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Damaged and Threatened National Natural Landmarks 1988



U.S. Department of the Interior
National Park Service
Washington, D.C.

Cover: Hagerman Fauna Sites, Twin Falls County, Idaho, has been listed in the Section 8 Reports every year since 1977. Off-road vehicle use has caused damage to the Natural Landmark. In 1988, Public Law 100-696 added this National Natural Landmark to the National Park System. The site contains the world's richest known deposits of Upper Pliocene terrestrial fossils.

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INTRODUCTION

Section 8 of the National Park System General Authorities Act of 1970, as amended, requires the Secretary of the Interior to monitor the status and condition of National Natural Landmarks that are threatened or damaged. In response to this mandate, the "Section 8 Report" is prepared by the National Park Service each year and submitted to Congress.

The report that follows, **Damaged and Threatened National Natural Landmarks for 1987**, lists and describes those landmarks which are threatened or damaged to such an extent that the nationally significant features for which the sites were designated are in danger of being irreversibly damaged or destroyed.



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NATIONAL NATURAL LANDMARKS

THE NATIONAL NATURAL LANDMARKS PROGRAM

The National Natural Landmarks Program was established in 1962 by the Secretary of the Interior to encourage preservation of the best remaining examples of the major biotic communities and geologic features composing the Nation's natural history. It is the only natural areas program of national scope to identify and recognize best examples of both biological and geological features without regard to site ownership or management.

Potential national natural landmarks are identified primarily through inventory studies conducted for the National Park Service; recommendations received from Federal agencies, State natural heritage programs, and other sources are also considered in relationship to those in these inventories. Highly recommended areas are then surveyed in the field and evaluated comparatively with respect to selection criteria by expert natural scientists. Areas judged to be the best examples of ecological or geological features are proposed to the Secretary of the Interior for designation as national natural landmarks, and, if approved, are listed on the National Registry of Natural Landmarks, which is updated annually in the **Federal Register**. To date, 586 sites in 48 States, 3 territories, and the Commonwealth of Puerto Rico have been designated as national natural landmarks.

Natural landmark designation is not a land withdrawal and affects neither the ownership of a site nor its use. Rather, through resulting public recognition, the Secretary employs the designation of nationally significant natural areas to encourage their preservation, their well-informed management, and their consideration in public and private planning efforts. The Service can provide technical advice to landowners upon request. In addition, nearly two-thirds of national natural landmark owners or administrators have entered into voluntary agreements with the National Park Service to protect the features for which their properties have been recognized. This National Park Service activity therefore increases the likelihood that such areas of national interest can be preserved and protected, without requiring Federal acquisition.

The Congress mandated in Section 8 of the National Park System General Authorities Act of 1970, as amended, that the Secretary of the Interior monitors the status of both national natural landmarks and national historic landmarks, and annually report on those which are threatened or damaged. A national natural landmark is listed in the Section 8 report if the site is threatened or damaged to such a degree that the nationally significant features for which it was designated are in danger of being irreversibly damaged or destroyed. The report is based upon information provided by National Park Service employees and volunteers, who, since the first report in 1977, have monitored and reported on approximately 50% of all designated sites each year.

EXECUTIVE SUMMARY

The National Natural Landmarks Program was established in 1962 by the Secretary of the Interior to encourage the preservation of the best remaining examples of the major biotic communities and geologic features composing the Nation's natural landscape. In 1976, the Congress amended Section 8 of the National Park System General Authorities Act of 1970 to require that the Secretary monitor the status of both national natural landmarks and national historic landmarks and report annually on those determined to be threatened or damaged. This document serves as that report for 1988.

In 1988, reports were submitted for 335 sites, or 57% of the 586 national natural landmarks currently listed on the National Registry of Natural Landmarks. From that information, the National Park Service identified the following 38 as damaged or threatened:

Mobile-Tensaw River Bottomland, Alabama
Newsome Sinks Karst Area, Alabama
White River Sugarberry Natural Area, Arkansas
Cinder Cone Natural Area, California
Nipomo Dunes-Point Sal Coastal Area, California
Morrison Fossil Area, Colorado
Big Cypress Bend, Florida
Paynes Prairie, Florida
Reed Wilderness Seashore Sanctuary, Florida
Hagerman Fauna Sites, Idaho
Heron Pond-Little Black Slough Natural Area, Illinois
Lower Cache River Swamp, Illinois
Volo Bog Nature Preserve, Illinois
Wauconda Bog Nature Preserve, Illinois
Cabin Creek Raised Bog, Indiana
Wesselman Park Woods, Indiana
Baker University Wetlands, Kansas
Long Green Creek and Sweathouse Branch, Maryland
Lynnfield Marsh, Massachusetts
Gay Head Cliffs, Massachusetts
Valles Caldera, New Mexico
Nags Head Woods and Jockey Ridge, North Carolina
Piedmont Beech Natural Area, North Carolina
Rush Lake, North Dakota
Crall Woods, Ohio
Dysart Woods, Ohio
Mentor Marsh, Ohio
White Pine Bog, Ohio
Hawk Mountain Sanctuary, Pennsylvania
Congaree River Swamp, South Carolina
Reelfoot Lake, Tennessee
Dinosaur Valley State Park, Texas
Green Cay, U.S. Virgin Islands
Salt River and Sugar Bays, U.S. Virgin Islands
Sandy Point, U.S. Virgin Islands
Vagthus Point, U.S. Virgin Islands
Virginia Coast Reserve, Virginia
Molly Bog, Vermont
Canaan Valley, West Virginia
Kickapoo River Natural Area, Wisconsin

The following sites listed in the 1987 Section 8 Report have been removed from this year's report.

Attwater Prairie Chicken Preserve, Texas
 Caverns of Sonora, Texas
 Ezell's Cave, Texas
 Little Blanco River Bluff, Texas
 Tionesta Scenic and Research Natural Areas, Pennsylvania

The following sites have been added to this year's report, that were not on last year's report.

Newsome Sinks Karst Area, Alabama
 Morrison Fossil Area, Colorado
 Big Cypress Bend, Florida
 Wauconda Bog Nature Preserve, Illinois
 Cabin Creek Raised Bog, Indiana
 Lynnfield Marsh, Massachusetts
 Gay Head Cliffs, Massachusetts
 Crall Woods, Ohio
 Dysart Woods, Ohio
 Mentor Marsh, Ohio
 White Pine Bog Forest, Ohio
 Hawk Mountain Sanctuary, Pennsylvania
 Reelfoot Lake, Tennessee
 Green Cay, US Virgin Islands
 Sandy Point, US Virgin Islands
 Vagthus Point, US Virgin Islands
 Molly Bog, Vermont

An attempt was made in the 1986 Section 8 report to categorize threat or damage according to classification schemes for the impact to five ecosystem components (water, air, geologic resources, vegetation, or wildlife), and for the source activities causing those impacts. Those schemes are again included in the appendix. Also included in the appendix is a more elaborate summary of the 1988 statistics.

**INVENTORY OF NATIONAL NATURAL LANDMARKS
LISTED AS
THREATENED OR DAMAGED
IN 1988**

Alabama

Name: **MOBILE-TENSAW RIVER BOTTOMLANDS**

Location: Baldwin, Mobile, and Washington Counties

Ownership: State (Division of Lands), Private

Designation: May 1974

Section 8 Listing: Annually since 1977

Significance: This site is one of the most extensive and significant wetlands in the United States. The many different habitat types, ranging from mesic flood plain forests and freshwater swamps to open, brackish marshes, support a great variety of wildlife and plant species, including several rare and endangered species.

Description: A 185,000-acre wetland and bottomland forest area, which includes saltwater, brackish, and freshwater marshes and streams, and an extensive hardwood forest.

Threat or Damage: Source Activities

residential, commercial, industrial, transportation
construction/operation
oil/gas extraction/exploration
agricultural runoff

Resource Impacts

WATER--degradation of water quality
potential alteration of coastal processes

Summary

Cumulative impacts from continued agricultural, residential, commercial, and industrial development and expanded oil and gas activities surrounding the site may be affecting the natural systems in and surrounding the landmark. Pollutants from point and non-point sources, including transportation and construction activities, and chemical and industrial plants, may be becoming bound in the fine sediments. Oysters in Mobile Bay, for example, are known to contain concentrations of heavy metals.

More specifically, dredging and increased sedimentation result from the Tennessee - Tombigbee Waterway. Water pollution results from industrial

discharge and inland gas exploration. Mobile State Dock is a major source of pollution for the entire bay area. The southern half of the landmark's western boundary is lined with heavy industry, including a number of chemical plants and a coal-fired electrical generation plant.

Development is expected to increase in the area. The ongoing commercial timber harvesting operations have the potential to cause loss of wildlife habitat.

Current Situation:

It is not known what actions may have been taken or are now in progress to mitigate these problems. The size of the site and the large number of owners makes monitoring and protection difficult.

The Tennessee Tombigbee Waterway Wildlife Mitigation efforts are underway due to enactment of PL-99-662, the Water Resources Development Act of 1986. Under Section 601 of PL 99-662, the Secretary of the Army is authorized to acquire, from willing sellers, in a timely manner and at fair market value, 88,000 acres of land for mitigation losses. Of the land to be acquired under this law, not less than 20,000 acres shall be acquired in the area of the Mobile-Tensaw River Delta in Alabama.

**Recommended
Actions:**

A comprehensive review of the site is needed to determine the efforts of these threats on the landmark with suggested solutions. Government entities (Federal, state and local), scientists, and landowners should meet to develop a long term agenda for the site's protection. Revision of the site boundary may be necessary, pending further study.

The State of Alabama has identified the NNL as a high priority under its State Comprehensive Outdoor Recreation Plan. A potential option to protect the site would be purchase of the land authorized by Section 601 of PL 99-662.

Alabama

Name: **NEWSOME SINKS KARST AREA**

Location: Morgan County

Ownership: Multiple private

Designation: November 1973

Section 8 Listings: None

Significance: The site is a classic example of karst development, containing more than 40 caves. Illustrations of karst development of such magnitude and quality are rare in the United States.

Description: The 1700-acre site occupies a karst valley about 4 miles long, 3/4 of a mile wide, and 400 feet deep. Over 50,000 feet of passages have been explored among its more than 40 caves. Both ends of the drainage basin are higher in elevation than the valley floor forcing water runoff to escape through subterranean passageways.

Threat: Source Activities

Off-road vehicle use

Resource Impacts

VEGETATION - physical removal, with potential for increasing erosion and influencing the groundwater of the cave system underneath.

Summary

Uncontrolled access and use of the area by all-terrain vehicles, motorcycles, and 4-wheel drive vehicles is damaging the vegetation, thus increasing erosion because of the loss of ground cover. The impact or potential impact to the groundwater from increased erosion is unknown.

Current Situation: Little action has been taken to control off-road-vehicle use. The area is used almost every weekend by cavers, but little impact is occurring from their use. New vehicle trails are being created. Logging is taking place on the south end. Approximately 40 private owners are within the landmark, but only one lives in the area of damage.

**Recommended
Actions:**

Action is needed in controlling off-road vehicle use in the area.

Arkansas

Name: **WHITE RIVER SUGARBERRY NATURAL AREA**

Location: Desha County

Ownership: Federal (U.S. Fish and Wildlife Service)

Designation: December 1974

Section 8 Listing: 1987

Significance: The area contains excellent examples of bottomland hardwood forest with a high degree of integrity, that once covered floodplains of the surrounding region. The forest is in part virgin. It has wilderness characteristics and is near large urban population centers offering environmental education opportunities.

Description: The 973-acre site is characterized by mature bottomland hardwood forest. Three types are present: overcup oakwater hickory, sweetgum-Nuttall oak-willow, and sugarberry - American elm-ash.

Damage: Source Activities
wildlife dynamics
Resource Impacts
VEGETATION REMOVAL - beaver impoundments
Summary
Beaver populations onsite have resulted in felling of much timber and construction of permanent and semi-permanent impoundments through damming activities. These impoundments also result in extending high water levels into late spring and/or early summer, which can be detrimental to other timber generally growing in dryer locations.

Current Situation: Although recognized as a natural part of the ecosystem, flooding caused by beaver impoundments has resulted in the loss of approximately 30-60 percent of standing timber. Beaver dams are removed annually to help mitigate the damage to the forest. During some years, natural flooding regimes in conjunction with beaver impoundments delay dam removal into summer, at which time much damage has already occurred. No further losses have been recorded in the past year but the potential exists for continued degradation of the area.

Recommendation: Eradication of beavers is not feasible nor probably desirable. The only mitigation action currently available is releasing impoundment waters via removal of dams on an accelerated basis. Other alternatives might be considered.

California

Name: **CINDER CONE NATURAL AREA**

Location: San Bernardino County

Ownership: Federal (Bureau of Land Management), State (Land Commission)

Designation: May 1973

Section 8 Listings: Annually since 1977

Significance: The site contains highly illustrative examples of volcanic features, including cinder cones and lava flows.

Description: A 25,600-acre volcanic field containing more than 20 large cinder cones within about 1/2 to 1 mile of each other. The cones rise 300 to 600 feet above the surrounding terrain and are estimated to be 1,000 to 5,000 years old.

Threat or Damage: Source activities
 surface mining
Resource impacts
 GEOLOGIC RESOURCES--removal of cinders
Summary
 Mining activity on Federal land at two pre-landmark mines has caused damage during the past 13 years. In addition, mineral exploration mainly in washes between the lava flows and cones has been approved, but no major surface disturbance has yet occurred.

Current Situation: Regulations outlined in 43 CFR 3802 and 3809 provide BLM with authority to prohibit those mining operations that may result in unnecessary or undue degradation of Federal lands, and to provide for the reclamation of disturbed areas. Under these authorities, BLM has contested several claims in the landmark, and the case is still pending before the Interior Board of Land Appeals.

The entire landmark is within the East Mojave National Scenic Area. BLM completed a East Mojave National Scenic Area Management Plan, after public review. A landmark boundary change may be requested in 1989/90 to conform with protective measures under consideration by BLM.

Portions of the landmark, not including the damaged area, are also within two wilderness study areas (WSA's) which are managed according to Interim Management Policy and Guidelines for Land Under Wilderness Review. In addition, 4783 acres, including a small portion of one of the WSA's but not the damaged area, were withdrawn from mineral entry in 1972.

BLM has developed new Plans of Operation, approved by BLM's Needles Resource Area office, which direct the reclamation of authorized mining activities in the area. In addition, BLM will be signing route closures and other ORV restrictions in October/November 1988.

**Recommended
Action:**

In view of the pre-existing damage, continuing mining operations, and efforts by BLM to preserve the nationally significant resources, the National Park Service will initiate negotiation to adjust the landmark boundary and exclude the damaged areas from the National Natural Landmark.

California

Name: **NIPOMO DUNES-POINT SAL COASTAL AREA**

Location: San Luis Obispo and Santa Barbara Counties

Ownership: Federal (U.S. Air Force, Bureau of Land Management), State (Department of Parks and Recreation), County, Private

Designation: May 1974

Section 8 Listings: Annually since 1977

Significance: Nipomo Dunes constitutes the most extensive coastal dune tract in California and also supports rare and endangered plant and animal species. Point Sal represents one of the last remaining sections of pristine rocky coastline in the South Coast Ranges.

Description: Nipomo Dunes and Point Sal comprise 15,900 acres in two contiguous tracts of land. The landmark extends for about 18 miles along the coast and 3-1/2 miles inland near its center, and contains freshwater lagoons and lakes, cliffs, rocky shores, and various types of dunes.

Threat or Damage: Source Activities
 visitor use -- off-highway vehicles, camping, vandalism, poaching
 proposed oil pipeline construction
 water projects -- channel construction, breakwater construction
 agricultural -- cultivation, irrigation, erosion
 mining -- sand, road construction

Resource Impacts

VEGETATION--destruction or removal of dune vegetation, exotic species invasion
 WATER--channel alteration, current disruption
 GEOLOGIC--beach erosion, extraction
 WILDLIFE--destruction
 ECOSYSTEM--wetland drainage

Summary

The identified threats will impact only the Nipomo Dunes portion of the landmark. The following activities or projects have been identified which may have a significant cumulative impact on the central portion of the Nipomo Dunes site.

Current Situation:

Recreational Activities

Damage resulting from four years of ORV use has been "stabilized" and conditions actually may have begun to improve. The State Recreational Vehicle Area (SRVA) is now fenced and monitored to prevent vandalism and excursions. Day use has decreased 15% over last year. For all intents and purposes ORV use outside of SRVA, particularly south of Oso Flaco Lakes and in Santa Barbara County, has been eliminated. Two issues pertaining to SRVA are still unresolved: (1) permanent access corridor and (2) day use limits. Other impacts on the NNL which continue are: poaching and vehicle - related destruction of clams, and illegal overnight camping. Success with revegetation projects to date has had limited results, largely with annuals. A large land trade to consolidate disturbed and undisturbed areas is in final planning.

Guadalupe County Park has been reopened to use for surfing, after several years closure for public health and safety reasons. While little direct impact to the NNL is likely, surfer parking and use of other facilities may have ORV user redistribution ramifications. Surfers generally are viewed as "protectionist" and supportive of dune stabilization and use regulation efforts.

Abalone Farm

Threats likely to occur within a year will be direct (if sited in Santa Barbara County) or indirect (if sited in San Luis Obispo County). An EIR has been released and alternatives now are being evaluated at County levels. If a go-ahead project alternative is approved, then review and approval by the State Coastal Commission is required. Abalone Unlimited, Inc. plans for 308,550 square feet of above ground tanks which include: administrative offices, saltwater exchange lines, roads and pipelines, five 120-140 horsepower pumps capable of constant 20,000 gpm water circulation, berm, electrical lines, and reservoir.

Harbor Complex

Threats are potentially occurring within a year. The Pt. Parsons harbor complex would be a multi-use industrial and commercial marina. Feasibility studies are being completed at this time with a \$50,000 grant from California Department of Boating and Waterways. Conceptual design for three alternative break-water jetty configurations has

been finalized, and littoral drift impact is now being analyzed. Port San Luis Harbor District has had pre-application discussions with local and state agencies, and several public hearings have been conducted in the last six months. Proponents concede there is considerable political interest for and against the proposal.

Pipeline Construction

Threats are potentially occurring within a year. The San Miguel Oil Pipeline EIR has been released. The Pipeline from Platform Julius to shore has been approved by the State Coastal Commission. Four on-shore alternative pipeline corridors are now being evaluated. City Service interests have been purchased by Shell. If a pending Exxon purchase is completed, then small investor holdings will have dropped to 33%. Product mix and phasing of delivery is likely to be changed, but on-shore impacts to NNL will remain about the same, i.e., construction of a staging/transfer facility and installation of pipeline along a 100 foot wide right of way through the dunes parallel to an existing pipeline. Depending upon pipeline route approval, up to 200 acres of dunes will be trenched. U.S. Fish and Wildlife Service required mitigation of three acres of restoration for each acre disturbed. Approval is anticipated within the year with actual construction more than a year away.

Sand Mining

Incremental damage from excavation and processing at the Gordon Sand Pit continues. More serious damage resulted from trespass and unauthorized ORV use. The project area is now entirely fenced and ORV damage no longer occurs. This action also contributed to curtailing ORV excursions into the entire southern portion of the NNL. Since completion of the fences there has been noticeable natural regeneration of dunes in the immediate vicinity of the sand pit. Excavation will continue, and a small degree of damage from this business will continue each year.

Land Acquisition and Related Activities

With a \$715,000 grant from the State Coastal Conservancy, a key 567 acre tract south of the Santa Maria River has been purchased by The Nature Conservancy (TNC). This tract will in turn be sold to Santa Barbara County, which will lease it back to TNC for management and restoration. No mineral or surface access rights were conveyed in the purchase, so protection of the tract is only partially achieved.

San Luis Obispo Land Conservancy is negotiating for State funds to match \$150,000 obtained from San Luis Obispo County. Also, a California Parks Bond was passed during June 1988; \$16 million was earmarked for the Nipomo Dunes area. Purchases and appraisals of key tracts are underway--lands will be acquired but timing is uncertain. Finally, the U.S. Fish and Wildlife Service is evaluating Nipomo Dunes-Pt. Sal for National Wildlife Refuge status.

**Recommended
Actions:**

Continued efforts should be made to reduce or eliminate the above five identified potential threats.

Colorado

Name: **MORRISON FOSSIL AREA**

Location: Jefferson County

Ownership: Municipal, private

Designation: December 1973

Section 8 Listings: None

Significance: This is the locality where the first major discovery of large dinosaur fossils occurred in North America, in 1877. Nine species were found here from four quarries, seven new to science.

Description: The Morrison Formation is exposed in hogbacks approximately 300 feet high. A roadside park along Interstate 70 does an excellent job of telling the geologic and paleontologic story of the general area, a roadcut through the hogback provides a spectacular view of the Morrison-Dakota sequence, and a trail with interpretive signs allows a person to walk along the rock exposures. There is a 9-acre southern tract and a 53-acre northern tract.

Damage: Source Activities

visitation by vandals

Resource Impacts

Geologic/Paleontologic Resources - extraction, removal or defacement of fossils

Summary

Dinosaur tracts have been removed and vandalized on land that is in private ownership.

Current Situation: Representatives from Denver Mountain Parks, Jefferson County Open-Space, the Colorado State Highway Department, and the Museum of Western Colorado have met to evaluate the problem and discuss potential solutions, one of which is to provide the development necessary to allow for public access and interpretation. C- 470 highway construction is underway in the area, but impacts, if any, are unknown at this time.

**Recommended
Actions:**

Discussions between interested organizations, such as above, should be continued to explore all possible options to better protect this site.

Florida

Name: **BIG CYPRESS BEND**

Location: Collier County

Ownership: State

Designation: October 1966

Section 8 Listing: None

Significance: The site includes about 215 acres of undisturbed virgin cypress.

Description: The 650 acre site contains cypress, sawgrass prairie, and palmetto hammocks. Many cypress are 100 feet tall and 4-5 feet in diameter. Some royal palms are present.

Threat: Source Activities
water diversion

Resource Impacts
WATER - potential alteration of water table
VEGETATION - invasion of exotic species

Summary
Drainage of wetland areas to the north of Big Cypress Bend, and irrigation of citrus, can reduce the availability of water to the site, thus potentially lowering the water table. Exotic encroachment is also resulting because of a change in habitat type.

Current Situation: Salt water intrusion appears likely if drainage continues. The direct result of this could be a drastic change in species composition. Exotic species encroachment has begun around the edges, including Australian pine and Brazilian pepper. The State has an active exotic removal program, and they are meeting with the South Florida Water Management District to finalize long range plans for the area. All county, State and Federal agencies are concerned about exotic species invasions, and are cooperating on solutions. The site is contained within Fakahatchee Strand State Preserve.

Acreage north of U.S. 41 will be purchased by the State. Acreage south of U.S. 41, as a result of Big Cypress Public Law 100-696, is authorized for land exchange which will bring it under the U.S. Fish and Wildlife Service in three years. Exotic plants and drainage threats will continue because they originate outside this acreage.

**Recommended
Actions:**

Options should be thoroughly investigated to try to diminish water drainage and diversion outside the site. The exotic species removal program should be given high priority.

Florida

Name: **PAYNES PRAIRIE**

Location: Alachua County

Ownership: State (Department of Natural Resources), Private

Designation: December 1974

Section 8 Listings: Annually since 1977

Significance: This site contains the largest and most diverse freshwater marsh or wet "prairie" in northern Florida. The area is further characterized by karst topography and contains the Alachua Sink, one of the largest and most significant sinkholes in Florida. The site is also a major inland wintering ground for waterfowl in the Florida Peninsula and provides habitat for numerous other wildlife species, including the American alligator and southern bald eagle.

Description: This 14,000-acre site contains an extensive, flat limestone basin vegetated primarily by freshwater marsh, or wet "prairie." A large lake in the center of the prairie, Alachua Lake, tends to fluctuate in size and is drained by Alachua sink on the northern border of the tract. Disturbed live oak hammock forest, interspersed with a diversity of other species, surrounds the prairie on nearly all sides.

Damage or Threat: Source Activities

municipal sewage disposal
urban runoff

Resource Impacts

WATER--degradation of water quality; siltation
VEGETATION--non-native plant succession

Summary

Treated effluent from the City of Gainesville's secondary sewage treatment plant and urban run-off, containing some pollutants and occasionally a high sediment load, continue to enter the landmark via the Sweetwater Branch Canal. A change in species composition of the marsh could result from nutrient

deposition, and a blockage of the sink aquifer could result from increased siltation. In another portion of the marsh, where effluent deposition occurred until about ten years ago, non-native willows and other woody invaders have taken hold and are increasing in numbers. They are difficult to burn. Cattails are increasing. A weedy bean plant (Phaseolus) is increasing on the basin.

Current Situation:

Effluent discharge and sedimentation affect the landmark primarily during storm surges, when overflow from the canal enters the undiked portion of the marsh. This now occurs more frequently, because although the canal was designed to carry a peak discharge of 4.5-5 million gallons/day, the sewage plant has increased its baseflow discharge rate to 6-7 million gallons/day. The plant is still not operating at peak capacity. No actions have been taken by the City of Gainesville to improve the overflow problems which occur during storm surges.

**Recommended
Action:**

A diversion of Sweetwater Branch into a series of settling ponds before entering the marsh would help to reduce sediment load. In addition, further treatment of effluent wastewater to remove nutrients, heavy metals, and pesticides would be desirable. Further increase in the baseflow discharge rate of the municipal sewage treatment plant should be avoided. If properly engineered so as not to adversely affect the aquifer, the canal could be widened to accommodate the current effluent discharge and reduce the frequency of storm surge overflow into the marsh.

Florida

Name:	REED WILDERNESS SEASHORE SANCTUARY
Location:	Martin County
Ownership:	Federal Government (U.S. Fish and Wildlife Service)
Designation:	November 1967
Section 8 Listings:	1986 - 1987
Significance:	This semi-tropical site is one of the few remaining unaltered examples of Atlantic beach coast along the Florida seaboard. It provides habitat for numerous animal and plant species characteristic of beach, shell mound, and mangrove swamp communities and is an important nesting site for the endangered Atlantic green and threatened leatherback and loggerhead sea turtles.
Description:	A 320-acre seashore composed of bays, lagoons, islands, and beach areas within Hobe Sound National Wildlife Refuge.
Threat or Damage:	<p><u>Source activities</u></p> <p>invasion of exotic plant species</p> <p><u>Resource impact</u></p> <p>VEGETATION—alteration of native species composition</p> <p><u>Summary</u></p> <p>Non-native vegetation, including Australian pine (<u>Casuarina equisetifolia</u>) and Brazilian pepper (<u>Schinus terebinthifolius</u>), is invading the mangrove swamps and the beach from adjacent land. The number of Australian pine on the refuge is estimated to be one to two million plants, including approximately one-half million trees and seedlings in the landmark area. Exotic plant species were introduced with the spoil material placed in the area before landmark designation.</p> <p>The mangrove swamps remain vulnerable because they are surrounded by trees that are sources of new pest seeds. In addition, the exotics may contribute to the erosion of the beach, which has been eroding at 10 to 15 feet per year, because they hinder establishment of native beach-stabilizing grasses. They are also incompatible with the threatened and endangered marine turtles' nesting requirements.</p>

The erosion of the beach is assumed to be caused primarily by a jetty to the north and a natural inlet being closed.

Current Situation: The U.S. Fish and Wildlife Service is focusing its management efforts on the beach area in order to maintain the nesting habitat of the threatened and endangered turtles; refuge managers have removed 75 percent of the exotic seed trees from the beach. Spoil material from maintenance dredging of the St. Lucie Inlet was placed on Jupiter Island to mitigate beach erosion.

Recommended Actions: Continued long-term management of exotic species by the U.S. Fish and Wildlife Service will be necessary to inhibit seedling growth.

Idaho

Name: **HAGERMAN FAUNA SITES**

Location: Twin Falls County

Ownership: Federal (Bureau of Land Management), State (Department of Parks and Recreation)

Designation: May 1975

Section 8 Listings: Annually since 1977

Significance: The site contains the world's richest known deposits of Upper Pliocene terrestrial fossils and therefore is considered to be of international significance.

Description: A 4,187-acre tract that contains fossil exposures distributed through about 550 feet of stratigraphic section within the hills and cliffs bordering the west bank of the Snake River.

Threat or Damage: Source activities

agricultural irrigation

Resource Impacts

FOSSIL RESOURCES--erosion of exposures and structural disturbance of stratigraphy

Summary

Accelerated soil movement caused by surface-water runoff from irrigated farmlands on the plateau above and west of the river canyon and by discharge from springs and seeps along steep, east-facing slopes of the canyon continues to erode the fossil beds. Gullying has occurred in a large portion of the site, and fossils have been washed away. A landslide at the Bell Rapids pipeline and pumping station occurred on April 16, 1987; the direct impact on the fossil resources was significant. Large slump areas caused by subsurface soil saturation are another visible evidence of erosion and likely will continue to disrupt fossiliferous strata, as long as seepage from springs remains active.

Approximately 50+ acres have now been disturbed. Because earthflow movement disrupts local stratigraphy, the scientific and educational value of areas affected has been considerably diminished.

The principal sources of surface-water runoff are excess irrigation water and the periodic flushing of sprinkler valves. The source of the springs and seeps is a perched aquifer, which is probably recharged by seepage losses from an irrigation canal near the canyon rim and is supplied by water pumped from the Snake River. The precise nature and extent of the perched aquifer is unknown, however.

Public Law 100-696 added Hagerman to the National Park System. It did not include the Bell Rapids farmlands within its boundaries, which is important to consider. Another option is possible land exchanges between BLM and local landowners which would put source activity lands in federal ownership.

Current Situation:

A hydrologic study completed by the U.S. Geological Survey 1984 (USGS Water-Resources Investigations Report 84-4137), recommended the following corrective measures: (a) lining or treating the canals; (b) eliminating the practice of flushing irrigation systems; (c) constructing road berms and cross dips; and (d) establishing an uncultivated strip of land between irrigated farmlands and the canyon rim. The Bureau of Land Management (BLM) has designated the entire site as an Area of Critical Environmental Concern (ACEC) and has included it within the Jarbidge Resource Management Plan (RMP). This RMP has been approved. In addition, BLM's Natural History Resources Management Plan for the Hagerman Fauna Sites has been approved.

In addition, a watershed activity plan approved on April 10, 1985, included provisions that at least 1/2 mile of irrigation canals be lined; however, a decision was made early in Fiscal Year 1986 to extend study of the problem by installation of 11 monitoring wells in order to determine the exact source of the springs and to insure that the canal lining is designed so as to solve the problem. One-half mile of the Northern Canal has been lined. The Southern Canal has been replaced by steel pipe. BLM is continuing to monitor the wells to evaluate the success of the project. The watershed activity plan also included gathering spring flow data needed to evaluate the nature of the flow. BLM continues to explore the possible acquisition of some lands along the western boundary in order to move farming activities farther westward away from the top of the bluffs. BLM also identified and relocated back onto private lands two trespass irrigation lines. BLM is working with Bell Rapids Irrigation District to study the canal leakage problem and develop mitigating measures. A special Congressional add-on through BLM and the Bell Rapids Mutual Irrigation Co. paid for this project.

The Bell Rapids pipeline and associated pumpstation were removed after the 1987 landslide. The substation and associated powerline were removed in the winter of 1987-1988. The Horse Quarry pipeline and pumping station are in direct contact with the formations which yielded the major fossils and gained the site its international reputation. Fractures in the substrata indicate the potential failure of this second pipeline and pumping station.

**Recommended
Actions:**

Efforts to mitigate the damage to fossil beds caused by irrigation runoff should continue. The numerous seeps and springs along the face of the slides will develop into slumps or landslides unless groundwater charging by the ditches and irrigation is stopped on the formations draining toward the face. Alternative solutions to correcting these problems include: 1) acquire all farming rights and associated water distribution systems above the formation, 2) line all ditches and acquire farmland west to the divide of the drainage within the formation, or 3) line all irrigation ditches. Because the landmark is of international significance, every effort should be made to provide the highest degree of protection.

Illinois

Name:	HERON POND-LITTLE BLACK SLOUGH NATURAL AREA
Location:	Johnson County
Ownership:	State (Department of Conservation), Private
Designation:	March 1980
Section 8 Listings:	1980 and annually since 1984
Significance:	Little Black Slough, Heron Pond, and Wildcat Bluff together contain some of the best remaining examples of vegetation types at the western margin of the Interior Low Plateaus, including: tupelo-cypress swamp, maple-oak forest, mixed hardwood forest and hill prairies. The site contains the largest remaining tupelo-cypress swamp in Illinois and in many respects is a small wilderness. In addition, it harbors a number of rare animal species.
Description:	This 6,315-acre area contains one of the largest tupelo-bald cypress swamps in Illinois, a remnant of the vast cypress swamp once found in the southern part of the State. Little Black Slough contains three major types of virgin forest: deep swamp and bottomland, dominated primarily by water tupelo with some bald cypress; a dense forest of maple and oak on Boss Island; and a mixed hardwood forest of exceptionally large trees on the Boulder Slope Woods. In addition, a well-developed, undisturbed hill prairie is located near the southeast end of Wildcat Bluff, which rises more than 180 feet above the swampy bottomlands. The valley itself is part of an entrenched, meandering system, which contains examples of alluvial, colluvial, and lacustrine sedimentation.
Threat or Damage:	<p><u>Source Activities</u></p> <p>stream channelization and diversion</p> <p><u>Resource Impacts</u></p> <p>WATER—potential lowering of water table VEGETATION—potential alteration of native species composition</p> <p><u>Summary</u></p> <p>Diversion and channelization of the Upper Cache River has caused stream entrenchment and riverbank erosion near the site. As a result, gullies extending from the eroding bank of</p>

Cache River toward Heron Pond, located only 20-40 feet away, threaten to drain the pond. Lowering the water table would dramatically alter the deep swamp and bottomland communities.

Current Situation:

The Illinois Department of Conservation has placed stone in the gullies as a temporary measure until a more permanent solution can be found. At the request of the Illinois Department of Conservation, the Army Corps of Engineers considered rehabilitation of the abandoned U.S.G.S. gaging station at river mile 10.51, just downstream from the natural area, to attempt to inhibit further streambank erosion and river entrenchment there. That study was completed under the authority of Section 14 of the 1946 Flood Control Act, as amended, and has been reviewed. A recent policy interpretation by the Army, however, determined that Section 14 authority does not apply to Heron Pond, because it is a wetland and not a structure. Accordingly, the Corps will pursue no further study of protection of Heron Pond under Section 14 authority. The Corps has received general authorization for a separate Feasibility Study of the Cache River Basin, however, including the Heron Pond-Little Black Slough Natural Area, which will focus on siltation, drainage, and flooding problems.

**Recommended
Actions:**

A more permanent solution probably must await more detailed study of the Cache River Basin.

Illinois

Name:	LOWER CACHE RIVER SWAMP
Location:	Johnson and Pulaski Counties
Ownership:	State (Department of Conservation), Private
Designation:	March 1980
Section 8 Listings:	1980 - 1981 and annually since 1984
Significance:	Lower Cache River Swamp is an outstanding remnant of the swampy flood plain forest and open swamp that once covered an extensive area at the junction of the Mississippi and Ohio River valleys. The tract lies at the northern edge of the range of many southern plants and animals and contains many large trees. No comparable area of large cypresses and water tupelos is known in Indiana, Kentucky, Missouri, Arkansas, or Tennessee.
Description:	This 1,250-acre tract of wet forest and swamp is one-quarter to one-half mile wide and extends for 5 miles along the Lower Cache River. Much of the site is dominated by water tupelo and bald cypress. Although timber has been harvested from the better-drained portions of the landmark, the swampy forest contains many unusually large and old trees. The Cache River occupies an underfit stream valley carved by glacial outwash drainage.
Threat or Damage:	<p><u>Source activities</u></p> <p>stream channelization and diversion invasion of exotic plant species</p> <p><u>Resource Impact</u></p> <p>WATER--increased siltation VEGETATION--potential alteration of native species composition</p> <p><u>Summary</u></p> <p>Diversion and channelization of the lower Cache River have created a settling basin downstream. Increased siltation is resulting, which in time will replace the swamp with dry land.</p>
Current Situation:	Several State agencies are working to solve the problem. In addition, the Corps of Engineers has received general authorization for a study on the Cache River Basin.

The State Dept. of Conservation has initiated litigation to force the local drainage district to respect the integrity of the site. The State is now in the process of designating a settlement with the drainage district to create a management agreement to protect the NNL. All pending litigation would then be dropped.

**Recommended
Actions:**

A more permanent solution probably must await more detailed study of the Cache River Basin.

Illinois

Name:	VOLO BOG NATURE PRESERVE
Location:	Lake County
Ownership:	State
Designation:	September 1972
Section 8 Listings:	1977 - 1980,- 1982 - 1984, 1986 - 1987
Significance:	Volo Bog exhibits the characteristics of northern bogs near the southern limit of their occurrence and is in excellent condition. Because few bogs occur in Illinois, this site contains many plants that are unusual or rare to the State.
Description:	Volo Bog is characteristic of the classic northern quaking bog. An area of open water is located at the center and is surrounded by a border of cattails and giant bur-reed. The sphagnum mat is well developed and extends back from the open water some distance, where it forms the substrate for the surrounding tamaracks and shrubs, such as poison sumac and winterberry.
Threat or Damage:	<p><u>Source Activities</u></p> <p>invasion of exotic plant species</p> <p><u>Resource Impacts</u></p> <p>WATER—lowering of water table VEGETATION—potential alteration of native species composition.</p> <p><u>Summary</u></p> <p>There is ongoing and proposed development adjacent to the site. The manager of the adjacent residential development has also dug a ditch in an attempt to lower the lake level, which would permit cheaper dredging operations. As a result, the lake has already dropped 2 feet, and the manager of the adjacent property hopes to lower it another 2 feet. This may also drop the water level in the bog, with serious effect on bog vegetation. In addition, two exotic pest species have invaded the bog.</p>
Current Situation:	The State is removing purple loosestrife from the bog and plans to continue this practice. The water level is being manipulated and monitored in an effort to raise it to its natural level, and hopefully thereby reduce the spread of smooth buckthorn. The potential of a drop in water level in the bog due to external

development is being monitored. There is a proposed highway project (FAP420), the Richmond Expressway, that could threaten the entire NNL if constructed.

Recommended
Actions:

It is critical that development of lands surrounding the bog occur in such a manner so as not to affect the local water table. Exotic plant species management should continue.

Illinois

Name:	WAUCONDA BOG NATURE PRESERVE
Location:	Lake County
Ownership:	County
Designation:	November 1972
Section 8 Listing:	None
Significance:	Wauconda Bog is a mature fen in very good condition. It appears to be the furthest southern appearance of bog or fen vegetation in Illinois, and consequently represents an unusual biotic community for the region.
Description:	The bog (referred to as a fen due to almost neutral pH) occurs within the limits of the Valparaiso moraine. The site represents a fen community in a mature state and has no open water. It illustrates bog succession, and is a mixture of trees, shrubs and herbaceous plants.
Threat of Damage:	<p><u>Source activities</u></p> <p>invasion of exotic plant species</p> <p><u>Resource Impacts</u></p> <p>VEGETATION-potential alteration of native species composition</p> <p><u>Summary</u></p> <p>The area has been invaded by purple loostrife and smooth buckthorn. Herbicides are being used and their effects evaluated. Their effectiveness has not been determined. In addition, the deer population is increasing, and overbrowsing may soon also negatively impact the bog plant community.</p>
Current Situation:	Lake County Forest Preserve District has sprayed the bog with Tri-mec, a broad-leaf herbicide, and it appears to have better results in some areas than in others. Studies of the effects are not yet conclusive. Both species are very aggressive and difficult to control. Deer census reveals an increasing population. In this predominately residential area, the bog plant community will likely be over-browsed.

**Recommended
Action:**

Exotic plant species management should be continued with increased emphasis placed on control of these and any other species which escapes cultivation in the surrounding residential areas. The deer population should be reduced.

Indiana

Name:	CABIN CREEK RAISED BOG
Location:	Randolph County
Ownership:	Private
Designation:	December 1974
Section 8 Listings:	1977 - 1980, 1983
Significance:	The site is one of the few known inland raised bogs in the United States. It has a very rich flora including many species at or near their range limits.
Description:	This 115-acre bog is a fen (alkaline bog) elevated some 10 feet above the general flood plain level of Cabin Creek which forms the northern boundary. An early study listed 159 species of vascular plants, including prairie species, disjuncts, typical bog shrubs, and species at their northern and southern limits in the State. A later study reported 63 additional vascular plant species, bringing the total to 222. A wooded buffer zone surrounds the bog.
Threat:	<p><u>Source Activities</u></p> <p>potential road widening</p> <p><u>Resource Impact</u></p> <p>VEGETATION - potential destruction WATER - potential lowering of water table by drainage culverts</p> <p><u>Summary</u></p> <p>Stakes for widening the road and bridge are in place. The Indiana Department of Transportation indicated 0.7 acres of the site would be destroyed by road widening, and that road design was such as to minimize impacts.</p>
Current Situation:	No major changes appear to have occurred at the site. The threat is proposed road widening.

**Recommended
Actions:**

All possible alternatives should be examined to prevent damage to the NNL.

Indiana

Name:	WESSELMAN PARK WOODS
Location:	Vanderburgh County
Ownership:	Municipal
Designation:	November 1973
Section 8 Listings:	1978, 1987
Significance:	Wessleman Park Woods represents one of the two finest remaining large tracts of presettlement lowland mixed forest in Indiana. The forest has the largest basal area per acre of any known stand in Indiana. A number of exceptionally large trees create a very impressive stand as the general canopy height is great. The sweet gum-tulip domination is unusual. A stand of this size and quality within a city or town is not found elsewhere in Indiana.
Description:	This 210-acre presettlement, lowland mixed forest remnant is contained within the larger Wesselman Park. The stand is unusual in being dominated by sweet gum and tulip tree and at least 26 tree species have representatives greater than 4 inches dbh. Shrub species total 32, fern species total 14 and over 200 species of wildflowers have been reported for the tract, including many uncommon species.
Threat or damage:	<p><u>Source Activities</u></p> <p>Existing drainage ditch</p> <p><u>Resource Impacts</u></p> <p>VEGETATION -- Potential alteration of soil moisture</p> <p><u>Summary</u></p> <p>In November 1986 the City of Evansville encroached onto the Wesselman Park Woods Preserve by construction of a drainage ditch without notifying the site manager or the State Department of Natural Resources.</p>
Current Situation:	The City of Evansville has promised to install a system of check dams to stabilize water levels and abate undercutting. The City has also promised to fence part of the park boundary along Stockwell Road to prevent unauthorized access.

Recommendation: Check site after implementation of these solutions and commend the City for working out solutions to problems causing degradation of a National Natural Landmark.

Kansas

Name:	BAKER UNIVERSITY WETLANDS
Location:	Douglas County
Ownership:	Private
Designation:	July 1969
Section 8 Listing:	1987
Significance:	Two tracts, one of 30-acres and the other of 15-acres are undisturbed examples of wetland prairie. Such examples are rare today.
Description:	This 573-acre prairie is a breeding ground for pintails, mallards and Canada geese. It is also a stopover for migrating wildfowl. Eastern gamagrass is dominant in spring and cordgrass in late summer. Scores of other plant and animal species typical of the prairie habitat are found here.
Threat:	<p><u>Source Activities</u></p> <p>construction of highway</p> <p><u>Resource Impacts</u></p> <p>WATER RESOURCES -- degradation of water quality WILDLIFE -- alternation of population dynamics VEGETATION -- large-scale removal</p> <p><u>Summary</u></p> <p>The City and County are pursuing a 4-lane highway construction project. Three road construction alternatives are under consideration. Several routings will eliminate habitat in the natural landmark or cause damage due to its close proximity.</p>
Current Situation:	The site remains threatened by the highway construction project. The county owns land that will allow a routing through the NNL. A routing outside the NNL is on land owned by Haskell Indian College, making it not as easy to change alignments. Plans for the highway are moving ahead and Phase I (2 lane) is funded.
Recommendation:	Construction of the highway in a direction and in such a manner as to not impact the natural landmark.

Maryland

Name: **LONG GREEN CREEK AND SWEATHOUSE BRANCH**

Location: Baltimore County

Ownership: State

Designation: May 1977

Section 8 Listings: 1986-1987

Significance: The site is an uncommon example of climax mixed mesophytic forest in the Piedmont Natural Region, and it contains a rich herbaceous flora.

Description: This 250-acre site contains a mature beech-tulip poplar-white oak forest with variation from xeric ridges to mesic ravines.

Threat or Damage: Source activities
invasion of exotic plant species
Resource impacts
VEGETATION--potential alteration of native species composition
Summary
A significant invasion of exotic woody vegetation, multiflora rose (Rosa multiflora) and Japanese honeysuckle (Lonicera japonica), has occurred throughout approximately 30 percent of the area. This could impact the native herbal flora and climax tree reproduction through interference for space, light and nutrients, which, in turn, could reduce the abundance of species in the herbaceous layer and interfere with the survival of canopy tree seedlings.

Current Situation: No action has been taken to reduce this exotic species invasion.

Recommended Actions: Mechanical removal or chemical treatment are potential means of control. Onsite study is needed.

Massachusetts

Name:	GAY HEAD CLIFFS
Location:	Dukes County
Ownership:	Municipal
Designation:	October 1965
Section 8 Listing:	None
Significance:	The site is distinctive as an exposure of pre-glacial sedimentary formations resting upon the continental shelf and detached from the mainland. It represents an unusual cross section of strata from the Cretaceous through the Pleistocene.
Description:	Gay Head forms the western tip of Martha's Vineyard. The approximately 20-acre site includes approximately one mile of the exposed cliff of Gay Head, and is 100-200 yards wide. The cliffs rise vertically for as much as 150 feet above the sea. Their striking colors are from the white, red, gray, black and yellow sands, clays, gravels and lignites of the Raritan and Magothy Formations in exposed Cretaceous sediments. Above these are beds of fossil-bearing green sand of the middle Miocene overlain by fossil-bearing, iron-impregnated sand of either the Pliocene or the very early Pleistocene.
Threat or Damage:	<p><u>Source Activities</u></p> <p>visitation</p> <p><u>Resource Impacts</u></p> <p>GEOLOGIC - erosion of the cliff face</p> <p><u>Summary</u></p> <p>The natural erosion of the cliff face is being accelerated by visitors climbing on the cliffs or removing clay from them.</p>

Current Situation:

The town of Gay Head is the current owner of the landmark area. They have tried for many years to enforce a town ordinance which prohibits climbing on the cliffs by placing signs at intervals along the base of the cliffs. A lack of funds has precluded any active enforcement.

It was anticipated for many years that the land would be transferred to the Wompanoag Indian Tribe for the creation of a reservation. The actual transfer of the land has yet to be made. This requires action by the Bureau of Indian Affairs. The Tribe has expressed concern over erosion of the cliffs and has developed several proposals for enforcing a ban on climbing on the cliffs or mining the clay, once the transfer of land has been completed.

**Recommended
Action:**

Transfer of land to the Wompanoag Indian Tribe to encourage better enforcement of local ordinances, via posting, policing, or other means.

Massachusetts

Name:	LYNNFIELD MARSH
Location:	Essex County
Ownership:	Municipal, private
Designation:	June 1972
Section 8 Listing:	1979-1982
Significance:	The site is an exceptional fresh water marsh and preserves habitat for rare species.
Description:	The site is a 540-acre fresh water marsh dominated by cattails, with sedges, grasses, and rushes. Higher ground has cottonwood, red maple, red oak and alder. The Saugus River flows through it.
Threat:	<u>Source Activities</u> urban development dredging <u>Resource Impacts</u> WATER - potential water flow disruption <u>Summary</u> Much development has occurred on the boundary of the NNL. Also, local towns plan to dredge the marsh to maintain water flow through it and alleviate flooding.
Current Situation:	The site is progressively appearing like a habitat island in the midst of surrounding urban development.
Recommended Actions:	The site needs to be reevaluated for its significance and viability due to increasing urban development outside its boundaries. Plans to dredge the marsh should be reevaluated in terms of alternative actions.

New Mexico

Name: VALLES CALDERA

Location: Sandoval and Rio Arriba Counties

Ownership: Private

Designation: May 1975

Section 8 Listings: 1980, 1987

Significance: The site is one of the largest calderas in the world.

Description: This 156 square mile site contains most of a huge subcircular volcanic depression 12-15 miles in diameter, with walls rising from a few hundred to 2,000 feet above its floor. A dome exists in the center 8-10 miles in diameter and nearly 3,000 feet high. There are eight major plant associations here as well as two threatened and endangered animals, which contribute to the site's naturalness and importance.

Threat: Source Activities
 proposed powerline construction

Resource Impacts
 VEGETATION - physical destruction
 WILDLIFE - harassment
 disruption of breeding patterns

Summary
 There is a proposal by a local utility to construct a 345 KV powerline across six to seven miles of the caldera and thereby traverse its northeastern section. Vegetation loss is predicted from construction activities. Wildlife could be displaced or negatively affected by habitat loss or construction noise, including the Jemez Mountain salamander, on the State endangered species list, and the peregrine falcon, both a State and federally listed endangered species.

Current Situation: The final environmental impact statement (EIS) was prepared by BIA, DOE, BLM, and the USFS, with BIA the lead agency. NPS does not think it treated the existence of the NNL adequately, nor provided an adequate evaluation of alternatives. In fact, the USFS disagreed with the Valles Caldera alternative, citing potential impacts to threatened and endangered species, Indian religious practices, existing and proposed land uses, visual quality, and strong public opposition. The NPS opposed the routing in commenting on the draft EIS. The decision to build the powerline at this location is being appealed by the State of

New Mexico, the All-Indian Pueblo Council, San Juan Pueblo, Santa Clara Pueblo, San Ildefonso Pueblo, Jemez Pueblo, Save the Jemez, and others. The U.S. Forest Service indicates that 80 % of the public responses during the EIS process opposed this planned routing.

Recommended
Actions:

The decision to route the powerline through the NNL should not be implemented, but other alternatives more thoroughly examined.

North Carolina

Name: **NAGS HEAD WOODS AND JOCKEY'S RIDGE**

Location: Dare County

Ownership: State (Division of Parks and Recreation), County, Municipal (Towns of Nags Head and Kill Devil Hills), Private (The North Carolina Nature Conservancy and others).

Designated: May 1974

Section 8 Listings: 1978-1985, 1987

Significance: Jockey's Ridge is the largest active sand dune on the Atlantic Coast, and provides excellent illustration of the entire range of dune development and associated plant succession, from shifting open dunes to forested, stabilized dunes. Many rare plant and animal species also occur within the landmark.

Description: A 1,980-acre site, which includes open and forested coastal dunes and freshwater wetlands.

Threat or Damage: Source Activities

proposed utility development
 proposed residential development
 sand mining on the perimeter

Resource Impacts

VEGETATION--large scale removal or complete destruction

GEOLOGIC RESOURCES--extraction or removal of sand

Summary

Relocation and construction of a municipal wastewater treatment facility has been proposed in or near the landmark. The NC Environmental Management Commission in 1987 adopted regulations prohibiting construction of sewer lines and wastewater systems in a state registered natural area or dedicated nature preserve. Because The Nature Conservancy in 1987 dedicated its Nags Head Woods property as a NC Nature Preserve through donation of a conservation easement to the State, the construction of a municipal wastewater treatment facility or sewer lines in the preserve is effectively prohibited.

The Town of Kill Devil Hills is now considering several feasible alternative sites for its facility, but at least one of those sites is on municipal property in the designated landmark.

A 223-acre section of the landmark was purchased by a real estate interest for development purposes, although the area is zoned to require low-impact, low-density residential development.

Commercial sand mining has been stopped on the perimeter of Jockey's Ridge but has accelerated on the perimeter of Run Hill dune. Removal of sand could influence its movement and availability for Run Hill in the northern sector of the landmark.

Current Situation:

Although the Town of Nags Head has adopted stringent development controls for privately owned sections of the landmark in its municipal jurisdiction, local real estate interests recently purchased 223 acres for proposed development. The purchaser outbid the Town and the Nature Conservancy, both of which attempted to acquire the tract for a municipal park and nature preserve.

The NC Coastal Management Commission responded to accelerated sand mining operations on the periphery of Jockey's Ridge State Park by designating Jockey's Ridge as a "Coastal Area of Environmental Concern (Unique Geologic Formation Category)." This designation stopped the commercial sand mining operation which has been permanently removing sand, normally available to replenish Jockey's Ridge. A permit system now regulates the collection of sands on the Jockey's Ridge system, and requires that all amounts of collected sand in excess of 10 cubic yards per year be redeposited in the State Park. However, sand mining operations have accelerated on the Run Hill dune in the northern sector of the NNL and adjacent to The Nature Conservancy's Nags Head Woods Preserve. Removal of sand from the dune system may be damaging to the preserve. The Nature Conservancy is compiling research information on which to base opposition when the sand mining company reapplies for a mining permit from the N.C. Mining Commission in 1989.

**Recommended
Action:**

The Town of Kill Devil Hill will be required by the State to prepare an Environmental Impact Statement for its wastewater plant proposal. The State (Governor and Council of State) should not approve placing the plant in the landmark.

The Town of Nags Head should enforce its development restrictions on privately-owned sections of the landmark.

The North Carolina Division of Parks and Recreation should petition the Council of State for approval to acquire the remaining areas of sand mining.

North Carolina

Name:	PIEDMONT BEECH NATURAL AREA
Location:	Wake County
Ownership:	State (Division of Parks and Recreation)
Designation:	May 1974
Section 8 Listings:	Annually since 1977
Significance:	This site is one of the finest remaining examples of mixed mesophytic forest in the eastern Piedmont of North Carolina. Several climax stands of beech occur in portions of the site, as well as a number of disjunct mountain plant species.
Description:	A 50-acre site, located within the William B. Umstead State Park, consisting primarily of mixed upland hardwood forest dominated by beech.
Threat or Damage:	<p><u>Source Activities</u></p> <p>proposed dam and reservoir construction visitor use--horseback riding</p> <p><u>Resource Impact</u></p> <p>WATER--potential periodic fluctuation VEGETATION--potential destruction; trampling WILDLIFE--potential destruction GEOLOGIC RESOURCES--soil erosion</p> <p><u>Summary</u></p> <p>Construction of a dry dam, the last structure (No. 25) proposed in the USDA Soil Conservation Service's Crabtree Watershed Flood Control project, would periodically impound approximately 292 acres of flood waters and would flood 2.9 acres of the landmark for up to three days annually. Intermittent flooding with depths up to 22 feet would alter bottomland forest communities. There is the potential of elimination of rare species and sediment deposition and alteration of the bottomland.</p> <p>Damage by illicit horse riding on undesignated trails in the landmark has been reduced through actions by the N.C. Division of Parks and Recreation to repair some of the</p>

erosion and gullying damages, use of trail markers and a new trail map to inform riders that horses are prohibited in the landmark area. However, illicit horse riding continues in the natural area, and there are indications that new signs are often ignored. The horse problem continues to be generated primarily by riders who rent horses from a commercial stable near the park.

Current Situation:

Completion of the flood control structure is pending completion of a revised Environmental Impact Statement (EIS) by the Soil Conservation Service, and a ruling by the National Park Service as to the suitability of proposed replacement lands. NPS requested the preparation of a supplemental EIS to the 1976 EIS for the Crabtree Watershed Flood Control Project to determine in greater detail the potential negative impacts upon the site, especially the effects of flooding on flora and fauna. Because the land is within Umstead State Park, NPS will also need to determine whether replacement land will be required under Section 6f(3) of the Land and Water Conservation Fund Act as a result of land use conversion. Ten alternatives to the proposed dam have been suggested by the Umstead Coalition.

The State Division of Parks and Recreation intends to further increase its surveillance and enforcement efforts to stop illicit horse riding in the natural area, and intends to start issuing citations to riders found in the landmark area.

**Recommended
Actions:**

Any action concerning the flood control project is contingent upon the National Park Service ruling on suitable replacement lands.

As a further deterrent to illicit horse traffic, surveillance and enforcement efforts should be expanded. If damage cannot be prevented consideration should be given to physical barriers, requiring the stables to build an interpretive display of unauthorized trails, ticketing violators, or requiring the stables to pay for damages.

North Dakota

Name:	RUSH LAKE
Location:	Cavalier County
Ownership:	Private
Designation:	May 1975
Section 8 Listings:	Annually since 1977
Significance:	This site is an excellent, essentially undisturbed example of a large prairie pothole lake and is also an important breeding and staging area for up to 200,000 waterfowl.
Description:	<p>This 1600-acre site was a natural wetland including approximately 700 acres of shallow, open water and 900 acres of adjacent potholes and marshland. South Rush Lake is the main body of water and is situated in a glacial depression draining into Snowflake Creek. The lake receives the majority of runoff from the 292-mi² watershed, including water that enters the lake through two major inlets from surrounding natural wetlands drained for agricultural purposes. North Rush Lake is outside designation boundaries but continuous with South Rush Lake in normal precipitation years, in the absence of dikes and drains. A multi-dike system prevents runoff from entering North Rush Lake, however, and so it has been dry or nearly dry since the early 1970's. Adjacent lands are intensively farmed, primarily for small grains and sunflowers.</p>
Threat or Damage:	<p><u>Source Activities</u></p> <p>ditching/diking for wetland drainage agricultural development</p> <p><u>Resource Impacts</u></p> <p>WATER--lowering of water table VEGETATION--destruction of wetland ecosystem WILDLIFE--disruption of breeding and migratory patterns due to loss of habitat</p> <p><u>Summary</u></p> <p>South Rush Lake continues to be maintained at an artificially reduced level of 1551.5 msl and the drained area continues to be farmed, resulting in substantial destruction of waterfowl habitat and the loss of site significance. Destruction of waterfowl habitat is deemed reversible, however.</p>

Current Situation:

As a result of interest in the restoration of Rush Lake, as part of the Wildlife Mitigation Plan for the Garrison Diversion Irrigation Project, and offers from willing area landowners to sell to the Bureau of Reclamation (BOR) for that purpose, BOR entered into an agreement with the North Dakota State Water Commission on March 15, 1985, for a preliminary engineering study of a Rush Lake Restoration Project. The study was completed in June 1985 and proposed the acquisition of approximately 10,000 acres surrounding South and North Rush Lakes and the restoration of South Rush Lake to an elevation of 1553.5 msl. The Cavalier County Water Resources Board disapproved and rejected that plan, however, on July 25, 1985, following a public hearing and discussion; the resolution did not disapprove a similar plan providing for a lake level of 1552.5 msl with land acquisition and flood easements adjusted accordingly. As a result, the BOR project manager for Bismarck, North Dakota, recommended on July 30, 1985, that offers extended to acquire land surrounding South Rush Lake be withdrawn, because maintenance of South Rush Lake at 1552.5 msl would not provide sufficient wildlife benefits to make South Rush Lake a priority acquisition. At present, there are no plans to acquire lands surrounding South Rush Lake.

The 1987 Section 8 report indicated a formal reevaluation of the natural integrity of the site was needed, and steps towards de-listing the site was an option. In September 1987 the State recommended de-listing. However, there was subsequent concern from the State and the Fish and Wildlife Service about any possibility of restoring the site and avoiding de-listing. NPS agreed to postpone actions to evaluate and document the rationale for de-listing.

**Recommended
Actions:**

Restoration of the site is unlikely under the present circumstances. Consequently, reevaluation of the natural integrity of the site is warranted. However, because of requests to not be hasty in examining options, NPS will wait another year and determine if there is any alternative to de-listing it as a National Natural Landmark.

Ohio

Name:	CRALL WOODS
Location:	Ashland County
Ownership:	Private
Designation:	November 1967
Section 8 Listings:	None
Significance:	The site contains a 40-acre virgin remnant maple basswood-beech hardwood forest representing the original vegetation found in Ohio's glaciated till plain.
Description:	This 120-acre tract contains sugar maple, basswood, beech, tulip poplar and red oak, some with 3-4 foot diameters. A 40-acre tract has never been cut over and has been protected from grazing and fire since pioneer days. There is a 36-acre second-growth hardwood forest to the north and a 44-acre tract of early successional red cedar woods to the south of the old-growth woods, providing a buffer for it. The site is surrounded by agricultural lands.
Threat or Damage:	<p><u>Source Activities</u></p> <p>other - selling of property to a party who would damage natural values</p> <p><u>Resource Impacts</u></p> <p>VEGETATION - potential destruction by forestry activities</p> <p><u>Summary</u></p> <p>The owner is interested in selling the property. Because of the old timber, it is especially valuable.</p>
Current Situation:	The site is presently not a priority acquisition for either The Nature Conservancy or the State. The potential always exists that it could be sold to a buyer interested in harvesting the timber.

**Recommended
Actions:**

A private conservation organization should buy the property at its market value, and either manage it or turn it over to the State.

Ohio

Name:	DYSART WOODS
Location:	Belmont County
Ownership:	Private
Designation:	April 1967
Section 8 Listings:	None
Significance:	The site contains one of the best remaining examples of white oak forest in eastern Ohio.
Description:	This 456-acre tract contains about 40 acres of virgin white oak forest and another 30 acres of near-virgin mixed mesophytic hardwoods. It contains trees 400 years old.
Threat or Damage:	<p><u>Source Activities</u></p> <p>proposed coal mining</p> <p><u>Resource Impacts</u></p> <p>WATER - potential lowering of the water table and decrease in soil moisture</p> <p>VEGETATION - potential ground subsidence causing root damage.</p> <p><u>Summary</u></p> <p>North American Coal Company has proposed that an area adjacent to the landmark be used for mining coal. If this occurs, depletion of the water table and subsidence could result.</p>
Current Situation:	The Ohio Department of Natural Resources has requested that the permit applications be withdrawn to do longwall mining next to the site. In longwall mining, a machine eats out the underground coal seam and no supports are erected

to prevent cave-ins. The Department can also deny the permit. A public hearing was held in February where 200 people attended, most objecting to the application. The coal company owns mineral rights next to the forest but not under it.

**Recommended
Actions:**

The mining permit should be denied.

Ohio

Name:	MENTOR MARSH
Location:	Lake County
Ownership:	State, private
Designation:	October 1964
Section 8 Listings:	1981
Significance:	This site is one of the best examples of marsh habitat in northern Ohio.
Description:	The 170-acre site contains marsh vegetation, swamp and bottomland forest, and upland forest. It is an important stopover for migrating water fowl.
Threat or Damage:	<p><u>Source Activities</u></p> <p>Salt water intrusion</p> <p><u>Resource Impact</u></p> <p>VEGETATION - alteration of native species composition</p> <p><u>Summary</u></p> <p>There are high salt concentrations in the marsh. Phragmites cover 50-60 percent of the marsh, a change in the original vegetative composition.</p>
Current Situation:	<p>Floral and faunal changes have occurred. High salt content, high levels of Lake Erie, and increased flow of Marsh Creek and Black Brook may all have contributed to swamp forest die-back.</p> <p>Progress has been made on a diversion ditch which will allow salt runoff to bypass the marsh. An observation platform was dedicated.</p>

**Recommended
Actions:**

Work on the diversion ditch should continue. Efforts should continue to restore the area to a more natural species composition.

Ohio

Name:	WHITE PINE BOG FOREST
Location:	Geauga County
Ownership:	Municipal, private
Designation:	January 1976
Section 8 Listings:	1978
Significance:	The site is the only remaining near - virgin white pine boreal bog in Ohio, and is one of the southwesternmost such relict communities in the country.
Description:	This 333-acre tract harbors a relict boreal bog forest situated in a glacial depression. Snow Lake, a kettlehole lake of about 20-acres, lies in the middle of the marsh. A second growth beech-maple forest occurs on the better drained soils. A small noncontiguous 23-acre tract, which comprises Fern Lake and associated bog vegetation, lies approximately 1/3 mile north of the main 310-acre tract.
Threat or Damage:	<p><u>Source Activities</u></p> <p>sewage treatment plant development</p> <p><u>Resource Impacts</u></p> <p>WATER -potential water pollution potential alteration of the water table</p> <p><u>Summary</u></p> <p>A new sewage plant is immediately outside the landmark and drainage seeps into Snow Lake.</p>
Current Situation:	A new sewage plant for Burton sometimes feeds sewage into the NNL. A beaver dam has been lowered through joint intervention by Geauga Metroparks, Akron Park Board, The Nature Conservancy, and the Cleveland Museum of Natural History. There is the possibility of more development adjacent to the NNL, which could alter the water table and threaten the wetland. Akron is interested in drilling for oil and gas in the area. A reservoir may be built below Burton.

**Recommended
Actions:**

Pollution inflow should be abated. The area adjacent to the NNL should be watched closely for potential development.

Pennsylvania

Name:	HAWK MOUNTAIN SANCTUARY
Location:	Berks County
Ownership:	Private
Designation:	October 1965
Section 8 Listing:	None
Significance:	The site is one of the best vantage points to view migrating hawks in the Fall in this part of the Appalachian Ranges Natural Region. It is also a fine example of the geology and ecology of the forested ridges of the eastern Appalachians.
Description:	The 2050-acre site contains Kittatinny Ridge, which narrows at this point and is 1200-2000 feet high. Northerly and westerly winds against the face of the ridge produce updrafts which are especially suited to the soaring habits of raptors. Hardwood forest covers much of this protected wildlife preserve and north slopes have a cover of hemlock and pine. At least 222 species of birds have been identified here, and 70 of these are summer residents. About 450 species of plants have been identified in the Sanctuary.
Threat and Damage:	<p><u>Source Activities</u></p> <p>development</p> <p><u>Resource Impacts</u></p> <p>WILDLIFE - elimination of nesting and feeding sites for birds on land bordering the NNL.</p> <p><u>Summary</u></p> <p>The area known as the "Pine swamp", adjacent to the eastern border of the NNL, is being threatened by private land development. The Pine Swamp is a major nesting and feeding area for the migrating and resident birds that utilize the sanctuary.</p>
Current Situation:	The Sanctuary has attempted to convince the current landowners not to develop the "Pine Swamp". This action has not been successful. Elimination of this area would effectively reduce the natural resources available to the raptors and other birds utilizing the Sanctuary.

**Recommended
Action:**

Development of this area adjacent to the NNL should be discouraged.

South Carolina

Name:	CONGAREE RIVER SWAMP
Location:	Richland County
Ownership:	Federal (National Park Service), Private
Designation:	May 1974
Section 8 Listings:	Annually since 1978
Significance:	This site is the most extensive mature cypress-gum swamp and bottomland hardwood forest remaining in the southeastern United States.
Description:	This site contains a 19,800-acre mature swamp forest, which extends for approximately 13 miles along the Congaree River. It includes Congaree Swamp National Monument (15,200-acres).
Threat or Damage:	<u>Source Activities</u>

timber harvest
commercial development

Resource Impacts

VEGETATION--destruction of a portion of the forest
ecosystems

Summary

Although Congaree Swamp National Monument protects about three-fourths of the designated national natural landmark, clear-cutting of the privately-owned portion outside the monument has been occurring since 1978, and has now damaged most of that land.

A hunting club is still planning to develop two land parcels of approximately 385-acres within the landmark as a hunting preserve. This development will include cabins, access roads, and a lodge. To date, a field has been cultivated, and access roads and hunting blinds have been constructed.

Reduction of ground water quality and quantity is a concern for future management of the area, especially in drought years like 1986, as more farmers turn to the use of ground water for irrigation.

Current Situation:

A draft General Management Plan (GMP) was completed by NPS, who held a public hearing, and is in the process of finalizing the GMP. The GMP calls for inclusion of an additional 3700 acres of NNL land.

The remainder of the NNL designated boundary (6,300 + acres) continues to be clearcut by the owners. As of March 1988, the area in private ownership is 50 - 60% clearcut. Georgia-Pacific has agreed that they would not cut timber on property adjacent to Cedar Creek in the north central portion of the NNL.

The entire S.C. Congressional delegation co-sponsored legislation to expand the Monument. Public Law 100-524 was enacted in October 1988, which increased the Monument by 7000 acres, designated 15,000 acres as wilderness and 6840 acres as potential wilderness. The expanded boundaries of the Monument generally coincide with the boundary of the NNL. As a result of the legislation, a land protection plan is being prepared that will establish priorities for protection within the boundaries.

Georgia-Pacific continues to cut trees in the eastern section of the Monument on land they own, within the new authorized boundary. Much of this area had been cut-over at the time PL 100-524 was enacted.

**Recommended
Actions:**

NPS should continue to monitor the lands which are not under Federal ownership.

Tennessee

Name:	REELFOOT LAKE
Location:	Lake and Obion Counties
Ownership:	State
Designation:	May 1966
Section 8 Listings:	None
Significance:	The site presents outstanding research and teaching opportunities in geology and ecology. It is the largest natural lake in Tennessee with a wide array of biotic communities.
Description:	The site was formed in the winter of 1811-12 as a result of a succession of shocks designated collectively as the New Madrid earthquake, the most severe recorded in the United States. Over an area of some 30 to 50 thousand square miles, there occurred phenomena characteristic of intensive shocks such as domes and sunken lands, fissures, sinks, sand blows, and large landslides. It was the sinking of a large area and temporary damming of the Mississippi River tributaries that formed the lake. The lake itself is a 23,000-acre area of cypress swamps, sawgrass jungle, water lily glades and scattered bodies of open water.
Threat:	<p><u>Source Activities</u></p> <p>Agricultural practices in the lake's watershed</p> <p><u>Resource Impacts</u></p> <p>WATER - siltation VEGETATION - siltation</p> <p><u>Summary:</u></p> <p>Reelfoot Lake is gradually filling from silt brought by streams that flow in the lake. The biota in the lake will change as a result.</p>
Current Situation:	An EIS is being prepared by the US Fish and Wildlife Service. It was ordered by a judge who refused to allow the Tennessee Wildlife Resources Agency to lower the lake level six feet on a temporary basis in hopes of deepening it.

It discusses eight alternatives for controlling the silt problem. One of the alternatives proposes the construction of a catch basin on Reelfoot Creek, the largest stream originating from the lake's watershed and brings in 40% of the silt. The Tennessee Wildlife Resource Agency has drafted a Management Plan, and propose to contract with the U.S. Army Corps of Engineers to dredge about 16 miles of canals. The Tennessee Assembly must fund a \$2 million feasibility study by the US Army Corps of Engineers to create a full set of engineering plans, a time schedule of implementation, and funding needed for each alternative in the EIS.

**Recommended
Actions:**

The options outlined in the EIS should be carefully examined by State and Federal officials. A reevaluation of the NNL boundary should be undertaken.

Texas

Name:	DINOSAUR VALLEY STATE PARK
Location:	Somerville County
Ownership:	State of Texas (Texas Parks and Wildlife Division)
Designation:	October 1968
Section 8 Listings:	1986 - 1987
Significance:	Fossil footprints displayed in the Glen Rose limestone and exposed in the bed of the Paluxy River and tributary creeks are among the first clearly defined sauropod trackways known in North America. Considerable scientific evaluation of the tracks has revealed valuable insight into the habits and locomotion methods of the large dinosaurs, including proof that dinosaurs walked on land, in spite of their bulk.
Description:	This 1,274-acre site contains several exposures of late Cretaceous fossil trackways of sauropod dinosaurs.
Threats or Damages:	<p><u>Source Activities</u></p> <p>proposed dam and reservoir construction</p> <p><u>Resource Impacts</u></p> <p>FOSSIL RESOURCES--potential increased erosion and destruction of fossils</p> <p>WATER--potential manipulation of discharge patterns</p> <p><u>Summary</u></p> <p>A dam (Applications 4237 and 4237A for the City of Stephenville, <u>et. al.</u>) has been proposed for construction in the Paluxy River valley, approximately two river miles above Dinosaur Valley State Park. Currently, flash floods, which may occur from one to three times per year, continually reveal new tracks by erosion of the overlying limestone. This is a natural process that the dam would halt. Of greater concern is that the dam would reduce the base flow of the river from about 65 cfs to about 3 cfs. The resulting lowering of the river surface would expose the dinosaur tracks to subaerial weathering by freezing and thawing, which in turn would result in fracturing and accelerated destruction of the track imprints.</p>

Current Situation:

The National Park Service testified at hearings before the Texas Water Commission in March 1986 and expressed the continuing need for protection of Dinosaur Valley State Park National Natural Landmark. The proposed dam project is now awaiting further action by the Texas Water Commission. No federal funds are involved in the proposed dam and reservoir construction. The Texas Parks and Wildlife Department is considering a detailed survey and stream flow analysis to assess threats to the integrity of each track site.

Recommended Action:

An Environmental Impact Statement for the project should recognize the existence and location of the national natural landmark and should assess the potential impact of the proposed project upon the values for which the site was designated. NPS will continue to participate in scheduled hearings as appropriate.

U.S. Virgin Islands

Name:	GREEN CAY
Location:	St. Croix
Ownership:	Federal Government, administered by U.S. Fish and Wildlife Service
Designation:	August 1980
Section 8 Listings:	None
Significance:	The site is one of two cays where the federally endangered St. Croix ground lizard (<u>Ameiva polops</u>), now extinct on the main island of St. Croix, still exists. Since the cay is uninhabited and free of rats and mongoose, it provides suitable habitat for many species of breeding birds, especially ground-nesting species. Geological features include exposure of three strata from the Cretaceous Caledonia Formation and evidence of tectonic activity.
Description:	This 30-acre uninhabited cay has three distinct intrusive (hornblende) layers of varying texture and the Cretaceous Caledonia Formation border contact is well illustrated. It is nesting ground for the American Oystercatcher (<u>Haematopus palliatus</u>), Brown Pelican (<u>Pelecanus occidentalis</u>), Least Tern (<u>Sterna antillarum</u>), White-cheeked Pintail (<u>Anas bahamensis</u>), Great Blue Heron (<u>Ardea herodias</u>), Great Egret (<u>Casmerodius albus</u>), Snowy Egret (<u>Egretta thula</u>), Little Blue Heron (<u>E. caerulea</u>), Tricolored Heron (<u>E. tricolor</u>), Cattle Egret (<u>Bulbulcus ibis</u>), Green-backed Heron (<u>Butorides striatus</u>), Yellow-crowned Night Heron, (<u>Nycticorax violaceus</u>), and White-crowned pigeon (<u>Columba leucocephala</u>), among others. It contains an excellent example of low wind-shaped xeromorphic vegetation with <u>Croton discolor</u> and <u>Acacia tortuosa</u> the conspicuous species. The cay contains the largest stand of <u>Cordia rickseckeri</u> known on St. Croix.
Threat:	<u>Source Activities</u> visitation <u>Resource Impacts</u> WILDLIFE - potential interference with breeding

Summary:

Due to landings on the island by boaters, breeding success by wildlife species has the potential of being reduced. Species that could be effected include the Least Tern (Sterna antillarum), locally threatened; American Oystercatcher (Haematopus palliatus), locally endangered; white-cheeked Pintail (Anas bahamensis), locally threatened, candidate for Federal threatened list; Brown Pelican (Pelicanus occidentalis), locally threatened, Federal endangered species.

Current Situation:

Boating at St. Croix is increasing and more and more boaters are landing on Green Cay National Wildlife Refuge to relax and explore. This activity can prevent nesting or cause egg and/or chick mortality by keeping the adult birds away from the nests or young for prolonged periods. About 20 boat landings occurred in 1985. In 1987 there were approximately 70 landings and by June 1 there were 40 landings for 1988. Most occur on holidays or weekends.

Recommended
Actions:

Action by the U.S. Fish and Wildlife Service should be taken to reduce or discourage these landings, especially during spring and summer when many birds breed. The impact of the landings on the St. Croix ground lizard (Ameiva polops) should be evaluated.

U.S. Virgin Islands

Name:	SALT RIVER AND SUGAR BAYS
Location:	St. Croix, U.S. Virgin Islands
Ownership:	Government of the Virgin Islands (Department of Cultural Affairs), and private.
Designation:	February 1980
Section 8 Listings:	1986 - 1987
Significance:	The inner shoreline of Salt River Bay, including both Sugar and Triton Bays, contains the best remaining stands of mangrove vegetation in the Virgin Islands and the largest stand of mature mangroves on St. Croix. This habitat also supports a multitude of bird species, including a significant wintering population of North American warblers and a mixed wading bird rookery. The submarine canyon at the mouth of Salt River Bay provides habitat for deep water corals, sponges, and fishes. Also, the bay is geologically significant as an illustration of mixed carbonate and clastic sedimentation processes.
Description:	This 690-acre (280-ha) site contains Salt River Bay, including Sugar Bay and Triton Bay. Together the bays encompass a variety of tropical marine and terrestrial ecosystems. It includes mature and almost totally undisturbed mangrove forests, and one of the last remaining stands of the large Swamp Fern. The area contains a most significant, high energy tropical reef system and a biologically rich submarine canyon that has become the principle biological study site for the National Undersea Research Program, supported by NOAA.
Threat or Damage:	<p><u>Source Activities</u></p> <p>proposed commercial development proposed dredging and channelization possible increased visitor use</p> <p><u>Resource Impacts</u></p> <p>ECOSYSTEM--destruction of mangrove ecosystem by human activity WATER--alteration of coastal processes, degradation of water quality</p>

VEGETATION--removal and alteration of native species
composition

WILDLIFE--loss of habitat

Summary

Private development of the eastern shore of Salt River Bay has been proposed and a CZM Permit has been provided to the developer, Sugar Bay Land Development, Ltd. for the construction of a 288-room hotel, 300 condominiums, and a 157-slip marina, including dredging of a 65-foot wide channel to a minimum depth of 8 to 9 feet, at Judith Fancy site.

Secondly, owners of the Salt River Marina, at the mouth of Sugar Bay, have proposed the construction of 88 to 100 condominiums and support facilities.

Thirdly, the proposed Columbus Bay Marina development includes a 400-slip marina, hotel and condominium complex, all within the Sugar Bay floodplain. This development would require the dredging of a channel directly through the heart of the Sugar Bay mangrove system.

At least three additional developments have been proposed along the Salt River shoreline. The potential impacts from any one of these projects can seriously threaten the ecological integrity of the whole system. Each new development would include new access routes and create disturbances that cannot help but increase the pollution of the bay and its fragile ecosystem.

Current Situation:

The Sugar Bay Land Development, Ltd. permit was appealed by the St. Croix Environmental Association (SEA). That appeal was denied by the Board of Land Use Appeals, and a second appeal was also denied. An appeal is presently awaiting a hearing date in U.S. District Court. No response has been received from the Corps of Engineers regarding the developer's request for the necessary permit for the dredging and marina parts of this project. Several national and local conservation associations and concerned citizen groups are assisting with this suit by filing amicus curias briefs in U.S. District Court.

Because several actions by the Salt River Marina developers were taken without all the required permits, (even though they received a CZM permit) their new construction project is on hold. More specifically, Salt River Marina received a CZM permit to construct a pier.

The pier was contracted before the Army Corps of Engineers could issue their permit. Since it is non-permitted construction, the Corps is considering whether to ask for its removal.

Developers of the Columbus Bay Marina are preparing an Environmental Assessment Report (EAR) but this project may have been postponed or dropped.

A new development, called Columbus landing Marina, was reviewed by CZM on Sept. 24, 1987. A decision is still pending due to the failure of the CZM committee to obtain a quorum by their decision deadline.

NPS, USFWS, NMFS, NPCA, NWF, SCLDF, VILWV, VICS, VIDFW, VIDEF, VIAS among others have recommended against approval of permits for most or all proposed development or expansion of existing commercial facilities within Salt River Bay. USACCE appear unlikely to issue 404 permits for water - related activities on the Bay.

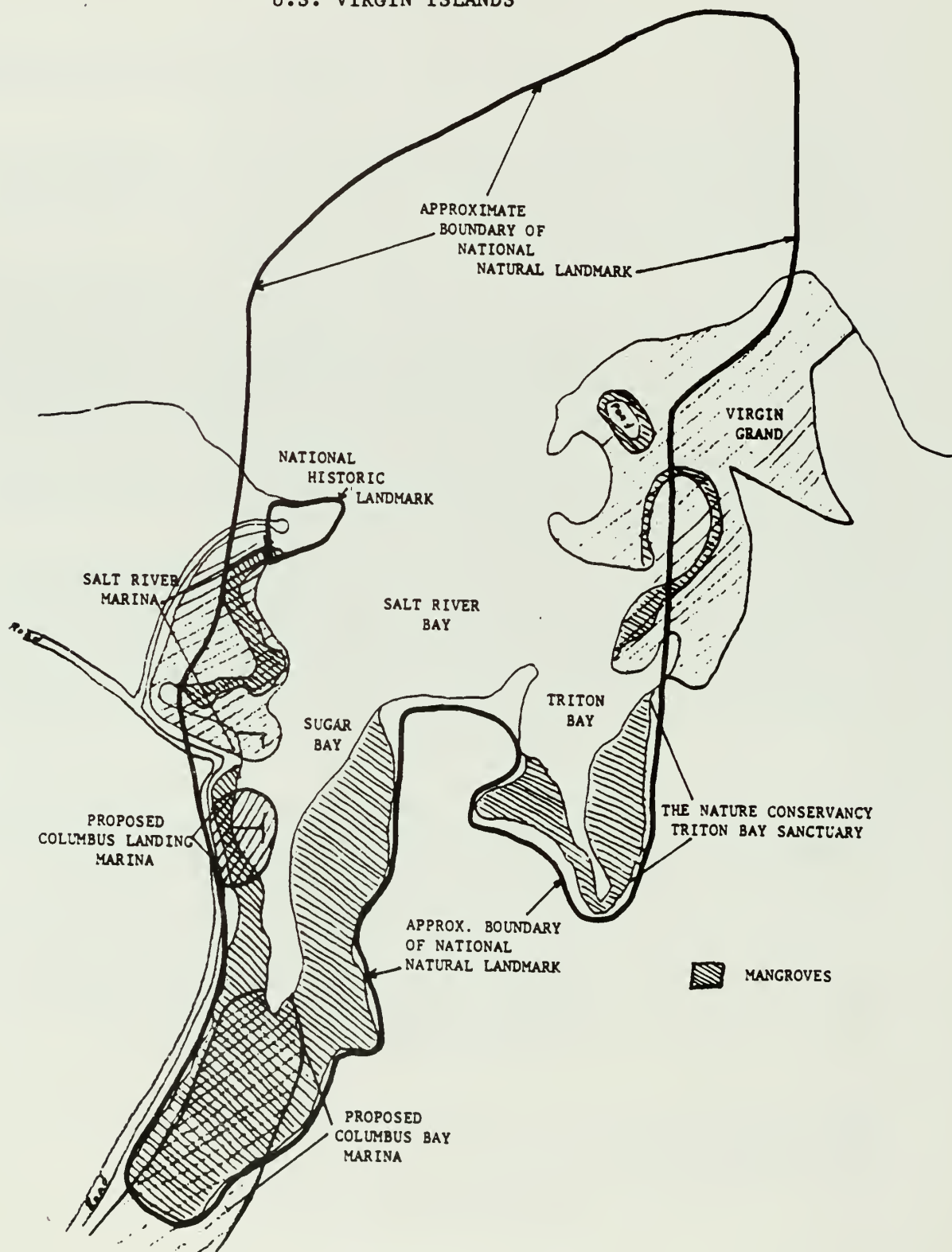
An attached diagram will assist in identifying the location of some of these projects in relationship to the NNL.

**Recommended
Action:**

If the Army Corps of Engineers or the CZM elects to prepare a full Environmental Impact Statement, it should acknowledge the existence and location of the national natural landmark and should assess the potential impact of the proposed developments upon the values for which the site was designated. In spite of this potential action, CZM should comply with their responsibilities to protect Salt River resources.

All possible effort should be made to emphasize to the Governor of VI, Legislature of VI, and to the VI Delegate to Congress the vital importance of preserving this NNL for its valuable natural resources and its historical and archeological value on a local, regional and national scale. Consideration should be given to extending the boundaries of the national historic landmark (5 acres on west shore) to include the entire region of the entrance to the Bay, including approximately 10-15 acres on the east shore at "Cabo de las Flechas" or "Cape of Arrows."

PROPOSED DEVELOPMENT PROJECTS IN
SALT RIVER AND SUGAR BAY NATIONAL NATURAL LANDMARK,
U.S. VIRGIN ISLANDS



U.S. Virgin Islands

Name:	SANDY POINT
Location:	St. Croix
Ownership:	Federal (U.S. Fish and Wildlife Service)
Designation:	June 1988
Section 8 Listing:	None
Significance:	The site is the most heavily used nesting site in the U.S for the leatherback seaturtle, a federally endangered species and one of eight known regularly used nesting sites in the world. It is the only extensive sandy scrub habitat in the Virgin Islands (both U.S. and British) except for that found on Anegada. It contains the longest beach in the U.S. Virgin Islands and supports the third highest avian species diversity of all other habitat types on St. Croix. The particular combination of plant communities found on Sandy Point are unique in the U.S. Virgin Islands.
Description:	The 600-acre site consists of sand spits which enclosed the Westend Saltpond. Inland from the beach is an area of littoral and shrub woodland, including seagrape <u>Coccoloba uvifera</u>), Acacia (<u>Acacia tortuosa</u>), tan tan (<u>Leucaena glauca</u>), wild sage (<u>Lantana involucrata</u>), and others. Beach plants include beach grass (<u>Sporobolus virginicus</u>) and sea pursland (<u>Sesuvium portulacastrum</u>). <u>Manchenil</u> (<u>Hippomane mancinella</u>), Mampoo (<u>Pisonia sp.</u>) and pipe organ cactus (<u>Cereus eyeeni</u>) are present. Westend Saltpond is ringed by white mangroves (<u>Laguneularia recemosa</u>), buttonwood (<u>Conocarpus erectus</u>) and black mangrove (<u>Avicennia nitida</u>). Ground-nesting birds include the white-cheeked pintail (<u>Anus bahamenis</u>), a Regional Species of Special Emphasis and locally threatened, the Wilson's Plover (<u>Charadrius wilsonia</u>) and the black-necked stilt (<u>Sterna antillarum</u>), a National Species of Special Emphasis and locally threatened.
Threat:	<u>Source Activities</u> Off-road vehicles <u>Resource Impacts</u> WILDLIFE - potential disruption of breeding.

Summary:

A continuing increase in recreational use of the site can partially harm wildlife populations. Especially harmful is the use of off-road vehicles.

Current Situation:

At several locations within the refuge, ground-nesting birds are found in small numbers. The operation of ORV's through these areas causes abandonment of the area for nesting or, if nests have already been started, egg or chick mortality. These species affected are Wilson's Plover (Charadrius wilsonia), Black-necked stilt (Himantopus mexicanus), and least tern (Sterna antillarum).

Recommendations:

If these bird ground-nesting locations were properly posted and entrance roads adequately blocked off, breeding success of these ground-nesting bird species could improve. The U.S. Fish and Wildlife Service should sign and block off these areas.

U.S. Virgin Islands

Name:	VAGTHUS POINT
Location:	St. Croix
Ownership:	Private
Designated:	February 1980
Section 8 Listings:	None
Significance:	The site is the best location in the Virgin Island for Upper Cretaceous fossils. Fossils of rudists (bizarre pelecypods) are especially noteworthy, which are rare in the Caribbean. It is the only known site in the world where two specific rudist genera are found together.
<u>Description:</u>	This 20-acre site is a steep rock cliff at a headland. At least twelve species of rudists have been found, which existed during the Late Jurassic to the Late Cretaceous (160-65 million years bp). Fossils here have been dated at 65-70 million years bp. It is one of the best paleontological age guides available to geologists in the Caribbean. The site became internationally known as a result of a 1986 geological map prepared for St. Croix which focused on Vagthus Point, which became the best compilation of geological information for the island.
Threat:	<u>Source Activities</u> development collecting <u>Resource Impacts</u> GEOLOGIC/PALEONTOLOGIC RESOURCES - specimen collecting, specimen destruction <u>Summary</u> The continuing collection of fossils by unqualified persons will degrade the site as a valuable study area. The construction of proposed condominiums on the north and west sides of the site will cause a loss of this sector for future study. The continuing collection of fossils will possibly cause the loss of unique specimens of rudist species.

Current Situation: CZM permits have been approved for condo/villas to be built on the eastern slope of the point. The property is presently zoned R-3, medium density residential. The developers are willing to cooperate in protecting the site.

Recommended Actions: A qualified person should be present during any construction on the point, and be allowed to collect and preserve fossils unearthed. Future collecting should be limited to individuals or institutions engaged in research on rudists. Exposures in the southern tip should have easy public access forever, possibly through covenant. Amateur collecting should be eliminated or well supervised. A boundary review of the NNL is needed.

	Vermont
Name:	MOLLY BOG
Location:	Lamoille County
Ownership:	State, private
Designation:	May 1973
Section 8 Listings:	None
Significance:	The site is a classic example of a small, early successional unspoiled cold northern bog.
Description:	The 110-acre site contains a bog pond surrounded by a sphagnum moss floating mat. This is surrounded by a semi-open relatively dry bog with scattered low black spruce and tamarack forest.
Threat:	<u>Source Activities</u> timbering <u>Resource Impacts</u> WATER — potential water flow disruption <u>Summary</u> Logging and field reclamation is occurring just outside of the south and southeast boundary of the NNL. This appears to be altering the surface water flow patterns and is causing erosion.
Current Situation:	The Vermont field office of The Nature Conservancy is working with the University of Vermont to acquire additional land around Molly Bog to act as a buffer and to be included in the University's Molly Bog Natural Area. It is possible current clear cutting could expand to other areas outside the NNL boundary.

**Recommended
Actions:**

Logging and field reclamation activity outside the NNL boundary should be stopped through negotiation, easement, or land purchase.

Virginia

Name:	VIRGINIA COAST RESERVE
Location:	Accomack and Northampton Counties
Ownership:	Private
Designation:	March 1979
Section 8 Listings:	1986-1987
Significance:	This site is the most extensive, least altered barrier island-lagoon complex remaining along the Atlantic coast of North America. It is extremely valuable as a refuge for migratory shorebirds and waterfowl, as well as for colonial nesting birds.
Description:	This 35,000-acre site consists of a mosaic of 13 barrier islands, saltmarsh, lagoons, and mudflats, all in relatively undisturbed condition. It comprises the majority of the barrier island system of Virginia and contains an excellent representation of all the various vegetative communities once occurring on many barrier islands from North Carolina to New Jersey before human settlement.
Threat or Damage:	<p><u>Source Activities</u></p> <p>residential development increased visitor use-- boating traffic and OHV use</p> <p><u>Resource Impacts</u></p> <p>VEGETATION--destruction of dune--grassland complexes WILDLIFE--potential disturbance of nesting bird colonies</p> <p><u>Summary</u></p> <p>The northern two-thirds of Cedar Island, which is largely privately owned, is presently being subdivided into cross-island strips for second home development. Besides the destruction of dune-grassland complexes and maritime thickets during house construction, development will result in increased vehicular traffic on the dunes and beaches, which would impact colonial nesting birds such as the little tern and Wilson's and piping plovers, all three candidates for endangered species status.</p> <p>In addition, a developer has acquired a 900-acre tract on the mainland near Quinby, Virginia, for a recreational vehicle campground. Use of the campground may soon</p>

reach 2,000 persons a day and could go as high as 6,000-7,000. This high concentration of campers is likely to increase boat traffic to the islands, located approximately 8 miles across the bay, which could interfere with the breeding success of birds that nest on the beach or in low rookeries. Such species include piping and Wilson's plovers; little, common, and royal terns; black skimmers; and common egrets. Hog Island, the nearest island, likely will be the one most affected. Although the island can be posted, boaters have the right to beach below the high-water mark, and so it is expected that enough people will land there or boat nearby to threaten the bird populations.

Current Situation:

To date, approximately 69 plots on Cedar Island have been sold ranging in size from 2-9 acres. Potential plans include marina facilities, both on the island and the adjacent mainland. At Quinby, the developer so far has constructed a pool, golf course, snack bar, office, and about 12 cabins, with plans for about 20 more. A harbor with boat slips and a ramp have also been constructed. Boat traffic from the campground so far has been modest, and no impacts have yet been observed. The developers of Cedar Island have agreed to turn over about 1100 acres of Cedar Island to the U.S. Fish and Wildlife Service as a refuge.

**Recommended
Actions:**

Bird populations should be monitored closely for signs of disturbance. Campers and local residents should be encouraged to land away from the vicinity of nesting colonies.

West Virginia

Name: **CANAAN VALLEY**

Location: Tucker County

Ownership: Private

Designation: December 1974

Section 8 Listings: Since 1977

Significance: The area contains a diverse assemblage of relict northern boreal communities seldom found in the eastern United States and unique at this latitude with respect to size, elevation, and diversity.

Description: A 15,000-acre site in the northern portion of Canaan Valley, which, at an elevation of 3,200 feet, harbors a diverse assemblage of northern boreal relict species.

Threat or Damage: Source Activities

proposed dam and reservoir construction
residential and commercial development

Resource Impacts

WATER--potential permanent flooding of valley; pollution
VEGETATION--potential destruction of boreal
communities

Summary

Inundation of 7,200 acres of the valley by the proposed Monongahela Power Company dam and reservoir remains an uncertain possibility.

In addition, on the southern boundary of the landmark, the construction of two vacation resorts threatens its natural integrity. A State ski slope has opened in the valley; a private ski slope has been proposed for expansion; and second homes continue to be constructed.

Current Situation: Although the Corps of Engineers denied a Section 404 dredge-and-fill permit for the dam in July 1978 on account of the wetland loss that would result, the matter still

remains in court. In addition, the U.S. Fish and Wildlife Service proposed that the area be designated a National Wildlife Refuge in an Environmental Impact Statement completed in June 1979.

Recommended
Actions:

Until litigation regarding the dam is settled, the landmark will be considered threatened by the proposed project.

Regarding other development, the principal preservation tool available to the National Natural Landmarks Program is the owner agreement, whereby landmark owners voluntarily agree to protect the natural features for which the site was designated. Because many privately owned tracts compose Canaan Valley, however, the likelihood of obtaining owner agreements for them all remains rather slim.

Wisconsin

Name:	KICKAPOO RIVER NATURAL AREA
Location:	Vernon County
Ownership:	Federal (U.S. Army Corps of Engineers), State
Designation:	May 1975
Section 8 Listings:	1977-1980 and annually since 1983
Significance:	This complex geological area contains entrenched meanders, seeping sandstone cliffs, and limestone-capped ridges. Those features support a variety of micro-habitats comprising a highly diverse ecological area that includes 10 different plant community types, more than 600 individual plant species, more than 30 relict, rare, threatened, or endangered plant species, and more than 100 species of breeding birds.
Description:	A 5,795-acre site containing sandstone cliffs, entrenched river meanders, and diverse plant life.
Threat:	<p><u>Source Activities</u></p> <p>dam and reservoir construction</p> <p><u>Resource Impacts</u></p> <p>WATER--potential permanent flooding of site VEGETATION--potential destruction of rare species</p> <p><u>Summary</u></p> <p>Construction of the LaFarge Dam has proceeded throughout many years, and to date has included completion of the left abutment embankment, the intake collar for the pool, and a low-flow conduit, as well as the relocation of State Highway 131. The Federal Highway Administration is now proposing a continuation of that relocation in the vicinity of Wildcat Mountain State Park. No closure of the valley has yet occurred, however. If the dam were completed, about half of the landmark would be flooded where rare plants associated with sandstone bluffs occur, including one species on the Federal list of threatened plants.</p>
Current Situation:	Construction of the LaFarge Dam was halted on account of its environmental impacts. A report prepared by the Corps of Engineers in November 1984 concluded that construction of either a dry dam or a wet dam would be economically

unfeasible; accordingly, it recommended that no further funds be spent on the dam. The report acknowledged the national natural landmark, although it did not discuss impacts in specific detail, since its purpose was to address fish and wildlife mitigation needs.

The Corps submitted these recommendations to the Congressional Committee on Environment and Public Works on August 2, 1985, but no further action has occurred. The Corps is not currently conducting any studies on the LaFarge Dam Project, and no further studies are anticipated.

Both the Wisconsin Department of Natural Resources (DNR) and the Governor are opposed to the project because of predicted adverse environmental impacts on the scenic and biological resources at the site and the predicted poor water quality of the reservoir. In fact, the Wisconsin DNR has prepared a park plan for the Corps property, should the DNR ever acquire it, but there is local opposition to the plan. The long-range question of disposal of the property by the Corps, if the dam is deauthorized, therefore, remains unanswered.

Regarding the further relocation of State Highway 131, the State has awarded a contract to a consultant for preparation of an Environmental Impact Statement (EIS) that will consider various alternatives.

**Recommended
Actions:**

The site will be considered threatened until Congress officially deauthorizes the project. In addition, the EIS for the relocation of State Highway 131 should acknowledge the existence and location of the national natural landmark and should assess the potential impacts of the proposed project on the values for which the site was designated.

APPENDIX:

1. CLASSIFICATION SCHEMES FOR RESOURCE IMPACTS AND SOURCE
ACTIVITIES CAUSING THOSE IMPACTS
2. STATISTICAL SUMMARY OF THE 1988 REPORT

CLASSIFICATION SCHEMES

I. RESOURCE IMPACTS

A. Water resources

1. degradation of water quality by:
 - a. organic wastes
 - b. inorganic wastes
 - c. salts
 - d. hydrocarbons
 - e. garbage/refuse disposal
 - f. radioactive waste
 - g. hydrothermal pollution
 - h. siltation
 - i. eutrophication
 - j. disease organisms
 - k. mining wastes
 - l. acidification
 - m. multiple or unknown agents
 - n. other
2. alteration of water table:
 - a. permanent flooding
 - b. permanent drainage or extraction
 - c. periodic fluctuation
3. alteration of stream flow:
 - a. alteration of channel configuration
 - b. discharge manipulation
 - c. disruption of drainage network
4. alteration of coastal processes
 - a. interruption of longshore transport
 - b. interruption of tidal flow
 - c. disruption of current patterns
5. other

B. Air

1. degradation of air quality by:
 - a. visible pollutants (particulates)
 - b. non-visible pollutants
2. odors
3. other

C. Geologic/Paleontologic Resources

1. alteration of soil or sediment chemistry by:
 - a. organic pollution
 - b. inorganic pollution
 - c. salts
 - d. hydrocarbon pollution
 - e. radioactive pollution
 - f. leaching, loss of soil nutrients
 - g. burning
 - h. other
2. structural alteration
 - a. soil compaction

- b. fracturing; shattering
 - c. slump, slide, or debris flow
 - b. faulting
 - c. seismic disruption
 - d. beach erosion and redeposition
 - e. other
- 3. extraction or removal
 - a. surficial erosion
 - b. surficial defacing
 - c. specimen collecting
 - d. surficial extraction (strip mine, etc.)
 - e. subsurface extraction (drilling, mine shaft, etc.)
- 4. other

D. Vegetation

- 1. large-scale removal or complete destruction
 - a. one-time removal/destruction
 - b. periodic removal and replanting
- 2. degradation
 - a. chemical contamination (air pollution, herbicide)
 - b. physical destruction (trampling, etc.)
 - c. biological (infestation, browsing, grazing)
- 3. alteration of characteristic species composition
 - a. succession by non-native plant species
 - b. acceleration of natural succession
- 4. disturbance or removal of rare, threatened, or endangered species
- 5. other

E. Wildlife

- 1. alteration of population numbers
 - a. overpopulation
 - b. underpopulation
 - c. destruction of population
- 2. alteration of population dynamics
 - a. disruption of migration patterns
 - b. disruption of breeding patterns
- 3. disturbance of individuals
 - a. harrassment
 - b. destruction
- 4. disturbance or removal of rare, threatened, or endangered species
- 5. other

F. Entire ecosystem

- 1. inundation by flooding
 - a. permanent
 - b. periodic
- 2. wetland drainage
- 3. burial
- 4. destruction by natural process
- 5. destruction by human activity
- 6. other

II. SOURCE ACTIVITIES

A. Construction/operation of structures

1. residential
2. commercial
 - a. ski resort
 - b. other
3. recreational
 - a. visitor information centers
 - b. foot path, trail, bike path
 - c. other
4. industrial
 - a. chemical plant
 - b. oil refinery
 - c. other
5. utilities
 - a. powerline
 - b. pipeline
 - c. power plant
 - d. sewage treatment plant
 - e. water treatment plant
 - f. other
6. transportation facilities
 - a. road or highway
 - b. railroad
 - c. other pathway for vehicles
 - d. bridge
 - e. airport
 - f. other
7. other

B. Water projects

1. impoundment structures
 - a. dam and artificial reservoir
 - b. other flood control structure
2. channel engineering
 - a. stream channelization
 - b. channel dredging
 - c. canal or other artificial waterway
 - d. associated road construction
3. ditching and diking
4. coastal fortifications
 - a. rip-rap
 - b. groins
 - c. jetty or breakwater
5. other

C. Agricultural/forestry activities

1. agricultural use
 - a. conversion of land to agriculture
 - b. agricultural irrigation
 - c. insecticide/herbicide spraying

- d. use of fertilizers
- 2. forestry practices
 - a. logging; single event
 - b. repeated logging
 - c. tree farm
- 3. livestock use
 - a. grazing/trampling by domestic livestock
 - b. livestock-feces
- 4. associated by-products of agricultural and forestry practices
 - a. runoff, siltation, or erosion
 - b. associated road construction
- 5. other

D. Exploration/extraction of geologic resources

- 1. exploration or extraction
 - a. coal
 - b. oil/gas
 - c. minerals, ores
 - d. rock materials
 - e. geothermal
 - f. placer
 - g. sand and gravel; cinders
 - h. peat
 - i. other
- 2. associated by-products of exploration or extraction
 - a. spoil deposition
 - b. acid mine drainage
 - c. runoff from quarry or mining operations
 - d. associated roads and/or staging areas
 - e. other
- 3. abandoned mining operations
- 4. other

E. Visitor use

- 1. modes of travel
 - a. trail use by hikers or horses
 - b. off-trail use by hikers or horses
 - c. off-road vehicle (ORV)/all-terrain vehicle (ATV) use
 - d. boating, air-boats
- 2. camping; camp-fire building
- 3. vandalism, littering
- 4. arson
- 5. wildlife harrassment
- 6. hunting, poaching
- 7. specimen collecting
- 8. other

F. Waste disposal and resource contamination

- 1. dumpsite location
 - a. hazardous
 - b. non-hazardous

- c. nuclear dump-site characterization (DOE)
- 2. other waste disposal
 - a. hazardous
 - b. non-hazardous
- 3. acid precipitation/deposition
 - a. near-source (<50 km)
 - b. far-source (>50 km)
- 4. oil spill
- 5. urban run-off
- 6. other non-point-source pollution
- 7. other

G. Military activities

- 1. weapons testing
 - a. nuclear
 - b. non-nuclear
- 2. military facility siting
- 3. military exercises
 - a. ground maneuvers
 - b. aircraft overflight
- 4. other

H. Physical processes

- 1. fire
- 2. wind erosion
- 3. hydrologic systems
 - a. flooding
 - b. drainage
 - c. siltation; sedimentation
 - d. surficial erosion or gullyng
- 4. landslide
- 5. snow avalanche
- 6. earthquake
- 7. fault movement
- 8. volcanic eruption
- 9. tsunami
- 10. other

I. Weather phenomena

- 1. wind storm; tornado
- 2. precipitation-related conditions
 - a. drought
 - b. excessive precipitation
 - c. unnatural effects of cloud-seeding
- 3. temperature extremes
- 4. other

J. Ecological processes

- 1. floral processes
 - a. native plant succession

- b. introduction/invasion of exotic vegetation
 - c. eutrophication
- 2. wildlife dynamics
 - a. introduction/invasion of exotic animals
 - b. feral animals
 - c. overpopulation
- 3. pestilence
 - a. insect infestation (Gypsy Moth, etc.)
 - b. plant disease
 - c. animal disease
- 4. other

K. Unknown

L. Other

STATISTICAL SUMMARY OF THE 1988 REPORT

1988 STATISTICS

335 (57%) of the total 586 national natural landmarks were investigated by the National Park Service.

38 (6%) of the total 586 national natural landmarks are listed as threatened or damaged in the 1988 report.

Comparison with previous reports

22 (58%) of the 38 national natural landmarks listed as threatened or damaged in this year's report were also listed in the 1987 report.

23 (61%) of the 38 national natural landmarks listed as threatened or damaged in this year's report were also listed in any of the previous 5 year's reports.

8 (21%) of the 38 national natural landmarks listed as threatened or damaged in this year's report have been listed every year since 1977.

12 (32%) of the 38 national natural landmarks listed as threatened or damaged in this year's report have never been listed before.

6 (16%) of the 38 national natural landmarks listed in the 1987 report were determined to be no longer threatened or damaged and have been omitted from this year's report.

Tables following

- Listing by State
- Listing by National Park Service Region
- Listing of NNLs Removed from the 1988 Report
- Listing of NNLs Added to the 1988 Report

This usually means an onsite visit by an NPS employee, or patron acting on behalf of NPS. It also sometimes includes people providing information to NPS, such as the site manager, via telephone inquiry.

1988 NNL STATUS REPORTS SUBMITTED BY STATE

<u>STATE</u>	<u>NUMBER OF NNLs</u>	<u>STATUS REPORTS SUBMITTED</u>	<u>PERCENT SUBMITTED</u>
Alabama	7	6	85.71
Alaska	17	0	0
American Samoa	7	7	100.00
Arizona	9	8	88.88
Arkansas	5	5	100.00
California	34	26	76.47
Colorado	11	3	27.27
Connecticut	7	2	28.57
Delaware	0	0	0.00
Florida	18	6	33.33
Georgia	12	0	0
Guam	4	4	100.00
Hawaii	7	7	100.00
Idaho	11	8	72.72
Illinois	18	15	83.33
Indiana	29	29	100.00
Iowa	7	7	100.00
Kansas	5	5	100.00
Kentucky	6	2	28.57
Louisiana	0	0	0.00
Maine	15	9	60.00
Maryland	5	2	40.00
Massachusetts	11	6	54.00
Michigan	12	12	100.00
Minnesota	7	7	100.00
Mississippi	5	1	20.00
Missouri	16	11	68.75
Montana	10	7	70.00
Nebraska	4	4	100.00
Nevada	6	5	83.33
New Hampshire	11	3	27.27
New Jersey	11	1	9.09
New Mexico	12	6	50.00
New York	26	9	34.61
North Carolina	13	7	53.84
North Dakota	4	1	25.00
Ohio	23	23	100.00
Oklahoma	3	2	66.67
Oregon	6	3	50.00
Pennsylvania	25	7	28.00
Puerto Rico	5	3	60.00
Rhode Island	1	0	0.00
South Carolina	6	2	33.33
South Dakota	13	4	30.76
Tennessee	13	8	61.53
Texas	19	13	68.42

Utah	4	0	100.00
Vermont	11	2	18.18
Virginia	10	3	30.00
Virgin Islands	7	5	71.43
Washington	17	4	23.52
West Virginia	15	4	26.66
Wisconsin	18	16	94.11
Wyoming	<u>8</u>	<u>5</u>	<u>62.25</u>
 TOTAL	 586	 335	 57.16

1988>NNL STATUS REPORTS SUBMITTED BY NPS REGION

<u>NPS Region</u>	<u>NUMBER OF NNLS</u>	<u>STATUS REPORTS SUBMITTED</u>	<u>PERCENT SUBMITTED</u>
Alaska	17	0	00.00
Mid-Atlantic	54	16	29.62
Midwest	140	130	92.85
North Atlantic	93	32	34.40
Pacific Northwest	34	15	44.11
Rocky Mountain	50	20	40.00
Southeast	92	39	42.39
Southwest	40	26	55.00
Western	<u>66</u>	<u>57</u>	<u>86.36</u>
 TOTAL	 586	 335	 57.16

SITES ON THE 1987 SECTION 8 REPORT
BUT REMOVED FROM
THE 1988 SECTION 8 REPORT

Attwater Prairie Chicken Preserve, Texas

The 36-inch diameter pipeline, known as the "All American Pipeline", was proposed to convey liquid petroleum products from California to the Houston, Texas area. Both construction of the pipeline, which include blasting and dredging, and possible oil leaks or major spills during operation, posed a threat. Final construction of the pipeline in part of Texas was on hold pending completion of a supplemental Environment Impact Statement (EIS), which would consider an extended right-of way and two alternative routes away from the landmark. The Bureau of Land Management (BLM), the lead agency, completed the final supplemental EIS in late 1987. BLM's Record of Decision, as required by NEPA, indicates one of the alternative routes away from the landmark was selected. Therefore, the situation is no longer a threat.

Caverns of Sonora, Texas

Same as above

Ezell's Cave, Texas

Same as above

Little Blanco River Bluff, Texas

Same as above

Tionesta Scenic and Research Natural Areas, Pennsylvania

The area was hit by a tornado on May 31, 1985. As a result, approximately 800 acres of timber in the Scenic Area were leveled. The Research Natural Area was not damaged. Forest Service managers permitted only existing roads and pipelines to be cleared of fallen timber. They plan to leave the other fallen timber as is, and provide interpretation of this natural disaster. The tornado did not significantly alter the significance of the site. It was stated in the 1987 Section 8 Report that this would be listed as damaged that year only, and neither would the site be dedesignated nor will the boundaries be revised. Therefore, this site was removed from this 1988 Section 8 Report.

SITES ADDED TO THE 1988 SECTION 8 REPORT

Newsome Sinks Karst Area, Alabama
Morrison Fossil Area, Colorado
Big Cypress Bend, Florida
Wauconda Bog Nature Preserve, Illinois
Cabin Creek Raised Bog, Indiana
Lynnfield Marsh, Massachusetts
Gay Head Cliffs, Massachusetts
Crall Woods, Ohio
Dysart Woods, Ohio
Mentor Marsh, Ohio
White Pine Bog Forest, Ohio
Hawk Mountain Sanctuary, Pennsylvania
Reelfoot Lake, Tennessee
Green Cay, US Virgin Islands
Sandy Point, US Virgin Islands
Vagthus Point, US Virgin Islands
Molly Bog, Vermont

