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Part VII

Environmental Protection Agency

Prince William Sound and Gulf of Alaska; Draft 1991 Restoration Work Plan; Notice

ENVIRONMENTAL PROTECTION AGENCY

[WH-FRL-3910-8]

Prince William Sound and Gulf of Alaska Restoration

AGENCY: Environmental Protection Agency and the Alaska Department of Law.

ACTION: Notice.

SUMMARY: The Environmental Protection Agency, acting to coordinate restoration on behalf of the Federal Trustees (the U.S. Departments of Interior and Agriculture and the National Oceanic and Atmospheric Administration), and with the Alaska State Trustees (the Alaska Attorney General as the lead State Trustee and the Alaska Departments of Fish and Game and Environmental Conservation) are publishing here (1) a discussion of the overall process the State and Federal governments intend to follow to enhance and expedite the recovery of Prince William Sound, lower Cook Inlet, and the Gulf of Alaska from the *Exxon Valdez* oil spill and (2) a draft 1991 Restoration Work Plan comprised of restoration planning and implementation activities being considered by the Trustees. The public is invited to comment and to suggest other activities that should be considered by the Trustees in preparing this draft 1991 Restoration Work Plan. Notice of intent to take this action was published in the **Federal Register** in November (55 FR 48160, November 19, 1990).

DATES: The Federal and State of Alaska governments will accept comments through April 15, 1991.

ADDRESSES: Written comments should be submitted to: Secretary, Restoration Planning Work Group, Oil Spill Restoration Planning Office, 437 "E" Street, Suite 301, Anchorage, Alaska 99501, Phone (907) 271–2461.

FOR FURTHER INFORMATION CONTACT: Susan MacMullin at (202) 245–4373.

SUPPLEMENTARY INFORMATION:

I. Introduction

Purpose

The U.S. Departments of Agriculture (DOA) and the Interior (DOI), the National Oceanic & Atmospheric Administration (NOAA), and the Alaska Attorney General, the Alaska Departments of Fish and Game and Environmental Conservation, (hereafter referred to as "the Trustees") and the Environmental Protection Agency (EPA) desire to implement restoration activities in the areas affected by the *Exxon Valdez* oil spill as soon as practicable. This Notice contains a draft 1991 Restoration Work Plan comprised of restoration planning and initial implementation activities under consideration by the Trustee Council, an Alaska-based intergovernmental group charged by the Trustees with managing the natural resources damage assessment and restoration program for 1991. Restoration activities in 1991 and subsequent years will be undertaken as appropriate, based on the Trustees' increasing understanding of resource injuries and other relevant considerations. Implementation activities in 1991 will not foreclose future restoration options and are not intended to be a complete or comprehensive restoration program. Implementation of all restoration activities will follow appropriate procedures for compliance with applicable State and Federal laws and regulations. The President of the United States has designated EPA to coordinate, on behalf of the Federal Trustees, the long-term restoration of Prince William Sound and other areas affected by the *Exxon Valdez* oil spill. Accordingly, the EPA Administrator is issuing this document as an action under the Clean Water Act and the Alaska Attorney General is working in concert with the EPA under State authority.

Although preparation of the draft 1991 Restoration Work Plan is not required under the Clean Water Act or the laws of Alaska, the Trustees and EPA have chosen to present this document to obtain public comment and to invite suggestions about other restoration activities that should be considered by the State and Federal governments. The public is also invited to comment on the overall process the governments intend to follow in enhancing environmental recovery in Prince William Sound, lower Cook Inlet, and the Gulf of Alaska and achieving restoration of affected resources and services after the *Exxon Valdez* oil spill.

The Trustees expect to complete the assessment of damages, determine liability, and collect funds from the responsible parties before they prepare a final Restoration Plan. Although the Trustees wish to resolve damage assessment and liability issues as promptly as possible, it is not possible to predict when this will occur. Considering this uncertainty, in cases where the nature of the resource injury, loss or destruction [hereinafter referred to as "injury"] is reasonably clear, and where no alternatives would be foreclosed, it may be desirable to begin implementation of certain restoration activities prior to a final Restoration Plan. As a result, the Trustees are considering implementation in 1991 of activities described in section III of this notice. Other activities related to restoration, such as feasibility studies, technical support projects, and monitoring (see sections 2 and 3), will be considered in the following months and will be presented to the public for review and comment. The Trustees also expect to publish a revised 1991 Restoration Work Plan in the Federal Register in Spring 1991. The Trustees also expect subsequently to publish notice of and to solicit public comment on detailed descriptions for each of the restoration projects selected for implementation in 1991.

Organization of this Notice

This notice has three main sections: I. Introduction, II. Restoration Planning, and III. Draft 1991 Restoration Work Plan. The Introduction presents a synopsis of the purpose of this notice and background information. Section II, Restoration Planning, describes the overall approach to restoration and reports on the planning activities conducted in 1990. In Section III, this notice provides information on restoration planning and initial implementation actions under consideration for 1991.

Further Information

Further information about the *Exxon Valdez* oil spill, the damage assessment studies, and restoration planning activities is contained in the documents referenced at the end of this notice and in the **Federal Register** published on November 19, 1990 (55 FR 48160). These documents and other information on restoration and damage assessment are available from the Oil Spill Public Information Center, 645 G Street, Anchorage, Alaska 99501.

II. Restoration Planning

A. The Planning Process

The Trustees' and EPA's restoration planning activities are designed to determine appropriate ways to restore natural resources and services injured by the *Exxon Valdez* oil spill. Restoration builds upon the spill response and damage assessment process by planning for, and then implementing, activities to restore the environment to its baseline condition.

The Natural Resource Damage Assessment (NRDA) regulations [43 CFR part 11], which implement certain provisions of CERCLA and CWA, define "restoration" or "rehabilitation" as "* * * actions undertaken [in addition

to response actions], to return an injured resource to its baseline condition as measured in terms of the injured resource's physical, chemical, or biological properties or the services it previously provided * * *". This definition of restoration from the NRDA regulations is provided here for informational purposes. The NRDA regulations are not mandatory but do provide a model for restoration planning.

The Trustees have determined that restoration after the *Exxon Valdez* oil spill should be subject to continuing review as information is developed about injuries and possible restoration opportunities. The Trustees expect that each year's work will build on the last, and that all information pertinent to the *Exxon Valdez* oil spill will be examined in the course of the restoration process.

1. Steps in the Planning Process

The restoration planning process is a dynamic and evolving process that will generally include the following steps:

a. *Determining the Need for Restoration.* The need for restoration depends on the nature and extent of natural resources injured, lost, or destroyed and the adequacy of natural recovery. The primary information sources regarding resource injury, loss, or destruction are the studies conducted by State and Federal agencies as part of the natural resources damage assessment. These studies are described in the 1989 and 1990 *Exxon Valdez* damage assessment plans (see the documents referenced at the end of this notice). Other sources of information include public comments, data gathered as part of the oil spill response, and other studies conducted by government agencies outside of the damage assessment process.

b. *Identifying Potential Restoration Activities.* For any injury, there are three possible types of restoration which may be used singularly or in any combination:

Direct restoration refers to measures in addition to response actions, usually taken on site, to directly restore or rehabilitate an injured, lost, or destroyed resource or otherwise to promote or enhance the recovery of such resources;

Replacement refers to substituting one resource for an injured, lost, or destroyed resource of the same or similar type; and

Acquisition of equivalent resources means to compensate for an injured, lost, or destroyed resource by substituting another resource that provides the same or substantially similar services as the injured resource.

Determining the adequacy of natural recovery is fundamental to the choice of a restoration activity. In some cases the Trustees may determine that it is most appropriate to allow natural recovery to proceed without further intervention by man (i.e., no action alternative). The definition of direct restoration includes any administrative actions that may be taken by the Federal or State agencies, such as limiting certain activities in the affected areas, to promote recovery of injured resources.

c. *Evaluating Potential Restoration Alternatives.* Evaluation of potential restoration alternatives will consider such factors as:

—Nature and extent of injury;
—Adequacy of natural recovery;
—Technical feasibility;
—Net environmental benefit (including indirect impacts);
—Cost effectiveness;
—Reasonableness of cost of the restoration project in light of the value or ecological significance of the resource; and
—Results of actual or planned response actions.

Some restoration proposals may be readily evaluated. In other cases additional information, for example, biological, ecological, or resource assessment data, will be gathered to support the evaluation process. The goal of the Trustees and EPA is to conduct restoration planning for the recovery of the injured environment as a whole. In general, priority will be given to alternatives which benefit multiple rather than single species or resources. By necessity, however, individual elements of the restoration program may be species- or resource-specific.

d. *Recommending and Implementing Restoration Activities on a Continuing Basis.* As information about injuries, resources recovery, restoration methods or costs becomes available, certain activities may be recommended and carried out in advance of the receipt of funds for restoration from the parties responsible for the oil spill (see Section III, below).

e. *Presenting a Damage Claim to Parties Responsible for the Oil Spill and Receiving Funds for Restoration.* The damage assessment process initiated by the Trustees is designed to identify and quantify specific resource injuries and determine restoration costs and other corresponding monetary values. The Federal and State governments will present their claims for these amounts to the parties responsible for the oil spill as required by Federal and State law.

f. *Preparing and Implementing a Final Restoration Plan.* When the full amount of restoration funds that will be recovered has been resolved, final determinations will be made concerning the nature and scope of the remaining phases of restoration.

g. *Evaluating the Effectiveness of Restoration Measures, and Recommending Additional Actions.* Implementation of restoration activities and the success of resource recovery will be monitored and evaluated based on standards appropriate to individual projects and resources to verify that restoration goals have been met. Long-term monitoring activities also may be implemented to verify that the affected area is recovering.

Restoration planning, as outlined above, is underway; the overall pace of restoration is dependent on the availability of information to determine injury and the resolution of a claim for damages. Implementation of restoration and monitoring activities may take a number of years. The Trustees and EPA intend to follow the restoration planning process as outlined above in order to accelerate the restoration of the Prince William Sound-Gulf of Alaska ecosystem and the affected natural resources and services.

2. Public Participation

The Trustees and EPA intend to encourage, provide for, and be responsive to public participation and review during the restoration planning process. Carrying out this intent, however, is complicated by the need for confidentiality with respect to damage assessment information due to pending or possible future litigation with the parties responsible for the *Exxon Valdez* oil spill. Notwithstanding these considerations, the Trustees intend to provide an opportunity for meaningful public review and comment on all restoration implementation activities.

In September of 1990, the Oil Spill Public Information Center was opened in Anchorage to provide the public with scientific data and other information related to the 1989 *Exxon Valdez* oil spill. The Trustees will continue to place information in the center as it becomes available.

3. Restoration Planning Activities in 1990

The Trustees and EPA began to solicit public opinion in March 1990 with a symposium on restoration in Anchorage, Alaska. In April and May of 1990, eight public scoping meetings were held throughout southcentral Alaska to ascertain the public's priorities for the restoration program. For a detailed description of these meetings, see the

documents referenced at the end of this notice. In addition to these public meetings, the governments have communicated individually with such constituencies as Native corporations and villages, fishing groups, and environmental organizations.

To gather specific scientific input for the restoration planning process, technical workshops were held in Anchorage in April 1990. Follow-up meetings were held in October and November 1990. Participants included members of the Restoration Planning Work Group (the Alaska Departments of Fish and Game, Environmental Conservation, and Natural Resources, and the U.S. Departments of Interior and Agriculture, the National Oceanic and Atmospheric Administration, and the U.S. Environmental Protection Agency) Federal and State resource managers, and scientists and technical experts under contract to the governments. Due to the necessary discussion of litigation-sensitive damage assessment information, these workshops were closed to the general public.

The Restoration Planning Work Group completed a preliminary literature search, which identified articles and other published material concerning techniques for ecological restoration following oil spills. Approximately 200 publications were acquired for detailed review and are listed in the August 1990 Progress Report.

The Trustees and EPA initiated several small-scale field studies to evaluate the feasibility of restoration techniques. Results from these studies will help determine the costs and effectiveness of full-scale restoration projects. Several technical support studies were also initiated to provide information needed to evaluate or carry out some potential restoration activities. These studies are described in the "State/Federal Natural Resources Damage Assessment and Restoration Plan for the *Exxon Valdez* Oil Spill," August 1990. The 1990 studies and preliminary results are summarized below.

B. 1990 Restoration Feasibility Studies

1. Reestablishment of *Fucus* in Rocky Intertidal Ecosystems

Agencies: U.S. Environmental Protection Agency, U.S. Forest Service.

Early observations indicated that *Fucus*, a marine plant (rockweed) found on rocky shorelines in the intertidal zone throughout the oil spill area, was extensively damaged by both the spilled oil and cleanup efforts. If the natural recovery of *Fucus* could be significantly accelerated or enhanced it would benefit the recovery of associated flora and fauna on intertidal rocky shores.

Specific objectives of this study were to identify the causes of variation in *Fucus* recovery at and near Herring Bay, Knight Island in Prince William Sound; to document the effects of alternative cleaning methods on *Focus;* and to test the feasibility of enhancing the reestablishment of *Fucus.* Although results are preliminary at this time, it appears that *Fucus* recovers most slowly at the sites that were intensively cleaned and that almost no recovery occurs where tar cover persists.

2. Reestablishment of Critical Fauna in Rocky Intertidal Ecosystems

Agencies: U.S. Forest Service, U.S. Environmental Protection Agency.

This feasibility study was designed to compare the rates of faunal recovery in rocky intertidal communities, and to demonstrate the feasibility of restoration of these communities by enhancing recolonization rates for such key species as limpets and starfish. Recolonization rates for these organisms and for the rockweed, *Fucus,* may limit the natural rates of recovery for the entire community.

Parameters examined included the presence or absence of comon intertidal species on impacted and reference sites, population dynamics of several species of invertebrates, larval settlement on oiled versus non-oiled surfaces, and differences in algal grazing by limpets between oiled and referenced sites. Preliminary results indicate that heavy predation of several species of transplanted invertebrates was probably due to the lack of cover usually provided by *Fucus.*

3. Identification of Potential Sites for Stabilization and Restoration With Beach Wildrye

Lead Agency: Alaska Department of Natural Resources, United States Forest Service.

This study was designed to identify sites at which damage to beach wildrye grass has occurred and to recommend restoration measures. This species was affected by both spilled oil and subsequent cleanup activities. Beach wildrye grass is important in the prevention of erosion in the coastal environment and is a key component of supratidal habitats in locations throughout the oil spill area. Erosion resulting from loss of beach wildrye can lead to the destabilization and degradation of wildlife habitats and of cultural and recreational sites. Survey work in 1990 in Prince William Sound indicated injury to several beach rye communities. Following confirmation in the 1991 spring shoreline assessment, restoration activities can be initiated (see Restoration Project 1 summary).

4. Identification of Upland Habitats Used by Wildlife Affected by the Oil Spill

Agencies: U.S. Fish and Wildlife Service, Alaska Department of Fish and Game.

A diversity of birds, mammals, and other animals were killed by the spill or injured by contamination of prey and habitats. Many of these species are dependent on aquatic or intertidal habitats for activities such as feeding and resting, but many also use upland habitats. Protection of upland habitats from further degradation may reduce cumulative effects on injured fish and wildlife populations, and thereby help them recover from the effects of the oil spill. This study focused specifically on marbled murrelets and harlequin ducks, two species known to have been affected by the spill and known to use upland habitats.

Based on surveys of 140 streams, preliminary results of the harlequin duck study indicate that this species nests along larger-than-average anadromous fish streams, with moderate gradients and clear waters. Preliminary results on murrelets suggest that murrelets use slopes facing north or west, and inland areas at the heads of bays as opposed to the outer peninsulas. Open bog meadows, especially at the heads of bays, appear to be used as flight corridors to upper wooded areas.

5. Land Status, Uses, and Management Plans in Relation to Natural Resources and Services

Agencies: Alaska Department of Natural Resources, U.S. Forest Service, U.S. National Park Service, Alaska Department of Fish and Game.

The objective of this study is to locate, categorize, evaluate, and determine the availability of maps, management plans, and other resource documents relevant to restoration planning throughout the oil-spill region. Resource materials identified will assist in planning for and implementing site-specific restoration activities, including direct restoration, replacement, and the acquisition of equivalent resources.

To date, a variety of documents, maps, and management plans have been identified and are being evaluated; other resource materials are being located. This preliminary project will be completed in Spring 1991. A second phase, directly supporting the proposed Restoration Project Number 4, Protection of Strategic Fish and Wildlife

Habitats and Recreation Sites, is under consideration.

C. 1990 Technical Support Projects

1. Peer Reviewer Process for Restoration Feasibility Studies

Agencies: Alaska Department of Fish and Game, Alaska Department of Environmental Conservation, Alaska Department of Natural Resources, U.S. Department of the Interior, U.S. Department of Agriculture, National Oceanic and Atmospheric Administration, U.S. Environmental Protection Agency.

This project provided funds to ensure that scientists with expertise on natural resource restoration were available to provide peer review of restoration feasibility projects and other restoration planning studies and activities.

2. Assessment of Beach Segment Survey Data

Agencies: Alaska Department of Natural Resources, Alaska Department of Environmental Conservation, Alaska Department of Fish and Game, U.S. Forest Service, U.S. Park Service, U.S. Environmental Protection Agency.

The objective of this project is to review and summarize beach survey information (obtained through oil spill response activities) to assist in planning for and implementing site-specific restoration activities, particularly in the area of direct restoration. This study was initiated late in 1990 and continues to date.

A master database is being created from that portion of the beach surveys relevant to restoration. The primary sources of this information are the Alaska Departments of Natural Resources and Environmental Conservation. Data from local and regional governments as well as non-governmental sources will also be reviewed and integrated into the system as appropriate. This preliminary project will be completed in Spring 1991.

3. Development of Potential Feasibility Studies for 1991 Agencies: Alaska Department of Fish and Game, U.S. Environmental Protection Agency, Alaska Department of Natural Resources, Alaska Department of Environmental Conservation, U.S. Forest Service, U.S. Department of Fish and Game, U.S. National Park Service, U.S. National Oceanic and Atmospheric Administration.

This project provided for the orderly development of additional feasibility studies including: (a) Monitoring "natural" recoveries; (b) pink salmon stock identification; (c) herring stock identification/spawning site inventory; (d) artificial reefs for fish and shellfish; (e) alternative recreation sites and facilities; (f) historic sites and artifacts; and (g) availability of forage fish. Currently feasibility study proposals are under consideration for all of the above themes.

III. 1991 Restoration Work Plan

The Trustees are currently developing and evaluating restoration planning and implementation activities, which will be described in the 1991 Restoration Work Plan to be published in the **Federal Register** later in the Spring. Planning activities will include feasibility studies, technical support studies, and natural recovery monitoring which will be made available to the public for review and comment. Implementation activities that are now under consideration are presented in this section. The Trustees and EPA are asking, through this notice, for public comment on and additional suggestions for restoration planning and implementation activities for 1991. As noted previously, the Trustees and EPA anticipate publishing later this Spring a notice of the restoration projects identified for implementation in 1991. More detailed descriptions for 1991 restoration projects will be made available to the public for comment.

A. 1991 Restoration Planning Activities

The fundamental purpose of restoration planning is to identify and evaluate potential restoration implementation activities, in consultation with technical experts and the public. The integration of results from the damage assessment and other information into restoration planning is critical to the success of the oil spill program. As damage assessment results are reviewed and evaluated, the Trustees will identify potential restoration implementation activities and related feasibility and technical support projects. This process involves ongoing consultation with principal investigators for damage assessment studies, agency experts, and outside peer reviewers to review the nature and extent of oil spill injuries in relation to the biology and ecology of injured species, habitats, and ecosystems. A key goal is to identify life history requirements, limiting factors, and environmental processes that are especially sensitive or that may be enhanced.

Section II describes five feasibility studies carried out in 1990, some of which may continue in 1991. The Trustees and EPA are considering additional feasibility and technical support projects in 1991 and, following additional review, intend to discuss them in the Spring 1991 **Federal Register** Notice. Studies now being considered concern a variety of resources, including pink salmon, tidal marshes, Pacific herring, bald eagles, recreation, and sea otters. Feasibility and technical support studies will be implemented as damage assessment data and funding become available.

The scientific literature and experience from oil spills other than the *Exxon Valdez* will provide background on restoration and information from other oil spills. In 1991, the Restoration Planning Work Group expects to review and evaluate previously identified literature on restoration (see Appendix B, August 1990 Progress Report) and to continue review and evaluation of literature on species and ecosystem recoveries following anthropogenic and natural environmental disturbances.

Information on the adequacy of natural recovery is central to determining whether to implement restoration actions or to allow injured resources to recover on their own. Direct measures of recovery, such as species distribution, abundance, diversity, growth, reproductive success, or other physiological and biochemical properties, may be appropriate monitoring objectives. In some cases, it is appropriate to indirectly determine the degree of recovery by measuring exposure (presence of oil residuals and/or metabolites) and by applying knowledge or toxicological effects derived from the oil spill literature. For these reasons, the recovery of injured resources can best be followed by implementing a balanced program of monitoring. The duration of recovery monitoring will depend on the time necessary to establish a trend for recovery, and this in turn will necessarily depend on the severity and duration of effects resulting from the oil spill.

Some recovery monitoring studies will be considered for implementation in 1991. As with feasibility and technical support projects, these will be discussed in the March 1991 **Federal Register** document.

Public participation will continue to be an important component of restoration planning in 1991. The Restoration Planning Work Group is interested in and will try to accommodate requests for meetings with individuals or groups. In addition, the Trustees will consider whether and what additional actions, such as publications and workshops, are appropriate and possible in 1991. Requests and suggestions from the public are invited.

B. 1991 Restoration Implementation Activities

Where the nature of the resource injury is reasonably clear, it may be desirable to begin restoration prior to receipt of funds from the parties responsible for the oil spill. There are several reasons why this may be so.

Failure to undertake timely restoration may allow damages initiated by the spill to continue or accelerate, as in the case of the loss of stabilizing vegetation on beaches. In other cases, protection of strategic habitats, subject to land-use changes, can reduce cumulative stresses on injured resources and maintain, in the near term, a full range of restoration options. Finally, the importance of a resource for subsistence, commercial, or recreational purposes may justify prompt restoration action.

The restoration activities being considered by the Trustees for implementation in 1991 are described below. Before making final decisions for the 1991 program, the Trustees are prepared to conduct public meetings in some of the oil spill communities, if requested to do so. Moreover, the Trustees expect to provide further opportunity for public comment on the 1991 restoration projects after detailed descriptions for each project are available. The projects now under consideration for the initial phase of the restoration process are:

1. Restoration of the Beach Wildrye Community

Lead Agencies: Alaska Department of Environmental Conservation, U.S. Forest Service

Need and Objectives:

The high intertidal-supratidal beach wildrye grasses (*Elymus arenarius* and *E. mollis*) communities show signs of localized injury as a result of the *Exxon Valdez* oil spill and the associated cleanup activities. Injury appears to have resulted from oiling and the stress of mechanical abrasion resulting from oil removal operations carried out by cleanup workers and equipment. Beach wildrye grasses are major contributors to natural beach stability. Injury to this important plant community may result in accelerated erosion of the beaches and adjacent upland plant communities. Also at risk from increased erosion are several nearshore archaeological sites.

Once the beach wildrye root masses are disturbed, natural recovery may be slow, taking several years. Wildrye recolonizes primarily by spreading outward from undamaged plants, and this process can be stopped altogether if the rate of erosion is too great. This may result in a significant loss of intertidal and supratidal area. Restoration intervention may often stabilize a beach in one growing season.

The objective of this project is to stabilize injured sites where natural or cultural resources are at risk. Specific sites for restoration will be chosen following the 1991 Spring Shoreline Assessment. The Department of Environmental Conservation and the Forest Service are also exploring whether this project may more appropriately be carried out under the State/Federal response program.

Methods:

Replanting beach wildrye for stabilization is a proven technology. Nearby healthy stocks of beach wildrye grass will be used as a source of donor material. After replanting, fertilizer will be applied (20–20–10 fertilizer up to 800 pounds per acre) to help the transplanted beach wildrye grass recolonize. At some locations fertilizer alone may be sufficient to encourage existing injured plant communities to recover without transplanting new stock.

Estimated 1991 Cost: $180,000

2. Public Information and Education for Recovery and Protection of Alaska's Marine and Coastal Resources

Lead Agencies: U.S. Fish and Wildlife Service, U.S. National Park Service, Alaska, Department of Environmental Conservation

Need and Objectives:

The *Exxon Valdez* oil spill caused direct and indirect injury to the marine birds and mammals of southcentral Alaska. The purpose of this project is to make users of the area aware of the changes to the ecosystem resulting from the oil spill and to lessen the potential for additional harmful human disturbances.

Methods:

The project's sponsors will publish and distribute information explaining the potential adverse impacts of human activities, and the importance of increased conservation and protection of marine birds and mammals in key habitats in the oil spill area. Print media such as posters, brochures, and possibly books and video tapes will be produced. Consideration will also be given to production of material for school curricula.

Print media will be distributed through traditional outlets including but not limited to refuge, park, and tourist information and visitor centers. Additional distribution will occur at airports, boat harbors, commercial tour operators, and to public agency and private industry training staffs.

Some species identification information will be included but the primary content of the media will emphasize strategies to allow public use and enjoyment of marine birds and mammals while preventing harmful disturbances to these species.

Estimated 1991 Cost: $100,000

3. Salmonid Stocks and Habitat Restoration

Lead Agencies: Alaska Department of Fish and Game, U.S. Forest Service

Need and Objectives:

Spawning and nursery areas of wild stocks of pink and chum salmon which were impacted by the *Exxon Valdez* oil spill occur throughout Prince William Sound, lower Cook Inlet, and the Gulf of Alaska. Pink and chum salmon are major components of the ecosystem, serving as important food sources for other fish, birds, terrestrial and marine mammals. Pink and chum salmon are also harvested by man in subsistence, commercial, and sport fisheries. Since salmon return to the individual streams in which they were born, with little straying to other streams, genetically unique wild salmon stocks will be restored through site specific rehabilitation of salmon spawning and rearing habitats.

Methods:

This project consists of several proven fisheries enhancement techniques that may be applied immediately at specific sites. In addition to those sites and streams at which potential rehabilitation activities already have been identified, a survey of affected salmon spawning habitat within the oil spill area will be conducted in 1991 to determine additional restoration measures. The proposed techniques include fish passage through stream channelization or fish ladders to overcome physical and hydrological barriers and construction of spawning channels. All of these measures provide oil-free spawning areas to replace oil-impacted spawning areas. Additional wild salmon stock restoration measures include remote egg-taking and incubation at existing hatcheries for ultimate fry release in oil-impacted streams. Other measures may include optimal fry release programs that will enhance marine survival of juvenile salmonids.

Estimated 1991 Cost: $1,300,000

4. Protection of Strategic Fish and Wildlife Habitats and Recreation Sites

Lead Agencies: Alaska Department of Fish and Game, Alaska Department of Natural Resources, U.S. Department of the Interior, U.S. Department of Agriculture

Need and Objectives:

The marine and intertidal habitats where most oil spill injuries occurred are ecologically linked to adjacent uplands. The water quality in streams and estuaries where salmon spawn depends on the adjacent uplands. Eagles nest and roost in large trees along the coasts and streams, and marbled murrelets nest in association with forested uplands. Harlequin ducks nest in riparian habitats and feed in the streams as well as in nearby intertidal and estuarine areas. Common and thick-billed murres and other seabirds nest on off-shore islands.

Tourism and recreation activities, such as sport fishing and camping, also depend on the quality and accessibility of shorelines and uplands. The diversity, productivity, and uses of intertidal and estuarine habitats, and of freshwater streams along the coast depend on the ecological integrity of the adjacent uplands. Continued productivity in the undamaged parts of the regional ecosystem, including strategic marine, intertidal, and estuarine habitats and adjacent uplands, may be necessary for the recovery of biological communities that were injured.

During the public scoping process the governments received many restoration suggestions that involved the protection and prime fish and wildlife habitats, recreation sites, and adjacent uplands. Suggested approaches to this protection included land acquisition and changes in management practices.

Land-use activities may occur in the oil spill area in 1991 or 1992. These activities may impact important habitats and recreation sites or slow the recovery of spill-injured resources.

The objective of this project is to identify and protect strategic wildlife and fisheries habitats and recreation sites and to prevent further potential environmental damages to resources injured by the *Exxon Valdez* oil spill. This project will be preceded by a technical support project to identify and evaluate potential properties which if publicly owned will contribute to this objective. Where acquisition of property rights is determined to be appropriate, they will be acquired on a willing buyer/willing seller basis. Primary considerations in deciding which properties should be acquired during this project will include (1) the nature and immediacy of changes in use that may further affect resources injured by the oil spill and (2) the prospect that failure to act will foreclose restoration opportunities.

The Trustees have developed the following preliminary sequence of steps for use in identifying and protecting strategic fish and wildlife habitats and recreation sites:

1. Identification of key upland habitats that are linked to the recovery of injured resources or services by scientific data or other relevant information.

2. Characterization and evaluation of potential impacts from changed land use in relation to their effects on recovery of the ecosystem and its components; comparative evaluation of recovery strategies not involving acquisition of property rights (e.g., redesignation of land use classification), including an assessment of protection afforded by existing law, regulations, and other alternatives.

3. Evaluation of cost-effective strategies to achieve restoration objectives for key upland habitats, identified through steps one and two above. This would include evaluation of other restoration alternatives for these resource injuries.

4. Willing seller/buyer negotiations with private landowners for property rights.

5. Incorporation of acquired property rights into public management.

Habitat and recreation site acquisition proposals that meet the appropriate evaluation factors for restoration (see section 2) will be identified and assigned by priority for implementation in accordance with this preliminary five-step process and applicable State and Federal laws and regulations.

The geographic scope of the 1991 project will be the oil spill area. Subsequent to this initial effort, the Trustees will continue to survey potential acquisitions, including acquisitions outside the spill area.
Estimated Cost: To be determined

C. Funding for the 1991 Restoration Work Plan

Although it is expected that the responsible parties will pay for the costs of the damage assessment and restoration program, there is no certainty about the final amount and when such funds will be forthcoming. It is possible, therefore, that funds to carry out the 1991 Restoration Work Plan, including the proposed planning and implementation activities, will have to be advanced by the State and Federal governments. To date, those funds have not been committed or secured by either government.

D. References

The documents listed below provide additional information on damage assessment and restoration. They are available from the Oil Spill Public Information Center, The Simpson Building, 645 G Street, Anchorage, Alaska, 99501.

1. "The 1990 State/Federal Natural Resource Damage Assessment and Restoration Plan for the *Exxon Valdez* Oil Spill, Volume I Assessment and Restoration Plan Appendices A, B, C."

2. "State/Federal Natural Resource Damage Assessment Plan for the *Exxon Valdez* Oil Spill," August 1989.

3. "Restoration Planning following the *Exxon Valdez* Oil Spill: August 1990 Progress Report."

4. "Restoration following the *Exxon Valdez* Oil Spill: Proceedings of the Public Symposium," July 1990.

Dated: February 26, 1991.

LaJuana S. Wilcher,

Assistant Administrator, Office of Water, U.S. Environmental Protection Agency.

Dated: February 25, 1991.

Charles E. Cole,

Attorney General, State of Alaska.

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