Campground
Closed

Restoration of natural systems is a growth area of resource management today. Wolves in Yellowstone; water supply in Everglades; prairie grasses in the Midwest; sea turtles on the Gulf Coast; prescribed fire in many parks—the list of current projects is impressive, even though the tasks themselves may be daunting. Costly, complex, and labor-intensive, ecological restoration requires a sound understanding of natural processes and interrelationships. It also requires follow-up to determine if goals are being met. A recent trend is the timely evaluation of resource damage and restoration action following natural disturbances, such as fires and floods. An example is the Burned Area Emergency Response Team, designed to assess and mitigate impacts from fire and fire suppression activities. It has succeeded in being funded by the fire incident command structure, thus allowing for restoration to begin during wildfires. Despite the successes, ecological restoration is still costlier and less certain than prevention of resource degradation in the first place.

Facilities & Resource Impacts

Yosemite flood provides opportunity to realize resource protection goals

by Bill Jackson, Jerry Mitchell, and Louise Johnson

A 1997 New Year's Day flood in Yosemite National Park (California) was the largest in over an 80-year period of record on the Merced River. Water backed up in the central part of Yosemite Valley and inundated park offices, roads, lodging units, and other developments. In steeper reaches of the river the force of the flowing water ripped up roads, sewer lines, and campgrounds. The park was closed for over three months while the basic infrastructure was repaired or cleaned up.

Interestingly, the Yosemite flood occurred less than nine months after a man-made flood was prescribed for the Colorado River in Grand Canyon to rejuvenate ecosystem processes impacted by dam-induced reductions in flooding. However, unlike the Grand Canyon flood, the significance of the Yosemite flood as a natural ecosystem event was tempered somewhat by the impacts to human developments in the floodplain. Also, some natural resource damage occurred when flood flows interacted with infrastructure or floodplains that were vulnerable to erosion due to heavy visitor trampling. For example, the Lower Pines Campground, which was severely damaged by the flood, occupies a natural point bar located on the inside of a large river meander. The point bar eroded excessively during the flood partly because a road and undersized bridge forced floodwaters across the bar, and partly because soil compaction had eliminated most vegetative ground cover.

Whereas the Grand Canyon flood demonstrated the importance of flooding in natural ecosystems, the Yosemite flood highlighted the problems associated with human occupation and development of floodplains.

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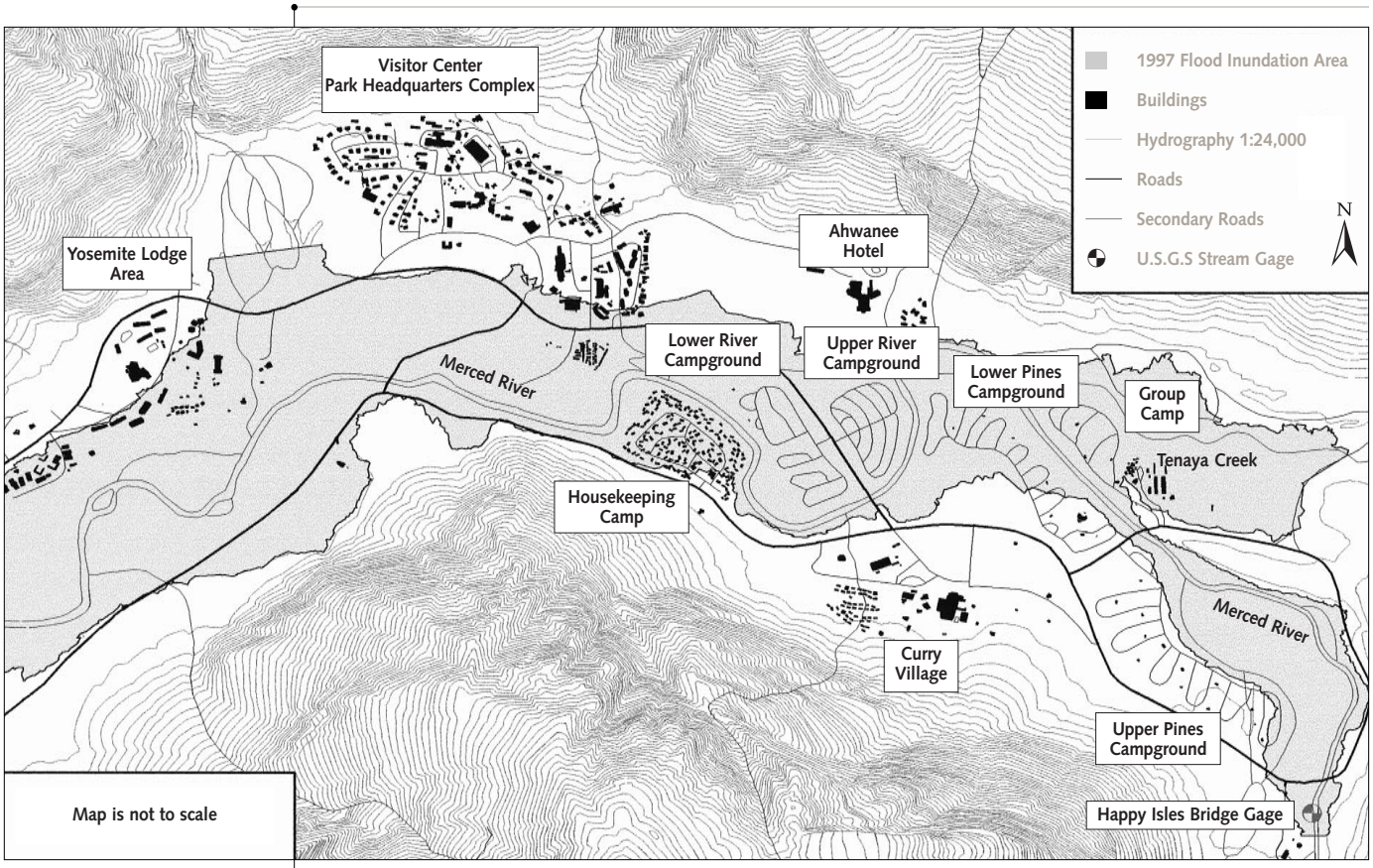
Sign of the times—warm weather and rains combined to melt the alpine snowpack in Yosemite National Park (California) in early 1997. The resulting 100-year flood caused widespread damage to park facilities, including the Lower River Campground in Yosemite Valley.

Yosemite National Park, Steve Thompson



Water Resources Division

Resource managers mapped the extent of the floodwaters (shaded area) in Yosemite Valley, giving park managers information they needed to move ahead with plans to relocate facilities outside the floodplain.

Yellowstone National Park

Yellowstone wolves are causing "an explosion in species diversity" according to private research. An institute called "Yellowstone Ecosystem Studies" concludes that coyote populations are down fifty percent in the Lamar Valley, a benefit to predators of rodents such as foxes, hawks, owls, and eagles. Despite the ecological good news, a U.S. district court ruled in December that the ongoing restoration is illegal and that the wolves must be removed. The United States will defer any action to remove the wolves until all appeals of the court's decision are final.

Park planners recognize this fact, and restoration of the Merced River and its floodplain is a cornerstone of the draft Yosemite Valley Implementation Plan (VIP). The plan's proposed alternative is to remove flood-prone activities out of the floodplain and restore natural floodplain conditions and processes. It calls for wide (50-75 meter) buffer zones on both sides of the Merced River and Tenaya Creek, a tributary of the Merced. Three historic bridges interfere with river flows and processes during floods and are proposed for removal. All campsites in the river management zone of the Merced River are proposed for removal and restoration to natural conditions. This includes 107 sites at the Lower Pines Campground and all sites at the Upper and Lower River Campgrounds. Finally, though being dealt with separately from the public draft VIP, flood recovery actions include removing most of the overnight lodging and concessioner housing units in the Yosemite Lodge area from the floodplain.

Ironically, the January flood assisted the valley planning process in several ways. First, the flood (which approximated a 100-year flood) permitted a far more accurate delineation of flood-prone areas than existed previously. Second, observations by park staff during the flood and a post-flood analysis conducted by the NPS Water Resources Division provided a better understanding of the hydraulic characteristics of the flood (depths, velocities), and a more precise understanding of the causes of infrastructure and resource response to the flood. Finally, flood recovery funds approved by Congress allowed the park to take action on many of the proposals in the plan.

Although initially presented in the press as a major natural disaster, after reconsideration, the New Year's Day flood in Yosemite Valley can now be viewed as a significant natural ecosystem process and as a major boon to river resource restoration and management in Yosemite Valley.

Demolishing the past and restoring the future

by Athena Demetry

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In the early part of this century, visitor facilities were placed in the most spectacular areas of national parks in order to attract people to the parks. In Sequoia National Park (California) a small city complete with gas station, market, hundreds of cabins, campgrounds, and a sewage treatment plant sprang up beneath the towering giant sequoia trees in the Giant Forest Grove, Sequoia's main attraction. By the 1930s, park managers understood the damage such intense use could cause to sensitive ecosystems and began to call for removal and relocation of visitor facilities from the Giant Forest. After decades of management efforts, the first phase of ecological restoration began in August 1997, with the demolition of buildings, roads, parking lots, and utilities from the Giant Forest Lodge.

Such restoration projects, which are becoming more common throughout early national parks, present a challenge to natural resource managers. Managers must determine if a site can recover on its own or whether it requires human intervention. In Giant Forest Village, soils are highly compacted relative to natural soils, soil seed banks are absent or depleted, and there is little tree or shrub regeneration. Formerly developed sites in the area that have been abandoned for over 30 years show little natural recovery. Clearly, human intervention is needed, but how much? Through adaptive management, in which increasing degrees of active restoration are applied in a coherent, well-designed manner, resource managers can determine the least intrusive but still effective means of restoring the area. Sequoia's experimental restoration treatments include: (1) mitigating soil compaction; (2) mitigating soil compaction and burning to release canopy-stored seed of giant sequoia; and (3) mitigating soil compaction, planting propagated trees, shrubs, grasses and forbs, and irrigating.

More parks are now using well-defined natural models to decide on plant species, densities, and spatial arrangement. In planning and designing the Giant Forest restoration, resource managers looked to the ecosystem surrounding the developed area for a natural disturbance condition that resembled the human disturbance. Forest canopy openings, or gaps, caused by prescribed fire were of similar scale to canopy openings caused by tree removal for buildings and parking lots. The shrub and tree regeneration within fire-caused gaps serves as a model to prescribe what to plant within restoration gaps and as a reference to evaluate the success of all the restoration treatments.

In 1997, the park began the transition from planning and design to demolition. As ecological restoration begins in the coming year, the long-awaited goal of correcting past development mistakes and preserving the giant sequoia ecosystem will enter its concluding phase.

Sequoia and Kings Canyon National Park, A. Demetry

A backhoe demolishes the amphitheater at Sequoia's Giant Forest during 1997 as part of the first phase of the restoration project. Resource managers will begin ecological restoration during 1998.

Sequoia and Kings Canyon National Park, A. Demetry

Built early this century beneath towering sequoias, Giant Forest Village in Sequoia National Park (California) has led to ecological problems such as soil compaction, seed bank depletion, and little tree regeneration. A large-scale effort has begun to relocate facilities and restore natural conditions to the area.

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The Right Expertise

Military engineers invade the parks!

by David Steensen

Bulldozers and military personnel are striking contrasts to the serene beauty and pristine resources found extensively in the national parks. Yet through innovative partnerships, engineering units of the U.S. Army National Guard and Reserve helped restore 25 acres of disturbed lands in three parks during the last two years: Sleeping Bear Dunes National Lakeshore (Michigan), Mount Rainier National Park (Washington), and El Malpais National Monument (New Mexico).

Throughout the national park system over 315,000 acres of lands exist in disturbed condition in 195 parks. Abandoned roads, mines, dams, campgrounds, and other unwanted facilities impair natural and cultural resources through erosion, sedimentation, metals contamination, habitat alteration, and exotic plant invasion, and create visual scars on the landscape. Scarce project funding severely limits the number of restoration efforts that can be undertaken, especially for larger sites that require the use of heavy equipment to correct soil and landform problems.

(3) Geologic Resources Division, David Steensen

Army National Guard and Reserve engineering units restored an abandoned road and an unused portion of a campground at Mount Rainier National Park (Washington) during 1997. The process involved removing the oiled road surface (top), returning soils to their original horizons (middle), and reestablishing the original contour (above), creating the best conditions for revegetation.

Despite limited funds, partnerships with U.S. Army National Guard and Reserve engineering units have facilitated the completion of important restoration work. Conducted under interagency agreement, these partnerships link park projects to annual training for military engineers. Usually two-week exercises, annual training requires intensive operation of heavy equipment. During these skill-enhancing exercises, engineers have reestablished original land contours, eliminated erosion problems, and salvaged and placed topsoil, all essential elements for successful reintegration of disturbed areas into the surrounding ecosystem. Usually, parks pay only for fuel and other support costs for the heavy equipment work.

The range of capabilities available to the National Park Service has been impressive. During the pilot project in 1995, the 1436th Engineer Company of the Michigan National Guard completed the reclamation of two sand and gravel pits at Sleeping Bear Dunes, which totaled 7 acres. During 1997, the 898th Engineer Battalion of the Washington National Guard removed 1.2 miles of abandoned campground road located in a subalpine meadow on Mount Rainier, and partially restored an additional half-mile of road. At El Malpais, the 52nd and 387th Engineer Battalions of the Army Reserves reclaimed a 5-acre sandstone quarry, constructed 1 mile of new access road, and graded an area for a future visitor overlook. Oversight by NPS staff trained in physical restoration techniques and the application of heavy equipment assured that park restoration goals were met. At the same time, the military achieved its training goals.

Partnerships with the military enable the National Park Service to accomplish significant restoration projects in the absence of funding that is commensurate with the scale of the problem. Through these partnerships, limited funds are leveraged, allowing for the completion of restoration work that otherwise would not be undertaken. Future projects are scheduled at two additional parks.

Issue Update

A new twist in the Elwha River ecosystem restoration

by Brian Winter

The Elwha River Ecosystem and Fisheries Restoration Act (P.L. 102-495) authorizes the Secretary of the Interior to acquire and remove the Elwha and Glines Canyon Dams on the Elwha River (Washington) if that action is needed to fully restore the ecosystem and native anadromous fisheries. In a report to the Congress and in an environmental impact statement (EIS), the Secretary concluded that the removal of both dams is necessary.

Through fiscal year 1998, $11 million has been appropriated for Elwha Dam acquisition. Additional funds to acquire the dams may be available from the Land and Water Conservation Fund. Washington Senator Slade Gorton, a previous opponent of dam removal, now supports acquisition of both dams, removal of the lower dam (Elwha), and determination of the upper dam's (Glines Canyon—within Olympic National Park) fate following documentation of salmon restoration for 12 years after removal of the Elwha Dam.

Meeting Senator Gorton's proposal will require the development of a supplemental EIS; the "phased removal" option was rejected originally because of the added environmental impacts from two distinct dam removal periods as opposed to simultaneous removal, additional cost, and the delay in meeting the goal of the act. Removal of just the lower dam (outside the park) will result in, at most, the restoration of 30,000 salmon and steelhead compared to the 392,000 that can be restored with both dams removed. Nevertheless, Senator Gorton's proposal would allow the restoration process to move forward. Funding to complete acquisition and removal of the Elwha Dam will be decided in early 1998.

Olympic National Park

Removal of the Glines Canyon Dam (shown) and its downstream companion, the Elwha Dam, is necessary to fully restore the native salmon and steelhead fishery in the Elwha River drainage within and adjacent to Olympic National Park (Washington). Funding for the project will be decided in early 1998.

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Padre Island National Seashore, Darrell Echols

For the third consecutive year, the world's most endangered sea turtle, the Kemp's Ridley, returned to nest in record numbers at and near Padre Island National Seashore in Texas. The continuing increase in the number of nests at the park—nine during 1997—may signal the success of a two-decade, international, multiagency effort to establish a secondary nesting colony of this species at the seashore.

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Paying for Restoration

Damage assessment procedures lead to resource restoration

by Jake Hoogland

The Washington D.C. area experienced its worst oil spill in memory when a major pipeline burst in a Sugarland Run suburb during March 1993. The spill released 408,000 gallons of diesel fuel into the environment, and despite the best efforts of responding agencies to contain it, much of the fuel entered the Potomac River. The river was at flood stage and the vegetation along its banks was oiled. This damage included resources of the George Washington Memorial Parkway and the Chesapeake and Ohio Canal National Historical Park. Portions of the parks were closed to visitation and even those areas that remained open were negatively impacted.

The National Park Service together with other federal agencies, the Commonwealth of Virginia, and the District of Columbia sought to recover damages from the pipeline owner under the provisions of the Oil Pollution Act (1990) and related statutes. During 1997, the responsible party and the federal, state, and District of Columbia governments entered into a consent decree, a legally binding agreement, to settle the matter. The decree provides for compensation to the National Park Service by the pipeline owner of approximately $1.5 million for use in projects designed to restore, enhance, or replace the resources lost to the public as a result of the spill.

Negotiated for the Park Service by the Environmental Quality Division, the settlement represents a positive outcome for all of the involved parties. It provides funds for the restoration of lost resources and clearly establishes the role of the National Park Service as an advocate for compensation when resource access is denied to the public. Projects planned under the restoration include boardwalks and wildlife viewing platforms at the Dyke Marsh area of the parkway, refurbishment of visitor use facilities along the C & O Canal, and rehabilitation of a scenic overlook at Great Falls Park, which provides additional accessible pathways to existing viewing areas.

Now in the restoration planning phase, Sugarland Run represents successful recovery of damages under the provisions of the Oil Pollution Act. In 1996, Congress passed the Omnibus Parks and Public Lands Management Act, amending the Park System Resource Protection Act of 1990. As a result, the National Park Service is now authorized to seek com-

Award Winner Profile

Resource manager receives new award

For the first time, the Director's Awards for Resource Stewardship, given during the summer, included the Trish Patterson-SCA Award. This award recognizes excellence in natural resource management in small parks, where staff is often especially limited. Patterson was a Southeast Region resource manager who was killed in a 1995 car accident; she was well known for her efforts to assist small parks in her region. Sponsored by the Student Conservation Association, the award provides extra assistance to the winning park by supplying

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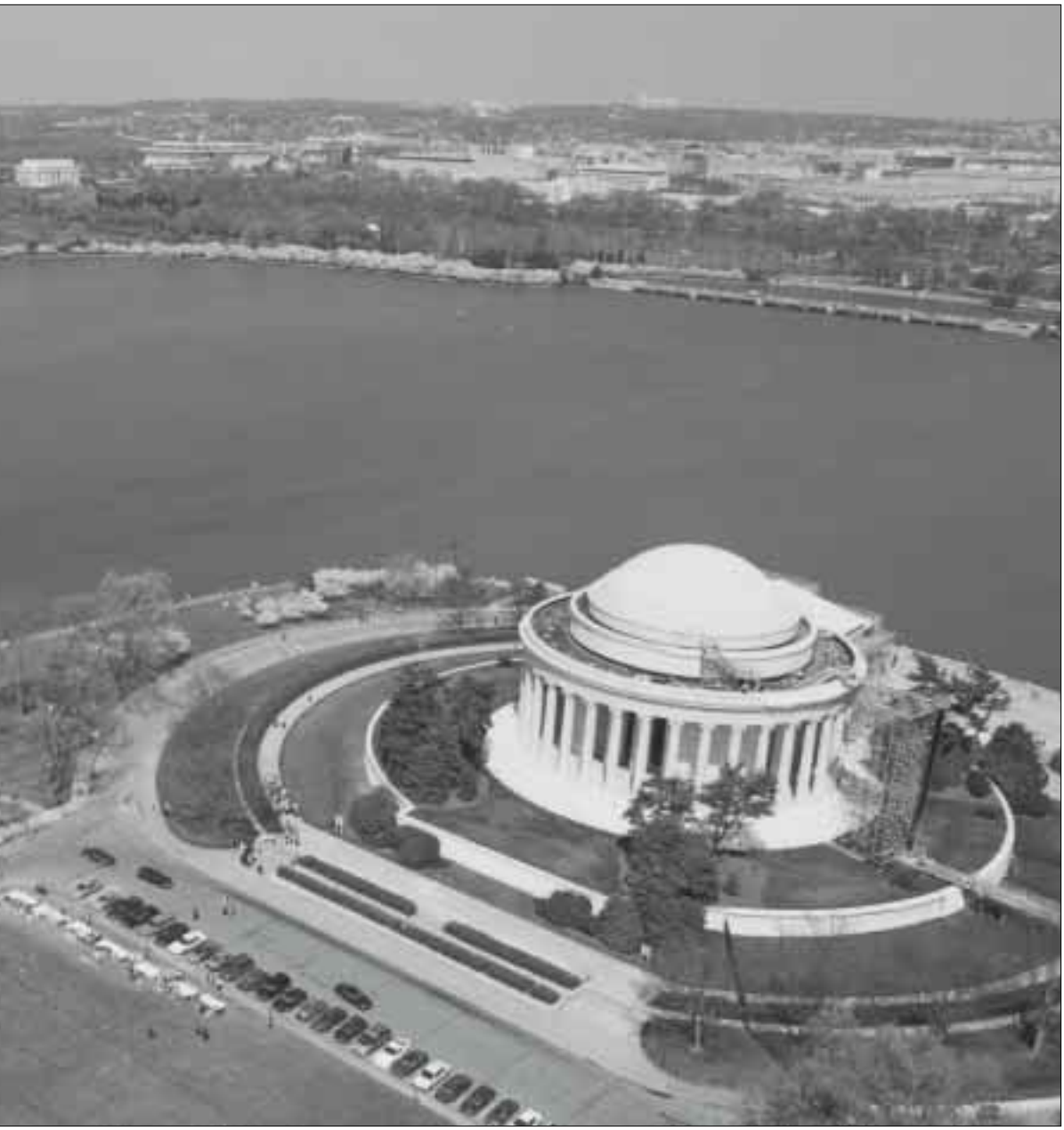
Zandy-Marie Hillis-Starr, winner of the first Trish Patterson-SCA Award for natural resource management.



National Park Service

A 1993 diesel fuel spill 18 miles upstream of Washington D.C., entered the Potomac River and spread to four units of the national park system, damaging resources. The slick is visible on the Tidal Basin waters near the Jefferson Memorial. Damage assessment procedures facilitated recovery of $1.5 million during 1997 for park resource and facility restoration.

pensation from third parties for any resource damage in any park. Thus, the amended statute provides another means for seeking compensation and provides broader protection to park resources than the Oil Pollution Act.

Still, the methods and processes used in the Sugarland Run case may be applicable in future settlements under the recently amended law. In order to develop a unified approach to implementing the Park System Resource Protection Act, coordination of recoveries has begun with the Department of Justice, Office of the Solicitor, and the Environmental Quality Division. Implemented correctly, and supported by scientific resource inventories, the statute has the potential for significant restoration to park resources damaged by third parties.

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a seasonal resource assistant to help complete important resource management projects.

The first Trish Patterson-SCA honoree is Zandy-Marie Hillis-Starr, Biological Technician at Buck Island Reef National Monument in the Caribbean. The sole resource manager at Buck Island Reef, Hillis-Starr has established an internationally renowned sea turtle monitoring program at the park and nearby Christiansted National Historic Site; she also has established coral reef monitoring at Buck Island Reef. Her preparation of the Buck Island hawksbill turtle research program manual has standardized data collection methods for endangered turtles and reef monitoring. Information derived from the sea turtle program has been used to protect the hawksbill sea turtle under the Endangered Species Act. With a knack for getting things done, Hillis-Starr instituted a program with volunteers and visiting scientists to document the effects of Hurricane Hugo (1989) and monitor subsequent reef recovery. She also arranged cooperative agreements with government and private organizations to assist in reef and turtle projects.

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Mitigation funds boost melaleuca control efforts

by Tony Pernas

An unusual partnership between Big Cypress National Preserve and Dade County (Miami) has provided NPS resource managers in south Florida with funds to fight the spread of the invasive nonnative plant, melaleuca. To mitigate the effects of the development of a new jail facility, Dade County contributed $1,581,000 to be used for treatment, retreatment, and subsequent monitoring and evaluation of melaleuca infestations occupying 35 square miles in the preserve. In 1997, private contractors completed the initial treatment of the project area. The second phase of the project, retreatment, will begin in early 1998.

Big Cypress National Preserve, J. Snyder

Crews hired during 1997 cut and treated more than 3.4 million melaleuca trees in Big Cypress National Preserve. Retreatment, the second phase of the melaleuca control project, will begin in early 1998.

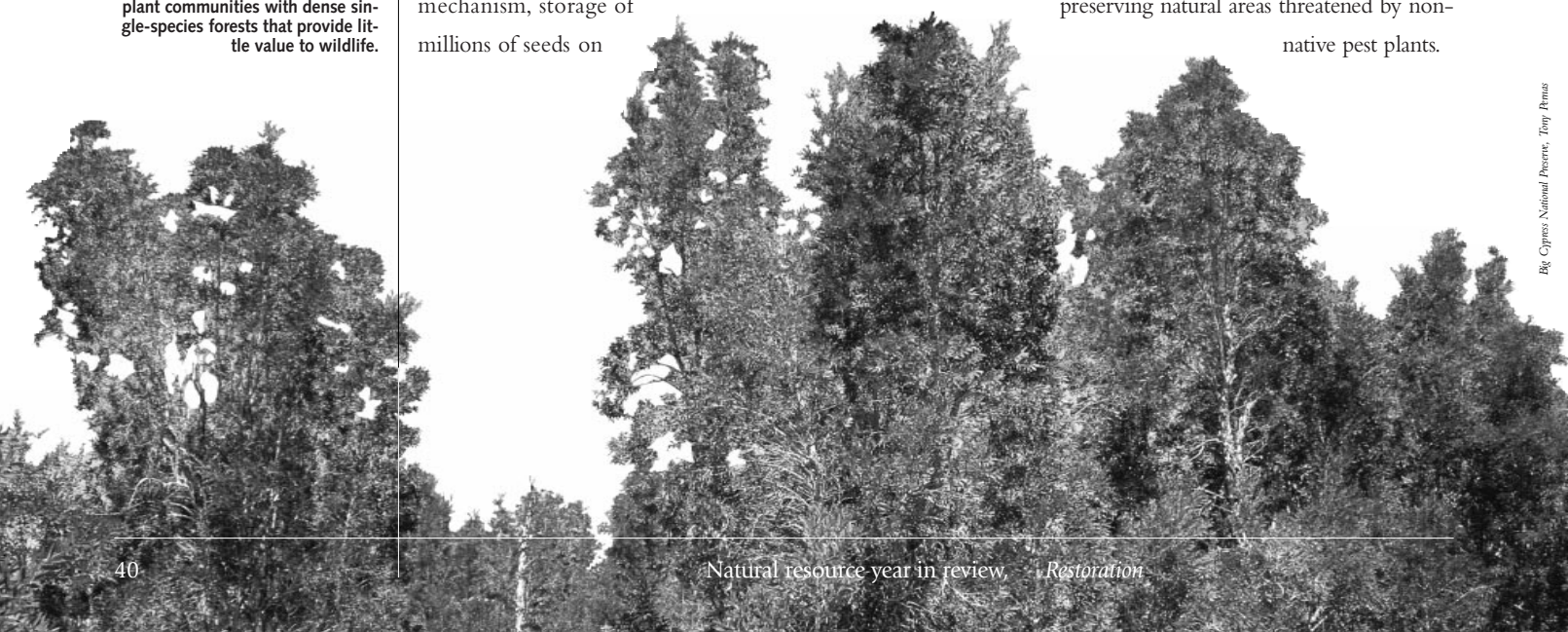
Melaleuca is an Australian tree species that was introduced into South Florida in the early 1900s as an ornamental and a possible source of lumber. An aggressive, invasive plant, it has now spread throughout the region, displacing native plant communities with dense single-species forests that provide little value to wildlife. Experts agree that the spread of melaleuca constitutes one of the most serious threats to the greater Everglades ecosystem, which includes Big Cypress National Preserve and Everglades National Park.

Melaleuca has several characteristics that have helped it spread throughout South Florida. Rapid growth, fire-insulating bark, a damage-triggered seed release mechanism, storage of millions of seeds on a single tree, the ability to sprout from stumps and stems, and a lack of insect pests are all hallmarks of its remarkable success. Natural and prescribed fires in South Florida also favor the proliferation of the species. Fire promotes seedling establishment, and high fire intensities lead to the demise of less fire-adapted native species.

In 1979, varying densities of melaleuca infested an estimated 60 square miles of Big Cypress. By 1992, systematic reconnaissance flights revealed 186 square miles of infestations. In 1984, the preserve initiated a nonnative plant control program, with primary emphasis on melaleuca. From 1984-95 NPS crews spent nearly all of their time treating outlying populations of the invasive species. The goal of this strategy was to limit the further spread of melaleuca. This strategy did not address the dense single-species melaleuca forests, which are extremely costly to treat.

With the new funding source from the Dade County partnership, Big Cypress has been able to pay private contractors. This approach has reduced the cost of treatment from 66 cents per tree to 24 cents each and has allowed the park to deal with a much larger area of infestation. The first phase of the new project resulted in the treatment of 3,420,741 trees and 957,539 seedlings at a cost of $900,000 in an area of nearly 34 square miles. To date, through the combined efforts of NPS crews and private contractors, over six million melaleuca trees on over 100 square miles have been treated. Habitat restoration projects on a scale such as this are essential to preserving natural areas threatened by nonnative pest plants.

An invasive tree species, melaleuca is widespread in Big Cypress National Preserve and throughout South Florida. Unchecked, the aggressive species displaces native plant communities with dense single-species forests that provide little value to wildlife.



Big Cypress National Preserve, Tony Pernas

Issue Update

Good science fundamental to Everglades restoration

by Bill Walker

A commitment to base ecosystem restoration decisions on scientifically sound information from the full range of natural and social sciences is the guiding principle of the South Florida Ecosystem Restoration Task Force and its working group. As the interagency coordinating body for the South Florida restoration, the task force demonstrated a renewed commitment to science in 1997 when it chartered the interagency Science Coordination Team to serve as a scientific advisory group to both bodies.

The new team is made up of a broad mix of federal, state, local, and tribal scientists and managers, with the responsibility of achieving multidisciplinary integration of the scientific activities needed to support South Florida ecosystem restoration. The team replaces the former federal interagency Science Subgroup (which provided science support during the initial years of the restoration). In 1993, the subgroup developed the initial *Federal Objectives for South Florida Ecosystem Restoration*, and in 1994, developed a comprehensive *Science Information Needs* report, defining critical science gaps throughout the region. In 1998, the Science Coordination Team will complete an updated *Strategic Science Plan*, to integrate the ongoing interagency science initiatives with the critical management decisions needed to implement the restoration.

In addition, 1997 was the first year of a five-year Critical Ecosystem Studies Initiative (CESI) that brought an increase of over $7 million to the South Florida Department of the Interior science programs to fund high priority projects. The fiscal year 1997 funds were used to accelerate numerous ongoing projects that focus on: (1) the development of a key set of environmental performance measures (restoration success indicators) needed to evaluate and track ongoing and proposed restoration initiatives; (2) the collection of baseline topographic, water flow, and water quality information in remote areas (principally in Big Cypress National Preserve, lands held in trust for the Miccosukee and Seminole Indian tribes, and the mangrove and estuarine areas of Everglades and Biscayne National Parks); (3) detailed ecological process studies that link changes in the water flows and nutrients to their impacts on critical habitats and their associated wildlife communities; and (4) the development of hydrological and ecological simulation models to predict the impacts of proposed restoration alternatives.

Fiscal year 1998 CESI funding will continue these programs and add the following efforts: (1) planning and design studies of water quality improvement technologies needed to treat storm water runoff before it enters the protected, public wetlands and estuaries; (2) regional-scale landscape ecology studies to look at the linkages between the broader landscape units (Everglades marshes, developed uplands, coastal mangroves, estuaries, etc.); (3) control strategies for invasive exotic species; and (4) the planning and evaluation work needed to integrate ecosystem restoration with adjacent land use and socioeconomic impacts on the human environment of South Florida.

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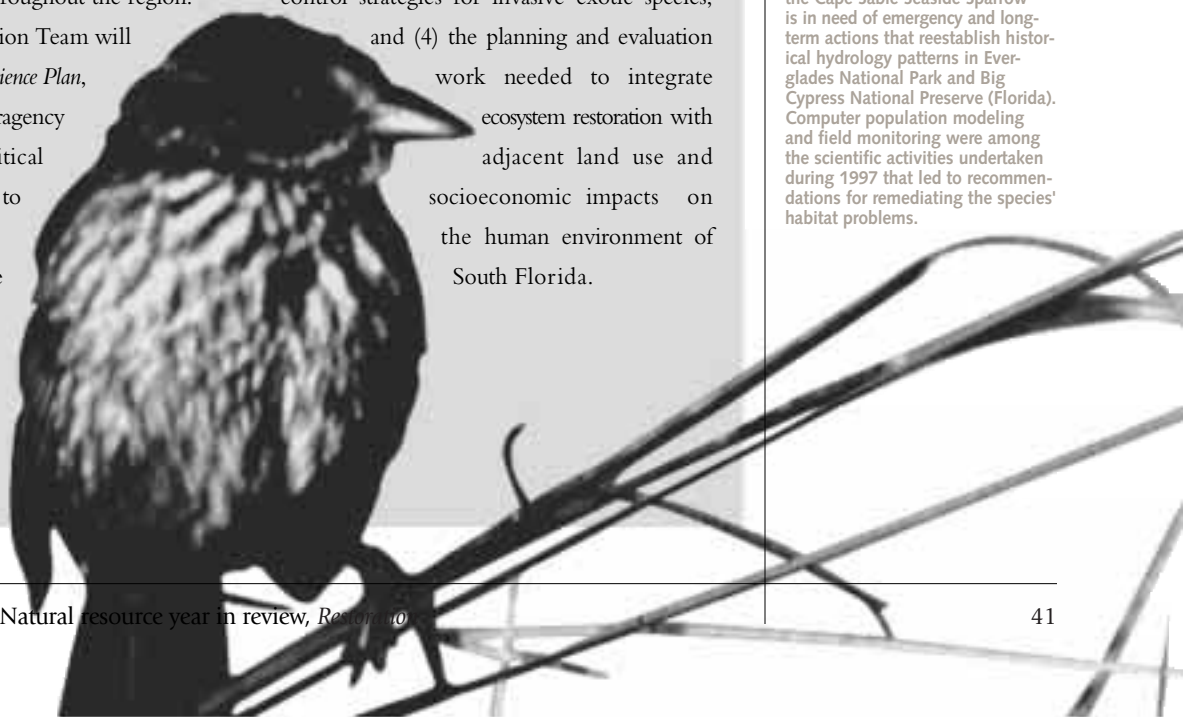

Everglades National Park

Dangerously close to extinction, the Cape Sable Seaside Sparrow is in need of emergency and long-term actions that reestablish historical hydrology patterns in Everglades National Park and Big Cypress National Preserve (Florida). Computer population modeling and field monitoring were among the scientific activities undertaken during 1997 that led to recommendations for remediating the species' habitat problems.