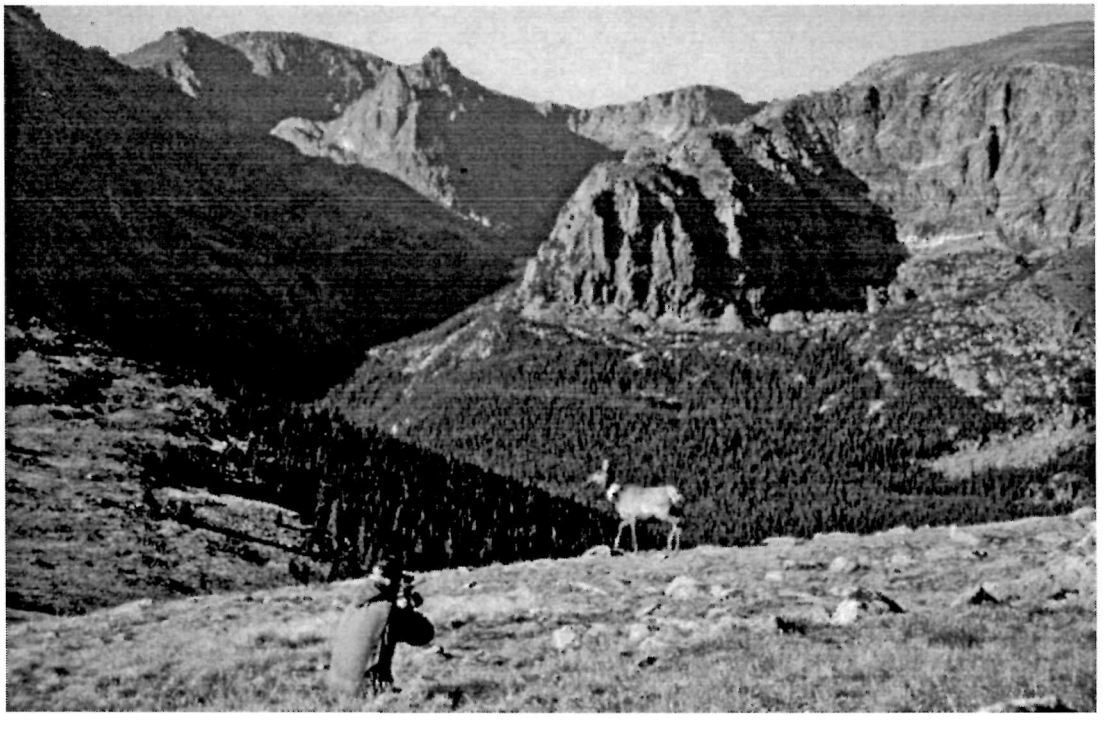
The National Park Service
U.S. Department of the Interior
Natural Resource Program Center
Biological Resource Management Division

Biological Resource Management Division Annual Report Fiscal Year 2002



Wildlife Program staff darting elk in Rocky Mountain NP
Photo courtesy of Dan Baker, Colorado Division of Wildlife

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Annual Report – Fiscal Year 2002

Introduction:

Active natural resource management has become crucially important as the natural heritage preserved within national park boundaries is threatened. To assist parks in addressing current natural resource management issues, the Biological Resource Management Division (BRMD) provides professional, innovative, state-of-the-art, science-based support programs for exotic species management, terrestrial ecosystem restoration, threatened and endangered species protection, and wildlife management. The Natural Resource Challenge Funding for exotic plant control and strategic biological support totaled $5,846,000 in fiscal year (FY) 2002 and totaled $3,441,000 in FY 2001.

The activities of the Division contributed to meeting the following performance goals for FY 2002; 1a1 Disturbed Lands/Exotic Plant Species and 1a2 Threatened and Endangered Species.

Biological Resources Management Funding

Funding Available in FY 2001*	3,441,000
Uncontrollable Change to Base	6,000
Streamlining Change to Base	(1,000)
Net available After Changes to Base	3,446,000
Natural Resource Challenge Increase in FY 2002	2,400,000
Total Available in FY 2002	**$ 5,846,000**

Biological Resource Management Program Funding Categories

Exotic Plant Management Teams	3,000,000
Ecological Restoration	400,000
Endangered Species Program	522,000
Integrated Pest Management Program	625,000
Wildlife Program	612,800
Biological Resource Projects-National Level Support	686,200
	$ 5,846,000

In addition to the above Natural Resource Challenge Funding programs, BRMD provides oversight and management for the Natural Resource Preservation Program (NRPP), a program that provides support for natural resource management projects in national parks.

BRMD is proud of its systematic and nationwide response to the increasing management needs of biological resources on parklands. This report provides highlights of FY 2002 BRMD natural resource efforts in each of the above Natural Resource Challenge funded programs or projects.

*Resulted from an FY 2000 Natural Resource Challenge Increase

Exotic Species and Ecological Restoration Branch

The national parks are home to complex native communities of plants and animals that have developed over millions of years. This natural heritage is threatened by the invasion of exotic plants and animals as well as by human-caused disturbances that foster the establishment of exotic species. The introduction of harmful exotic species is an emerging global problem. A recent Cornell University study estimated that invasive plants and animals cost the US Economy $137 billion annually. The Ecological Society of America noted that invasive species contribute to the listing of 35 to 46 percent of all threatened and endangered species. Today, exotic plants infest some 2.6 million acres in the national parks. Control of exotic species is one of most significant land management issues facing national parks. The Exotic Species and Ecological Restoration Branch is comprised of the Exotic Plant Management Teams, Integrated Pest Management Program, and Ecological Restoration. Projects focused on invasive species and restoration helps preserve our natural heritage. Highlights of this work in FY 2002 are listed below.

Exotic Plant Management Teams

Funding Allocation: $3,000,000

(For a complete report on EPMT FY 2002 accomplishments, see the EPMT Annual Report - FY 2002.)

To combat and control exotic plant species populations in national parks, BRMD established EPMTs in FY 2000. EPMTs were modeled after the coordinated rapid-response approach used in wildland fire fighting. EPMTs are designed to provide a highly trained, mobile strike force of plant management specialist to assist parks in the control of exotic plants. Five new tactical EMPTs joined the four EPMTs established in FY 2002. These nine EPMTs have been lauded for their work in controlling nuisance exotic plants.

Workshop on Invasive Plant Species Mapping and Monitoring

BRMD worked cooperatively with the NPS Inventory and Monitoring Program to hold an Invasive Plant Species Mapping and Monitoring Workshop in FY 2002. State, federal and nongovernmental experts in invasive plant monitoring and mapping met to develop a set of guidelines and a report on mapping and monitoring protocols for use by NPS Inventory and Monitoring Networks and Exotic Plant Management Teams.

Exotic Plants in Alaska NPS Units

The Exotic Plants in Alaska NPS Units project was initiated to establish the status of non-native plants in Alaska park units and develop a program for controlling and monitoring such populations. The project has four multi-year objectives that were partially achieved during FY 2002. These objectives include:

1. Develop a current, comprehensive picture of the status of exotic plants on and near NPS lands in Alaska.
2. Develop a plan for addressing existing exotic plants and those that have become threats to the ecosystem.
3. Begin implementation of this plan with early, small removal actions and bi-directional education with other NPS programs, especially planning and maintenance.
4. Coordinate management efforts with agencies and other landowners who manage lands around and within park borders.

Cape Cod National Seashore Kettle Pond Exotic Plant Survey

During the FY 2002 field season, each of the primary and secondary kettle ponds (20 in total) in the Kettle Pond Monitoring Program were surveyed for the presence of exotic, non-native vegetation. The non-native common reed (*Phragmites australis)* and purple loosestrife (*Lythrum salicaria)* were specific targets of this investigation since these species have a high potential for spread and can wreak ecological havoc upon wetland communities. The entire perimeter of each pond was surveyed via canoe or foot. Global Positioning System (GPS) mapping coordinates were recorded where non-native vegetation was observed. Samples of submersed aquatic vegetation (SAV) were collected for identification. Common reed was observed in 8 ponds (Ryder, Great-Truro, Long, Snow, Herring, Williams, Horseleech, and Round-east) ranging from a few individual plants to stands measuring several meters across. Common reed appears to have invaded Herring pond fairly recently since this species was not recorded in 1996 by Dr. Charles Roman (Roman et al. 2001). In Higgins pond there is a stand of purple loosestrife that was previously documented in the 2000 exotic plant survey at Cape Cod National Seashore. No exotic SAV was observed. This information was translated into Global Information System (GIS) map layers and is currently being used to develop an exotic plant management plan and several projects concentrated on monitoring and removal.

Ecological Restoration
Funding Allocation: $400,000

BRMD continues to work with specialists from other Natural Resource Program Center Divisions on disturbed lands and other NPS programs to support ecosystem restoration in the context of wildland fire, weed control, contaminants and cultural resources. Highlights of FY 2002 work done in ecological restoration are below.

Fire Management

BRMD increased its efforts to work with the NPS Fire Management Program Center through participation in the NPS Fire Ecology Program. BRMD also continued to provide NPS input into a plan for Native Plant Material Development that was submitted to Congress in the summer of 2002. In September 2002, BRMD met with fire and selected park staff to develop focus areas for integrating the efforts of the fire and the resource divisions. The overall goal was to facilitate a shared vision by fire management staff and resource management staff of desired conditions for both divisions in the near future and the long-term. This shared vision will be accomplished through a common understanding of assorted planning processes, mutual identification of desired future conditions for resources, planning templates, joint workshops, technical assistance, and co-location of a fire specialist at the Natural Resource Program Center.

Prescribed fire at Badlands NP

Degraded Ecosystem Restoration

To address the issue of degraded ecosystem restoration, BRMD provided technical assistance to parks representing 12 new projects. BRMD also continued work on projects at Fort Union Trading Post, Big Bend and Valley Forge. Ecological restoration projects, such as these, will often run greater than one or two years due to funded project overlap, management programs, and long-term planning. Project issues included native plant establishment, restoration monitoring, environmental and ecological planning in the face of degrading systems due to invasive species, and soil quality.

Project Oversight

BRMD provided project oversight (technical guidance and input) on several NRPP and BRMD competitive funding projects on ecosystem management and restoration for the following parks: Sleeping Bear Dunes NL, Pictured Rocks NL, Cape Hatteras NS, Point Reyes NS, Yellowstone NP, Canyonlands NP, Pinnacles NP, and Olympic NP.

Contaminants

To address the issue of contaminants, BRMD continued to assist the Appalachian Trail staff in their technical discussions with the Environmental Protection Agency. These discussions focused on the development of a mutually acceptable solution to remediate and restore natural systems on

the Appalachian Trail in Pennsylvania. Other contaminant work included membership on the NRPC Red Dog Mine Review Team evaluating issues related to a mine haul road through Cape Krusenstern National Monument and collaboration with the NRPC-Operations HazMat Program Contaminants Technical Advisory Group.

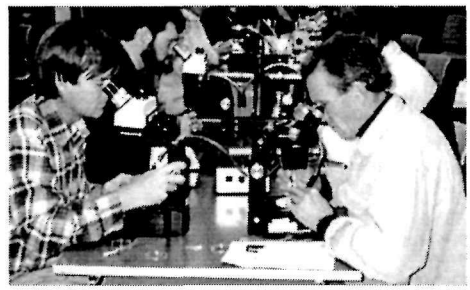
Biostatistics

BRMD signed a cooperative agreement with the University of Wyoming to provide technical assistance to parks for biostatistical support. This two year trial project will begin with six parks in FY2003.

Integrated Pest Management Program
Funding Allocation: $625,000

The NPS Integrated Pest Management (IPM) Program is viewed as a model by other resource agencies in managing pest species. Through a broad range of IPM training and technical assistance, the IPM Program provides low-risk strategies for the management of exotic and native pests adversely affecting park management objectives. Technical assistance is provided by IPM staff to more than 100 parks per year either through on-site consultations, distributed material, remote consultations on problems, or identification of other experts available to park personnel. Technical Assistance provided by the IPM program often results in an economical and permanent solution to pest management problems. In addition to assisting natural resource managers with pest management issues, the IPM Program assists with many other program areas including operations, concessions, cultural resources and visitor safety.

During FY 2002 a significant on-going activity included the maintenance of a process for reviewing and tracking pesticide proposals. During the year, a record 1,700 pesticide proposals were processed.


IPM Workshop participants identify mosquitoes

Two weeklong IPM courses were presented, reaching a total of 56 trainees. Other training was offered for facilities managers and concessionaires.

West Nile Virus continued to pose a threat to human and wildlife health. The IPM staff worked closely with the Centers for Disease Control, the US Fish and Wildlife Service and the West Nile Virus Interagency Task Force to assure that parks received the latest information on the virus and provided specimens for testing. In addition, information and briefings were prepared for Congress, the Secretary's Science Advisor, and the American Mosquito Control Association. A West Nile Virus web site was created to provide current information to parks.

An IPM program review was conducted. Participants included the IPM staff and supervisors, two regional IPM coordinators, and IPM experts from the Department of Defense and the U.S. Department of Agriculture-Cooperative State Research, Education, and Extension Service. One result of the review was a contract with Pennsylvania State University for the services, on a half-time basis, of a highly experienced entomologist to meet parks increased IPM needs.

Nearly $290,000 was obtained from the US Forest Service and distributed to 11 parks to control forest insects and diseases. Projects ranged from protecting 19 high-value trees from hemlock

woolly adelgids at Gettysburg National Military Park to spraying 1,250 acres for gypsy moths in the National Capital Region.

Endangered Species Program
Funding Allocation: $522,000

During FY 2002 the Natural Resource Challenge again provided important opportunities for the Endangered Species Program to contribute to the stabilization and recovery of threatened and endangered species in national parks.

NPS currently has over 400 federally listed endangered, threatened, proposed, or candidate species reported from lands that it manages (see Tables 1 and 2). To better support recovery efforts of these species, NPS staff continued to update the NPS endangered species database with information on the status of individual species in each park as well as track expenditures by species. This updated information provides NPS with a better picture of where recovery efforts are succeeding and where additional emphasis should be placed (see Figure 1).

In cooperation with Colorado State University (CSU) and the Colorado Plateau Cooperative Ecosystem Studies Unit (CESU) approximately 200 draft management summaries on listed species have been prepared. These concise reviews are utilized by NPS resource managers to help identify priorities for funding and to evaluate the effects of park operations on listed species.

A lichen searcher searches for species in a late-successional lichen stand in BELA's Bavarian. This area has not been grazed in hundreds of years due to natural landscape barriers. A one acre plot is likely to host more than 60 lichen species.

The Endangered Species Program worked with the National Center for Genetic Resources Preservation to develop a Memorandum of Understanding (MOU) that facilitates NPS storing seeds from highly endangered species in its Seed Storage Laboratory. Continued efforts were made to develop a cooperative agreement with the Center for Plant Conservation that will result in the collection and preservation of seeds from over 200 NPS populations of endangered plants. Endangered Species Program biologists provide technical assistance to park units from coast to coast. Two examples of this assistance in FY 2002 include providing advice on listed plants and birds to the Colonial National Historical Park as it prepared for its 400th anniversary and providing advice to the Channel Islands National Park which has brought its endemic island foxes into a captive breeding program. The January/February 2002 issue of the Endangered Species Bulletin focused exclusively on conservation efforts in National Parks; there were articles from each NPS region as well as an overview of the NPS program.

The Endangered Species Program continued to take a lead role in drafting and negotiating MOUs with other federal agencies in order to prevent further species declines. An MOU on amphibians and reptiles was signed and work continued on black-tailed prairie dogs, migratory birds, and lynx. To stabilize species that move beyond park boundaries, the Endangered Species Program helped NPS develop new partnerships with Bat Conservation International, Partners in Flight, and the International Association of Fish and Wildlife Agencies.

Table 1. The number of endangered, threatened, proposed, and candidate species found in National Park Service units (as of September 30, 2002).

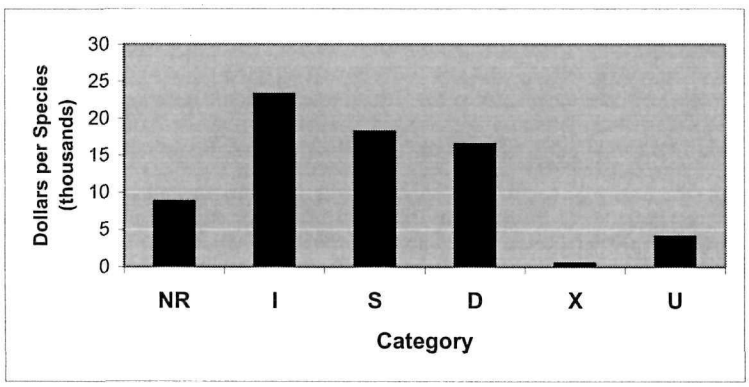
Status	Species
ndangered Species (E)	261

hreatened Species (T)	96
xperimental Populations (EXPN)	7
roposed Species (P)	4
andidate Species (C)	52
anaged via Conservation Agreement (M)	4
otal	**424**

Table 2. The taxonomic affinity of endangered, threatened, proposed, and candidate species found in National Park Service units (as of September 30, 2002).

Taxonomic Group	Species
lants	181
nvertebrates	50
ish	50
mphibians	6
eptiles	22
irds	59
otal	**424**

Figure 1. NPS expenditures by species in 2001 for species in different trend categories. Note: not-at-risk (NR), increasing (I), stable (S), declining (D), extirpated (E), and unknown (U).



Wildlife Program
Funding Allocation: $612,800

BRMD's Wildlife Program provides policy guidance, technical assistance, and training to enhance the ability of park staff to meet the increasing demands for professional wildlife management. Subject areas that are typically addressed include wildlife health, wildlife restoration, exotic species management, wildlife population management, and the identification of wildlife research needs. During FY 2002, assistance was provided in the following areas:

Wildlife Capture and Anesthesia

BRMD provided technical assistance to parks via consultation, training, and fieldwork on wildlife capture and anesthesia. One wildlife anesthesia training class was conducted for park staff. Aerial capture, eradication, and tagging training was provided to NPS park staff, state employees, US Fish Wildlife Service staff, and Wildlife Services personnel from Haleakala NP, Hawaii Volcanoes NP, Kalaupapa NHP, Yellowstone NP, and the states of Hawaii, Montana, Idaho, and Wyoming. Additionally, technical assistance for aerial and ground wildlife capture or field anesthesia was provided to the following seven parks: Zion NP, Rocky Mountain NP, Channel Islands NP, Lake Clark NP and Preserve, Yellowstone NP, Fire Island NP, and Acadia NP.

A draft Specialized Task Book (STB) for Basic Wildlife Anesthesia was prepared with the assistance of Elaine Leslie from the Grand Canyon National Park. The STB was designed along the lines of the Position Task Books in place for the National Interagency Incident Management System. This STB defines training and performance requirements for NPS personnel who conduct and carry out specialized and sensitive operations. It also provides Servicewide uniform measurements for NPS personnel to conduct specialized wildlife management operations. In the future, additional STB's are proposed for Advanced Wildlife Anesthesia, Aerial Wildlife Capture, and General Wildlife Capture.

Wildlife Management

BRMD assisted a number of parks in evaluating and developing wildlife management actions for critical wildlife issues. This included; assisting Theodore Roosevelt NP in evaluating management alternatives for surplus elk and assisting Pea Ridge National Military Park through a site visit by the Inter-regional White-tailed Deer Team to discuss alternatives and actions for white-tailed deer management. BRMD Wildlife Management Program and Endangered Species Program staff visited Cape Hatteras NS and Cape Lookout NP to discuss policy and management alternatives to reduce predation on Piping Plovers and sea turtle nests by both native and exotic species.

Veterinary Diagnostics and Wildlife Health

Veterinary diagnostic services for wildlife are an important component of ecosystem health management. BRMD has teamed up with the National Wildlife Health Center and, through a CESU agreement, with the Colorado State University Veterinary Diagnostic Laboratory to provide veterinary diagnostic services to national parks. Surveillance for emerging diseases, such as chronic wasting disease (CWD) of deer and elk as well as for common diseases provides managers with valuable information to address wildlife and public health concerns.

During FY 2002, consultation was given on wildlife health issues and general diagnostic services were provided at levels that were markedly expanded from previous years. In addition, information sharing was provided to requesting parks on subjects including wildlife-domestic animal disease interactions, a specific disease, disease risks associated with translocation of wildlife, disease sampling protocols, and animal welfare concerns such as methods for euthanasia.

CWD emerged as a priority wildlife health issue. The BRMD wildlife veterinarian served on interagency working groups to produce the national Plan for Assisting States, Federal Agencies, and Tribes in Managing Chronic Wasting Disease in Wild and Captive Cervids and the subsequent Implementation Plan. Briefings on CWD were provided to NPS and Department of the Interior administrators, including Secretary Norton. Technical assistance was provided to parks for assistance in designing and implementing CWD surveillance and management programs. Assistance was provided primarily to Rocky Mountain and Wind Cave National Parks, however, training and consultation were provided to numerous other NPS units. Assistance to parks and others was also provided by the BRMD wildlife veterinarian preparation of the manuscript titled *Preclinical diagnosis of chronic wasting disease in captive mule deer and white-tailed deer using tonsillar biopsy* that was published in the Journal of General Virology.

Tonsillar biopsy procedure is on a deer at Rocky Mountain

Rabies in raccoons in the eastern United States and in gray fox and coyotes in Texas also emerged as a disease of interest to NPS. BRMD staff gathered information and initiated communications with the United States Department of Agriculture and the Centers for Disease Control and Prevention in order to formulate guidance on the use of oral rabies vaccination in NPS units.

BRMD provided technical assistance to Olympic National Park by reviewing the technology available for contraception of free-ranging mountain goats. (Improved methodology for wildlife population control by non-lethal means is a growing need of wildlife management agencies and parks.) Additionally, BRMD collaborated with the Colorado Division of Wildlife on fertility control work at Rocky Mountain National Park. Collaboration on studies on captive cervids is ongoing and a field evaluation of the experimental contraceptive Leuprolide was initiated in Rocky Mountain National Park.

BRMD continued technical assistance to Yellowstone National Park by supporting planning on a multi-tiered, collaborative project with Russian scientists to investigate brucella vaccines, vaccine enhancers, and delivery systems to address bison brucellosis management at the park. Additionally, BRMD hosted a workshop on remote delivery of pharmaceuticals to free-ranging wildlife. The most immediate need in NPS for improved technology in this field is for remote vaccination of bison at Yellowstone National Park. The workshop brought together a diverse group of experts from the fields of ballistics, polymer chemistry, immunology, and wildlife health to identify approaches for developing effective methods of remote delivery and to plan collaborative efforts.

Park Flight Migratory Bird Program

Funded Through a Cooperative Agreement with the University of Arizona in FY 2001

The Park Flight Migratory Bird Program (Park Flight) works to protect shared migratory bird species and their habitats in both U.S. and Latin American national parks and protected areas. The program develops bird conservation and education projects and creates opportunities for technical exchange and cooperation. Park Flight is a partnership between NPS, National Park Foundation, American Airlines, National Fish and Wildlife Foundation, U.S. Agency for International Development, and the University of Arizona. The program is made possible through the generous support of American Airlines and the NPS Natural Resource Challenge. Technical direction is provided by the University of Arizona Desert Southwest Cooperative Ecosystem Studies Unit and BRMD.

[illegible] talks [illegible] Cape May Point, New Jersey. Belkys is an International Volunteer in Parks intern from Panama who assisted with the New Jersey Park Flight project.

In FY 2002, Park Flight continued a second year of funding for seven bird conservation and education projects in 13 U.S. national parks, and in protected areas in Guatemala, El Salvador, Nicaragua, Honduras, Panama, and Mexico. As part of the FY02 Park Flight technical exchange effort, seven interns from Guatemala, El Salvador, Nicaragua, Panama, and Mexico assisted with monitoring and education efforts at Sequoia/Kings Canyon NP, North Cascades NP, Point Reyes NS/Golden Gate NRA, and the New Jersey Coastal Heritage Trail Route. These technical exchanges were coordinated through the NPS Office of International Affairs International Volunteer in Parks program. In addition, six NPS employees provided technical assistance for Park Flight projects in Honduras, Guatemala, El Salvador, Nicaragua, Panama, and Mexico.

The Park Flight Program held its first grantee workshop in FY 2002 at the Albright Training Center in Grand Canyon NP. The workshop focused on techniques for interpretation, environmental education and outreach. It also provided an opportunity for Park Flight grantees from U.S. and Central American national parks and protected areas to build relationships for collaboration on migratory bird conservation.

Park Flight received the NPS Director's Award as part of the 2002 National Park Partnership awards, and was one of only two NPS programs highlighted at the United Nations World Summit on Sustainable Development in Johannesburg, South Africa. The program was featured in articles in the American Bird Conservancy's *Bird Conservation* magazine, the American Birding Association's *Winging It* newsletter, the National Fish and Wildlife Foundation's publication, "*The Neotropical Migratory Bird Conservation Program: Results and Lessons Learned*" as a case study on effective partnerships, and in the *NPS Natural Resource Year in Review - 2001*.

Under the umbrella of Park Flight, NPS worked with the U.S. Fish and Wildlife Service to produce an advanced draft of the Memorandum of Understanding required by Executive Order 13186 for the protection of migratory birds. NPS also contributed to the efforts of Partners in Flight and the North American Bird Conservation Initiative, attending and presenting at national and international meetings, chairing the Partners in Flight Federal Agency Committee, and supporting and distributing International Migratory Bird Day materials in English and Spanish.

Biological Resource Projects – National Level Support
Funding Allocation: $686,200

BRMD competitive funds are used for biological resource projects that address national level issues facing various park units and benefiting multiple partners. In FY 2002, 24 projects were funded in 20 parks for a total funding of $686,200. The following table (Table 3) lists these projects. Projects funded addressed a myriad of resource management needs for aquatic and terrestrial plants and animals throughout the NPS. Projects ranged from developing a orchid recovery plan and sensitve plant data base at Indiana Dunes National Lakeshore to restoring Colorado River Cutthroat Trout at Rocky Mountain National Park and assessing distribution and status of mountain lion at Santa Monica Mountains National Recreation Area.

Table 3. Listing of Biological Resource Projects including park unit, region, project title and FY 2002 funding allocation.

Park Unit	Region	Project Title	FY 2002 Funding
LACL	AKR	Improve a Census Technique for a Harvested Population of Moose	38,500
LACL	AKR	Tracking Sockeye	23,000
BAND	IMR	Develop a Wilderness Stewardship Plan	30,000
BAND	IMR	Monitor Ecosystem Conditions Baseline Wilderness Plan EIS	34,000
BIBE	IMR	Implement Conservation Agreement Two Candidate Plant Species	24,000
CANY	IMR	Salt Creek Invertebrates	22,000
ROMO	IMR	Restore a Population of Colorado River Cutthroat Trout	31,000
SAGU	IMR	Conduct Invasive Non-Native Grass Backcountry Hasty Search	25,000
SAGU	IMR	Status Assessment and Management Lowland Leopard Frogs	30,000
YELL	IMR	Baseline Inventory of Thermophile Biodiversity	24,000
INDU	MWR	Develop a Database for Sensitive Plants and Orchid Recovery Plan	30,500
ISRO	MWR	Develop a Fishery Management Plan for ISRO	14,000
WICA	MWR	Baseline Land Snail Inventory for WICA	25,000
VOYA	MWR	Protect Muskellunge in Shoepack Lake	23,000
GWMP	NCR	Potential Impacts of Mosquito Control Activities: Assessment of the Arthropods of	25,000
ROCR	NCR	Determine Ecological Vulnerability of Kenk's Amphipod	27,700
SHEN	NER	Control Exotic Vegetation -Essential Follow-up Controls for Several Units	25,000
UPDE	NER	Determine Size and Significance of Newly Discovered Population of Endangered Dwarf Mussels	50,000
LAME	PWR	Development of a Comprehensive Invasive Plant Management Plan for LAME	35,000
LAVO	PWR	Taxonomic Affinity, Spatial Ecology and Resource Utilization of a Red Fox Population	42,500
PIRO	MWR	Evaluation of Seasonal Stream Usage and Inter-stream migration by Coaster Brook Trout	33,000
PORE	PWR	Habitat Assessment of the Federally Endangered Myrtle's Silverspot Butterfly	24,000
SAMO	PWR	Assess Distribution and Status of Mountain Lion	25,000
SAMO	PWR	Assess Reptile and Amphibian Dist. & Status	25,000

Park Unit	Region	Project Title	FY 2002 Funding
		TOTAL	$686,200

The following project highlights are for those projects identified in Table 3 that have been fully funded.

Tracking Sockeye at Lake Clarke National Park and Preserve

The purpose of this study was to locate and map all major sockeye salmon spawning areas in the Lake Clark watershed, to collect basic habitat characteristics and to determine current and potential conflicts with lakeshore development and subsistence use. Understanding where and when salmon spawn will provide park managers with the information necessary to protect critical spawning habitats.

All work was completed on schedule and all objectives were accomplished as set out in the project proposal. Radio telemetry was used to determine spawning locations for 247 of 332 radio-tagged salmon from 2000 - 2001. There were 35 distinct spawning areas (including 10 previously unknown) that were identified and mapped into the Geographic Information System (GIS). Habitat characteristics were collected from beach and tributary spawning areas and were entered into a database. Historic and current subsistence fishing data was gathered and entered into GIS as part of a Traditional Ecological Knowledge (TEK) project already underway. Current land use development relative to spawning areas was documented with aerial photography and on-ground surveys.

Conduct Invasive Non-Native Grass Backcountry Hasty Search at Saguaro National Monument

Saguaro NP hired a crew of two seasonal Biological Science Technicians to perform backcountry searches for two of the park's most problematic invasive species, buffel grass (*Pennisetum ciliare)* and fountain grass (*Pennisetum setaceum).* The crew worked through the summer of 2002 to the end of FY 2002.

The crew hiked a total of 220 miles, completing an estimated 127 miles of survey routes. The crew recorded an additional 16.0 acres of buffel grass and 34.4 acres of fountain grass not identified in previous surveys. This added roughly 1% to the total area for each species in the park. However, these areas were considered more "natural" undisturbed areas because of their remoteness, showing these species have little trouble spreading over distances.

The crew used GPS to record their survey routes and locations where both species were found. These locations will be added to the existing park database and used in the GIS to prioritize eradication efforts for the park as a whole.

Baseline Land Snail Inventory at Wind Cave National Park

The purpose of this project was to obtain baseline data on the diversity of land snail species within the Park, identify and describe the associated habitats, and receive recommendations for management.

In FY 2002, eighty-two soil samples were collected. Of these, 59 contained snails and/or shells. An additional six areas were hand-searched for snails. Snails were found at two of these areas (Dry Creek and Cold Brook Canyon). The main focus for these hand searches was larger species such as *Discus* and Oreohelix. It is possible that some of the smaller species (i.e. Vertigo or Vallonia) could have been present but overlooked. Several flowing creeks (Highland Creek, Beaver Creek, Reaves Gulch) and small pools were examined casually, but no aquatic snails were observed. GPS locations were used to create maps with ArcView 8 software (ESRI).

Protect Muskellunge in Shoepack Lake at Voyageurs National Park

The basic biological information needed to ensure the long-term sustainability of the genetically unique muskellunge population in the remote Shoepack Lake of Voyageurs National park, MN is severely limited. The Shoepack population, like most of the limited number of self-sustaining muskellunge (*Esox masquinongy*) populations that still exist (Hanson et al.1986), is at risk from over-exploitation and possible habitat deterioration. Biological information on this genetically distinct population (Hanson et al.1983; Fields et al. 1997) is extremely limited despite its having been used by the Minnesota Department of Natural Resources (MNDNR) as a source of eggs for 17 years. The objectives of this study were to (1) identify the biological characteristics and habitat requirements of this endemic strain of muskellunge, and (2) determine the level of exploitation. This information is needed for proper management in native lakes as well as to provide guidance on how it can be most effectively managed in other lakes where it has been or may be introduced.

Shoepack Lake sampling began on May 3, 2002 after an April 25th ice out to coincide with the spawning run. Mark and recapture was conducted one week per month in June, July, and August. Smaller mesh trap nets were used in July and August to target the younger fish in the population. Other areas of interest in addition to population estimates include age and growth analysis, fecundity, and angler pressure.

Angler surveys were handed out at visitor centers, and at Shoepack Lake. The park pilot throughout the fishing season also took angling pressure counts.

FY 2002 is the second year of a two-year study. The graduate student will return in spring of 2003 for additional sampling prior to publication of findings and data, expected late in 2003.

Determine Ecological Vulnerability of Kenk's Amphipod at Rock Creek Park

Information currently available suggests that Kenk's amphipod is extremely rare and vulnerable to pollution and other impacts to groundwater in which they live.

During FY 2001, the distribution and threats to Kenk's amphipod (*Stygobromus kenki*) were assessed. It was known previously from only two sites. In addition, eight small drainages, each originating at one or more seeps a few hundred meters from Rock Creek, were studied in FY 2001. Kenk's amphipod is one of three species in the genus *Stygobromus* known from Rock Creek Park. During the FY 2001 field season, the endangered Hay's Spring amphipod (*S. hayi*) was found in a new location. Kenk's amphipod was found in two locations from where it was previously known and one new location.

The project was delayed because of the extreme drought in FY 2002, which impeded the sampling of springs and groundwater seeps. As soon as groundwater flows are restored the investigator will be able to resume and complete the study. A one year no cost extension was approved for this project. Completion of the study is anticipated for FY 2003 with a final report by September 30, 2003, which will summarize findings and include management recommendations to protect the seeps and improve habitat for Kenk's amphipod.

Population estimates for Alasmidonta heterodon in the Delaware River were determined using adaptive quadrat sampling methods. Photo by Jeff Cole.

Control Exotic Vegetation: Essential Follow-up Controls for Several Units

The objectives of this project were to (1) conduct invasive vegetation suppression retreatment of targeted aliens within stream corridors and side ravines impacted by the SHEN 1995 Flood Event, (2) conduct initial controls on 50 acres in the same areas, and (3) provide retreatment on 15 acres identified within the Park. NPS staff and volunteers worked in an integrated fashion to complete the project.

Retreatment surveillance was conducted on the streams that make up the project, including Rapidan River, Staunton River, Wilson Run, Kinsey Run, and North Fork of the Moormans River. Retreatment of other Park areas amounted to 41.6 acres.

The Park discovered the highly invasive mile-a-minute vine (*Polygonum perfoliatum*) in May 2002. This highly invasive vine quickly became a high priority for treatment due to its extremely high rate of spread accomplished by its long-season flowering and fruiting and attractiveness as bird soft mast.

Determine Size and Significance of Newly Discovered Population of Endangered Dwarf Mussel at Upper Delaware NSRR

The purpose of the study/ project was to determine the size and significance of a newly discovered population of endangered dwarf wedge mussel (*Alasmidonta heterodon*). Specific objectives were, to: 1) determine population size and extent of *Alasmidonta heterodon* in the mainstem Delaware River of the Upper Delaware Scenic and Recreational River, 2) determine approximate age and/or year-class structure of the population, 3) determine reproductive status of the population, 4) determine genetic relationship of the mainstem population to other known populations of *Alasmidonta heterodon* found within and exterior to the Delaware River drainage.

These objectives have been partially accomplished to date, with fieldwork in summer and fall 2002 involving quantitative sampling (using adaptive quadrat methods to ascertain absolute population size) being done. Measurements and photographs of individual mussels were taken to determine age and/or year class structure, and tissue samples were taken from 30 individual mussels from each of three separate populations for genetic analysis. Data analysis continues to be done to refine population estimates, age structure (shell analysis), and Geographic Information System data.

Assess Distribution and Status of Mountain Lion at Santa Monica Mountains NRA

The purpose of this project was to identify landscape-level habitat linkages and wildlife movement corridors by using mountain lions as indicators for these connections. The project funded for the last two years by BRMD was the first phase of this multi-phase project. The

BRMD component is now complete and ongoing data collection and capture work is expected to continue for the next three years (using separate funding). For the overall project, mountain lions will be tracked using GPS-linked radio telemetry collars and information on their distribution and movements will be used to assess fragmentation impacts and critical wildlife movement corridors. Long-term consequences of habitat loss and fragmentation caused by urban development and roads will be evaluated by modeling mountain lion movement patterns in combination with GIS-based land cover data. Implications of the results will be applied within the study area and in other parks facing similar threats.

In the first (BRMD) phase, all background information was obtained, permits secured, and detailed animal capture protocols were established. Fieldwork was initiated with comprehensive field reconnaissance used to determine likely mountain lion capture areas. Remote camera surveys were also used in this effort. Near the end of FY 2002, the first mountain lion (a 140-lb. male) was captured and radio-collared. More recently, an 80-lb. female mountain lion was captured. Both animals are currently being monitored with GPS and conventional radio telemetry. Capture work continues throughout the mountains and in adjacent areas. Results up to now have been amazing, with a tremendously large home range (in excess of 350 square km) for the male lion. Very exciting and important data is anticipated to be obtained as the project continues.

Assess Reptile and Amphibian Distribution and Status at Santa Monica Mountains National Recreation Area

The purpose of this project was to assess the population status and distribution of reptiles and amphibians throughout the Santa Monica Mountains National Recreation Area. BRMD funds were crucial to allow the park to expand this important work across the Santa Monica Mountains. The project is of particular relevance because substantial anecdotal evidence indicates declines and even local extinctions of some reptile and amphibian species. This project has helped establish a baseline for assessing possible factors responsible for declining population numbers. Over the long-term, this work will also be used to identify species as indicators of ecosystem change and habitat degradation for incorporation into a vital signs monitoring program.

For terrestrial reptiles and amphibians, pitfall trap arrays were installed across much of the park, and are now being monitored. Data processing and analyses are underway as information is collected. These results are linked to similar work directed at urban impacts in the northern section of the park. (See Regional Block Grant Report for more information on this related project.) In addition to the terrestrial species, breeding aquatic amphibians were surveyed in all major streams in the mountains over the last three years. Park staff are preparing a final report for the stream work which we expect to complete by the end of FY03. This report will be linked to the pitfall trap array data also being collected.

BRMD Technical Assistance
Funded Through Individual BRMD Programs and Projects

Technical assistance and service to parks is the heart of the BRMD and NPS Natural Resource Program Center (NRPC) operations. Through direct technical assistance—accessible to all parks—NRPC scientists not only share their expertise with parks, but also maintain and improve their own professional status. It allows for information sharing, and adds "real-world" context to the development of national programs and policies. Table 4 identifies all of the technical assistance requests received in FY 2002.

Table 4. BRMD technical assistance requests received in FY 2002.

Park Unit	Region	Priority	Topic	BRMD Coordinators
AKSO	Alaska	1	T&E Strategy	Mehrhoff
KEFJ	Alaska	2	Nuka River	Dratch
LACL	Alaska	3	Moose Capture	Coffey
CHIC	IMR	16	Rehab Historic Pasture	Eckert
FLFO	IMR	*	Drainage Restoration	Eckert
GRCA	IMR	1	Exotics and IPM	Cacek
GRCA	IMR	9	River Corridor Restoration	Eckert
GRCA	IMR	14	Restoration Matrix for Park	Eckert
MEVE	IMR	2	Review Weed Plan	Cacek
MEVE	IMR	12	T&E Analysis of Fire Plan	Mehrhoff
MEVE	IMR	15	Evaluate Fuel Management.	Eckert
MEVE	IMR	15	Evaluate Fuel Management	Eckert
ROMO	IMR	11	Bighorn Sheep	Wild
SAGU	IMR	10	Road Restoration	Eckert
YELL	IMR	3	Ballistic Vaccine Delivery	Wild
ZION	IMR	5	Mule Deer Screen & Relocate	Wild
ZION	IMR	13	IPM Plan for Concessions	DiSalvo
FOUS	MWR	1	Prairie and Riparian Restoration	Eckert
OZAR	MWR	5	Disturbed Land Restoration Plan	Eckert
PERI	MWR	2	Deer Advisory Consultation	Coffey
SLBE	MWR	4	Monkey Flower Monitoring	Mehrhoff
TAGR	MWR	6	Brome -to-Tallgrass Restoration	Eckert
ANTI	NCR	3	Wildlife Management	Coffey
GWMP	NCR	1	Dyke Marsh Restoration	Eckert
ACAD	NER	1	Restoration Strategies	Eckert
COLO	NER	5	EA for Bald Eagle and Vetch	Mehrhoff
COLO	NER	11	Review of Herps Inventory	Mehrhoff
COLO	NER	14	EIS Green Spring and Jamestown	Mehrhoff
DEWA	NER	3	Restore Hemlock Community	Eckert
FIIS	NER	2	Adaptive Management of Deer	Coffey
FIIS	NER	13	General Management Plan	Johnston
FONE	NER	9	NR Program Review	Eckert
FRHI	NER	8	NR Program Review	Eckert

Park Unit	Region	Priority	Topic	BRMD Coordinators
MORR	NER	7	Restoration of Vegetation	Eckert
MORR	NER	12	Deer Field Necropsy Techniques	Wild
VAFO	NER	10	Native Grasses on Earthworks	Eckert
APPA	OPS	1	Superfund Remediation	Eckert
APPA	OPS	2	T&E Plan	Mehrhoff
CAHA	SER	1	Predator Control Plan	Coffey

Collaboration with Conservation Partners

BRMD met with representatives of NaturServe and the Nature Conservancy to discuss areas for improved collaboration and information sharing. The groups agreed to develop a Memoranda of Understanding to be implemented beginning in FY 2003.

Natural Resource Preservation Program NRPP (*For a complete report on the administration of the NRPP, see the NRPP Annual Report FY 2002.*)

BRMD provided oversight for $12,289,000 in Servicewide programs in FY 2002. Of the funds, ten percent were available for unspecified Servicewide natural resource management projects, while the remaining ninety percent targeted specific needs and are generally distributed to Smallpark, Disturbed Land Restoration, Threatened and Endangered Species, Regional Block Allocation, and USGS/BRD technical assistance projects.

BRMD administers the NRPP-Threatened and Endangered Species and the NRPP-Natural Resource Management programs. Twelve NRPP-Threatened and Endangered Species projects were funded at $468,000, and eighty-two NRPP–Natural Resource Management projects were funded at $7,402,000 in FY 2002. Administration of NRPP includes sponsoring the review/ ranking panels for these two programs once per year, tracking and recording implementation plans, drafting annual accomplishment and completion reports, and preparing funding advice memos upon completion of program requirements for all NRPP programs. Finally, BRMD prepares the comprehensive annual report on Servicewide and NRPP fiscal year funding for submission to Congress.