

PROJECT SUMMARY

Applicant Organization: Illinois Department of Natural Resources, in cooperation with the Illinois State Geological Survey and the Illinois Natural History Survey

Project Title: Recovery Act - Restoring the Adeline Jay Geo-Karis Illinois Beach State Park Ecosystem

Site Location: nearest community - Winthrop Harbor, Illinois
approximate center of project area - 42°28'12"N, 87°48'17"W

Landowner: Illinois Department of Natural Resources **Agency Contact:** Glen Kruse (217)785-8691; glen.kruse@illinois.gov

On-the-Ground Implementation Start Date: 30 days after grant award

Number and types of jobs created or maintained, labor hours and anticipated duration for each:

Code	Business Activity	Labor Hours	# of People Employed on Grant Activities	Grant Funds Allocated to the Business Activity
212321	Construction Sand and Gravel Mining	50000	42	\$2,809,542
237990	Other Heavy and Civil Engineering Construction	91500	66	\$4,389,892
238910	Site Preparation Contractors	5500	8	\$532,875
541620	Environmental Consulting Services	12000	19	\$626,560
541990	All Other Professional, Scientific, and Technical Services	6500	3	\$205,090
611310	Colleges, Universities and Professional Schools	7680	3	\$286,000
	TOTALS	166680	138	\$8,849,959*

* - this total does not equal the total project cost because A/E fees have not been included in this table

Coastal and marine habitats to benefit from the project: This project will protect, restore and enhance 812 acres of nationally declining palustrine wetland, 67 acres of globally significant panne wetlands, and 1,136 acres of wet-mesic and dry-mesic sand prairie habitat. This site also includes habitat for two federally listed plant species (Eastern Prairie Fringed Orchid and Pitchers Thistle), nesting and foraging areas for two federally listed animal species (Piping Plover and Karner Blue Butterfly), habitat for more than 50 state listed species, such as Blanding's Turtle, sea rocket, longnose sucker, red-veined prairie leafhopper and over 160 migratory coastal avian species of concern including Caspian Tern, Common Tern, Long-tailed Duck, Black Scoter, Willet, Whimbrel, Sanderling.

Project Scope:

Task 1 - Terrestrial habitat restoration

a) Establishment of transects for monitoring; b) Invasive plant species removal using mechanical and chemical methods; c) Native species seedings

Task 2 - Stream restoration

a) Remove concrete debris from Middle Creek; b) Grading and stabilization of banks of Kellogg Creek; c) Removal of invasive species and establishment of native plant community; d) Removal of channel obstructions and installation of in-stream habitat structures

Task 3 - Debris and infrastructure removal

a) Removal of fence that harbors invasive species and inhibits wildlife movements; b) Removal of sub-grade infrastructure from former housing development

Task 4 - Hydrological restoration

a) Removal of beaver dams and trapping of beavers; b) Removal of concrete culverts and debris from Middle Creek

Task 5 - Shoreline restoration

a) Construction of downdrift sand entrapment groin; b) Supply a reservoir of nourishment sand at updrift feeder beach; c) Restoration of lake bottom profile at and near North Point Marina

Task 6 - Shoreline protection

a) Onshore - Construction of revetment; b) Offshore - Construction of submerged breakwater

Task 7 - Monitoring

a) Monitor plant and animal diversity and abundance in restored areas; b) Monitor changes in shoreline and lake bottom extent and elevations; c) Monitor nearshore aquatic biological communities

Project Outputs/Outcomes:

Restoration of native plant communities on 270 acres, including wetland, coastal sand savanna, sand prairie, fen, marsh and rare Lake Michigan panne.

Restoration of 850 feet of Kellogg Creek

Reduced dredging needs at industrial and recreational facilities on the Lake Michigan shore

Restoration of beach width

Protection of rare coastal natural communities from effects of shoreline erosion

Encapsulation of asbestos-containing materials

Improved water quality along a portion of Lake Michigan shore

Redistribution of sand to restore natural shoreline configuration

Enhanced public safety through removal of derelict infrastructure

Project Time Line: (assumes May 1, 2009 grant award)

May 1 - July 1, 2009: advertise and award engineering design contract and contract for removal of invasive plants

June 1, 2009 - March 2011 (intermittent): placement of sand on feeder beach

July - September 2009: monitor existing vegetation transects, install additional transects

July 2009 - March 2010: Complete engineering design and obtain permits

July 2009 - February 2011: invasive plant control

September - October 2009: beaver dam removal

September - December 2009: fence removal

December 2009 - April 2010: prescribed burning for native plant management

April 2010 - May 2010: advertise and award construction contract

June 2010 - April 2011: dredging, sediment testing, and construction of sand trap

August - March 2011: restoration of Kellogg Creek and culvert removal from Middle Creek

Permits and Approvals:

1) The Illinois Department of Natural Resources (IDNR) holds valid permits for dredging at North Point Marina and deposition of sand on the feeder beach; 2) Kellogg Creek restoration will require Corps of Engineers permit and authorization from Com Ed and the Zion Water District; 3) IDNR will consult with U.S. Fish and Wildlife Service on Lyme Grass control for expansion of piping plover habitat; 4) Nature Preserve management schedules will be updated and approved by the Illinois Nature Preserves Commission for all activities within Illinois Beach Nature Preserve and North Dunes Nature Preserve.

Federal Funds Requested and Non-Federal Match Anticipated:

\$10,738,331 federal funds requested; \$210,231 non-federal match anticipated

Overall Project Cost:

\$10,948,562

PROJECT NARRATIVE

The purpose of the project described herein is to restore, enhance and protect the diverse and rare resources at Adeline Jay Geo-Karis Illinois Beach State Park (IBSP) on the Lake Michigan shore in northeast Illinois. IBSP supports a diverse variety of plants and animals because of the site's unique coastal beach ridge and swale topography. The park is recognized as a National Natural Landmark by the U.S. Park Service. The diverse topography and coastal climate also has allowed for the establishment of a wide range of rare natural communities, including some that have been classified as globally significant. Past human activities combined with suppression of stochastic fire events have resulted in the encroachment of invasive herbaceous and woody vegetation into historically open landscapes. These invasive exotic plants have increased shade levels and competition and have contributed significantly to the alteration of natural plant succession, habitat structure, hydrologic function, and floral and faunal species composition. The habitat restoration components of this project will eliminate many of the invasive species at IBSP and restore a more natural hydrology at the park.

Along with the changes that have occurred at IBSP as a result of the factors described above, variation in water levels on Lake Michigan and changes in the pattern of sand movement and deposition along the lake shore have affected the area. An increase in beach erosion has created a real threat that lake waters will breach the dunes near the lake shore and permanently alter or destroy the ridge and swale topography at IBSP and eliminate populations of rare plants and animals. The engineering/construction components of this project will restore sand deposition patterns to their historical norm and assure the continued existence of the topography of the park.

This project will meet the intent of the American Recovery and Reinvestment Act by creating or maintaining diverse types of jobs ranging from engineering services to equipment operators and laborers. Some components of this project, such as invasive species control and final design and planning of structural components, can commence within 60-90 days after grant award, thus bringing employment to the local area in the summer of 2009. All project expenditures will benefit the local economy by using grant funds to employ local contractors, not to pay salaries of employees of the agencies involved.

The long-term economic condition of the area will be enhanced through increased tourism and recreation opportunities at IBSP. The removal of invasive species and derelict infrastructure, along with the restoration of native plant communities and historic beach conditions, will make this popular recreation area more appealing to anglers, hikers, swimmers and other recreational users. Any increase in visitor numbers will benefit the local economy in the years to come through expenditures for lodging, food, fuel and other commodities available from local businesses.

The short-term economic inputs of this project to the local area will be readily measurable through the keeping of records of the labor hours expended on each project component and the types and numbers of workers utilized. Contractors will be required to provide detailed billings which include this information so that full accounting can be provided in progress reports.

IBSP is located on the Zion beach-ridge plain on the southwest shore of Lake Michigan. This is an extensive coastal sand plain that extends for about 18 miles from near Kenosha, Wisconsin on the north, southward to North Chicago, Illinois. This is a complex landscape of alternating dune sand ridges and marshy swales that result in an elongate washboard-like topography. The ridges and swales correspond to successive shorelines of the sand plain as it developed over time (Hester and Fraser 1973; Fraser and Hester 1974; Chrzastowski and Frankie 2000). This diverse topography supports a wide range of natural communities including beach, foredune, coastal sand savanna, sand prairie, fen, marsh, interdunal pond, and panne, a globally rare coastal wetland community.

The Zion beach-ridge plain is a migratory coastal landform. Prior to about 3,700 years ago the entire sand body was located along the southern Wisconsin shore. The entire Illinois portion of the beach-ridge plain has formed over the past 3,700 years (Larsen 1973) as a result of erosion of sand from the northern portions of the landform and accretion on the southern portion.

The natural wave processes that have shaped and moved the Zion beach-ridge plain over the past several thousand years are still operating today removing sand from the beaches of the North Unit. Here long-term shoreline recession rates are as high as 10-feet per year. The sand recycling system proposed (downdrift sand capture and return to updrift feeder beach) will work with the natural sand transport to maintain a balanced sediment budget and thus prevent sustained shoreline recession. A sand supply to the feeder beach at 80,000 cu yards per year is needed for a balanced sediment budget. The wave transport of this sand along the downdrift shore provides the natural shore protection of the inland habitats. Existence of the IBSP habitats is dependent on this balanced sediment budget.

IBSP is divided into North and South Units separated by a strip of land that is part of the City of Zion. The South Unit was established in 1953 and the North Unit was acquired by the Illinois Department of Conservation (now the Illinois Department of Natural Resources) in the early 1970s. Spring Bluff Nature Preserve is owned by the Lake County Forest Preserve District and is located immediately north of the North Unit of IBSP. The North Point Marina, owned by the Illinois Department of Natural Resources, is located at the northeast corner of the North Unit and east of Spring Bluff Nature Preserve. North Point Marina was constructed in the late 1980s.

Only limited commercial activity had occurred in the South Unit of IBSP before it was acquired as parkland. Sand mining created Dead Lake, located on the west margin of the South Unit. The North Unit was more extensively developed, with residential development, commercial enterprises, and industry each using parts of the site. Camp Logan, a former military installation, also was located within the North Unit. Shore erosion was an impetus for residential property owners to sell to the state (Bannon-Nilles 2003).

Shore erosion has continued along the North Unit of IBSP, at times threatening to breach the dunes closest to Lake Michigan. If the dunes are breached, the rare habitat types within IBSP will be at risk of flooding and erosion resulting in severe alteration of habitat conditions. IBSP has been recognized as one of the most important natural areas in the State of Illinois. Large portions of the South Unit were dedicated as Illinois' first nature preserve (Illinois Beach Nature Preserve). Much of the North Unit was later dedicated as the North Dunes Nature Preserve.

Dedication protects the site in perpetuity and legally designates the preservation of natural communities on the site as the highest and best use of the site (525 ILCS 30/1 et seq).

Conditions in the inland portions of IBSP are also influenced by two streams. Kellogg Creek drains into the North Unit of IBSP and the Bull Creek/Dead River drains into the South Unit. Kellogg Creek has a watershed of 8,143 acres and Bull Creek/Dead River drains an area of 10,254 acres. Kellogg Creek and a tributary (sometimes known as Dead Dog Creek) have been channelized since early development of the North Unit. Bull Creek drains much of the towns of Zion, Beach Park and Waukegan. Bull Creek becomes the Dead River once it descends from the uplands in these communities and traverses the sand plain within IBSP. Dead River is an unaltered natural tributary to Lake Michigan and flows through an extensive high-quality coastal wetland complex.

In 1997, a piece of debris found on the beach at IBSP was determined to be asbestos-containing material (ACM). Searches along the beach found additional pieces of ACM (Cali et al. 2006). The ACM was identified as transite which was a common building material used in the 1950s and 1960s for water supply pipes. House siding, floor tiles and roofing material that contained ACM were also found. All of the ACM was non-friable with the asbestos fibers held in a cement matrix.

Searches for ACM have been conducted on a regular basis along the Lake Michigan Beach. Any ACM found by park employees or contractors is properly disposed of. Searches are also conducted after management activities such as prescribed burning or invasive brush removal with any ACM found being removed and disposed of in licensed facilities.

Potential sources of ACM found at IBSP include a Johns-Manville plant located just south of the park. This facility manufactured a variety of building products that contained asbestos. The likely source of the ACM found along the park beach is the former residential development within the North Unit of IBSP. ACM would have been present in the homes in the form of siding, roofing and floor tiles. Underground infrastructure such as water and sewer pipes were not always removed when the homes were demolished, leaving another potential source of ACM intact.

Multiple studies conducted by state and federal health agencies have concluded that the ACM present at IBSP does not pose a public health risk. This has not, however, eliminated all public concern about the presence of ACM. The continuing need to search for and remove ACM from IBSP consumes time and funds that could otherwise be utilized for other needed work at the park.

Long-term protection of the many rare resources at IBSP requires that the historic pattern of shoreline sand erosion and deposition be restored to the greatest extent possible. That pattern has been disrupted by changes in shoreline management and the construction of facilities along Lake Michigan that include shoreline armoring or other structures that alter or impede the movement of sand.

Evaluation of alternatives for accomplishing this restoration was conducted by an Illinois Department of Natural Resources task force in 2001. The conclusion of the task force was that sand artificially supplied to a feeder beach at the north (updrift) end of IBSP and wave transport to the south (downdrift) shore was the preferred coastal management technique. Use of this technique would avoid the construction of breakwaters, revetments or other structures that would permanently compromise the character of the park shoreline if placed along extensive reaches of the shoreline. Since 2001, capture of dredged sand along the downdrift shore and returning it northward has been done to a limited extent. Limited funding and the presence of ACM along the beaches and nearshore have constrained this activity.

The multiple project components described in this proposal will provide a long-term solution to the problems caused by altered sand movement patterns and will protect the resources of IBSP. NOAA Coastal and Marine Habitat Restoration funds will provide the support needed to complete one-time restoration and construction measures. The State of Illinois will then assume the costs of carrying on the necessary movement of sand and continued habitat management.

Description of Project Tasks

Terrestrial Habitat Restoration

Invasion of IBSP by a variety of exotic plant species has had negative effects on native plants and has altered habitats of native animal species. Control or eradication of the invasive plants is needed to restore populations of native species and to allow continued management for those species.

Before chemical or mechanical treatment of an area is initiated, each unit is assessed for sensitivity factors such as soil wetness, weather and presence of endangered, threatened or other sensitive native species. Based on these factors and the species to be controlled, specific control methods, timing and the area of treatment are determined. The use of prescribed fire to remove accumulated plant debris may also be needed on some management units before treatment can begin.

Exotic and invasive brush will be removed from 270 acres by a combination of hand and mechanical means during the winter months when native herbaceous vegetation is dormant and the ground is frozen to avoid disturbance to fragile wetland and sandy soils. Non-invasive native woody species considered to be high quality resources will not be cut. Desirable high quality, conservative woody plants, and state listed woody species will be marked by the project manager to prevent accidental cutting. Disturbance to the substrate or topographic features will not be permitted.

Mechanical clearing will use state-of-the-art cutter heads (e.g., Seppi, Rohwer, forestry cutter), on rubber, track-mounted mowers capable of clearing ½ to 1½ acres per hour. This equipment is designed for low impact on the land and exerts a ground pressure of less than 3.9 psi. This method has been very efficient in avoiding damage to hydric soils and wetland plant communities during several previous IDNR projects.

Portions of the project site deemed “too sensitive” to be accessed by mechanical means due to the presence of a high percentage of desirable woody species, a desirable herbaceous plant community, or wet conditions, will be cleared by hand (loppers, chain saws, or other hand carried equipment).

A time consuming but critically important aspect of this activity is the follow-up with appropriate herbicide application to prevent re-sprouting of the cut stumps. The proposed 270 acres of land cleared of invasive woody species will be treated with the appropriate herbicide following the Illinois Nature Preserves Commission and Nature Conservancy management guidelines. Cut stumps will be treated with a 20% solution of Garlon 4 in basal oil (or a suitable substitute) by Illinois Department of Agriculture Certified Pesticide operators working under a qualified licensed Pesticide Applicator. Foliar application will follow during the growing season to treat missed stumps of for areas where herbicides labeled for use over standing water need to be used.

Pockets of invasive herbaceous species exist throughout the project areas. Contractors will be provided with aerial photos showing locations for each of the target species and target areas will be prioritized by the project manager. Small, outlier populations and populations within, or in close proximity to, high-quality areas will be given highest priority for treatment. Source populations in more degraded areas will also be treated if possible to prevent re-introduction from these areas into more pristine sections of the park via maintenance equipment, animals, visitors, etc. Because in some areas the seed bank may have been accumulating for many years, and some species such as cypress spurge have extensive root systems, several years of follow-up treatment will be necessary. Herbaceous species are treated most effectively with herbicides by hand swiping or spraying, or by using mechanical spaying equipment during the growing season, May-October.

All work to control invasive plant species and restore native plant communities within IBSP, removal of a chain link fence and restoration of Kellogg Creek will be overseen by a Department of Natural Resources Natural Heritage Biologist and/or Natural Heritage Regional Administrator. These personnel possess degrees in natural resource management and have extensive experience in the management of the community types present at IBSP.

Lyme Grass

Removal of the ever encroaching Lyme Grass from the foredune area at IBSP has been identified as a high priority activity. This area of beach front has been designated as Critical Habitat for the federally endangered Piping Plover. Removal of this highly invasive species will significantly expand the potential nesting habitat for this avian species of concern. Consultation with the U.S. Fish and Wildlife Service has been initiated to assure that all invasive species control work in areas suitable for use by piping plovers is done in a manner to avoid disturbance of any plovers that may be present at IBSP during the project period and to avoid adverse effects on the federally-listed Pitcher’s thistle which has been reintroduced to portions of the foredune.

Cattails, Phragmites, Reed Canary Grass

This task will target the removal of monoculture stands of cattails in the rare pannes, as well as phragmites and reed canary grass removal near sedge meadows to prevent the spread of these

exotics into the most pristine wetland areas and restore degraded high quality wetland and wet-mesic prairie communities.

Crown vetch, Sweet clover, and Cypress spurge

The project also aims to prevent the spread of invasive species within unique black oak savanna containing wild lupine; the obligate host plants for the federally endangered Karner Blue Butterfly. The site is considered by the US Fish and Wildlife Service to be a “potential recovery area” for the Karner Blue butterfly, and is under consideration for re-introduction. The quality and extent of lupine habitat at Illinois Beach is sufficient to support a viable Karner Blue population, but infestations of crown vetch, sweet clover, and cypress spurge threaten to reduce species diversity in these upland natural communities and to compete with nectar source species. An area of the North Unit, within and immediately south of the chain link fence has been highly degraded by past development. Invasive brush will be cleared to establish suitable sowing substrate. Once the brush has been removed, a broadcast application of herbicide will be made to reduce invasive species density. This area also encompasses stream bank stabilization work along Kellogg Creek as described below.

Areas from which invasive species have been removed will be seeded with native seed stock as needed, using only local genotype and species already native to the site. Dormant seeding will take place in the fall. Conservative prairie mixes providing 12-13 lbs/acre (85 seeds/sq ft) will cost from \$1,200 to \$1,900/acre. A drop seeder will be used to sow seed over approximately 23 acres. The site will require mowing at least twice during the first growing season to reduce exotic species competition.

Seed purchased and used for this restoration will comply with guidelines for the management of Illinois nature preserves and IDNR policy. Only seed from within a 100-mile radius of IBSP will be used and only species known to occur or to have historically occurred at IBSP will be included in seed mixes.

Long-term management of restored areas will be part of the regular duties of IDNR. Primary means of management will be prescribed burning and continued spot treatment of invasive species that reoccur within IBSP.

Stream Restoration

Kellogg Creek is one of only a very few Illinois streams that flow directly into Lake Michigan. Kellogg Creek has an 11-square-mile watershed, encompassing the communities of Zion and Beach Park, Illinois and Pleasant Prairie, Wisconsin. Kellogg Creek has been listed on the Illinois Environmental Protection Agency 2008 303(d)3 list of restricted stream reaches due to low dissolved oxygen levels. Aquatic surveys in 2005 and 2008 indicate relatively low Index of Biotic Integrity (IBI) scores in Kellogg Creek (17 and 27, respectively). The Lake County Storm Water Management Commission, Lake County Health Department, and Illinois Department of Natural Resources joint report states that low IBI ratings at this site are most likely due to “unstable channel conditions due to urban runoff, combined with the high gradient slope. Installation of BMPs should provide habitat and help stabilize the stream channel, allowing recovery of fish communities.” Kellogg Creek’s direct connection to a

species rich recruitment source, Lake Michigan, should provide rapid reestablishment of fish communities.

Where the stream enters IBSP it exhibits a significant meander pattern, with the channel having roughly 1,300 feet of flow length over a straight-line distance of 975 feet. This stream reach features a dense canopy of invasive trees such as box elder and Siberian elm, with a thick understory of non-native shrubs, including common buckthorn and bush honeysuckles. The dense shade cast by these woody species severely limits the amount of sunlight reaching the ground surface. This shade, in turn, prevents the formation of a dense root mass of grasses and native herbaceous plants that would otherwise help protect streambank soils from erosion and scour, making them less prone to erosion. Current conditions, however, have resulted in severe undercutting, allowing trees to fall into the creek and causing debris blockages that divert streamflows into unprotected streambanks, causing additional erosion. These blockages also impede the passage of anadromous fish species that attempt to migrate upstream to spawn.

Grading and Stabilization of Stream Banks: Kellogg Creek

Kellogg Creek has become highly incised due to exacerbated erosion patterns and highly disturbed plant communities along its stream banks. The steep, incised banks of Kellogg Creek will be graded to create lower slopes and stabilized using best management practices, including rock armoring. A native riparian buffer will be established by planting selected herbaceous and shrub species. The native habitat will in turn provide sediment reduction and wildlife habitat. This work will require the use of a backhoe or similar heavy equipment.

Removal of Channel Obstructions and Installation of In-Stream Habitat Structures

Log jams that obstruct and divert flow in Kellogg Creek will be removed or modified to restore flow and reduce streambank erosion. Approximately 900 linear feet of longitudinal stone toe protection on the outside bends of the stream channel to reduce future streambank erosion will be installed. The installed stone toe practice will be inter-planted with native wetland vegetation to provide water quality and habitat benefits. Up to fifteen (15) “rock riffles” will be installed at selected locations along the project reach to provide stable grade control of the creek as it descends towards Lake Michigan. This will promote development of a pool and riffle sequence suitable for use by a variety of fish and invertebrate species. The streambank slopes will be planted with native wetland / wet prairie species, as well as small native shrubs.

Throughout the work to be done on Kellogg Creek, all necessary erosion control methods will be utilized to minimize the introduction of sediment to Kellogg Creek. A short-lived cover crop will be planted in disturbed areas to help control erosion until permanent native vegetative cover is established.

In order to evaluate the effects of restoration efforts on Kellogg Creek, additional sampling will follow stabilization of the stream reach. In addition to monitoring fish communities, sampling of macroinvertebrates will occur in order to provide additional information on habitat and water quality conditions.

Debris and Infrastructure Removal

An old chain-link fence, about 5,470 feet long with posts embedded in concrete needs to be removed from the Camp Logan natural area at IBSP. This will be done during the dry season August-November 2009. Removal of the fence, posts and concrete will be done with a backhoe. These materials will be hauled off site and will be disposed of in a licensed disposal facility. Invasive brush will be cleared along the fence line to facilitate recovery of native plant communities. Once removed and hauled off site, disturbed areas will be seeded with native seed stock, using only local genotype and species already present on site. Dormant seeding will take place in the fall. Conservative prairie mixes providing 12-13 lbs/acre (85 seeds/sq ft) will cost from \$1,200 to \$1,900/acre. The area of impact is anticipated to be about 1.5 acres. Derelict infrastructure persists in that portion of the North Unit where residences once existed. Prolonged shore erosion has exposed foundations, well casings, and sub-grade utilities. These exposed features are a safety issue and detract from the park aesthetics. Also along the shore are the ruins of former piers built by the U.S. Army at a former training camp. These structures are similarly a safety and aesthetic issue. This restoration effort will remove all existing beach and nearshore relict infrastructure. Disturbed areas will be graded to match existing elevations and contours and seeded with native species.

Hydrologic Restoration

Beaver dams along Dead Dog Creek and Middle Creek have impeded the movement of water through the high-quality wetlands at IBSP. Deep, standing water and an elevated temperature of the water impounded by the dams has adverse effects on the vegetation in sedge meadows and wet sand prairies. At least ten dams will be removed by hand or with equipment such as a backhoe. Beaver trapping has been initiated at IBSP to reduce the number of beavers on the site and consequently minimize the problem of new dams being constructed.

Concrete sewer pipe was installed within the terminal, excavated portion of Middle Creek just prior to exiting into Lake Michigan. These sewer pipes have been frost-heaved to the surface and no longer are in alignment, causing water to back up and flood high quality sand prairie communities. Approximately 12 sections of concrete pipe will be removed (120 feet) and the channel cleared of brush and debris that has accumulated and blocked flow. The remaining sections of pipe are sufficiently buried and serve to convey water under the beach into Lake Michigan. The terminal ends need to be retrofitted with steel grating to prevent public access into the pipes and to facilitate keeping the pipes free of debris.

Shoreline Restoration

Construction of Downdrift Sand Entrapment Groin

This structure will be built along the southern portion of IBSP. The preferred location is near the southern edge of the Johns-Manville property at the eastern projection of Greenwood Avenue. Numerical modeling and wave-tank testing for this structure has been completed by the Iowa Institute of Hydraulic Research at the University of Iowa. An L-shaped groin of 800 to 1,000 feet in length will provide maximum efficiency. For this project, an 800-foot groin is planned. Construction will be carried out both from the shore and from a barge on Lake Michigan.

Restoration of Sand Supply for Beach and Nearshore Transport

Sand will be imported to IBSP and placed at the designated feeder beach at the north (updrift) end of the North Unit. The natural wave-induced transport of sand along the shore will distribute this sand to the downdrift beaches. Sand will be delivered to the feeder beach by truck from a local sand pit and distributed onto the feeder beach with front loaders. A total of 333,333 cubic yards of sand will be supplied. The IDNR has all necessary permits in hand for placing this feeder beach sand. There is a possibility that non-native species of plants will be introduced with the imported sand, although this problem is not likely to be severe because the sand will come from subsurface reserves that typically do not harbor a diverse seed bank. As part of the ongoing habitat management at IBSP, there will be regular surveillance of the beach to detect any introduced plant species. If non-native or invasive species are found, they will be controlled using approved herbicides applied by licensed applicators.

Restoration of Lake-Bottom Profile at and Near North Point Marina

Construction of North Point Marina in 1986-1987 resulted in the introduction of a partial barrier to littoral transport. Pre-construction assessment identified the need to periodically remove sand trapped on the updrift side of the marina. Such work has never been done. Twenty years of sand entrapment has created a broad, low-slope beach and nearshore with reduced wave action and serious water-quality issues. Persistent below-average lake levels in recent years have compounded the shoaling problems. Restoring the lake-bottom profile to 1988 conditions is essential. All accumulated sand will be removed and returned to the littoral transport downdrift of the marina. Lake-bottom restoration is also needed at the marina entrance and entire marina lakeward perimeter. All sand will be transferred to the downdrift shore. Bathymetric data for 1988 provides base line depths to be reestablished. A total of 225,000 cubic yards needs to be removed from all accumulation areas on the margin of North Point Marina (Chrzastowski 2003). This work will be done with an offshore clam shell dredge. Removed sand will be taken by barge to just off the feeder beach and dumped. Land-based excavation at North Beach with front-loaders and trucks will be evaluated as a means to assist in the beach excavation.

Shoreline Protection

Work to stop ongoing shoreline erosion and prevent future erosion will be done in the vicinity of North Point Marina. This area has suffered serious erosion in recent years which has reduced the stability of the shore in the area of the marina parking lot and other facilities. Without more robust shore protection, the south end of the marina parking lot is a potential source of ACM that could wash downshore into various areas within IBSP.

Onshore - Construction of revetment

The onshore work will involve construction of a rubble mound revetment that runs along the southeast perimeter of the NPM South Parking Area. This work involves some preparation work of repositioning some stone and concrete shore protection, excavation of a key notch for the placement of new revetment stone, and the layering of revetment stone along the shore. The operation will require a large front loader to move stone, a large bucket crawler to position stone, and a fleet of trucks bringing stone to the staging area.

This onshore work will involve a crew of at least 20 (site engineer and assistant, surveyor, bucket crawler operator, front loader operator, drivers for a fleet of at least 15 stone-carrying trucks). The revetment will be approximately 600 lineal feet and 15 feet in height. It will be constructed with a base of quarry run rubble and capped with 4 ton quartzite armor stone. It is estimated the work can be done in seven weeks.

Offshore - Construction of submerged breakwater

Offshore operations are needed to extend the underwater breakwater (reef) farther south to give needed wave protection for the shore. This will involve two barges and a tug. One barge will have a mounted derrick with a clam-shell bucket for lifting and placing stone. The second barge will contain the stone supply. The tug will be used to position the barges along the construction site. The barges will have spuds (vertical beams to place on the lake bottom) to hold the barges in position.

The underwater breakwater (reef) will be approximately 300 feet long, 3 feet high and 16 feet wide at its crest. The reef will be constructed with a bed of quarry run rubble and a cap of 1-ton quarry stones.

This offshore operation will involve a crew of five (tug operator, tug deck hand, crane operator, two engineer technicians on deck giving signals for stone placement). It is estimated the work can be done in five weeks.

Monitoring

Monitor Plant and Animal Diversity and Abundance in Restored Areas

Several transects have been established and are in use for monitoring of plant diversity and abundance at IBSP. The occurrence and abundance of both native and exotic species are monitored as an indication of the success of restoration efforts and to guide future management. Additional transects will be established within areas restored using NOAA grant funds. All transects will continue to be monitored by IDNR staff and/or contractors.

Annual monitoring of piping plover critical habitat along Lake Michigan will continue to be conducted by IDNR staff and/or volunteers to determine the number of birds using the site as a stopover during migration and to detect any nesting attempt that may occur at IBSP. Ongoing surveys and monitoring of Blanding's turtle movements within IBSP will continue.

Coastal Monitoring of Project Effectiveness

This project will require monitoring of coastal morphology in order to assess the effectiveness of the various project components in managing the coastal sand. This monitoring will include collection of beach measurements, profile data, bathymetry, and ground and aerial photography. The following are the primary monitoring elements:

1. Pre- and post-construction beach and nearshore profiling in the vicinity of the proposed downdrift sand entrapment groin.
2. Periodic monitoring of the sand entrapment for computing sand volumes.
3. Measurement of sand volume dispersion from the updrift feeder beach.
4. Post-dredging bathymetric survey in the vicinity of the North Point Marina to restore the lake bottom to 1988 conditions.
5. Beach measurements and profiling to confirm restoration of North Beach to 1988 conditions.

6. Bathymetric surveys at and near the lake-bottom sand trap following construction and periodically thereafter to determine volume of sand entrapment and rate of entrapment.

Monitor Nearshore Aquatic Biological Communities

Researchers from Lake Michigan Biological Station, University of Illinois, Illinois Natural History Survey located in the North Unit of IBSP will conduct monitoring of biological communities in the area of shoreline affected by the proposed coastal management infrastructure.

Three major animal community types will be monitored. Community composition, density and diversity of benthic macroinvertebrates, zooplankton, and fish in both shallow water (<1.0 m depth) and nearshore (3.0 m depth) habitats will be monitored in the area undergoing shore alteration. Data will be compared to an existing long-term data set collected in the south unit of IBSP as part of a long term ongoing study. These long-term data sets will serve as a reference and will allow assessing the degree to which the different proposed shoreline modifications influence biological communities.

Four representative sampling sites along the stretch of shore undergoing modifications will be established: 1) the south end of the Johns-Manville property where an L-shaped groin will be planned, 2) downshore from feeder beach, 3) submerged breakwater at the southern end of the North Point Marina property, and 4) lake-bottom pit on the Illinois side of the state line. Site specific sampling will be established to monitor the effect of each feature on the biological communities. Three animal community groups will be sampled at each site on seasonal (spring, summer, fall) basis starting just before shoreline modifications go underway and continue through late fall. The same sampling protocol will be implemented in the second year.

For sites in which a structure of some sort is to be built, we will sample on both the west and east or north and south sides of the structure, depending on its orientation to shore. We will sample a series of water depths/distances from shore out to the eastern-most edge of the structure and with one sample beyond the edge of the structure. For beach modification sites, we will have two transects, perpendicular to shore that will extend out to water depths of 3 m.

Benthic macroinvertebrate community

Benthic macroinvertebrates in shallow water (<1 m depth) will be collected using a combination of kick screens/dip nets and grab samples. Samples at deeper depths (≥ 3 m) will be collected using either a PONAR grab or by SCUBA divers using a 7.5-cm diameter core sampler, depending on the conditions. For the sites for which structures will be built, we will also attempt to sample the hard surface of the structure itself to detect any organisms (such as dreissenids) that may be attached. Replicate samples will be collected at each depth and location. Samples will be sieved through 500 μm mesh screens to remove sand and preserved for later analysis and identification in the laboratory. Benthic macroinvertebrates will be identified to the lowest practical taxa in the laboratory and length measurements will be taken on a sub-sample of each taxa.

Zooplankton community

Zooplankton will be sampled at water depths ≥ 3 m using replicated vertical tows of a 63- μm mesh 0.5-m diameter plankton net. At each site the net will be towed vertically from 0.5 m above

the bottom to the surface. Sampling the entire water column generates a representative sample of the zooplankton community composition and abundance. Samples will be stored immediately in 5% sugar formalin for later identification and measuring. In the lab, samples will be processed by examining up to three 5-ml subsamples, taken from adjusted volumes that provided a count of at least 20 individuals of the most dominant taxa. Length measurements will also be recorded for a subsample of each taxa (with the exception of rotifers).

Fish community

The fish community will be sampled using beach seines and gill nets depending on water depth. Fish in shallow water (<1 m depth) will be collected using a beach seine where possible. Samples at deeper depths (≥ 3 m) will be collected using small-mesh gill nets consisting of 33-foot panels of 0.31, 0.50, 0.75, and 1.0-in stretch mesh. Gill nets will be set for 2-4 hours depending on water temperatures and sampling logistics. Captured fish will be identified and counted, and a subsample will be measured for length. All fish will be returned to the lake.

Composition, density, and diversity estimation

The collected samples will allow us to track possible changes in invertebrate, zooplankton and fish community composition, density and diversity at several sites over time in relation to these proposed shoreline modifications. Comparison to our long-term historical data set will help determine whether they are typical seasonal changes or in fact a response to the shoreline modifications and structures. Because the shoreline will be expected to continue to change as it adjusts to these modifications, we will attempt to obtain additional funding to continue monitoring the biological communities of these areas for several additional years after this funding is complete. This will allow us to determine immediate and longer-term impacts of modifications, such as those proposed here, on biological communities in nearshore Lake Michigan.

Anticipated Outcomes

Completion of the work described in this proposal will restore, protect, preserve and/or enhance 812 acres of nationally declining palustrine wetland, 67 acres of globally significant panne wetlands, and 1,136 acres of wet-mesic and dry-mesic sand prairie habitat. Within this acreage is habitat for two federally listed plant species (Eastern Prairie Fringed Orchid and Pitchers Thistle), nesting and foraging areas for two federally listed animal species (Piping Plover and Karner Blue Butterfly), habitat for more than 50 state listed species, such as Blanding's Turtle, sea rocket, longnose sucker, red-veined prairie leafhopper and over 160 migratory coastal avian species of concern including Caspian Tern, Common Tern, Oldsquaw, Black Scoter, Willet, Whimbrel and Sanderling.

Other measurable results of this project, all of which contribute to the overall objective of restoring and protecting the native coastal communities and species described above, include:

Restoration of a 850-foot reach of Kellogg Creek

Kellogg Creek has been identified as a high quality stream with direct connection to Lake Michigan. Remedial action is planned under an emergency USCOE permit to prevent flooding of the City of Zion water treatment plant. Comprehensive stream restoration of a 850-foot reach of Kellogg Creek is estimated to cost \$225,000 based on the Lake County

Stormwater Plan, Kellogg Creek Watershed Plan (accessible at <http://www.lakecountyil.gov/Stormwater/LakeCountyWatersheds/KelloggCreek>)

Bank sloughing and erosional forces have greatly impaired the functional quality of this downstream reach just before entering Lake Michigan. This phase of the project will restore and manage the stream system to preserve and enhance stream and riparian health, function, and conveyance as part of the watershed's green infrastructure system. The natural hydrologic connection of the creek to Lake Michigan will be restored.

Reduced dredging needs at industrial and recreational facilities on the Lake Michigan shore

The construction of a downdrift sand entrapment groin at the south end of the property owned by Johns-Manville will create a trap for littoral sand moving southward along the shore of IBSP. In addition to capturing littoral sand that can then be used for sand recycling along the shore of IBSP, it is anticipated that this sand trap will reduce the need for dredging at downshore industrial facilities such as Midwest Generation's Waukegan Generating Station and the Waukegan Harbor entrance channel.

Restoration of beach width

The area of beach nourishment will extend from the feeder beach in the northern end of the park and southward to the park lodge. This extent includes beach restoration along the city of Zion Hosah Park and the decommissioned Commonwealth Edison Nuclear Power Station which are the shore properties that separate the state park North and South Units. Sand volume and restored beach width will be greatest at the north and diminish southward consistent with the shoreline recession trends. A total of 725,000 cubic yards of sand will be placed on the beach and nearshore. This will establish a new shoreline base line from which future shoreline mapping and monitoring will be referenced. A total of 225,000 cubic yards of this total will come from the restoration of lake-bottom contours at North Point Marina. Thus 500,000 cubic yards of new imported sand will be used.

Encapsulation of asbestos-containing materials (ACM)

As described above, the presence of ACM at IBSP has been a management issue since discovery of the materials in 1997. Although found to be no threat to public health by several state and federal agencies, the presence of ACM continues to be a concern to some members of the public and causes a consistent expense for collection and removal. The use of imported sand to restore historic beach widths along IBSP and protection of the shoreline near North Point Marina will provide permanent containment of ACM that has continued to be exposed through beach erosion.

Improved water quality along a portion of Lake Michigan shore

Restoring the beach and nearshore to 1988 conditions will also have positive economic effects by facilitating the neighboring private marina on the Wisconsin side of the state line (Prairie Harbor Yacht Club). The shoaling at North Beach is an adverse impact that aggravates shoaling in the Prairie Harbor entrance channel.

Enhanced public safety through removal of derelict infrastructure

Over the past one to two decades the northern part of the state park has suffered severe erosion and shoreline recession. Much of this shore was private residential property prior to state acquisition. Although the houses were removed for park development, all sub-grade infrastructure remains. Prolonged shore erosion has exposed foundations, well casings, and sub-grade utilities. These exposed features are a safety issue and detract from the park aesthetics. Also along the shore are the ruins of former piers built by the U.S. Army at a former training camp. These structures are similarly a safety and aesthetic issue. This restoration effort will remove all existing beach and nearshore relict infrastructure.

The State of Illinois has demonstrated its commitment to the long-term protection and stewardship of the natural resources at IBSP through dedication of its property as an Illinois nature preserve. Dedication is the strongest form of protection available under the Illinois Natural Areas Preservation Act (525 ILCS 30/1 et seq.) The protection afforded by dedication is perpetual unless revoked through action by the Illinois Nature Preserves Commission and the Governor of Illinois. Since the dedication of portions of IBSP as Illinois' first nature preserve in 1964, over 345 parcels of public and private land in Illinois have been dedicated. No Illinois nature preserve dedication has ever been revoked.

All Illinois Department of Natural Resources personnel and others who will be involved in the management and oversight of this project hold degrees in appropriate fields, e.g., engineering, natural resource management, coastal geology, and have extensive experience in projects of this type. All have worked on previous projects at IBSP and/or Lake Michigan and have first-hand familiarity with the project site. Brief curricula vitae for primary project personnel are attached to this proposal. Their roles in project management will be as follows:

Larry Aspland - manager of engineering/construction components of the project

Michael Chrzastowski - technical advisor on engineering/construction components of the project and coordinator of coastal monitoring of project effectiveness

Sergiusz Czesny - coordinator and supervisor of monitoring of aquatic biological communities

Brad Semel - manager of habitat restoration, stream restoration and hydrologic restoration components of the project

SUMMARY

This proposed project is designed to protect and enhance the resources present at Adeline Jay Geo-Karis Illinois Beach State Park (IBSP) in the extreme northeast corner of the State of Illinois. IBSP includes a total of 3,070 acres in two units (North Unit and South Unit) and is part of a larger complex of public lands that extend north into Wisconsin. IBSP and adjacent property owned by the Lake County Forest Preserve District represent most of the undeveloped Lake Michigan shoreline in Illinois.

IBSP provides habitat for over 500 species of plants and 300 species of animals. More than 50 Illinois endangered and threatened species are found within the park and over 160 species of migratory birds use the area. Most of the Lake Michigan shoreline within IBSP has been

designated as critical habitat for the piping plover, a federal-endangered species. This project will expand available habitat for the piping plover by removing invasive plant species from otherwise suitable habitat and by reducing erosion of the beach habitat that is essential for nesting by piping plovers.

Restoration work within IBSP will directly enhance the rare habitats that occur there. Other project components will reduce beach erosion that currently threatens those habitats. Water levels on Lake Michigan are currently relatively low, making it possible to implement many of the measures needed to protect IBSP should water levels rise again in the future.

The funding made available through NOAA's Coastal and Marine Habitat Restoration Project Grants under the American Recovery and Reinvestment Act provides an opportunity for IDNR to make significant progress on the measures needed to provide long-term protection for IBSP. Receipt of NOAA funding will provide protection for the many valuable natural resources at IBSP and will create or maintain jobs of many kinds in northeast Illinois.

BUDGET JUSTIFICATION

	Federal	Non-Federal	Total
a. Personnel	0	134,025	134,025
b. Fringe Benefits	0	66,438	66,438
c. Travel	0	2,250	2,250
d. Equipment	0	0	0
e. Supply	0	0	0
f. Contractual	10,738,331	0	10,738,331
g. Construction	0	0	0
h. Other	0	0	0
i. Total Direct Charges	10,738,331	202,713	10,941,044
j. Indirect Charges	0	7,518	7,518
k. Total of Direct and Indirect Charges	10,738,331	210,231	10,948,562

Personnel (Federal Share): none

Personnel (Non-Federal Share): \$134,025

Dr. Michael Chrzastowski, Senior Coastal Geologist, will provide 600 hours of work at \$37/hr for project coordination and coastal monitoring. Total: \$22,200

The Illinois Natural History Survey (INHS) will provide 8.3% of the salary of Dr. Sergiusz Czesny each year. Total: \$11,333

Brad Semel, IDNR Natural Heritage Biologist, will provide 175 hours of work for project administration and on-site supervision of habitat restoration contractors at \$33.99/hr. Total: \$5,948

Maggie Cole, IDNR Natural Heritage Regional Administrator, will provide 40 hours of work for project administration and oversight at \$41.72/hr. Total: \$1,669

Greg Behm, IDNR Site Superintendent at IBSP, will provide 1000 hours of work for assisting with site access, coordinating contractor activity on-site and monitoring of progress of the project at \$32.86/hr. Total: \$32,860

Robert Feffer, IDNR Site Assistant Superintendent at IBSP, will provide 1000 hours of work for assisting with site access, coordinating contractor activity on-site and monitoring of progress of the project at \$31.98/hr. Total: \$31,980

Christopher Rollins, IDNR Regional Land Manager, will provide 250 hours of work for project administration and oversight at \$37.60/hr. Total: \$9,400

David Suthard, IDNR North Point Marina General Manager, will provide 250 hours of work for assisting with site access and on-site project coordination at \$47.80/hr. Total: \$11,950

Roger Mellem, IDNR North Point Marina Harbor Master, will provide 250 hours of work for assisting with site access and on-site project coordination at \$26.74/hr. Total: \$6,685

Fringe Benefits (Federal Share): none

Fringe Benefits (Non-Federal Share): \$66,438

Fringe benefit rate for Dr. Michael Chrzastowski is 33.06%. Total: \$7,339

Fringe benefit rate for Dr. Sergiusz Czesny at the INHS is 33.06%. Total: \$3,747

Fringe benefit rate for Brad Semel is 55%. Total: \$3,271

Fringe benefit rate for Maggie Cole is 50%. Total: \$836

Fringe benefit rate for Greg Behm is 56%. Total: \$18,370

Fringe benefit rate for Robert Feffer is 57%. Total: \$18,120

Fringe benefit rate for Christopher Rollins is 53%. Total: \$4,935

Fringe benefit rate for David Suthard is 47%. Total: \$5,665

Fringe benefit rate for Roger Mellem is 62%. Total: \$4,155

Fringe benefits go toward FICA, retirement, and medical insurance (dental and vision insurance may be included for some employees)

Travel (Federal Share): none

Travel (Non-Federal Share): \$2,250

IDNR staff in northeast Illinois, e.g., Brad Semel, Larry Aspland and Christopher Rollins, will make multiple trips from their respective offices to IBSP for project management and supervisions. Estimated total mileage for these trips is 4,500 miles, calculated at a rate of \$0.50/mile.

Equipment (Federal Share): none

Equipment (Non-Federal Share): none

Supply (Federal Share): none

Supply (Non-Federal Share): none

Contractual (Federal Share): \$10,738,331

Contractors will be hired to carry out habitat restoration within Adeline Jay Geo-Karis Illinois Beach State Park (IBSP), to construct the structures proposed in Lake Michigan, and to transport and place sand as needed to complete the proposed project. The attached estimate of quantities summarizes the anticipated costs of the various project components. All contractors will be required to certify that any iron, steel or manufactured goods used on the project will be made in the United States. All personnel hired under contract will be paid prevailing wages as established for Lake County, Illinois.

Contractual (Non-Federal Share): none

Construction (Federal Share): none

Construction (Non-Federal Share): none

Other (Federal Share): none
Other (Non-Federal Share): none
Indirect Charges (Federal Share): none
Indirect Charges (Non-Federal Share): \$7,518

This amount represents the indirect costs that will not be recovered by the Illinois Natural History Survey.

Total Direct Charges: Federal: \$10,738,331
Non-Federal: \$202,713
Total Indirect Charges: Federal: \$0
Non-Federal: \$7,518
Total Charges: Federal: \$10,738,331
Non-Federal: \$210,231

ATTACHMENTS

1. Budget Sheet (Estimate of Quantities) - 1 page
2. Site Map - 3 pages
3. Curricula Vitae of Primary Project Personnel - 4 pages
4. References Used in Preparation of Proposal - 1 page
5. U.S. Army Corps of Engineers Permit for Dredging and Placement of Sand on Feeder Beach - 4 pages (pages 1-3 of permit and signature page)
6. Illinois Environmental Protection Agency Permit for Dredging - 5 pages
7. IDNR Director's Letter of Support - 1 page