Rocky Mountain National Park*

- Advised park on water supply for a new livery in Glacier Basin area.
- Advised park on water supplies for facilities at Fall River Entrance area and tested the yield of a well at Aspenglen Campground.
- Collected snow, water, sediment, and soil samples to measure possible contamination from snowmobiles.
- Assisted in the formation of a study on the inter-relationships between willows, beavers, and elk by coordinating hydrologic measurements and interpretation. Planned and initiated a survey of monitoring wells, river stage gages, and topographic features in Moraine Park.
- Reviewed a proposed project and assisted the Geologic Resources Division by coordinating the removal of remaining portions of the Lawn Lake Dam.
- Provided advice related to the restoration of Hidden Valley Creek.
- Performed survey of Moraine Park in support of a WRD funded project.

### *Yellowstone National Park*



- Conducted technical review and provided comments on the construction of a waste rock repository for the New World Mining District restoration program.
- Participated in various technical discussions with park, WRD, and Contaminants Technical Advisory Group staff on contaminants issues in Soda Butte Creek.
- Assisted park and WRD staff in reviewing snowmobile hazards to the environment.

## **Water Rights Branch**

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

- Evaluated water rights applications filed in Water Division 2 to determine impact of diversions or changes on park water rights.

### *Big Hole National Battlefield*

- Initiated the construction and installation of a stream gage on the North Fork Big Hole River.
- Submitted water use report for park as required by the Montana Water Rights Compact.

### *Bighorn Canyon National Recreation Area*

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

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

- Evaluated water rights applications in Water Division 4 to determine impact of diversions or changes on park water rights.
- Assisted park and Region with negotiations for the quantification of a reserved water right.
- Participated in the Aspinall Unit Operations meetings.
- Conducted briefings for Department of Interior and Regional Office management personnel.
- Participated in meetings with DOJ and SOL attorneys and other federal agencies in an effort to develop a consistent Department of Interior position on the park's water right.
- Conducted hydrologic analyses in support of the FWS's flow recommendations for endangered fish species on the Gunnison River.
- Developed computer programs for statistically analyzing pre- and post-dam flows through the canyon.
- Refined the one-dimensional hydraulic model for the Warner Point study reach at the request of USGS contractors.

### *Florissant Fossil Beds National Monument*

- Evaluated water rights applications in Water Division to determine impact of diversions or changes on park water rights.
- Researched water rights located within the park.

### *Glacier National Park*

- Evaluated non-NPS water-right applications to determine impacts on park water rights pursuant to the Montana Water Rights Compact.

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

#### *Grant- Kohrs Ranch National Historic Site*

- Evaluated water right application (ARCO) and assisted park in responding to the State of Montana.
- Obtained information on new well and established docket for park water right.

#### *Great Sand Dunes National Park*

- Assisted DoJ, SOL, FWS, and park staff in developing technical strategy to prepare to respond to Stockman's proposed water development.
- Assisted park in the continuation of studies in the Sand Creek area and western portion of park.
- Evaluated water rights applications in Water Diversion 3 to determine impact of diversions or changes on decreed water rights.

#### *Little Big Horn Battlefield National Monument*

- Initiated the construction and installation of a stream gage on the Little Bighorn River.
- Submitted water use report for park as required by the Montana Water Rights Compact.

#### *Rocky Mountain National Park*

- Evaluated water rights applications in Water Divisions 1 and 5 to determine impacts of diversions or changes on park water rights.
- Evaluated draft water rights appraisal for Lily Lake.

#### *Yellowstone National Park*

- Evaluated non-NPS water right applications to determine impacts on park rights pursuant to the Montana Water Rights Compact.
- Attended Yellowstone Controlled Groundwater Technical Oversight Committee meeting and the Yellowstone Federal Interagency Science Conference.
- Coordinated with the USFS on water rights implications of the Phase II land transfer between the USFS and the Church Universal and Triumphant.
- Assisted park in retrofitting fish screens used in water diversion structures on Reese Creek.
- Continued support for investigations by the USGS and Montana Bureau of Mines and Geology to describe the hydrogeologic system of the Soda Butte Creek drainage upstream from the park boundary.
- Evaluated USGS research proposal on the hydrothermal system within Yellowstone Controlled Groundwater Area.
- Presented talk to field tour of Yellowstone Controlled Groundwater Area sponsored by the American Water Resources Association.
- Submitted water use report for park as required by the Montana Water Rights Compact.
- Collected streamflow and water quality data for Soda Butte Creek in support of the Water Rights Compact.

## **SOUTHWEST CLUSTER**

### **Planning and Evaluation Branch**

- Provided Regional Director with technical briefing materials pertaining to DOI issues along the Rio Grande and accompanied the NPS delegation to the Rio Grande Symposium.
- Provided review and comment on a proposal entitled “A Physical assessment of the Opportunities for Improved Management of the Water Resources of the Bi-national Rio Grande Basin” proposed by several academic and non-governmental organizations.

#### *Amistad National Recreation Area*

- Initiated the development of a Water Resources Scoping Report.
- Assisted park in the development of a proposal seeking funding from the Office of International Affairs to develop an International Cooperative Fisheries Management Plan for Lake Amistad.
- Assisted in planning an international and interagency meeting for the development of a Fisheries Management Plan for International Amistad Reservoir. Presented an overview of the NPS fisheries management process and planning needs at this meeting.

#### *Bandelier National Monument*

- Assisted in the completion and publication of a Water Resources Management Plan for the park.

#### *Big Bend National Park*

- Traveled to the park (with GRD staff) to develop a strategy for landscape reclamation in the Nine Point Draw watershed. Prepared a joint trip report with recommendations, and assisted the park in preparing a proposal for a study that would evaluate erosion processes and prioritize removal of water control structures that are concentrating runoff.

#### *Big Thicket National Preserve*

- Reviewed and commented on the second internal draft Oil and Gas Management Plan Environmental Impact Statement.

#### *Chiricahua National Monument*

- Provided Corps of Engineers Clean Water Act information to the park for a trail rehabilitation project.

#### *Guadalupe National Park*

- Continued to provide graduate student support and guidance for a study to evaluate the condition and impacts of an exotic rainbow trout population within McKittrick Creek in the park.
- Provided assistance with fish population and water quality surveys in McKittrick Creek.

#### *Lake Meredith National Recreation Area*

- Provided review and comment on a proposal to acquire funding from the American Sportfishing Association to help continue the stocking of rainbow trout in the tailwater ponds of the park.
- Provided consultation and assistance to the park and the Regional Office on potential critical habitat designation for the endangered Arkansas River Shiner.
- Participated in a scoping meeting, planning, and analysis for the park’s Oil and Gas Management Plan Environmental Impact Statement.

### *Padre Island National Seashore*

- Participated in discussions with the Denver Service Center and the Region regarding the categorical exclusion for the Malaquite Beach wastewater treatment system improvements.
- Provided assistance to the region with compliance issues concerning 3-D seismic exploration at the park and possible impacts to seagrass beds in the Laguna Madre.
- Continued to participate in development of the park's Oil and Gas Environmental Impact Statement/Minerals Management Plan.

### *Palo Alto Battlefield National Historic Site*

- Reviewed and approved the final study plan for the WRD-funded project "Restore Resaca Wetlands and Associated Habitats at Palo Alto Battlefield National Historic Site -- Phase I: Historic Aerial Photo Analysis and Mapping."
- Worked with park staff and researchers from Texas A&M University to develop a proposal for a project titled "Restore Resaca Wetlands and Associated Habitats at PAAL -- Phase II: Restoration Planning and Technique Development."

### *Pecos National Historical Park*

- Completed the lower Glorieta Creek wetland-riparian reclamation project.
- Obtained additional funding (\$3,600) for post-implementation monitoring and minor follow-up treatments for the lower Glorieta Creek wetland-riparian reclamation project.
- Assisted park staff in revegetation phase of the Glorieta Creek wetlands restoration project.

### *Saguaro National Park*

- Provided technical review and comments on the draft proposal "Inventory Water Sources and Riparian Areas."

### *Tonto National Monument*

- Provided information on Corps of Engineers 404 permit compliance for rebuilding a trail washed out by a flood.

## **Water Operations Branch**

### *Alibates Flint Quarries National Monument*

- Participated in meetings to generate alternatives for the Oil and Gas Management Plan/EIS.
  - Supervised the research and writing of the water resources section in the affected environment chapter in the Lake Meredith/Alibates Flint Quarry Oil and Gas Management Plan.
- Provided park staff with information on magnesium chloride.

### *Amistad National Recreation Area*

- Provided a listing of non-point source pollution considerations for the development of a grazing management plan.

### *Bandelier National Monument*

- Assisted in watershed stabilization efforts following the wildfire resulting from a prescribed burn.

### *Big Bend National Park*

- Prepared summary of history of water well exploration and development for the Castolon Area.
- Investigated cause of flow decrease at Oak Spring and made recommendations for rehabilitation of the spring.
- Conducted geomorphic assessment of Panther Junction and interpreted flood hazard to park staff.

### *Big Thicket National Preserve*

- Interpreted soil sampling results from a potentially contaminated oil drilling pad.
- Provided final comments and edits for water resources section (both affected environment and impacts) of the Oil and Gas Management Plan.
- Assisted park and other Southwest Cluster parks in determining cleanup standards and Superfund ARAR issues.

### *Carlsbad Caverns National Park*

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

### *Casa Grande Ruins National Monument*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *Chiricahua National Monument*

- Assisted with construction of new water supply well.
- Reviewed Floodplain Statement of Findings for project.
- Provided summary information on deicers.

### *Coronado National Monument*

- Assessed alternative potable water supplies.
- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *Fort Davis National Historic Site*

- Reviewed Floodplain Statement of Findings for project.

### *Lake Meredith National Recreation Area*

- Interpreted soil sampling results from a potentially contaminated area near a natural gas pipeline rupture.
- Provided advice to planning team related to interpretation of NPS floodplain guidelines with respect to variable lake levels.
- Participated in meetings to generate alternatives for the Oil and Gas Management Plan/EIS.

- Supervised the research and writing of the water resources section in the affected environment chapter in the Lake Meredith/Alibates Flint Quarry Oil and Gas Management Plan.
- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- Provided park staff with information on magnesium chloride.

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

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

#### *Padre Island National Seashore*

- Reviewed a sampling plan for a contaminated natural gas operation and tank site.
- Provided continued assistance for the restoration of Yarborough Pass from mercury and oil contamination.

#### *Pecos National Historical Park*

- Participated in a NPS team assessing a hazardous waste site that may impact the park.

#### *Petroglyph National Monument*

- Met with urban developers and park staff to determine acceptable criteria for future stormwater drainage through the park. Wrote up a Project Statement for a strategy to determine acceptable stormwater flows to protect park resources.

#### *Salinas Pueblo Missions National Monument*

- Coordinated project and funding calls for the initiation of Level I water quality inventory.

#### *Tuzigoot National Monument*

- Advised on replacement of water well.

#### *Washita Battlefield National Historic Site*

- Advised about risks associated with a possible permit variance at a nearby oil and gas drilling waste disposal facility to increase the limit on chloride concentrations in produced water wastes accepted at the facility.

#### *White Sands National Monument*

- Provided advice to park staff regarding the reconstruction of a road bordering parklands.
- Helped park staff assess potential environmental effects of an accidental crash of an ICBM rocket into a dry lakebed.

## **Water Rights Branch**

#### *Carlsbad Caverns National Park*

- Initiated investigations to determine the dependence of cave resources on Capitan Aquifer.
- Conducted a field review of water-related resource attributes with DoJ to evaluate the NPS need for filing claims in the Pecos River Stream System Adjudication.

### *Pecos National Historical Park*

- Initiated quantification of water resources and water rights associated with acquired properties.

### *Washita Battlefield National Historic Site*

- Completed water rights analysis for a Water Resources Scoping Report.

## **MIDWEST REGION**

### **GREAT LAKES CLUSTER**

#### **Planning and Evaluation Branch**

#### *Cuyahoga Valley National Recreation Area*

- Provided technical review and comments on a draft “Wetland Assessment and Protection Plan for Proposed Agricultural Lands.”
- Assisted the park in developing a contract Scope of Work and supplemental technical information for a wetland delineation project.

#### *Indiana Dunes National Lakeshore*

- Provided technical review and comments on a draft Ph.D. dissertation titled “Ecological Assessment of a Dune Swale Wetland on the Southern Shore of Lake Michigan” and a related technical report titled “Great Marsh Wetland Habitat Restoration.”

#### *Pictured Rocks National Lakeshore*

- Initiated literature review pertaining to the development of a Water Resources Management Plan.

#### *Sleeping Bear Dunes National Lakeshore*

- Continued the development of a Water Resources Management Plan.
- Provided technical review and oversight of a USGS-BRD project to develop a zooplankton Integrated Biological Index (IBI).
- Provided technical review comments on a proposal pertaining to bioassessment-related research.
- Provided technical review and comment on a USGS-WRD proposal for hydrological/biological work on the Crystal River.

#### *Voyageurs National Park*

- Provided technical review and comment pertaining to the water resources aspects of the draft General Management Plan.
- Provided consultation and comment on two fishery issues at Voyageurs National Park. One issue dealt with a proposed fishing tournament and NPS policies and position relative to these activities. The second issue dealt with continued commercial fishing activity within the park and a commercial fishing individual that has been non-compliant with fishing regulations.
- Reviewed the “Kabetogama-Ash River Hiking and Ski Trail System Environmental Assessment” and advised park staff on NPS wetland compliance.
- Assisted park staff in initial planning phase for the development of a Water Resources Management Plan.

## **Water Operations Branch**

### *Cuyahoga Valley National Recreation Area*

- Provided park, Bureau of Reclamation, and Facilities Management Division staff with detailed technical comments on the Draft Feasibility Study for the Krejci Dump Superfund Site.

### *Isle Royale National Park*

- Made a site visit and continued to serve as project officer and provide technical assistance for WRD-funded studies entitled "Investigation of processes influencing elevated fish mercury levels in Isle Royale National Park" and "A survey of unionid mussels in the aquatic systems of two National Park Service units." Served as moderator of small group that developed the quality assurance project plan, and helped write plan.
- Visited the site of an oil spill remediation project and wrote a summary of how the remediation goals and general level of effort compared to those adopted at other NPS sites around the country.

### *Keweenaw National Historical Park*

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

### *Pictured Rocks National Lakeshore*

- Provided park staff with summary information on mercury, lead, and copper issues and continued serving as project officer for WRD-funded study entitled "A survey of unionid mussels in the aquatic systems of two National Park Service units." Assessed progress in the mussel study with a site visit.

### *Saint Croix National Scenic Riverway*

- Assisted in rehabilitation of water supply well.
- Provided fiscal and technical management and guidance for WRD Funded Project - Monitoring of Trace Metals Associated with Urban Runoff.
- Developed task order for the implementation of a USGS water quality monitoring project.
- Served as WRD project officer on the project entitled "Identify sources of mercury and methylmercury in the St. Croix National Scenic Riverway." Reviewed and provided park and BRD researcher with detailed comments on the proposed study plan and QA/QC plan.

### *Voyageurs National Park*

- Provided Park and USGS staff with information on using the IQC approach in evaluating lake biological metrics.

## **Water Rights Branch**

### *Voyageurs National Park*

- \* Provided comments to park staff on Water Resources Scoping Report.

## **GREAT PLAINS CLUSTER**

### **Planning and Evaluation Branch**



### *Badlands National Park*

- Provided wetland compliance information to the Denver Service Center and the park regarding the Loop Road Over Cedar Pass project.

### *Buffalo National River*

- Provided review and comment on park's draft response to the Corp of Engineers' request for scoping comments on a notice of intent to prepare an environmental impact statement for the White River Minimum Flow Study.
- Provided technical assistance for the development of a Water Resources Management Plan.
- Reviewed and provided comments on a study to evaluate effects of elevated nitrogen on aquatic invertebrates in the Buffalo River.
- Provided comments on and approved the study plan for the WRD funded project titled "Assessment of Streambank Stabilization/Riparian Restoration Project."

### *Ozark National Scenic Riverways*

- Provided assistance to the park regarding proposed bridges and Corps of Engineers Clean Water Act compliance.

### *Scotts Bluff National Monument*

- Began discussions of wetland compliance issues concerning a proposed bike path through the park.

### *Tallgrass Prairie National Preserve*

- Reviewed the draft General Management Plan for the park and provided comments on wetland protection issues.

## **Water Operations Branch**

### *Buffalo National River*

- Coordinated a NRPP funded project on streambank stabilization.
- Provided the Park and other WRD staff with suggestions for QA/QC detailed planning related to a proposed project, "Macroinvertebrate community assessment of the midreaches of the Buffalo National River."

### *Fort Larned National Historic Site*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *Fort Scott National Historic Site*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *George Washington Carver National Monument*

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

### *Jewel Cave National Monument*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *Mount Rushmore National Memorial*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- Coordinated project and funding calls for the initiation of Level I water quality inventory.

### *Ozark National Scenic Riverways*

- Evaluated hydrogeology and potential impacts of proposed lead mining in the watershed of the park.

### *Scotts Bluff National Monument*

- Coordinated project and funding calls for the initiation of Level I water quality inventory.

### *Wilson's Creek National Battlefield*

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

## **Water Rights Branch**

### *Buffalo National River*

- Assisted the park in assessing potential impacts from a proposed dam on Bear Creek.
- Assisted the park in the design of water-related resources studies.

## **NATIONAL CAPITAL REGION**

### **NATIONAL CAPITAL CLUSTER**

#### **Planning and Evaluation Branch**

### *Chesapeake and Ohio Canal NHP*

- Assisted in an issues scoping meeting/fact finding trip in preparation for the development of a Water Resources Scoping Report.
- Initiated an information gathering effort for the development of a Water Resources Scoping Report.
- Provided assistance to the park with wetland compliance for construction of a horse stable for park police.

### *Harpers Ferry National Historic Park*

- Provided information to the park on submittal of a funding project statement for wetland mapping.

### *Manassas National Battlefield Park*

- Provided wetland compliance assistance to the park and a consultant regarding preparation of a wetlands Statement of Findings for the “Route 29/234 Intersection Safety Improvements.”

## **Water Operations Branch**

### *Antietam National Battlefield*

- Assisted with preliminary scoping of a newly acquired dam by field inspection and identifying issues related to retaining the dam or deactivation.

### *Monocacy National Battlefield*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *National Capital Parks - East*

- Reviewed Floodplain Statement of Findings for projects.

### *Rock Creek Park*

- Assisted park and Environmental Quality Division staff in assessing a fish kill in Rock Creek caused by cypermethrin. Helped identify questions, methods, and QA/QC needed.

## **NORTHEAST REGION**

- Provided technical assistance and proposal review comments for the project “Map and Ground Truth Wetlands at Richmond National Battlefield Park, Petersburg National Battlefield, and New Acquisitions at Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park.”
- Provided technical review and comments on a Natural Resources Survey for the George Washington Boyhood Home Special Area Study.

## **ALLEGHENY CLUSTER**

### **Planning and Evaluation Branch**

#### *Fort Necessity National Battlefield*

- Provided technical review and comments on a draft project agreement for “Restoration of Great Meadow Run.”

### **Water Operations Branch**

#### *Friendship Hill National Historic Site*

- Provided comments on plans for the construction of a sludge storage and treatment facility.

### **Water Rights Branch**

#### *New River Gorge National River*

Provided comments on a draft water resources management plan for New River Gorge National River, Gauley River National Recreation Area, and Bluestone National Scenic River.

## **CHESAPEAKE CLUSTER**

### **Planning and Evaluation Branch**

#### *Assateague Island National Seashore*

- Provided technical review and comment to park on their annual progress report and study plan to develop seagrass monitoring protocols.
- Assisted in the review and approval of second-year funds for the project “Develop Submerged Aquatic Vegetation Plan.”

#### *Colonial National Historic Park*

- Provided technical review and comment on wetland-related issues relevant to the Green Spring Unit General Management Plan.
- Assisted in preparing a Scope of Work for a project to perform wetland delineations and assessments of wetland functions and values in the Neck-O-Land area of the park. Provided technical review and comments on the contractor’s report titled “Wetland Delineation and Functional Assessment: Neck-O-Land Area.”
- Attended planning meetings and provided written comments on the draft “Jamestown Island Shoreline Protection Plan,” which addresses the impending loss of cultural resources by proposing construction of rock sills and vegetated wetlands along the shoreline. Provided assistance to the Denver Service Center with wetland compliance issues and the wetlands Statement of Findings requirements for the “Jamestown Island shoreline protection.”

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

- National Wetland Inventory maps, soil survey maps, and digital data from a WRD funded project were completed.

#### *Eisenhower National Historic Site*

- Reviewed and provided comments on a study plan to assess potential biological impacts of increased flow depletions and groundwater augmentation in Marsh Creek.

#### *New River Gorge National River/Gauley River National Recreation Area/Bluestone National Scenic River*

- Provided technical review and provided revisions on a draft Water Resources Management Plan for New River Gorge National River, Gauley River NRA and Bluestone National Scenic River which was authored by the USGS (West Virginia District).

#### *Richmond National Battlefield Park*

- Completed a Water Resources Management Plan for the Gaines Mill and Cold Harbor units of the National Battlefield Park
- Initiated work on the development of a Water Resources Management Plan for the remaining eight units of the National Battlefield Park.

#### *Shenandoah National Park*

- Provided technical review and comment to Shenandoah National Park on the park’s long-term Fishery Monitoring Protocols.

### **Water Operations Branch**

### *Assateague Island National Seashore*

- Provided park staff with detailed technical comments on Draft Quality Assurance Project Plan (QAPP) for water quality monitoring.

### *Colonial National Historical Park*

- Visited the park and provided advice regarding floodplain delineations and compliance.
- Provided detailed technical comments on draft report, "Hydrology and water quality of the shallow aquifer system at Yorktown."
- Provided park staff with detailed technical comments on proposed monitoring of contaminants at CERCLA Site 12.
- Provided technical comments on a DOD proposal to sample the waters, fish tissue, and other media at Cheatham Pond.
- Prepared a preliminary approach to surface water quality monitoring.
- Reviewed and interpreted baseline water quality data.

### *Delaware Water Gap National Recreation Area*

- Provided park staff with analyses of PCB data and summary information on PCBs and statistical methods.
- Coordinated project funding and progress reports on the dam removal and stream restoration at Pool Colony.
- Inspected the completed site and made recommendations for controlling runoff.
- Assisted park staff in evaluating several locations for a proposed public beach access.
- Participated in an assessment of calciferous wetland monitoring in anticipation of removal of another dam nearby.

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

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *George Washington Birthplace National Monument*

- Provided advice related to shoreline erosion which threatens the cultural resources of the park.
- Provided summary information on deicers.

### *Shenandoah National Park*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.
- Provided park staff with information on ecological concerns related to Vanquish and Garlon herbicides.
- Conducted wellhead protection planning for Big Meadows area.

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

- Provided summary information on deicers.

### *Valley Forge National Historical Park*

- Provided park with information on PAHs and risk-based (RBC) cleanup standards.

## **NEW ENGLAND CLUSTER**

### **Planning and Evaluation Branch**

#### *Acadia National Park*

- Assisted the University of Maine and the park in the completion of a Water Resources Management Plan.

#### *Boston Harbor Islands NRA*

- Attended an interagency scoping meeting to identify water-related issues which will be considered during the development of a Water Resources Scoping Report.
- Discussed with the region possible wetland mapping scenarios for the park. Reviewed and commented on the funding proposal.

#### *Cape Cod National Seashore*

- Consulted with the park and provided technical advice on the harvest of horseshoe crabs, their classification, and general management approaches to this species.
- Completed the publication and distribution of a Water Resources Management Plan.
- Provided technical review and comments on the draft manuscript “Aquatic Vegetation and Trophic Conditions in Cape Cod National Seashore Kettle Ponds” (report from WRD-funded study).
- Providing technical assistance on effects of delaying migration of river herring (*Alosa pseudoharengus* and *A. aestivalis*).
- Provided assistance in determining the need for a wetland Statement of Findings for maintenance of a small plot in the Pamet Valley that would involve demonstrating and interpreting the historic cranberry production scene.
- Approved the study plan for “Monitoring Vegetation & Salt Marsh Development Processes in the Restoring Hatches Harbor Salt Marsh.”

#### *Fire Island National Seashore*

- Provided technical review and comments on the “Fire Island National Seashore Rehabilitation and Protection of Beach Facilities, Dunes, and Wetlands” (for the NPS Development Advisory Board).
- Provided assistance to the Denver Service Center by reviewing the draft Environmental Assessment for “Restoration and Protection of Beach Facilities, Dunes, and Wetlands at Barrett and Talisman Beaches.”

#### *Gateway National Recreation Area*

- Provided technical review and comments on the project “Elevate Hartshorne Drive Critical Zone” (for the NPS Development Advisory Board).
- Provided assistance to the Denver Service Center with wetland compliance for the Hartshorne Drive project and discussed mitigation opportunities.

#### *Morristown National Historical Park*

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

#### *Saratoga National Historical Park*

- Initiated development of a park Water Resources Management Plan; conducted a round-table review of the first draft of the plan.
- Continued to provide assistance on NPS wetland compliance and Clean Water Act permit requirements for a 9-mile road project in the park.

### **Water Operations Branch**

#### *Acadia National Park*

- Provided park, USGS, and other WRD staff with overview comments on USGS BEST Project findings.
- Commented on possible effects of placing dredged sediments contaminated with metals in a parcel of land adjacent to the park.

#### *Cape Cod National Seashore*

- Evaluated impacts of groundwater withdrawals from wells at the North Truro Air Base.
- Evaluated impacts of restoring tidal flow to Herring River on groundwater resources.

#### *Fire Island National Seashore*

- Provided park with an interpretive review of DDT sediment sample data.
- Assisted in the planning of capping flowing artesian wells in wilderness area.
- Obtained, entered, reformatted, and QA/QCed a variety of water quality data for upload to new STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

#### *Gateway National Recreation Area*

- Provided park staff with a review of lengthy QA/QC and other contract materials for the remediation of the Pennsylvania Ave. landfill.

#### *Lowell National Historical Park*

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

#### *Saint- Gaudens National Historic Site*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

#### *Salem Maritime National Historic Site*

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

#### *Saugus Iron Works National Historic Site*

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

## **Water Rights Branch**

### *Cape Cod National Seashore*

- Monitored progress of ongoing work to address effects of groundwater withdrawals on aquatic resources.
- Monitored progress of study of freshwater fauna in kettle ponds and vernal pools.

## **PACIFIC WEST REGION**

- Participated in a meeting of Pacific area coral reef parks and Regional staff concerning the implementation of increased monitoring, assessment and protection of coral reef resources under FY00 and 01 funding initiatives.

## **COLUMBIA CASCADES CLUSTER**

### **Planning and Evaluation Branch**

#### *Crater Lake National Park*

- Provided technical review and assistance to Crater Lake National Park for a Bull trout restoration project being conducted on Sun Creek.

#### *Craters of the Moon National Monument*

- Provided assistance with wetland compliance information concerning restoration of the park's water delivery system.

#### *Olympic National Park*

- Completed a Water Resources Issues Overview for the park.
- Completed FY2000 intertidal monitoring program; provided training for park staff in intertidal monitoring methods and species identification.
- Represented the park at meetings of Olympic Coast National Marine Sanctuary, Marine Conservation Working Group (MCWG); made a presentation on intertidal resources and data to the MCWG.
- Provided input into ongoing efforts to develop an ecologically sound approach to bank stabilization on the Hoh River.

### **Water Operations Branch**

#### *City of Rocks National Reserve*

- Assisted in construction of new water supply wells.

#### *Craters of the Moon National Monument*

- Advised on the rehabilitation of springs and the construction of new wells for potable water.



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

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *Fort Clatsop National Memorial*

- Responded to a request from park staff about flow measuring equipment to be used in a research project.
- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *Fort Vancouver National Historic Site*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *Hagerman Fossil Beds National Monument*

- Coordinated WRD funded project on ground water monitoring related to slope stability.

### *John Day Fossil Beds National Monument*

- Reviewed and commented on EIS on river management through the park.

### *Mount Rainier National Park*

- Traveled to park to make a project officer site visit and provided study design and QA/QC comments on project during early field sampling phases of the project.
- Provided information used in new General Management Plan.

### *Nez Perce National Historical Park*

- Advised on development of wells for potable water.

### *North Cascades National Park*

- Advised park on technical fate aspects of metals in sediments being blown around by high winds after sediments are exposed following lake drawdowns.
- Coordinated WRD funded project on erosion control on Stehekin River, and conducted geomorphic survey of Stehekin River.

### *Olympic National Park*

- Conducted channel survey and performed hydraulic modeling of Finley Creek and provided advice related to aggradation problems and new bridge design.
- Provided advice regarding erosion by the Hoh River into the access road embankment and campground.
- Participated on the Value Study Engineering Team for the Elwha River Restoration Project.
- Provided review comments on proposed State of Washington revisions to the State Water Quality Regulations.
- Provided a summary of past hydrologic and water quality investigations at Sol Duc resort.

### *San Juan Island National Historical Park*

- Advised on rehabilitation or development of wells for potable water.

### *Whitman Mission National Historic Site*

- Assisted with a public meeting and field inspection pertaining to technical aspects of water resources within and adjacent to the park.

## **Water Rights Branch**

### *Crater Lake National Park*

- Participated in ADR negotiations with local stakeholders regarding the park's Klamath Basin Adjudication federal reserved water right claims. Alternative settlement options were discussed and conceptual settlement proposals were developed.
- Reviewed water right claims of non-federal parties in the Klamath Basin Adjudication and prepared a summary of the claims of interest to the NPS.
- Evaluated the reliability of the Park's Annie Creek water supply by comparing estimates of the Creek's natural flow to the diversion rates allowed by water rights on the Creek.
- Prepared 21 amended federal reserved water right claims to include additional mapping and information needs required by the State of Oregon.

### *Whitman Mission National Historic Site*

- Provided assistance in resolving the Doan Creek diversion issue.

## **PACIFIC/GREAT BASIN CLUSTER**

### **Planning and Evaluation Branch**

#### *Death Valley National Park*

- Advised park staff regarding preparation of wetland compliance documentation for the Texas Spring Tunnel water system rehabilitation.
- Provided technical review and comments on a draft Scope of Work for the "Furnace Creek Water Environmental Impact Statement."
- Assisted the park in identifying qualified potential contractors for restoring a degraded riparian system in the Furnace Creek area.
- Reviewed the Environmental Assessment titled "Estimating Rates of Evaporative Discharge" to determine the need for a wetland Statement of Findings.

#### *Golden Gate National Recreation Area*

- Provided technical review and comment to the park on the Lower Easkoot Creek Habitat Restoration Project plans.

#### *Great Basin National Park*

- Provided technical review and comments on the proposal "Spring and Wetland Restoration and Range Improvement Removal at Great Basin National Park."

### *Lassen Volcanic National Park*

- Provided technical review and comments on an Environmental Assessment for “Manzanita Creek Channel Realignment.”
- Traveled to the park to initiate restoration planning for Drakesbad Meadow and the Hot Rock heliport area. Developed a strategy for establishing hydrologic monitoring networks at both sites to evaluate drainage impacts and guide restoration.
- Provided information to the park on NPS wetland compliance and Corps of Engineers Clean Water Act requirements for replacement of the Butte Lake water treatment plant.

### *Pinnacles National Monument*

- Provided assistance to the park with wetland compliance issues concerning a landfill adjacent to Chalone Creek.

### *Point Reyes National Seashore*

- Provided assistance to the park with the advertisement of a two-year term ecologist/wetland restoration specialist by promoting the job on wetland and ecology web sites, listservs, mailing lists, and bulletin boards.
- Provided comments on and approved the final study plan for the funded project titled “Wetlands Inventory and Mapping.”

### *Redwood National Park*

- Coordinated technical assistance from Olympic National Park fisheries staff in developing a creel survey for Redwood Creek and the Smith River (ongoing).

### *Santa Monica Mountains National Recreation Area*

- Approved the final study plan for the WRD-funded project “Restoration of Lower Zuma Creek and Lagoon.”
- Provided comments on and approved the final study plan for the WRD-funded project titled “Restoration of Lower Malibu Creek Riparian Wetlands: Eradication of *Arundo donax*.”
- Provided information to the park on developing a funding proposal for wetland mapping

### *Sequoia and Kings Canyon National Parks*

- Reviewed and approved the final study plan for the WRD-funded project “Wetlands Inventory and Assessment,” which involves digitizing National Wetland Inventory maps and placing crews in the field to verify the spatial and classification accuracy of the data.

### *Yosemite National Park*

- Provided technical review and comment on the Merced River Comprehensive Management Plan and Environmental Impact Statement.
- Continued to provide assistance to the park on NPS wetland compliance during preparation of the Valley Plan Environmental Impact Statement. Reviewed and provided comments on the internal draft EIS. Reviewed the memo for the Administrative Record.
- Provided comments on and approved the final study plan and the task order for the WRD-funded project “Toulumne Meadows Wetlands Inventory and Assessment.”

## Water Operations Branch

### *Cabrillo National Monument*

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

### *Death Valley National Park*

- Provided park staff with detailed technical comments on Draft Environmental Impact Statement on the Yucca Mountain Nuclear Repository EIS.
- Advised park staff on alternative sources of potable water for the Furnace Creek area.

### *Golden Gate National Recreation Area*

- Field survey and volume calculations were conducted on a dam to be removed from Tennessee Valley that is habitat for prey of an endangered species.
- Provided historical retrospective on Marin Headlands dumpsite.
- Assistance was provided on locating a reference reach and conducting a site assessment on a restoration project near Stinson Beach.
- Completed report on the hydrogeology of the Muir Beach Community Services District well site adjacent to Redwood Creek.
- Served as WRD technical contact for contaminants and biomonitoring issues on new project entitled “Water quality mitigation actions at GOGA stables.” Provided technical comments on associated water quality monitoring plan. Reviewed project plan and QA/QC aspects.
- Provided park staff with summary information on the potential use of vinegar as a herbicide.

### *Great Basin National Park*

- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *John Muir National Historic Site*

- Compiled field work using GIS, researched background information, modeled numerous alternatives, and published a professional report on watershed conditions in and adjacent to the park. Incorporated comments from the park superintendent and reviewers from the Region and a citizen watershed planning group.
- Developed a project statement for an evaluation of the stability of John Muir’s gravesite and worked with the USGS to determine possible interest in doing the evaluation.
- Coordinated project and funding calls for the initiation of Level I water quality inventory.

### *Lake Mead National Recreation Area*

- Served as technical advisor at meetings on alternative sewage discharge release points in Lake Mead and endocrine disruption compounds and pharmaceuticals.
- Analyzed mercury in fish tissue in Lake Mead and provided overview comments and statistical summaries to park and EPA staff working on the issue.

- Provided fiscal and technical management and guidance for a WRD-funded project "Identify numerical criteria to protect existing higher water quality."
- Advised park on contaminants issues related to wetlands construction in or near Las Vegas Wash.
- Assisted Water Rights Branch staff in assessing statistical trend analyses related to Muddy River flows into the Overton Arm of Lake Mead.
- Reviewed water sample results for motorboat contaminants.
- Participated in a workshop that reviewed alternatives for the discharge of Las Vegas wastewater into Lake Mead.

#### *Lassen Volcanic National Park*

- Advised park of hazards of asphalt and polycyclic aromatic hydrocarbons related to a project to realign a creek.

#### *Lava Beds National Monument*

- Coordinated project and funding calls for the initiation of Level I water quality inventory.

#### *Mojave National Preserve*

- Provided technical advice to park staff regarding mine closure plan.
- Provided advice to park staff related to the construction of a proposed new maintenance facility near Hole in the Wall Campground. Also, inspected the Group Campground for potential flood hazard.
- Met with a private engineering firm to assist in design for facilities associated with the Kelso Depot.

#### *Pinnacles National Monument*

- Provided review comments on a watershed implementation plan to improve the documentation and usefulness of the proposed study.
- Provided park staff with technical advice related to potential contaminants concerns related to a stream carving into an old landfill.

#### *Point Reyes National Seashore*

- Co-chaired the Coho-Steelhead restoration project technical advisory committee.

#### *Redwood National Park*

- Provided advice to park staff regarding hydraulic modeling of a bridge across Prairie Creek. Assisted in developing design information for new bridge.
- Obtained, entered, reformatted, and QA/QCed a variety of water quality data for upload to new STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.

#### *Santa Monica Mountains National Recreation Area*

- Provided analyses of the severity of contamination of DDT in soils.
- Completed field assessment and technical report for geomorphic hazard rating criteria.

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

- Conducted a field inspection of a WRD-funded project for Paige-Boulder Creek watershed restoration effort involving rebuilding a road, replacing culverts, and monitoring water quality.
- Conducted a preliminary hydrologic and geomorphic assessment of a potentially high-hazard dam considered for removal.
- Conducted a review of water quality concerns in the park and provided guidance for the development of monitoring programs.
- Made a site visit while serving as WRD project officer on a new water monitoring project for Willow Creek. Helped with study design and Quality Assurance Project Plan (QAPP). Helped assess tadpole die off and other issues related to a CERCLA site and various other mining sites.
- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

### *Yosemite National Park*

- Assisted park staff and Denver Service Center staff in the ongoing planning process related to flood reconstruction and implementation of the park's GMP. Advised park staff on numerous issues, including removal of a small dam, stability of the Merced River in El Portal area, and hydraulic considerations associated with road redesign.
- Reviewed Floodplain Statement of Findings for project.

## **Water Rights Branch**

### *Death Valley National Park*

- Continued development of project and study plans to protect water rights.
- Coordinated investigations with other entities at the eighth annual Devil's Hole workshop.
- Monitored Devil's Hole pool level and discharge of Nevares, Texas, and Travertine springs.
- Evaluated 22 Nevada Water Right Applications and protested 4.
- Compiled and exchanged monitoring data with Department of Energy and Barrick Bullfrog in accordance with established conditions of water permits.
- Evaluated water rights language in proposed legislation for Timbisha Shoshone reservation.
- Continued multi-year USGS study of evapotranspiration at Death Valley salt pan and prepared task order.
- Assisted DoJ with preparation of memorandum of understanding among federal agencies that manage lands in the Death Valley Region.
- Prepared funding initiatives to expand NPS's technical investigations in the Death Valley ground-water system.
- Monitored progress of the USGS Death Valley regional groundwater flow model project and prepared task order.
- Prepared and implemented contract for expert hydrogeology assistance in overseeing the USGS Death Valley groundwater flow model project.
- Prepared and implemented contract to examine possible causes for water level decline at Devils Hole.

- Prepared a task order for USGS to review statistical analyses used by other investigators to explain possible causes for water level decline at Devils Hole.
- Participated in USGS Technical Exchange on the Death Valley ground-water flow model project.
- Continued work on park water uses data report.
- Conducted field reconnaissance for additional studies for determining spring discharge and field orientation for team staff on DEVA water right issues.
- Provided park with data in response to a request from Nye County, Nevada, on park water rights and water uses.
- Provided comments on draft GMP and prepared responses to public comments.

#### *Golden Gate National Recreation Area*

- Assisted in negotiations with Muir Beach Community Services District concerning their water rights application on Redwood Creek.
- Assisted with the implementation of an aquifer test to determine the hydrologic connectivity between Muir Beach's ground water pumping and streamflow in Redwood Creek.
- Determined the status of water rights held at Stinson Beach.
- Initiated data collection effort on Easkoot Creek to assist evaluation of steelhead habitat.
- Reviewed, commented on, and advised park management on stream restoration plan for Redwood Creek.

#### *Great Basin National Park*

- Evaluated 15 Nevada Water Right Applications and protested 13.

#### *Joshua Tree National Park*

- Provided water rights comments to park staff on backcountry management plan.

#### *Lake Mead National Recreation Area*

- Submitted annual report to Moapa Valley Water District regarding Rogers Spring as required by monitoring plan.
- Approved final report of findings for the investigation by Desert Research Institute of the origin and flowpaths of water issuing from selected springs.
- Completed additional field reconnaissance of the Muddy River area and Rogers-Bluepoint Springs area.
- Installed a flume to replace deteriorated weir at Rogers Spring.
- Provided funding to USGS to continue monitoring Rogers Spring discharge and to install a discharge gaging station at Blue Point Spring .
- Evaluated 56 Nevada Water Right Applications and protested 34.

### *Mojave National Preserve*

- Evaluated potential water rights issues and provided comments to park staff on draft Water Resources Scoping Document.
- Reviewed water rights claims for lands transferred from BLM administration and obtained a change in ownership for these rights to NPS.
- Reviewed the EIR/EIS for the proposed Cadiz project to withdraw groundwater from the Fenner basin.

### *Multi- Park*

- Reviewed notices of water rights applications near California park units.
- Submitted Reports of Licensee and Progress Reports for California parks.
- Completed draft maps of selected California parks outlining the area of concern for new water right applications.

## **PACIFIC ISLAND CLUSTER**

### **Planning and Evaluation Branch**

#### *Pacific Islands Support Office*

- Traveled to the Pacific Islands Support Office to discuss the implementation of coral reef funding initiatives within the Pacific Islands area. Also visited the Cooperative Park Studies Unit at the University of Hawaii to discuss the establishment of the newly funded coral reef management coordinator position at the Coop Unit.

#### *American Memorial Park*

- Provided information to the park on wetland compliance, wetland assessment methodologies, and wetland functions and values for an educational program that the park is assembling.

### **Water Operations Branch**

#### *American Memorial Park*

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

#### *Kaloko- Honokohau National Historical Park*

- Provided comments on the Kaloko-Honokohau Utilities Package to the Development Advisory Board.
- Issued a Baseline Water Quality Data Inventory and Analysis Report documenting water quality data retrievals from six Environmental Protection Agency databases.

#### *National Park of American Samoa*

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

#### *War in the Pacific National Historical Park*

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



## Water Rights Branch

### *Kaloko- Honokohau National Historical Park*

- Completed a groundwater modeling study with USGS to determine effects of proposed groundwater withdrawals on park water resources.

### *Multi- Park*

- Reviewed well applications for potential impacts to park water resources.

## SOUTHEAST REGION

### APPALACHIAN CLUSTER

#### Planning and Evaluation Branch

### *Chattahoochee River National Recreation Area*

- Provided technical review and co-authored specific sections of the Chattahoochee River National Recreation Area Water Resources Management Plan.
- Assisted park in conducting a workshop pertaining to bacteriological monitoring needs within Chattahoochee River National Recreation Area.
- Provided assistance to the park regarding the Corps of Engineers new Nationwide Permits.

### *Great Smoky Mountains National Park*

- Provided technical review and comment on a draft Environmental Assessment for the proposed removal of exotic rainbow and brook trout and the reestablishment of native brook trout in Sam's Creek of Great Smoky Mountains National Park.
- Provided consultation to Great Smoky Mountains National Park concerning management policy, regulations, and guidelines with regards to a local tribal request to allow their tribe to develop and maintain a recreational trophy sport fishery for exotic rainbow trout within a selected park stream.

#### Water Operations Branch

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

- Developed Scope of Work for the completion of NEPA requirement for contaminated mine drainage remediation.

### *Mammoth Cave National Park*

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

## Water Rights Branch

### *Blue Ridge Parkway*

- Initiated discussions with the town of Blowing Rock to evaluate the potential for authorizing the use of a reservoir on the Moses T. Cone estate.

*Obed Wild and Scenic River/Big South Fork National River and Recreation Area*

- Evaluated proposal to divert and store water from the New River by the Huntsville Utility District and provided comments on the project to the U.S. Corps of Engineers.
- Assisted park in responding to a request by McCreary County Utility District to divert water from Lake Cumberland, located within park boundaries.
- Briefed park staff on water right protection strategies for both parks.
- Reviewed a proposal by the USGS to study historic stream flow parameters for Obed Wild and Scenic River.
- Provided funding to USGS for streamflow monitoring at Daddy’s Creek and Obed River.

**ATLANTIC COAST CLUSTER**

**Planning and Evaluation Branch**

*Congaree Swamp National Monument*

- Reviewed and provided comments on a study plan to inventory and determine distribution and abundance of fish species.

*Cumberland Island National Seashore*

- Provided technical review and comment on Cumberland Island National Seashore’s draft Commercial Services Plan, draft Wilderness Management Plan, draft Long Range Interpretative Plan, and draft GMP Amendment.

*Mammoth Caves National Park*

- Reviewed and provided comments on an NRPP study plan to collect baseline data on the plankton community of the Green River.

*Moore’s Creek National Battlefield*

- Wrote a project proposal titled “Restore Native Vegetation to Savanna Wetland.” The objective is to reestablish four native savanna bunchgrass species as part of an ongoing wetland restoration project at the park.
- Reviewed and commented on the technical report “Establishment of Vegetation Monitoring Protocols and Management Recommendations for the Restoration of a Wet Pine Savanna at Moore’s Creek National Battlefield” (final report for this WRD-funded project).

*Timucuan Ecological and Historic Preserve*

- Reviewed and approved the final study plan for the WRD-funded project “Characterization and Mapping of Tidal Wetlands in Timucuan Ecological and Historic Preserve.”
- Provided technical review and comments on the “Fort George Inlet Shoreline Erosion Study.” The inlet is in danger of being severely reduced or even closed due to presence of the St. Johns River jetty.

**Water Operations Branch**

*Cape Hatteras National Seashore*

- Assessed drainage ditches, topography, surface water flow patterns, and campground flooding in the Cape Point area.

*Canaveral National Seashore*

- Provided park staff with summary information on cadmium toxicity.

*Chattahoochee River National Recreation Area*

- Provided comments on the draft Water Resources Management Plan related to the need for geomorphologic information about the river.
- Provided park staff with QA/QC planning and invertebrate monitoring summary information.
- Obtained, entered, reformatted, and QA/QCed a variety of water quality data for upload to new STORET in preparation for producing a Baseline Water Quality Data Inventory and Analysis Report.
- Provided review and comments on a Bacteriological Monitoring Plan.

*Congaree Swamp National Monument*

- Assisted in reviewing FEMA studies related to floodplain delineation of the Congaree River near Columbia, South Carolina. Coordinated with the USGS and the South Carolina Department of Natural Resources on this issue.

*Wright Brothers National Memorial*

- Provided advice to park staff regarding erosion problems on Big Kill Devil Hill and general drainage problems in the park.

**Water Rights Branch**

*Cape Hatteras National Seashore*

- Continued North Carolina State University investigation to describe spatial and temporal variations of water table.

**GULF COAST CLUSTER**

**Planning and Evaluation Branch**

*Big Cypress National Preserve*

- Provided technical review and comments on an Environmental Assessment for Oil and Gas Plan of Operations (Collier Resources Company, Landing Strips) in the park.
- Provided technical review and comments on Draft Recreational ORV Plan/Supplemental EIS.
- Provided technical review and comment on Turner River Management Plan.
- Provided assistance with respect to Director's Order #77-1 for the Off-Road Vehicle Supplemental Environmental Impact Statement.
- Reviewed and commented on the draft Wetland Statement of Findings for the "Scenic Corridor Visitor Safety Highway Improvements." Reviewed the Environmental Assessment.

*Biscayne National Park*

- Assisted the park with a fisheries management workshop and initiation of a Cooperative Fisheries Management Plan with the State of Florida.
- Provided a technical review and comment on a draft scientific paper by National Marine Fisheries Service and park staff concerning the summary and analysis of over ten years of recreational fisheries harvest data at the park.

#### *Canaveral National Seashore*

- Provided technical assistance, review, and WRD oversight in the initiation of a Water Resources Management Plan.
- Attended Mosquito Lagoon workshop to share research and management information on current and planned activities in the park and identified opportunities for cooperative efforts.

#### *Dry Tortugas National Park*

- Provided technical assistance to Everglades National Park staff concerning Dry Tortugas National Park General Management Planning process, activities relating to the coral reef protection initiative, and implementation of actions under the FY00 funding increases for coral reef management.

#### *Gulf Islands National Seashore*

- Provided information to the park on seagrass research.

#### *Jean Lafitte National Historical Park and Preserve*

- Reviewed and commented on the workplan for the GRD-funded project titled “Back-fill Dead-end Canals: Restore Marsh and Mitigate Impacts of Past Oil and Gas Exploration. Phase One/Year One: Planning and Design.”
- Provided comments on and approved the final study plan for the WRD-funded project "Use Existing Aerial Photography to Inventory and Monitor Wetlands.”

#### *Natchez Trace Parkway*

- Reviewed and commented on the draft Supplemental Environmental Impact Statement for the “Old Agency Road” (3P13) project.

#### *Shiloh National Military Park*

- Provided technical review and comment on a manuscript titled “Ichthyological Investigations in Shiloh National Military Park.”

#### *Virgin Islands National Park*

- Met with park staff concerning the implementation of FY00 coral reef funding increases and the coordination of ongoing I&M program work. During this visit, also met with BRD field office staff at the Virgin Islands and observed coral die-off areas and BRD study sites within the park.

## **Water Operations Branch**

#### *Biscayne National Park*

- Reviewed and provided detailed comments on the Draft Focused Feasibility Study (FFS) for Operable Unit 11 and Military Canal, Homestead AFB, Florida.

#### *De Soto National Memorial*

- Interpreted sampling results from stormwater runoff entering the memorial.

### *Dry Tortugas National Park*

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

### *Everglades National Park*

- Provided park staff with information related to mercury in fish and birds, as well as sea level rise vs. wetlands land building. Provided the park with a final analysis of technical issues and conclusions from the meeting on effects of mercury on wading birds.
- Served as NPS representative on USGS interagency Contaminants/Ecotoxicity Program subgroup of the Critical Ecosystems Studies Initiative [CESI] effort. Reviewed draft "Program Announcement" for the Contaminants/ Ecotoxicity Program funding. Helped provide QA/QC and other decision criteria for ranking projects.

### *Gulf Islands National Seashore*

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

### *Shiloh National Military Park*

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

### *Vicksburg National Military Park*

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

### *Virgin Islands National Park*

- Provided data management and downloading capability for an ongoing erosion study
- Assisted the Southeast Regional Office with issues related to managing erosion within the park.
- Advised park on a demonstration project proposed by a researcher to communicate the erosion problem on the island to the public and local officials.
- Provided study design and statistical advice for a water monitoring project.

## **SERVICEWIDE**

- Participated in a USGS-sponsored conference entitled "Building Capabilities for Monitoring and Assessment in Public Health Microbiology"
- Planned and sponsored a biannual national meeting of NPS Water and Aquatic Resource Professionals in Fort Collins, Colorado.
- Coordinated all NPS participation on the U.S. Coral Reef Task Force working groups and participated on the Ecosystem Science and Conservation working group.
- Helped develop recommendations for "A National Network of Marine Protected Areas for Coral Reefs" and participated in the development of "A National Program to Assess and Monitor U.S. Coral Reefs".

- Continued to participate on a working group to establish “A National Coral Reef Resource Inventory and Monitoring Network Program.” Developed a draft document entitled “Guide for Management of Coral Reef Protected Areas”
- Provided technical review and comment on a Draft Invasive Species Research Strategy for DOI Lands within the USGS Biological Resources Division’s Central Region.
- Participated on an oversight committee and that has been formed to oversee and administer projects selected for funding within the Geologic Resources Division’s Disturbed Lands Restoration Program.
- Provided review and comment to the Associate Director NRSS on HR 1775, a bill to authorize a program and funding source to help states and other non-Federal entities to conduct estuary restoration projects.
- Facilitated a meeting between staff from the Assistant Secretary’s Office and the American Sportfishing Association on an adopted goal of the Coral Reef Task Force calling for protection of up to 20% of all coral reef habitat in no-take reserve status.
- Represented the Director at the American Fisheries Society’s Annual Board of Governor’s meeting. Presented an overview of our fisheries needs, priority issues and thoughts on how the AFS could better serve our agency needs during this meeting.
- Provided a review and comment on the “fishery resource sections” of several park annual Inventory and Monitoring Reports for prototype parks within the Servicewide Inventory and Monitoring program.
- Worked with the Boundary Mapping Division of the Mineral Management Service and the Washington Solicitor’s Office to determine the extent to which any waters of NPS coastal units extended into the Federal Exclusive Economic Zone of jurisdiction as defined by the Magnuson-Stevens Fishery Conservation and Management Act.
- Provided technical comments on the water resources aspects of projects under review by the Development Advisory Board.
- Provided a technical review and comment on draft Director’s Order No. 47 concerning sound management within NPS areas.
- Facilitated a meeting among Caribbean and Atlantic coral reef park superintendents and staff and WASO I&M Program staff to review progress and set new direction in the development of a long-term cooperative coral reef inventory and monitoring program, given the new funding made available under the Coral Reef Initiative.
- Participated on the annual Line-item Construction Project review panel administered by the Denver Service Center and helped review and rank 84 proposed projects.
- Assumed the coordinating role for NPS participation in the implementation of a new Marine Protected Areas Executive Order (E.O. 13158). This E.O. calls for increased emphasis on marine resource protection and conservation through strengthening and expansion of the Nation’s system of marine protected areas.
- Participated on an Operations Review Team for the Submerged Resources Center located within the Intermountain Region at Santa Fe, New Mexico.
- Participated as the DOI representative on a National MPA Coordinating Committee formed under the COMPASS Program (Communication Partnership for Science and the Sea.)
- Participated on a panel established to review and incorporate agency and public comments on the draft Resources Management Chapter of the NPS Management Policies.
- Provided review and comment on the National Invasive Species Council’s draft Management Plan with regards to aquatic and marine resources.
- Organized a meeting with representatives of the Great Lakes Commission staff to discuss their participation in issues scoping and information synthesis for General Management Planning Projects for NPS units located in states within the Great Lakes Basin.

- Represented the NPS in Federal Geographic Data Committee meetings on “Federal Definitions and Reporting for Wetland Conservation Activities.” The purpose is to meet the White House Wetland Working Group’s requirement that agencies (including NPS) provide an accounting of wetland restoration, enhancement, and protection accomplishments on federal lands.
- Participated in a Northeast Region Coastal and Barrier Network “Vital Signs” Workshop. The workshop identified parameters that should be monitored to provide early warning regarding change or degradation of natural resources.
- Presented a paper titled “Managing Wetlands in NPS Cultural Landscapes” at the NPS Northeast Region’s Conference on Resource Stewardship.
- Reviewed and commented on the Denver Service Center’s call for proposals for design and construction of sub-surface flow treatment wetlands. Served on a panel to evaluate proposals and select qualified contractors.
- Delivered a “Wetland Protection and Management” lecture for the Natural Resources Fundamentals Course (Albright Training Center).
- Reviewed and commented on draft policies and procedures for Director’s Order #55: Interpreting the National Park Service Organic Act.
- Revised the “Wetlands” section of the draft revised NPS Management Policies.
- Reviewed and provided comments to Ch. 4 (draft) from RM-18, *Wildland Fire Management*.
- Worked with park units nationwide in correcting species lists in the Recreational Fisheries database.
- Compiled data on FY 1999 NPS projects and expenditures related to the conservation and enhancement of recreational fishery resources and submitted an accomplishment report to the National Recreational Fisheries Coordinating Council.
- Presented information at the Natural Resource Law and Policy for Superintendents conference in Boulder, Colorado on NPS floodplains and wetlands compliance and Corps of Engineers Clean Water Act Section 404/401 compliance.
- Prepared a response to a FOIA request concerning comments the NPS had made to the Corps of Engineers in regards to Nationwide Permits under the Clean Water Act Section 404 permit program.
- Attended a workshop on techniques for streambank bioengineering erosion control and on wetland creation for water treatment. The workshop was sponsored by the Denver Service Center and taught by a wetland plant ecologist from the Natural Resources Conservation Service Plant Materials Center in Aberdeen, Idaho.
- Reviewed House Bill 1755 titled “Estuary Habitat Restoration.”
- Began preparation of a report on types of wetland restoration that has occurred on NPS lands in FY00, including acreages. The report will be sent to the Committee for Defining and Tracking Wetland Gains and Losses. The committee has been tasked with obtaining this information for the White House Wetlands Working Group in response to the President’s Clean Water Action Plan.
- Attended an interagency meeting concerning tracking wetland gains for the Clean Water Action Plan of reversing the historic pattern of wetland losses in the U.S. Other attendees at the workshop represented the US Fish and Wildlife Service, Bureau of Reclamation, and National Marine Fisheries Service.
- Attended a 4-day hydric soils workshop sponsored by the Colorado Department of Transportation and taught by Russ Pringle of the USDA-Natural Resources Conservation Service’s Wetland Science Institute.
- Reviewed the Federal Register (Vol. 65, No. 47, dated 3/9/00, pgs. 13783-13788) regarding Corps of Engineers Regulatory Guidance Letters.
- Reviewed the Federal Register (Vol. 65, No. 77, dated 4/20/00, pgs. 21292-21300) regarding proposed revisions to the Clean Water Act Regulatory Definitions of “Fill Material” and “Discharge of Fill Material.”

- Reviewed the Federal Register (Vol. 65, No. 47, dated 3/9/00, pgs. 12818-12899) regarding the Final Notice of Issuance and Modification of Nationwide Permits.
- Reviewed the Federal Register (Vol. 65, No. 52, dated 3/16/00, pg. 14255) regarding the Final Notice of Issuance and Modification of Nationwide Permits, Correction.
- Reviewed the Federal Register (Vol. 65, No. 60, dated 3/28/00, pgs. 16486-16503) regarding the Final Rule Establishing an Administrative Appeal Process for the Regulatory Program of the Corps of Engineers.
- Developed a summary table of the new Clean Water Act Section 404 Nationwide Permits and Conditions.
- Provided literature to the Natural Resource Conservation Service on the invasive wetland plant *Phalaris arundinacea* (reed canarygrass) for an information sheet they are preparing.
- Facilitated the session titled “Restoration efforts in the National Park Service” at the ASCE Watershed 2000 Conference.
- Presented a paper on “Watershed condition assessment at John Muir National Historic Site ” at the American Society of Civil Engineers Watershed 2000 Conference held in Fort Collins, CO.
- Participated in the NRPC Disturbed Lands Restoration Workgroup.
- Facilitated a special session at the water professional meeting on “the basics” of statistics in water quality. Gave presentation one session on simple univariate statistics.
- Jointly with EPA representative, gave presentation to the NPS Aquatic Professional Meeting on 303d listing of water-quality impaired waterbodies and implementation of Total Maximum Daily Loads.
- Commented on the riparian mapping initiative as part of the National Wetlands Inventory and represented the NPS on a follow-up interagency conference call.
- Commented on the Draft Directors Orders on Environmental Leadership (specifically on water conservation in the NPS).
- Assisted Lake Mead National Recreation Area, Grand Canyon National Park, and Glen Canyon National Recreation Area in their participation in the Colorado River Surplus Criteria EIS process, the preparation of the Record of Decision, and the development of a proposal for a new, experimental flood program in Grand Canyon National Park.
- Represented NPS on the Colorado River Annual Operating Plan Workgroup.
- Organized a Snowmobile Contaminants Workshop with the Colorado School of Mines and the Public Counsel of the Rockies.
- Revised a detailed guidance document on how to include a Quality Assurance Project Plan as part of detailed study plans required in all WRD-funded projects.
- Continued updating handouts (ready to send to the parks upon request) on the subjects of deicers, some basic statistical subjects, and ammonia toxicity.
- Participated in the USGS-sponsored Wildfire Science Workshop.
- Participated in monthly coordination meetings with the Contaminants Technical Advisory Group (CTAG).
- Coordinated all aspects of the joint WRD - Servicewide Inventory and Monitoring Program's effort to produce Baseline Water Quality Data Inventory and Analysis Reports for all I&M parks. To date, the project has issued 207 Baseline Water Quality Data Inventory and Analysis Reports and generated a database of “new” NPS data in legacy STORET, totaling 17,477 stations and 2,543,143 water quality observations from 191 national park units.



- Initiated the process to migrate the NPS water quality data in legacy STORET to new STORET by creating projects and programs, assigning stations to projects, assigning projects to programs, mapping legacy STORET parameter codes to new STORET characteristics, and providing other metadata to Gold Systems, Inc.
- Created software to convert completed Baseline Water Quality Data Inventory and Analysis Reports to Microsoft Word files to facilitate incorporation in the I&M Data Browser and Synthesis, to provide additional copies of the reports upon request (including on the Internet), and to store the reports more efficiently.
- Processed downloaded STORET data for 30 parks using procedures formerly developed by Horizon Systems, Inc., to generate the files that are used to prepare Baseline Water Quality Data Inventory and Analysis Reports.
- Maintained and updated a geo-referenced park boundary digital database for use in GIS-based water resources analyses and queries; provided copies of this database to other WASO Divisions, as well as groups within the NPS, USGS, EPA, Census Bureau, and the private sector; and posted copies of the database on the NPS GIS Web Site to better service requests for the data.
- Represented the National Park Service on the Interagency Watershed Network GIS Action Team for EPA Region 8.
- Made presentations on developing water quality monitoring information systems and on water quality data management to the Southeast Region's Vital Signs Workshop.
- Represented the Water Resources Division at the Lake Powell Cooperators Meeting in Page, Arizona.
- Represented the Water Resources Division at the Servicewide GIS Coordinators Meeting in Kona, Hawaii.
- Made presentation at I&M Advisory Committee Meeting at Point Reyes National Seashore.
- Provided input into Director's Order 13: Environmental Leadership.
- Represented the Water Resources Division at the National Hydrography Dataset Applications Symposium in Austin, Texas.
- Contributed to Draft Director's Order and Procedural Manual for floodplain management, Draft Executive Order for Floodplain Management, and NPS Floodplain Management Policies.
- Provided advice and consultation to Denver Service Center, Regional and Support Offices, and parks on interpretation of floodplain management policy and procedures.
- Developed an implementation plan for a new water quality monitoring program to be implemented in coordination with the new Park Vital Signs Monitoring Program.
- Reviewed, and revised water quality sections of NPS 77—Livestock Management Policies and Operations Handbook.
- Supported the implementation of Servicewide Goal 1a4 of NPS's Strategic Plan by 1) summarizing progress to date and recommending changes to the Technical Guidance to the Servicewide Strategic Planning Committee, 2) amending technical guidance for reporting to the goal, and 3) reviewing fiscal plans and expenditures for the goal.
- Presented "Fundamentals of the Clean Water Act" at a Natural Resource Law for Superintendents course and to an Albright Training Center course for new NPS Resource Managers.
- Continued to participate on the State of Wyoming Total Maximum Daily Load Implementation Advisory Board and the Federal Family Coordination Committee.
- Developed a workload analysis for the water quality function to determine staffing requirements for implementation of the Servicewide Strategic Plan.
- Attended EPA workshop on the 2002 implementation of the Phase II Stormwater regulations.

- Developed and participated in the pilot training session “Expert Witness Preparation for Water Rights Proceedings.”
- Developed and maintained data bases for managing information on NPS reviews of water rights applications and protests.
- Prepared Director’s Order #35a to update Special Directive 78-2.

# PUBLICATIONS/CONTRIBUTIONS

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- Buck, C.E.B, K.W. Grabner and T.A. Nigh. 2000. Ecological Classification of Riparian Areas in the Ozark National Scenic Riverways. USGS-Northern Prairie Wildlife Research Center and Missouri Department of Conservation. 64 pp.
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- Kunkle, S.H. and D.L. Vana-Miller. 2000. *Chattahoochee River National Recreation Area (Georgia) Water Resources Management Plan*. National Park Service, Chattahoochee River National Recreation Area, Atlanta, GA. 244 pp.
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- Weeks, D.P. 2000. Water Resources Management in Katmai National Park and Preserve. 1999 Annual Report, NPS Water Resources Division. Natural Resources Report NPS/NRWRD/NRR-00/09. United States Department of Interior, National Park Service, Washington D.C. pp. 5-6.

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- Wurster, F.C. and D.J. Cooper. 2000. *Analysis of Interdunal Wetland Disappearance at Great Sand Dunes National Monument, Colorado*. Technical Report, Department of Earth Resources, Colorado State University, Fort Collins, CO. 103 pp.
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### **Water Operations Branch**

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- Martin, Larry, 2000. *Drinking water source protection plan, Hovenweep National Monument*. National Park Service. Fort Collins, CO. 16 pp.
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- National Park Service. 2000. *Baseline water quality data inventory and analysis: Great Basin National Park*. Fort Collins, CO. Technical Report NPS/NRWRD/NRTR-99/246.
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## **Water Rights Branch**

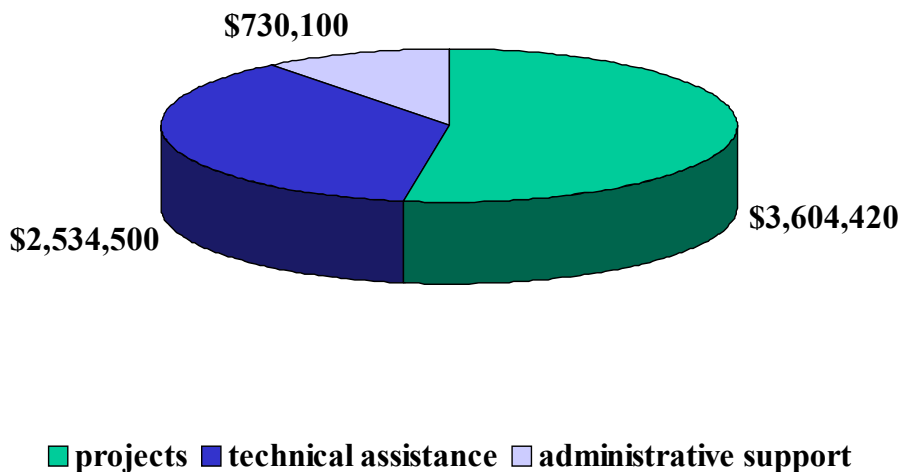
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# Water Resources Division Financial Status and Sponsored Projects

By Dan B. Kimball, Division Chief  
and Debi Cox, Program Analyst

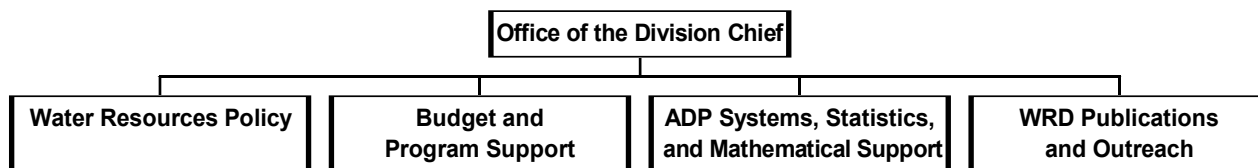
FY2001 base funding for the Water Resources Division (WRD) was \$6,869,000. The figure below illustrates the distribution of total WRD funds among technical assistance, project, and administrative support costs. Technical assistance, which is predominately day-to-day operational support to the parks includes staff salaries, travel, and associated expenses. Administrative support includes program management costs, administrative support, equipment, and supplies and materials Divisionwide. The projects category includes funds supporting WRD-sponsored projects in the areas of general water resources, water quality, wetlands protection, and water rights.

### Distribution of WRD FY2001 Funding



# Office of the Division Chief

## Organization and Staff



**Dan Kimball:** Division Chief, MS in Water Resources Administration. Specialty areas include water and natural resources management, administration, and planning and the evaluation of natural resource development projects.

**Sharon Kliwinski:** Water Resources Washington Liaison, BS in Environmental and Pollution Sciences. Specialty area includes environmental legislation and regulations; natural resource policy issues; and mining laws, policies, and programs.

**Debi Cox:** Program Analyst, BA in Anthropology.

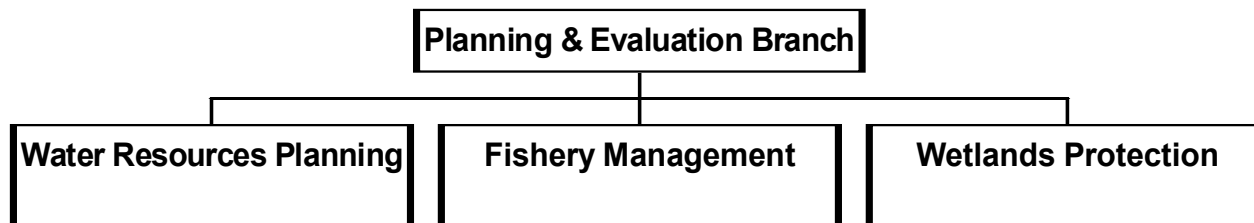
**Patty Hennessy:** Secretary, BBA in Management.

**Carol Liester:** Purchasing Assistant.



# Planning and Evaluation Branch

## Organization and Staff



**Mark Flora:** Branch Chief, MS in Environmental Science (Water Resources). Specialty areas include water resources management planning, water quality, and watershed management.

**Joel Wagner:** Wetlands Protection Program Team Leader, MS in Environmental Science (Water Resources). Specialty areas include wetlands science, hydrology, restoration, and regulatory issues.

**Leslie Krueger:** Natural Resource Specialist, BS in Water Resources. Specialty areas include wetlands science, management, and regulatory issues.

**Jim Tilmant:** Fishery Management Program Team Leader, MS in Wildlife and Fisheries. Specialty areas include aquatic and marine resources management, fish biology, and population dynamics.

**David Vana-Miller:** Water Resources Planning Program Team Leader, MS in Marine Biology. Specialty areas include water resources planning, aquatic and marine resources management, and water quality.

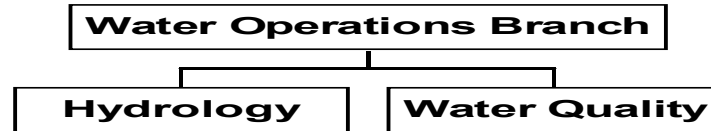
**Don Weeks:** Hydrologist, MS in Geology (emphasis in hydrogeology). Specialty areas include water resources management planning, water quantity, and water quality.

**John Wullschleger:** Fishery Biologist, BS in Zoology, MS in Fish & Wildlife Biology. Specialty areas include effects of regulation on river ecosystems, freshwater and marine invertebrates, intertidal ecology, and fish and benthic invertebrate sampling methods.

**Lael Wagner:** Secretary

# Water Operations Branch

## Organization and Staff



**Bill Jackson:** Branch Chief, Ph.D. in Hydrology. Specialty areas include sedimentation processes, fluvial geomorphology, and river rehabilitation and management.

**Gary Rosenlieb:** Water Quality Program Leader, MS in Water Resources. Specialty areas include water quality (chemistry and microbiology), groundwater quality, and hazardous materials management.

**Gary Smillie:** Hydrology Program Leader, Hydrologist/Hydraulic Engineer, MS in Civil Engineering. Specialty areas include flood-frequency analysis, open-channel hydraulics, floodplain management, and sediment transport.

**Rick Inglis:** Hydrologist, BS in Watershed Science. Specialty areas include field hydrologic data collection using automated recorders, watershed management, ground water monitoring, and data analysis.

**Roy Irwin:** Senior Contaminants Specialist, Ph.D. in Biology. Specialty areas include environmental contaminants and biological aspects of water quality (including bio monitoring).

**Barry Long:** Hydrologist, BS in Watershed Sciences, MS in Forest Hydrology. Specialty areas include physical-chemical aspects of water quality.

**Larry Martin:** Hydrogeologist, MS in Hydrology. Specialty areas include hydrogeology, groundwater surface water interaction, well siting, drinking water source protection, and aquifer testing.

**Michael Martin:** Hydrologist, BS in Environmental Geology, MS in Watershed Science. Specialty areas include geochemistry, water quality, geomorphology, flood analysis, and tropical aquaculture.

**Pete Penoyer:** Hydrogeologist, Associate in Hazardous Materials, BS and MS in Geology, Professional Degree in Hydrogeology. Specialty areas include groundwater contamination, site assessments under CERCLA, and water quality monitoring.

**Dean Tucker:** Computer Programmer-Analyst, Ph.D. in Forestry. Specialty areas include data management, computer graphics, and water resources applications in GIS.

**Mike Matz:** Research Associate, Colorado State University, MS in Civil Engineering. Specialty areas include water quality planning and management, inventory and monitoring, and data analysis.

**Mark VanMouwerik:** Contaminants Specialist/Research Associate, Colorado State University, BS in Biology, MS in Environmental Health. Specialty areas include environmental fate and toxic effects of contaminants, contaminants data interpretation, and wastewater treatment.

**Pat Wiese:** Secretary and Bibliographic Database Manager, BS in Biology.

## **STUDENT ASSISTANTS**

**Amy Benton:** Water Quality Data Analyst/Report Writer, BS Candidate in Watershed Science (2002), BS in Business Administration (1991).

**Cara Ellis:** Water Quality Data Analyst, BS Candidate in Watershed Science (2002).

**Sonny Emmert:** GIS Cartographer, BS Candidate in Civil Engineering (2002).

**Josh Johnson:** Water Quality Data Analyst/Report Writer, BS Candidate in Civil Engineering (2002).

**Matt Kunze:** GIS Cartographer, MS Candidate in Watershed Science (2002), BS in Environmental Studies (1997).

**Nancy O'Keeffe:** Water Quality Data Analyst, MS Candidate in Soil Science (2001), BS in Wildlife Biology (1997), BA in Social Science (1984).

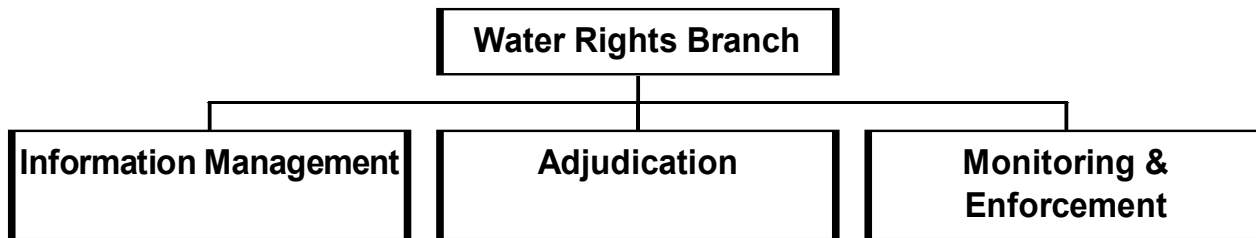
**Scott Ratchford:** GIS Cartographer, MS Candidate in Ecology (2002), BS in Economics (1987).

**Tracy Weddler:** Water Quality Data Analyst, MS Candidate in Watershed Science (2002), BS in Environmental Studies (2000).

**Chris Woodward:** GIS Cartographer, MS Candidate in Geomatics (2002), BS in Natural Resource Recreation and Tourism (2000).

# Water Rights Branch

## Organization and Staff



**Chuck Pettee:** Branch Chief, Supervisory Hydrologist, MS in Watershed Science. Specialty areas include water rights, surface water hydrology and hazardous materials.

**Jeff Albright:** Supervisory Hydrologist, Information Management Program Leader, MS in Watershed Management. Specialty areas include surface water hydrology, field methods, and instrumentation.

**Bill Hansen:** Supervisory Hydrologist, Adjudication Program Leader, MS in Hydrology. Specialty areas include water law, surface water hydrology, field methods, and watershed management and rehabilitation.

**Dan McGlothlin:** Supervisory Hydrologist, Monitoring and Enforcement Program Leader, BS in Watershed Hydrology. Specialty areas include water rights law and administration and water resources policy.

**Jennifer Back:** Hydrologist, MS in Watershed Science. Specialty areas include surface water hydrology and water law.

**Chris Gable:** Hydrologist, BS in Watershed Sciences. Specialty areas include surface water hydrology, water quality control, field methods, instrumentation, and data analysis.

**Brad Gillies:** Hydrologist, BS in Watershed Science. Specialty areas include field methods and data analysis.

**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, surface water hydrology, and field methods.

**Eric Moser:** Hydrologist, MS in Physical Sciences. Specialty areas include surface water hydrology, field methods, and data analysis.

**Bill Van Liew:** Hydrologist, BS in Civil Engineering, BS in Geology, MS in Groundwater Engineering/Environmental Hydrogeology. Specialty is ground water hydrology.

**Mark Wondzell:** Hydrologist, BS Forestry, MS Agricultural Engineering. Specialty areas include surface water hydrology.

**Paula Cutillo:** SCEP Student,

**Eric Lord:** Research Associate, Colorado State University, Monitoring and Enforcement Group.

**Flora Romero:** Secretary.

**Travis Huggins:** Student Research Technician, Colorado State University, Information Management Group.

# AWARDS

## Office of the Division Chief

**Patty Hennessy** received an “On-the-Spot” Award for her efforts on the team that planned and executed the highly successful NPS Water and Aquatic Resources Professional’s Meeting held in Fort Collins in November 2000.

## Planning and Evaluation Branch

**Joel Wagner** received a Quality Step Increase in recognition of his exceptional performance in providing leadership and technical expertise in the area of wetlands restoration. His efforts over the last two years has led to successful restoration projects at Pecos National Historical Park, Moore’s Creek National Battlefield, and an innovative design for the proposed restoration of approximately 60 acres of floodplain/riparian habitat at the Snake River Pit (John D. Rockefeller Memorial Parkway).

**David Vana-Miller** received a Quality Step Increase in recognition of his performance in the oversight and completion of water resources management plans for Arches National Park, Canyonlands National Park, Cape Cod National Seashore, Bandelier National Monument, Chattahoochee River National Recreation Area, and the Cold Harbor/Gaines Mills units of Richmond National Battlefield Park.

**Jim Tilmant** received a “STAR” Award in recognition of his successful efforts to spearhead NPS participation in the Coral Reef Funding Initiative and serving over the last three years as principal coordinator of the NPS and DOI involvement in these efforts.

**John Wullschleger** received an “On-the-Spot” Award for his efforts on the team that planned and executed the highly successful NPS Water and Aquatic Resources Professional’s Meeting held in Fort Collins in November 2000.

## Water Operations Branch

**Mike Martin** received an “On-the-Spot” Award for his efforts on the team that planned and executed the highly successful NPS Water and Aquatic Resources Professional’s Meeting held in Fort Collins in November 2000.

## Water Rights Branch

**Jennifer Back** received an “On-the-Spot” Award for her efforts on the team that planned and executed the highly successful NPS Water and Aquatic Resources Professional’s Meeting held in Fort Collins in November 2000.

**Jim Harte** received a STAR Award for his exemplary performance preparing water rights claims for Aztec Ruins National Monument and Chaco Cultural National Historic Park for the San Juan Basin Adjudication in New Mexico and submitting claims in a timely fashion to Department of Justice.

# CREDITS

## PHOTOGRAPHS

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Cover Photos, Grand Teton National Park – park staff; sampling – Barry Long; heron – Leslie Krueger; Acadia National Park – Barry Long

Title page, Gulf Islands National Seashore – Mark VanMouwerik

Lodore Canyon, Dinosaur National Monument, John Wullschleger – page 6

Egret *casmerodiua albus*, Leslie Kreuger - page 8

National Park of American Samoa, David Vana- Miller – pages 9, 10

Rialto Beach, Olympic National Park, John Wullschleger - page 12

Sampling, Rocky Mountain National Park, M. VanMouwerik - page 16

Snake River, Grand Teton National Park, park staff - page 17

Oil and Gas Site, Padre Island National Seashore, Pete Penoyer - page 20

Photoionization Detector (PID), M. VanMouwerik - page 20

Rogers Spring, Lake Mead National Recreation Area, W. Van Liew – page 24

Inside back cover, rocky stream, NPS photo

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As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The Department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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