# A RETROSPECTIVE on NPS invasive species policy and management

By Linda Drees

Following habitat loss, exotic species proliferation is considered the greatest threat to our natural heritage. Invasive species encroachment is implicated in the listing of 42% of all species protected by the Endangered Species Act (Stein and Flack 1996). Invasive species cost the U.S. economy $138 billion annually (Pimental et al. 1999). Of the 83 million acres (34 million ha) managed by the National Park Service, 2.6 million acres (1.1 million ha) are infested by exotic plants and nonnative animals. Examples of nonnative animal species plaguing the parks are feral pigs and goats, hemlock woolly adelgid, New Zealand mudsnail, African oryx, and more recently mosquitoes carrying an exotic microbe, West Nile virus. To address the damage of invasive species, a National Invasive Species Management Plan was developed in 200l and is being carried out by federal agencies. The National Park Service, with its long history of fighting harmful invasives, welcomes this interagency coordination in taking on the tremendous challenge of controlling and eradicating invasive species.

**Figure 1. Burro removal from Grand Canyon National Park, Arizona, began in 1982 and was initially achieved by trapping (right), relocation to holding pens, and adoption by projects partners, such as the Fund for Animals. Today, those few burros that evaded the earlier trapping efforts (and their offspring) (top) are removed by lethal methods, as specified in the environmental impact statement for the park burro management plan. Despite these efforts, some reclusive burros still persist in the park today.** NPS PHOTOS

The National Park Service has been a pioneer in combating threats to resources posed by invasive species. This work began with the grassroots efforts of park staff removing feral pigs at Great Smoky Mountains National Park, burros at Grand Canyon National Park (fig. 1), and purple loosestrife at Acadia National Park. As more and more invasives have encroached on parklands over the last century, the National Park Service has committed more resources, developed more complex programs and policies, and strengthened its resolve to deal with and manage invasives.

## Historical warnings: the crucible of policy

The Organic Act of 1916 is the origin of NPS policy on exotic species. The National Park Service was created to preserve examples of the natural and historic objects characteristic of the United States. With respect to living things in the National Park System, the term "natural objects" has come to mean individual plants and animals, their species and habitats, and their ecological systems. This definition instructs the National Park Service to protect (or in many cases manage *toward*) (1) resource conditions that were present before a major increase in the rate of human impacts, and (2) resource conditions that would still exist today had modern people not interfered with the normal processes of ecological and evolutionary change.

In managing natural resources and historic objects, the National Park Service recognized that some park species were "exotic." As the National Park Service gained experience with management of parks and their living objects, its definition of exotic species became clearer, reflecting the complex relationships among organisms in the landscape. The basis for this evolution has been the National Park Service's relatively early recognition that exotic species threaten the preservation of park natural resources. For example, in 1932 the NPS field biologists George Wright, Joseph Dixon, and Ben Thompson authored a report called the *Fauna of the National Parks of the United States* that identifies the threat of exotic species. The following excerpt from the report qualifies as one of the first warnings to park managers on the implications of exotic species.

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> [Encroachment of exotic species upon the natural park fauna] is a situation which is not apparent in many parks at present, *but which is apt to become more and more difficult*. There are three ways in which man has brought about the introduction of exotics.
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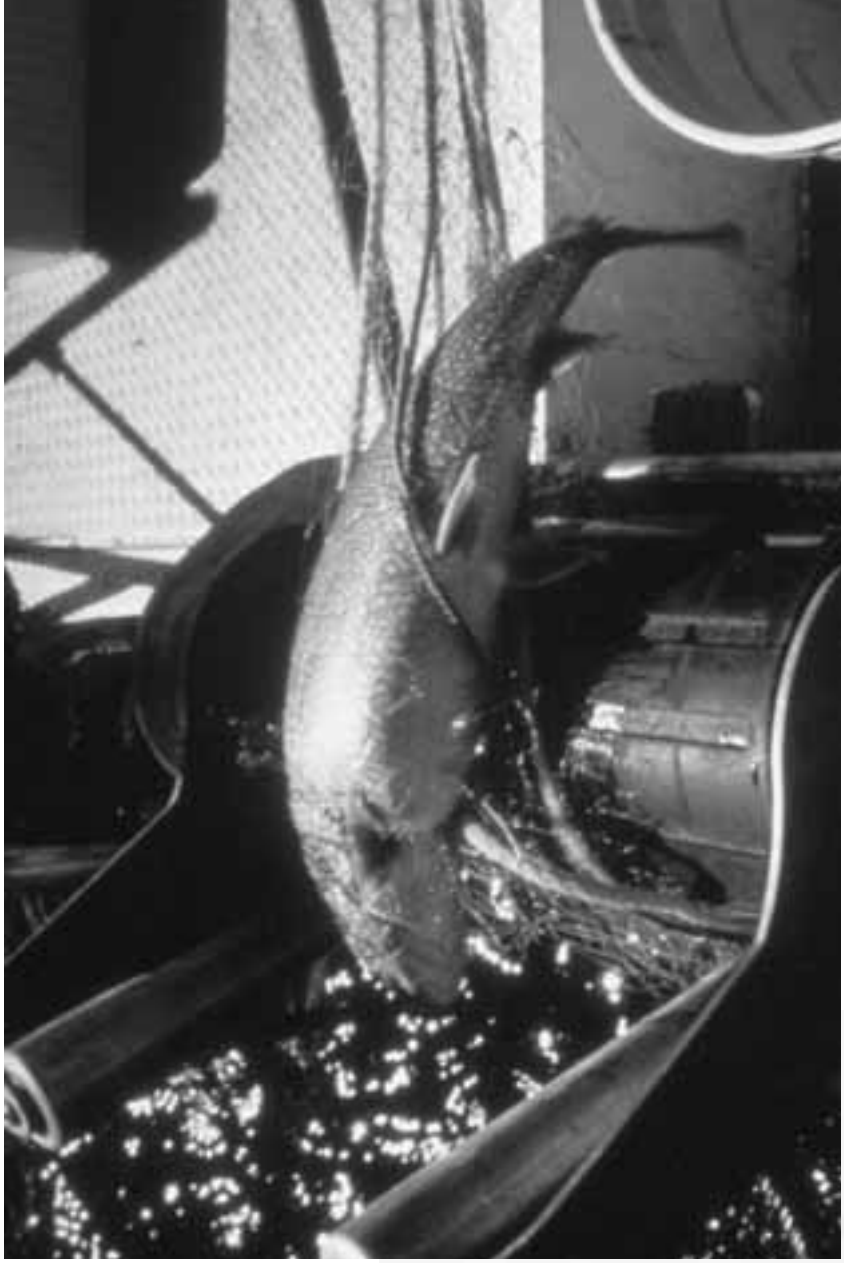
> (1) Many important species of animals, notably game birds and fishes, are liberated all over the country each year in the interests of sportsmen.
>
> (2) Exotic species are constantly being liberated by accident.
>
> (3) Certain animals native to one part of the country actually flourish with civilization and invade new ranges in the wake of man. These are exotic in their newly occupied ranges, too.

Even when Yellowstone—the first national park—was in its infancy, its managers resisted adding new plants and animals because of the damage caused by the introductions.

Two reports of the 1960s—the Leopold report on wildlife management in the national parks (Leopold et al. 1963), and the Robbins report on research (Robbins et al. 1963)—asserted that the introduction of exotic species was inappropriate for areas set aside to preserve natural conditions. Reacting to the Leopold report, Secretary of the Interior Udall issued a memorandum dated 2 May 1966 instructing the director of the National Park Service "to incorporate the philosophy and the basic findings of the report into the administration of the National Park System" (Commission on Geosciences, Environment, and Resources 1992). With respect to exotic species, the Park Service responded informally in statements such as one by the principal NPS biologist Lowell Sumner in 1964 that "nonnative species are to be eradicated, or held to a minimum if complete eradication is impossible." In 1968 the National Park Service answered with formal publication of the Administrative Policies for Natural Areas of the National Park System, which declared that "nonnative species may not be introduced into natural areas. Where they have become established or threaten invasion of a natural area, an appropriate management plan should be developed to control them, where feasible…." It went on to state that "nonnative species of plants and animals will be eliminated where it is possible to do so by approved methods which will preserve wilderness qualities" (National Park Service 1968).

Similarly, in revising its exotic species policy in 1975, 1988, and 2001, the National Park Service maintained the prohibition of introducing new exotic species into natural zones of parks (although, controlled introductions of exotics into historic, developed, and special use zones of parks was permitted). All three policy documents maintained that control or eradication of existing populations of exotic species would occur in a variety of situations where park purposes or adjacent, privately held lands were being threatened by such species.



## Parks take action

Over the last century parks throughout the country have taken creative and concrete steps toward controlling harmful invasive species. Yellowstone National Park has removed thousands of nonnative lake trout since 2000 because they were displacing native fish (fig. 2). African oryx were intentionally introduced into New Mexico the 1960s and grew to a herd numbering more than 4,000. However, oryx were physically damaging White Sands National Monument and control was necessary (see article, page 6). The park initiated a comprehensive control program in 1999 and successfully removed all oryx from the park. At St. Croix National Scenic Riverway (Wisconsin and Minnesota), a boat inspection program has been initiated with the State of Minnesota and federal agencies to prevent the spread of invasive aquatic plants and zebra mussels into the unit. This prevention program was initiated to stop the introduction of zebra mussels, which were outcompeting threatened and endangered native mussels (see article, pages 66–67).

Finally, invasive plant control has been carried out in almost every natural resource park in the National Park System. Even with the Herculean efforts by parks to reduce invasive species, it became increasingly clear an

**Figure 2. (Right) Fisheries crew member John Bauer secures a gill net after its deployment in Yellowstone Lake for the removal of nonnative lake trout (top). The ongoing control program at Yellowstone National Park is necessary to protect native cutthroat trout from this invasive competitor.** NPS PHOTOS

NPS policy and funding strategy were needed. The National Park Service responded by dedicating one of its overarching natural resource management goals to measure its performance relative to the containment of exotic plants (Government Performance and Results Act [GPRA] 1a1b). Since 1999, the National Park Service has controlled exotic plant species on more than 167,000 acres (67,635 ha); however, 2.6 million acres (1.1 million ha) remain infested. The National Park Service has met or exceeded performance levels for GPRA goal 1a1b each year since this goal's inception in 2000.

## Finding institutional solutions

The Washington Office of the National Park Service first responded to problems posed by exotic species with the creation of the Integrated Pest Management (IPM) program in the 1980s. This program was developed because of concerns related to documented increases in the use of chemicals to control native and nonnative pests, such as termites and cockroaches, on park lands. The National Park Service received a grant for $80,000 from the Environmental Protection Agency and initiated a pilot IPM program within the National Capital Region. The program has since grown and is now viewed by other natural resource agencies as a model for managing pest species. The IPM program supplies a broad range of technical assistance and training to park staffs on the low-risk management of exotic and native pests that adversely affect park operations, natural and cultural resources, visitor safety, and concessions. These services are given to more than 100 parks per year through on-site or remote consultations by IPM staff, technical manuals, or other means, and the identification of non-NPS experts who can assist. The result is often an economic and permanent solution to pest management problems in parks.

The next significant response to invasive species came in 1996 when the National Park Service published "Preserving our Natural Heritage: a strategic plan for managing invasive nonnative plants in the National Park System." It outlines a framework for a national invasive species program. This plan has earmarked funding from the Natural Resource Preservation Program (NRPP) on invasive species control projects, which numbered 46 in 2002 and totaled more than $1.6 million. Despite this financial boost, an assessment conducted in the 1990s of staffing and funding needs for a viable invasive species program was estimated at $80 million per year for the National Park Service.

The unrelenting demand for exotic species management and research resulted in a full-scale needs assessment under the Natural Resource Challenge initiative. First funded in 2000, the Challenge comprises several action plans related to natural resource management.

**Figure 3. Crew members of 13 of the 15 NPS EPMTs, along with university staff and representatives of Mexico's national parks, traveled to Arches National Park, Utah, in 2004 to control 25 acres (10 ha) of tamarisk in Courthouse Wash. The operation, which was funded in conjunction with the NPS Fire Program, exceeded its goal by 100%, controlling 50 acres (20 ha) of the invasive tree species. The operation was the first to bring together several EPMTs for a joint training and work exercise, and resulted in no injuries to participants.** NPS PHOTOS

The exotic species action plan is the most recent, ambitious, and comprehensive approach to invasive species management in the National Park Service. It identified the need to form the Biological Resource Management Division (BRMD) under the umbrella of the Natural Resource Program Center. The division develops policy and technical assistance programs, and awards NRPP funding to help parks manage native and nonnative species. The Invasive Species Branch of BRMD operates the IPM program and Exotic Plant Management Teams (EPMTs). These mobile, specialized EPMTs are the first to be established among federal land management agencies. Thanks to Natural Resource Challenge funding, the National Park Service now has 16 EPMTs that assist 209 national parks. Since the inception of the program in 2000, the EPMTs have treated more than 73,000 acres (29,565 ha) (fig.3). As partnerships are expanded and the expertise of the teams becomes institutionalized, the National Park Service anticipates the future benefit of this program to grow exponentially.

## Needs beyond parks

Recognition of the problems associated with invasive species beyond national park boundaries is growing. In the last decade, both the National and Western Governors Associations have adopted policy on invasive species and specifically called for federal action and coordination. In l999, President Clinton responded to the governors' resolutions by signing Executive Order 13112 on invasive species. The executive order established an invasive species council made up of eight departments of the federal government. The partnership established under the executive order will promote a concerted and coordinated management of invasive species across the country.

## For the future

The National Park Service has steadily progressed through the development of innovative programs to manage invasive species. Its policies are solid, committing the National Park Service to protect park resources from invasive species. Yet most on-the-ground management is carried out as collateral duties of existing resource management staff rather than by trained invasive species specialists. However, the National Park Service cannot expect additional internal funding to solve its problems. Rather, it must look to creative mechanisms to leverage funds and expertise through partnerships. For example, the State of Florida makes dollar-for-dollar matching grants for control of exotics. In 2003, EPMTs received $2.8 million in outside contributions to conduct invasive weed work in national parks.

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In addition to leveraging more resources for the control of invasives, the National Park Service must integrate restoration more thoroughly into its efforts. In some cases disturbances from park-based management activities have led to the ease with which invasives have become established. Restoration of ecosystems can reduce the encroachment of invasive species and is the next challenge for the National Park Service in protecting this country's natural heritage for future generations.

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Increasingly obvious as the best strategy for battling invasive plants is preventing them from entering our national parks. New and innovative programs are being established in a handful of parks to institutionalize prevention programs. In cases where this is not possible, the sooner new introductions are detected and addressed the greater the likelihood of eradication. Fortunately, the NPS Inventory and Monitoring (I&M) Program has identified the spread of invasive species as a premier threat to ecosystem function. Many I&M networks are helping parks develop monitoring programs for the detection of new invasions, so a quick response can ultimately remove the threat *before* it becomes unmanageable.

This is a golden time for managing invasive species in national parks. Recognition that invasives are a major threat to our natural heritage is broad-based, and includes such groups as our partners, constituents, park visitors, and the Bush administration. New policies and increased funding through the Natural Resource Challenge reflect a commitment to take action to manage invasive species. If we stay the course, management of invasive species in parks is within our grasp.

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