

NRWG  
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Oil Spill Restoration Planning Office  
437 "E" Street, Suite 301  
Anchorage, Alaska 99501  
(907) 271-2461

MEMORANDUM

15 MAY 1990

SUBJECT: Authorization to Conduct 1990 Feasibility Studies

TO: Trustee Council

THROUGH: Management Team

FROM: Restoration Planning Work Group

The Restoration Planning Work Group has been working to identify and evaluate a wide array of potential restoration projects. As a result of the Public Symposium held in March, the series of Community Scoping Meetings begun in April, and the Technical Workshop also held in April, many ideas for restoration projects have been put forth.

A key element in the work plan for Oil Spill Year 2 is to carry out an initial series of feasibility studies that begin to define and test projects that ultimately may be recommended in the Restoration Plan. Attachment 1 summarizes the Work Group's recommendations for feasibility studies to be conducted and developed in 1990. These proposals were developed initially by participants at the Technical Workshop and emerged out of a broader list of information needs developed by the workshop participants.

The broader list of needs are presented in Attachment 2, as they were developed by the workshop participants. Where possible, we have identified linkages to NRDA studies, some of which have been discontinued for the current field season. Many workshop participants felt that the need to support restoration planning could justify reconsideration of these aspects of the NRDA. The Work Group suggests that restoration planning needs be given more weight in future decisions about the continuation and scope of NRDA studies.

The Work Group has evaluated the proposed feasibility studies carefully, taking into account such factors as (1) restoration ideas from the scoping process, (2) linkages to damages or concerns from the NRDA, (3) the potential to successfully carry out the project in the current field season, and (4) cost relative to the feasibility study budget. These feasibility study proposals have resulted from a process involving NRDA principal

**Memorandum to Trustee Council**  
**Page 2**

investigators, NRDA peer reviewers, outside experts, agency personnel, and the Work Group. In addition, EPA research and development scientists had a significant role in developing the details of the larger project proposals, including the Fucus, intertidal fauna, and marsh studies (Nos. 1-3).

Due to the short time frame before field work must begin a more formal peer review process was not possible. A formal process is proposed, however, for future projects, including the second year of projects begun in 1990 (Attachment 1).

As shown in Attachment 1, we are proposing 16 projects in 1990: 8 for full implementation at a cost of \$495, 6 for detailed development at a cost of \$120K, and 2 technical support projects at a cost of \$100K. Three other potential projects at a cost of \$255K are not recommended for implementation as feasibility studies at this time. The total proposed budget for 1990 feasibility projects is \$720K. Although the feasibility study budget approved by the Trustees was for \$500K, we anticipate that sufficient funds will be available for these purposes.

We request that the Trustee Council review and approve these recommendations as its earliest convenience. We specifically request authorization to initiate the proposed feasibility studies immediately. We appreciate your consideration and are ready to respond to any questions you may have.

Attachment 1: Feasibility Studies  
Attachment 2: Information Needs

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ATTACHMENT 1

Feasibility Studies:  
Recommendations of the  
Restoration Planning Work Group

(Estimated Costs are in \$000)<sup>1</sup>

**Recommended for Implementation in 1990**

(1) Fucus communities (\$150)

Develop and demonstrate techniques for large-scale seeding/transplanting of Fucus, a key component of intertidal ecosystems.

(2) Critical intertidal fauna (\$75)

Demonstrate techniques to re-establish intertidal grazers (e.g., the limpet) and predators and evaluate the importance of such efforts for restoring intertidal ecosystems.

(3) Intertidal marshes (\$150)

Develop and demonstrate aeration and other techniques to reduce concentrations of oil in marsh substrates and then to test techniques for transplanting marsh vegetation.

(4) Supratidal Beach Rye Grasses (\$28K)

Locate and analyze supratidal areas for eligibility for site stabilization and restoration. This has significance for ecosystem, cultural, and recreational restoration projects.

(5) Marbled Murrelet Nesting Habitat (\$15)

A preliminary field study to identify nest sites/habitats in support of habitat restoration projects. Pending the results, there may be a full-scale effort in Summer 1991.

(6) Harlequin Duck Nesting Habitat (\$10)

A preliminary field study to identify nest sites/habitats in support of possible habitat protection projects. Pending the results, a full-scale effort in 1991 may be appropriate.

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<sup>1</sup>Cost estimates are for 1st year only.

(7) Land Status, Uses, and Management Plans in Relation to Natural Resources and Services (\$50)

Identify sites, habitats, and sensitive areas for possible restoration projects. These data are fundamental to the entire Restoration Planning Project, especially for the potential acquisition of equivalent resources. Identified as high priority by bird, marine mammal, and recreation technical groups.

(8) Availability of Forage Fish (\$17)

A preliminary field study to provide clues to long-term population declines that influence "natural" recovery times and provide possible basis for projects to restore or augment forage fish populations. This was identified as a key need by both bird and marine mammal groups (seabirds, cetaceans, and pinnipeds feed on many of the same fish species). Pending the results, a full-scale effort in 1991 may be appropriate.

**Subtotal for Projects Recommended for Full Implementation in 1990: \$495**

**Recommended for Further Development in 1990**

(9) Pink Salmon Stock Identification (\$10)

Tagging, otolith, or other studies to separate wild and hatchery stocks and enable management actions that target individual stocks.

(10) Herring Stock Identification/Spawning Site Inventory (\$10)

Analyze scale patterns, survey spawning areas, and undertake other studies to determine if separate stocks exist (e.g., within Prince William Sound and between PWS and lower Cook Inlet). Will provide basis to protect, restore, or augment spawning populations and habitats. Pacific herring is a key food-chain species that is also of commercial importance.

(11) Artificial Reefs for Fish and Shellfish (\$15)

Test the value and cost at northern latitudes of a structural technique that has often been used to enhance commercial and recreational fisheries elsewhere. May have particular significance for rockfish.

(12) Alternative Recreation Sites and Facilities (\$10)

Explore ways (information programs, construction of new facilities, etc.) of redirecting recreational use from oil-damaged sites to alternative locations.

(13) Historic Sites and Artifacts (\$15)

Explore applicability of restoration/stabilization techniques developed elsewhere to archaeological sites in the oil-spill area.

(14) Additional Potential Studies (\$65)

Support development of additional feasibility studies that may emerge through the on-going planning process.

**Subtotal for Projects Recommended for  
Further Development in 1990: \$120**

**Technical Support Projects Needed in 1990**(15) Peer Reviewer Process (\$75)<sup>2</sup>

Implement a peer reviewer process to improve the scientific quality of feasibility studies and restoration projects through better design, implementation, and evaluation. Peer reviewers may include experts already involved in the NRDA process, experts involved in the first technical workshop, or individuals not previously involved in either of the preceding.

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<sup>2</sup>Based on 10 individuals for 5 days each at \$1.5K/day.

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(16) Beach Segment Survey Data (\$25)

Analyze "walk-a-thon" data to enable selection of specific sites and habitats for feasibility studies and restoration projects.

**Subtotal for Technical Support  
Projects Needed in 1990: \$100**

**Total Budget for Proposed 1990 Feasibility Projects: \$720**

**Projects Not Recommended as 1990 Feasibility Studies**

(17) Sea Lion/Harbor Seal Habitat Protection (\$125)

Study the effects of disturbance on sea lion or harbor seal rookeries in support of possible projects to acquire equivalent resources (e.g., on Marmot Island). RPWG recommends that this is best approached through study on opportunities to acquire sensitive habitats (No. 7, above). RPWG does not recommend implementation in 1990.

(18) Sea Otter Histopathology (\$80)

Determine the efficacy of sea otter medical treatment and rehabilitation following exposure to crude oil. This study will yield information that is very valuable to guide future rehabilitation projects. RPWG suggests, however, that it is not a restoration feasibility study and recommends that it be funded through response or NRDA funds (e.g., NRDA Mammal Study No. 7).

(19) Removal of Introduced Predators on Bird Nesting Islands  
(\$50)

Test the effectiveness and cost of the removal of introduced predators (e.g., foxes) on islands with nesting birds (primarily burrow-nesting seabirds) as a restoration technique. This restoration technique holds a great deal of promise, but its feasibility is already well established. No additional information is needed at this time.

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ATTACHMENT 2

Information Needs<sup>1</sup>  
Identified at the Technical Workshop  
3-5 April 1990

Fish and Shellfish

1. Herring stock identification to separate stocks within Prince William Sound and between Prince William Sound and outer Kenai/lower Cook Inlet. [cross reference: Feasibility Study Proposal No. 10 and NRDA Fish/Shellfish Study Nos. 11 and 12]
2. Inventory of herring spawning substrates/localities. [cross reference: Feasibility Study Proposal No. 10 and NRDA Fish/Shellfish Study Nos. 11 and 12]
3. Hydro-acoustic biomass estimates of resident herring stocks. [cross reference: Feasibility Study Proposal No. 10 and NRDA Fish/Shellfish Study Nos. 11 and 12]
4. Adult pink salmon tagging near hatcheries to distinguish wild and hatchery stocks. [cross reference: Feasibility Study Proposal No. 9]
5. Expanded escapement enumeration for commercial species of salmon in relation to oiled streams (would involve additional air and ground surveys). [cross reference: NRDA Fish/Shellfish Study No. 1]
6. A cheap, practical way (e.g., otolith analysis) to separate hatchery from wild stocks. Valdez hatchery needs additional resources to read otoliths and conclude experiment this year (one third of returning fish are marked). [cross reference: Feasibility Study Proposal No. 9]
7. More rapid analysis of coded-wire tag data. [cross reference: NRDA Fish/Shellfish Study No. 3]
8. Basic biological information on rockfish; e.g., tagging fish on reefs and port sampling to provide population estimates. Need age-size database to identify recruitment rates. [cross reference: NRDA Fish/Shellfish Study No. 17]

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<sup>1</sup>These items are presented here, largely as identified by the workshop participants (i.e., with minimal editing on the part of the RPWG staff).

9. Continue trawl assessments on full-scale basis in 1990. [cross reference: NRDA Fish/Shellfish Study Nos. 18 and 24]
10. Monitor contamination in clams and other shellfish. [cross reference: NRDA Fish/Shellfish Study Nos. 13 and 21]
11. Catalog and inventory resources in Prince William Sound and lower Cook Inlet; e.g., better real-time harvest data, escapement estimates, and stock abundance information. Can use mass marking techniques such as otolith analysis, coded wire tags, and electrophoretic techniques.
12. Catalog and inventory dolly varden and cutthroat populations in selected stream systems throughout oil-spill area. [cross reference: NRDA Fish/Shellfish Study Nos. 5 and 10]
13. Pre-oil spill, lower precision in fisheries management data was adequate to ensure proper management. Post-oil spill, however, there is a need for more precise management data owing to the added stress on species and uncertainty introduced by the spill.

### Birds

1. Breeding habitat requirements for the marbled murrelet in the oil-spill area; do they nest in trees as in lower latitudes?, do they use old-growth forest habitat, or can they use second-growth timber? [cross reference: Feasibility Study Proposal No. 5 and NRDA Bird Study No. 6]
2. Status of sea duck populations, with emphasis on the harlequin duck. With reference to the harlequin, specific needs are for population and harvest-level estimates, breeding habitats and nest sites, and winter distribution and site fidelity. [cross reference: Feasibility Study Proposal No. 5 and NRDA Bird Study No. 11]
3. Availability and distribution of forage fish for seabirds in Prince William Sound, including sandlance, herring, and other intertidal non-commercial forage species. [cross reference: Feasibility Study Proposal No. 8]
4. Status of the Smith Island parakeet auklet population--the only parakeet auklet colony in Prince William Sound. [cross reference: NRDA Bird Study No. 9]

5. Population monitoring of pigeon guillemots and alcids on Smith Island. [cross reference: NRDA Bird Study No. 9]
6. Magnitude of bird mortality associated with the nearshore gillnet or seine fisheries in oil-spill area.
7. Annual food habits and requirements of the bald eagle. [cross reference: NRDA Bird Study No. 4]
8. Overwintering requirements and immigration patterns of the common murre. [cross reference: NRDA Bird Study No. 3]
9. Productivity of marine and shore birds in Prince William Sound and elsewhere in order to estimate and then monitor time needed for "natural" recoveries. [cross reference: NRDA Bird Study Nos. 6, 7, 8, 9, and 12 (oystercatcher part)]
10. Relationship of winter and migrant populations of yellow-billed loons in Prince William Sound to Alaska and world populations; also, where do Prince William Sound winter/migrants breed (e.g., Siberia)?
11. Location and abundance of great blue heron rookeries.
12. Sea bird colonies currently on privately-owned lands that may be purchased to provide public education opportunities (e.g, Gull Island near Homer). [cross reference: Feasibility Study Proposal No. 7]
13. Hydrocarbon analysis of 1987 sea duck samples from Valdez Arm (completion of a USFWS project on contaminants due to chronic pollution). [cross reference: Feasibility Study Proposal No. 6 and NRDA Bird Study No. 11]
14. Winter feeding habits of peregrine falcon. [cross reference: NRDA Bird Study No. 5]
15. Causes of long-term declines in marine bird populations (e.g., black-legged kittiwakes) in Prince William Sound. [cross reference: Feasibility Study Proposal No. 8 and NRDA Bird Study No. 8]

#### Mammals

1. Population modeling to derive an accurate estimate of the proportion of the Prince William Sound sea otter population

impacted by the oil spill. [cross reference: NRDA Marine Mammal Study No. 6]

2. Expansion of individual identification capabilities (fluke and dorsal fin catalogs) to facilitate studies of residency, habitat use, reproductive rates, and stock identity of both humpback and killer whales. [cross reference: NRDA Marine Mammal Study Nos. 1 and 2]

3. Biopsy sampling for stock identification of humpback and killer whales (to determine resident versus transient groups). [cross reference: NRDA Marine Mammal Study Nos. 1 and 2]

4. Availability of forage fish (e.g., sandlance and herring) and other prey for humpback and killer whales. [cross reference: Feasibility Study Proposal No. 8]

5. Causes of pre-spill decline in sea lion population and the relative contribution of the oil spill to the declining trend. [cross reference: NRDA Marine Mammal Study No. 4]

6. Sea lion stock identification. [cross reference: NRDA Marine Mammal Study No. 4]

7. Frequency and importance of use of marsh vegetation/beach grasses by sitka deer and black bears in relation to salt marsh habitat damaged by the oil spill. [cross reference: NRDA Terrestrial Mammal Study Nos. 1 and 2]

8. Potential delayed effects of oiling on black bears. [cross reference: NRDA Terrestrial Mammal Study No. 2]

9. Total populations of river otter and mink in affected areas and their habitat use, reproductive potential, and food habits. [cross reference: NRDA Terrestrial Mammal Study No. 3]

10. Effects of oil ingestion on mink reproduction (cross reference: NRDA Terrestrial Mammal Study No. 6]

### Coastal Habitats

1. Area and proportion of Prince William Sound shoreline made up of sandy beaches, cobble beaches and rocky shores in relation to distribution and degree of oiling. [cross reference: NRDA Coastal Habitat Study No. 1]

2. Clean-up options (no clean-up efforts, hot water rinse, cold water rinse, bioremediation) used for each of the three habitat types (supratidal, intertidal, and subtidal). What proportion of each of these types of shoreline was exposed to which cleanup technique? [cross reference: NRDA Coastal Habitat Study No. 1]
3. Direct effects of exposure to oil and whether these effects can be distinguished from the effects of the clean-up efforts. Are Prince William Sound shorelines being monitored for long-term effects and are studies being done to adequately discern the effects of oil from the effects of clean-up efforts? [cross reference: NRDA Coastal Habitat Study No. 1]
4. Amount and concentrations of oil that reached the sediments within Prince William Sound. Also, specific benthic communities within those sediments that are likely to be sensitive to petroleum hydrocarbons. [cross reference: NRDA Air/Water Study No. 2]
5. Areal extent and exposure to oil of supratidal marshes. [cross reference: NRDA Coastal Habitat Study No. 1]
6. Areal distribution of Fucus and proportion of the population which was exposed to oil and to various clean-up methods; also, the effects of those methods. [cross reference: NRDA Coastal Habitat Study No. 1]

### Recreation

1. People's values and perceptions about the oil spill and the area. Must look at users, potential users, and "armchair" users. [cross reference: NRDA Economic Uses Study No. 7]
2. User numbers and patterns in the oil-spill area; e.g., where do kayakers camp in Prince William Sound? [cross reference: Feasibility Study Proposal 12, NRDA Fish/Shellfish Study No. 6, and NRDA Economic Uses Study No. 5]
3. Effects on recreation opportunity spectrum. [cross reference: NRDA Economic Study No. 5]
4. Are we trading high value/low volume tourism for high volume/low value tourism?
5. Value of recreational opportunity translated into consumer surplus. [cross reference: NRDA Economics Study No. 5]

6. Land status/acquisition opportunities with respect to ecological/recreational/cultural values. [cross reference: Feasibility Study Proposal Nos. 7 and 12]
7. Effects of spill on small versus large operators in tourism/recreation industry.
8. Present and future land use plans by land management agencies and private land holders. [cross reference: Feasibility Study Proposal No. 7]
9. Distribution and nature of public-use facilities and opportunities in relation to oil spill. [cross reference: Feasibility Study Proposal No. 12]

#### Cultural Resources

1. Cultural resource values are poorly understood in the oil-spill area. Pre-spill archaeological surveys of sites and artifacts are few. More extensive and complete surveys are needed to help resolve conflicts that have arisen, such as the completeness and accuracy of SCAT surveys by Exxon, the ability of resource surveys to garner proper information to identify site significance, and the ability of the site surveys to meet minimum requirements to develop a proper damage assessment. [cross reference: Feasibility Study Proposal No. 13 and NRDA Economic Study No. 9]
2. Is oil contaminating artifacts? Damaging ability to age to artifacts? Possible to remove oil contamination? [cross reference: Feasibility Study Proposal Nos. 7, 13, and 16, and NRDA Economic Study No. 9]
3. Has oil carried by storm surges splattered and damaged the vegetative cover, there creating instability and increased erosion? [cross reference: Feasibility Study Proposal No. 4]
4. Have clean-up workers accessing supratidal areas resulted in increased vandalism, etc.? [cross reference: Feasibility Study Proposal Nos. 4, 7, 13, and 16]
5. Losses to cultural heritage values. What is the realm of lost opportunity to use local cultural sites for subsistence on a contemporary basis? [cross reference: Feasibility Study Proposal Nos. 1, 7, 9, 10, 11, 13, and 16, and NRDA Economic Study No. 6]

Nos. 1, 7, 9, 10, 11, 13, and 16, and NRDA Economic Study No. 6]

6. Identify ways to restore "faith" in the subsistence environment.

7. Reliability of fly-by shoreline videotaping of vegetation for sites subject to high erosion and therefore possible increased site vandalism and loss of integrity.

#### General

1. Land status/habitat overlay which would synthesize all information relative to existing and proposed land use, management and ownership, wildlife and fisheries habitats, recreational use and cultural resources. Information should be assembled and presented in a GIS-type format. [cross reference: Feasibility Study Proposal No. 7]

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DEPARTMENT OF NATURAL RESOURCES  
OIL SPILL PROJECT COORDINATION OFFICE  
FAX# 762-2290

FAX TRANSMITTAL

TO: STAN/BRIAN FAX NO. 271-2467  
FROM: FRANKIE

NUMBER OF PAGES (INCLUDING COVER PAGE) 3

DATE: 5-14-90

COMMENTS: \_\_\_\_\_

Take what you will. Brian  
will no doubt have more  
to add. I did not include  
the exact list of short-term/long-term  
ideas the group id'd. Instead  
I tried to generalize.

Call if you have questions.

IF YOU HAD PROBLEMS RECEIVING THIS FAX, CALL THE OIL SPILL  
PROJECT COORDINATION OFFICE AT 762-2295.

File w/ L  
Letter to Trustee  
Council  
Requesting Auth'n  
for 1990 Fees  
Slade

THE non-regenerative ability of cultural resources creates a priority situation for immediate resolution of the information needs. The information needs carry a parallel from response to damage assessment to restoration. Without knowing the current status of the economic studies we are guessing at some of the information needs.

## INFORMATION NEEDS

### CULTURAL RESOURCES

1. Cultural resource values are poorly understood in the oil impacted zones. Pre-spill archaeological surveys of sites and artifacts is scant, as is the understanding of the significance these resources hold. More extensive and complete site surveys are needed to help resolve the conflicts that have arisen, such as: completeness and accuracy of SCAT surveys by Exxon; the ability of resource surveys to garner proper information to identify the significance of a site; or the ability of the site surveys to meet minimum requirement to develop a proper damage assessment.  
(ref: feasibility study #7,16; NRDA economic study #9)

2. Is oil contaminating artifacts, and; Is the oil damaging the ability to age the artifacts accurately, and; Is it possible to remove the oil contamination to the artifacts?  
(ref: feasibility study #7,13,16; NRDA economic study #9)

3. How much, if any, has the storm surge oil splattering damaged vegetation cover and therefore created a loss of site stability and increased erosion?  
(ref: feasibility study #4)

4. What have the affects of clean-up been from workers accessing the high supratidal areas creating exposure of previously unknown sites, increasing erosion, vandalism, looting and 'loss of context'(artifacts in situ)?  
ref: feasibility study #4,7,13,16)

5. What has been the loss to cultural heritage values? What is the realm of lost opportunity to use local cultural sites for subsistence on a contemporary basis?  
(ref: feasibility study #1,7,9,10,11,13,16; NRDA economic study#6)

6. Identify pathways for restoring 'faith' in the subsistence environment through education, regulation/management changes, and involvement of local natives in agency inventory groups.  
(not referenced to a current feasibility study)

7. Assess erosion and dye-off of vegetation in supratidal areas which directly affects the stabilization and visibility of cultural sites.  
(ref: feasibility study #4,7,16)

8. Assess reliability of fly-by shoreline videotaping of vegetation for sites subject to high erosion and therefore possible increased site vandalism and loss of integrity.  
(not referenced to a current feasibility study)

Oil Spill Restoration Planning Office  
437 "E" Street, Suite 301  
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(907) 271-2461

MEMORANDUM

23 MAY 1990

SUBJECT: Authorization to Conduct 1990 Feasibility Studies

TO: Trustee Council

THROUGH: Management Team

FROM: Restoration Planning Work Group

The Restoration Planning Work Group has been working to identify and evaluate a wide array of potential restoration projects. As a result of the Public Symposium held in March, the series of Community Scoping Meetings begun in April, and the Technical Workshop also held in April, many ideas for restoration projects have been put forth.

A key element in the work plan for Oil Spill Year 2 is to carry out an initial series of feasibility studies that begin to define and test projects that ultimately may be recommended in the Restoration Plan. Attachment 1 summarizes the Work Group's recommendations for feasibility studies to be conducted and developed in 1990. These proposals were developed initially by participants at the Technical Workshop and emerged out of a broader list of information needs developed by the workshop participants. More detailed descriptions have been reviewed by the Management Team and will be published in the 1990 Natural Resource Damage Assessment Plan.

The broader list of needs are presented in Attachment 2, as they were developed by the workshop participants. Where possible, we have identified linkages to NRDA studies, some of which have been discontinued for the current field season. Many workshop participants felt that the need to support restoration planning could justify reconsideration of these aspects of the NRDA. The Work Group suggests that restoration planning needs be given more weight in future decisions about the continuation and scope of NRDA studies.

The Work Group has evaluated the proposed feasibility studies carefully, taking into account such factors as (1) restoration ideas from the public scoping process, (2) linkages to damages or concerns from the NRDA, (3) the potential to successfully carry out the project in the current field season, and (4) cost relative to the feasibility study budget. These feasibility study proposals have resulted from a process involving NRDA principal investigators, NRDA peer reviewers, outside experts, agency personnel, and the Work Group. In addition, EPA research and development scientists had a significant role in developing the details of the larger project proposals, including the Fucus, intertidal fauna, and marsh studies (Restoration Feasibility Studies No. 1-3). Due to the short time frame before field work must begin a more formal peer review process was not possible. A formal process is proposed, however, for future projects, including the second year of projects begun in 1990 (Restoration Technical Support Project No. 1).

Please keep in mind that the projects for 1990 by no means represent the full range of feasibility studies that will eventually be undertaken by the Restoration Planning project. The 1990 projects are only the initial stages of a process that must address the variety of different resources and geographical areas affected by the oil spill. Funding and timing constraints in 1990 allow only a limited number of field studies to be initiated. Further development of 1991 projects will be on-going, however, and we anticipate a significantly increased effort in 1991 that leads toward a Restoration Plan addressing the ecosystem as a whole.

As shown in Attachment 1, we are proposing 10 projects in 1990: 7 feasibility studies for full implementation at a cost of \$476.4K and 3 technical support projects at a cost of \$236.5K. One of the technical support projects is to develop a series of 1991 feasibility study proposals for possible implementation. The total proposed budget for the proposed 1990 feasibility projects is \$712.9K. Although the feasibility study budget approved by the Trustees was for \$500K, we anticipate that sufficient funds will be available for these purposes.

Memorandum to Trustee Council  
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We request that the Trustee Council review and approve these recommendations at its earliest convenience. We specifically request authorization to initiate the proposed field studies immediately. We appreciate your consideration and are ready to respond to any questions you may have.

Attachment 1: Feasibility Studies  
Attachment 2: Information Needs

cc: Management Team  
Restoration Framework Committee

ATTACHMENT 1

RESTORATION FEASIBILITY STUDIES

Recommendations of the  
Restoration Planning Work Group

(Estimated Costs are in \$000)<sup>1</sup>

Recommended for Implementation in 1990

- (1) Re-establishment of Fucus in Rocky Intertidal Ecosystems  
(\$150)

Develop and demonstrate techniques for large-scale seeding/transplanting of the marine alga, Fucus, a key component of rocky intertidal ecosystems.

- (2) Re-establishment of Critical Intertidal Fauna in Rocky Intertidal Ecosystems (\$75)

Demonstrate techniques to re-establish intertidal grazers (e.g., the limpet) and predators and evaluate the importance of such efforts for restoring intertidal ecosystems.

- (3) Restoration of Intertidal marshes (\$150)

Develop and demonstrate aeration and other techniques to reduce concentrations of oil in marsh substrates and to test techniques for transplanting marsh vegetation.

- (4) Identification of Potential Sites for Stabilization and Restoration with Beach Wildrye (\$28.1K)

A scoping study to locate and analyze supratidal areas for eligibility for potential site stabilization and restoration, using Beach Wildrye, a native plant. This has significance for ecosystem, cultural, and recreational restoration projects.

- (5) Identification of Upland Habitats Used by Wildlife Affected by the Oil Spill (\$23.3K)

A preliminary study to begin to identify upland habitats that are used by wildlife that are dependent on both marine

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<sup>1</sup>Cost estimates are for 1st year only.

and upland habitats to satisfy their life history requirements. The primary subjects for the initial study will be the Harlequin Duck and Marbled Murrelet. Pending the results, there may be a full-scale effort in Summer 1991.

(6) Land Status, Uses, and Management Plans in Relation to Natural Resources and Services (\$50)

Research and map land status and related data to identify sites, habitats, and sensitive areas. These data are fundamental to the entire Restoration Planning Project, especially for the potential acquisition of equivalent resources. Identified as high priority by bird, marine mammal, and recreation technical groups.

Subtotal for Projects Recommended for  
Full Implementation in 1990: \$476.4

**Technical Support Projects Needed in 1990**

(1) Peer Reviewer Process (\$75)

Implement a peer reviewer process to improve the scientific quality of feasibility studies and restoration projects through better design, implementation, and evaluation. Peer reviewers may include experts already involved in the NRDA process, experts involved in the first technical workshop, or individuals not previously involved in either of the preceding.

(2) Beach Segment Survey Data (\$25)

Analyze coastline status information from S.A.T., Walk-a-thon, or elsewhere as it becomes available to support selection of specific sites and habitats for feasibility studies and restoration projects.

(3) Development of Potential Feasibility Studies for 1991 (\$136.5)

Based on public comment, NRDA studies, and technical consultations, identify additional feasibility study needs and potential restoration projects. Work with agency personnel, peer reviewers, and outside experts to develop

proposals for feasibility studies, which can be considered for implementation in the 1991 season. Projects listed below already have been identified as needing further evaluation and development. The Restoration Planning Work Group expects to identify additional potential projects as more information becomes available:

(A) Monitoring "Natural" Recoveries

Develop an approach to estimate and monitor the rates and degrees of natural recoveries (i.e., unaided by man) of resources and ecosystems harmed by EVOS. This information is necessary in order to evaluate the need, effectiveness, and cost of potential restoration projects. There may be a need for such monitoring on a long-term basis.

(B) Pink Salmon Stock Identification

Tagging, otolith, or other studies to separate wild and hatchery stocks and enable management actions that target individual stocks.

(C) Herring Stock Identification/Spawning Site Inventory

Analyze scale patterns, survey spawning areas, and undertake other studies to determine if separate stocks exist (e.g., within Prince William Sound and between PWS and lower Cook Inlet). Will provide basis to protect, restore, or augment spawning populations and habitats. Pacific herring is a key food-chain species that is also of commercial importance.

(D) Artificial Reefs for Fish and Shellfish

Test the value and cost at northern latitudes of a structural technique that has often been used to enhance commercial and recreational fisheries elsewhere. May have particular significance for rockfish.

(E) Alternative Recreation Sites and Facilities

Explore ways (information programs, construction of new facilities, etc.) of redirecting recreational use from oil-damaged sites to alternative locations.

(F) Historic Sites and Artifacts

Explore applicability of restoration/stabilization techniques developed elsewhere to archaeological sites in the oil-spill area.

(G) Availability of Forage Fish

Identify and test methods for identifying the distribution and availability of forage fish in relation to marine birds and mammals. This was identified as a key need by both bird and marine mammal groups (seabirds, cetaceans, and pinnipeds feed on many of the same fish species).

Subtotal for Projects Recommended for  
Further Development in 1990: \$236.5

Total Budget for Proposed 1990 Feasibility Projects: \$712.9

Feasibil.rec  
05-21-90

## RESTORATION FEASIBILITY STUDY NUMBER 1

Study Title: Re-establishment of Fucus in Rocky Intertidal Ecosystems

### INTRODUCTION

Qualitative evidence indicates that the marine alga, Fucus, was damaged by both the spilled oil and the cleanup effort. Fucus is a critical structural component of the intertidal habitat in the oil-spill area, and it serves as an important spawning substrate for herring. Re-establishment of this species will increase the rate of recovery of other associated biotic communities.

There may be a substantial delay in natural recovery of areas where populations were reduced over large areas (100-1000 m of shoreline), because dispersal of seeds is limited (< 1 m in most circumstances). Drift plants may increase this distance, but the importance of this mode is unknown.

The reproductive and life history of Fucus is well known, and techniques for collection of seed is well established. In southern parts of the range plants are fertile year round, so the timing of the application of seeds may be relatively unimportant in the establishment of the plant. The specific life history cycle of the plant in PWS and the GOA is not known. It is expected, however, that the plants will be fertile for at least most of the spring and summer.

#### Objectives:

- A. Document the extent and magnitude of recruitment of Fucus in areas subjected to alternative cleaning technologies.
- B. Determine the feasibility of re-establishing Fucus in damaged areas.
- C. Develop and demonstrate potential large scale seeding techniques to re-establish Fucus.
- D. Demonstrate the efficacy of seeding of versus transplanting Fucus.
- E. Identify the costs of implementing a full-scale Fucus restoration project.

## Relationships with Other Studies:

This study is fundamental to bringing an ecosystem approach to the restoration program. It relates directly to Restoration Feasibility Study Number 2, re-establishing critical intertidal fauna, and to various NRDA studies, particularly Coastal Habitat Number 1.

## Methods

The study plan has two parts: (1) laboratory experiments that develop techniques for obtaining large quantities of embryos suitable for use in reseedling, and (2) field experiments to test the effectiveness of embryo reseedling and transplanting in habitats that experienced varying degrees of oiling and cleaning.

Laboratory experiments will be conducted to determine embryo attachment strength over time. Since the seeds must remain in suspension, experiments will also be conducted to assure their viability in culture media for at least two weeks. Although techniques for obtaining Fucus embryos are simple and well known, these techniques will be modified and tested for the production and handling of the large numbers of embryos that would be necessary for a full-scale reseedling project.

Field tests will then be conducted with various "seeding" procedures (e.g., dispersal of embryos, dispersal of embryos, and transplants of fertile adults). All three methods will be tested in one control and one habitat that was disturbed by oil and subsequently cleaned. Dispersal of embryos will then be tested in habitats with different combinations of oil and cleanup techniques (e.g., bioremediated, hot water wash). The experimental design will use three replicates of each habitat type, three replicates of each procedure, and three replicates of controls to measure natural settlement. Variables to be measured include height of Fucus plants, numbers of plants, and percentage vegetative cover. Maps prepared by the Damage Assessment Geoprocessing Group will be used to identify potential study sites. In the initial project, primary study sites will be in or near Herring Bay, PWS.

Lead Agency: EPA

Cooperating Agency: USFS

Budget: EPA

|                      |            |
|----------------------|------------|
| Salaries             | \$ 2.0     |
| Travel               | 11.0       |
| Contractual Services | 135.0      |
| Supplies             | 2.0        |
| Equipment            | <u>0.0</u> |
| <u>TOTAL</u>         | 150.0      |

fucus.nol  
05-22-90

## RESTORATION FEASIBILITY STUDY NUMBER 2

Study Title: Re-establishment of Critical Fauna in Rocky Intertidal Ecosystems

### Introduction

Intertidal ecosystems on rocky shores, including both fauna and flora, were seriously affected by the oil spill and cleanup activities. Initial results suggest that certain key faunal species, such as grazers and predators, that are likely to structure these intertidal communities, were moderately to heavily affected. Natural restoration processes in these communities will be limited by recolonization rates of these key species, which in some cases are known to be quite low. Re-establishment of Fucus alone may therefore not be sufficient to ensure a return to pre-spill conditions on ecologically meaningful time scales. Before a restoration plan is proposed, we should demonstrate the feasibility of enhancing the rate of recovery of the intertidal community by the re-establishment of key grazers and predators. If the the natural recoveries of Fucus and intertidal fauna can be augmented by restoration projects, it will be of fundamental benefit to the marine ecosystem.

### Objectives:

- A. Compare rates of recovery of rocky intertidal communities with and without key faunal species and combinations of species.
- B. Demonstrate the feasibility of restoring rocky intertidal communities by enhancing colonization by key faunal species.
- C. Identify the costs of implementing a full-scale restoration project to re-establish key faunal species in rocky intertidal ecosystems.

### Relationships with Other Studies:

This study will be carried out in conjunction with the Fucus study, Restoration Feasibility Study Number 1, and it is related to several NRDA studies, particularly Coastal Habitat Number 1.

### Methods

Based on results of NRDA studies, limpets have been identified as important grazers that were harmed by the oil spill in rocky intertidal ecosystems. Predators, such as Nucella and Leptasterius, also could be important in structuring these intertidal communities. Rates of recovery of intertidal areas with

and without key species and combinations of species will be compared. Grazer, predator, and grazer-predator exclusion and enhancement plots will be established in habitats that experienced differing degrees of oiling or were subjected to different cleanup techniques (e.g., bioremediated, hot-water high-pressure cleaned). A key aspect of the study will be demonstrating the feasibility of enhancing colonization by key species.

Lead Agency: USFS

Cooperating Agency: EPA

Budget: USFS

|                      |            |
|----------------------|------------|
| Salaries             | \$ 0.0     |
| Travel               | 5.0        |
| Contractual Services | 65.0       |
| Supplies             | 2.0        |
| Equipment            | <u>3.0</u> |
| <u>TOTAL</u>         | 75.0       |

intertidal.no2  
05-22-90

## RESTORATION FEASIBILITY STUDY NUMBER 3

Study Title: Restoration of Intertidal Marshes

### Introduction

Recovery of oil-impacted marshes in PWS and the GOA is anticipated to be slow: There are relatively few marshes, they are small in area, and they tend to be at sheltered, low-energy sites. As a result, opportunities for recolonization through seeding or propagule dispersal are limited. Although marshes are limited in areal extent, they are ecologically important, serving as feeding and resting areas for migratory waterfowl and other birds and as alternative food sources for browsing mammals, especially in harsh winters.

Traditional oil cleanup methods that disturb marsh soils or hydrology can have severe long-term effects. Because of the sensitivity of marsh habitats, cleanup crews have not removed oil from marshes following EVOS. Thus, it is expected that some marsh habitats will be contaminated with residual oil. There is a need to demonstrate the efficacy of oil removal by natural processes, using techniques with minimal impact on marsh habitats. Methods to re-establish marsh vegetation are well-established outside of Alaska, but have not been tested in the EVOS-affected environment. Thus, transplants and other techniques for re-establishing vegetation need to be tested in combination with the use of low-impact oil-removal methods.

### Objectives:

- A. Develop and test low-impact methods of removing residual oil from marsh habitats.
- B. Test techniques to transplant or otherwise re-establish marsh vegetation, following removal of residual oil.
- C. Identify the costs of implementing a full-scale marsh restoration project.

### Methods

This project should be implemented in as large a marsh as possible, preferably where there is an unoiled portion to serve as a control site. Oil removal techniques will be selected for testing based on some likelihood that they will be successful. Techniques to be considered are: (1) periodic gentle raking of surface soils, to bring oil to the surface, to disperse the oil more evenly throughout the surface sediments and to ensure aeration of surface

soils; (2) to install a network of aeration pipes, buried in the oiled surface sediments for the purpose of constantly supplying air to the soil (under gentle pressure) in a manner similar to a drip irrigation system; and (3) installation of a network of trenches to drain oiled soils or to supply air-saturated water on a periodic basis to infuse dissolved oxygen into the soils; (4) augmenting aeration techniques with fertilizer to enhance the growth and metabolic rate of oil-degrading, aerobic bacteria and (5) initial transplanting prior to application of removal techniques. Test plots for each treatment should be on a 10M x 10M scale, with triple replicates, assigned randomly to available test plots.

Once there is evidence that oil concentrations in the test plots have been reduced to acceptable levels, native marsh plants will be transplanted. Marsh vegetation will be planted in triplicate on randomly selected 2M x 2M plots within each of the above treatments and plant biomass determined at the end of growing season. Sites will be visited twice in the second year: once at the beginning of the growth season to determine if viable plants still exist and again at the end of the growing season to assess relative plant biomass production.

Lead Agency: EPA

Cooperating Agency: USFS

Budget: EPA

|                      |            |
|----------------------|------------|
| Salaries             | \$ 0.0     |
| Travel               | 20.0       |
| Contractual Services | 115.0      |
| Supplies             | 10.0       |
| Equipment            | <u>5.0</u> |
| <u>TOTAL</u>         | \$150.0    |

marsh.no3  
05-22-90

## RESTORATION FEASIBILITY STUDY NUMBER 4

Study Title: Identification of Potential Sites for Stabilization and Restoration with Beach Wildrye

### Introduction

The oil spill and associated cleanup efforts have affected supratidal beach ecosystems, of which a key component is the native grass, Beach Wildrye (Elymus mollis). The supratidal Beach Wildrye plant community is extremely important in the prevention of erosion in the coastal environment. Erosion can lead to the destabilization and degradation of cultural and recreational sites as well as of wildlife habitats (e.g., for ground-nesting birds). There are well established techniques for restoring rye grasses and other plants on coastal dune systems, including at some sites in Alaska. It is necessary, however, to first identify sites at which damage has occurred and restoration efforts appear to be feasible, and it is also necessary to establish the cost of a full-scale restoration project in the EVOS area.

### Objectives:

- A. Determine the distribution and areal extent of supratidal sites at which Beach Wildrye restoration efforts will be needed and feasible.
- B. Identify potential sites for pilot projects to re-establish supratidal stands of Beach Wildrye.
- D. Identify the costs of implementing a full-scale project to restore supratidal stands of Beach Wildrye.

### Relationships with Other Studies:

This feasibility study addresses a key component in supratidal beach ecosystems. It relates directly to other feasibility studies and potential restoration projects in the areas of cultural, recreational, and avian resources.

### Methods

Beach segment survey data, aerial photographs, on-site inspections, and other sources of coastline status data will be used for a preliminary identification of sites where stands of Beach Wildrye have been injured and erosion is occurring or may occur as a result. Based on these preliminary results, individual sites will be visited and evaluated for their

potential as sites at which Beach Wildrye restoration techniques may be developed and tested. The on-ground activities will include documenting the size, type, and extent of damage and the depth of oil, if present, in the substrate. This study will enable development and evaluation of a proposal for a full-scale feasibility study of restoration methods in subsequent years.

Lead Agency: DNR

Cooperating Agencies: USFS

Budget: DNR

|                      |            |
|----------------------|------------|
| Salaries             | \$ 14.4    |
| Travel               | 5.6        |
| Contractual Services | 5.0        |
| Supplies             | 3.1        |
| Equipment            | <u>0.0</u> |
| <u>TOTAL</u>         | \$ 28.1    |

beachrye.no4  
05-22-90

## RESTORATION FEASIBILITY STUDY NUMBER 5

Study Title: Identification of Upland Habitats Used by Wildlife Affected by the Oil Spill

### Introduction

A variety of marine birds, waterfowl, and other bird and mammalian species were killed by the spill or injured by contamination of their prey and habitats. Many of these wildlife species are dependent on aquatic or intertidal habitats for such activities as feeding and resting, but they use upland habitats in forests, along streams, or above tree line to fulfill other life-history requirements (e.g., nesting, shelter). Through the public scoping process and technical workshop, many people have suggested that protection of upland wildlife habitats from further degradation may be an important way to help wildlife recover from the effects of EVOS. To explore this potential, it is necessary to learn more about the specific upland habitats upon which these species depend and how they use them. Such a feasibility study would be a large and complex undertaking. In 1990 we propose a modest, initial study that primarily focuses on the Marbled Murrelet and the Harlequin Duck. The results of this study in 1990 will provide a basis for developing and evaluating a broader feasibility study proposal that will more fully explore the ecological relationship between marine-dependent wildlife and upland habitats.

### Objectives:

Objectives A-C specifically apply to both Harlequin Ducks and to Marbled Murrelets, the primary subjects of the 1990 study:

- A. To develop and test methods for establishing the presence of breeding birds.
- B. To develop and test methods for locating nest sites.
- C. To identify and characterize nest habitats and sites.
- D. To define the parameters of and develop a proposal for a full-scale upland habitat feasibility study for marine birds, waterfowl, and other species.
- E. To identify the costs of implementing a full-scale restoration project concerning upland habitats used by marine-dependent wildlife.

## Relationships with Other Studies:

This study relates directly to the results and field work of Bird Study Numbers 2 and 11 and Restoration Feasibility Study Number 7.

## Methods

**Marbled Murrelet:** Naked Island in PWS will be the primary study site. The presence of breeding murrelets will be recorded by a stationary observer at dawn, at which times murrelets fly to inland nest sites. Murrelet altitude, behavioral, and other data will be recorded for each bird observed. Sites with high murrelet activity will be identified and then searched for nests. The efficacy of the dawn detection technique will be evaluated.

**Harlequin Duck:** Streams in PWS will be selected for investigation based upon reported concentrations of ducks, survey data from NRDA projects, and interviews with knowledgeable field personnel. Once streams are identified as having a high potential for Harlequin nests, there will be intensive ground searches for nests. As nests are located, the nest sites and habitats will be characterized by such parameters as distance from the stream and coast, topography, and vegetative cover.

Lead Agency: FWS

Cooperating Agency: ADF&G

Budget: FWS, ADF&G

|                      |            |
|----------------------|------------|
| Salaries             | \$ 9.3     |
| Travel               | 1.0        |
| Contractual Services | 7.0        |
| Supplies             | 2.5        |
| Equipment            | <u>3.5</u> |
| <u>Total</u>         | 23.3       |

upland.no5  
05-21-90

## RESTORATION FEASIBILITY STUDY NUMBER 6

Study Title: Land Status, Uses, and Management Plans in Relation to Natural Resources and Services

### Introduction

Through the restoration scoping process members of the public have suggested a wide variety of projects to acquire "equivalent resources." Examples are the acquisition of timber or development rights, conservation easements, recreational and cultural sites, inholdings within state and federal protected areas, and buffer strips along streams and coasts. In addition, scientists participating in the technical workshop found that in some cases habitat protection projects would be the best means of providing for the long-term restoration of injured wildlife resources. In order to begin to identify and evaluate potential restoration projects of this type, it is necessary to summarize existing information about the land status, uses, and management plans for both privately and publicly owned lands. This initial effort will focus on the oil-spill area and adjacent lands and will also serve to identify potential sites for other types of restoration projects.

### Objectives:

- A. Research and map the land status and ownership, land-use designations, and existing and proposed uses of tidelands and related uplands within the general oil-spill area.
- B. Research and map the extent and degree of oiling and coastal morphology in the same area.
- C. Research and map natural resources and services, including vegetation, fish and wildlife populations, habitats, and sensitive areas, recreation, and commercial forestry in the same area.
- D. Identify the costs of implementing a potential restoration projects.

### Relationships with Other Studies:

These data are fundamental to the entire Restoration Planning Project and especially to those feasibility studies and potential restoration projects that concern the acquisition of equivalent resources.

## Methods

The Alaska Department of Natural Resources, through the NRDA, has compiled much of the necessary data on their computerized Geographic Information System. Additional resource and land use information is available in state and federal management plans and resource inventories and from the Alaska Coastal Management Program. The Restoration Planning Work Group and technical advisors will be consulted to define the specific area and information needs, which will then be obtained from the various existing data bases. After determining the most feasible means and best resolution to portray the information, it will be summarized, produced, and distributed, primarily in map form.

Lead Agency: DNR

Cooperating Agencies: USFS, NPS, ADF&G

Budget: DNR

|                      |            |
|----------------------|------------|
| Salaries             | \$ 34.0    |
| Travel               | 1.0        |
| Contractual Services | 5.0        |
| Supplies             | 10.0       |
| Equipment            | <u>0.0</u> |
| <u>TOTAL</u>         | 50.0       |

landstat.no7  
05-21-90

## RESTORATION TECHNICAL SUPPORT PROJECT NUMBER 1

Project Title: Peer Reviewer Process for Restoration Feasibility Studies

### Introduction

The initial feasibility study projects to be conducted during the 1990 field season were developed with the assistance of many of the scientists involved in the NRDA process, after considering comments received at the technical workshop and a series of public meetings held in Spring 1990 in Alaska. Due to the limited time available before projects need to be in the field, an additional more formal round of peer review is not possible. This technical support project is designed to incorporate formal peer review in the design, implementation, and evaluation of 1991 and future feasibility studies. It will also provide for detailed review of 1990 feasibility study results.

### Objective:

Implement a peer reviewer process to improve the scientific quality of feasibility studies and restoration projects through better design, implementation, and evaluation.

### Relationship with Other Studies:

A similar process is in place for the other NRDA projects.

### Methods

Peer reviewers may include experts already involved in the NRDA process, experts involved in the technical workshops on restoration, or other selected individuals. Peer reviewers would review and comment on feasibility study proposals (including overall design and detailed study plans) and results. The budget for 1990 is based on the services of 10 expert reviewers for five days each, plus expenses. It is anticipated that this technical support project will expand in 1991, as additional feasibility studies are initiated and as results from 1990 feasibility study projects become available.

Lead Agency: RPWG

Cooperating Agencies: DOJ, DOL

Budget: DOJ, DOL

|                       |            |
|-----------------------|------------|
| Salaries:             | \$ 0.0     |
| Travel:               | 0.0        |
| Contractual Services: | 70.0       |
| Supplies:             | 5.0        |
| Equipment:            | <u>0.0</u> |

|               |        |
|---------------|--------|
| <u>TOTAL:</u> | \$75.0 |
|---------------|--------|

Techserv.no1  
05-22-90

## RESTORATION TECHNICAL SUPPORT PROJECT NUMBER 2

Project Title: Assessment of Beach Segment Survey Data

### Introduction

There is a large volume of beach-survey information obtained through response activities (e.g., the fall and spring surveys) and NRDA studies (e.g., Coastal Habitat Study Number 1). All of these data are being integrated into a standard NRDA data base as they become available. This information needs to be reviewed and summarized with respect to restoration planning needs and will complement and support Restoration Feasibility Study Number 7. Together, this information will help identify potential sites at which (a) "hands-on" restoration projects may be carried out, and (b) equivalent resources may be acquired. Additionally, it should prove valuable in providing further information for analytical purposes in the development of the restoration planning matrix.

### Objectives:

- A. To obtain and translate to maps, pertinent beach survey information that is not currently available in hard copy as it relates to the feasibility studies and restoration projects.
- B. Analyze possible trends in information for applicability to feasibility studies.
- C. Create a data base for future reference use in restoration projects.

### Relationships with Other Studies:

This project relates directly to Restoration Feasibility Study Number 7 and provides data of fundamental importance to the entire Restoration Planning Process.

### Methods

Research and map, using standard cartographic and G.I.S. techniques, all available information from the fall 1989, spring 1990, and fall 1990 walk-a-thon and S.A.T. surveys. Combined with Feasibility Study Number 7, this will provide further support in the selection process for specific restoration sites and habitats. It may also prove advantageous for documenting natural recovery processes that may be occurring. Care will be taken to not duplicate existing data bases and maps. The need here is to integrate new information and summarize it in a form helpful to the

Restoration Planning Project: this project will essentially add a "restoration layer" to the existing NRDA data base.

Lead Agency: DNR

Cooperating agencies: DEC, ADF&G, USFS, NPS, USFS, EPA

Budget: DNR

|                      |            |
|----------------------|------------|
| Salaries             | \$ 16.0    |
| Travel               | 0.0        |
| Contractual Services | 5.0        |
| Supplies             | 4.0        |
| Equipment            | <u>0.0</u> |
| <u>TOTAL</u>         | 25.0       |

techserv.no2  
05-22-90

## RESTORATION TECHNICAL SUPPORT PROJECT NUMBER 3

Project Title: Development of Potential Feasibility Studies for 1991

### Introduction/Justification

A variety of potential restoration feasibility studies need to be undertaken before recommendations can be made in the Restoration Plan. Due to funding and timing constraints in 1990, it was possible to carry out only a limited number of such studies in the current season. There is much that can and needs to be done, however, to develop the substance of feasibility study proposals for possible implementation in 1991. A number of specific areas have been identified for development of study plans. These include (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. In addition, as new information becomes available through the NRDA process, public comments, and technical consultations, the Restoration Planning Work Group expects to identify additional restoration ideas and areas of concern for which feasibility studies may be appropriate.

### Objectives:

- A. To identify restoration ideas and areas of concern for which feasibility studies may be necessary and appropriate.
- B. To develop feasibility study plans and proposals which may be considered for implementation in 1991 and beyond.

### Relationships with Other Studies:

This project relates directly to Restoration Technical Services Project Number 1, implementation of a peer reviewer process, as well as the entire NRDA and Restoration Planning Project.

### Methods:

Based on public comments, NRDA results, and consultations with technical experts, the Restoration Planning Work Group anticipates that candidate restoration projects will be identified on an on-going basis. In order to fully evaluate some of these suggestions, it will be necessary to carry out feasibility studies. The Restoration Planning Work Group then needs to convene ad hoc committees consisting of combinations of agency

personnel, peer reviewers, and outside experts to more fully develop the study plans and proposals. Support is needed to convene meetings, particularly involving travel by outside experts. In some cases, site visits will be needed to examine particular problem areas related to the oil spill or successful restoration projects which have been implemented elsewhere.

Lead Agency: Restoration Planning Work Group

Budget: Restoration Planning Work Group

|                      |            |
|----------------------|------------|
| Salaries             | \$ 0.0     |
| Travel               | 75.0       |
| Contractual Services | 40.0       |
| Supplies             | 5.0        |
| Equipment            | <u>0.0</u> |

|              |       |
|--------------|-------|
| <u>TOTAL</u> | 120.0 |
|--------------|-------|

techserv.no3  
05-21-90

ATTACHMENT 2

Information Needs<sup>1</sup>  
Identified at the Technical Workshop  
3-5 April 1990

Fish and Shellfish

1. Herring stock identification to separate stocks within Prince William Sound and between Prince William Sound and outer Kenai/lower Cook Inlet. [ref: Restoration Technical Support Project No. 3 and NRDA Fish/Shellfish Study Nos. 11 and 12]
2. Inventory of herring spawning substrates/localities. [ref: Restoration Technical Support Project No. 3 and NRDA Fish/Shellfish Study Nos. 11 and 12]
3. Hydro-acoustic biomass estimates of resident herring stocks. [ref: Restoration Technical Support Project No. 3 and NRDA Fish/Shellfish Study Nos. 11 and 12]
4. Adult pink salmon tagging near hatcheries to distinguish wild and hatchery stocks. [ref: Restoration Technical Support Project No. 3]
5. Expanded escapement enumeration for commercial species of salmon in relation to oiled streams (would involve additional air and ground surveys). [ref: NRDA Fish/Shellfish Study No. 1]
6. A cheap, practical way (e.g., otolith analysis) to separate hatchery from wild stocks. Valdez hatchery needs additional resources to read otoliths and conclude experiment this year (one third of returning fish are marked). [ref: Restoration Technical Support Project No. 3]
7. More rapid analysis of coded-wire tag data. [ref: NRDA Fish/Shellfish Study No. 3]
8. Basic biological information on rockfish; e.g., tagging fish on reefs and port sampling to provide population estimates. Need age-size database to identify recruitment rates. [ref: NRDA Fish/Shellfish Study No. 17]
9. Continue trawl assessments on full-scale basis in 1990. [ref: NRDA Fish/Shellfish Study Nos. 18 and 24]
10. Monitor contamination in clams and other shellfish. [ref: NRDA Fish/Shellfish Study Nos. 13 and 21]

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<sup>1</sup>These items are presented here, largely as identified by the workshop participants (i.e., with minimal editing on the part of the RPWG staff).

11. Catalog and inventory resources in Prince William Sound and lower Cook Inlet; e.g., better real-time harvest data, escapement estimates, and stock abundance information. "Can use mass marking techniques such as otolith analysis, coded wire tags, and electrophoretic techniques.

12. Catalog and inventory dolly varden and cutthroat populations in selected stream systems throughout oil-spill area. [ref: NRDA Fish/Shellfish Study Nos. 5 and 10]

13. Pre-oil spill, lower precision in fisheries management data was adequate to ensure proper management. Post-oil spill, however, there is a need for more precise management data owing to the added stress on species and uncertainty introduced by the spill.

#### Birds

1. Breeding habitat requirements for the marbled murrelet in the oil-spill area; do they nest in trees as in lower latitudes?, do they use old-growth forest habitat, or can they use second-growth timber? [ref: Restoration Feasibility Study Proposal No. 5 and NRDA Bird Study No. 6]

2. Status of sea duck populations, with emphasis on the harlequin duck. With reference to the harlequin, specific needs are for population and harvest-level estimates, breeding habitats and nest sites, and winter distribution and site fidelity. [ref: Restoration Feasibility Study Proposal No. 5 and NRDA Bird Study No. 11]

3. Availability and distribution of forage fish for seabirds in Prince William Sound, including sandlance, herring, and other intertidal non-commercial forage species. [ref: Restoration Technical Support Project No. 3]

4. Status of the Smith Island parakeet auklet population--the only parakeet auklet colony in Prince William Sound. [ref: NRDA Bird Study No. 9]

5. Population monitoring of pigeon guillemots and alcids on Smith Island. [ref: NRDA Bird Study No. 9]

6. Magnitude of bird mortality associated with the nearshore gillnet or seine fisheries in oil-spill area.

7. Annual food habits and requirements of the bald eagle. [ref: NRDA Bird Study No. 4]

8. Overwintering requirements and immigration patterns of the common murre. [ref: NRDA Bird Study No. 3]

9. Productivity of marine and shore birds in Prince William Sound and elsewhere in order to estimate and then monitor time needed for "natural" recoveries. [ref: NRDA Bird Study Nos. 6, 7, 8, 9, and 12 (oystercatcher part)]
10. Relationship of winter and migrant populations of yellow-billed loons in Prince William Sound to Alaska and world populations; also, where do Prince William Sound winter/migrants breed (e.g., Siberia)?
11. Location and abundance of great blue heron rookeries.
12. Sea bird colonies currently on privately-owned lands that may be purchased to provide public education opportunities (e.g, Gull Island near Homer). [ref: Restoration Feasibility Study Proposal No. 6]
13. Hydrocarbon analysis of 1987 sea duck samples from Valdez Arm (completion of a USFWS project on contaminants due to chronic pollution). [ref: Restoration Feasibility Study Proposal No. 5 and NRDA Bird Study No. 11]
14. Winter feeding habits of peregrine falcon. [ref: NRDA Bird Study No. 5]
15. Causes of long-term declines in marine bird populations (e.g., black-legged kittiwakes) in Prince William Sound. [ref: Restoration Technical Support Project No. 3 and NRDA Bird Study No. 8]

#### Mammals

1. Population modeling to derive an accurate estimate of the proportion of the Prince William Sound sea otter population impacted by the oil spill. [ref: NRDA Marine Mammal Study No. 6]
2. Expansion of individual identification capabilities (fluke and dorsal fin catalogs) to facilitate studies of residency, habitat use, reproductive rates, and stock identity of both humpback and killer whales. [ref: NRDA Marine Mammal Study Nos. 1 and 2]
3. Biopsy sampling for stock identification of humpback and killer whales (to determine resident versus transient groups). [ref: NRDA Marine Mammal Study Nos. 1 and 2]
4. Availability of forage fish (e.g., sandlance and herring) and other prey for humpback and killer whales. [ref: Restoration Technical Support Project No. 3]
5. Causes of pre-spill decline in sea lion population and the relative contribution of the oil spill to the declining trend.

[ref: NRDA Marine Mammal Study No. 4]

6. Sea lion stock identification. [ref: NRDA Marine Mammal Study No. 4]

7. Frequency and importance of use of marsh vegetation/beach grasses by sitka deer and black bears in relation to salt marsh habitat damaged by the oil spill. [ref: NRDA Terrestrial Mammal Study Nos. 1 and 2]

8. Potential delayed effects of oiling on black bears. [ref: NRDA Terrestrial Mammal Study No. 2]

9. Total populations of river otter and mink in affected areas and their habitat use, reproductive potential, and food habits. [ref: NRDA Terrestrial Mammal Study No. 3]

10. Effects of oil ingestion on mink reproduction (cross reference: NRDA Terrestrial Mammal Study No. 6]

#### Coastal Habitats

1. Area and proportion of Prince William Sound shoreline made up of marshes, sandy beaches, cobble beaches and rocky shores in relation to distribution and degree of oiling. [ref: Restoration Feasibility Study Nos. 1-4, Restoration Technical Support Project No. 2, and NRDA Coastal Habitat Study No. 1]

2. Clean-up options (no clean-up efforts, hot water rinse, cold water rinse, bioremediation) used for each of the three habitat types (supratidal, intertidal, and subtidal). What proportion of each of these types of shoreline was exposed to which cleanup technique? [ref: Restoration Feasibility Study Nos. 1-4, Restoration Technical Support Project No. 2, and NRDA Coastal Habitat Study No. 1]

3. Direct effects of exposure to oil and whether these effects can be distinguished from the effects of the clean-up efforts. Are Prince William Sound shorelines being monitored for long-term effects and are studies being done to adequately discern the effects of oil from the effects of clean-up efforts? [ref: NRDA Coastal Habitat Study No. 1]

4. Amount and concentrations of oil that reached the sediments within Prince William Sound. Also, specific benthic communities within those sediments that are likely to be sensitive to petroleum hydrocarbons. [ref: NRDA Air/Water Study No. 2]

5. Areal extent of supratidal marshes and exposure to oil [ref: Restoration Feasibility Study No. 3 and NRDA Coastal Habitat Study No. 1]

6. Areal distribution of Fucus and proportion of the population which was exposed to oil and to various clean-up methods; also, the effects of those methods. [ref: Restoration Feasibility Study No. 1 and 2 and NRDA Coastal Habitat Study No. 1]

### Recreation

1. People's values and perceptions about the oil spill and the area. Must look at users, potential users, and "armchair" users. [ref: NRDA Economic Uses Study No. 7]

2. User numbers and patterns in the oil-spill area; e.g., where do kayakers camp in Prince William Sound? [ref: Restoration Technical Services No. 3, NRDA Fish/Shellfish Study No. 6, and NRDA Economic Uses Study No. 5]

3. Effects on recreation opportunity spectrum. [ref: NRDA Economic Study No. 5]

4. Are we trading high value/low volume tourism for high volume/low value tourism?

5. Value of recreational opportunity translated into consumer surplus. [ref: NRDA Economics Study No. 5]

6. Land status/acquisition opportunities with respect to ecological/recreational/cultural values. [ref: Restoration Feasibility Study Proposal Nos. 6 and Restoration Technical Support Project Nos. 2 and 3]

7. Effects of spill on small versus large operators in tourism/recreation industry.

8. Present and future land use plans by land management agencies and private land holders. [ref: Restoration Feasibility Study Proposal No. 6]

9. Distribution and nature of public-use facilities and opportunities in relation to oil spill. [ref: Restoration Technical Support Project No. 3]

### Cultural Resources

1. Cultural resource values are poorly understood in the oil-spill area. Pre-spill archaeological surveys of sites and artifacts are few. More extensive and complete surveys are needed to help resolve conflicts that have arisen, such as the completeness and accuracy of SCAT surveys by Exxon, the ability of resource surveys to garner proper information to identify site significance, and the ability of the site surveys to meet minimum

requirements to develop a proper damage assessment. [ref: Restoration Technical Support Project No. 3 and NRDA Economic Study No. 9]

2. Is oil contaminating artifacts? Damaging ability to age to artifacts? Possible to remove oil contamination? [ref: Restoration Feasibility Study Proposal Nos. 6, Restoration Technical Support Project Nos. 2 and 3, and NRDA Economic Study No. 9]

3. Has oil carried by storm surges splattered and damaged the vegetative cover, there creating instability and increased erosion? [ref: Restoration Feasibility Study Proposal No. 4]

4. Have clean-up workers accessing supratidal areas resulted in increased vandalism, etc.? [ref: Restoration Technical Support Project Nos. 2 and 3]

5. Losses to cultural heritage values. What is the realm of lost opportunity to use local cultural sites for subsistence on a contemporary basis? [ref: Restoration Technical Support Project No. 2 and 3 and NRDA Economic Study No. 6]

6. Identify ways to restore "faith" in the subsistence environment.

7. Reliability of fly-by shoreline videotaping of vegetation for sites subject to high erosion and therefore possible increased site vandalism and loss of integrity.

#### General

1. Land status/habitat overlay which would synthesize all information relative to existing and proposed land use, management and ownership, wildlife and fisheries habitats, recreational use and cultural resources. Information should be assembled and presented in a GIS-type format. [ref: Restoration Feasibility Study Proposal No. 6 and Restoration Technical Support Project No. 2]