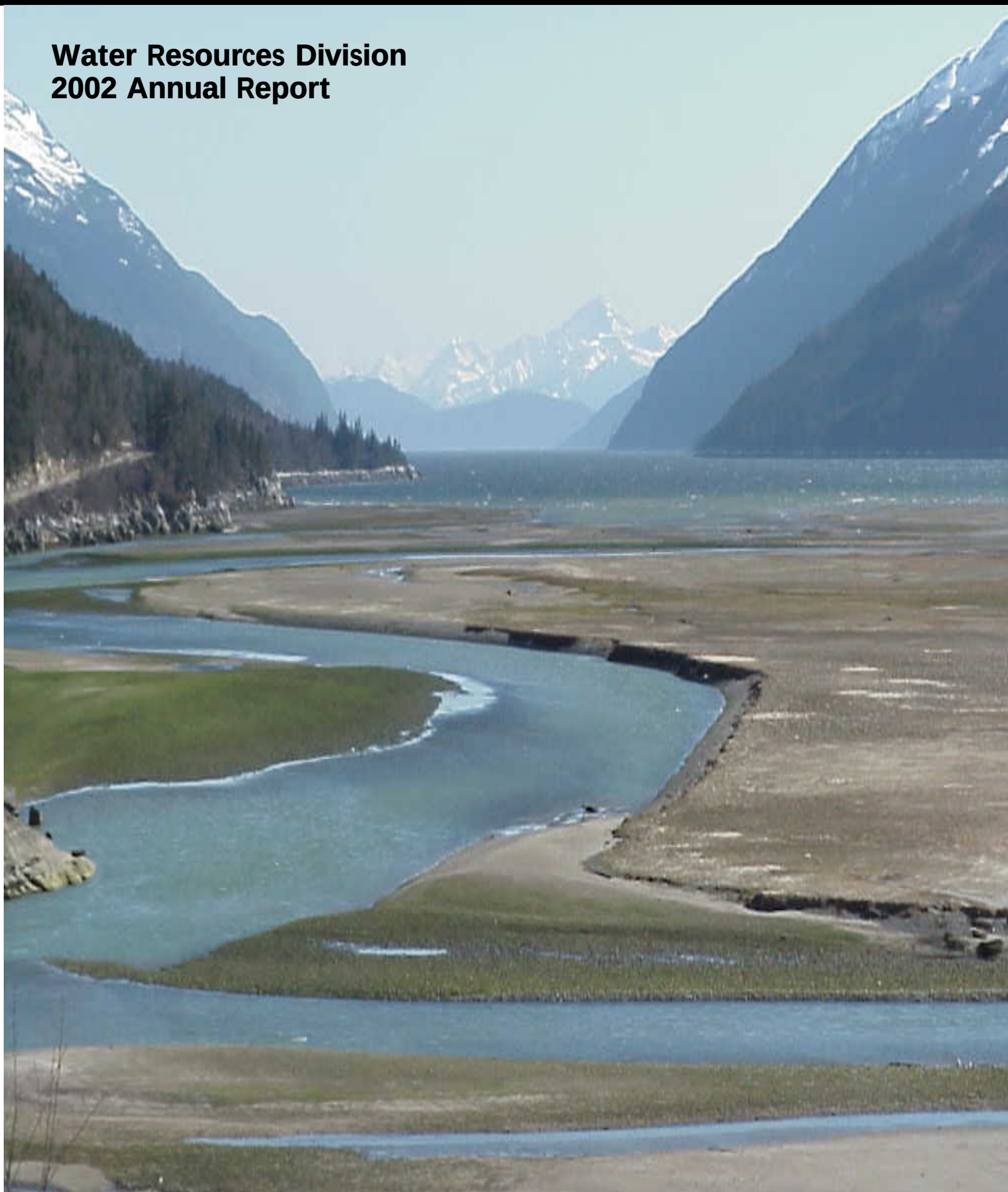
National Park Service
U.S. Department of the Interior

Natural Resource Program Center

Water Resources Division
2002 Annual Report



Water Resources Division

2002 Annual Report

Natural Resource Program Center
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front cover: Klondike Gold Rush National Historical Park, NPS Photo

opposite: Cape Code National Seashore, NPS Photo

Contents

Opposite: Mojave sink pan, NPS Photo

Rocky Mountain National Park, Bill Jackson

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

The National Park Service disseminates the results of biological, physical, and social research through the National Resources Technical Report Series. Natural resources inventories and monitoring activities, scientific literature reviews, bibliographies, and proceedings of technical workshops and conferences are also disseminated through this series.

A Word from the Associate Director, Natural Resource Stewardship & Science

by Mike Soukup, PhD

This Annual Report provides a summary of the accomplishments of the Water Resources Division (WRD) of the National Park Service in 2002. WRD provides servicewide technical assistance and policy guidance with respect to the preservation, protection, and management of water and aquatic resources of units of the National Park System. The Division provides services directly to parks throught a broad range of programs in the areas of water rights; water quality; floodplain management; groundwater analysis; watershed and wetlands protection; water resources management planning; fisheries and marine resources management; policy, legislative, and regulatory analysis; information management; and training. The Division's workplan is developed from the annual Servicewide Comprehensive Call and an annual technical assistance call to identify park needs, which in turn determines WRD's priorities. In addition to direct support to parks, the Division provides day-to-day support to regional offices, support offices, and the Washington Office in addressing water resources issues and concerns facing the 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 in parks, support offices, regional offices, and the Washington office to address water resource issues of concern to the NPS. I continue to believe that WRD provides a model for cost effective, centralized support for the vast majority of 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 the Service. This collective effort , I believe, has created the environment necessary to match the level of the Division's technical expertise to the magnitude of water-related issues facing units of the National Park System in a changing landscape.

I would also like to highlight the water resources component of the Natural Resource Challenge (NRC) as implementation continued in 2002. 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 continue to be pleased with the leadership role that WRD has played in developing this action plan and then guiding implementation of this important component of the NRC.

Comments from the Division Chief

by 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 park, regional, and Washington office management and staff to continue implementation of the water resources component of the Natural Resource Challenge. In FY2003, a funding increase was received to support three new aquatic resource professionals at Lake Mead National Recreation Area, Chickasaw National Recreation Area, and Fire Island National Seashore. Funding was also received to support watershed condition assessments and water quality monitoring in five networks, Southwest Alaska, Northeast Temperate, Southern Colorado River Plateau, Pacific Islands, and Great Lakes. Examples of significant WRD accomplishments in 2002 include:

- Completed water resource management plans for New River Gorge National River and Sleeping Bear Dunes National Lakeshore and water resource scoping reports for Hot Springs National Park, Boston Harbor Islands National Recreation Area, Kings Mountain National Memorial Park, and Antietam National Battlefield.

- Participated on the National Coral Reef Task Force and provided support to the Department of the Interior and the National Park Service relative to the establishment of marine protected areas.

- Provided assistance on endangered fish management issues at Dinosaur National Monument and Canyonlands National Park as part of the Upper Colorado River Recovery Implementation Program.

- Completed final design and earthmoving associated with the reclamation of 55 acres of wetland habitat at the Snake River Gravel Mine in Grand Teton National Park and John D. Rockefeller Memorial Parkway and restoration of a wet pine savannah at Moore Creek National Battlefield.

- Implemented 39 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 9 additional parks with a complete inventory and analysis of all available and applicable water quality data. (This brings to 234 the total number of parks with completed water quality databases.)

- Provided leadership in drafting a new Director's Order (DO 77-2) for Floodplain Management.

- Provided significant assistance to Lake Mead National Recreation Area (contaminants assessment and assistance with a new EIS on sewage treatment for Las Vegas, NV); Death Valley National Park (assessment of water supply alternatives at Furnace Creek); Arches and Canyonlands National Parks (uranium mill tailings reclamation); Glen Canyon National Recreation Area (evaluation of personal watercraft impacts on water quality); and C & O Canal National Historical Park (analysis of Washington Aqueduct);

- 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, Crater Lake National Park, Chickasaw National Recreation Area, and a number of parks in the Little Colorado River Basin in Arizona.

- Completed water rights settlement agreements for Golden Spike National Historic Park and Rainbow Bridge National Monument.

- Assisted numerous Parks in the restoration of natives fish species and their habitats; continued to provide support in developing an international cooperative fisheries management plan involving the States of Texas and Coahuila, Mexico and Amistad National Recreation Area; and continued the development of fishery management plans at Isle Royale National Park and Biscayne National Park.

- Provided support to the "Natural Resources Law for Superintendents" course, the development of impairment assessment guidance for the National Park Service, and initiation of the Cooperative Conservation Initiative.

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 aquatic 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, policy, and legislative 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 Park System.

Washington Program Coordination Office

by Sharon Kliwinski, Washington Liaison

This year saw reconsideration and reinterpretation of environmental policies and long standing provisions of environmental laws including provisions of the Clean Water Act dealing with wetlands and water quality. The new emphasis within existing environmental law and policy ties environmental protection to goals such as economic growth, increased energy production and increased access to public lands, including deference to states and local communities.

As policy direction shifts, an emphasis on different tools to implement environmental protection (e.g., leaning toward collaboration and consultation and away from regulation and litigation) is intended. This requires the National Park Service to review its own toolbox to ensure our approach to important park issues such as impairment of park resources, incorporating good science into park decision making, and improving the efficiency of environmental compliance documents is consistently based in consultation, communication, and cooperation while remaining grounded in the NPS mission to protect and conserve park resources for this and future generations.

The Water Resources Division continued to support the Chesapeake and Ohio Canal National Historical Park and the National Capital Region in re-issuance of the Clean Water Act permit for the Washington Aqueduct, the drinking water treatment facility for the nation's capital. The NPS and the U.S. Fish and Wildlife Service raised specific concerns to the U.S. Environmental Protection Agency regarding protection of park resources and aquatic resources of the Potomac River and the science underlying the EPA's draft permit. The EPA ultimately redrafted the permit to bar all harmful discharges to the Potomac River.

The Water Resources Division also provided key support for the management training—Natural Resource Protection Law and Policy for Superintendents—that was held in Washington, D.C. Background work was also done in support of the Cooperative Conservation Initiative, a new funding source for federal/non-federal partnership projects, as this proposal moved through the FY 2003 budget process.

Planning and Evaluation Branch Highlights

By Mark Flora, Chief

Planning and Evaluation Branch (PEB) activities in FY 2002 were focused upon developing Servicewide policy and guidance for the protection of wetlands, fisheries, and marine resources; providing programmatic oversight and accountability for more than 60 NRPC-funded projects; and providing direct support to NPS units in the areas of water resources planning, wetlands protection and restoration, fisheries management, and marine resources conservation.

In the policy and guidance arena, PEB staff revised and Director Mainella reissued Director's Order #77-1 which provides guidance and procedures for wetland protection within the National Park Service. PEB also developed briefing papers and presented briefings for the Assistant Secretary, Director, and Congressional staff outlining NPS policies, programs, and activities relating to coral reef conservation and the establishment of marine protected areas. PEB staff were also invited to participate on committees to develop draft NPS impairment policies and to support the development of "measures" and "outcomes" pertaining to wetland/riparian, aquatic biological resources, and marine resources for the Department of the Interior Strategic Plan.

During the year, PEB staff have also been instrumental in providing programmatic oversight and technical guidance and evaluation for more than 60 WRD or NRPC-funded projects relating to water resources planning, wetlands protection and restoration, fisheries management and marine resources conservation. Included in this task is providing appropriate oversight and accountability for the $4.5 million of Natural Resource Challenge funding (multi year total) allocated to support these projects.

PEB staff has also provided the lead for the regulatory review and approval of 13 wetlands statement of findings, Servicewide review and comments on 12 EIS/EA environmental compliance documents, and policy review of the water-related aspects of 10 NPS planning documents (primarily General Management Plans).

Accomplishments during the year were numerous and several are highlighted in the following articles. Of particular note, PEB's Water Resources Planning Program was successful in completing Water Resources Management Plans at New River Gorge National River and Sleeping Bear Dunes National Lakeshore as well as assisting with the completion of Water Resources Scoping Reports for Hot Springs National Park, Boston Harbor Islands National Recreation Area, Kings Mountain National Memorial Park, and Antietam National Battlefield. PEB's Wetlands Protection and Restoration Program completed both the final design and earth moving associated the reclamation 55 acres of wetland habitat at the Snake River Gravel Mine (Grand Teton National Park/John D. Rockefeller Memorial Parkway) as well as a report on the successful restoration of a Wet Pine Savanna at Moores Creek National Battlefield. The Fisheries Management and Marine Conservation Program have been active overseeing fisheries population and habitat restoration activities in a number of parks, working with States in the cooperative development of Fisheries Management Plans, and assessing and supporting opportunities for the cooperative establishment of marine protected areas.

PEB is also proud of the numerous opportunities we have had to serve park's directly by providing technical support at the request of park staff. More than 40 opportunities to work directly with park and regional staffs in activities ranging from issues assessment and proposal development to implementation of new field techniques are summarized in a later section of this report.

Finally, as we plan for the future, I am pleased to report two staff additions in 2002 which will allow the Water Resources Division to provide expanded support to both parks and regions. The addition of Dr. Kevin Noon to the Wetlands Protection and Restoration Program will enhance our current capability in providing assistance pertaining to wetlands evaluation, wetlands restoration, and addressing wetlands regulatory & management issues. The addition of Mr. Cliff McCreedy to the Marine Conservation Program provides the Natural Resource Stewardship and Science Directorate with additional capabilities in the area of marine resource management and planning, coastal watershed assessment, coral reef conservation and interagency marine partnerships.

The Planning and Evaluation Branch is honored to be part of the National Park Service and looks forward to being of continued service to the units of the National Park system during FY 2003.

Water Resources Planning Support for the Boston Harbor Islands Partnership

by Mark D. Flora, Water Resources Division, National Park Service and Bruce Jacobson, Boston Harbor Islands Project Office, National Park Service

The Boston Harbor Islands National Park area is a unique unit of the National Park System. Rather than having the National Park Service own and manage the park, the federal law establishing the national park area made the National Park Service a nonland-owning participant in the 13 member Boston Harbor Islands Partnership. In 2000, the NPS Water Resources Division agreed to assist the Boston Harbor Islands Partnership in the development of a water resources scoping report in order to identify and better understand water-related issues relevant to the management of the national park area.

The Boston Harbor Islands National Park area consists of 34 islands, former islands, and peninsulas containing over 1500 acres of coastal woodlands, dunes, freshwater, estuarine and marine wetlands, and sandy and rocky beaches scattered within the 50 square-mile Boston Harbor. For many years, the waters surrounding the national park area were notorious for their polluted condition. Sources of pollution to Boston Harbor included the discharge of sewage treatment plant effluent, sanitary sewer overflow, stormwater runoff, and combined sewer overflows. A court ordered clean-up effort, known as the Boston Harbor Project, was initiated in 1985. Less than two decades later, no other urban harbor has experienced the remarkable turn around from "near disaster" to "environmental success story" as has Boston Harbor. Although not pristine, much of Boston Harbor should with time, resemble less polluted New England coastal ecosystems.

Grape Island, Boston Harbor Islands National Park Area, Photo Courtesy of John Nove

Boston Harbor Light on Little Brewster Island, Photo Courtesy of Brent M. Erb

Unlike many of the islands typical of the New England coast, several of the islands of the national park area are coastal extensions of drumlin features, which are glacially-formed, asymmetrical, elongate masses of till formed into smooth-sloped hills on the Boston Basin lowlands. In addition, a number of the "outer" islands, including Little Brewster Island, pictured here, are the more typical bedrock outcrops more commonly found along the coast of New England.

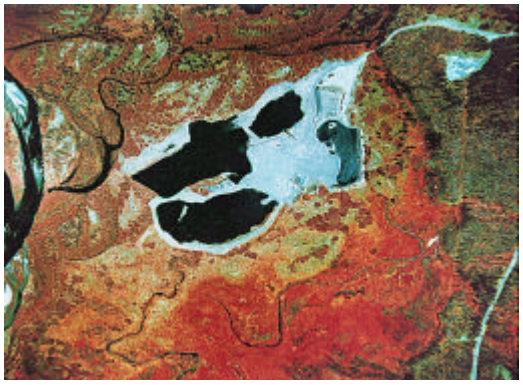
A water resources issues identification workshop hosted by the Boston Harbor Islands Partnership identified the following water-related concerns: Inadequacy of available baseline resource information; intertidal resources (salt marshes, tidal flats, rocky intertidal); coastal processes / erosion; wetland resources (ponds, freshwater marshes, brackish marshes); subtidal resources (eel grass beds); water quality concerns to include potential impacts of marinas/mooring areas, infrastructural issues (septic/sewage management & hazmat), public health / recreational water quality monitoring, impacts of water quality on shellfish harvesting, and the need for additional spill contingency planning; and water supply/groundwater issues

A Water Resources Scoping Report was completed in 2002 which: 1) provided a basic description of the national park area's water-related resources; 2) included an assessment of the current water-related resource condition; 3) provided a discussion of the water-related issues and concerns; and developed considerations for future management action.

The Boston Harbor Islands National Park Area Water Resources Scoping Report was accepted and the recommendations endorsed by unanimous vote of the Boston Harbor Islands Partnership on December 17, 2002.

Reference:

Flora, M.D. 2002. Boston Harbor Islands – A National Park Area (Massachusetts). Technical Report NPS/NRWRD/NRTR-2002/300. US Department of the Interior, National Park Service. 74 pp.



A 1993 color infrared aerial photo shows the unvegetated mine waste and steep-walled borrow ponds that scar the floodplain landscape. The Snake River is visible on the left, and Highway 89/287 is in the lower right corner of the photo

Restoration of wetland and riparian ecosystems at the Snake River Gravel Pit, John D. Rockefeller, Jr. Memorial Parkway

by Joel Wagner, Wetland Program Leader, Water Resources Division; Michael Martin, Hydrologist, Water Resources Division; and David Cooper, Department of Earth Resources, Colorado State University

From the 1950's through the early 1990's, the National Park Service and the Federal Highway Administration extracted thousands of cubic yards of gravel from the Snake River floodplain within the John D. Rockefeller, Jr. Memorial Parkway. The Snake River Gravel Pit, located approximately 1 mile south of Flagg Ranch, provided gravel for NPS road projects and maintenance activities in the surrounding area. Mining ceased in 1992 when the Corps of Engineers determined that the operation had violated the Clean Water Act. Closure of the site left over 60 acres of poorly vegetated waste piles, steep-walled borrow ponds, and sand and gravel stockpiles visible from both U.S. Highway 89/287 and the Snake River. The park elected to resolve these regulatory and resource management issues by reclaiming the abandoned mine to a mix of wetlands, oxbow ponds, and uplands modeled after comparable features on the adjacent, undisturbed floodplain.

Analysis of hydrology, vegetation, and soil relationships in nearby undisturbed "reference" communities provided models for restoring wetland communities in the mined area.

The NPS Water Resources Division, Colorado State University, and Grand Teton National Park staff collaborated on the restoration design. We based the design on extensive analysis of soil, vegetation, and hydrologic data collected within the mined area and in nearby undisturbed reference areas. Data from 24 shallow wells and 6 staff gages provided the seasonal and interannual water level information that is critical to wetland and riparian ecosystem design. Special factors that had to be addressed included the complex hydrology of the site, the need to protect existing western boreal toad breeding habitat, and appropriate use of topsoil that had been preserved during the mining process.

A unique aspect of the design process was our use of field experiments to evaluate the potential for willow establishment from "seed rain." Designing the site to promote natural willow establishment not only saves money (fewer willow stakes need to be planted), but also helps assure that the site will be a self-sustaining wetland-riparian ecosystem over the long term. We installed and monitored willow seed traps to evaluate distribution and abundance of seed rain across the site. Two experimental plots were also created to determine which combination of available soil types (sand, mine reject material, or topsoil) and water table elevations would optimize willow

A park equipment operator places parallel strips of mine reject material, sand, and topsoil in preparation for willow establishment experiments. These experiments identified the combination of soil type and water table elevation that would optimize willow establishment from seed.

Contractors moved over 350,000 cubic yards of earth to create the pond shoreline configurations and wetland and riparian zone elevations called for in the design.

Final grading was completed by the end of October 2002. Steep-walled borrow ponds were reshaped into river oxbow features, and mine waste was removed to form wetland and riparian communities. Planting will occur in spring and early summer of 2003.

establishment from seed. Experiment results guided placement of topsoil at critical elevations throughout the site.

A combined $1.3 million received from the Federal Lands Highway Program and from a partnership with the State of Wyoming Abandoned Mine Lands Program was sufficient to complete the final design and carry out the project. During the winter of 2002 we worked with project partners to produce final design drawings and specifications for the construction bid documents. An earthmoving contractor was selected in June, and construction lasted from mid-July through October 2002. Under the direction of the design team and the onsite construction manager, the contractor reshaped more than 350,000 cubic yards of mine reject material and topsoil into the 55 acres of sedge meadows, willow flats, stream channels, oxbow ponds, and upland features specified in the final design. In late spring and early summer of 2003, contractors will plant over 580,000 herbaceous wetland plants and 35,000 willow stakes in specified habitat zones. To assure preservation of local genetic integrity, nursery contractors were instructed to collect seed and willow cuttings from within 15 km of the project site. With the help of the Natural Resources Conservation Service, upland zones will also be revegetated using local seed sources.

We have found that restoration projects of this size and complexity require rigorous data collection and analysis, innovative design, much coordination among cooperators and regulators, tight design specifications, careful supervision of construction/planting phases, and sufficient funding to do the job right. But a final step - monitoring - should not be overlooked. We will monitor vegetation, hydrology, and soil characteristics for at least three years to document restoration of target wetland habitats and to identify any remedial treatments needed to assure restoration success.

Shoepack Lake Muskellunge – Voyageurs National Park

by John Wullschleger, NPS-Water Resources Division, Clay Pierce ,USGS-BRD-Iowa Cooperative Fish & Wildlife Research Unit, Larry Kallemeyn, USGS-CERC-International Falls Biological Station, and Nick Frohnauer USGS-BRD-Iowa Cooperative Fish & Wildlife Research Unit

Shoepack Lake, on the Kabetogama Peninsula in Voyageurs National Park, supports an endemic, genetically-unique population of muskellunge (*Esox masquinongy*). This is the only population of muskellunge within the Park and one of a limited number of self-sustaining populations still in existence. In the past, eggs from Shoepack Lake have been used by the Minnesota Department of Natural Resources (MDNR) to establish muskellunge populations in a number of waters statewide; the Park's enabling legislation specifically provides for continued use of Shoepack Lake muskellunge by MDNR for purposes of propagation.

Despite the widely recognized importance of these fish, prior to 2001 managers had little information that could be used to assess population status or

discern trends. Information on the recreational fishery was limited as well. A fly-in service for fisherman recorded 110 customers with each spending 8 hours at the lake in 2000. Fewer data were available for walk-in anglers and winter fisherman, who access the lake by snowmobile. Voluntary survey cards, returned by walk-in anglers in 1999 and 2000 (n = 5), indicated a catch rate of 0.5 fish per hour, an order of magnitude higher than reported in the literature for muskellunge in other waters. This high estimated catch-rate suggested the potential for over-exploitation.

To ensure that the Shoepack Lake muskellunge population is adequately protected by current fishing regulations, park managers applied for and received BRMD funding for a two-year population study and angler survey. The work is being conducted by University of Iowa researchers with assistance from the Park and the USGS International Falls Biological Station.

In 2001 and 2002, the muskellunge population was sampled from May – September using a variety of gears, including fyke nets, gill nets and hook and line. Captured fish were measured (total length in mm) weighed (grams), and provided with a plastic floy tag bearing a unique number. Scales were collected for age determination. While most fish were returned to the water alive, a small number were sacrificed to verify sex and age and to allow examination of gonads.

Effective in 2001, the Park established a requirement that all anglers complete and return a creel survey card. The card was designed to obtain data on hours fished, time and location of muskellunge caught, tag code (for tagged fish), and fish disposition (kept or released). In addition, aerial surveys by fixed-wing aircraft were employed to obtain estimates of both pressure and compliance with the new reporting requirement.

Iowa State University researchers have now completed two field seasons work at Shoepack Lake. While data analysis is still underway, some preliminary results are available: Estimated adult population size based on mark–recapture data is 1197 (95% confidence intervals 1016 - 1457). The majority of captured fish were between 500 and 750 mm TL with growth rates that appear to be slower than those reported for other lakes. Sex ratio is about 1.8 males to every one female. Juvenile fish were under-represented in the samples; researchers intend to conduct supplemental sampling during the Spring of 2003 to obtain better data on this segment of the population. Mean catch rate by anglers was 0.2 fish/hour in 2001 and 0.3 fish/hour in 2002; catch rates for both years are lower than the estimate from the 1999 – 2000 survey cards but high relative to those reported for most other lakes. However, only 3.6% of the fish caught exceeded the minimum length limit and less than 1% of the fish caught were harvested. In July of 2001, a beaver dam on the outlet stream washed out, lowering lake level by 5 feet and reducing surface area by 47%. Implications for the muskellunge population are not yet known but will be discussed in the final report. The report including simulated population scenarios for muskellunge and recommendations to managers is anticipated in late 2003.

Shoepack Lake muskellunge captured by the Iowa State University research crew. (Nick Frohnauer)

Captured muskellunge received a floy tag with a unique number. (Clay Pierce)

During the study, high-flows from a natural storm event washed out a beaver dam on the outlet stream, lowering lake level by 5 feet. (Nick Frohnauer)

WRD Plays Lead Role in Coral Reef Task Force

by Cliff McCreedy, Marine Management Specialist

Twenty-seven percent of coral reefs have been lost or seriously degraded worldwide and another 60 percent are threatened, according to the Global Coral Reef Monitoring Network and the World Resources Institute. Charged by Executive Order 13089 to protect the nation's imperiled coral reefs, a Task Force of 17 federal, state and territorial agencies are coordinating their response to threats from impaired water quality, overfishing, coral bleaching and disease. NPS Water Resources Division is a key player in these efforts under the U.S. Coral Reef Task Force co-chaired by Assistant Secretary for Fish, Wildlife and Parks, Harold Craig Manson. And with more than 275,000 acres of coral reefs, the ten (10) coral reef National Parks (see inset) not only offer outstanding recreational opportunities, but a chance to protect their biodiversity and astonishing natural beauty for future generations to enjoy unimpaired.

Assistant Secretary Manson said in a October 1, 2002 editorial: "We need to develop an inventory of coral reef resources, conduct an assessment of the state of reefs, and monitor their health over the long-term. We need to take action now to reduce pollutants and sedimentation on reefs" and "stop the over harvesting of coral reefs and the fish and animals that depend on them."

In 2002, the Water Resources Division provided national policy and planning support to DOI, and management action in the Parks to meet the challenge from Assistant Secretary Manson. Marine Management Specialist Cliff McCreedy coordinated coral reef policy issues and drafted briefing papers for the Assistant Secretary, and provided support from WASO and the departmental level to various coral reef parks. He assisted with developing and releasing regulations and Notices of Intent for General Management Plans for the new Virgin Islands National Monument and expanded Buck Island Reef National Monument. Both areas were created as marine reserves where coral reef ecosystems are fully protected from extractive use. McCreedy also provided input into Congressional testimony and highlighted activities in the coral reef parks to conserve marine resources. Finally, WRD coordinated activities and preparation for the October Coral Reef Task Force meeting.

WRD Fisheries Program Leader Jim Tilmant is pursuing cooperative programs with states, territories and federal partners to manage and restore reef fish populations (see article on Biscayne National Park). In 2001, Dry Tortugas National Park set aside the 46 square mile Research Natural Area as a no-take reserve to protect shallow seagrass beds, coral reefs, and mangrove communities. General Management Plan updates are currently underway at Biscayne National Park, Virgin Islands National Park, Virgin Islands Coral Reef National Monument and Buck Island Reef National Monument.

Coral Reef Parks in the National Park System:

Biscayne National Park, Florida
Buck Island Reef National Monument, U.S. Virgin Islands
Dry Tortugas National Park, Florida
Kaulapapa National Historical Park, Hawai'i
Kaloko Honokahau National Historical Park, Hawai'i
National Park of American Samoa
Salt River Bay National Historical Park and Ecological Preserve, U.S. Virgin Islands
Virgin Islands National Park, U.S. Virgin Islands
Virgin Islands Coral Reef National Monument, U.S. Virgin Islands
War-in-the-Pacific National Historical Park, Guam

Potential Barrier to Brook Trout Migration, Rocky Mountain National Park

by Matt Kondratieff, Colorado State University and Jim Tilmant, National Park Service

The natural range of native trout species has been greatly reduced or eliminated within many national parks by the introduction of nonnative species. Successful restoration of native trout in streams where they have been displaced largely depends on the permanent exclusion of the competing non-native species. Such exclusion usually requires barriers to the upstream movement of non-native fish into treated areas.

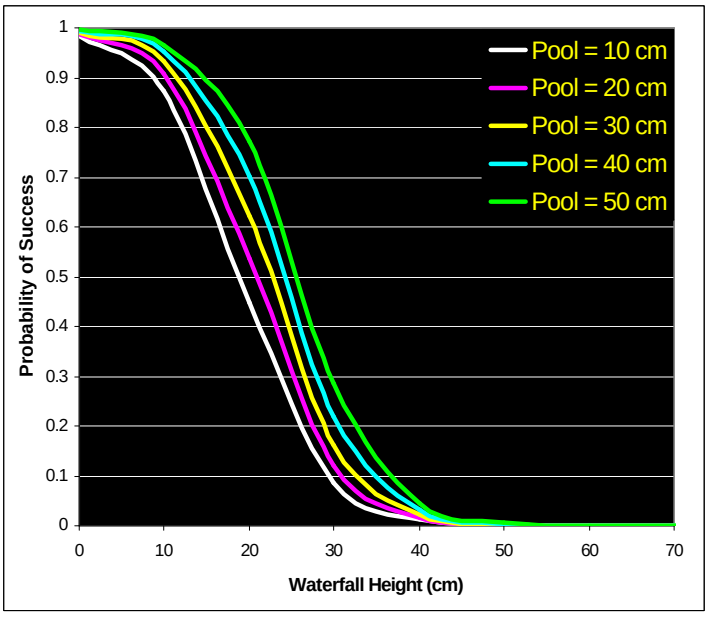
Within many western national parks, brook trout are a non-native species that has displaced native cutthroat trout. A study of the physical characteristics of successful barriers to brook trout migration is being conducted by researchers from Colorado State University in cooperation with the Water Resources Division. This study has involved both laboratory tests of barrier structures and a field assessment of a potential natural barrier on the Big South Fork of the Poudre River in Rocky Mountain National Park (RMNP). National Park Service and Fish and Wildlife Service personnel identified a waterfall formed by a narrow bedrock constriction on the Big South Fork as a potential fish barrier in 1998. Although non-native brook trout had been stocked both above and below this waterfall, it appeared as if the waterfall might be impassible to upstream

movement of fish. If the waterfall proved to be an effective barrier, it would permit the reclamation of cutthroat trout to 11.3 km of an upstream, headwater reach of the Poudre River.

In an effort to determine whether this waterfall was an effective barrier, 123 brook trout were captured from above the falls, marked, and released below the waterfall in the fall of 1999 by FWS personnel. In the fall of 2000, an electroshocking survey above the barrier recovered six marked fish, suggesting that the waterfall was not impassable to upstream fish movement. Based on this result, combined with information gained from ongoing laboratory studies of effective barrier characteristics, the park decided to experimentally modify the waterfall in an attempt to make it impassable to fish. Modifications included reducing the plunge pool depth and increasing the vertical heights a fish would have to jump to successfully negotiate the falls. This was done by placing large boulders at key convergence points at the top and bottom of the falls.

The stream is now being monitored and further evaluated to determine whether the waterfall has become an effective fish barrier. This monitoring and evaluation study has three objectives: 1) to determine whether the modified waterfall is now a true barrier; 2) to develop a model that can successfully predict when a waterfall is an effective barrier to brook trout movement; and, 3) to produce a guidance document for barrier selection and construction in the National Park System. Determining the success of the waterfall modifications involves additional movement and monitoring of marked fish from above to below the falls. These fish were moved in the fall of 2002 and the stream will be sampled above the falls this spring. If marked brook trout are again recaptured above the waterfall, their size data will be used to help develop a barrier model that can successfully predict the probability of brook trout negotiating a barrier as a function of barrier height, plunge pool depth, and fish size. Laboratory testing of brook trout jumping capabilities is also helping to develop the theoretical model. The pre- and post- modification barrier dimensions will be entered into the laboratory-derived model and predictions compared to field results. Final results of the modeling will then be applied to other potential barrier sites within RMNP for further testing. Upon successful completion of a barrier model, a general NPS guideline for fish barrier selection and/or construction will be produced.

View of the experimental falls on the Big South fork of the Poudre River (ROMO) before modification. Water flow was approximately 0.10 m^3/s (3.7 cfs) when this photo was taken.



Logistic modeling results for a 10 cm TL brook trout. Probability of fish jumping over a waterfall (y-axis) as a function of water fall height and plunge pool depth. Data for these results were collected from the Colorado Division of Wildlife Fish Research Hatchery, Bellvue, CO.

Development of Stream Indicators of Biological Integrity: a Potential Water Quality Inventory and Monitoring Tool for NPS units in the Hudson, Delaware, and Susquehanna River Basins

by David L. Vana-Miller, Water Resources Division, National Park Service; Robert A. Daniels, New York State Museum; Karen Riva-Murray, New York District, US Geological Survey; David B. Halliwell, Maine Department of Environmental Protection; Michael D. Bilger, Pennsylvania District, US Geological Survey

The biological integrity of a stream is a measure of its naturalness; high integrity is associated with populations of native species interacting under natural community processes and functions. Thus, biological integrity is closely allied with environmental health, and an assessment of integrity can serve as a surrogate measurement of health. Introduced in the early 1980s, the index of biotic integrity (IBI) is a bioassessment tool that integrates several attributes of stream fish assemblages and provides a relatively inexpensive way to assess the general health of streams and to evaluate environmental change. This concept, although initially developed for warm-water streams in the Midwest, has been applied in many other regions and ecosystems (e.g., lakes, wetlands, and estuaries) in the past two decades. The IBI approach has a firm foundation in ecological theory, is simple and relatively consistent, and provides a quantitative basis for environmental decision-making. As such, the IBI is a tool from the grab bag of tools that parks should be considering in water quality monitoring and inventory and monitoring programs.

In 2002 Water Resources Division staff coauthored a manuscript with personnel from the U.S. Geological Survey and the states of New York and Maine entitled "An index of biological integrity for northern Mid-Atlantic drainages" (Daniels et al., 2002) This manuscript, published in *Transactions of the American Fisheries Society* (Volume 131:1044-1060), describes the development of an IBI based on fish assemblage data for streams in three large mid-Atlantic slope basins — the Hudson, Delaware, and Susquehanna rivers. The goal was to present a general, watershed-oriented IBI to assess stream conditions in these basins that comprise cold-, cool- and warm-water fishes. The validity of this IBI was demonstrated by examining the quality of streams in the three basins. We used data on fish assemblages, benthic macroinvertebrate assemblages, and chemical and physical stream characteristics obtained during 1993-2000 by the U.S. Geological Survey's National Water Quality Assessment Program in these basins to examine relations between the IBI and other indicators of environmental quality. The mid-Atlantic IBI appears to be sensitive to environmental degradation in all three river basins.

Reference:

Daniels, Robert A., Karen Riva-Murray, David B. Halliwell, David L. Vana-Miller, and Michael D. Bilger. 2002. An Index of Biological Integrity for Northern Mid-Atlantic Slope Drainages. Transactions of the American Fisheries Society 131:1044-1060.

WATER OPERATIONS BRANCH HIGHLIGHTS

By Bill Jackson, PhD, Chief

The Water Operations Branch oversees servicewide programs in the areas of hydrology (surface and ground water), water quality and water resources data management. Program activities include direct technical assistance to parks, administration of project funding programs, programmatic leadership to servicewide initiatives, development and administration of water resources databases, and policy and strategic planning support to the Associate Director Natural Resources Stewardship and Science. The numerous short articles that follow highlight major Branch accomplishments. I encourage you to read these articles and review the extensive listing of park, region, network and DSC assistance. I think you'll agree that this was an incredibly productive and substantive year.

New servicewide initiatives continue to require considerable involvement of our staff. Specifically, the Natural Resource Challenge has engaged the water quality program in assisting networks in developing their water quality vital signs monitoring programs. We're providing direct technical assistance to networks, program and technical guidance, and program accountability. The data management program offers data management services to the networks, while concurrently expanding the National Park baseline water quality data inventory in EPA-Storet. To support coordination and communication among networks we hosted a network water quality workshop in FY- 2002. Among other things the workshop resulted forming two ad-hoc groups that refined water quality monitoring protocol and core parameter guidance for both upland and marine/estuarine systems. Throughout NPS, considerable progress has been made in implementing this important Natural Resource Challenge program.

The hydrology program took the lead in drafting a new Director's Order (DO 77-2) on Floodplain Management, which at this writing is in the final stages of review and issuance. We also assisted the Division Chief and Regions in developing position descriptions and work plans to support several new aquatic resource professional positions in parks funded by the Natural Resources Challenge. Several staff also worked closely with Department and NPS strategic planners to develop a new strategic planning framework that we believe will provide improved long-term direction to the breadth of programs administered by the Water Resources Division.

Our record of accomplishment this year, as reviewed in this report, reflects the talent and dedication of staff, as well as that of all our partners and all of you throughout the service we've had the privilege to work with this past year. Lastly, I'd like to welcome the addition of Kim Johnson to our staff. Kim is also a student in watershed science at Colorado State University.

Work Begins on Project to Assess Potential Impacts to Aquatic Systems from Recreational Snowmobile Use

by Gary Rosenlieb, Water Resources Division and Jim Petty, Ph.D., U.S. Geological Survey, Columbia Environmental Research Center

Field sampling of soil and sediment supporting an investigation of the potential occurrence and effects of snowmobile contaminants was initiated in Voyagers and Rocky Mountain National Parks in 2002 by the U.S. Geological Survey's Columbia Environmental Research Center (CERC). In each park NPS and CERC scientists selected two representative aquatic systems, one potentially impacted by snowmobile use and one having little potential for such impacts. A transect-grid sampling plot was delineated with a Global Position System to encompass inflow areas of the aquatic system. (Typical transect-Grid layout is depicted in Figure 1, the North Windigo Campsite Pond Control Site at Voyageurs National Park). At Voyageurs scientists, under the direction of Chief CERC Environmental Chemist Dr. Jim Petty, collected 13 composite sediment samples at each aquatic system. Sampling at the Rocky Mountain National Park aquatic systems included collection of six composite soil samples at runoff areas into the ponds, as well as seven composite sediment samples. All samples were placed in pre-cleaned stainless steel buckets under a blanket of argon gas and transported to CERC laboratories where they will be analyzed for the presence of polycyclic aromatic hydrocarbons.

This work represents the first phase of four total phases of investigation that are proposed in "Use of Semipermeable Membrane Devices to Assess the Presence ad Potential Impacts of Polycyclic Aromatic Hydrocarbons Resulting

Sediment and soil sampling, Rocky Mountain National Park, NPS Photo

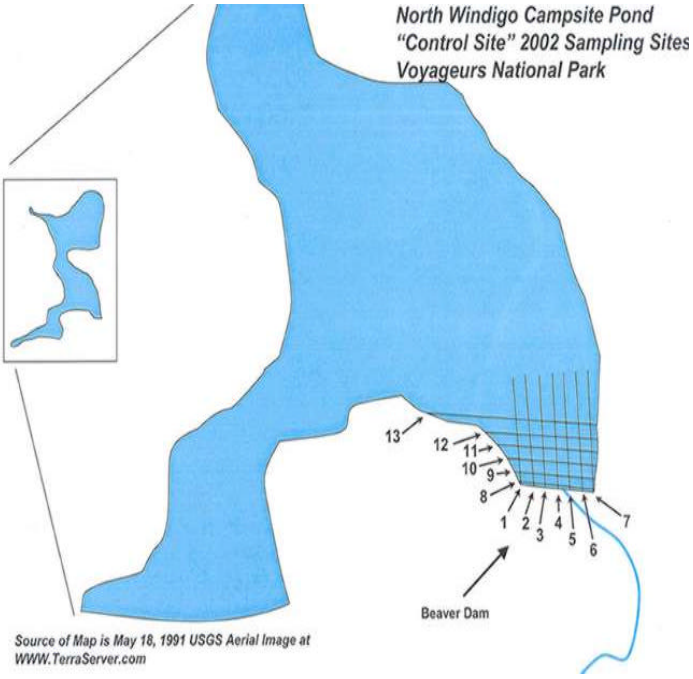


Figure 1, the North Windigo Campsite Pond Control Site at Voyageurs National Park

from Recreational Snowmobile Use in National Parks". Additional work over the next two years will include deployment of semipermeable membrane devices for the detection of polycyclic aromatic hydrocarbons in waters, and ambient toxicity testing with daphnids. This four-year investigation being conducted by CERC is being funded by National Fee Demo project funds. The study will assist the NPS in implementing Executive Orders 11644 and 11989 that require NPS to monitor the effects of the use of off-road vehicles. Information gathered in this study not only will measure any effects of snowmobile in the two parks where the study is occurring, but also will provide all parks that allow snowmobile the information they need to design appropriate monitoring programs.

Four Parks Demo Core Parameter Instruments

by Pete Penoyer, Hydrologist

In 2002 the Water Operations Branch (WOB) tested multiparameter water quality instruments (datasondes) in four Parks–Rocky Mountain National Park, Indiana Dunes National Seashore, Whiskeytown-Shasta-Trinity National Recreation Area, and Buffalo National River. The purpose of the testing was to evaluate high-end datasondes, which can perform continuous water quality monitoring of "core" parameters (Temperature, Specific Conductance, pH, and Dissolved Oxygen) plus turbidity. The instruments (In-Situ MP Troll 8000, YSI 6000 series sonde, and Hydrolab Datasonde 4a) were evaluated qualitatively on the basis of each participant's assessment of overall ease of use, apparent sensor reliability and measurement accuracy, hardware and software capabilities, and compatibility with the needs of core parameter monitoring under the Vital Signs program.

WRD staff arranged for datasondes vendors to train participants and for the manufacturers–Hach (formerly Hydrolab), Yellow Springs Instruments (YSI), and In-Situ, Inc.–to loan instruments for deployment at stream and lake sites over a period of six months. Continuous monitoring data was collected at 15-minute intervals and uploaded to laptop computers by Park, WOB, or USGS staff on a monthly basis, using the vendors recommended software. At the completion of each one-month deployment period the sondes were given maintenance checks, recalibrated according to manufacturers' recommendations, and redeployed. Repeatability tests and other evaluations were performed by WRD staff prior to the completion of the demonstration. In some cases, instruments were monitored side-by-side in laboratory water baths between deployments to compare parameter measurements under a controlled environment.

Preliminary results from this demonstration were presented at the NPS Water Professionals Meeting held in November 2002. Results and the general consensus of participants who evaluated the instruments are being compiled and will be available mid-

2003. All data has been transferred to Excel spreadsheets to facilitate its comparison. Those Monitoring Network representatives considering use of datasondes for continuous monitoring in their Vital Signs water quality component are encouraged to contact Pete Penoyer at pete_penoyer@nps.gov.

Preservation of Cultural and Natural Resources in Alaska

By Richard Inglis, Hydrologist

Klondike Gold Rush National Historical Park is saving the remains of historic Dyea using river friendly methods. Dyea was a short lived town (1898-99) at the head of the famous Chilkoot Trail, a popular route to the goldfields in the Yukon Territory. Unfortunately, the town site is on the west bank of the Taiya River and is rapidly being eroded by naturally occurring fluvial processes. Over 70 feet of bank has been eroded since the late 1970's removing a majority of the original town cemetery. Engineered log jams have been proposed to protect the historic town site by stabilizing the banks up to a 100-year flood. While we normally don't advocate interfering with natural fluvial processes associated with a dynamic landscape, this is a resource protection situation driven by a historic preservation mandate. Engineered log jams offer benefits over traditional bank stabilization methods (e.g., rock riprap), including likely establishment of fishery habitat and preservation this wild Alaskan scene through the use of native materials.

KLGO is using expertise of the WRD, GRD and an environmental consultant to implement a stabilization project using native materials. WRD hydrologist Rick Inglis and a GRD geomorphologist Hal Pranger visited the site in May 2002 and observed that large wood debris was a major component of the complex and dynamic river system. They consulted Dr. Tim Abbe, a leading expert in the design and construction of "engineered log jams" in forested streams, and requested a design concept to reduce the erosion of Dyea without compromising natural values in the river corridor. Valuable input has been provided by Carl Gurke, Archeologist, Meg Hahr, Resource Specialist, and Theresa Thibault, Chief of Resources – all from KLGO – and Ben Kirkpatrick of the Alaskan Dept. of Fish and Game. Stabilization efforts will be influenced by complex factors at the site, such as glacial outburst floods, iso-static rebound (rising landscape of about 7 feet per century), anadromous fisheries, an obstructing highway bridge, sensitive cultural resources in the banks, and recreational rafting.

Taiya River, Klondike Gold Rush National Historical Park, NPS Photo

When funding is approved construction will be scheduled during winter or very early spring. This will minimize impacts associated with melting glaciers, salmon runs and tourism. If not available locally, some of the equipment and larger logs may need to be barged in from nearby Haines or Juneau, AK.

Assessing Flood Hazard in Glacier National Park

By Kim Johnson, SCEP Hydrologist

In the summer of 2002, Water Resources Division staff traveled to Glacier National Park (GLAC) in order to assess flood hazard at several sites within the park. The sites were Snyder Creek near Lake MacDonald Lodge, Appistoki Creek in the Two Medicine area, Rose Creek in the Rising Sun area, Apgar and Many Glacier Hotel. Flood Hazard was assessed in some areas by surveying cross sections and using HEC-RAS, a one-dimensional flow model for estimating flow depths for specified floods. In other areas, flood hazard was assessed using geomorphic indicators and other evidence.

Snyder Creek runs just to the south of Lake MacDonald Lodge, a National Historic Landmark, and by several other structures. The creek passes through three bridges in this reach. Going-to-the-Sun Highway is the most upstream bridge, followed by an access road, then a small footbridge. Snyder Creek's 100-year flood is estimated at 5000 cubic feet per second. There is evidence that the creek has been straightened and armored in the past few decades in an attempt to protect the Lodge from flooding. Eight cross-sections and the two upstream bridges were surveyed in this reach in order to model the 100-year flood.

Assuming free-flowing bridges, the 100-year flood may present problems in some areas. Both upstream bridges would be overtopped and create backwater. However, there are no structures upstream of Going-to-the-Sun Highway bridge, and those upstream of the access road bridge would not be flooded. However, below the access road bridge, overbank flooding would occur, affecting several buildings. Lake MacDonald Lodge is out of the 100-year floodplain if the bridge remains clear of debris.

However, due to the amount of large woody debris in and around the channel, it is likely that the bridges would become obstructed during any large flood event. In this case, Lake MacDonald Lodge is at much higher risk of flooding. Conversely, blockage of the bridge may increase risk of the bridge failing. In this event, flood risk to the Lodge would be reduced.

To protect these structures, constructing a larger bridge, a larger channel or a levee may be the only options. However, these may be expensive options and/or impact natural resources and visual appeal. Therefore, accepting risk to structures and protecting human life through warning and evacuation may be the best option.

Saving Money by NOT Repeating Past Mistakes

by Larry Martin, Hydrologist

The Water Resources Division maintains files containing information for water wells and test drilling in parks. The information in the files is only as complete as what is provided to the WRD from parks. For some parks, we have a plethora of information, for other parks we have nothing. Often times these files are the only remaining copies of data regarding well construction and testing. Copies that might have been in the park files have been discarded or lost. WRD staff frequently uses information from these files in conducting hydrogeologic analyses at parks. Following are two recent examples of how information in these files was used to save thousands of dollars in new construction projects.

The water supply for the Polebridge Ranger Station at Glacier National Park is obtained from an infiltration gallery in Bowman Creek. Increasingly restrictive water treatment standards required the park to construct a new water treatment system. The park was interested in possibly drilling a shallow well to replace the surface water source, eliminating the need for a water filtration system. A search of WRD files found data regarding test well drilling in the area in 1972 and 1979. These test wells failed to produce adequate amounts of water. Current park staff were not the first to identify groundwater as a preferable alternative to treating surface water for park facilities at Polebridge. However, the reports documenting past test drilling at the site were not available at the park. Further investigation by WRD staff resulted in producing a hydrogeologic report for the area that showed there were no aquifers underlying the immediate area within a half-mile of the site. Tens of thousands of dollars were saved by not repeating the process of drilling dry holes in an area that had already been shown to be nonproductive.

Dinosaur National Monument has a campground at Deerlodge Park on the Yampa River. The campground is also the launch site for multi-day whitewater rafting trips on the Yampa River. A large number of persons spend the night there before embarking on river trips. The park service has never provided drinking water at the campground. In 1962 and 1965, a test well and production well were constructed at the old campground location, but apparently a water distribution system was never developed. The wells were capped and forgotten. In 1979, the campground was moved upstream about ¾ mile to its current location. Finally, in 2003, the park service is planning to provide drinking water to the campground. WRD was contacted by park staff for advice in locating and construction of a well. We found the information for the long forgotten wells at the old well site. Investigation of local hydrogeologic conditions concluded that a new well at the current campground location would need to be about 1000 feet deep to penetrate the nearest aquifer containing good quality water. The park will use water from the old well to provide water at the new campground location. The trade-off between constructing a longer water line from the source to points of use versus drilling a thousand foot well will save the park several tens of thousands of dollars.

WRD staff are always available to assist parks with their dual mission of providing safe drinking water and protecting natural resources. This can only be done if we have all available information. Otherwise we are doomed to repeat the past mistakes of our predecessors. Additional water well information is always welcome and will be archived in WRD files. Sometimes the most important data is that obtained from “dry holes”.

National Park Service and U.S. Geological Survey Water Quality Assessment and Monitoring Partnership Program Revised Implementation Plan

by Barry Long, Hydrologist

The National Park Service (NPS) and U.S. Geological Survey (USGS) Water Quality Assessment and Monitoring (WQAM) Partnership Program is a mutual collaboration between both agencies. The goal of the WQAM program is to develop information on park water quality to enable NPS to address its most critical water quality management responsibilities.

During the last 4-5 years, the WQAM program has undergone various procedural changes to address concerns of agency partners and improve the program. In response, a revised implementation plan (NPS 2002) was prepared to provide an updated description of the partnership program and outline required program steps for agency managers and scientists who wish to participate. The new plan is a revision of the original program plan that was developed and funded as part of the Clean Water Action Plan. The revised plan and other program information will be posted on a web page linked to both the NPS and USGS web sites.

The main program changes noted in the revised plan include: 1) USGS participation in NPS Regional screening of project proposals, 2) project funding limits raised back to 1999 levels, 3) confirmation of USGS District Chief role as the funnel for project proposals and transfers of project funds, 4) continuing project progress reports requested in the fall with new project work plans, 5) joint approval required for modification of project work plans, and 6) formal approval of project proposals by USGS District Chiefs and park Superintendents.

Currently, the USGS Water Resources Division, Office of Water Quality maintains funding support for the partnership program. Since 1999, over $11 million has been allocated for partnership water quality projects in parks. To date, 76 partnership projects have been initiated in 56 national park units, and 45 of these projects have been completed. Fifteen new partnership projects are targeted for funding in fiscal year 2003. We have learned that the single most significant factor to the success of a partnership program is the amount and quality of communication among the parties.

National Park Service, 2002. National Park Service and U.S. Geological Survey water quality assessment and monitoring partnership program, revised implementation plan, November 7, 2002 draft. NPS Water Resources Division, Ft. Collins, CO. 14 p.

Identification of Interim Actions to Reduce Flooding Along Redwood Creek: Golden Gate National Recreation Area

by Gary M. Smillie, Hydrologist

Big Lagoon and the community of Muir Beach are located at the mouth of Redwood Creek in coastal Marin County, California, an area managed by Golden Gate National Recreation Area (GOGA). The lagoon and creek are important resources in GOGA, providing habitat for several threatened species and winter habitat for migratory waterfowl. The riparian vegetation bordering the lagoon and creek provides important nesting habitat for resident and migratory songbirds. Pacific Way, a county road, provides vehicle access to the Muir Beach parking lot (property of GOGA) and several private residences. Under current conditions in the creek and lagoon, Pacific Way floods during even moderate rain events, stranding residents and hindering access to the public beach. The frequency, magnitude, and duration of this flooding appear to have been exacerbated by sedimentation (in the lagoon and creek channel) combined with the limited capacity of the Pacific Way bridge culvert.

GOGA is in the process of developing a restoration plan for Big Lagoon, which will improve its ecological function and habitat value and address long-term flooding at Pacific Way. Construction of the restoration project, however, is not anticipated to begin for another three to five years. In an attempt to immediately reduce the severity of flooding at Pacific Way, GOGA implemented short-term actions in 2001 and 2002, primarily removing wood and debris from the Pacific Way culvert following storm events. The NPS and Marin County Department of Public Works have also installed culverts, constructed a berm along Pacific Way west of the bridge, provided pumps to remove ponded water, and implemented other actions to reduce flooding on the road. More aggressive interim actions, however, are required to reduce flooding and the risk of channel avulsion until the Big Lagoon restoration project is completed.

During the spring of 2002, Water Resources Division staff visited the Big Lagoon area with Randy Kline, geomorphologist with Redwoods National Park, and GOGA staff to identify potential short-term actions to reduce flooding. Any action recommended by the group could not preclude potential future options for the restoration of Big Lagoon or have potentially significant adverse environmental impacts (particularly any related to threatened species). Given these constraints and the numerous causes of flooding at Muir Beach, finding acceptable flood-reducing actions was a difficult matter. To assist in developing an understanding of the flooding problems a detailed topographic survey was conducted and a careful inspection of channel obstructions was made. The actions eventually recommended by the

group involve slightly elevating the road surface on Pacific Way and performing limited wood and sediment removal in key locations in the channel. It is believed that by taking these limited actions, flooding along Pacific Way will be less frequent and less severe while, at the same time, important Park resources will not be adversely impacted and all options for future restoration will remain available.

Baseline Water Quality Data Inventory and Analysis ("Horizon") Reports Available as PDF Files

by Dean Tucker, Natural Resource Specialist

Baseline Water Quality Data Inventory and Analysis ("Horizon") Reports for 235 national park units are now available for download as Adobe PDF[1] files from the Water Resources Division's website (http://www1.nature.nps.gov/wrd/). These reports, jointly prepared by the Water Resources Division and Servicewide Inventory and Monitoring Program, are reference documents intended to provide descriptive water quality information for park planning and to help design new goal-driven water quality monitoring programs. The reports document water quality data entered in the Environmental Protection Agency's (and National Park Service's) national water quality database, STORET (http://www.epa.gov/storet/), by local, state, and federal governments; nonprofit organizations; and the private sector.

Due to the voluminous nature of these reports and the original "semi-automated" production procedures, only a limited number of analog copies were printed and distributed to parks, regions, WASO, the NPS Technical Information Center, and the U.S. Department of Commerce National Technical Information Service. By recompiling the various components (text, graphics, tables, maps, etc.) of the report in Adobe PDF format and serving them on the Internet, the reports are now readily available to park contractors, cooperators, and the public. An additional benefit of the PDF versions of these reports is that they include tables and other features not present in the earliest produced reports, including hyperlinks and word searches. Additionally, all maps are now in color. Baseline Water Quality Data Inventory and Analysis Reports for the remaining 35 I&M parks will be produced with new procedures under development that will output the report directly to Microsoft Word[1] format, allowing an easy conversion to PDF format.

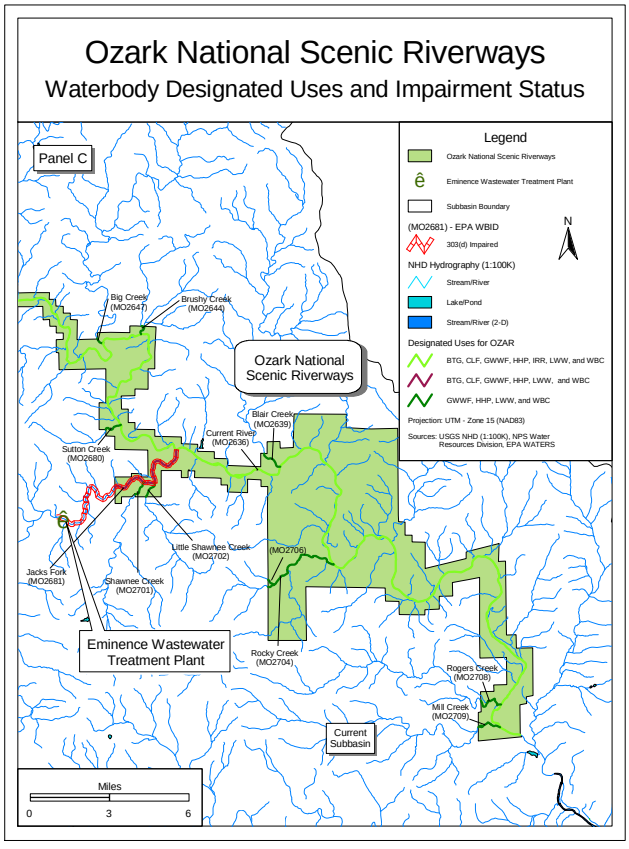
[1]Use of trade names and commercial sources is for identification only and does not imply endorsement by the National Park Service

Water Quality Designated Uses, Impairments, and Hydrographic Statistics Database

by John Christiansen, Database Manager, Colorado State University

NPS-75 requires the National Park Service (NPS) Natural Resource Inventory and Monitoring Program to establish a Servicewide inventory of waterbodies and water quality use classifications. The creation of an impaired waters inventory is further called for to support water quality goals in the NPS Strategic Plan.

In 2002 the NPS Water Resources Division (WRD) began constructing a Servicewide water resources database, inclusive of park hydrographic statistics and Clean Water Act (CWA) designated uses and impairments. Park hydrographic statistics are being generated in a geographic information system (GIS) using the U.S. Geological Survey (USGS) 1:100,000 and 1:24,000 (when available) scale National Hydrography Dataset (NHD). The USGS NHD is a nationally consistent hydrography database for the United States. CWA designated uses are codified in State water quality standards and form the basis of the 305(b) water quality assessment report.



Example of a GIS generated map depicting designated uses and impairments used in park reports

Waterbodies found not meeting their designated uses in the 305(b) report are placed on a State 303(d) list. State designated uses, 305(b) assessment information, and 303(d) impaired waterbodies are compiled by the Environmental Protection Agency (EPA) into separate databases and made available from their WATERS (Watershed Assessment, Tracking & Environmental Results) website at http://www.epa.gov/waters. Using the NHD as the basic framework, the NPS WRD has been collating State water quality standards and impairment information for NPS waterbodies into a single national database.

Water resources data from the national database are being used to generate reports for individual park units. Included in these reports are: (1) CWA State-designated uses; (2) CWA 303(d) quality impaired waters and causes; (3) special designations recognizing waters of exceptional quality as defined in State water quality standards; and (4) hydrographic statistics based on the USGS 1:100,000 and 1:24,000 (when available) scale NHD. In 2002, reports were completed for all national park units in Colorado. Reports for Missouri national park units will be finalized subsequent to the EPA's approval of Missouri's 2002 303(d) list. In addition to releasing individual park reports, the WRD plans to make the national database and associated GIS files accessible to all park units via the internet.

Lower headcut prior to stabilization, looking upstream. Note raw vertical banks, exposed soil, and small amount of groundwater drainage at the face of the headcut.

Channel Stabilization of the upper Hogcamp Branch Stream in Big Meadows area of Shenandoah National Park.

by Mike Martin, Water Resources Division and Rolf Gubler, Shenandoah National Park

The Hogcamp Branch of Big Meadows was channelized during bridge reconstruction in 1985. Subsequently, the shallow, vegetated, watercourse adjusted through incision to a continuous 300 foot-long gully with unstable banks, and several large headcuts. The incised portion of the channel has a catchment area of only about 0.2 square miles; nevertheless, the stream has been subjected to large rainfall events and has conveyed substantial flows in the recent past, resulting in the marked erosion. The upper basin of the drainage supports a unique, high-elevation wetland and continued headward erosion imminently threatened this feature that contains both regionally rare and State-listed species. Consequently, a plan to proactively stabilize the channel to protect the upstream wetland was devised by park and WRD staff.

To complete the design, we started by collecting detailed channel and overbank survey data starting well above the

Lower headcut after structural stabilization but prior to revegetation, looking upstream. Note checkdams in the foreground and a sloping-rock drop structure near the equipment.

highest headcut and extending downstream below any incision to a stable reach controlled buy a stone bridge. We used these survey data to model a series of flow events producible in this drainage with a standard numerical hydraulic model, HEC-RAS. Subsequently, we evaluated different channel reconstruction options and identified a stable particle size range to serve as an armor layer by calculating average velocities for flows up to bankfull. Lastly, relative cut and fill volumes from several design channels were calculated for evaluation of cost, overall benefit, and feasibility.

With the results of the various design evaluations, park staff completed the Environmental Assessment process and chose a combination of structural stabilization and revegetation to produce a stable channel that could accommodate high magnitude flows and maintain riparian quality. Through the use of fee-demo funds, the selected channel was completed in Summer 2002. The structural stabilization consists of two sloping-rock drop structures located at the two major headcuts, and seven loose-rock checkdams interspersed above, between, and below the drop structures. The drop structures account for the majority of the grade change between stable reaches and the checkdams provide multiple stable grade locations throughout the reach. All structures were constructed of native rock and sized to withstand flows that are inevitable in this watershed. Additionally, an assemblage of native trees was cultivated by park staff and transplanted to the upper riparian areas.

With time, the checkdams should collect sediment and reestablish a stable grade above, below, and in between the drop structures. The vegetation that was transplanted above the most frequent flow levels should become well established, eventually stabilizing the upper banks, encroaching somewhat into the channel, and grading back into the undisturbed overbank areas. Reestablishment of a moderately sloping, vegetated channel will not only arrest headward erosion but will help to maintain the upper basin water-table that supports a rare wetland environment.

Water Rights Branch Overview

By Chuck Pettee, Chief

The NPS has seen a continuing increase in water rights activities related to large-scale water development proposals near fast growing metropolitan areas. In Nevada, the NPS has been participating in the Nevada State Engineer's (NSE) decision-making process. During the year 2002, the NSE issued decisions on a number of pending applications in multiple ground water basins up-gradient from Lake Mead National Recreation Area. Taken together, the NSE decisions reveal a strategy for staged ground water development that doesn't get ahead of a sound science basis and that relies on follow-up monitoring, management and, if necessary, mitigation of impacts.

In compliance with the NSE's direction, the NPS is working closely with other federal agencies and the water development interests to collect and analyze data necessary to accomplish this strategy. In Oklahoma, multiple applications to appropriate large quantities of ground water near Chickasaw NRA were filed in the year 2002 with the Oklahoma Water Resources Board (OWRB). The NPS concern here is that the proposed withdrawals may impact springs and streams at the park. The NPS is working with the OWRB and United States Geological Survey in 2002 to collect and analyze data necessary to evaluate the potential impacts of the proposed withdrawal of groundwater.

NPS continues to participate in general water rights adjudications. We added two settlement agreements to the growing list of resolved adjudication issues. One of the following articles describes some of the technical work that was completed in 2002 to help state and federal negotiators resolve adjudication issues at Arches National Park.

WRB contributed to improving the coordination between the NPS water rights and real property acquisition and disposal programs. WRB staff participated in the Lands 2002 conference to learn more about the lands program and convey information about water rights issues that may be created when property, including water rights, is acquired for park units. One of the following articles describes the circumstances surrounding an unwanted water right that had been acquired at Scotts Bluff NM and how that issue was resolved.

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

Hydrogeologic Study of Courthouse Wash and Sevenmile Canyon in Arches National Park

by Jim Harte, Hydrologist

Courthouse and Sevenmile Canyon washes are ephemeral streams that include some short perennial reaches. The headwaters lie on Bartlett Flat mesa west of the park and the washes flow east to their confluence inside the park and then southeast to the Colorado River. Springs and seeps located along the canyon walls of Courthouse Wash and Sevenmile Canyon within and adjacent to Arches National Park support stable riparian communities and provide baseflow for Courthouse Wash and Sevenmile Canyon. Arches National Park is concerned that ground water development on private and state land adjacent to the park may affect the quantity and quality of water issuing from springs and seeps feeding Courthouse Wash and Sevenmile Canyon and small long-term changes in spring flow could impact the ecologic system.

The NPS is negotiating water rights issues with the State of Utah for Arches National Park. Both parties are concerned that upgradient ground water development may impact water resources in Arches National Park. To determine if a connection exists the NPS contracted with the Utah Geological Survey (UGS) to characterize the hydrogeology and delineate recharge areas for the Courthouse Wash-Sevenmile Canyon spring system within and adjacent to the western border of Arches National Park.

The Courthouse Wash-Sevenmile Canyon study area includes approximately 30 square miles of state, private, and federal lands within and adjacent to the west park boundary. Within the study area Courthouse Wash and Sevenmile Canyon are deep, narrow, vertical-walled canyons that

partition the spring system into three geographic groups with distinct recharge areas. The northern group includes Courthouse Wash Boundary Spring located along the west wall of Courthouse Wash north of its confluence with Sevenmile Canyon, the eastern spring group includes Sleepy Hollow Spring located along the east wall of Courthouse Wash above its confluence with Sevenmile Canyon, and the western spring group, including Sevenmile Canyon Boundary Spring and Poison Ivy Spring, is located along the south wall of Sevenmile Canyon and the west wall of Courthouse Wash below its confluence with Sevenmile Canyon. Springs issue from the Jurassic Moab Member of the Curtis Formation aquifer. The spring names referred to here were given informally by the NPS for this study.

The study focused on the four springs because they appeared to be representative of the larger Courthouse Wash-Sevenmile Canyon spring system and were accessible for measuring discharge. The study included determination of geologic controls on ground water movement and spring occurrences, developing a conceptual model for the ground water flow system contributing to spring discharge, and determining recharge areas for springs. Geologic analysis included field examination of springs, seeps, and major geologic structures to determine the influence of stratigraphy and structure on spring occurrence, and quantitative and qualitative description of joints and faults that may influence ground water flow. A conceptual model for ground water flow and spring discharge was developed using monthly instantaneous spring discharge data collected from May 2001 to May 2002, physical and chemical properties of spring water, water levels of private water wells located west of the park, precipitation records, and the hydrogeologic properties of structures. Land surface and aquifer areas contributing to spring flow were determined using simple mass-balance equations and the shapes and locations of recharge areas were based on the conceptual model of ground water flow, including geologic and topographic boundary conditions (Hurlow and Bishop, 2002).

The principal conclusions of the study are 1) existing private water wells west of the park are producing from the Moab Member aquifer, 2) Courthouse Wash Boundary Spring and other springs in the northern spring group are directly connected to the Moab Member aquifer underlying private and state land to the west and north of the park, 3) Sevenmile Canyon Boundary Spring, Poison Ivy Spring, and other springs in the western spring group are connected to the Moab Member aquifer underlying public lands southwest of Sevenmile Canyon and Courthouse Wash, 4) Sleepy Hollow and other springs in the eastern spring group are connected to the Moab Member aquifer underlying Arches National Park east of Courthouse Wash, and 5) springs in the Courthouse Wash-Sevenmile Canyon spring system would be vulnerable to future ground water withdrawals or contamination in their recharge areas (Hurlow and Bishop, 2002).

View upstream of the confluence of Courthouse Wash and Sevenmile Canyon in Arches National Park

The conclusions and data from this report will be used by the National Park Service and the Utah Division of Water Rights to discuss limits on future ground water appropriations in the study area to preserve the present environmental quality and ecologic stability of Courthouse Wash and Sevenmile Canyon.

References:

Hurlow, H. A. and Bishop, C. E. 2002. Recharge Areas and Geologic Controls For the Courthouse-Sevenmile Spring System, Western Arches National Park, Grand County, Utah. Utah Geological Survey Final Contract Report, 134 pp.

Metropolitan Water District Declines to Pursue the Cadiz Project

By Chuck Pettee, Branch Chief

In last year's annual Report, we reported on the Cadiz Ground Water Storage and Dry Year Supply Project (Project) proposed by the Metropolitan Water District of Southern California (District) for a desert basin that is located near Mojave National Preserve (Preserve) and other wilderness areas administered by the Bureau of Land Management. The project would divert water from the Colorado River in years when there is surplus river flow and store it underground beneath private property owned by Cadiz, Inc. During dry years, the stored water and additional indigenous ground water would be withdrawn from the ground and sent to the District's service area. This was one piece of the puzzle being pursued by the Dis-

trict in response to their need to reduce their dependence upon the Colorado River.

The issue for the NPS was the potential for over-drafting the ground water basin which could result in impacts to springs or seeps at Mojave National Preserve. Administratively, there was no independent decision-maker involved so the parties determined to resolve technical disagreements by negotiations in the course of producing the state-required Environmental Impact Report and federal-required Environmental Impact Statement. Management of the technical uncertainty was accomplished and in 2002 the Department of the Interior decided to approve the necessary right-of-way permit conditioned with the negotiated ground water monitoring and management plan.

The final decision was in the hands of the District's Board of Directors and in a close vote, the Board rejected the proposed project. The reasons cited for the rejection included the cost of the project, the uncertainty in the amount of indigenous ground water available, and the drought conditions in the Colorado River basin which means surplus Colorado River water is less likely to be available in the near term.

Scotts Bluff National Monument: A Lesson in Acquired Water Rights

by Eric Lord, Research Associate, Colorado State University

During 2002, the Water Resources Division assisted Scotts Bluff National Monument (SCBL) in the disposal of a right to receive irrigation water from a local irrigation district. In the 1970s, NPS purchased a golf course adjacent to SCBL. The property was located within the boundaries of the local irrigation district and was entitled, by virtue of a water right and contractual right, to delivery of irrigation water. Upon purchase of the golf course, the water right and contractual right came to be held by SCBL, and obligated the park to pay an annual assessment for water delivery whether the park wanted water or not. Because park water needs are satisfied through other sources, SCBL had no use for the water and desired relief from the annual assessment paid to the irrigation district.

Given the increasing scarcity of water, actively seeking to get rid of such a right is questionable. But in this case, divestment was appropriate for several reasons. The park had no use for the water; the former irrigated fairways and greens were converted to non-irrigated natural conditions to better represent park purposes. As a result, the park paid an annual assessment for which it received no value. Additionally, the park's inability to use the water exposed the right to possible forfeiture action by the State of Nebraska. In order to ascertain the proper means of disposal, an assessment was performed, and Solicitor Opinion requested, to determine the true nature of the right as either a "property" right, or as a "contract" right. Such a determination would dictate whether disposal should occur through the General Services Administration or through relinquishment to the irrigation district. The Solicitor Opinion concluded that this particular right was a hybrid, fairly characterized as either a "property" right or a "contract" right. Given water right adjudication time constraints, relinquishment of the right to the irrigation district was chosen as the best means of disposal.

While the value of the right does not make this project a major action, the project does provide some lessons that may apply to many park units where private lands are being considered for acquisition. Valid appurtenant water rights should be identified and included in the land appraisal. Parks should also plan how those rights will be exercised in the future and determine any additional assessment fees or monitoring that will be required. If this planning did not occur before acquisition and a park finds that they have property with water rights in an undetermined status, the land should be immediately inventoried for water use activity and the land acquisition papers examined for mention of water rights. If evidence suggests a water right is appurtenant to the land, the previous landowner and the appropriate state agency should be contacted to determine the current status of the acquired rights; that is, are there any records indicating that there has been beneficial use, for what purposes, for what time periods. This assessment should reveal the extent to which the right is useful or vulnerable to forfeiture issues. Next, an assessment should be done to determine whether the rights in their present form can be applied to NPS purposes, or, whether the rights could be changed so that water could be applied to NPS purposes. If no reasonable use can be made of the rights, disposal should be considered.

Results of Water Chemistry and Age Dating of Springs and Wells in the Vicinity of Chickasaw National Recreation Area

by Jennifer Back, Hydrologist

The Chickasaw National Recreation Area (Chickasaw NRA) is located in the south-central part of Oklahoma in Murray County and was established in 1902 to preserve numerous freshwater and mineral springs that are fed by ground water from the Arbuckle-Simpson aquifer. Recent applications for permits to withdraw groundwater from the

Arbuckle-Simpson aquifer have renewed concerns about the effect on springs.

In 1906, C.N. Gould documented 33 springs within the Park boundaries, some yielding "fresh" water and some yielding "mineralized" water. Since that time, discharge from many of the springs has declined and a number have ceased to flow. The observed decline in spring flow has become one of the most troubling questions facing resource managers at the park. Additional withdrawals from the Arbuckle-Simpson aquifer may pose a new threat to springs in Chickasaw NRA.

The Arbuckle-Simpson aquifer is thought to be the source of water discharging from springs in the park. Rocks that make up the Arbuckle-Simpson aquifer crop out in an area of nearly 500 square miles east and south of the park. Rocks of the Arbuckle Group are primarily limestone and dolomite, whereas those of the Simpson Group are primarily sandstone, shale and limestone. Because of similar water bearing characteristics of the limestone and sandstone formations that comprise these two geologic groups, they are commonly combined and referred to as the Arbuckle-Simpson aquifer.

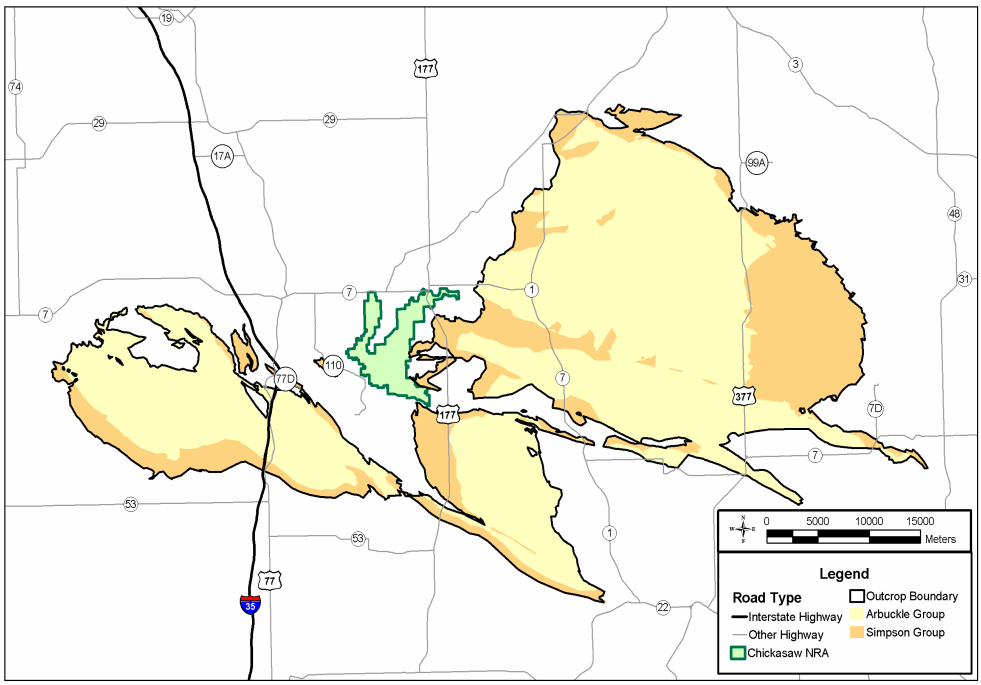
Existing hydraulic data suggest that ground water enters the Arbuckle-Simpson aquifer in the outcrop area to the east of the park and flows underground towards the park, with a portion discharging from the aquifer through the park springs. Although the existing data indicates a relationship between the aquifer and park springs, it sheds little light on the groundwater flow paths, how long flow to the park takes, or why some springs have fresh water and some mineralized water.

In 2002, the NPS initiated a study with the U.S. Geological Survey to collect water quality data from wells and springs in the vicinity of Chickasaw NRA to better understand potential flow paths and residence times of ground water. Water was sampled from 31 sites and analyzed for major ions, bromide, fluoride, iron, manganese, stable hydrogen and oxygen isotopes, and chloroflourocarbons. Depth to water was measured in wells and discharge was measured at springs.

The study shows that the water chemistry of the park's freshwater springs, Antelope and Buffalo Springs, is identical to the water chemistry of wells in the adjacent outcrop area of the Arbuckle-Simpson aquifer. The concentration of total dissolved solids increases from east to west within the park ranging from about 336 mg/l at the freshwater springs to as much as 1300 mg/l at the Vendome Well.

Age data also shows an increasing trend from east to west. As water flows from the outcrop area toward Chickasaw NRA and the town of Sulphur, estimated ages appear to increase. Water in wells near the outcrop boundary is 20 years old or younger, water discharging from the freshwater springs is about 30 years old, and water discharging from mineralized springs further to the west is much older.

This data adds considerable support to theories proposed in previous reports that water from the outcrop area of the Arbuckle-Simpson aquifer is the source of water for



Location of the Arbuckle-Simpson Aquifer Outcrop Area and Chickasaw NRA.

freshwater springs in Chickasaw NRA. Mineralized springs and flowing wells in the park and the town of Sulphur are older and reflect longer flow paths and greater residence time in the aquifer. Taken together, these findings confirm that park resources may be at risk from new groundwater development in the Arbuckle-Simpson aquifer.

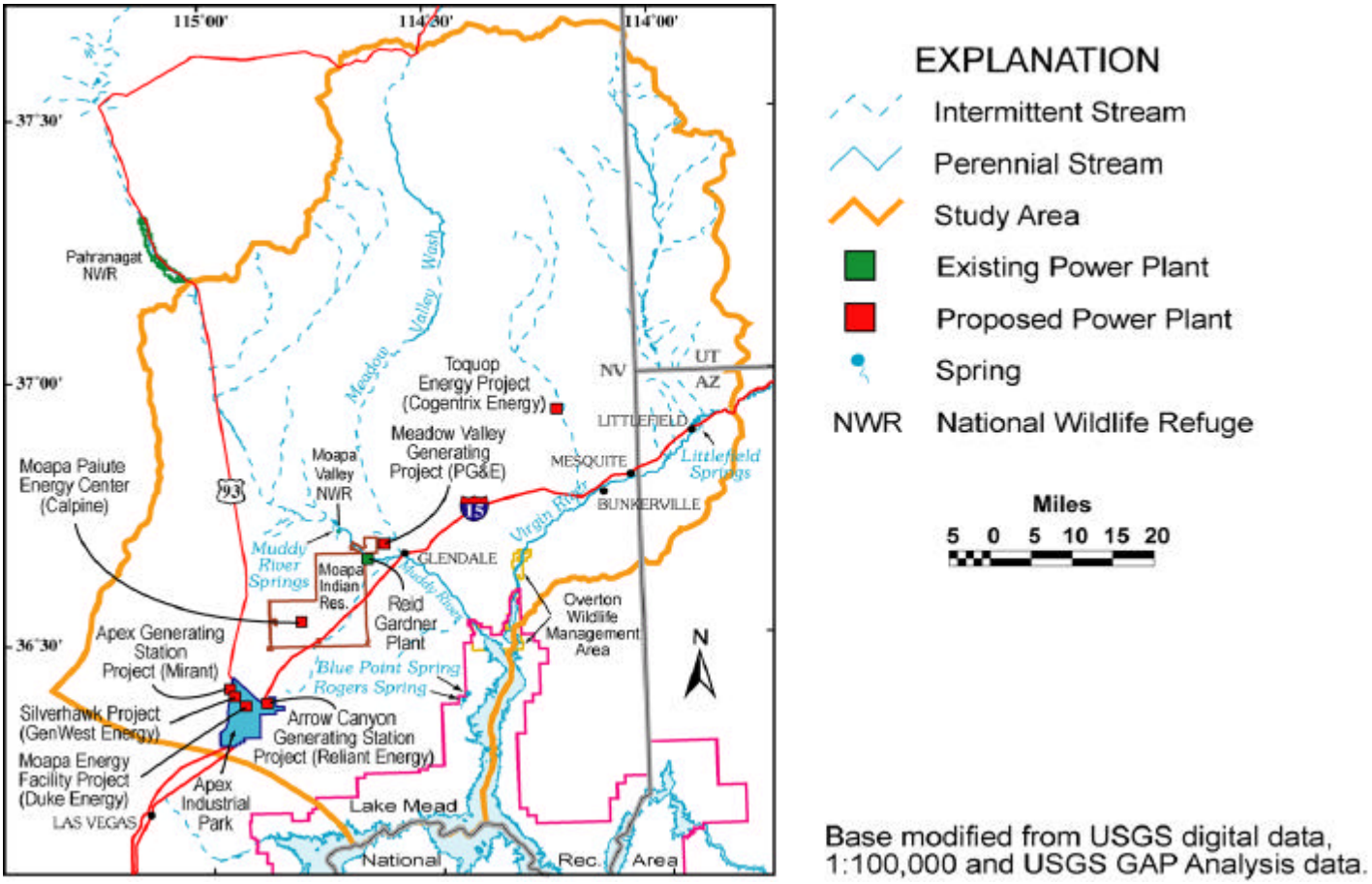
Update: Energy Development in Southern Nevada Increases Demand for Groundwater

by Dan McGlothlin, Hydrologist

In 2002, we reported that independent power producers proposed constructing seven new power plants in southern Nevada, along the Interstate 15 corridor between Las Vegas and Mesquite. The combined withdrawal of groundwater for all projects constructed would impact the regional groundwater-flow system near Lake Mead National Recreation Area. In 2002, the Nevada State Engineer issued permits to water purveyors supporting energy projects in the Lower Meadow Valley Wash and Tule Desert Hydrographic Basins. The permits were for significantly less water than requested, with provisions to increase withdrawals if monitoring indicates no impact. Agreements were reached with the applicants (Moapa Valley Water District in Lower Meadow Valley Wash basin and Lincoln County and Vidler Water Company in Tule Desert basin) to allow NPS to withdraw its protests to their applications. Resources at Lake Mead are protected through early warning monitoring wells, and action criterion were established to determine if mitigation or other actions may be necessary.

There was considerable change in energy development activities in 2002. Reflecting a downturn in economic conditions throughout the west, federal decisions on four of seven power generation projects were suspended or placed in inactive status (pers. comm. BLM Las Vegas Field Office), including projects in the Apex Industrial Park, Lower Meadow Valley Wash and Moapa Indian Reservation areas. A ruling by the Nevada State Engineer may also have contributed to a chilling of interest in developing high water use power generation projects in southern Nevada. In Ruling No. 5115, issued April 18, 2002, the state engineer found that the use of substantial amounts of newly appropriated water for water-cooled power plants is not a prudent use of water "in one of the driest places in the nation" and only limited quantities of groundwater development should be allowed until a determination "can be made as to the quantity of water available". Two of the four suspended projects were water-cooled power plants.

In the near-term, power plant development has slowed. At this writing, project construction and/or planning continue in the Apex area and near Mesquite.



Support Provided to Regions, Parks, and Other NPS Organizational Units

ALASKA REGION

Planning & Evaluation Branch

Presented a talk entitled "*Tools for Managing Water Resources in Alaska's National Parks"* at the North American Lake Management Society symposium in Anchorage, AK (Oct. 30 – Nov. 1 2002).

Met with network staff to discuss marine monitoring needs and plans in Southeast Alaska Vital Signs Network.

Reviewed and approved a wetland Statement of Findings for the project "Property Acquisition in Kotzebue, Western Arctic Parklands, Alaska. WRD's signature certified the technical adequacy of the wetland analyses and consistency of the project with Director's Order #77-1.

Denali National Park and Preserve

Reviewed and approved wetland Statements of Findings for two park projects: "Construction of New Visitor Facilities in the Entrance Area" and "Construction of an Access Road to Spruce #4 Inholdings in Kantishna."

Provided technical and policy review on the draft report "Denali National Park Gravel Acquisition Plan Wetland Delineation."

Provided technical and policy review on the draft Denali National Park and Preserve's Backcountry Management Plan and EIS.

Glacier Bay National Park & Preserve/Sitka National Historical Park/Klondike Gold Rush National Historical Park

Met with park staff to review fisheries stock assessments, CREEL survey protocols, and coastal inventory programs.

Katmai National Park and Preserve

Assisted Park and the Alaska Support Office with preparation of a the Water Resources Management Plan.

Wrangell-St. Elias National Park and Preserve

Initiated the development of Water Resources Scoping Report

Water Operations Branch

Participated in interagency and multimedia (air and water) meetings and provided Park Service staff with information on persistent organic pollutants, mercury, and other toxic chemicals.

Cape Krusenstern National Monument

Reviewed and provided comments to Park and Region staff on various documents generated by Teck Cominco Alaska related to transport of metal concentrates across Park lands via the DeLong Mountain Transportation System.

Addressed Park and Region concerns with residual hydrocarbon contaminants and use of source water from a borrow pit (existing Material Site) where elevated arsenic levels in site soils had been previously indicated.

Katmai National Park and Preserve

Advised Park on PAH issues and studies needed to establish a chemical baseline condition before potential future oil spills occur.

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

Kenai Fjords National Park

Obtained, entered, reformatted, and QA/QCed additional 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

Evaluated the erosion of the historic town site of Dyea by the Taiya River and determined the viability of channel bank stabilization using engineered log jams in a detailed report for the Park.

Assisted in interpreting monitoring data regarding bank erosion on the Taiya River near Dyea town site.

Water Rights Branch

Kenai Fjords National Park

Provided assistance to Park and SOL on the agreement with Alaska Power Authority defining instream flow requirements for the Nuka River.

Sitka National Historic Park

Assisted park in acquiring an appraisal for water rights owned by Sheldon Jackson College on the Indian River.

INTERMOUNTAIN REGION

Planning & Evaluation Branch

Represented the NPS at meetings of the Upper Colorado River Recovery Implementation Program (UCRRIP) Biology Committee; coordinated with IMR staff in submitting comments and establishing positions on reports and issues.

Represented the NPS in the Flaming Gorge Dam EIS process, including meetings of the Cooperating Agencies and the Interdisciplinary Team in order to develop a run of the river alternative for FGD operation.

Participated in the Northern Colorado Plateau Inventory and Monitoring Network Workshop on Water Quality Monitoring Design.

Worked with Upper Colorado River Recovery Implementation Program members to reach a compromise on flow recommendations for Colorado pikeminnow (*Pytchocheilus lucius*) and razorback (*Xyrauchen texanus*) sucker in the Gunnison River.

Participated in the NPS Geologic Resources Division's Geoindicators Workshop for Canyonlands National Park, Arches National Park, Natural Bridges National Monument, and Capitol Reef National Park, in conjunction with Park Vital Signs Monitoring.

Badlands National Park

Provided water-related references and materials to the DSC planning team developing the Park's General Management Plan.

Carlsbad Caverns National Park

Provided technical assistance relating to the management of flow from Rattlesnake Springs.

Provided information on the preservation of largemouth bass stomach samples for food analysis.

Devils Tower National Monument

Reviewed and approved a wetland Statement of Findings for the project "*Expand Existing Headquarters and Relocate Parking Area*."

Dinosaur National Monument

Provided programmatic oversight and technical review for a WRD funded study to assess the response of Colorado pikeminnow in Lodore Canyon to changes in Flaming Gorge Dam operations and to determine their relationship to the population in the Green and Yampa rivers.

Assisted the US Geological Survey in a study of pH levels in the Yampa River.

Fort Union National Historic Site

Compiled information on pallid sturgeon (*Scaphirhynchus albus*) habitat in the Upper Missouri and Yellowstone rivers and made recommendations on an approach to addressing bank erosion and habitat protection in the Park.

Glen Canyon National Recreation Area

Participated in an NRPC team that assessed the functional condition of several riparian-wetland areas and uplands on the Kaiparowits Plateau.

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

Completed the final design for reclamation of the Snake River Gravel Mine. Developed bid specifications for earthmoving and revegetation contracts, and supervised earthmoving contractors to assure that final elevations were achieved in the field as designed. Created 55 acres of open water, submerged aquatic vegetation habitat, sedge meadows, willow flats, and uplands at the site.

Reviewed and evaluated the "North Park Road Reconstruction Environmental Assessment" and the "Statement of Findings for the North Park Road Reconstruction" wetland impacts. Documented changes necessary to evaluate consistency and compliance and provided language for the compensatory mitigation section, and carried the SOF through to signature.

Navajo National Monument

Provided internal NPS policy review and comments for the water-related issues within the Navajo National Monument Draft GMP/EA.

Padre Island National Seashore

Cooperated with consultants to BNP Petroleum Corporation to clarify, in writing, appropriate methods for delineating wetlands subject to both Section 404 of the Clean Water Act and NPS Director's Order #77-1: Wetland Protection.

Reviewed and approved a wetland/floodplain Statement of Findings for the project "BNP Petroleum Corporation Lemon/Lemon Seed Unit Wells." WRD's signature certified the technical adequacy of the wetland analyses and consistency of the project with Director's Order #77-1.

Palo Alto Battlefield National Historical Site

Assisted the US Department of the Interior U.S. – Mexico Border Field Coordinating Committee in the completion and publication of a water resources issues fact sheet for the Lower Rio Grande Valley Basin (Falcon Reservoir – Gulf of Mexico).

Provided programmatic oversight and technical assistance to park staff and contractors regarding implementation of the project "Restore Resaca Wetlands – Phase 2: Restoration Design."

Petrified Forest National Park

Provided internal NPS policy review and comment on the water-related issues within the Petrified Forest National Park Draft General Management Plan Revision / EIS.

Cooperated with a Colorado State University cooperator and park staff to develop a study proposal titled "Stream and Riparian Characterization and Analysis, Petrified Forest National Park, Arizona."

Rocky Mountain National Park

Assisted park staff in examining 10 wetland areas along the proposed "Bear Lake Road Improvement Project." Identified wetland impact areas, delineated the wetland boundaries in the field, and estimated the wetland impact/fill area using the proposed engineering drawings.

Analyzed and graphed well data (ground water, fill surface, and original grade) and provided onsite assistance to park staff regarding hydrologic design and methods for restoring wetland habitat as part of the "Hidden Valley Creek Wetland Restoration" project.

Provided programmatic oversight and assisted park staff in completing the detailed implementation plan for the NRPP-funded project "Glacier Creek Livery Wetland Reclamation."

Provided programmatic oversight and approved the implementation plan for a project to establish a population of Colorado River cutthroat trout (*O. c. pleuriticus*) in Pettingel Lake.

Provided programmatic oversight and approved the implementation plan for a project to restore a population of greenback cutthroat trout (*O. c. stomias*) in Hidden Valley Creek.

Assisted the park in researching materials on the use of antimycin in native fish restoration projects.

Washita Battlefield National Historic Site

Assisted park staff and an Oklahoma State University cooperator in developing a proposal entitled "Geomorphic Adjustment of the Washita River, Washita Battlefield National Historic Site, Oklahoma."

Wind Cave National Park

Provided policy and technical review concerning the water-related aspects of the DRAFT Wind Cave Boundary Expansion EA.

Yellowstone National Park

Reviewed and approved wetland Statements of Findings for two projects: "Canyon Junction to Tower Road Junction Road Improvement" and "Norris Area Water and Wastewater Treatment Project."

Water Operations Branch

Arches National Park

Reviewed report regarding hydrogeology and source of water for springs in Courthouse Wash area.

Arches National Park/Canyonlands National Park

Reviewed and commented on multiple documents related to the Moab Mill (UMTRA) Site, methods used in its characterization and groundwater investigation, interim actions, long-term cleanup alternatives, and remedial actions now being considered/undertaken by the Department of Energy. Served on the Groundwater Subcommittee for the Moab Mill Site.

Participated in the Long Term Management of DOE Legacy Waste Sites: Phase 2 meeting to facilitate a National Academy of Science site review and understanding of groundwater issues at the Moab Mill Site and served as a Groundwater Panel participant.

Provided continuing assistance assessing potential effects of leachate from the Atlas Mine tailings on downstream resources in the Colorado River.

Big Bend National Park

Performed a detailed survey and assessment of two existing fish ponds and several potential pond locations for the

purpose of maintaining endangered species habitat. (

Supervised rehabilitation of water supply wells in the Castolon Area and conducted subsequent testing for yield.

Provided technical assistance regarding public water supplies at Rio Grande Village, Panther Junction, and Chisos Basin.

Prepared groundwater monitoring plan for the Park.

Big Thicket National Preserve

Provided advice to Park staff related to NPS permitted non-federal oil and gas operations located adjacent to the Park.

Canyonlands National Park

Prepared report on hydrogeology and potential groundwater supplies for the Island-in-the-Sky area.

Reviewed and commented on the Salt Creek Road Management Environmental Assessment on the use of the Proper Functioning Condition method to evaluate impairment of riparian zones and stream channels by vehicle use.

Capitol Reef National Park

Reviewed paper regarding potential for groundwater pumping east of Park to impact Park resources.

In conjunction with the EPA, State of Utah and other NPS Divisions, participated in the development and implementation of a set of prototype sampling protocols for abandoned uranium mine lands at the Rainy Day Mine and Duchess Mine sites.

Carlsbad Cavern National Park

Provided Park staff with comments on potential effects of a contact cement on cave invertebrates and other resources.

Casa Grande Ruins National Monument

Provided advice regarding groundwater monitoring plan.

Chiricahua National Monument

Initiated Level 1 Water Quality Inventory.

Coronado National Memorial

Initiated Level 1 Water Quality Inventory.

Curecanti National Recreation Area

Provided fiscal and technical management and guidance for funded project "Data Collection and Analysis of Required Water Quality Parameters; Outstanding waters designation."

Devils Tower National Monument

Performed floodplain analysis for a proposed visitor transfer station located near the Belle Fourche River.

Assisted in surveying, hydraulic modeling, and floodplain delineation for the Belle Fourche River in the area of proposed visitors orientation center.

Dinosaur National Monument

Consulted with Park management on the relocation of a boat ramp on the Yampa River in Deerlodge Park.

Reviewed the final report for the USGS project to study a potential upward trend in pH in the Green River. Helped formulate plans for additional pH studies and review the data when it became available.

El Malpais National Monument

Provided review and consultation for a contractor for the development of a restoration plan and environmental assessment for Aqua Fria Creek. Contributed geomorphic assessments to enhance a WRD funded project.

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

Florissant Fossil Beds National Monument

Contacted Park staff and other involved professionals to check on restoration progress after removal of five dams.

Fort Bowie National Historic Site

Initiated Level 1 Water Quality Inventory.

Fort Davis National Historic Site

Performed floodplain reconnaissance of a group camp building located near the headwaters of an unnamed drainage and provided additional technical input for a floodplain Statement of Findings for the entire Park.

Gila Cliff Dwellings National Monument

Initiated Level 1 Water Quality Inventory.

Glacier National Park

Performed floodplain hazard assessments at several loca-

tions in the Park.

Assisted in surveying, hydraulic modeling, and developing of recommendations regarding flood hazards for Appistoki Creek at Two Medicine, Rose Creek at Rising Sun, Snyder Creek at Lake McDonald Lodge, McDonald Creek at Apgar, Swiftcurrent Lake at Many Glacier Hotel, and Swiftcurrent Creek.

Reviewed Floodplain Statement of Findings for project in the Park.

Provided technical assistance related to water supplies at Granite Chalet and Walton Ranger Station and to mitigation of high water table conditions at Many Glacier sewage lagoons.

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

Glen Canyon National Recreation Area

Attended annual cooperators' meeting and interagency meeting related to the strategic plan for addressing human health issues at Lake Powell. Served on Technical Advisory Committee tasked with developing bacteria water quality monitoring guidelines and protocols.

Grand Canyon National Park

Provided technical assistance in evaluating potential effect of developing regional water supplies on South Rim springs.

Reviewed and commented on report for alternative water supplies.

Provided advice regarding potential for impact to Park resources from groundwater withdrawals in the Dell City area.

Reviewed status of spring inventory studies with Park staff and USGS cooperators.

Grand Teton National Park

Provided technical comments on Vital Signs Network plan to develop a Phase 1 Report.

Reviewed project proposal for baseline water quality parameters/land use characteristics of five Snake River headwater tributaries.

Completed grading plan design for Snake River Gravel pit wetlands restoration project.

Assisted Park staff in water supply development efforts and traveled to the Park to observe the drilling of a water supply well at Moran Junction to ensure that water yields were sufficient to meet Park water supply needs.

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

Provided water quality stations as an ArcView ShapeFile in UTM projection.

Grant-Kohrs Ranch National Historic Site

Advised Park staff with environmental aspects of burning vegetation that had accumulated heavy metals.

Guadalupe Mountains National Park

Completed a floodplain and flood hazard analysis at four locations within the Park: Dog Canyon Ranger Station and Campground, Visitors Center, Pine Springs Campground, and Pratt Cabin in Mckittrick Canyon.

Provided advice regarding potential for impact to Park resources from groundwater withdrawals in the Dell City area.

Obtained, entered, reformatted, and QA/QCed water quality data for upload to new STORET.

Hubbell Trading Post National Historic Site

Provided information on WRD's assistance to the Park as requested by management as a follow-up on a stream assessment conducted in May 2000.

Lake Meredith National Recreation Area

Provided advice to Denver Service Center planning team related to interpretation of NPS floodplain guidelines with respect to non-federal oil and gas operations.

Lyndon B. Johnson National Historical Park

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

Mesa Verde National Park

Contacted Park staff to provide technical assistance and discussion about spring monitoring and other water resource issues requested by the Park.

Montezuma Castle National Monument

Initiated Level 1 Water Quality Inventory.

Natural Bridges National Monument

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

Organ Pipe Cactus National Monument

Initiated Level 1 Water Quality Inventory.

Padre Island National Seashore

Provided advice to Park staff related to NPS permitted non-federal oil and gas operations.

Advised Park staff on environmental significance of arsenic levels.

Reviewed Floodplain Statement of Findings for project in the Park.

Pipe Spring National Monument

Investigated hydrogeology related to reduction of spring flow.

Assisted Park in developing design for reconstruction of Tunnel Spring.

Consulted with Park management on a USGS geophysical investigation to determine the source of spring flow in and around the Monument.

Rocky Mountain National Park

Assisted in the removal of remaining portions of the infrastructure of Hidden Valley Ski Area by providing guidance in designing a stream channel for Hidden Valley Creek to replace a 500 ft culvert. Participated in the initial steps of the wetlands restoration project in the location of the old parking lot.

Performed hydraulic modeling for proposed alignment of Hidden Valley Creek.

Performed survey of Moraine Park and Horseshoe Park in support of a WRD funded project.

Developed rating curves for newly installed staff gages at Glacier Creek at Sprague Lake Trailhead, Big Thompson River near the YMCA, and Hidden Valley Creek.

Reviewed draft water designated uses and impairment status report.

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

Provided water quality station location maps to Colorado River Watch and the Big Thompson Watershed Forum during the implementation phase of the volunteer water quality monitoring program.

Saguaro National Park

Provided assistance regarding the potential for groundwater pumping in Avra Valley to affect the water supply well in the West District of the Park.

Evaluated alternative groundwater supplies for Manning Camp in the Rincon Mountain District.

Initiated Level 1 Water Quality Inventory.

Sand Creek Massacre National Historic Site

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

Timpanogo Cave National Monument

Served on an interagency team (USFS, BOR) to evaluate and report on river restoration needs associated with dam removal on the American Fork River.

Tonto National Monument

Conducted drawdown and yield testing of the Park's water supply well and prepared a report on hydrogeology and potable water supply for the Park.

Tumacacori National Monument

Initiated Level 1 Water Quality Inventory.

Washita National Battlefield

Prepared a report for Park management on a riparian assessment of the Washita River using Proper Functioning Condition procedures that will assist the Park's ongoing restoration efforts.

White Sands National Monument

Advised Park staff on "free from" water quality standards language in New Mexico Standards.

Completed reconnaissance of stream crossings and provided advice and technical guidance for game fence con-

struction.

Followed Department of the Army plans to address potential contamination resulting from a missile impact on the Monument.

Monitored groundwater issues related to development of a municipal groundwater supply near the Park.

Yellowstone National Park

Participated in US Forest Service meetings addressing long-term cleanup and restoration of the New World Mining District. Continued to review and comment on US Forest Service work plans, reports, and proposed remedial activities involving restoration of the New World Mining District.

Reviewed and commented on the State of Montana's preliminary EE/CA addressing proposed alternatives for the disposition of the McLaren mine tailings. Developed a basis for consideration of alternate proposals more protective of Park resources.

Visited New World Mining District to inspect ongoing remedial actions and to review progress made by the US Forest Service in cleanup, construction, surface restoration, and groundwater monitoring activities at the new mine waste repository, McLaren Pit, Como Basin, and Glengarry Adit.

Reviewed and commented on study proposal to use natural ferricrete (iron hydroxides) deposits in the New World Mining District to estimate pre-mining water quality.

Provided review comments for EEE/CA regarding disposition of McClaren mining tailings.

Water Rights Branch

Aztec Ruins National Monument

Assisted park in evaluating water rights associated with land acquisitions.

Arches National Park

Completed Hydrogeology Study to determine connectivity between park water sources and adjacent private ground water wells.

Directed data collection for springs on Sevenmile and Courthouse Washes.

Completed water source and water rights inventory.

Continued quantification of state and Federal reserved water rights.

Bent's Old Fort National Historic Site

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

Big Bend National Park

Discussed acquisition of Rio Grande River water rights with conservation groups.

Big Hole National Battlefield

Monitored flow 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 on park water rights.

Assisted park and Region with negotiations for the quantification of a Federal reserved water right.

Participated in the Aspinall Unit Operations meetings.

Participated in meetings with DoJ and SOL attorneys and other Federal agencies in an effort to develop a consistent Department interpretation of the Park's water right claim.

Prepared database of protests received regarding NPS application for water rights.

Capitol Reef National Park

Completed water source and water rights inventory.

Prepared present/future consumptive use estimate.

Continued quantification of Federal reserved water rights.

Prepared assessment report on impacts of a proposed BLML and exchange.

Carlsbad Cavern National Park

Initiated investigations to determine the dependence of cave resources on Capitan Aquifer.

Installed stage gages in Sulphur Springs and Lake of the White Roses in Lechugilla Cave. Prepared draft study plan to identify studies required to support a federal reserved water rights claim to groundwater.

Estimated water use by NPS and Washington Ranch at Rattlesnake Springs.

Provided recommendations for the development of spring discharge and natural resources management plans at Rattlesnake Springs.

Chaco Culture National Historical Park

Prepared draft completion report summarizing flow and water level studies.

Coronado National Memorial

Updated and amended the claim for future consumptive uses.

Amended statement of claimant for Richard's property.

Assisted park, SOL and DoJ on negotiations with objectors to resolve contested case in San Pedro River adjudication.

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.

Craters of the Moon National Monument

Assisted SOL and DoJ review offers for water rights on the Snake River Basin Adjudication.

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.

Coordinated and funded development of a "run-of-the-river" model and companion report for Flaming Gorge EIS.

Maintained a stream gage on the Green River to assist hydraulic modeling efforts.

Provided assistance to park by reviewing flow recommendations for Colorado River fishes.

El Malpais National Monument and El Morro National Monument

Assisted park, SOL and DoJ respond to motions regarding the quiet title action for the Zuni river.

Florissant Fossil Beds National Monument

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

Prepared documents for DoJ in support of application for finding of reasonable diligence for Sawmill Trail.

Glacier National Park

Evaluated 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.

Revised draft completion report for discharge and survey data collected on 1990-93.

Glen Canyon National Recreation Area

Assisted park with review of proposals for a dam on the Escalante River.

Provided assistance to park on reviewing flow recommendations for the Navajo Dam EIS.

Golden Spike National Historic Site

Prepared present/future consumptive use estimate report.

Assisted SOL and DoJ in finalizing a water rights agreement with Utah.

Grand Canyon National Park

Participated in settlement discussions and status conferences for the Little Colorado River (LCR) Adjudication.

Finalized stipulations with five other parties to resolve water rights in the LCR Adjudication and received approval from Decree Court.

Briefed park staff and management, the SOL, the Department, and DoJ on water right issues in the LCR adjudication.

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.

Finalized geohydrology report for the C-Aquifer.

Provided funding to USGS to collect springflow and geologic information about South Rim Springs.

Assisted SOL and DoJ in the preparation of a General Agreement with nonindustrial users in the LCR.

Coordinated the completion of an appraisal level study by the BoR evaluating water supply alternatives.

Provided water rights assistance and guidance for participation on the North Central Arizona Water Supply Technical Committee and the Water Advisory Council.

Grand Teton National Park

Researched Wyoming statutes for requirements concerning ditch easements and maintenance.

Great Sand Dunes National Monument

Produced reports by consultant summarizing aquifer tests and geophysical work on Medano Creek.

Provided assistance to park to monitor terminus point of surface flow on Sand Creek.

Evaluated water rights applications in Water Diversion 3 to determine impact of diversions on decreed water rights.

Assisted Park, Region and SOL review documents/proposals to acquire Baca Ranch.

Hovenweep National Monument

Reviewed Colorado water right resumes for Water Division 7 to determine if protests were necessary to protect park water rights and resources.

Established agreement with Division Engineer to report annual water uses for Federal reserved rights at springs.

Assisted park in preparing annual water use reports for the Water Commissioner.

Hubbell Trading Post National Historic Site

Participated in settlement discussions and status conferences for the LCR (Little Colorado River) Adjudication.

Finalized stipulations with five other parties to resolve water rights in the LCR Adjudication and received approval from Decree Court.

Finalized geohydrology report for the C-Aquifer.

Monitored groundwater level to protect park water rights.

Briefed staff and management, the SOL, the Department, and DoJ on water rights issues in the LCR Adjudication.

Assisted park in reviewing documents to join the Ganado Water Users Association.

Assisted SOL and DoJ on the preparation of a General Agreement with non-industrial users on the LCR.

Little Big Horn Battlefield National Monument

Continued support and oversight for park operation of a stream gage on the Little Bighorn River.

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

Mesa Verde National Park

Reviewed Colorado water right resumes for Water Division 7 to determine if protests were necessary to protect decreed water rights.

Continued support and oversight for park operation of a stream gage on the Mancos River.

Established agreement with Division Engineer to report annual water uses for Federal reserved rights at springs.

Assisted park in preparing annual water use reports for the Water Commissioner.

Montezuma Castle National Monument

Conducted seepage run on Beaver Creek.

Installed stream gage on swalet at Montezuma Well.

Updated consumptive use estimate.

Prepared draft project plan to quantify Federal reserved rights for the Verde River Adjudication.

Pecos National Historical Park

Initiated quantification of water rights associated with acquired properties.

Petrified Forest National Park

Participated in settlement discussions and status conferences for LCR Adjudication.

Completed stipulations with five other parties to resolve water rights in the LCR Adjudication approved by Decree

Court.

Finalized geohydrology report for the C-Aquifer.

Monitored groundwater level to protect park water rights.

Assisted SOL and DoJ on the preparation of a General Agreement with non-industrial users on the LCR.

Briefed staff and management, the SOL, the Department, and DoJ on water rights issues in the LCR adjudication.

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.

Advised park on well registration requirements for Tunnel Spring.

Rainbow Bridge National Monument

Finalized a water rights settlement agreement with the State of Utah to recognize Federal reserved water rights.

Rocky Mountain National Park

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

Saguaro National Park

Inventoried water rights on acquired lands and prepared draft change of ownership forms..

Filed application for instream flow right on Rincon Creek.

Initiated development of project plan for work to support instream flow application.

Sunset Crater Volcano National Monument

Participated in settlement discussions and status conferences for the LCR Adjudication.

Finalized stipulations with five other parties to resolve water rights in the LCR Adjudication and received approval from Decree Court.

Finalized geohydrology report for the C-Aquifer.

Briefed staff and management, the SOL, the Department, and DoJ on water rights issues in the LCR adjudication.

Monitored groundwater level to protect park water rights.

Assisted SOL and DoJ in the preparation of a General Agreement with non-industrial users on the LCR.

Assisted park in the development of a Governmental Agreement and a Technical Advisory Committee for the water rights agreement between the United States and the City of Flagstaff.

Timpanagos Cave National Monument

Revised draft settlement agreement with Utah for Federal reserved and state appropriative water rights.

Coordinated review of draft water rights settlement agreement by the Forest Service.

Tumacacori National Historic Park

Provided assistance to park and SOL in water rights negotiations for the Upper Santa Cruz River Adjudication.

Updated consumptive use estimate.

Tuzigoot National Monument

Updated consumptive use estimate.

Walnut Canyon National Monument

Participated in settlement discussions and status conferences for the LCR.

Finalized stipulations with five other parties to resolve water rights in the LCR Adjudication and received approval from Decree Court.

Finalized a geohydrology report for the C-Aquifer.

Cooperated with the city of Flagstaff to determine the frequency and magnitude of high flows in Walnut Creek.

Monitored groundwater level to protect water rights.

Briefed staff and management, the SOL, the Department, and DoJ on water rights issues in the LCR Adjudication.

Assisted SOL and DoJ in preparation of a General Agreement with the non-industrial users on the LCR.

Assisted park in the development of a General Agreement and Technical Advisory Committee for the water rights agreement between the United States and the City of Flag-

staff.

Wupatki National Monument

Participated in settlement discussions and status conferences for the LCR Adjudication.

Finalized stipulations with five other parties to resolve water rights in the LCR Adjudication and received approval from Decree Court.

Finalized a geohydrology report for the C-Aquifer.

Monitored groundwater level to protect park water rights.

Briefed staff and management, the SOL, the Department, and DoJ on water rights issues in the LCR Adjudication.

Assisted SOL and DoJ in preparation of a General Agreement with the non-industrial users on the LCR.

Assisted park in the development of a General Agreement and Technical Advisory Committee for the water rights agreement between the United States and the City of Flagstaff.

Yellowstone National Park

Evaluated water right applications to determine impacts on park rights as required by the Montana Water Rights Compact.

Negotiated with USFS to set diversion limits for a well located on a tributary to Soda Butte Creek, attended New World Mine Restoration Project field tour.

Attended Yellowstone Controlled Groundwater Technical Oversight Committee annual meeting.

Assisted USFS legal council with proposed water rights transfers from Royal Teton Ranch to the United States..

Monitored progress of Montana Bureau of Mines and Geology project to map geology and collect streamflow data for watersheds in the Yellowstone Controlled Groundwater Area.

Monitored progress of Colorado State University study of the performance characteristics of the upper Reese Creek flume.

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

Monitored streamflow and water quality for Soda Butte Creek in support of the Montana Water Rights Compact.

Evaluated long-term monitoring plan proposed by Yellowstone Controlled Ground-Water Area Technical Oversight Committee.

Assisted SOL and DoJ review offers for water rights on the Snake River Basin Adjudication.

Zion National Park

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

Prepared draft implementation plan for water rights agreement.

Multi-Park

Assisted region and parks in the development and implementation of the Colorado River technical and steering committees.

Prepared draft letter to U.S. Bankruptcy Court concerning acquisition of Rio Grande River water rights.

MIDWEST REGION

Planning & Evaluation Branch

Buffalo National River

Provided programmatic oversight and approved an accomplishment report for an ongoing NRPP funded study of fish distribution and water quality in the Buffalo River and its tributaries.

Cuyahoga Valley National Recreation Area

Provided policy and technical review for a draft “Wetland Protection Plan for Proposed Agricultural Lands” and a draft “Riparian Buffer Plan for Proposed Agricultural Lands.”

Provided technical review and comment on the draft report “Wetland Restoration Needs at Cuyahoga Valley National Park.”

Hot Springs National Park

Provided policy and technical review of the draft Hot Springs National Park Water Resources Scoping Report prepared cooperatively by the National Park Service and U.S. Geological Survey.

Isle Royale National Park

Provided programmatic oversight and approved an implementation plan to develop a cooperative Fisheries Management Plan for Isle Royale National Park with special emphasis on inland waters.

Ozark National Scenic Riverways

Assisted the park in the review of state fisheries harvest data and provided policy guidance and recommendations regarding State of Missouri proposal to expand fish stocking activities in the Ozark National Scenic Riverways.

Pictured Rocks National Lakeshore

Provided policy review and comment concerning the water-related aspects of the Pictured Rocks National Lakeshore Draft General Management Plan / EIS.

Provided programmatic oversight and approved a preliminary implementation plan for a study of coaster brook trout migration and distribution in Pictured Rocks National Lakeshore streams and the nearshore waters of Lake Superior.

Voyageurs National Park

Provided programmatic oversight and assisted Voyageurs National Park and the University of Minnesota cooperator in the development of a Water Resources Management Plan for Voyageurs National Park.

Provided programmatic oversight and approved the accomplishment report and ongoing BRMD funded study of muskellunge (*Esox masquinongy*) in Shoepack Lake.

Provided policy review and comments on a draft Memorandum of Agreement on fish management between the Park and Minnesota Department of Natural Resources, Fisheries Division.

Water Operations Branch

Agate Fossil Beds National Monument

Conducted hydrologic inventory and developed monitoring plan.

Buffalo National River

Provided Park with technical comments related to previous and anticipated bioassessment work and national and state protocols required to assess biological integrity of streams.

Cuyahoga Valley National Recreation Area

Consulted with Park staff on the appropriate use of interlocking block for bank stabilization along the Cuyahoga River.

Effigy Mounds National Monument

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

Fort Union Trading Post National Historic Site

Assessed field conditions with a consultant from the Bureau of Reclamation to design a bio-engineered bank protection on the Missouri River within the Park's view shed.

George Washington Carver National Monument

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

Herbert Hoover National Historic Site

Reviewed a stream restoration plan for Hoover Creek for riparian and geomorphic resources.

Homestead National Monument of America

Provided technical assistance to Park staff regarding the erosion of a hiking trail along Cub Creek and developed stream bank stabilization alternatives in a report to the Park.

Hopewell Culture National Historical Park

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

Mississippi National River and Recreation Area

Provided technical expertise to a partnership group developing a watershed management plan for Etter Creek.

Missouri National Recreational River

Provided technical comments on potential impacts to water resources from the proposed replacement of the Yankton, SD, Highway Bridge.

Reviewed and commented on plans for Lewis and Clark Rural Water System.

Niobrara-Missouri National Riverways

Visited Park and provided assistance related to bank stabilization.

Ozark National Scenic Riverways

Provided assistance regarding the local hydrogeology and potential impacts of proposed lead mining in the watershed of the Park.

Reviewed draft water designated uses and impairment status report.

Provided technical advice to Park staff regarding water quality metadata and the format of project, station, metadata, and result files to facilitate uploading data from their ongoing monitoring program to STORET.

Pictured Rocks National Lakeshore

Provided Park Staff with summary information on environmental issues related to clonitralid, a pesticide.

Pipestone National Monument

Reported on a field trip assessing flooding potential of the Visitor Center and other portions of the Park. Instructed Park staff on how to monitor the effects of dewatering quarries on a nearby population of rare orchids.

Sleeping Bear Dunes National Lakeshore

Conducted field reconnaissance, analyzed historic and current streamflows of the Crystal River downstream from Glen Lake, and prepared report on relationship between streamflows and instream recreation uses and aquatic habitat conditions.

Conducted a hydraulic analysis of the Crystal River for use in minimum flow requirements.

Helped review draft water resources management plan.

Provided technical advice to Park staff regarding water quality metadata and the format of project, station, metadata, and result files to facilitate uploading data from their ongoing monitoring program to STORET.

Tall Grass Prairie Preserve

Provided advice regarding establishment of rural water district.

Wilson's Creek National Battlefield

Reviewed draft water designated uses and impairment status report.

Water Rights Branch

Badlands National Park

Reviewed state and federal authorities for disposal of water rights, and advised park concerning applicability of NPS policy to provide water for local ranchers.

Buffalo National River

Provided funding and technical oversight to support hydrologic and biologic studies on Bear Creek.

Provided assistance to the Park, SOL, and DoJ in developing technical information and response to the Bear Creek Dam 404 permit application by Searcy County.

Provided assistance (including briefings) to the Park, Sol, and DoJ in responding to the Ozark, et al. lawsuit filed against the Corp of Engineers.

Scotts Bluff National Park

Completed assessment of options for relinquishment or disposal of unneeded irrigation rights, coordinated with Office of the Solicitor, and prepared a recommendation regarding preferred method of disposal.

Sleeping Bear Dunes National Lakeshore

Prepared a preliminary report on hydrologic conditions in Glen Lake and the Crystal River.

Theodore Roosevelt National Park

Prepared response to the North Dakota State Engineer regarding Medora Foundation application, met with the North Dakota State Engineer to explore resource protection options for Little Missouri River.

Conducted field reconnaissance of the Little Missouri River, researched legislative history and land records.

Wind Cave National Park

Completed evaluation of Norbeck Reservoir right for possible conversion to instream uses for wildlife needs.

Voyageurs National Park

Provided comments to park staff on Water Resources Scoping Report.

Multi-Park

Presented talk on instream flow quantification at Wild and Scenic River Management Workshop, Nebraska City, NE.

NATIONAL CAPITAL REGION

Planning & Evaluation Branch

Antietam National Battlefield

Completed and published the Antietam National Battlefield's Water Resources Scoping Report (NPS Technical Report NPS/NRWRD/NRTR-2002/299).

Catoctin Mountain Park

Reviewed and commented on the draft 1998 Catoctin Mountain Park (CATO) Water Resource Scoping Report (WRSR) prepared by the park.

George Washington Memorial Parkway

Provided programmatic oversight and assisted park staff and University of Maryland cooperators in completing the detailed study plan for the NRPP-funded wetland restoration feasibility study "Should We Restore Dyke Marsh? – A Management Dilemma Facing George Washington Memorial Parkway."

National Capital Parks East

Provided internal NPS policy review and comments for the water-related issues within the Fort Circle Parks Draft General Management Plan / EA.

Prince William Forest Park

Provided policy and technical assistance to Prince William Forest Park regarding opportunities to create wetland compensation banks.

Water Operations Branch

Provided input and review of NPDES permits for the Washington Aqueduct. Comments were developed for and submitted to the House Sub-Committee on Resources.

Provided regional staff with information on aluminum toxicity, especially related to sediment and transport.

Provided fiscal and technical management and guidance for funded project "Assess condition and identify stressors of aquatic resources in NCR."

Catoctin Mountain Park

Provided fiscal and technical management and guidance for funded project "Evaluate Water Quality for All Park Streams."

NORTHEAST REGION

Planning & Evaluation Branch

Acadia National Park

Reviewed and evaluated the "Duck Brook Road Rehabilitation Environmental Assessment" and the "Statement of Findings" for wetland impacts. Consulted with park staff and DOT engineers in discovering an alternative that significantly reduced wetland impacts, satisfied park needs, and eliminated the need for a SOF.

Appomattox Court House National Historic Park

Provided programmatic oversight and technical review of a draft report entitled: "Appomattox Court House NHP Wetland Inventory and Mapping Project."

Assisted park staff in developing a scope of work for a parkwide wetland delineation and functional condition assessment and assisted in identifying qualified contractors.

Boston Harbor Islands National Park Area

Completed the Boston Harbor Islands National Park Area Water Resources Scoping Report (NPS Technical Report NPS/NRWRD/NRTR-02/300).

Developed a poster presentation regarding the findings and recommendations from the Boston Harbor Islands National Park Area Water Resources Scoping effort.

Cape Cod National Seashore

Reviewed and approved a combined floodplain/wetland Statement of Findings for the Provincetown Municipal Airport project.

Provided programmatic oversight and technical review for a BRMD funded study of horseshoe crab (Limulus polyphemus) spawning sites within Cape Cod National Seashore.

Provided technical assistance in compiling and summarizing literature on river herring (Alosa aestivalis and Alosa pseudoharengus) to assist in identifying impacts resulting from delayed out-migration.

Colonial National Historical Park

Provided technical review and comments on the "Draft

Wetland Statement of Findings for the Shoreline Management Plan, Colonial National Historical Park, Jamestown Island, VA."

Provided policy and technical review of the water-related aspects of draft planning and compliance documents for the "Draft Development Concept Plan and Environmental Impact Statement for the Jamestown Project."

Provided policy and technical review on the "Draft Environmental Assessment for Proposed Riverwalk & Shoreline Stabilization at Yorktown, VA."

Provided policy and technical review on the "Draft Environmental Assessment for Wormley Pond Dam."

Delaware Water Gap National Recreation Area

Provided a technical review of a manuscript evaluating and summarizing the results of 1992 – 1998 water quality monitoring efforts at Delaware Water Gap National Recreation Area.

Eisenhower National Historic Site

Provided programmatic oversight and technical review on the accomplishment report for a study of the potential biological impacts of increased flow depletions and groundwater augmentation on biota in Marsh Creek

Gateway National Recreation Area

Reviewed the project description for the investigation and restoration of the Jamaica Bay saltmarsh ecosystem in preparation for providing programmatic oversight and technical assistance to the NRPP funded project titled "Investigation and Restoration of the Jamaica Bay Saltmarsh Ecosystem."

Gettysburg National Military Park

Reviewed and approved a wetland Statement of Findings for the "Codori-Trostle Thicket Rehabilitation."

Saugus Iron Works National Historic Site

Reviewed and approved a wetland Statement of Findings for the park's General Management Plan.

Shenandoah National Park

Worked with park staff and University of Virginia cooperators to develop a study proposal entitled "Hydrology of Big Meadows." The study will characterize Big Meadows wetland hydrology and evaluate sensitivity to ground water withdrawals in the area.

Advised park staff regarding NPS wetland compliance requirements for the "Hazel Stream Crossing" and "Old Rag Parking Lot" projects.

Valley Forge National Historical Park

Provided policy and technical review of the "Restoration Plan and Environmental Assessment for Damaged Resources of Valley Creek Watershed."

Water Operations Branch

Allegheny Portage Railroad National Historic Site

Provided technical advice to Park staff and contractors regarding water quality metadata and the format of project, station, metadata, and result files to facilitate uploading data from monitoring at the Staple Bend Tunnel Unit to STORET.

Booker T. Washington National Monument

Conducted an assessment of potential water sources for interpretive livestock maintained by the Park. Performed evaluation of apparent sedimentation problems on a small drainage that originates outside of but flows through the Monument.

Cape Cod National Seashore

Provided assistance regarding potential impact of groundwater withdrawals from wells at the North Truro Air Base.

Colonial National Historical Park

Provided review comments on the Jamestown 400 Project Draft DCP/EIS.

Reviewed Floodplain Statement of Findings for project in the Park.

Delaware Water Gap National Recreation Area

Provided peer review and comment on the hydrodynamic calibration for a QUAL2e water quality model to be utilized on the Delaware River.

Fire Island National Seashore

Provided technical assistance on project to cap flowing artesian wells in a wilderness area.

Saratoga National Historical Park

Advised Park on PCB levels in sediments and soils and participated in review of interagency documents related to

General Electric's cleanup of PCBs in the Hudson River.

Shenandoah National Park

Supervised channel reconstruction and stabilization operation for the Hogcamp Branch drainage.

Provided interpretation of the applicability of Clean Water Act Section 303d and the Virginia State Water Quality Standards to Park streams.

Reviewed report on air quality impacts to water quality and provided extensive comments on adequacy of the information in general and on statistical aspects of the trend analysis.

Finalized source water protection plan for the Big Meadows area.

Valley Forge National Historical Park

Reviewed draft Valley Creek watershed restoration plan and environmental assessment.

Facilitated analysis of an unstable reach of Valley Creek that is eroding cultural resources.

Water Rights Branch

Cape Cod National Seashore
Reviewed proposed permit conditions for consistency with Director's Order No. 35A.

Delaware Water Gap National Recreation Area

Assisted Park in assessing minimum flow requirements for the Delaware River.

PACIFIC WEST REGION

Planning & Evaluation Branch

Assisted Regional and park staff at Olympic National Park, San Juan Island National Historic Park, North Cascades National Park, Mount Rainier National Park, Lake Roosevelt National Recreation Area, Whitman Mission National Historic Site, Fort Clatsop National Heritage Site, John Day Fossil Beds National Monument, Point Reyes National Seashore, Golden Gate National Recreation Area, Channel Islands National Park and Santa Monica Mountains National Recreation Area in providing policy review and developing comments concerning a NOAA status review for 25 listed ESUs of salmon and steelhead.
Pacific Area Office

Provided policy review and comments to the Pacific Area Office pertaining to the Peleiu Battlefield Special Resource Study.

Provided technical review of the preliminary results of the marine resources survey and characteristics of area proposed for a possible NPS unit on Maui (Hawaii).

Fort Vancouver NHS

Provided policy and technical review on the water-related sections of the Draft Fort Vancouver General Management Plan.

Great Basin National Park

Provided programmatic oversight and a review of ongoing progress for an NRPP-funded project to remove nonnative fish species and reestablish Bonneville cutthroat trout (*O. c. utah*).

Kalaupapa and Kaloko Honokahau National Historical Parks

Conducted an analysis of issues between the NPS and the State of Hawaii on sharing management authority for coral reef marine areas in KAHO and KALO.

Lassen Volcanic National Park

Provided programmatic oversight and technical assistance to park staff and Colorado State University cooperators in completing a detailed study plan for the WRD/LAVO-funded project "Restoration of Drakesbad Meadow."

Marshall Islands Marine Park

Provided technical review of the results of the marine resources survey of first marine protected area in Marshall Islands under consideration for World Heritage Site status.

Mojave National Preserve

Provided programmatic oversight and technical review of the detailed study plan for the WRD-funded project entitled: "Perform Baseline Hydrologic and Biological Inventory of Wetlands of the Mojave National Preserve."

North Cascades National Park

Participated in a meeting EQD, Park staff and, Washington Department of Fish and Wildlife and to discuss the process for developing a Lake Management EIS.

Olympic National Park

Provided programmatic oversight and approved an imple-

mentation plan for study of bull trout (*Salvelinus confluentus*) distribution and migration in the Hoh River of Washington

San Juan Islands National Historical Park

Provided the Seattle SSO with water-related references and materials pertinent to the development of the San Juan Islands National Historical Park General Management Plan.

Whiskeytown National Recreation Area

Reviewed and approved a wetland Statement of Findings for the project "Replace Clear Creek Bridge at National Environmental Education Development Camp."

Water Operations Branch

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

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

Channel Islands National Park

Assisted in identifying sediment impacts and loadings from roads and other surface disturbance.

Craters of the Moon National Monument

Provided advice on rehabilitation of springs and operation of new wells for potable water.

Death Valley National Park

Reviewed Progress Report entitled "Ecology of Macroinvertebrates in Travertine and Nevares Springs."

Participated in EIS process for water development in the Furnace Creek area.

Eugene O'Neill National Historic Site

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

Golden Gate National Recreation Area

Consulted with Park staff and reviewed engineering designs on a proposed dam removal at Tennessee Valley. Reviewed designs for restoration of Easkoot Creek near Stinson Beach.

Visited the park and conducted analysis of alternative for reducing flooding along Redwood Creek.

Performed hydraulic modeling in the Big Lagoon area for several options for flood mitigation.

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

Provided technical advice to Park staff and contractors regarding water quality metadata and the format of project, station, metadata, and result files to facilitate uploading data from their ongoing monitoring program to STORET.

John Muir National Historic Site

Assisted with the review of a storm water drain design near Mount Wanda with engineers from the Pacific West Region and Contra Costa County Public Works.

Published a report evaluating the stability of John Muir's gravesite near Alhambra Creek.

Joshua Tree National Monument

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

Kaloko Honokohau National Historical Park

Assisted Park staff in reviewing various documents and assessing various issues related to State Land Use Commission decisions on the expansion of additional industrial park areas just upgradient of the Park.

Advised Park on new contaminants and eutrophication studies.

Lake Mead National Recreation Area

Advised Park on wastewater discharge alternatives from the City of Las Vegas being developed by the Clean Water Coalition Systems Conveyance and Operations Program.

Advised Park on contaminants issues related to wetlands construction in or near Las Vegas Wash.

Provided Park with information on dust suppressing chemicals.

Reviewed environmental issues related to the use of EnviroStain, a chemical product that stains rocks.

Lake Roosevelt National Recreation Area

Provided comments to Park on Proposed USGS Study entitled "The Effects of Trace Elements on Water Quality and Biological Health in the Lake Roosevelt National Recreational Area: Columbia River."

Reviewed project proposal evaluating effects of trace elements on water quality and biological health in Lake Roosevelt.

Lassen Volcanic National Park

Visited the Park and performed survey and subsequent analysis of dam removal alternatives.

Manzanar National Historic Site

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

Mojave Desert National Preserve

Evaluated hydrogeology and potential water well locations in the Cima area.

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

Provided water quality stations as an ArcView ShapeFile in UTM projection.

National Park of American Samoa

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

Olympic National Park

Helped draft Physical Process Monitoring Plan for Elwha River dam removal and ecosystem restoration.

Provided advice regarding erosion by the Hoh River into the access road embankment and campground.

Provided advice related to aggradation problems with Finley Creek.

Pinnacles National Monument

Supervised construction and testing of a new water supply well near the west entrance to the Park.

Pu'ukohola Heiau National Historic Site

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

Sequoia and Kings Canyon National Park

Loaned WRD pump sampling equipment to a researcher studying water quality in runoff from post fire conditions.

War in the Pacific National Historical Park

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

Whiskeytown-Shasta-Trinity National Recreation Area

Advised Park staff on the completion of a WRD funded project for Paige-Boulder Creek watershed restoration effort involving rebuilding a road, culvert replacement, and water quality monitoring.

Yosemite National Park

Assisted Park 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 and hydraulic considerations associated with road redesign.

Provided advice regarding repair of exposed sewage pipeline crossing the Tuolumne River.

Water Rights Branch

Crater Lake National Park
Assisted Park in water rights acquisition discussions with a downstream landowner.

Assisted Park in the evaluation of risk associated with a 1902 priority date for out-of-stream uses.

Assisted Park and DoJ in preparation and review of documents for settlement of the Park's in-stream Federal reserved water rights claims.

Death Valley National Park

Monitored Devil's Hole pool level and discharge of Nevares, Texas, and Travertine Springs; and prepared a preliminary report concerning data collection problems due to water delivery system modifications.

Evaluated Nevada water right applications for potential to impact park rights and resources.

Compiled and exchanged monitoring data with Department of Energy and Barrick Bullfrog in accordance with established conditions of water permits.

Met with representatives of the Town of Beatty and the Nevada State Engineer's office to determine future monitoring of the Barrick Bullfrog wells.

Mapped change applications in the Amargosa Desert, identified shift in pumping center.

Monitored progress of multi-year USGS study of evapotranspiration at Death Valley saltpan and Grapevine Springs area.

Participated in Federal family annual coordination meeting on water rights and water development issues in the Death Valley region.

Presented talk at Devils Hole Workshop on NPS's concerns for groundwater development in the Death Valley region.

Provided expert hydrogeology assistance to the USGS Death Valley groundwater flow model project including reviews of draft USGS reports, and study of regional flow potential and lateral boundary flow conditions.

Briefed superintendent and staff on water right protection concerns for Devil's Hole and participated in meetings to develop an action plan for Devil's Hole pupfish recovery.

Reviewed analysis of alternatives to modify the Furnace Creek water supply system, and provided comments to park.

Coordinated with SOL on existing water use agreement with Xanterra.

Briefed park hydrologist on WRB water rights protection activities for DEVA.

Great Basin National Park

Evaluated Nevada water right applications for potential to impact park rights and resources.

Reviewed proposals for rehabilitating Young Canyon Spring.

Assisted park with negotiations of spring restoration for Young Canyon Spring with neighboring landowner.

Completed analysis of Lehman Creek adjudicated rights and briefed park management on the priority of these rights.

Initiated multi-year study with USGS to determine areas of susceptibility to groundwater pumping impacts, and briefed park management on study progress.

Briefed park management on nature of USFS authorization of Snake Creek diversion.

Briefed park management on status of water rights applications in Spring and Snake Valleys.

Lake Mead National Recreation Area

Continued discharge monitoring of Rogers and Blue Point Springs.

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

Conducted reconnaissance of lower Virgin River with park and USGS representatives to select a site for a new stream-gage and implemented task order to install the gage.

Reviewed monitoring plan proposed by the Southern Nevada Water Authority to determine effects of groundwater pumping in Coyote Spring Valley and conducted reconnaissance of potential monitoring sites.

Recommended additional hydrogeologic investigations to Nevada State Engineer as part of Order 1169 study. Consulted with NPS's experts in numerical ground water flow modeling, hydrogeology, and aqueous geochemistry to assist NPS negotiations.

Updated summaries of existing and pending rights in the Lower Colorado Flow System.

Initiated geologic mapping and geophysical studies to support development refinements to the Lower Colorado Groundwater Flow System model.

Presented talks at Geologic Society of America-Rocky Mountain Chapter Conference on possible sources of recharge to park springs, and conceptual groundwater flow model to Lower Colorado Flow System.

Initiated study of possible use of a wider range of isotonic data a tool for evaluating sources to Rogers and Blue Point Springs.

Prepared review comments on environmental assessments

and environmental impact statements prepared in support of energy development projects in southeastern Nevada.

Prepared materials for possible use in hearings on applications by Hidden Valley Ranch.

Planned and coordinated negotiation between Moapa Band of Paiutes Indian Tribe, The Calpine Corporation, and NPS and FWS to determine possibilities for settlement of protests of groundwater applications for the Moapa Paiute Energy Center.

Completed agreement with Lincoln County and Vidler Water Company (LCVWC) to withdraw NPS protests of groundwater applications in Tule Desert.

Attended hearing on applications by LCVWC for groundwater withdrawals in Tule Desert.

Completed agreement with Moapa Valley District and PG&E/National Energy Group to withdraw NPS protests of groundwater applications in Lower Meadow Valley Wash.

Mojave National Preserve

Assisted with conversion of NPS rights to existing uses, and created database for water rights acquired through purchase by third party.

Assisted with resolution of issues of concern in the final EIR/EIS for the proposed Cadiz Groundwater Storage and Dry –Year Supply Program to withdraw groundwater from the Fenner basin.

Sequoia and Kings Canyon National Parks

Evaluated water rights for Merritt Spring and existing uses by the park and a neighboring landowner.

Multi-Park

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

Submitted Reports of Licensee and Progress Reports for California parks.

Continued work on draft maps of California park units outlining the area of concern for new water right applications.

SOUTHEAST REGION

Planning & Evaluation Branch

Big Cypress National Preserve

Provided policy and technical review of Big Cypress National Preserve's (draft) Issue Paper entitled: *"Water Deliveries to the Northeast Addition Lands of Big Cypress National Preserve."*

Provided policy and technical review of Big Cypress National Preserve's line-item construction project entitled: "Rehabilitate Off-Road Vehicle Trails and Trailhead Development".

Canaveral National Seashore

Coauthored and assisted with the completion and publication of the Canaveral National Seashore Water Resources Management Plan.

Provided a poster for the Third Biennial Mosquito Lagoon Conference (August 2002) in Titusville that overviews the Canaveral National Seashore Water Resources Management Plan.

Cape Hatteras National Seashore

Reviewed and approved a wetland Statement of Findings for the project "Environmental Assessment for the Manteo (Shallowbag Bay) Project – Maintenance of Oregon Inlet Bar Channel/Channel Widener."

Chattahoochee River National Recreation Area

Assisted park staff and the NPS Environmental Quality Division in identifying methods for determining wetland resource losses and compensation requirements for a Park System Resources Protection Act - Sec. 19jj damage assessment claim.

Participated in meetings and conference calls of the Federal Agencies Working Group evaluating the Tri-State Agreement between the states of Georgia, Alabama and Florida pertaining to flow regimes in the Chattahoochee River.

Congaree Swamp National Monument

Provided programmatic oversight and a review of ongoing progress of an NRPP-funded study of fish distribution and fish community condition in Congaree Swamp National Monument.

Fort Pulaski National Monument

Assisted with experimental tidal flushing to introduce predator mosquito fish into in an extensive ditch system around the fort.

Great Smoky Mountains National Park

Provided policy and technical review of the preliminary results of wetland delineation and hydrology studies being conducted by contractors in the Ravensford area. The studies will be used during preparation of an Environmental Impact Statement that will analyze impacts of a proposed land exchange with the Cherokee Indian Tribe.

Kings Mountain National Military Park

Completed and published the Kings Mountain National Military Park's Water Resources Scoping Report (NPS Technical Report NPS/NRWRD/NRTR-2002/296).

Assisted park staff in developing a scope of work for a parkwide wetland delineation and functional condition assessment.

Mammoth Cave National Park

Provided programmatic oversight and a review of ongoing progress for an NRPP-funded study of the plankton in the Green River downstream of Green River Reservoir.

Moores Creek National Battlefield

Co-authored a technical report titled "Hydrologic Restoration of a Wet Pine Savanna at Moores Creek National Battlefield, NC." The report compares the hydrology of the savanna before and after a hydrologic restoration experiment was implemented in late 1998.

Researched qualifications of wetland plant nurseries in the region and provided the park with a list of potential contractors for the WRD-funded project "Restore Native Vegetation to Savanna Wetland."

Timucuan Ecological and Historic Preserve

Provide technical assistance and recommendations regarding wetland restoration opportunities at Thomas Creek, Fort Caroline, Haulover Creek, and Heckscher Drive.

Water Operations Branch

Big South Fork National River and Recreation Area

Provided continued assistance for the completion of NEPA requirements for contaminated mine drainage remediation projects.

Participated in a team of NPS staff to review severity and adequacy of cleanup of oil spill.

Chickamauga & Chattanooga National Military Park

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

Cumberland Island National Seashore

Evaluated potential for groundwater pumping on the mainland to affect wetlands on Cumberland Island.

De Soto National Memorial

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

Everglades National Park

Reviewed Floodplain Statement of Findings for project in the Park.

Fort Pulaski National Monument

Conducted an experimental tidal flushing of the ditches using structures already in place, assessed the effect with regards to ditch filling and overbank flooding, and evaluated the potential of ditch maintenance through periodic flooding.

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

Great Smoky Mountains National Park

Conducted assessment of floodplain analysis for a proposed land transfer and subsequent development near the Oconaluftee River.

Gulf Islands National Seashore

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

Mammoth Cave National Park

Provided detailed comments on QA/QC, study design, and other aspects of draft Vital Signs Network detailed study plan for long term water monitoring.

Provided technical advice to Park staff regarding water quality metadata and the format of project, station, metadata, and result files to facilitate uploading data from their ongoing monitoring program to STORET.

Ocmulgee National Monument

Evaluated potential of stream excavation to alleviate sedimentation problems in a small drainage that originates within Macon Georgia and flows through the Park.

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

Timucuan Ecological and Historic Preserve

Completed initial reconnaissance and performed rudimentary cut and fill calculations for proposed wetlands restoration.

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

Virgin Islands National Park

Provided equipment logistics, data management, and downloading capability for an erosion study.

Water Rights Branch

Chattahoochee National River

Assisted Park in preparing comments and attending technical meetings for ACF Negotiations.

Assisted Park in preparing comments for Cobb County-Marietta water diversion proposal.

Cumberland Gap National Historic Park

Assisted Park and SOL prepare and review legislation to acquire Fern Lake.

Blue Ridge Parkway

Provided assistance to park in evaluating the potential for authorizing the use of a reservoir on the Moses T. Cone Estate by the town of Blowing Rock.

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

Evaluated Fairfield Glade proposal to divert and store water and assisted in preparing comments to the Corps of Engineers.

Assisted park in leading a discussion among water development interests and Federal, state and county governments on regional water supply planning issues in the Big South Fork watershed.

Briefed park staff on water right protection strategies for both parks.

Continued multi-year study by the USGS of historic flow regimes for Obed Wild and Scenic River.

Initiated a multi-year paired-basin study by USGS to investigate the effects of small and medium-sized impoundments on streamflow.

VITAL SIGNS WATER QUALITY MONITORING NETWORKS

Greater Yellowstone Network

Participated in Water Quality Vital Signs Monitoring Planning Workshop.

Provided technical advice to Network staff regarding water quality metadata and the format of project, station, metadata, and result files to facilitate uploading historical and new data to STORET.

Attended Greater Yellowstone Network Vital Signs meeting, retrieved and screened water quality data from USGS National Water Information System and STORET, and provided National Hydrography Dataset status report.

Northern Colorado Plateau Network

Presented guidance on programmatic and core parameter issues at the Northern Colorado Plateau Network meeting.

Attended meetings of the Northern Colorado Plateau Network and reviewed and commented on the Network website being constructed by Colorado State University to provide individual Park summaries of information about their water resources.

SERVICEWIDE

Revised Director's Order #77-1: Wetland Protection, conducted a Servicewide review, and submitted to the Director's Office for signature. The revised D.O was signed on October 30, 2002.

Completed the a policy review of the water resources / aquatic resources sections of RM-77 (Natural Resources Management), clearing these sections for Servicewide release and implementation.

Provided Assistant Secretary Fish, Wildlife and Parks with a briefing paper outlining NPS policy on coral reef protection for units of the National Park system.

Provided input on behalf of NPS to ensure that DOI state-

ments in Congressional Oversight Hearings accurately reflected NPS activities, programs and policies on coral reefs and marine protected areas.

Participated in briefings for Congressional staff regarding NPS activities, programs, and policies regarding coral reef protection and marine protected areas.

Developed briefing memos for DAS/Policy, Management and Budget on NPS marine resource management in Alaska Parks.

Participated on a committee that developed draft impairment policy entitled: *Assessing Impacts and Impairment to Natural Resources*. Provided policy review and made modifications to sections pertaining to wetlands and aquatic biological resources.

Participated in development of wetland and riparian elements of the draft "Departmental Strategic Plan: The End and Intermediate Outcome Goals and Measures."

Coordinated WRD technical and policy review of environmental planning documents forwarded to the WRD by the DOI Office of Environmental Policy and Compliance.

Completed a program review of NPS wetland restoration projects identified in Statements of Findings signed in FY 1998 - 2000.

Provided input and assessment, as requested, regarding natural resource-related aspects of line –item construction projects considered by the Development Advisory Board (DAB).

Developed a plan and established priorities for the placement of 16 new water-related positions brought about by the successful implementation of the Natural Resource Challenge.

Assisted parks and regions in the development of position descriptions, review and evaluation of applications, and development of work plans for the new water-related professionalization positions established as part of the Natural Resource Challenge.

Provided WRD support to Park Operations in the development of plans and procedures to extend "green marina" protocols to marinas within units of the national park system.

Represented NPS in meetings with NOAA regarding NPS participation with the CEC tri-lateral marine program.

Provided the Office of Management and Budget a list of parameters necessary to estimate costs per acre for wetland restoration in the National Park Service in support of the OMB effort to define: *Common Measures for Estimating Costs of Wetland Activities Across Agencies*.

Provided a legislative review of the National Drought Preparedness Act of 2002.

Provided review of the proposed wilderness planning guidelines.

Provided policy review of the Corps of Engineers proposed regional permit public notice (General Permit 22349, Linear Transportation Construction and Maintenance Projects in Texas) and drafted the NPS response.

Reviewed and commented on the draft NPS "Operator's Handbook for Non-federal Oil and Gas Development in Units of the National Park System."

Assisted Assistant Secretary Fish, Wildlife and Parks in organizing and planning activities of the Department of the Interior Coral Reef Task Force.

Organized, planned and chaired meeting on marine monitoring needs for coastal networks of the NPS Vital Signs Inventory & Monitoring Program.

Presented a "Wetland Protection and Restoration" session for the Natural Resources Fundamentals Course (Albright Training Center).

Participated in meetings of the NPS Colorado River Basin Steering and Technical Committees.

Participated in three regional Superintendents' meetings (AKR, SER, PWR) to review marine issues and concerns, and increase Servicewide emphasis on coastal conservation.

Investigated sources and formulated draft concepts regarding data appropriate for delineating the boundary between intertidal (wetland) and deepwater (non-wetland) environments.

Completed a survey of coral reef research, monitoring and information needs for 10 NPS units containing coral reef resources in support of a request response to request from the Department of the Interior Science Advisor.

Assisted with gathering and uploading NPS data into the NOAA Marine Managed Areas Inventory.

Provided program leadership, coordination, and administration for the Natural Resource Challenge Water Quality Vital Signs Monitoring Program, developed program guidance, and distributed funding to twelve NPS Monitoring Networks. Reviewed Annual Administrative Reports and prepared Report to Congress.

Provided contact for water quality monitoring component of the Natural Resources Challenge program.

Sponsored a Freshwater Core Parameters Work Group meeting in Fort Collins, and prepared a follow-up "white paper" summarizing the meeting results and work group recommendations.

Revised Part B Water Quality Monitoring Program guidance document on how to write detailed study plans with QA/QC documentation for long-term I&M aquatic monitoring.

Participated in a program review of USGS Contaminants Program.

Served as official member of the National Water Quality Monitoring Council representing NPS. Prepared and sponsored a council resolution in support of developing an interface for the EPA STORET and USGS NWIS database management systems.

Coordinated the NPS-USGS Water Quality Assessment and Monitoring (WQAM) Partnership Program as part of the Clean Water Action Plan funded by Congress.

Provided significant support to the Environmental Quality Division for the development of two Environmental Statements (ES) and 20 Environmental Analyses (EA) to address the impacts of personal watercraft (PWC) use in Assateague Island National Seashore, Big Thicket National Preserve, Fire Island National Seashore, Lake Mead National Recreation Area, and Glen Canyon National Recreation Area.

Participated in planning a fee-demo funded snowmobile study.

Continued development of draft technical guidance for water quality monitoring protocols, including recommended core parameters, content of detailed monitoring plans (QA/QC), and water quality data management.

Participated in Vital Signs scoping and planning sessions for the National Capital Network and the Sonoran Desert Network.

Supported the implementation of Servicewide Goal 1a4 of the NPS Strategic Plan by updating the Technical Guidance for reporting to Goal 1a4, participating in the Department of Interior working group to develop a water quality goal for the Department's Strategic Plan, and consolidating Park end-of-year reports for incorporation into the Annual Performance Plan.

Participated on the State Of Wyoming Total Maximum Daily Load Implementation Advisory Board, and the Federal Family Coordination Committee.

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.

Completed multiparameter probe demonstration deployments in the Big Thompson River in Rocky Mountain National Park and in a pond in Fort Collins, CO. Analyzed demonstration data collected from these deployments and from deployments by other instrument demonstration participants in Indiana Dunes National Lakeshore, Buffalo National River, and Whiskeytown-Shasta-Trinity National Recreation Area in preparation for presentation of results at the November Water Professionals Workshop.

Continued the gathering of information and field testing of multiparameter water quality equipment for possible use in long-term monitoring under the Natural Resource Challenge.

Served on a joint NPS/EPA/State of Utah work group and partnership effort organized to develop a management and sampling strategy for evaluation of human health and environmental risk of Abandoned Mine Lands (AML) which lie within or adjacent to lands of NPS or other government agencies.

Served as a key NPS contact to EPA on water monitoring, QA/QC, study design, and other contaminants issues. Advised EPA STORET program on improvements needed to make the database more useful to NPS users. Advised EPA Office of Water and QA/QC programs on improvements needed in guidance related to uncertainty analyses.

Participated in the Disturbed Lands Restoration Program steering committee in developing national goals and objectives for the Restoration Technical Advisory Group.

Participated in the NRPC Disturbed Lands Restoration Workgroup.

Continued development of water quality database templates to facilitate entry of physical, chemical, and biological monitoring data at Parks, Networks, and WASO for upload to STORET.

Prepared documentation of water resource-related data systems for the Natural Resource Data and Information Systems Handbook and several other national computer system inventories.

Determined the number of National Pollutant Discharge Elimination System (NPDES) permits within Park bound-

aries and within 3 and 5-mile radii by overlaying retrievals from the EPA's Permit Compliance System with digital Park boundaries.

Responded to public water resource inquiries generated by NPS Internet Web Site.

Represented NPS at the EPA National STORET Users Conference.

Provided overview of I&M water quality and water resource inventory themes and a tutorial at Natural Resource Data Management Workshops in Denver, Fort Collins, and Shepherdstown, WV.

Presented "USGS Digital Hydrographic Data" at NPS Spatial Odyssey National GIS Conference in Primm, NV.

Presented "National Park Baseline Water Quality Data Inventory and Analysis Report Series" at the National Water Quality Monitoring Council Conference in Madison, WI.

Participated in periodic meetings with other Federal agencies to coordinate water rights issues.

Facilitated and participated in the 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.

Attended the American Bar Association Water Law Conference.

Completed computerization of Servicewide water rights records.

Presented a session on water rights related to land and other property acquisition at the 2002 Lands Conference.

Publications/Contributions

Planning & Evaluation Branch

Big Bend National Park. 2001. *Restore Endangered Big Bend Mosquitofish Habitat: Final Report to NPS Water Resources Division*. 26 pp.

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James-Pirri, M.J., K. Tuxbury, S.F. Marino and S. Koch. 2002. Population Demographics and Spawning Densities of the Horseshoe Crab, *Limulus polyphemus*, within Cape Cod National Seashore, Cape Cod Bay, and Monomoy National Wildlife Refuge, Massachusetts. Final Report to National Park Service, Cape Cod National Seashore.

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Petersen, J.C. and D.N. Mott. 2002. *Hot Springs National Park (Arkansas) Water Resources Scoping Report.* Technical Report NPS/NRWRD/NRTR-2002/301.US Department of the Interior, U.S. Geological Survey, Little Rock, AR and National Park Service , Harrison, AR. 26 pp.

Purvis, J.M., M. Mathes, T. Messinger, J. Wiley, and D. Vana-Miller. 2002. *Water Resources Management Plan: New River Gorge National River / Gauley River National Recreational Area / Bluestone National Scenic River (West Virginia).* US Department of the Interior, National Park Service, Glen Jean, WV and U.S. Geological Survey, Charleston, WV. 233 pp. + map.

Schenk, Gretchen. 2002. Fish in the desert. National Park International Bulletin 6:5-6.

Spaulding, M.L. and A. Grilli. 2001. *Hydrodynamic and Salinity Modeling for Estuarine Habitat Restoration at Herring River, Wellfleet, Massachusetts.* Technical Report, Ocean Engineering Department, University of Rhode Island, Narragansett, RI.

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Water Rights Branch

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Van Liew, W.P., J.T. Back, and B.E. Gillies. 2002. *The potential impacts of proposed groundwater pumping in Lower Meadow Valley Wash on the water resources of Lake Mead National Recreation Area.* National Park Service, Fort Collins, Colorado, January 11, 2002, 18 pages, plus 41 figures, 10 tables, and one oversized plate.

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Water Resources Division Financial Status and Sponsored Projects

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

FY2003 base funding for the Water Resources Division (WRD) was $11,614,000. The figure below illustrates the distribution of total WRD funds among technical assistance, projects, 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. Table 1 shows the breakdown of project based funding. Table 2 shows the projects completed in FY02 with water rights funds.

Distribution of WRD FY2003 Funding

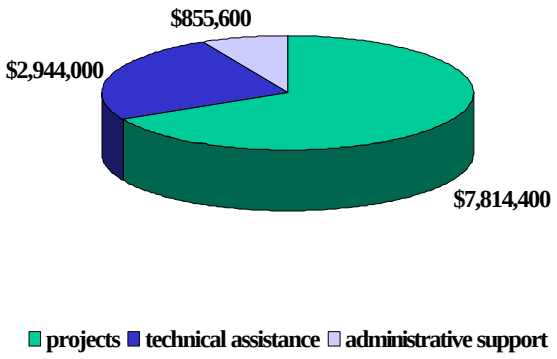

TABLE 1 - WRD Funding Programs

FUNDING SOURCE	WRD PROJECT COORDINATOR	Funding$(000s)
WRD Funded Projects	Dan Kimball	$ 471,400
Water Rights Funded Projects	Chuck Pettee	$1,329,000
Aquatic Resources Professionals	Dan Kimball	$1,200,000
Water Quality Vital Signs Monitoring	Bill Jackson	$1,775,000
Watershed Assessment	Bill Jackson/Cliff McCreedy	$3,024,000
Fisheries Program	Jim Tilmant	$ 15,000
	TOTAL WRD Funded	**$7,814,400**

Table 2
Summary of Water Rights Projects Supported by WRD Funds in 2002

PARK	REGION	PROJECT TITLE (s)	WRD PROJECT COORDINATOR	FUNDING $(000)
ALL	ALL	Support to the Office of the Solicitor	Pettee	160.4
MT Parks	IMR	Implementation of the Montana-NPS Compact	McGlothlin	2.7
CAVE	IMR	Hydrologic Data Collection at Lake of the White Rose	Christiansen	3.3
LAME	PWR	Spring Flow Monitoring, Participation in Cooperative Aquifer Stress Test, Model Development	McGlothlin	408.1
BLCA	IMR	Participation in the Adjudication of Colorado Water Division 4	Wondzell	34.0
BUFF	MWR	Investigation of Hydrology and Water Related Values	Hansen	146.0
DEVA	PWR	Devil's Hole and Spring Flow Monitoring, and Groundwater Model Development	Back	223.0
AZ Parks	IMR	Participation in the Adjudication of the Little Colorado River Basin in Arizona	Hansen	22.9
GRBA	PWR	Assessment of Park Hydrology	Van Liew	40.0
GRCA	IMR	Hydrologic Investigation, Spring Protection	Hansen	153.5
MEVE	IMR	Implementation of Water Rights Decree	Hughes	5.5
OBRI	SER	Stream Flow Monitoring, Surface Hydrology Study	Hughes	50.0
UT Parks	IMR	Participation in the Adjudication of Various Areas in Utah	Harte	13.0
YELL	IMR	Implement Reese Creek Water Rights Agreement	Hughes	25.4
ALL	ALL	Technical and Administrative Support to all Projects	Pettee	112.2
		TOTAL FOR WATER RIGHTS PROJECTS		1,400.0

The National Park Service's water rights protection efforts are generally dictated by court schedules, Department of Justice case strategies, water development proposals by private entities, and State administrative actions and schedules. This table lists the allocation of funds necessary to meet these anticipated demands for FY2002. If unforeseen hearing or adjudication needs arise, adjustments to project funding may be necessary.

Office of the Division Chief 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. Specialty areas include coordination of interagency and cooperative agreements and project funding.

Patty Hennessy: Secretary, BBA in Management. Speciality areas include report editing, web page development, and meeting planning.

Carol Liester: Purchasing Assistant.

Laura Pascavis: Archivist, Colorado State University, M.A. in Archival Science; M.A. in Historical Archaeology. B.A. in History with specialization in environmental and western history

Planning & Evaluation Branch Staff

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

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

Kevin Noon: Wetland Specialist, PhD in Wetland Ecology. Specialty areas include wetland evaluation, management, restoration, and regulatory issues.

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

John Wullschleger: Fisheries Biologist, MS in Fish and Wildlife Science. Specialty areas include freshwater invertebrates, marine-intertidal biota, fluvial ecology, and stream habitat restoration.

Cliff McCreedy: Marine Management Specialist, BA in Political Science with career emphasis on regulatory and ocean policy. Specialty areas include marine resource management and planning, marine protected areas, coral reefs, coastal watershed assessment, and interagency marine partnerships.

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 (Hydrogeology). Specialty areas include water resources management planning, ground water monitoring, wetland management.

Lael Wagner: Secretary

Water Operations Branch Staff

Bill Jackson: Branch Chief, PhD in Hydrology. Specialty areas include sedimentation processes, fluvial geomorphology, and river assessment, restoration and management.

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

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

Dean Tucker: Information Management Program Leader, Natural Resource Specialist, PhD in Forestry. Specialty areas include data management and reporting, hydrographic analysis, computer graphics, and water resources applications in GIS.

Larry Martin: Hydrogeologist, MS in Hydrology. Specialty areas include groundwater management, groundwater modeling, surface water – ground water interactions, water supply development, and source water protection.

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

Rick Inglis: Hydrologist, BS in Watershed Science. Specialty areas include field hydrologic data collection and analysis, watershed assessment and management, riparian assessment and management, and stream restoration.

Michael Martin: Hydrologist, BS in Environmental Geology, MS in Watershed Science. Specialty areas include open channel flow, geomorphology, flood analysis, wetlands hydrology, geochemistry, and water quality.

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

Roy Irwin: Senior Contaminants Specialist, PhD in Biology. Specialist in environmental contaminants and biological aspects of water quality, including biomonitoring, study design and development, and QA/QC issues.

Kim Johnson: SCEP Hydrologist. Watershed Science major, Colorado State University. Graduation June 2003

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

Clinton Bassett: Colorado State University Research Associate, STORET Database Project, BS in Watershed Science.

Adriane Petersen: Colorado State University Research Associate, STORET Database Project, BS in Zoology.

John Christiansen: Colorado State University Research Associate, Clean Water Act Impaired Waters Project, MS in Civil Engineering.

Pat Wiese: Colorado State University Administrative Assistant, BS in Biology.

Water Rights Branch Staff

Chuck Pettee: Branch Chief, Supervisory Hydrologist, MS in Watershed Science. Specialty areas include water rights establishment and protection and water resources policy.

Jeff Albright: Supervisory Hydrologist, Information Management Program Leader, MS in Watershed Management. Specialty areas include surface water hydrology, water rights, and data management.

Bill Hansen: Supervisory Hydrologist, Adjudication Program Leader, MS in Hydrology. Specialty areas include water rights policy and adjudications, surface water hydrology, and watershed management.

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

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

Paul Christensen: Hydrologist, MS in Geology. Specialty areas include hydrogeology, water resources, and water rights.

Paula Cutillo: Student Trainee (Hydrology), BA in Environmental Policy and Analysis, MS in Groundwater Hydrology. PhD candidate in Hydrogeology.

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

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

Scott Grover: Hydrologist, BS in Watershed Science. Specialty areas include surface water hydrology, 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 and surface water hydrology.

Jennifer Miller: Student Trainee (Hydrology), BS in Natural Resources Management. MS candidate in Watershed Science.

Bill Van Liew: Hydrologist, BS in Civil Engineering, and Geology, MS in Groundwater Engineering/Environmental Hydrogeology. Specialty areas include groundwater hydrology and groundwater surface-water interactions.

Mark Wondzell: Hydrologist, BS Forestry, MS Agricultural Engineering.

Jennifer Brunsman: Student, Colorado State University, Natural Resources Management

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

Flora Romero: Colorado State University Administrative Assistant

AWARDS

Jeffrey Albright received a STAR Award for efforts to complete the transfer of the NPS water rights dockets to electronic format.

William Hansen received a STAR Award for outstanding efforts to complete settlement agreements that establish water rights for parks in Utah and Arizona.

James Harte received a STAR Award for efforts to complete a Proposed Final Order for Crater Lake National Park's water rights in the Klamath Basin Adjudication.

Cliff McCreedy received an On-the-Spot Award for his assistance with the organization and interagency coordination of the Coral Reef Task Force meeting held in San Juan, Puerto Rico in October, 2002.

Lael Wagner was presented with a STAR Award from the Geological Resources Division in recognition of the outstanding assistance she provided to the managers and staff of the Geologic Resources Division while the Division was without a secretary from October 2001 through April 2002.

John Wullschleger was recognized with an On-the-Spot Award for his efforts in coordinating the Servicewide panel rating and review of the FY03/FY04 Water Resources Competitive Project component NPS Servicewide Comprehensive Call.

Jim Harte, Patty Hennessy, Gary Smillie, and **Jim Tilmant** received On-the-Spot Awards for their participation in the planning and execution of the 2002 Water and Aquatic Resources Professionals meeting held in Fort Collins in November 2002.

Dean Tucker, Barry Long, Patty Hennessy, and **Pete Penoyer** received On-The-Spot Awards for their participation in planning and facilitating the Servicewide Water Quality Vital Signs Monitoring Workshop.

Roy Irwin received a STAR Award in recognition of his continued outstanding level of professional achievement.

Gary Rosenlieb received a STAR Award in recognition of his continued outstanding level of professional achievement.

ADDENDUM

Funding Tables for WRD Programs

TABLE 1 – FY03 WATER RESOURCES PROJECTS, CONTINUING				
PARK	**REGION**	**PROJECT TITLE**	**WRD PROJECT COORDINATOR**	**Funding $(000s)**
				FY03
ISRO	MWR	Develop Water Resources Management Plan	Vana-Miller	25.0
REDW	PWR	Evaluate Watershed and Stream Channel Conditions Related to Disturbance History and Coho Habitat in Mill Creek	Inglis/Tilmant	20.7
DEWA	NER	Develop Groundwater Monitoring	M. Martin/ L. Martin	41.0
OLYM	PWR	Analyze Channel Dynamics on the Hoh and Quinault Rivers to Protect Fish and Aquatic Resources	Smillie/Wullschleger	15.0
CATO	NCR	Evaluate Water Quality for all Park Streams	Rosenlieb	14.0
SACN	MWR	Historical Trends in Phosphorous Loading from Permitted Point Source Discharges	Irwin	25.0
GRTE	IMR	Baseline Water Quality Parameters/Land Use Characteristics of Five Snake River Headwater Tributaries	Long	29.4
ACAD	NER	Assess Current and Historic Atmospheric Deposition of Toxic Contaminants	Penoyer	49.5
LAVO	PWR	Restoration of Drakesbad Meadow	Wagner	25.0
PORE	PWR	Hydrologic and Ecological Impacts of Commercial Oyster Framing on the Biota of Drakes Estero	Noon/Tilmant	25.0
MOJA	PWR	Perform Baseline Hydrologic and Biologic Inventory of Wetlands	Noon	25.0
MOCR	SER	Restore Native Vegetation to Savannah Wetland	Wagner	18.2
TOTAL				**312.8**

TABLE 2 - FY03 WATER RESOURCES PROJECTS NEW					
PARK	**REGION**	**PROJECT TITLE**	**WRD PROJECT COORDINATOR**	**FUNDING $(000s)**	
				FY03	**FY04**
CACO	NER	Management of Dune Slack Wetlands (PMIS#75141)	Noon	16.0	15.0
BISC	SER	Develop Waterflow Needs in Biscayne NP Using Adjacent Coastal Wetlands Indicators (PMIS# 87999)	Wagner/Smillie	72.3	0.0
DEWA	NER	Regional Point Source Management to Support Special Protection Water Quality Regulations (PMIS# 87936)	Rosenlieb	50.0	50.0
CURE	IMR	Data Collection & Analysis of Required Water Quality Parameters; Outstanding Waters Designation (PMIS# 72796)	Rosenlieb	49.8	49.8
CANA	SER	Develop Water Quality Monitoring Program (PMIS# 41023)	Long	50.0	0.0
BUFF	MWR	Ground and Surface Water Interactions of the Buffalo National River (PMIS# 84047)	Penoyer	42.5	40.0
BUFF	MWR	Inventory and Assess Springs and Perennial Streams Buffalo National River (PMIS# 82055)	Long	50.0	50.0
HAFO	PWR	Water Quality Impacts to the Snake River from Landslides (PMIS# 36661)	Martin, L.	25.0	25.0
MULTI	NCR	Capture and Assess Stream Health in Highly Fragmented Parks (Two Year Project) (PMIS# 89328)	Irwin	52.2	47.8
BUFF	MWR	Characterization of Macroinvertebrate Community and Drift in a Tributary of BUFF, Prior to Damming (PMIS# 82725)	Wullschleger/Irwin	19.2	19.2
ISRO	MWR	Assess Hydrocarbon Pollution Threats to Park Waters (PMIS#80222)	Irwin	49.5	49.8
MACA	SER	Develop Water Resources Management Plan (PMIS#47376)	Weeks	25.0	25.0
PEFO	IMR	Stream and Riparian Characterization and Analysis (PMIS#85644)	Wagner/Smillie	26.8	26.0
ACAD	NER	Develop /Groundwater Flow Model (PMIS#86352)	L.Martin/Penoyer/Noon	41.5	32.1
PORE	PWR	Restoration of Horseshoe Pond to Coastal Lagoon (PMIS#76269)	Smillie/Noon	62.5	12.5
WABA	IMR	Conduct a Riparian Corridor Restoration Study (PMIS#85164)	Inglis/Wagner	48.6	47.4
REDW	PWR	Install Streamflow Gaging Station on Prairie Creek (PMIS#87368)	Smillie	14.7	0.0

TABLE 2 - FY03 WATER RESOURCES PROJECTS NEW					
PARK	**REGION**	**PROJECT TITLE**	**WRD PROJECT COORDINATOR**	**FUNDING $(000s)**	
				FY03	**FY04**
OLYM	PWR	Lake Ozette Tributary Sediment Sources, Transport, Potential, and Control (PMIS#76758)	Smillie	50.0	0.0
GRBA	PWR	Aquatic Survey and Condition Assessment (PMIS#83233)	Inglis/Wullschleger	58.5	41.5
SACN	MWR	Determine Groundwater Impacts to the St. Croix NSR (PMIS#84732)	L. Martin/ Penoyer	40.0	40.0
SACN	MWR	Classify Critical Aquatic Habitat for the S. Croix NSR (PMIS#84374)	M. Martin/Tilmant	45.2	45.2
CACO	NER	Pilgrim Lake Dynamics (PMIS#72733)	M. Martin	50.0	50.0
MORR	NER	Distribution of Consumer Chemical Tracers to Evaluate (PMIS#78401)	Rosenlieb	42.5	0.0
WRST	AKR	Investigate Liminological Conditions in Tanada Lake Affecting Sockeye Salmon Production (PMIS#80235)	Irwin/Wullschleger	17.3	17.3
GOGA	PWR	Plan Rodeo Lagoon Watershed Wetland Riparian Habitat Restoration (PMIS#81650)	Wagner	43.5	25.5
REDW	PWR	Evaluate Stream Temperature Regimes for Juvenile Coho (PMIS#87588)	Tilmant	29.1	4.1
PORE	PWR	Enhanced Wetlands Mapping for Tomales Bay Watershed (PMIS#81564)	Noon	47.6	50.6
TOTAL				**1119.3**	**763.8**

Table 3 – Park-Based Aquatic Resource Professional Positions)

Region	Park/Office	Position	Status
AKR	YUCH	Aquatic Ecologist	Position filled (Dr. Amy Larsen)
AKR	LACL	Fishery Biologist	Position filled (Dan Young)
IMR	UT State Coordinator Office	Fishery Biologist	Position filled (Melissa Trammell)
IMR	Sonoran Desert Network	Groundwater Hydrologist	Position filled (Colleen Filippone)
IMR	GRTE	Hydrologist	Vice – Henderson/FY02 position
IMR/MWR	CHIC	Groundwater Hydrologist	Currently being advertised – closing date 08/08/03
MWR	SACN	Aquatic Biologist	Position filled (Brenda Moraska Lafrancois)
MWR	ISRO	Fishery Biologist	Position filled (Jay Glase)
NER/NCR	Center for Urban Ecology	Aquatic Ecologist	Position filled (Dr. Jeff Runde)
NER	DEWA	Hydrologist	Position filled (Alan Ellsworth)
NER	FIIS	Marine Ecologist	Position advertised
PWR	PORE	Aquatic Ecologist	Position filled (Marie Denn, EOD – 8/10/03)
PWR	MORA	Geomorphologist	Position filled (Paul Kennard)
PWR	LAME	Groundwater Hydrologist	Currently being advertised – closing date 7/25/03
SER	CHAT	Fishery Biologist	Position filled (Dr. James Long)
SER	CHAT	Wetlands Ecologist	Position filled (Cherry Green)

As of 07/22/03

Table 4 – Water Quality Vital Signs Monitoring Funding, FY2003

Network	Region	#of Parks	Allocation $(000)
Central Alaska	Alaska	5	98
Southwest Alaska	Alaska	5	139
Northern Colorado Plateau	Intermountain	16	108
Southern Colorado Plateau	Intermountain	19	124
Greater Yellowstone	Intermountain	3	71
Sonoran Desert	Intermountain	11	64
Great Lakes	Midwest	9	123
Heartland	Midwest	15	82
National Capital	National Capital	11	71
NE Coastal and Barrier	Northeast	8	90
Northeast Temperate	Northeast	10	60
Mediterranean Coast	Pacific West	3	76
North Coast & Cascades	Pacific West	7	82
Pacific Islands	Pacific West	9	151
San Francisco Bay	Pacific West	6	70
Cumberland/Piedmont	Southeast	14	59
Appalachian Highlands	Southeast	4	70
Subtotal		**155**	**1.538**
Cooperative Agreement, Colorado State University: Data Management			237
Grand Total			**1,775**

				CWAP NPS-USGS ASSESSMENT & MONITORING PROGRAM					
				SELECTED NEW PROJECTS					
USGS Region	State	NPS Region	Park	Project Title	Activity Category	FY2003 Request	FY2004 Request	FY2005 Request	TOTAL
						in 1000	in 1000	in 1000	in 1000
NR	MA	Northeast	CACO	Robowell: Automated Groundwater Monitoring	Fixed Station	42.50	42.50	42.40	127.40
WR	AK	Alaska	LACL	Potential Effects of Logging on Water Quality in Crescent River Watershed	Intensive/Synoptic	85.00	85.00	85.00	255.00
CR	NM	Intermountain	WHSA	Synoptic Survey of Ammonium Perchlorate Presence Along Lost River	Intensive/Synoptic	42.40			42.40
CR	UT	Intermountain	YELL	State of Montana Water Right Compact	Technical Assistance	10.00			10.00
NR	MD	National Capital	ROCR	Ecological Health Assessment in Riverine Faunal Communities	Intensive/Synoptic	85.00	85.00		170.00
CR	CO	Intermountain	CURE	Quality Assurance and Publication of Water Quality Data Collected From Streams, Rivers and Reservoirs	Intensive/Synoptic	18.70	19.70	31.40	69.80
CR	MO	Midwest	OZAR	303(d) - Source Identification of Fecal Indicator Bacteria in Water and Streambed Sediments	Fixed Station	42.50	42.50	42.50	127.50
NR	ME	Northeast	ACAD	Determine/Model Sources of Groundwater and Nutrients	Intensive/Synoptic	85.00	85.00	80.00	250.00
WR	CA	Pacific West	DEVA	Devils Hole Water and Sediment Chemistry	Technical Assistance	10.00			10.00
				TOTAL		**421.10**	**359.70**	**281.30**	**1062.10**

		CWAP NPS-USGS ASSESSMENT & MONITORING PROGRAM							
				NOT SELECTED NEW PROJECTS					
USGS Region	State	NPS Region	Park	Project Title	Activity Category	FY2003 Request in 1000	FY2004 Request in 1000	FY2005 Request in 1000	TOTAL in 1000
WR	WA	Pacific West	LARO	Effects of Trace Elements on Water Quality and Biological Health	Intensive/Synoptic	85.00	85.00	85.00	255.00
NR	MD	National Capital	ROCR	Effects of Fungicide Runoff on Aquatic Fungal Communities on Leaf Litter	Fixed Station	42.50	42.50		85.00
CR	NE	Midwest	NIOB	Research and Monitor Water Quality of Niobrara National Scenic River	Intensive/Synoptic	82.80	84.90	84.20	251.90
SR	KY	Southeast	MACA	Develop a Continuous Stream Flow Monitoring Station	Fixed Station	42.00	22.00		64.00
WR	CA	Pacific West	YOSE	Risk Assessment for Aquatic Ecosystems in Wilderness Areas	Intensive/Synoptic	70.00	68.40	81.80	220.20
CR	UT	Intermountain	CANY	Streamflow and Water Quality Monitoring Station for Salt Creek	Fixed Station	42.50	22.00	23.50	88.00
SR	TN	Southeast	BISO	Water Quality Assessment and Monitoring Program-Intensive Studies	Intensive/Synoptic	85.00	85.00	82.80	252.80
WR	NV	Pacific West	LAME	Continuous Real-Time Monitoring of Depth-Dependent Water Quality Physical Properties at Overton Arm	Fixed Station	85.00	70.00	73.00	228.00
CR	AZ	Intermountain	GLCA	Limnological Station in the Forebay of Glen Canyon Dam	Fixed Station	50.00	50.00	50.00	150.00
WR	ID	Pacific West	HAFO	Reactivation of USGS Fixed Station Monitoring	Fixed Station	35.00			35.00
NR	WI	Midwest	SACN	Determine Geomorphic History of Island Formation Along St Croix National Scenic Riverway	Technical Assistance	10.00			10.00
WR	AK	Alaska	GLBA	Evaluate East Alsek River Water Quantity and Quality	Fixed Station	35.40	32.80	32.80	101.00
				TOTAL		**665.20**	**562.60**	**513.10**	**1740.90**

					CWAP NPS-USGS ASSESSMENT & MONITORING PROGRAM					
					CONTINUING PROJECTS					
USGS Acct No.	USGS Region	State	NPS Region	Park	Project Title	Activity Category	FY2001 Allocation in 1000	FY2002 Allocation in 1000	FY2003 Allocation in 1000	FY2004 Request
	WR	AK	Alaska	CAKR	Occurrence and Distribution of Trace Elements in Land, Streams and Aquatic Life	Intensive/Synoptic	42.50	42.50	42.50	
	WR	AK	Alaska	GAAR	Effects of Wastewater Effluent on the Water Quality of the John Wild River	Intensive/Synoptic		85.00	85.00	85.00
	WR	AK	Alaska	SITK	Urban Impacts on the Water Quality of the Indian River	Intensive/Synoptic	42.50	42.50	37.50	
	CR	CO	Intermountain	BAND	Document Hydrologic Response to Watershed Restoration: Measure Runoff and Suspended Sediment	Intensive/Synoptic		42.50	42.50	42.50
	CR	TX	Intermountain	GLAC	Occurrence of Persistent Organic Pollutants and Current-Use Pesticides in Seasonal Snowpacks, Lake Water and Lake Sediment	Intensive/Synoptic		77.00	84.10	36.50
	CR	AZ	Intermountain	GLCA	Evaluation of Water-Quality Impacts From Visitation and Recreational Use Within Side Canyons	Intensive/Synoptic	85.00	85.00	85.00	
	CR	AZ	Intermountain	GLCA	Assessment of Sediment Chemistry in the Colorado River Delta	Intensive/Synoptic	85.00	85.00	72.00	
	CR	TX	Intermountain	BITH	Monitor In-Stream Biological Resources, Chemical Stressors & Land Uses	Fixed Station	42.20	42.20	42.00	
	CR	AR	Midwest	BUFF	Determine the Dependence of Aquatic Resources on Streamflow in Response to Proposed Tributary Impoundment	Intensive/Synoptic		53.80	58.60	68.90
	NR	IN	Midwest	INDU	Water-Quality and Ground-Water/Surface-Water Interactions near Long Lake	Intensive/Synoptic	84.81	84.80	84.85	
	CR	MN	Midwest	VOYA	Mercury Cycling in Small Lakes	Intensive/Synoptic	85.00	85.00	65.00	
	CR	AR	Midwest	BUFF	Fixed Site Stream-Flow and Water-Quality Monitoring for Calf Creek	Fixed Station	37.30	39.10	42.40	
	CR	MN	Midwest	VOYA	Assessment of Effects of Changes in Reservoir Operations on Tropic-State Indicators	Fixed Station	42.50	42.50	42.50	
	NR	MD	Northeast	ASIS	Study Relationships Between Land Use and Ground Water Quality in Chincoteague Bay Watershed	Intensive/Synoptic		85.00	85.00	
	NR	MA	Northeast	CACO	Ground-Water Nutrient Transport to Estuaries and Fresh-Water Ponds	Intensive/Synoptic	84.41	84.84	84.87	
	NR	NJ	Northeast	DEWA	Determining Impacts on Special-Protection Waters	Intensive/Synoptic		85.00	85.00	85.00
	NR	VA	Northeast	SHEN	Develop Park-Wide Episodic Acidification Vulnerability Map	Intensive/Synoptic		85.00	85.00	85.00
	NR	WA	Pacific West	NOCA	Persistent Organic Pollution and Heavy Metals in Glacial Fed Lakes and Aquatic Biota	Intensive/Synoptic		84.20	85.00	34.00
	WR	CA	Pacific West	WHIS	Identification of Contamination Associated with Abandoned Mine Lands	Intensive/Synoptic		84.10	85.00	44.60
	SR	FL	Southeast	BICY	Assessment of Nutrients and Pesticides in Barron and Turner River Canals	Intensive/Synoptic		66.70	46.70	
	SR	TN	Southeast	BISO	Effects of Oil and Gas Operations on Ground-Water Quality	Intensive/Synoptic		81.00	67.00	
	SR	SC	Southeast	COSW	Assessment of Mercury Input and Bioaccumulation	Intensive/Synoptic		26.50	48.00	
	SR	LA	Southeast	JELA	Survey of Porewater Chemistry of Floating Marshes	Intensive/Synoptic	85.00	85.00	50.00	
	SR	VI	Southeast	VIIS	Using Beryllium-7 to Measure Current Sediment Inputs to Coral Reef Ecosystems	Intensive/Synoptic		85.00	77.00	
					Completed Projects		1299.57	350.98		
					NPS/USGS administration		111.73	111.73	111.73	111.73
					Continuing Projects			1659.24	1582.52	481.50
					New Projects				433.75	1534.77
					TOTAL		**2127.52**	**2121.95**	**2128.00**	**2128.00**

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