

# APPENDIX A: Case Studies

The chapter entitled The Five Elements Of Success discussed the value added to coastal projects by the Coastal America process, including the general elements of collaboration and cooperation, scale, funding, technology transfer, and education and outreach. Some or all of these elements and their components appear in the project case studies presented below.



## Northeast Regional Implementation Team

### *Ballard Street Salt Marsh Restoration, Massachusetts*

The Saugus River flows through Saugus, Massachusetts, and is heavily influenced by the tides of the adjacent Massachusetts Bay. In an attempt to control tidal flooding within the community, tidal flap gates were installed. Since their original construction however, the standard flap-type tide gates have fallen into disrepair and need to be replaced in order to achieve the flood control benefits of their original construction. A recent cursory evaluation by the Corps of Engineers revealed adverse floodplain impacts were occurring. Additionally, as a result of tidal restriction caused by the flap gates, habitat degradation of adjacent wetlands has also occurred.

The proposed project, if feasible, will provide approximately 15 acres of restored or created freshwater wetlands for flood storage enhancement, nonpoint source pollution control, and wetland habitat restoration upstream of the newly constructed tide gate. Additionally 12 acres of salt marsh, including three acres of tidal creeks supporting shellfish, will be restored down-gradient of the new tide gate by increasing tidal flow through two separate broken tide gate structures.

It is likely that none of the projected project benefits could be achieved without a multiple agency consensus on the project. Presently the EPA, as the lead agency in this salt marsh restoration project, is using its technical expertise to coordinate the restoration of tidal flows in balance with flood protection. The other federal partnership agencies involved to date include: the Corps, with possible funding and permitting; the NRCS, with a potential study for floodplain

## APPENDIX A: Case Studies

management; the NOAA/NMFS, with technical support; and the USFWS, with possible funding support through their Partners for Wildlife Program. The state partners include: the Massachusetts Wetland Restoration and Banking Program, with support and technical assistance; the Commonwealth of Massachusetts Metropolitan District Commission, the custodian of the land in agreement with the Town of Saugus; the Massachusetts Highway Department, with its agreement for use of land for staging and construction and possible funding assistance; the Massachusetts Department of Environmental Management (DEM), with a possible connection of this project as compensation mitigation for DEM projects nearby. Finally, local government partners include: the Saugus River Watershed Council, with community outreach activities; the Town of Saugus Department of Public Works, with possible labor contributions; the Town of Saugus Conservation Commission, with required local permitting and support; and the Essex County Mosquito Control Project, for possible construction assistance and/or a permit applicant role.

Because a hazardous situation still exists, the community may opt for the normal repair of the inoperable tidegates to provide flood protection in lieu of considering alternative ecological enhancement actions. The simple repair of the tidegates would be easier to accomplish given the complexity of permits that are required for the enhancement/restoration alternative. Nevertheless, the NRCS is willing to do the floodplain study, without a state cost share, since the Massachusetts Wetland Restoration and Banking Program (MWRBP) endorses the project. The MWRBP is awaiting further evidence of local support for the project from the Town of Saugus (approval by the town manager or Board of Selectmen). The MWRBP is also awaiting the results of a north shore of Massachusetts study of hydrologically restricted marshes to determine priorities among various potential projects. The project is currently under consideration for implementation depending upon the results of the floodplain management study being done by the NRCS. This case study clearly demonstrates how a rehabilitation project can be enhanced through a collaborative process. However, it also underscores some of the complexities encountered in a project's development.

### *Blackstone River Basin Reconnaissance Study, Rhode Island and Massachusetts*



The Blackstone River, RI.

The Blackstone River flows through the states of Rhode Island and Massachusetts and ultimately into Narragansett Bay. Industrial use of the river has, over the years, resulted in heavy metal contamination of river sediments which have been identified as a major source of pollution to the river and Narragansett Bay. Contaminated sediments have also directly resulted in the loss of fish and wildlife habitat. A study conducted for the Massachusetts Department of Environmental Protection in 1981 identified the sediments in the Blackstone River as

“grossly polluted with heavy metals” and the “most severely contaminated sediments in the Commonwealth of Massachusetts.” The study evaluated various abatement strategies and recommended a sediment management plan that included the dredging

## APPENDIX A: Case Studies

and disposal of the contaminated sediments together with wetlands restoration and sediment and bank stabilization. In addition to the contamination problems, anadromous fish passage, historically plentiful on the Blackstone River, has been blocked or restricted by dams and diversions on the river.

Remediation of the Blackstone River represents a problem in comprehensive regional environmental management. Abatement strategies and sediment management plans must be developed to mitigate the damages on a watershed scale and be done with the participation of all appropriate federal agencies and the two states and numerous local communities operating in the region. A multitude of potential remediation sites exist, but it was necessary to first develop a comprehensive plan to choose sites and methodologies so as to maximize the potential environmental benefits. The first stage of this effort began in 1994 with a joint study that summarized the problems of the mainstem river and developed a scope of work for a more comprehensive study of the entire Blackstone River watershed. One half of this investigation was funded by the Corps of Engineers (Corps) using their Planning Assistance to States Program and the remaining half contributed jointly by the Massachusetts Department of Environmental Protection, the Rhode Island Department of Environmental Management and the National Park Service (NPS). In addition, the Environmental Protection Agency (EPA), assisted by the states, performed extensive testing of the chemistry and toxicity of the water column and the sediments in the Blackstone River as part of their Blackstone River Initiative.

Further, the Corps is conducting a reconnaissance investigation of the entire Blackstone River watershed. Its purpose is to determine the feasibility of comprehensively examining alternative measures for improving the environmental health of the Blackstone River. Some of the alternatives being examined include: the restoration of fish and wildlife habitat through flow regulation; the restoration of fish spawning habitat, wetland ecosystems, and waterfowl nesting areas; the construction of fish passage facilities; and the isolation of contaminated sediments by covering them with clean sediments. Finally, the Corps will also examine the potential of modifying any of its existing projects or their operations along the Blackstone River using its authority under Section 1135 of WRDA 1986, which allows for the modification of existing project structures and their operations for the benefit of the environment.

Several of Coastal America's partners are participating in the reconnaissance study. The project lead is the Corps, both for conducting the overall study and funding. The NPS is providing technical assistance related to overall project design and coordination. The U.S. Fish and Wildlife Service (USFWS) is developing fishway designs with technical support from the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA/NMFS) and the EPA is providing water quality and contaminant analyses. These partnership activities demonstrate the value added provided by the elements of cooperation and collaboration by virtue of the number of federal and state agencies involved, of project scale through the comprehensive examination of the Blackstone River watershed and its environmental problems and the enhanced funding brought about through the in-kind transfer of technical assistance among the participating agencies.

# APPENDIX A: Case Studies

## *Connecticut Coastal Embayments, Connecticut*



Restricted tidal flow as a result of railbeds in the Northeast Corridor, CT.

In 1991 the Connecticut Department of Environmental Protection (DEP) requested a study be conducted by Coastal America to identify salt marshes that have been degraded as a result of tidal flow restrictions caused by the placement of transportation facilities, especially roads and railroads. An initial \$100,000 study was conducted by the Army Corps of Engineers (Corps) under Section 22 of the Water Resources Development Act of 1974 (WRDA, 1974) which authorizes the Corps to cooperate with any state, at their request, in the preparation of cost shared, comprehensive plans for water resources development, utilization, and conservation, i.e., the Planning Assistance to States

Program. Matching funds were provided through Connecticut DEP's Long Island Sound Cleanup Account for the restoration of degraded coves, embayments and tidal wetlands. The study was to determine the locations of salt marshes degraded by roadway and railbed construction, which sites would most benefit by some form of tidal restoration, and to evaluate the relationship of transportation crossings to wetland degradation. Particular attention was given to sites where the dominant species was the common reed, *Phragmites australis*, a highly invasive plant that dominates disturbed and tidally restricted areas and is considered ecologically less productive.

A Technical Advisory Committee (TAC) was formed to select study sites and provide technical review. The TAC was comprised of the Coastal America partners including the Corps, the U.S. Department of Transportation (DOT), the Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), Connecticut DEP and DOT plus other wetland managers and scientists. All degraded or degrading salt marshes between New Haven and the Connecticut - Rhode Island border were considered. The study specifically evaluated the effect of the transportation facilities on tidal flows, documented existing biological conditions and determined, through analysis of historic photographs and other data, the historic wetland conditions (i.e., salt marsh, brackish meadow marsh, and/or brackish reed marsh). Assessments also considered the potential impacts from increased tidal flow on adjacent land uses such as housing and commercial activities. The importance of the area as habitat for local wildlife was also considered, especially if the species were listed as endangered or threatened, or if there was potential for recruitment of new, desirable species under the anticipated new salinity regime.

From this initial assessment, ten wetland sites were selected for further study and six were found to be experiencing degradation as a result of transportation related tidal flow restrictions. Using the results of the Coastal America study, Connecticut DEP applied for and received U.S. DOT Intermodal Surface Transportation Efficiency Act (ISTEA) funding for the restoration of about 50-75 acres of Sybil Creek and Mill Meadows salt marshes in 1994. The funding was

## APPENDIX A: Case Studies

channeled through the Connecticut DOT. Connecticut DOT was instrumental in convincing the Federal Highway Administration that wetland restoration was an eligible enhancement activity under ISTEA, i.e., it provided for scenic beautification and stormwater mitigation. This project represents the first commitment of ISTEA funding for salt marsh restoration in the United States. The Northeast RIT provided technical assistance at these degraded salt marsh sites. Additional funding was also provided from EPA's National Estuary Program. Additional restoration projects are now being implemented by the State of Connecticut's Long Island Sound Program.

Subsequently, based upon these initial assessments, the Connecticut Congressional Delegation drafted legislation to provide for a comprehensive examination of degraded coastal wetlands. Section 346 of WRDA 1992 authorized the Corps to undertake a comprehensive examination of potential wetland restoration projects. However, appropriations have yet to be requested to implement this provision. Additional federal implementation vehicles are being pursued for three additional wetland sites by the Northeast RIT. This project example demonstrates the value provided by the elements of cooperation, project scale, enhanced project benefits and enhanced funding through collaborative efforts.

### *Galilee Bird Sanctuary, Rhode Island*

In 1992, the Rhode Island Division of Fish, Wildlife and Estuary Resources requested the Corps to act as the federal lead in the restoration of tidal flows into a portion of the salt marsh at the Galilee Bird Sanctuary, Narragansett, Rhode Island. Historically, the 128 acre Galilee Bird Sanctuary was mostly salt marsh. However,



Aerial view of Galilee Bird Sanctuary, RI.

the placement of fill material from navigation projects adjacent to the marsh and the construction of an escape road through the middle of the marsh complex has significantly restricted tidal flow. Prior to the initiation of this restoration project less than 20 acres of salt marsh and open water existed within the sanctuary, of which only nine acres was vegetated salt marsh supported by tidal flow.

Up to one half of the sanctuary qualified for salt marsh restoration under the authority of Section 1135 of the Water Resources Development Act of 1986 (WRDA, 1986), which allowed the Corps to modify existing project operations or features to improve the environment. The remaining half of the site was restored under the program authority of the State of Rhode Island. However, the overall design and implementation was conducted at one time. Maximum allowable water level governed by acceptable flood risks to neighboring properties and the presence of two active dredged sediment placement sites diminished the area for restoration within the sanctuary. Of the total restoration acreage, about 14 acres of the intertidal habitat within tidal channels was restored, 84 acres was fully restored to salt marsh and 28 acres was partially restored to salt

## APPENDIX A: Case Studies

marsh. The area was restored by re-excavating natural channels and installing twin box culverts beneath the escape road to improve tidal exchange.

The Corps contributed \$1,420,000 under its Section 1135 Program which represents 75% of the project costs. Local partners include the Rhode Island Department of Environmental Management, which is contributing 25% (\$473,000) of the cost, and the Rhode Island Department of Transportation which has agreed to construct another project's required mitigation feature onsite thereby adding to the productivity of this restoration site. The EPA is contributing funds under a Clean Water Act Section 319 Grant and, together with the NMFS, is providing technical assistance and consultation. The USFWS assisted in site evaluations and in providing interpretive features and the University of Rhode Island is cooperating with field monitoring of the site and the progress of the restoration. Clearly, had the individual agencies sought to address the problems identified at this site the outcome would have been much different, as each of the authorities used have certain restrictions. By working together toward a common objective, the agencies were able to assemble a much more comprehensive solution.

### *Mohegan Tribe Coastal Management Plan, Connecticut*



The Thames River, CT.

The Mohegan Indian Tribe expressed the need to identify the extent and probable causes of water quality problems within Trading Cove, Connecticut, and how these water quality problems may contribute to pollution within the Thames River. Specifically, water quality issues such as the adequacy of flushing within Trading Cove, the condition of the Cove's benthic communities and sediments, and the general condition of Shantok Brook were investigated.

As part of the comprehensive watershed planning requested by the Tribe, the first phase of the project involved an initial appraisal of the water, sediment, and benthic quality in Trading Cove and

Shantok Brook. This effort was conducted under the Corps' Section 22 authority, the Planning Assistance to States Program. The investigation also determined the initial suitability of dredged material from Trading Cove for use in constructing a wetland between a training dike in the Thames River and adjacent riverbanks. Further analysis of this opportunity will be conducted under the Corps' Section 1135 authority, Project Modifications for Improvement of the Environment.

The investigation and restoration of the Tribal lands and associated waters will ultimately require a comprehensive effort and involve additional state and federal agencies. In this initial study, the Corps provided analytical services which was cost shared with the Mohegan Tribe. The EPA, NRCS, and the Navy provided technical assistance, together with the Connecticut Department of Environmental Protection's Long Island Sound Program. Volunteer support from the Coastal America's Northeast Regional Implementation Team (NERIT) is expected to exceed

## APPENDIX A: Case Studies

The integration of 410-kHz sonar with differential Global Positions System (GPS) allowed accurate positioning of eel grass in Narragansett Bay, RI.

40 hours. The initial appraisal for this project was completed in the Summer of 1997. These partnership activities demonstrated the value provided by the elements of cooperation, project scale and enhanced funding.

### *Navy Eelgrass Study — Narragansett Bay, Rhode Island*



This study created an interagency effort from a previously disassociated group of efforts. The Coastal America Northeast Regional Implementation Team became aware that the Navy was independently working with the detection of submerged vegetation due to its military implications for hiding undersea mines. Additionally, the Corps was mapping seagrass because of its habitat value and significance for dredging projects, and the USFWS and EPA's National Estuary Program were interested in seagrasses for habitat management purposes. The coordination of these independent efforts afforded an ongoing dialogue that is producing habitat mapping to be used for management and providing new tools for technological advancement. Team members included the U.S. Navy Naval Undersea Warfare Center (NUWC), U.S. Army Corps of Engineers, EPA, U.S. Fish and Wildlife Service, and the Narragansett Bay Estuary Program

In August, 1997, the team carried out its investigation into the acoustic properties of eelgrass in Narragansett Bay. The Corps integrated its 410-kHz sonar with differential Global Positioning System (GPS) for accurate positioning and recorded acoustic backscatter from eelgrass beds. A full hydroacoustic survey of Rose Island and partial surveys of Gould and Goat Islands were completed. The NUWC dive team performed ground truth referencing by carrying out sampling in four quadrants and filming more than 50 minutes of underwater video. NUWC engineers also deployed a 100-kHz EG&G side-scan sonar to image areas of seagrass and the boundaries of the eelgrass beds.



In addition to providing a coastal research vessel and boat operator, the EPA provided lab space and expertise in biological sampling methods. All eelgrass samples obtained by the NUWC dive team were analyzed at the EPA lab by NUWC and EPA staff. A multi-agency paper (Corps, EPA, and NUWC) entitled "Hydroacoustic Techniques for Detection and Characterization of Seagrasses" was presented at the International Conference for Remote Sensing for Marine and Coastal

Environments. This project initiated research into a new technology that will benefit both, military and resource agencies. More importantly, a new avenue of

## APPENDIX A: Case Studies

communication was initiated between state and federal agencies working in Narragansett Bay, Rhode Island.

The mapping and monitoring of eelgrass are priority activities for habitat managers in the northeast. By assuring increased communication between military and natural resource agencies in Narragansett Bay, the objectives of the partnering process are fulfilled along with enhanced project benefits and the transfer of new or underutilized technologies.

### *New England Coastal Contaminated Sediments Project*



Sampling contaminated dredge material in Boston Harbor, MA.

New England's ports and harbors have predominantly fine-grained sediments underlying these urbanized waterfronts. Historically, dredging and disposal operations have relocated these potentially contaminated sediments to many sensitive and productive aquatic sites. The Coastal America NERIT has several efforts underway to map existing contaminated sediments, to combine this data with data collected by other partner agencies and to enter this information into an interagency compatible Geographic Information System (GIS) format. This will allow reasonable management decisions to be made in an informed manner by all the involved agencies.

In August 1993 the NERIT published GIS location maps and a database of all recent Boston Harbor, Massachusetts aquatic sediment chemistry. This interagency collaboration among the Corps, the U. S. Geological Survey (USGS), the EPA, the NOAA, the states of Maine, Rhode Island and the Commonwealth of Massachusetts produced an agreed upon data format to manage contaminated sediments by spatial mapping. Funding was provided by the Corps, with assistance from the states, in the form of in-kind transfers of services. In August 1994 the NERIT published a similar GIS database for recent sediment chemistry in the Casco Bay National Estuary Program focus area in Maine. The data from the Providence Harbor Navigation Maintenance Project in Rhode Island is also being entered in this system.

The Corps, NOAA and EPA are also cooperating in studying numerous abandoned dredged material disposal sites in an effort to determine the extent of residual contamination and if future disposal of clean dredged material should be directed to "cap" or cover these sites, thereby isolating the contaminated sediments. Sites such as the Boston Lightship dredged material disposal site in Massachusetts Bay and the Bridgeport Harbor dredged material disposal site in Long Island Sound are being examined for any residual chemical signatures together with a current level of biological activity. Abandoned dredged material sites that have the greatest potential to degrade the aquatic environment will be capped with clean material to reduce exposure of aquatic organisms to potential contaminants.



## APPENDIX A: Case Studies

The New England Coastal Contaminated Sediments Project is being led by the Corps with funding assistance from the states of Maine, New Hampshire and the Commonwealth of Massachusetts. This study will identify what areas have the most contaminated sediments. Future dredging and disposal operations and potential environmental restoration projects can then focus on the need to manage these sediments in the most beneficial manner. This project could not have been undertaken by a single agency because the data being collected must be used and analyzed by several agencies which requires standardization in the data collection and distribution. This project has developed a data development and collection standard that is now being applied in several other similar projects and points to the importance of agency collaboration when addressing regional environmental management issues.

### *Ninigret National Wildlife Refuge Restoration, Rhode Island*

In 1970, the Department of Defense discontinued use of the Charlestown Naval Auxiliary Landing Field and transferred nearly 400 acres of the property to the U. S. Fish and Wildlife Service for inclusion in the Ninigret National Wildlife Refuge. Unfortunately, nearly 70 of the 400 acres were covered by aging asphalt runways, effectively precluding any large scale restoration efforts of the coastal



Excavation of asphalt runways by the 368th Construction Battalion, US Army Reserve Unit at the Ninigret Wildlife Refuge, RI.

sandplain grassland habitat that once covered the refuge. Although representing one of the northeast's high priority habitats for restoration and protection, the estimated costs to remove the runways — ranging from \$1,700 to \$7,000 per acre — were prohibitively expensive and effectively delayed restoration efforts.

In 1997, the Coastal America partnership facilitated an arrangement between a U.S. Army Reserve Unit, the 368th Construction Battalion, and the Refuge whereby the reserves would perform earthmoving, asphalt removal and site preparation as part of their annual two week training on heavy equipment. The asphalt runways and underlying crushed stone were excavated and removed to a local sand and gravel company where it was recycled as roadbed material. Some of the asphalt was left in place to serve as parking and paved handicapped access interpretive trails, providing visitors with the opportunity to explore the various habitats of the refuge. Through this collaborative venture among nontraditional partners, the U.S. Fish and Wildlife Service was able to begin its restoration efforts and significantly reduce their costs. The cost — less than \$250.00 per acre — was for fuel to run the equipment used by the reservists. The reservists benefitted from their training on heavy equipment while also making a significant ecological contribution to their community.

The USFWS was able to restore 30 acres of sandplain grassland habitat as part of the Ninigret Wildlife Refuge. This would not have been possible, due to prohibitive costs, if the 368th Army Construction Battalion had not been able to complete the restoration as part of their training exercise. This leveraging of resources, contributing to the health of the environment and providing training to

## APPENDIX A: Case Studies

reservists is what makes this project so unique. This project provides needed coastal restoration in a cost effective manner and celebrates a nontraditional partnership between a military department and a natural resource agency.

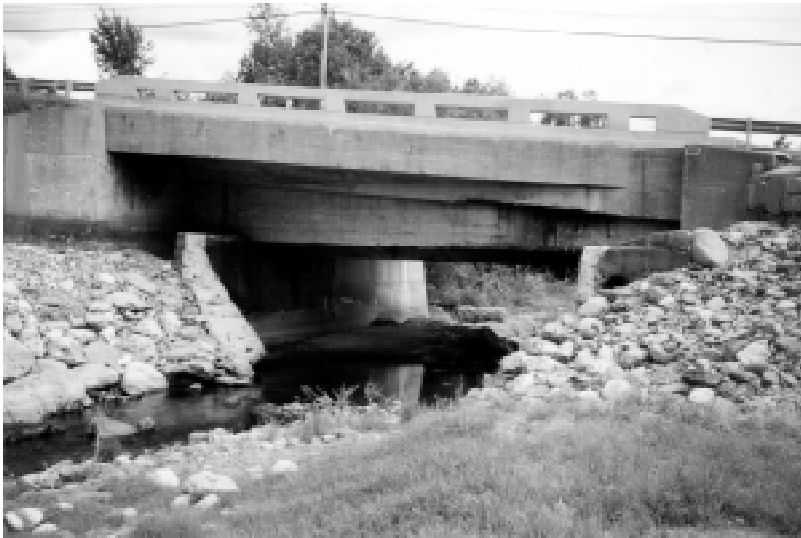
### *Souadabascook Stream, Grist Mill Dam Removal, Maine*



The Gristmill Dam on the Souadabascook Stream, ME.

The Coastal America partnership in the northeast was asked to provide an interagency collaborative effort to help the State of Maine achieve its diverse environmental priorities. The NERIT asked its partnership agencies to examine their available programs to restore important ecological features. What was created was a multi-faceted proposal to maintain, improve and restore some of the most important fisheries, wildlife habitat and recreational waters in Maine and northeast North America. Some of the habitat restoration projects associated with the proposal are critical to the restoration of Maine's "Wild and Native" brook trout, Atlantic salmon, American shad and alewife

populations. Other projects will restore or improve several thousand acres of wetlands habitat. The ecological and economic benefits extend far beyond Maine and into the international waters of the Gulf of Maine and the U.S. and the Canadian St. John River watershed. These projects will also contribute to the restoration of the Native American fishing rights of the Penobscot Indian Nation.



The Souadabascook Stream after removal of the Grist Mill Dam, ME.

An example of the type of project being undertaken in this initiative is the removal of the Grist Mill dam found on the Souadabascook Stream, a tributary of the Penobscot River. The Grist Mill dam was located at the head-of-tide and represented a significant barrier to upstream migrating fish. Originally constructed to support agricultural activities in the watershed, this dam hindered fish passage for nearly two hundred years, effectively eliminating the Souadabascook Stream's anadromous fishery. The dam had been used for power generation for the last 15 years; however, the current owner decided it was not economical to continue operating the dam for power and petitioned the Federal Energy

Regulatory Commission (FERC) for approval to remove the dam and return the river to its natural condition. Dam removal restored habitat and reopened miles of stream to anadromous fisheries. A one mile long impoundment was eliminated, thereby improving aeration and decreasing water temperatures within the restored stream channel. Habitat improvements also included removal and disposal of accumulated sediments from behind the dam, revegetation of the areas between the

## **APPENDIX A: Case Studies**

stream channel and the high water mark of the impoundment and removing embedded sediment from the gravel and rubble in the stream above the impoundment for a distance of about one mile. Other benefits of dam removal included: reduced minor flooding in upstream areas, reduced threat to the U.S. Route 1A and bridge from erosion and “piping” of fill beneath the road, reduced erosion of upstream properties and the town of Hampden’s Water Supply Building, and improved recreational benefits such as improved canoeing opportunities and the removal of the safety hazard caused by the old dam structure.

The 14-foot high, 47-foot wide dam was removed in September and early October 1998 opening 1,160 square miles of the drainage’s watershed to Atlantic salmon, sea run brook trout, striped bass, sea run smelt and alewives. There are over one hundred-fifty miles of streams in the Souadabscook watershed now accessible to various species of anadromous fish.

The voluntary removal of the dam by the FERC license holder was accomplished by the sale of the dam and license for one dollar to Facilitators Improving Salmonid Habitat (FISH), an affiliate of the Maine Council of the Atlantic Salmon Federation. Over \$60,000 of private money was raised to help remove the dam and associated structures from various organizations, including: Atlantic Salmon Federation, the National Fish and Wildlife Foundation, the Trout and Salmon Conservation Foundation, and the Casco Bay Corporation. Additional funds and technical assistance for stream restoration and associated activities were obligated from the USDA Wildlife Habitat Incentives Program (WHIP), the USFWS’s Gulf of Maine and anadromous fish programs and the Penobscot Indian Nation. Additional technical assistance was provided by the State of Maine’s Atlantic Salmon Authority, the Department of Marine Resources, the Department of Environmental Protection, and the Penobscot County Soil and Water Conservation District. Volunteer assets were provided by the town of Hampton, Trout Unlimited, the Penobscot Fly Fishers, the Veazie Salmon Club, the Eddington Salmon Club and the Penobscot Salmon Club.

This project represents an excellent example of the advantages of local collaborative efforts designed to achieve larger watershed objectives on both a state and an international level. It also points to the importance of enhanced project benefits, multiple funding sources, the transfer of technologies among agencies and the value of education.

### **Mid-Atlantic Regional Implementation Team**

#### ***Atlantic White Cedar Ecosystem Restoration, North Carolina***

Atlantic white cedar habitat in Dare County, North Carolina and on the Dare County Air Force Range, has not been able to reestablish itself following logging operations which began in the 1800’s and continued until 1989. This project evaluates the ecological factors in known cedar habitats that are critical to successful natural reforestation. Using this knowledge, the project is developing test plots where critical ecological conditions are introduced or modified. A variety of methods of introducing cedar (e.g. cones, seeds, seedlings) are being evaluated. Ultimately the project will produce guidelines for preparing and restocking traditional cedar ecosystems. It is estimated that 3,000 acres of Atlantic white cedar forest habitat will actually be restored using these guidelines. Preliminary surveys are complete.

## APPENDIX A: Case Studies

Partners with the Air Force are: the USFWS, the U.S. Forest Service (USFS), the North Carolina Division of Forest Resources (NCDFR), North Carolina State University (NCSU), the Nature Conservancy and the North Carolina Natural Heritage Program. The USFWS provided endangered species and habitat management guidance on the project, under the Endangered Species Act, and is working with the USFS, NCDFR and the NCSU to provide joint guidance on potential restoration methodologies. Additionally, the NCSU will develop, guide and document the project's research efforts in collaboration with the USFWS and the NCDFR. The Nature Conservancy will provide technical comments on the planning documents and restoration methodologies and the North Carolina Natural Heritage Program will provide technical assistance on site selection and restoration methods.

The Air Force provided the primary funding with a \$624,700 contribution. In-kind services are estimated at a federal partner contribution of \$120,000 and state partners contribution of \$60,000. In addition, 80 hours of volunteer labor was utilized. In total, 100 acres of seedlings have been planted to date.

As a result of this project and because of the exceptional interest in the Atlantic white cedar, a workshop was held during August 1995. More than 24 current research and demonstration projects were presented to approximately 80 participants representing the eastern seaboard from Georgia to New Jersey. Also, the Atlantic White Cedar Alliance was formed to promote wide-ranging interests including conservation, preservation, restoration, management, and utilization of this species and the ecological communities in which it occurs. These partnership activities demonstrate the value added by the elements of interagency cooperation and enhanced project scale and funding. It further demonstrates how collaboration in one area of interest (reforestation of white cedar forests) can lead to activities that enhance coastal resources, i.e., the promotion of healthy forests in the upstream sections of watersheds, which drain to the coast, can have potentially significant affects on coastal water quality and living resources.

### *Little Falls Dam Fish Passage Project, Maryland*

Little Falls Dam is located on the Potomac River approximately 1 mile upstream from the border between Maryland and the District of Columbia and



Little Falls Dam on the Potomac River.

approximately 75 feet upstream of the Chesapeake and Ohio Canal rubble dam. Migratory fish such as American shad, striped bass, and river herring have been unable to access the 10 miles of historic spawning, rearing and feeding habitat areas upstream of the Little Falls Dam since its construction in 1959. The existing vertical slot fishway at Snake Island was never successful at passing anadromous fish.

A Little Falls Dam Project Modification Report was prepared under the general continuing authority contained within the Corps Section 1135 Program, Project Modifications for Improvement of the Environment. The proposed

## APPENDIX A: Case Studies

modifications to the Little Falls Dam include the construction of a notch fishway with three labyrinth weirs to allow fish passage over the dam. The existing grout bags in this portion of the dam will be removed for the fishway construction and replaced with new grout bags after construction. The fishway will allow access to approximately 10 miles of fish habitat upstream of the dam, based on attracting and passing the types of fish that were used for the study (American shad, striped bass, and river herring).

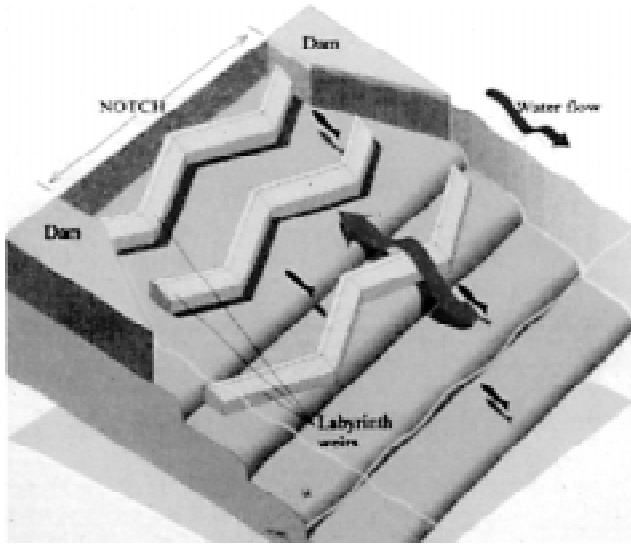


Diagram of notch fishway and three labyrinth weirs to be installed at Little Falls Dam.

The project is being led by the Corps which is providing \$858,750 of funding as well as technical support, report preparation, permitting, and management of the study team. The USFWS is partnering on this project and their representatives chair the Little Falls Task Force which is providing a forum for multi-agency advice on the project. The Maryland Department of Natural Resources is the nonfederal partner and is providing \$286,250 of funding as well as technical assistance, and permitting services.

The Integrated Project Modification Report and Environmental Assessment has received Corps approval. The Plans and Specification Phase was initiated in August 1996, with a scheduled construction start identified for the summer of 1999. These partnership activities demonstrate the value provided by the elements of cooperation, project scale and enhanced funding.

### *Poplar Island Restoration, Maryland*



The remaining five acres of Poplar Island before reconstruction, MD.

Poplar Island is located 34 nautical miles southeast of the Port of Baltimore in the Chesapeake Bay. From an estimated size of over 1,100 acres in the 1800's, Poplar Island has eroded and split into four separate smaller islands which total only five acres. The island is currently eroding at the rate of more than 13 feet per year. At this rate the island will disappear by the turn of the century. Poplar Island provides nesting and feeding areas for many migratory birds, as well as other fish and wildlife species. It currently supports nesting snowy egrets, common egrets, cattle egrets, common terns, double-crested cormorants, great blue herons, little blue herons, green herons and black ducks.

Additionally, diamondback terrapins nest on what beaches are left and river otters fish from the island's shores.

The Poplar Island restoration project is designed to return the island to its former size using uncontaminated dredged material from the maintenance dredging of the Baltimore Harbor and Channels Federal Navigation Project. Island restoration

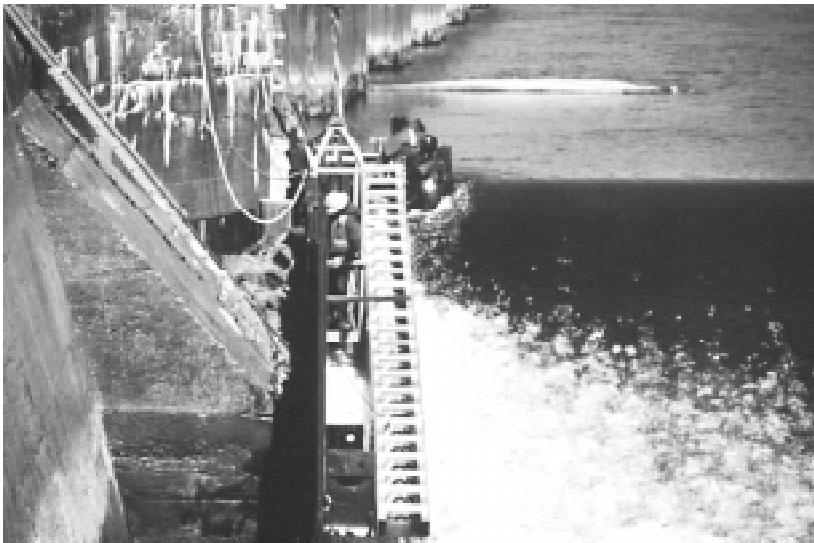
## APPENDIX A: Case Studies

would create 1,110 acres of wildlife habitat by placing, shaping and planting approximately 38 million cubic yards of clean dredged material. The habitat created would include approximately 555 acres each of intertidal wetland and upland habitat. Of the wetland habitat, 80 percent will be developed as low marsh and 20 percent as high marsh. Small upland islands, ponds and channels will be created to increase habitat diversity within the marsh system. It is expected that habitat diversity will be increased in the upland areas by constructing small ponds and providing both forested and relatively open shrub areas.

The Baltimore District Corps of Engineers, will be the lead federal agency on this project and will provide 75 percent of the necessary funding. In addition, the Corps will be responsible for the planning, design, construction and placement of the dredged material to be used in the restoration effort. The Maryland Port Administration (MPA) of the Maryland Department of Transportation is the nonfederal partner and will provide 25 percent of the funding as well as operations and maintenance services. In addition, MPA will provide land easements and rights-of-way for the project. Additional federal partners providing technical expertise include the NMFS, the USFWS and the EPA. These partnership activities demonstrate the value provided by the elements of cooperation, project scale and enhanced funding.

### **Southeast Regional Implementation Team**

#### *Cape Fear Lock and Dam No. 1 Fish Ladder, North Carolina*



Fish ladder at Cape Fear Lock and Dam No. 1, 39 miles upstream of Wilmington on the Cape Fear River, NC.

The Cape Fear River is known to provide spawning habitat for anadromous fish species including sturgeon, striped bass, shad and river herring. Populations of all these species are seriously depleted in the Cape Fear River system. Reduced access to spawning habitat caused by the construction of three locks and dams on the Cape Fear River from 1915 to 1934 contributed to the decline of these species. These structures have prevented spawning fish from entering the upstream portions of the river, except during locking and periods of very high river flows. Lock and Dam No. 1 is the first obstruction in the river and is located in Bladen County, North Carolina, 39 miles upstream of Wilmington, North Carolina. Data from recent state and university studies indicate that the locks and dams are a significant impediments to the spawning migration of these anadromous fishes.

The project involved the installation of a prefabricated fish ladder at Lock and Dam No. 1, in September, 1996 that will provide for passage of anadromous shad and river herring. The project will also restore access by these species to 33 miles of high quality spawning habitat in the Cape Fear River above Lock and Dam No. 1. It is anticipated that this project will have a life of 10 to 15 years. However, the ladder is not expected to pass sturgeon or striped bass, therefore future studies

## APPENDIX A: Case Studies

and projects are needed to provide a more comprehensive fish passage solution that addresses all affected species.

The effectiveness of the fish ladder will be monitored for two years. Monitoring is needed to assure the effective operation of the fish ladder and optimize passage of anadromous fish through the ladder and lock. Monitoring will consist of tagging fish with sonic transmitters and using receiving stations to track the movement of target fish through the lock and fish ladder. Monitoring was conducted during the spawning seasons of January through May in 1996 and 1997, with a report on the results scheduled for the summer of 1998.

Under the authority of Section 1135 the Corps, as the lead agency, has completed planning and design analysis, coordination of environmental clearances, and the purchase of two of the required five fish ladder sections and associated hardware. The Corps also installed the fish ladders (completed in September 1996) and funded a portion of the monitoring costs. Broad support among federal resource agencies, e.g., USDA, EPA and NMFS, exists for improving anadromous fish access to the upper Cape Fear River. The USFWS has supported this effort by providing technical guidance, and the purchasing of three of the required five sections of prefabricated fish ladder. Total federal funding for this project is \$78,000 and an estimated \$26,000 worth of in-kind services have been provided by the nonfederal partners.

The North Carolina Division of Marine Fisheries will provide oversight of monitoring activities and by a State Fishery Resource Grant will fund a portion of the cost of monitoring. During the 1994 spawning season the North Carolina Wildlife Resources Commission and Division of Marine Fisheries and the University of North Carolina at Wilmington conducted preliminary studies to determine the feasibility of proposed fish sampling techniques at the locks and dams. These partnership activities demonstrate the value provided by the elements of cooperation, project scale, enhanced funding and the benefits to be gained from using existing data to improve infrastructure constructed in an era of less environmental sensitivity and awareness.

The Quaker Neck Dam on the Neuse River near Goldsboro, NC.

### *Quaker Neck Dam Removal, North Carolina*



Removal of the Quaker Neck Dam, located on the Neuse River in North Carolina, was done under a contract issued by the North Carolina Division of Water Resources. Dam removal began on December 17, 1997, but was stopped shortly afterward due to locally heavy rains and flooding. The dam was scheduled to be removed in sections to allow the slow dispersal of sediments trapped by the dam. The contractor, R&W Construction, moved debris from the river's bypass canal by installing a 75-foot long dam across the canal and mechanically removing the 260-foot long Quaker Neck Dam. Due to the flooding in the region and a moratorium on

## APPENDIX A: Case Studies

construction because of fish migration (March 1st - May 15th) removal of the dam began again after May 15, 1998. Fish have since been seen traveling up the river to historic habitat and spawning grounds.



After removal of the Quaker Neck Dam on the Neuse River near Goldsboro, NC.

Removal of the dam has permanently restored fish spawning habitat along 75 miles of the Neuse River and 925 miles of its tributaries, in total 1,000 miles of anadromous fish habitat. This will benefit striped bass, American shad, hickory shad and shortnose sturgeon that spawn in this freshwater river system before returning to the ocean. In the first part of the century, North Carolina produced more striped bass and American shad than any other state and during that time the Neuse River produced more American shad than any other river basin in North Carolina. In other words, the Neuse River historically supported fisheries of national prominence. This project has advanced the goal of helping to reestablish

these fisheries by restoring access to most of the historically important spawning areas in the Neuse River. It is also expected that mussel fauna upstream of the dam will benefit, namely the endangered dwarf wedge mussel. It should also be noted that the removal of the Quaker Neck dam sets a national precedent, for it is the first dam to be removed voluntarily for solely environmental reasons.

This project would not have been possible without the persistence of the federal, state and private members of the project team. The team pursued various routes to the removal of the Quaker Neck dam in spite of numerous barriers and setbacks. As a result, the solution of mechanical removal of the dam addressed all legal and safety issues, as well as totally satisfying the project objectives in a cost-effective manner. The team was made up of various government and private entities including: North Carolina Department of Environment and Natural Resources, Carolina Power and Light Company, U.S. Fish and Wildlife Service, NOAA's National Marine Fisheries Service, Southeastern Watermen's Association, North Carolina Division of Water Resources, The Neuse River Foundation, North Carolina Division of Marine Fisheries, North Carolina Fishermen's Association, N.C. Division of Water Quality, North Carolina Wildlife Resources Commission, North Carolina Sea Grant, U.S. Army Corps of Engineers, Albemarle-Pamlico Estuarine Study, North Carolina Marine Fisheries Commission, U.S. Environmental Protection Agency, Atlantic Coast Conservation, National Fish and Wildlife Foundation, and North Carolina Coastal Federation.

This project represents, more than any other, the persistence of dedicated professionals and the ultimate benefit of collaboration in achieving mutual environmental objectives.

### ***Northern Right Whale Project and Early Warning System, Georgia and Florida***

The waters off southern Georgia and northern Florida are the calving grounds for the endangered Right Whale from November through April. The total population



## APPENDIX A: Case Studies

of these mammals is currently about 300, with about 11 calves born into the population each year. Human impacts are a major factor in the whales' ability to increase their numbers. Since the early 1990s, net entanglements and ship strikes have led to the average death and injury of one to two Right Whales each year.



The endangered Right Whale whose population has plummeted to only 300.

These impacts are believed to be retarding the recovery and growth of the population. Due to this continuing threat, the NMFS designated the area off southern Georgia and northern Florida as critical habitat in June 1994.

These same waters are also used heavily by commercial, recreational, and military vessels traveling to and from the highly valuable ports in this region. Jacksonville, the largest, services nearly 1,400 vessels, carrying five million tons of cargo each year worth nearly \$1.8 billion. The cost to run one of these cargo vessels under normal conditions is about \$35,000 per day. When these vessels are impeded during transit, by either collisions or

regulations that reduce their speed, it results in increased transportation costs, reduced fuel efficiency, and decreased international competitiveness.

To mitigate the effect of these human activities, overflights of the waters off Georgia and northern Florida are conducted to locate the whales and relay this information to transiting vessel captains. In addition, the Navy, Coast Guard, Army Corps of Engineers and port pilots have cooperated to provide information on whale occurrences. Through this network an "early warning system" on the marine radio has been established to inform all mariners immediately of the presence and locations of whales. Thus, vessel captains avoid collisions and can maintain an efficient speed into and out of the ports. As a result, in the last three years there have been no Right Whale mortalities due to ship strikes.

A citizen and volunteer network augments the work of scientists and professionals. Citizens distribute whale alert stickers and posters, and give presentations to local clubs and organizations. Beachside residents in homes, businesses and hotels from St. Mary, Georgia to Bonyton Beach, Florida monitor the coast and report possible whale sightings to the Marine Resources Council (MRC), which monitors the public telephone hotline. MRC then conveys the report to the Florida DEP. Scientists respond by launching aircraft to confirm the sighting and to photograph each animal for identification by scientists from the New England Aquarium. The ports, the Navy and the Coast Guard alert shipping interests. The aquarium and scientists from Florida DEP and Georgia DNR coordinate surveys. The entire team consists of the following agencies: National Marine Fisheries Service; Marine Mammal Commission; U.S. Navy; U.S. Army Corps of Engineers; Gray's Reef National Marine Sanctuary; Southeastern Implementation Team for the Recovery of the Northern Right Whale; Florida Department of Environmental Protection; Florida Sea Grant; Georgia Department of Natural Resources; Florida Advisory Council on Environmental Education; Marine Resources Council of East

## APPENDIX A: Case Studies

Florida; Marineland, Florida; Georgia Land Trust; Port Canaveral; Georgia Port Authority; Fernandina Port; and Jaxport.

This project has produced many benefits: collisions between whales and vessels are avoided; information is gathered on Right Whales and vessel movement patterns and speeds to establish further avoidance measures for shippers, Corps dredges, and Navy and Coast Guard vessels; and the recovery of the whales in these waters is fostered. This project has also expanded public awareness and increased the use of volunteers from 125 in 1995 to 485 in 1998. This monitoring project of the endangered Right Whales' movements and calving ground activities off the northern coast of Florida and southern Georgia has contributed significantly to our growing knowledge of this species' behavior, while also reducing shipping costs. Because the calving grounds are identified and individual animal movements are tracked, ships can now chart courses accordingly, maintaining speed and avoiding ship strikes with the Right Whale. This project demonstrates the type of success to be achieved when a common objective is clearly defined and all the partners make a concerted effort to achieve that objective.

### *Puerto del Mangler Red Mangrove Restoration, Puerto Rico*

In late 1989, Hurricane Hugo slammed into the Island of Culebra in Puerto Rico. The storm severely damaged or destroyed coastal mangrove forests in and around Puerto del Mangler. Initially, these mangrove forests were left alone in an attempt to allow them to regenerate naturally. However, after three years these trees were not regrowing and it was apparent that significant efforts would be needed to restore this important component of the Culebra coastal ecosystem.

The USFWS initiated the mangrove restoration and was responsible for overall administration of the project as well as administration of secondary grant monies, coordination of propagule (germinated seeds) collection and transportation to Culebra, equipment logistics and report preparation. The Culebra National Wildlife Refuge coordinated the hiring of local personnel, boat transportation, training and the planting activities. The EPA provided funding, technical support and assistance with planting and clearing activities. In addition, the NOAA/NMFS coordinated the use of University of Puerto Rico (UPR) student volunteers and assisted with planting and clearing activities.

Several nonfederal partners also provided their support to the project. The Puerto Rico Department of Natural Resources coordinated propagule collection and preservation. The University of Puerto Rico provided volunteers for planting and clearing. The Culebra Human and Social Services Center (a nonprofit NGO) helped coordinate the activities of local volunteers. Finally, the Puerto Rico Conservation Foundation (a nonprofit NGO) received a secondary grant for the project and hired personnel, provided educational materials and coordination to facilitate completion of the project.

The project was funded by cash contributions, in-kind services and volunteer efforts. The federal partners provided \$40,000 in funding and the nonfederal partners provided \$13,000. In addition, NOAA/NMFS and EPA personnel provided coordination and supervision of students from the UPR during trips to the site. Total time involved for preparation, planning, coordination and on site activities was approximately 17 staff days with an approximate value of \$3,500. The Culebra

## APPENDIX A: Case Studies

Human and Social Services Center coordinated with USFWS staff and paid contract personnel to provide student assistance. The value of this in-kind nonfederal transfer was approximately \$1,000. Finally, over 100 hours of volunteer labor helped make this project a reality.

In the transplant area, most of the dead trees were cleared, but some were left to serve as breakwaters for new trees and help them get established. Propagules were then collected from an unaffected red mangrove forest and transplanted at the newly cleared site. Through the cooperative efforts of Coastal America partners, UPR personnel, and citizens groups, approximately 4,000 seedlings were planted at Culebra. At the completion of the project, over 20 acres of fringe red mangrove, *Rhizophora mangle*, were restored and approximately 15,000 feet of the shoreline had been replanted.

This planting effort helped to restore one of the most environmentally sensitive and important areas in Culebra. These mangroves stabilize the shoreline, provide protection during storms, prevent resuspension of fine sediments thereby improving water quality, provide habitat for sessile organisms, and improve conditions for adjacent seagrass beds and coral reefs. The restored mangroves also improve the foraging, nesting and roosting habitat conditions for many common and endangered species of fish, sea turtles and shorebirds. Perhaps one of the greatest benefits of the project was the educational experience for the volunteers, students and employees involved in its construction. A recognition of the importance of these coastal mangroves and their relationship to the overall health of the aquatic environment was made apparent to a large segment of a small community that often takes its environment for granted. Although the project could have been conducted by a single agency, the support and desire for its accomplishment by several agencies and individuals made the probability for success much greater and definitively enhanced the scope of the project.

### Gulf of Mexico Regional Implementation Team

#### *Aransas NWR Shoreline Protection, Texas*



Since 1950, the Aransas National Wildlife Refuge has lost over 1,000 acres of critical habitat for the whooping crane, an endangered species.

The Gulf Intracoastal Waterway (GIWW) passes along the southern limit of the Aransas National Wildlife Refuge in Aransas County, Texas. Erosion of the channel banks caused by boat wakes, wind driven waves and storms threatened the sole wintering grounds for the federally listed endangered whooping crane, *Grus americana*. The crane's feeding, resting and territorial habitats are located immediately adjacent to the GIWW. These limited areas are designated as "critical habitat" and negative or adverse impacts are violations of the federal Endangered Species Act. The refuge has lost over 1,000 acres of critical habitat for the whooping crane since 1950.

## APPENDIX A: Case Studies

A volunteer project was designed as a temporary solution to prevent additional erosion of the GIWW shoreline until the Corps received authorization to investigate and implement a more permanent solution. Three months each year from 1989 to 1992 were spent planning, designing, coordinating and implementing the all volunteer project. The project, which formed a hardened edge through the placement of cement bags capable of withstanding the erosional forces, protected about 100 acres of salt marsh utilized by the whooping crane along 3,850 feet of channel bank. The USFWS was the project lead and, together with the Corps, provided coordination and technical support. Coastal America's role consisted of increasing the length of shoreline protected, nearly 1,300 linear feet, by facilitating the Navy's financial participation and aiding in the development of an interpretive video on the whooping crane's plight which was broadcast locally. Additionally, and perhaps most importantly, 38 private sector businesses, three conservation and special interest groups, four organized scouting groups, five Texas state agencies, and seven federal agencies contributed in kind services worth over \$2.4 million. Five hundred nonfederal volunteers contributed over 7,000 hours of labor to this effort over the four-year life of the program.

As a direct result of this volunteer project which was conducted from 1989 through 1992, the Corps, as part of its operation and maintenance responsibilities, has placed manufactured erosion prevention structures along approximately three miles of shoreline since 1993. A more permanent solution was examined by the Corps in a feasibility report completed in June of 1995. The study, authorized by Section 216 of the Rivers and Harbors Act of 1970, directs the Corps to reexamine existing projects if environmental, engineering and/or economic conditions warrant a change in the original project purposes. If authorization for construction is approved and an agreement is reached on cost sharing, this proposed project could provide a more permanent solution. These partnership activities demonstrate the value provided by the elements of cooperation, project scale, enhanced funding and the benefits to be gained from efficiently using volunteer services. Additionally, the project of one federal agency (USFWS) directly led to the modification of another's (Corps) and to the benefit of the overall coastal resources.

### *Apalachicola River Slough Restoration, Florida*

The mouth of Blue Spring Run on the Apalachicola River had silted-up over time and access into the spring was blocked during low flow conditions. Deepening the spring's mouth was proposed in order to provide access to a cool water refuge by striped bass and other fish during the warm weather months. A channel was excavated by a barge-mounted dragline at the mouth of the spring, extending from the natural river channel into the mouth of the creek. The channel was excavated to a depth of approximately 7 feet during low flow conditions. The excavated material was deposited in the river on the downstream side of the proposed channel, so the material would not wash back into the excavated hole and with the intent that subsequent flood flows would recapture the material into the river's bed load. Follow-up hydrographic surveys were to be completed to assure that the deposited material was adequately recaptured by the high water flows.

The Corps was the project lead and provided funding and excavation. The NOAA/NMFS helped with site selection for this demonstration project and lent agency support under a Department of the Army and a National Oceanic and Atmospheric Administration (DOA/NOAA) Cooperative Agreement to Restore and

## APPENDIX A: Case Studies

Create Fish Habitat. The USFWS provided Section 7 Consultation under the Endangered Species Act for potential impact to threatened Gulf sturgeon and to several proposed threatened or endangered mussel species. The Florida Department of Environmental Protection assisted with permitting (Issuance of Section 401 Water Quality Certification). The Florida Game and Fresh Water Fish Commission (FGFC) aided in site selection, facilitation of the permitting process within the State of Florida and monitoring of the restoration project before, during and after construction to document fishery use and success of the project. Finally, the Northwest Florida Water Management District provided agency support by participating in agency review during the permit process.

This project was conducted at minimal or no additional cost to ongoing Federal Operations and Maintenance Program activities in the Apalachicola River navigation channel. Federal costs were limited to approximately a half day for excavation, and before and after surveys of the excavation site. Other federal costs included those associated with interagency coordination and National Environmental Policy Act (NEPA) documentation prior to initiation of the proposed action. These costs have not been documented, but were absorbed into costs for the operation and maintenance program, and likely were less than \$15,000. FGFC contributed in-kind services by monitoring the restoration following construction to document success of the restoration action (i.e., use of excavated site by fish as a thermal refuge). Approximately 0.25 acres of thermal refuge fishery habitat was restored by the proposed action. Cool spring water from Blue Spring Run was able to collect in the excavated depression at the mouth of the spring-fed stream, thereby providing for thermal refuge for fish.

This project could have been completed by a single agency. However, this study also evaluated various abatement strategies along the Apalachicola River, on a case-by-case basis, in coordination with the State of Florida agencies, which is currently a condition of the water quality certification from FDEP. Under the DOA/NOAA Cooperative Agreement, efforts were taken by an interagency team to prioritize sites appropriate for fishery habitat restoration and to select a site to serve as a demonstration project. The Blue Spring Run site was selected as the demonstration project site. All project activities were completed by May of 1994 and FGFC indicates restored mouth area is successfully being used by Gulf striped bass for thermal refuge and as possible spawning habitat. These partnership activities demonstrate the value provided by the elements of cooperation, project scale, enhanced funding, and the benefit of interagency collaboration during the regulatory process.

### ***Cape San Blas Dune Restoration and Habitat Preservation, Florida***

Cape San Blas is located in the panhandle of Florida, on the Saint Joseph Peninsula in Gulf County. Eglin Air Force Base (AFB) controls approximately 500 acres of the Cape, including over three miles of shoreline along the Gulf of Mexico. The Air Force's property is primarily used for radar tracking of flying missions over the Gulf of Mexico, for various missile launches and other military activities. Additionally, the Air Force's beaches in Gulf County are also used for the recreational operation of motor vehicles.

In a desire to be good stewards of their property and comply with federal environmental statutes, Eglin AFB began investigations into the natural resources

## APPENDIX A: Case Studies

of this region. A one year pilot study, conducted by Eglin's Natural Resources Division, helped to identify and define issues of concern, document impacts to critical resources and aid in the development of research objectives. The pilot study documented a number of significant issues on the Cape, including: severe erosion (the largest historical rate recorded in Florida); significant numbers of and use by shorebird species including several endangered species; significant numbers of nests of the endangered Loggerhead turtle; and, severe impacts to these and other natural resources associated with the recreational use of the Cape by the public.

Armed with the results of the pilot study, a three year \$260,000 investigation was initiated in 1993. The project was funded by DOD's Legacy Resources Management Program and was conducted on the Eglin AFB's portion of the Cape. The purpose of the ecological study was to provide an integrated inventory of significant biological, geophysical, cultural and historical assets at the Cape in order to aid in the development of management strategies to protect and enhance these resources. Several partners played an active role in this research project: the USFWS Cooperative Research Unit at the University of Florida was the lead researcher and provided project oversight, specialized personnel (e.g., endangered species specialists, soil scientists) and sophisticated equipment (e.g., GIS); the Florida Department of Environmental Protection provided aerial photography, coastal erosion data, the necessary permits and dune stabilization methods; the Florida Game and Fresh Water Fish Commission provided funding and logistical support to the researchers; and the Florida Natural Areas Inventory provided data on the Cape's natural communities and plant species. To date, the investigations have substantiated continued severe erosion, in some cases threatening structures and the nests of loggerhead turtles and least terns; and the presence of several other endangered species, the nests of whom are being threatened by natural and man made causes.

If this study had not been conducted, the Air Force could have wasted a considerable amount of funding trying to reduce the rate of beach erosion using traditional methods. These methods would have been ineffective due to the high rate of erosion, which was not quantified prior to the study. In addition, traditional erosion control methods would have been detrimental to nesting sea turtles. Prior to the study, sea turtles were known to nest at Cape San Blas but their numbers were thought to be low. The study documented Cape San Blas as having the highest density of nesting sea turtles in northwest Florida. The study has also provided a considerable amount of base line data regarding the Cape's natural resources. For instance, prior to Hurricane Opal, the Cape was known to support a significant number of wintering piping plovers, a federally listed threatened species. This information was useful when evaluating the impacts of military operations on natural resources. In addition to these benefits, a better understanding of the impacts associated with vehicular (public) traffic on the Cape's resources has been achieved. Thus by partnering with the various federal and state agencies, Eglin AFB was able to conduct a comprehensive examination of the natural resources on its properties and develop better management approaches to ensure their wise and continued stewardship of those resources entrusted to them.

### ***Cockroach Bay Restoration. Florida***

Cockroach Bay is located in the southeast portion of Tampa Bay, Florida. The restoration area is a former shell mining area and much of the land serves as the

## APPENDIX A: Case Studies

last barrier between agricultural runoff and the bay ecosystem. Six hundred and fifty-one acres including the shell pits, salterns (areas set aside for evaporation of seawater to produce salt) and upland habitat were purchased by Hillsborough County in 1991. The restoration project was initiated by the Surface Water Improvement and Management Department (SWIM) of the Southwest Florida Water Management District (SWFWMD). The Cockroach Bay Restoration Alliance (COBRA) was



Volunteers planting marsh grass in Cockroach Bay, FL.

established through cooperation between federal, state, and local organizations to plan and carry out the restoration. Their objective is to restore a mosaic of habitats typical of estuarine and coastal environments while at the same time contributing to the improvement of the water quality of the bay.

The project involves two main phases. Phase one involves the restoration of approximately 200 acres of primarily intertidal habitat and phase two focuses on upland habitat enhancement. One hundred and fifteen acres of various types of intertidal wetlands have been restored to date, ranging from intertidal wetland channel systems to open salterns.

Stormwater ponds have been strategically placed, constructed and monitored, and are successfully filtering agricultural runoff before it enters the bay. Thousands of volunteers have worked to remove illegally dumped solid waste from the salterns and have planted native plant species in intertidal areas. Federal, state and local governments are all stake holders in this effort as well as environmental groups, private industry, volunteer groups and educational facilities, including: EPA's Tampa Bay National Estuary Program, NOAA's National Marine Fisheries Service, U.S. Geological Survey, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, the Surface Water Improvement and Management (SWIM) Program of the Southwest Florida Water Management District (SWFWMD), the Hillsborough County Environmental Lands Acquisition and Protection Program, Hillsborough County Environmental Protection Commission, Florida Game and Freshwater Fish Commission, City of Tampa, Tampa Bay Regional Planning Council, Florida Department of Environmental Protection, Cockroach Bay User's Group, Peninsula Design and Engineering Inc., W.C. Reese Contracting Inc., Hillsborough County Road and Street Department, Hillsborough County Parks and Recreation Department, Hillsborough Community College, Lewis Environmental Services, Tampa BAYWATCH, TECO and Leisey Corporation. Public support and the leveraging of resources make this a cost effective restoration project that can be an example to the rest of the nation.

The Cockroach Bay restoration project has successfully restored a variety of coastal habitats which support an array of species, many of them endangered. Furthermore, the partnerships that have been established as a result of this project have created a network through which future restoration activities can be implemented. The Cockroach Bay project is exemplary of a partnership approach that works to restore a coastal area. The benefits of this partnership approach have

## APPENDIX A: Case Studies

allowed the leveraging of funds from a variety of sources at the federal, state and local levels. Additionally, the project has involved the local community, including Americorps volunteers, a juvenile detention group, and numerous school groups, which in effect has raised awareness of the importance of wetland ecosystems. Finally, the restoration of the wetlands and the construction and careful placement of stormwater ponds have proven to be effective in filtering non-point source pollution that negatively effects estuarine and coastal habitats in the bay and beyond.

### *Galveston Bay Oyster Reef Creation, Texas*

Over two million pounds of eastern oysters are harvested from Galveston Bay each year. This harvest, however, has recently been in a state of flux. Changes in the water circulation patterns of Galveston Bay, resulting from development on land and in the bay itself, have resulted in shifting salinity patterns. These changed salinity patterns have, in turn, led to a decline in oyster production due to increased sedimentation over historical oyster reefs and a decreased amount of suitable reef material upon which the juvenile oysters, called spat, will attach. At the same time, the opportunity for new reefs has been created in other areas because of the shifting salinity patterns. These optimal salinity conditions for oyster growth, however, now exist in areas where the substrate is soft and not conducive for oyster spat settlement.

Houston Lighting & Power runs two plants, the Limestone Electric Station and W.A. Parish plant, which together produce 4,000 megawatts of electricity, supporting the large population and business/industrial complex of the Houston, Texas metropolitan region. These coal fired power plants produce 2.2 million tons of combustion byproduct annually in the form of fly ash, over 50 percent of which is landfilled. Regionally, coal-fired power plants in Texas produce about 9 million tons of fly ash annually, which places an enormous burden upon landfills within the state.



Creation of reefs for oyster spat settlement using fly ash pellets, Galveston Bay, TX.

In response to these two evolving problems, the loss of suitable substrate for oyster production and the increase in fly ash production, the idea to construct oyster reefs using pellets made of fly ash was developed. The pellets would provide a hard substrate encouraging oyster spat settlement and benefit the power industry by providing for the productive use of a waste product. Additionally, it was anticipated that estuarine fisheries populations and the commercial and sport fishing industry which rely upon these populations would also benefit. Several small demonstration reefs using fly ash pellets were tested in soft substrate areas of Galveston Bay. Encouraged by negative toxicity results and dense accumulations of oysters on the demonstration reefs, a five acre reef was constructed in the summer of 1993 and has shown significant oyster recruitment since its establishment. Preliminary monitoring results have demonstrated that on natural reefs, oysters reach commercial size in 18-24 months; however, on reefs constructed of fly ash pellets the oysters



## APPENDIX A: Case Studies

reach commercial size in 12 months. Additional monitoring and study will be required to determine the reason for the increased productivity. Nevertheless, depending on the continued realization of positive environmental results and the demand for fly ash pellet reefs in other bays and estuaries, the potential exists for fly ash generators to convert a costly waste disposal problem into a profit making venture with positive environmental consequences.

Numerous partners have participated in this venture: EPA, through the Galveston Bay National Estuary Program, provided planning funds; Houston Lighting & Power and the Port of Houston provided major funding contributions and project development activities; NMFS aided in the development of the proposal and conducted monitoring and testing activities along with Texas A&M University; and the Corps and the USFWS provided technical assistance and the necessary permit and project review. Again, the ability to recognize a common problem and address it in the spirit of collaboration yielded a truly unique project, demonstrating the value of collaboration and program integration in solving regional environmental issues.

### *Mobile Bay/Delta Wetlands Restoration, Alabama*

Mobile Bay has lost approximately 50 percent of its oyster reefs in the last 100 years and its wetlands have decreased by over 30 percent since 1950. The primary causes of this decline are habitat degradation and non-point source pollution. This project consists of two parts, the restoration and protection of oyster reef habitat and the restoration of wetland habitat.

Initial Coastal America efforts were devoted to the restoration and maintenance of public oyster beds in and near southern Mobile Bay. Over 2,000 acres of public reefs were marked, using signs and buoys to delineate reef perimeters. The marking assisted enforcement of existing state laws that prohibit trawling and vessel groundings over these reefs, whether intentional or not. The oyster reef restoration techniques were analyzed through the placement of archeological cultch in Dauphin Island Bay as test material for collecting oyster spat. Two quarter-acre plots were established and initial results



Planting of smooth cordgrass in Mobile Bay, AL.

were very favorable, with high spat settlement taking place accompanied by strong growth rates following spat attachment. Monitoring continues to determine the long term value of archeological cultch material, as the cost of this substrate is higher than most alternative cultch materials. If significantly increased growth rates are seen, they may justify the continued use of this material.

The wetland restoration portion of this project was conducted at the Dauphin Island Sea Laboratory (DISL) and at the State Alabama's Department of Conservation and Natural Resources, Marine Resources Division's Claude Petet Mariculture Center. The DISL project involved site preparation

## APPENDIX A: Case Studies

and planting of a smooth cordgrass (*Spartina alterniflora*) marsh as part of a major educational exhibit about wetlands and coastal values. Approximately two acres of marsh, in addition to coastal barrier upland habitat, was created on the site. In addition to the marsh and coastal barrier habitat, a boardwalk with handicapped access and an educational exhibit was constructed. This complex has become an integral part of the DISL educational program and is viewed by thousands of students and visitors each year. The Mariculture Center project involved the creation of approximately one quarter acre of estuarine marsh which is used to remove waterborne waste from water being released from a fish rearing pond back into the GIWW.

The oyster project, was accomplished by The Alabama Department of Conservation and Natural Resources, Marine Resources Division (MRD), who also provided \$20,000 of the funding. The EPA provided the federal share of the funding (\$40,000) through its Gulf of Mexico Program. The Corps provided assistance in permitting and technical design. The USFWS provided technical assistance and administered a grant to the state. The wetland project involved the provision of design, construction and maintenance services for the wetland area, plus cost sharing by the State of Alabama. Additionally, the Army Reserves provided cleanup and removal services for contaminated sediments in the project area as part of a training exercise, and aided in the construction of weirs providing water to the salt marsh. All together, the combined funding level for both phases of the project was \$302,000 federal and \$100,000 nonfederal, in addition to approximately \$10,000 of in-kind services. If this project had been undertaken without the aid of the Coastal America partnership it is likely that only one small part (about 1 acre of salt marsh) would have been constructed. Perhaps of more significance is that the partnership allowed the rapid implementation of the project over a 24-month time frame instead of the typical 5-6 year period of time. These partnership activities demonstrate the value of the elements of cooperation, project scale, enhanced funding, the benefits to be gained from efficiently using volunteer services and the services of the Army Reserves in a rather unusual, but effective manner.

### *Salt Bayou, McFaddin Wetlands, Texas*



Water control structure at Salt Bayou, McFadden Wetlands, TX.

Historically, the wetland areas located on the McFaddin National Wildlife Refuge, Sea Rim State Park, and J.D. Murphree Wildlife Management Area consisted of fresh to brackish marshlands. Construction of the Sabine-Neches Waterway and Gulf Intracoastal Waterway (GIWW) introduced salt water into these fresh and brackish water marshes which caused conversion of these vegetated areas into open water and reduced their wildlife habitat values. To correct this situation, a water control structure was constructed at Salt Bayou. The project was designated the highest priority project in Texas by the North American Waterfowl Management Plan.

## APPENDIX A: Case Studies

The area is a major waterfowl wintering area, an important wildlife area, and a significant estuarine nursery area for marine organisms of sport and commercial fishery importance. This project will restore the historical vegetative community and improve utilization of the area for a wide variety of fish and wildlife.

This water control structure prevents saltwater intrusion and restores the historic salinity gradient across the marsh lands on the two refuges and state park. The structure allowed restoration of good quality habitat for waterfowl and other wildlife. It also allows state and federal refuge personnel to manage salinity and water levels to influence the marsh vegetative community. At the same time, the area continues to function as habitat for marine animals such as fish, shrimp and crabs. They are able to freely migrate to and from the marsh through Keith Lake Pass at the eastern end of the project area. The Salt Bayou structure, in combination with the existing Star Lake structure, allowed implementation of a joint state and federal water management plan on 60,000 acres of coastal fresh and brackish water wetlands.

Because of the remote location, all equipment and material had to be transported to the construction site by water. To construct the project, the existing bayou was blocked and a new channel constructed. The structure was built on pilings because of the soft soils underlying the marsh. The structure itself contains five gated culverts equipped with slide gates on the marsh side and flap gates on the GIWW side. Stone riprap was placed around the structure and along the GIWW shoreline to protect the structure from erosion. Also, a boat roller ramp was installed for the portage of small boats over the dam between the marsh and GIWW. This will allow fishermen and duck hunters to have continued access to the marsh.

Construction of the water control structure at Salt Bayou was the culmination of about four years of effort by the Galveston District Corps of Engineers, the Texas Parks and Wildlife Department, and Ducks Unlimited. The Corps provided approximately \$1.8 million dollars of funding and designed and constructed the structure. The Texas Parks and Wildlife Department and Ducks Unlimited provided over \$600,000 in combined nonfederal funding for the project. The structure was officially dedicated on December 13, 1995, with a ribbon-cutting ceremony and a shrimp gumbo dinner at the project site. A project such as this demonstrates that when both engineers and biologists from construction and resource agencies combine their engineering skills and environmental knowledge and dedicate themselves to solving environmental problems, the fish and wildlife resources of our nation benefit.

### ***Santa Rosa Island Dune Restoration, Florida***

Hurricane Opal dramatically altered the dune systems of northwest Florida when it made landfall on October 4, 1995. Approximately one and a half miles of U.S. Highway 98 on Santa Rosa Island were washed out as a result of the storm surge. This highway, which links together the resort communities of Fort Walton Beach and Destin, was closed to traffic for over a month. After the immediate storm recovery efforts were conducted, a flurry of well intentioned but misguided efforts were directed toward rebuilding sand dunes. Most of these efforts were focused on protecting private property, structures, and roads. The Florida Department of Environmental Protection (DEP) granted a blanket permit enabling citizens to push sand with heavy equipment (beach scrapping) to protect private structures. Unfortunately, a lack of oversight led to these efforts going far beyond their intended

## APPENDIX A: Case Studies

purpose and resulted in considerable environmental damage. As a result, DEP canceled the blanket permit. The media covered this issue extensively. The public began to question which practices were appropriate and effective, and expected land management agencies to rebuild the dunes. There was no good source of information available to help determine which dune restoration practices were the most effective and least damaging to the remaining dunes. The USFWS hosted a meeting attended by most of the public land management and regulatory agencies in northwest Florida to discuss appropriate dune restoration techniques. During this meeting, it became apparent that a lack of information existed regarding these techniques.

Eglin AFB is responsible for the stewardship of 17 miles of Santa Rosa Island. Of the 17 miles, 4 miles are open to the general public for recreation and 13 miles are closed for mission reasons. Prior to Hurricane Opal, The Nature Conservancy rated Eglin's portion of Santa Rosa Island as the highest quality barrier island in northwest Florida. This island provides important habitat to eight threatened and endangered species including the Santa Rosa Beach Mouse, green sea turtle, loggerhead sea turtle, snowy plover, least tern, perforate lichen and two species of golden asters. One species in particular, the Santa Rosa Beach Mouse, was hardest hit by the hurricane. Eglin's beach mouse population was the largest and healthiest population of beach mice in northwest Florida and southern Alabama. Post hurricane evaluations estimate the population to have been reduced by as much as fifty percent.

The project was designed to accomplish five main objectives: 1) to help accelerate the natural dune building process; 2) to do so in a manner that would provide the greatest short-term benefit toward restoring Santa Rosa Beach Mouse habitat; 3) to evaluate the efficacy of two different sand fencing materials arranged in three different configurations; 4) to determine which types of native plantings and planting seasons were most successful; and 5) to publish the findings in hopes of benefiting other land managers and private citizens.

Sand fencing was determined to help accelerate natural dune building processes and as a result will help to restore threatened beach mouse habitat. Sand fencing will also help develop a dune system in critical areas where U.S. Highway 98 was washed out by Hurricane Opal's storm surge. The project consists of seven different treatments (six test treatments and one control treatment) that were replicated six times on Santa Rosa Island. Each of the seven treatments is 45 meters in length making the total length of each replication 315 meters. The total length of sand fencing erected was 1,890 meters. The project was led by the Air Force which provided project origination, funding (\$22,000), implementation and monitoring. The USFWS and Florida Department of Environmental Protection assisted with permitting and the University of Florida helped with study design, collection and analysis of data, and publication of findings. The USFWS also conducted literature reviews and hosted a meeting to share information regarding dune restoration techniques. In addition, the Boy Scouts of America provided over 120 hours of volunteer labor. Planting native vegetation was conducted in the fall of 1996 and again in the winter of 1997 with monitoring and evaluation ongoing until completion in July of 1998.

It is likely that the Air Force would have taken some action on its own to address dune restoration at Santa Rosa Island. However, by involving Coastal

## APPENDIX A: Case Studies

America's partners, they were able to accomplish more objectives by broadening the scope of the project and by conducting the project in the form of a research experiment.

### *West Galveston Bay Seagrass Restoration, Texas*

Seagrasses are nurseries for many marine species, often supporting faunal densities much greater than those found on bare sand or mud habitats. In the western portion of the Galveston Bay estuary however, seagrass beds have declined from 2200 acres in 1956 to zero by 1989. Most of these seagrass meadows (primarily shoalgrass, *Halodule wrightii*) grew along the barrier island edges of western West Bay. Seagrass loss has been attributed primarily to the direct and indirect effects of dredging canals, housing development, dredged material disposal on and dredging through seagrass beds, increased turbidity, and increased wave action caused by bulkheading, wherein waves are reflected by bulkheads instead of being absorbed on a natural shoreline.

Successful restoration of seagrass beds will increase habitat for species of commercial and recreational importance such as penaeid shrimp, blue crab, and spotted sea trout, as well as their prey and other species dependent upon this habitat. It will also stabilize shorelines and slow erosion. Because of increased water clarity in the West Bay due to decreased dredging and the area's history of supporting lush seagrass beds, restoration now appears possible. However, natural recolonization has been hindered by the lack of nearby propagules or seed sources, limiting restoration efforts to one acre plots.



Planting seagrass in West Galveston Bay, TX.

Two areas along western Galveston Island were replanted with *Halodule wrightii* in late April and early May of 1994. The objectives were to determine survival and growth rates of transplanted shoalgrass planted at various densities and depths and to obtain evidence of increased faunal densities compared to those on nonvegetated substrates. Monitoring of the plantings and the organisms inhabiting the restored areas continued through 1995 and a final estimation of shoalgrass coverage was made in 1996. One site failed during 1995 for unknown reasons, but a second site seems to be successful, as over 1,000 square meters of the original 1,300 square meters planted is alive and spreading. Densities of fish and crabs are higher in the restored areas than in adjacent nonvegetated sands.

The project was funded at \$75,000 by EPA's Near Coastal Waters Program, with NMFS/NOAA serving as the federal lead and the Texas Parks and Wildlife Department serving as the state lead. Both lead agencies were responsible for advance planning and subsequent site monitoring, attracting volunteers, arranging travel, and providing manpower, supplies and equipment (a combined \$25,000 in-

## APPENDIX A: Case Studies

kind match). A variety of federal and nonfederal partners have contributed to the project: the Corps provided permitting histories for coastal development and restoration site selection; the USFWS and EPA assisted in site selection and work plan development; and the Texas General Land Office facilitated the permitting process. These agencies along with the Texas A&M University, Dillard University and the Galveston Bay Foundation provided over 200 hours of volunteer manpower to set up, conduct and monitor the transplanted beds.

It is possible that this project could have been done by one state or federal agency. However, each partner brought a different but complementary set of skills and knowledge to enable smooth progress. In addition, the scale of the project would have prevented all but the largest agencies from fielding enough manpower for the short time frame needed for transplanting. Results of this project will be used by the Texas Natural Resources Conservation Commission's Galveston Bay Program to plan and conduct further seagrass restoration actions, with a goal of restoring 1400 acres of submerged aquatic vegetation over the next 10 years.

### Southwest Regional Implementation Team

#### *Prospect Island Restoration, California*

The Sacramento-San Joaquin River Delta has suffered severe habitat degradation. Less than 4 percent of the Delta's original wetland habitat remains which are required habitats for almost all of the Delta's fish and wildlife resources. Prospect Island is located in the northwestern part of the Sacramento - San Joaquin River Delta, about 20 miles south of Sacramento in Solano County, California. It is bordered on the west by the Sacramento River Deep Water Ship Channel, to the east by Miner Slough, to the south by the confluence of Miner Slough and the Ship Channel and to the north by remnants of the Little Holland tract. Typical of the islands in the Delta, Prospect Island is diked, leveed and farmed, thus providing very little wildlife habitat. However, its proposed restoration will increase the Delta's wetlands by nearly 9 percent!



Aerial view of Prospect Island, CA.

When completed, this effort will restore 229 riparian acres, 60 upland acres, 600 acres of open water, 260 acres of freshwater marsh, 160 acres of mudflat, and

The purpose of this project is to provide rearing habitat for endangered winter-run chinook salmon and other anadromous fish, spawning and rearing habitat for the Delta smelt and the proposed endangered Sacramento splittail, and habitat for federally listed waterfowl and shorebirds on the Pacific Flyway. Further, the environmental objectives also include providing high quality riparian, shaded riverine aquatic, wetland mudflat, emergent marsh and upland and shallow water habitat for a wide variety of aquatic, avian, and terrestrial species. Finally, the project will not adversely impact the levees of surrounding islands or other adjacent features. The entire island is about 1,600

## APPENDIX A: Case Studies

about one mile of shaded riverine aquatic habitat. A total of 1,309 acres of habitat will be restored.

The Sacramento District Corps of Engineers initiated a reconnaissance study in April 1994 and completed it in April 1995. Prospect Island was approved as a Section 1135 project on December 26, 1995. However, federal funding was not available to initiate the project modification report until August 1996. The USFWS will operate Prospect Island as part of its North Delta Refuge Unit. Local support for this project is extremely high. In May 1996, the nonfederal sponsor for Prospect Island, the Delta Wildlife Refuge (DWR), received their nonfederal portion of the cost share for Prospect Island from the CalFed Bay-Delta Program. The Bureau of Reclamation purchased the property in January 1995. The project is currently under construction and is scheduled for completion by the year 2000.

The project will construct interior islands within Prospect Island to help reduce wind induced waves and provide additional habitat. It will stabilize the existing levees by contouring the slopes to a 10:1 pitch and levees and islands above the high tide line will be stabilized with biotechnical plantings and hydroseeding. Following these activities, the ship channel and Miner Slough levees will be breached in one location each, restoring full tidal action to the interior of the site. Islands will be located so that they act as windbreaks, preventing long fetch lengths from developing, thereby reducing wind and wave erosion. Islands will be constructed so that upland, riparian, shaded riverine aquatic, riparian, emergent marsh, mudflat and open water habitats will grow at the appropriate tidal elevations. A channel will be excavated connecting the two breaches. This excavation will provide material needed to construct the islands and exterior levee embankments. The channel itself will provide a flow through, facilitating the movement of water through the site so that it will be replaced daily by tidal action and discourage predator fish from taking up residence within the site.

The federal lead on this project was the Corps which provided funding, design, NEPA and other federal regulation compliance and project management. The U.S. Bureau of Reclamation provided the land, geotechnical exploration and hydrology studies. The USFWS will provide long-term operations and maintenance at the site. In addition, The California DWR provided funding, geotechnical exploration, and hydrology expertise. The CalFed Bay-Delta program provided funding and the Interagency Ecological Program provided fish monitoring.

Prospect Island is a relatively large scale project. The federal funding for this project was provided as an estimated \$3.75 million in-kind transfer of services. In addition, \$2.5 million of nonfederal funding was provided with \$1.25 going toward project cost and \$1.25 million going toward an ongoing operations and maintenance endowment. These partnership activities demonstrate the value provided by the elements of cooperation, project scale, enhanced funding, and the benefit of agencies working collaboratively towards a common objective.

### *Sonoma Baylands Wetlands Restoration, California*

This project was designed to assist in the restoration of tidal wetlands at the Sonoma Baylands site by demonstrating the beneficial use of dredged sediments on a 39-acre pilot site and then transferring those lessons to the entire site. The overall project has created new habitat for fish and wildlife by using dredged sediments

## APPENDIX A: Case Studies

from the Petaluma River and Oakland Harbor navigation channels to restore tidal marsh on a subsided former hay field.

Sonoma Baylands was a 348-acre former tidal wetland that was diked, drained, and used as an oat hay field for decades. The site was prepared for tidal restoration by constructing peripheral and interior levees and interior wave barriers,



Before and after shots of Sonoma Baylands, CA where 348 acres of tidal wetlands were restored through beneficial use of dredge material.

modifying three high voltage electrical transmission towers, and constructing three return flow weir structures. Dredged sediments from maintenance of the Petaluma River navigation channel and the deepening of the Oakland Harbor channels were then placed within the site to restore the original marsh elevations partially.

The project was constructed in two major phases. The first phase consisted of the 39-acre pilot unit that was restored using 207,000 cubic yards of maintenance dredged sediments from the Petaluma River channel. The pilot unit was opened to tidal action by breaching the old bayfront levee in January 1996. The second phase was the restoration of the remaining 309-acre main unit using about 1.7 million cubic yards of dredged sediments from the deepening of Oakland Harbor. The main unit was restored to tidal action in October 1996. It is expected that an existing adjacent marsh will provide abundant propagules for the natural establishment of vegetation within the Sonoma Baylands site. Monitoring the development of the restored marsh is an element of the overall plan and includes provisions for mediation if the monitoring results indicate a need for corrective action. Current monitoring activities include tidal hydrology, sediment deposition, fish and bird use, vegetation and benthic colonization, water quality, sediment organic chemistry, and channel

morphology. Team members involved with this project include: the U.S. Army Corps of Engineers, EPA, National Marine Fisheries Service, California Coastal Conservancy, San Francisco Bay Conservation and Development Commission, San Francisco Bay Regional Water Quality Control Board, Sonoma Land Trust and the Pacific Gas and Electric Company

This project restored tidal wetlands in a region that has lost about 82 percent of this valuable resource. The pilot unit was also the first use of electrical resistivity technology to manage the hydraulic placement of dredged material for habitat restoration. This innovative use of technology greatly improved the ability of the construction managers to achieve the desired marsh elevations. The results from



## APPENDIX A: Case Studies

the pilot unit demonstrated that electrical resistivity technology could be relied upon to manage the construction of the main unit, as well as future marsh restoration projects, using dredged material. The Sonoma Baylands project restored 348 acres of tidal wetlands through the selective placement of clean, dredged material from federal navigation channels while providing for the maintenance of the federal channels and contributing to the local economy. This effort clearly demonstrates the advantage of collaborative efforts in achieving elements of cooperation, project scale, enhanced funding, and technology transfer.

### Northwest Regional Implementation Team

#### *Duwamish River Estuary Intertidal Wetlands, Washington*



Before and after shots of the GSA site on the Duwamish River, WA where the removal of a building and concrete structure enabled the restoration of intertidal habitat.

Local geologic conditions in the Pacific Northwest have limited the extent of broad, flat coastal areas considered essential for modern human development. This topography has directly influenced the location and manner in which commercial development in the areas surrounding Seattle, Washington's Puget Sound has evolved, thereby placing significant development pressures on coastal wetlands and other coastal habitats of the Puget Sound Estuary.

The Port of Seattle, located in the Duwamish River estuary within Puget Sound, provides an example of the industrial history in this area. The Duwamish River provides a passageway to the inland portions of the state, and thus has been an area of heavy industrial development. Concrete, glass, steel and lumber factories, and construction and barge companies have all been a part of its economic fabric. This development, while playing a significant role in the economic expansion of the Seattle region, has taken a heavy environmental toll. The developmental history of the Duwamish Estuary has resulted in the loss of approximately 98 percent of its former intertidal marshes and mudflats. These habitats are critical to juvenile salmon, and many other species of aquatic and terrestrial wildlife, and their loss represents a serious

threat to the ecological integrity of both the Duwamish River Estuary and the greater Puget Sound. In addition, anadromous fish passage has been blocked or restricted by dams and diversions. Despite this heavy loss, the Duwamish River system continues to provide remnants of valuable habitat function within a highly

## APPENDIX A: Case Studies

urbanized area. The river still supports a limited heron rookery and salmon fishery. However, that productivity could be increased if additional habitat were established.

This Coastal America project has remediated some of the impacts of historical industrialization with enhanced and restored environmental features. Three sites along the Duwamish River were identified for initial restoration: the Turning Basin, the General Services Administration (GSA) site, and Terminal 105. These three areas were chosen based on their availability, their suitability for restoration and their potential to show marked improvements in critical habitats with limited funding. Each project had three basic phases: first, the removal of debris; next, the regrading of the shoreline and bottom sediments to restore appropriate intertidal elevations, and; finally, the establishment of a riparian buffer.

There are a number of habitat reconstruction technologies being demonstrated in this group of projects. For example, at the GSA site, modified log booms are being used to minimize boat wake impacts along the shoreline. Another is the construction of an intertidal bench on existing rip-rap, along with modified rip-rap bank tops to facilitate the development of a more robust riparian buffer that is better able to withstand erosive forces. These projects also have individual education components such as interpretive signs to explain the ecological importance of the features being developed at these sites. Volunteer youth groups were used in the planting of the intertidal and riparian buffer areas, an activity that also had an education component to it, as these volunteers learned about the importance of these small ecological improvements in an urban setting. The restoration of these sites helps to partially restore salmon and other aquatic wildlife populations and their habitat, enhance public access to the river, and improve the quality of life along this active waterfront. The net result is ecological restoration and sustained environmental features along with continued economic development.

These restoration activities have been undertaken under the leadership of the USFWS in partnership with the NMFS, the EPA, the Corps, the GSA, and the Port of Seattle. The NMFS conducted contaminant sampling and evaluation, review and analysis of monitoring data, and technical review of the project design. The EPA investigated the feasibility of restoration on a system-wide basis, provided overall federal coordination, conducted baseline sediment sampling, developed and facilitated monitoring and sampling plans for project evaluation, and evaluated potential sites. The Corps provided technical assistance in engineering, design and construction, baseline sediment sampling and analysis and the administration of permit requirements. The GSA was the facilities manager of one of the sites. The Port of Seattle also played a major role and recommended a sediment management plan including dredging and disposal, and sediment and bank stabilization.

The Duwamish project was a fairly large scale project. The combined federal funding allocated was \$336,000 . The nonfederal contribution was \$290,000 for a combined total of \$626,000. In addition, staff of the federal partnership agencies contributed over 1000 hours of volunteer efforts and the Port of Seattle provided an additional 200 hours of volunteer time. The port also made available heavy equipment for the project. Several private organizations assisted with additional volunteer help. The Student Conservation Association, Duwamish Youth Initiative, People for Puget Sound, Earthworks Seattle, the Suquamish Tribe, the Muckleshoot

## APPENDIX A: Case Studies

Tribe and Shapiro and Associates all provided volunteer help totaling over 1,000 hours. Thus, over 2,400 hours of volunteer effort was utilized in this project to help restore about five acres of intertidal estuarine habitat in an urban environment at three separate locations. The project was completed in April of 1996.

This was an excellent project and it perpetuated a partnership that continues to this day. In the words of project manager, Mr. Pat Cagney of the Corp's Portland District, "I think what made the project come together was the start up money that Coastal America was able to divert towards the project." These partnership activities demonstrate the value added provided by the elements of cooperation, project scale, enhanced funding, and the benefit of more efficient regulatory mechanisms when a common objective is identified and the agencies work collaboratively towards that objective.

### Alaska Regional Implementation Team

#### *Barneby's Milkvetch Reintroduction, Alaska*

Located on the Kotzebue Long Range Radar Site (LRRS), in Kotzebue, Alaska, the rare plant, Barneby's milkvetch (*Oxytropis arctica* var. *Barnebyana*), colonizes disturbed soils of the Kotzebue LRRS and has been found on a 120 foot bluff adjacent to the a beach of Kotzebue Sound. Health and safety considerations required the demolition of abandoned buildings and the remediation of soils impacted by petroleum product uses on the Kotzebue LRRS. The plant also occurs on other LRRS properties and is considered to be under threat from dredging activities and adjacent development. This project will ultimately provide information for upcoming management decisions for the protection, mitigation and restoration of this rare species. The project is a cooperative effort between the U.S. Air Force (USAF), U.S. Fish and Wildlife Service (USFWS), the Bureau of Land Management (BLM), and the Alaska Department of Natural Resources' Alaska Plant Materials Center (APMC). To prevent destruction of this rare plant, the USAF and USFWS signed the first Conservation Agreement and Plan in Alaska which, it is hoped, will prevent the listing of Barneby's milkvetch under the authority of the Endangered Species Act.

Education and notification activities on the Kotzebue LRRS ensured all USAF staff, contractors, and agents were aware of the location of Barneby's milkvetch. Boundary maps were created to delineate plant population boundaries. Monitoring was conducted to survey plant populations and to map, record and monitor plants that were unaffected, transplanted or extirpated. Mitigation was accomplished by collecting and developing seeds and seedlings as well as transplanting plants. The last component, experimentation, established experimental populations to monitor survivorship of transplanted plants, seed viability, and germination.

US Air Force, the lead federal agency contributed \$88,500 to this effort. The other partners provided in-kind services (hours, equipment, or other forms of assistance and an

A US Fish and Wildlife Service employee waters transplanted Barneby's milkvetch, Kotzebue, AK.



## APPENDIX A: Case Studies

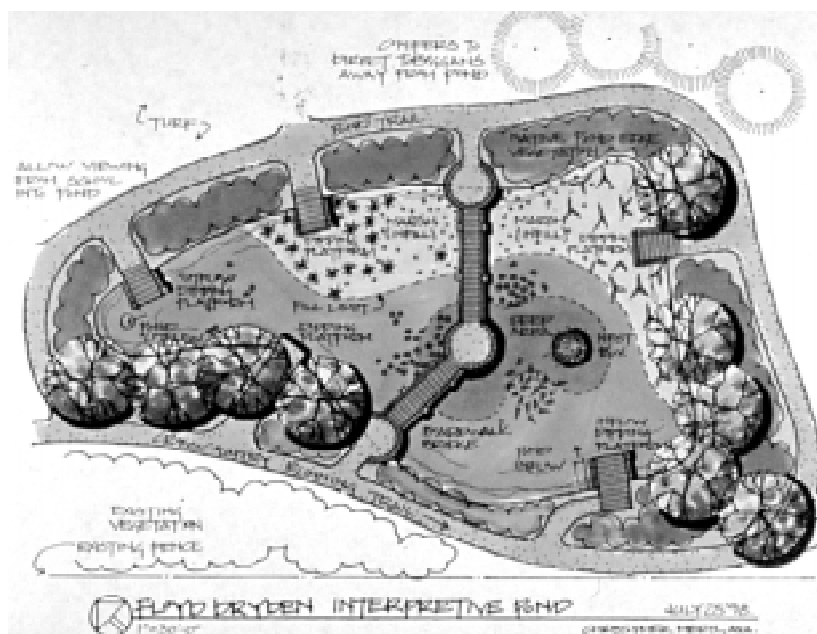
estimated dollar value) as follows: the USFWS, valued at approximately \$20,000 for paid staff, office space, materials, supplies, and tools; the APMC, valued at approximately \$4,000 for paid staff, laboratory and office space, materials, supplies and tools; the BLM, valued at approximately \$5,000 for surveys in adjoining areas showing promise for other Barneby's milkvetch populations: the National Park Service volunteered one person for 40 hours, estimated at \$800 and Lavonne's Fish Camp volunteered seven persons 3 hours each, estimated at \$420.

Implementation of the Conservation Agreement was completed with a December 1997 report. Project mitigation planting, seeding, and transplanting will continue following 1998 demolition and remediation activities. APMC will evaluate the mitigation and produce annual reports. Additional population genetics will be accomplished in the future by the University of Alaska, at Fairbanks. The genetics studies will confirm if Barneby's milkvetch populations discovered on BLM properties are the same species. Through projects such as this, Coastal America's partners are able to achieve success by leveraging resources, expanding the scope of the investigation, improving our natural history knowledge and avoiding the costly and time consuming listings of endangered species by implementing conservation and restoration activities early, before a species becomes listed.

### *Duck Creek Watershed Restoration Project, Alaska*

Duck Creek is a small stream in Juneau's Mendenhall River Valley, with much of its water originating from springs in its headwaters. Until the 1950's, chum salmon and trout were abundant, with chum salmon numbering as many as 10,000 per year. Fishing for Dolly Varden and cutthroat trout was excellent and as many as 500 coho salmon were present. Today in Duck Creek, chum salmon are extinct, coho salmon have been reduced to remnant numbers and trout fishing is closed. The stream resembles a ditch and is on the State of Alaska's impaired waterbodies list. The major problems on Duck Creek are: seasonally inadequate stream flow; channelization; sedimentation; inadequate stream crossings, e.g., improperly designed culverts; barriers to fish migration; excessive nutrient runoff from developed areas; pollution, including trash, litter, sewage, oil and others; flood hazards to property owners; loss of streamside vegetation; and high iron content in groundwater.

Restoration Plan of a stormwater treatment marsh at an old burrow pit site, Duck Creek, AK.



from developed areas; pollution, including trash, litter, sewage, oil and others; flood hazards to property owners; loss of streamside vegetation; and high iron content in groundwater.

An advisory group was formed in 1992 to look at the problems of Duck Creek and to help determine what would improve it. The advisory group provides technical assistance to the community stakeholders and agencies in managing and restoring Duck Creek and its watershed and is in the process of collaboratively developing a planning document for the long range management of the watershed. The advisory group cooperates with the City and Borough of Juneau and various state and federal agencies in the design of road and drainage structures to improve flood control

## APPENDIX A: Case Studies

and fish passage. Baseline information is being collected from various sources to help understand the problems and recommend restoration solutions. To date there are 26 organizations, small businesses, local, state and federal agencies involved with Duck Creek, including: NOAA/National Marine Fishery Service; USFWS; EPA; U.S. Geological Survey; Federal Highway Administration; Army Corps of Engineers; Alaska State Departments of Environmental Conservation, of Fish and Game, of Natural Resources, and of Transportation and Public Facilities; the City and Borough of Juneau; the Southeast Conference; Goldbelt, Inc.; Gastineau Guiding; Huna Totem Corporation; SuperBear Grocery; Yard Doctor Landscapes; Arete Construction; Dave Hanna Construction; Duck Creek Homeowners; Juneau Trout Unlimited; Southeast Alaska Guidance Association; Juneau Youth Services-Miller House; Alaska Discovery Foundation; and Juneau Public Schools. Finally, although Duck Creek and its watershed are severely impacted by residential, commercial, transportation and industrial development, there is still an opportunity to generate benefits from this urban stream by employing scientific methods and a cooperative framework to the problems. Although Duck Creek is severely degraded there is renewed confidence that the collaborative nature of this investigation and the subsequent implementation of selected features may work to bring about this watershed's restoration.

### *Kenai River Restoration, Alaska*

Located 75 miles south of Anchorage, Alaska, on the Kenai Peninsula, the Kenai River drains more than 2,000 square miles of diverse landscape. The river is also the state's premier chinook salmon and trout stream, and provides important rearing and spawning habitat for other extremely valuable fish species. The area is experiencing rapid development and increased pressure from recreational groups. These pressures have resulted in the loss of high value aquatic and wetland habitats. Specifically, the river banks of the Kenai and other south central Alaska streams and rivers have been degraded by boat wakes and the heavy foot traffic of fishermen into and out of the river. Additionally, residential and commercial development has also led to the filling of adjacent wetlands and the bulkheading of shorelines, which together with the heavy fisherman foot traffic, has led to the destruction of important rearing habitat for juvenile salmonids.

This restoration project has been designed to demonstrate a number of techniques for preventing erosion and damage from the development that has occurred along 80 miles of the river. Project implementation comes after nearly 12 years of biological surveys, the formulation of goals and objectives, and the development of plans specific to the project site. Project features include a combination of streambank restoration and protection structures plus an educational program. The streambank features include vegetated cribwalls, revegetation of denuded areas with grasses and willows, and an elevated, light penetrating boardwalk that keeps fishermen off the vegetation and leads to stairways that provide less damaging access to the river. The educational aspects include a poster to explain groundwater activity and an interpretive program at local grade schools, high schools and the community college to teach children and young adults of the importance of protecting and managing wetland and riverine habitat and groundwater quality. Additionally, education and technical support of local land owners is being provided to help them apply proven bioengineering techniques into any existing and/or future residential or commercial construction activities.

## APPENDIX A: Case Studies



Bioengineering techniques, such as the willows shown here, were used for bank stabilization along the Kenai River, AK.

Construction was initiated in the Spring of 1994. The vegetated cribwall was completed, but only part of the elevated boardwalk and only one set of stairs to get fishermen over the bioengineered banks and into the river was in place at the end of the first construction season. Most of the cribwall and live plantings held up well during the summer high water event in 1994, but some erosion occurred on the downstream portion of the project. Subsequently, several meetings of the principal partners, including the USFWS, the Alaska Department of Fish and Game, the City of Soldotna, and the project designer, were held to decide what needed to be done to complete the work and how it was to be funded. The Alaska Department of Fish and Game and the City of Soldotna agreed to complete the project. Partners included the USFWS, the lead federal agency, supported by the EPA, Army Corps of Engineers and Natural Resource Conservation Service who collectively provided \$145,000. This federal contribution was supplemented by \$135,000 from the State of Alaska. The project is now complete with maintenance activities being undertaken by the City of Soldotna. Of perhaps greater importance is the development of a “one stop shop” within the city where home and business owners can go to obtain technical information, advice and the necessary permits to apply these proven bioengineering techniques. Clearly this is an excellent example of technology transfer to the local user, in this case local land owners and developers in the City of Soldotna. Additionally, it also speaks

to the benefits of collaboration by getting multiple federal and state agencies involved in solving a problem.

### *Polar Bear Video, Alaska*

Polar bears are the most unpredictable and dangerous of all North American bears. Beaches and onshore radar sites and villages are the habitat used by polar bears when they are not offshore. Polar bears can and do attack humans. In 1991, a resident of the village of Point Lay was killed while walking through the Point Lay Long Range Radar Site (LRRS). In 1993, an Air Force contractor employee was critically wounded when a polar bear pushed its way into the Oliktok LRRS. The Air Force operates several radar sites on the Alaska North Slope and North Coastal Areas, including: Barter Island, Bullen Point, Oliktok, Lonely, Point Barrow, Wainwright, Point Lay, Cape Lisburne, Kotzebue, and Tin City.

In order to provide information to better understand and manage a species protected by the Marine Mammal Protection Act it was decided to develop a polar bear interaction plan and a safety training video to reduce the possibility of human and bear losses. The plan included researching structures and recommending modification to facilities to reduce bear/human interactions, minimizing the attraction of the radar sites by disposing of garbage properly, maximizing lighting for detection and deterrence, properly storing and/or disposing of materials that may be toxic to polar bears, and researching climate resistant trip-wire detection systems to warn personnel of potential dangerous polar bear conditions. A safety training video was produced that outlined various precautions to minimize encounters with polar bears

## APPENDIX A: Case Studies

and educate the viewer on the requirements of the Marine Mammal Protection Act and life history of the polar bears.

The federal lead for this effort was the U.S. Air Force, 611th Civil Engineer Squadron, which contributed \$45,000 to the project. In-kind services were provided by the USFWS, valued at approximately \$10,000 for paid staff, office space, materials, supplies and tools and the Minerals Management Service, valued at approximately \$2,000 for paid staff review of educational materials. The project is underway with a Safety Training Video having been produced, finalized and distributed. Guidelines for Radar Site Operations in Polar Bear Habitat is now in a Guideline Pamphlet. A final polar bear management plan has been developed. This project represents a non-traditional partnership between the military and the natural resource agencies to identify ways to solve problems collaboratively.



Polar Bears are the most unpredictable and dangerous of all North American bears.





# **Appendix B**

## Project Managers