

Restoration Planning Working Group

EXXON VALDEZ OIL SPILL RESTORATION OFFICE

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TO: RPWG

DATE: April 16, 1993

FROM: Bob Loeffler

TELE: 278-8012

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SUBJECT: Draft Plan Chapter V, for your review.

Attached is the RPWG-review draft of Chapter V, Alternatives. I will be out of the office this week. Please return comments during the following week (April 26th - 30th).

Thank you.

CHAPTER V. RESTORATION PLAN ALTERNATIVES

This chapter presents different ways the to use funds from the civil settlement to restore the injuries to resources and services caused by the spill. Each approach, called an alternative, is a scenario that demonstrates the effect of an approach to restoration. If there were no disagreement on how to restore oil spill injuries, or if there was enough money available to complete everything people wanted to do, there would be no need to illustrate different approaches. However, there are differences of opinion on the best methods of using settlement funds, and alternatives show the implications of different policy decisions on restoration.

Based on public comment, the Trustee Council will pick an alternative for the Final Restoration Plan. That alternative will likely be made up of different parts of the alternatives presented here.

This chapter has four sections.

Information to Understand the Alternatives:

- Issues and Policy Questions
- Categories of Restoration
- Funding Methods: Endowments

Description of the Alternatives

Comparison of the Alternatives

- Comparison of Potential Allocations
- In General, How does each alternative benefit recovery?
- Habitat Protection on Private Lands: How Much Land Could be Protected?
- General Restoration

General Restoration

Information to Understand the Alternatives

ISSUES AND POLICY QUESTIONS

The planning process raised five significant issues. The table below presents these issues as questions. Different answers to these questions will influence which restoration actions are conducted.

Table V-1. Issues and Policy Questions Addressed in the Alternatives

ISSUE	POLICY QUESTION
Injuries Addressed by Restoration Actions	Should restoration actions address all injured resources and services or all except those biological resources whose populations did not measurably decline because of the spill?
Restoration Actions for Recovered Resources	Should restoration actions cease when a resource has recovered or continue in order to enhance the resource?
Effectiveness of Restoration Actions	Should the plan include only those restoration actions that produce substantial improvement over natural recovery or also those that produce at least some improvement?
Location of Restoration Actions	Should restoration activities take place in the spill area only or anywhere there is a link to injured resources or services?
Opportunities for Human Use	To what extent should restoration actions create opportunities for human use of the spill area?

Injuries Addressed by Restoration Actions: *Should restoration actions address all injured resources or all except those biological resources whose populations did not measurably decline because of the spill?*

Resources and services injured by the spill are shown in the table at the top of this page. Some injured resources declined in population. For example, the loss of 35-70% of the breeding common murrelets in the Gulf of Alaska resulted in a decline that will persist through future generations. Other injuries, such as reduced growth rates, may not have resulted in a lower population. However, over time these injuries might also cause populations to decline.

If an injury was not severe enough to produce a detectable change in population, then perhaps settlement funds should not be spent to address it. On the other hand, if something can be done to address less serious injuries that might eventually cause populations to decline, perhaps it should be done before more serious effects occur.

Table III-? on page ___ shows the injured resources that suffered a measurable population

decline, and those that were injured but whose population did not measurably decline. The table also shows other natural resources and services injured by the spill.

Restoration Actions for Recovered Resources: *Should restoration actions **cease** when an injured resource has recovered, or **continue** in order to enhance the resource?*

None of the injured resources has recovered from a population decline. If a goal of the settlement is to restore injured resources, then perhaps restoration actions should cease once the resource has recovered to where it would have been had no spill occurred. On the other hand, if restoration actions were to continue after a resource has recovered, they may offset other disturbances or improve its condition. As resources recover, this issue will become more important.

Table III-? on page ____ shows expected rates of natural recovery.

Effectiveness of Restoration Actions: *Should the plan include only those restoration actions that produce **substantial** improvement over natural recovery or also those that produce at least **some** improvement?*

Many restoration actions were suggested by scientists, agencies, and the public. They were evaluated to determine how much improvement they may produce over natural recovery.

One strategy is to consider only those restoration actions likely to produce **substantial** improvement over natural recovery. However, if the Trustee Council were to consider all restoration activities that offer at least **some** promise of helping injured resources and services, the cumulative effect may produce greater improvement overall.

Location of Restoration Actions: *Should restoration actions take place in the **spill area** only or **anywhere** there is a link to injured resources or services?*

The map of the oil spill area is on page 9. The oil spill area includes the maximum extent of oiled shorelines. It also includes the adjacent land up to the watershed divide, and the area of immediate human use for communities affected by the spill.

If restoration actions were limited to the spill area, they could focus on the populations and uses directly affected. On the other hand, restoration actions outside the spill area may be more effective than those within the spill area. For example, increasing common murre populations at colonies outside the spill area may do more to increase the numbers of that species than would comparable projects within the spill area.

Opportunities for Human Use: *To what extent should restoration actions create opportunities for human use of the spill area?*

Certain restoration actions may create opportunities for human use of the spill area. Some of these actions would **protect existing use**. Examples include constructing outhouses in over-used areas and improving trails where hiking is damaging wetlands. Other activities

would **increase existing use**. Examples include installing a new mooring buoy in an anchorage or constructing new public-use cabins in a recreation area. Still other activities would **encourage new uses** in appropriate locations. Examples include providing a new visitor center or attracting new commercial facilities onto public land.

One view is that restoration actions should not create any opportunity for human use of the spill area. However, if restoration actions that create opportunities for human use were to be limited to those that would protect existing use, then restoration could proceed without changing the character of the area or impeding recovery of injured resources and services. On the other hand, increasing opportunities for human use through either increasing existing use or encouraging new use, would make the area more usable for more people and improve the quality of the experience for some users.

Any facilities built on public land would comply with existing land-use plans, and agency procedures such as those requiring public notice.

CATEGORIES OF RESTORATION ACTIONS

Restoration actions fall into four categories. The alternatives place different emphases on these categories. Not all categories are included in every alternative.

HABITAT PROTECTION and ACQUISITION. This category protection and acquisition of habitat on private land as well as protection of habitat on public land.

Habitat protection and acquisition on private land. Resource development on private land, such as harvesting timber or building subdivisions, can sometimes harm already injured resources or services that rely on the land. The object of protecting and acquiring land is to prevent further injury to resources and services and allow recovery to occur at its natural rate. For example, the recovery of harlequin ducks may be helped by protecting nesting habitat from future changes that may hamper recovery.

The Trustee Council may purchase private land or partial interests such as conservation easements, mineral rights, or timber rights as methods of restoration. These lands would be managed to protect injured resources and services. The Council's recent decision to purchase inholdings in Kachemak Bay State Park is an example of habitat protection and acquisition on private land. However, the settlement requires that any purchases must benefit resources or services injured by the spill.

The following injured resources and services might benefit from the purchase of private land or property rights: salmon, trout, bald eagle, black oystercatcher, common murre, harbor seal, harlequin duck, marbled murrelet, pigeon guillemot, river otter, sea otter, areas adjacent to particularly productive intertidal areas, recreation and commercial tourism, archaeological resources, and subsistence. Types of habitat that might be protected or acquired include:

- Habitats important to injured species
- Scenic areas such as those viewed from important recreation and tourist routes

- Areas important for recreation, including sport fishing and hunting
- Important subsistence harvest areas

Since there will not be enough money in any alternative to buy or protect all habitat important to recovery, it is necessary to prioritize available land. Some of the most important criteria are the degree of importance of the land to the recovery of injured resources or services and the number of resources or services that rely on a given parcel. Costs will vary depending on the land, and the private rights being purchased. For example, timbered land will often be more expensive than similar land without marketable timber. Also, purchase of partial interests such as easements or mineral rights may be less expensive and could increase the number of acres that can be protected.

Habitat protection on public land. Changes in management practices on public land and water may protect injured resources and services from further injury. Examples of these changes include amending agency management plans, changing regulations, and designating public land and water as special areas. Examples of special areas include scientific research reserves, recreation areas, parks, critical habitat areas, and marine sanctuaries. Any management changes must be approved and implemented by the appropriate government agency, or in some cases by the Alaska State Legislature or the U.S. Congress. Since land and water management actions could extend to any public upland, intertidal area, or marine waters, the actions could potentially benefit most injured resources and services. Management changes necessitated by spill injuries may be funded with settlement monies, but the costs are not expected to be a significant portion of the total settlement funds.

GENERAL RESTORATION. Since 1989, agencies and the public have proposed hundreds of ideas for restoration. Some ideas restore injured resources and services by directly manipulating resources. Examples include building fish passes and public-use cabins or replanting seaweed in the intertidal areas. Other ideas focus on managing human use to aid restoration. Examples include redirecting hunting and fishing harvest, or reducing human disturbance around sensitive bird colonies. General Restoration does not include Monitoring and Research or Habitat Protection and Acquisition.

In each alternative, enough money is potentially allocation to General Restoration to fund all activities that have been identified and that meet the policies of that alternative. Each alternative also identifies enough additional funds to provide a reserve for General Restoration activities that may be identified in the future.

MONITORING AND RESEARCH PROGRAM. A monitoring and research program will help the Trustee Council decide how resources and services are recovering, and whether restoration activities are effective. It could also be used to monitor the general health of affected ecosystems, or provide basic and applied scientific research about how to protect, manage, or restore resources or services injured by the spill. The program could include one or more of the following, although its components vary among alternatives.

- **Recovery Monitoring** would assess the rate of recovery of injured resources and services, and determine when recovery has occurred.

- **Restoration Monitoring** would evaluate the effectiveness of specific restoration activities, identify where additional restoration activities may be appropriate, and determine if delayed injury occurs.
- **Ecosystem Monitoring** ^(including services) would follow long-term trends in the distribution and abundance of injured resources and the quality and quantity of services. Monitoring could also detect residual spill effects and provide ecological baseline information to assess the impacts of future disturbances.
- **Restoration Research** would focus on the design, development and implementation of new technologies and approaches to restore resources not recovering or recovering at lower than expected rates.

ADMINISTRATION AND PUBLIC INFORMATION. Funding is required to manage the restoration program and to provide the public with information about recovery and restoration. As the number of restoration projects increases and the complexity of management duties grows, the percentage of funds needed for Administration and Public Information increases.

FUNDING METHODS: ENDOWMENTS

Exxon has made deposits into the restoration fund since 1991 and will continue to do so until 2001. The Trustees could spend the entire settlement during that time or they could save some for future use. An endowment is a savings program to fund restoration after Exxon's payments end. It uses part of the settlement funds to create an interest-bearing savings account, which could fund a constant level of restoration activities indefinitely. An endowment could be used to fund some or all categories of restoration activities.

The size of an endowment determines the amount of income it earns and the amount of restoration activities it can fund. It is possible to place any portion of the remaining settlement funds into an endowment. For example, if approximately 20% of the remaining settlement funds were placed into an endowment and the principal inflation-protected, the endowment could provide \$3 to \$5 million to fund restoration activities indefinitely.

DESCRIPTION OF ALTERNATIVES

Five alternatives have been developed for public review. Each alternative presents a different way of approaching restoration. Each uses different policies and emphasizes different categories of restoration activities to restore resources and human uses injured by the spill. No single alternative is likely to match your vision of the ideal plan.

ALTERNATIVE 1 - NATURAL RECOVERY (No Action)

What would happen to resources and services injured by the oil spill if no restoration actions were taken? Table III-? on page ___ describes expected times for natural recovery of injured resources and services, if expected patterns of use continue. They range from a few years to 120 years and are unknown for six resources. However, because recovery would not be monitored under this alternative, it would not be possible to confirm when recovery has occurred. Archaeological resources will not recover.

This alternative is the no-action alternative in the draft Environmental Impact Statement. Consequently, none of the civil settlement funds would be spent.

NOTE TO REVIEWERS: The pie charts are not included in this draft. You know what they look like. They will be included in subsequent drafts. Each pie chart includes will include this footnote: "Display of allocation is illustrative only and not a commitment of actual expenditures. Allocations are expressed as percentages of remaining civil settlement funds."

ALTERNATIVE 2 - HABITAT PROTECTION

Protect injured resources and services within the spill area from further degradation or disturbance.	
ISSUES	POLICIES
Injuries Addressed by Restoration Actions	Address all injured resources and services.
Restoration Actions for Recovered Resources	Continue restoration actions even after a resource has recovered.
Effectiveness of Restoration Actions	Conduct restoration actions that provide at least some improvement over natural recovery.
Location of Restoration Actions	Limit restoration actions to the spill area.
Opportunities for Human Use	Use habitat protection to protect or increase existing human use of the spill area.

The goal of this alternative is to protect strategic lands and habitats important to resources and services injured by the spill. In this alternative, 91% of the remaining settlement funds would be available for habitat protection. Monitoring and Research and Habitat Protection and Acquisition are the only restoration actions included in this alternative. The Habitat Protection and Acquisition program includes the acquisition of private land interests and changes in public land management. The Monitoring and Research program would evaluate the effectiveness of habitat protection measures undertaken and follow the progress of natural recovery. Restoration activities would be limited to the spill area.

ALTERNATIVE 3 - LIMITED RESTORATION

Take the most effective actions within the spill area to protect and restore all injured services and resources except those biological resources whose populations did not measurably decline . Maintain the existing character of the spill area.	
ISSUES	POLICIES
Injuries Addressed by Restoration Actions	Address all resources and services <i>except</i> those biological resources whose populations did not measurably decline.
Restoration Actions for Recovered Resources	Cease restoration actions once a resource has recovered.
Effectiveness of Restoration Actions	Conduct restoration actions that provide substantial improvement over natural recovery.
Location of Restoration Actions	Limit restoration activities to the spill area.
Opportunities for Human Use	Use restoration actions to protect existing human use of the spill area.

The goal of this alternative is to help the most injured resources and services recover as efficiently as possible. As its title implies, this alternative is *limited* in that it addresses only the most severe injuries until the resource or service recovers, includes actions most likely to produce substantial improvement over natural recovery, is limited to the spill area, and does not fund activities intended to increase human use of the spill area. Only a few restoration activities meet these standards.

In this alternative, 75% of remaining settlement funds would be available for Habitat Protection and Acquisition. Of the General Restoration options that have been evaluated, only 21 meet the criteria of this alternative. See the following section concerning General Restoration. The Monitoring and Research program would evaluate the effectiveness of restoration actions and follow the progress of natural recovery.

ALTERNATIVE 4 - MODERATE RESTORATION

Take the most effective actions to protect and restore all injured resources and services. Increase, to a limited extent, opportunities for human use of the spill area.	
ISSUES	POLICIES
Injuries Addressed by Restoration Actions	Address all injured resources and services.
Restoration Actions for Recovered Resources	Cease restoration actions once a resource has recovered.
Effectiveness of Restoration Actions	Conduct restoration actions that provide substantial improvement over natural recovery.
Location of Restoration Actions	Undertake restoration actions anywhere there is a link to injured resources or services.
Opportunities for Human Use	Use restoration actions to protect or increase existing human use of the spill area.

The goal of this alternative is to help all injured resources and services recover as efficiently as possible. It is similar to Alternative 3 in limiting restoration actions to resources not yet recovered and setting the same high standard of effectiveness. It differs from Alternative 3 by addressing additional injured species whose populations did not decline, including activities outside the spill area, and increasing opportunities for human use of the area to a limited extent.

In this alternative, 50% of remaining settlement funds would be available for Habitat Protection and Acquisition. Of the General Restoration options that have been evaluated, 31 meet the criteria for this alternative. The Monitoring and Research program would include ecosystem monitoring and restoration research in addition to evaluating the effectiveness of restoration actions and following the progress of natural recovery.

ALTERNATIVE 5 - COMPREHENSIVE RESTORATION

Take all effective actions to protect, restore, and enhance all injured resources and services. Increase opportunities for human use of the spill area.	
ISSUES	POLICIES
Injuries Addressed by Restoration Actions	Address all injured resources and services.
Restoration Actions for Recovered Resources	Continue restoration actions even after a resource has recovered.
Effectiveness of Restoration Actions	Conduct restoration actions that provide at least some improvement over natural recovery.
Location of Restoration Actions	Undertake restoration actions anywhere there is a link to injured resources and services.
Opportunities for Human Use	Use restoration actions to protect or increase existing use or encourage appropriate new use of the spill area.

The goal of this alternative is to help all injured resources and services return to or exceed prespill levels. It is similar to Alternative 4 in addressing *all* injured resources and services and including activities outside the spill area. It is more expansive than Alternative 4 because it allows restoration actions to continue in order to enhance a resource even after it has recovered, includes any action likely to produce at least *some* improvement over natural recovery, and encourages appropriate new human use of the spill area.

In this alternative, 35% of remaining settlement funds would be available for Habitat Protection and Acquisition. Of the General Restoration options that have been evaluated, 47 meet the standards of this alternative. The Monitoring and Research program would include ecosystem monitoring, and restoration research in addition to restoration monitoring and natural recovery monitoring.

Comparison of Alternatives

COMPARISON OF POTENTIAL ALLOCATIONS

Table V-? compares potential allocations within the five alternatives. It also indicates the components of the Monitoring and Research program included in each alternative. Spending for each restoration category gives a sense of the emphasis of the restoration program by alternative. The allocations are illustrative only and are not a commitment of actual expenditures.

In general, as potential allocations to General Restoration increase, funds available for Habitat Protection and Acquisition decline. Furthermore, as the restoration program increases in complexity, so does the cost of Administration and Public Information, and of Monitoring and Research.

Table V-?. Comparison of Potential Allocations to Restoration Categories by Alternative.

RESTORATION CATEGORY	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Administration and Public Information		4%	6%	7%	7%
Monitoring and Research		5%	7%	8%	10%
● Recovery Monitoring		x	x	x	x
● Restoration Monitoring		x	x	x	x
● Ecosystem Monitoring				x	x
● Restoration Research				x	x
General Restoration			12%	35%	48%
(For examples of general restoration activities within each alternative see page __.)					
Habitat Protection and Acquisition		91%	75%	50%	35%
Balance	100%	0%	0%	0%	0%
TOTAL:	100%	100%	100%	100%	100%

NOTES: Display of potential allocations is illustrative only and not a commitment of actual expenditures. Allocation expressed as a percent of remaining civil settlement fund.

Alternative #1 is the no-action alternative for the Draft Environmental Impact Statement. Consequently, it includes a balance that would not be spent on any restoration activity.

x = Component of restoration category included in this alternative.

IN GENERAL, HOW DOES EACH ALTERNATIVE BENEFIT RECOVERY?

Alternative 1, Natural Recovery (No Action), would produce no improvement over natural recovery. This alternative includes no restoration activities. It would allow injured resources and services to recover naturally, but would not monitor their recovery.

Alternative 2, Habitat Protection, would improve natural recovery by preventing some habitat disturbances that might otherwise occur. Benefits would accrue primarily to injured resources and services linked to upland habitat. The effectiveness of habitat protection would be monitored, as would the progress of natural recovery of injured resources and services for which no habitat protection measure is undertaken.

Alternative 3, Limited Restoration, might improve recovery of the most injured populations within the spill area. It includes no restoration activities for those species whose populations did not measurably decline because of the spill (see table on page 3). By protecting existing human use, this alternative neither changes the character of the area nor impedes natural recovery of injured resources and services. Because this alternative allocates less to General Restoration actions than do Alternatives 4 and 5, more funds would be available for habitat protection.

Alternative 4, Moderate Restoration, might improve recovery of all injured resources and services, reaching outside the spill area, if necessary, to find the most effective restoration actions. This alternative also addresses less severe injuries and prepares for future problems through ecosystem monitoring and restoration research. Finally, this alternative would increase opportunities for existing human use of the spill area, if doing so would improve recovery of an injured service. Because of the expanded scope of restoration actions in this alternative, fewer funds would be available for habitat protection than in Alternatives 2 and 3.

Alternative 5, Comprehensive Restoration, might improve recovery of all injured resources and services and could enhance some of them. In addition to the restoration actions in Alternative 4, this alternative includes actions that are less certain to benefit recovery and encourages appropriate new human use of the spill area. If successful, these additional General Restoration actions could produce greater overall beneficial effects than those in Alternatives 3 and 4, but they would further reduce the availability of funds for habitat protection. Under this alternative, restoration actions would be undertaken anywhere there is a link to injured resources and services.

Funding Methods: Endowment. Whether or not funds are placed into an endowment is a decision about the timing of when restoration activities should occur. The alternatives compared above assume that the funds are spent within approximately ten years. Some of the remaining funds could be placed into an endowment to fund restoration activities after Exxon payments end. For example, 20% of the remaining restoration funds could be placed into a savings account. If so, fewer restoration activities could be accomplished within ten years, but the interest from the account could annually fund approximately \$3 to \$5 million worth of restoration activities indefinitely.

HABITAT PROTECTION ON PRIVATE LANDS: HOW MUCH LAND COULD BE PROTECTED?

The alternatives indicate that 91% to 35% of the remaining settlement funds could be available for acquiring and protecting habitat. The Trustee Council is looking at many methods of protecting habitat. Some of the factors that would influence the actual amount of habitat protected include:

- land costs, which are highly variable; and
- whether full or partial property rights are acquired.

Under any alternative, the amount of available land exceeds available funding. Therefore, land parcels must be ranked according to their value in restoring injured resources and services. Acquiring fee title is the most expensive way of protecting private land. Assuming acquisition of fee title and a mix of land costs, approximately 275,000 acres of land could be protected under Alternative 2. This is equivalent to about 14% of the private land within the spill area. Under Alternative 5, this figure drops to 100,000 acres, or approximately 5% of the private land within the spill area. These acreage estimates could be even lower if a larger proportion of high-value land were acquired. The estimates could be higher, if the mix of land acquired included more low cost land or partial property rights.

GENERAL RESTORATION

For some resources and services, no known restoration approach is likely to be effective. In these cases, the main agent of recovery is nature. For other resources and services, however, it may be possible to provide some improvement over natural recovery. For more information about the each restoration option, see Appendix A.

The General Restoration category of Alternatives 3 through 5 includes various restoration actions that have been suggested throughout the planning process. The suggestions were evaluated by scientists and peer reviewers. Those that were determined to be effective have been combined into general options and are listed below. Those general options may include a number of specific projects. The evaluation of options considered how recovery was aided and whether further potential injury could be prevented. Other considerations included potential negative effects, how many species benefit, and cost effectiveness. No options were identified for restoring subtidal resources, air, water, sediment or designated wilderness or wilderness study areas. The list on these pages provide examples of restoration options that received favorable evaluations. New options will continue to be evaluated as the restoration plan is implemented.

Specific projects will require legal review to ensure compliance with the civil settlement. The Trustee Council will only fund projects that are consistent with the civil settlement.

Some activities, such as habitat protection and acquisition, would have wide-ranging impacts throughout the spill area. Most options that help resources also help the services that are dependent upon them. An option targeted to improve the recovery of a single resource may

greatly benefit other resources that occur in the same area. This is especially true of the activities that protect marine, coastal and upland habitats. In addition, options that benefit the foundation of a food web, such as marine invertebrates, would ultimately benefit top predators such as whales and eagles.

The asterisk "*" in the table denotes options that may produce **substantial** improvement in assuring recovery of a biological resource. Those without an asterisk may produce at least **some** improvement in recovery.

MAMMALS	Alternatives		
	3	4	5
HARBOR SEAL: Determine the effects of disturbance on harbor seals and implement actions to reduce adverse effects.			x
* Implement cooperative programs between fishermen and agencies to provide voluntary methods to reduce incidental take of harbor seals during fishing.	x	x	x
* Implement cooperative programs between subsistence users and agencies to assess the effects of subsistence harvest.	x	x	x
* KILLER WHALE: Determine techniques for changing black cod fishery gear to avoid conflicts with fishermen and implement actions to remove adverse effects.		x	x
* SEA OTTER: Determine the effects of disturbance of upland activities on sea otters and implement actions to reduce adverse effects. This would have benefits in local areas only.	x	x	x
* Determine if eliminating oil from mussel beds removes a potential source of continuing contamination to sea otter food and take appropriate action. This would have benefits in local areas only.	x	x	x
* Implement cooperative programs between subsistence users and agencies to assess the effects of subsistence harvest.	x	x	x
RIVER OTTER: Develop sport and trapping harvest guidelines to aid in the recovery of injured populations.			x

FISH	Alternatives		
	3	4	5
* SOCKEYE SALMON: Intensify management of sockeye salmon on the Kenai River and Red Lake to reduce the risk of overescapement.	x	x	x
Improve access to salmon streams by building fish passes to increase the area where salmon can successfully spawn and rear. This would have benefits in local areas only.			x
Fertilize lakes to improve sockeye rearing success within the lake and increase sockeye population.		x	x

* Improve survival rates of salmon eggs to fry by using egg boxes, net pens or hatchery rearing.	x	x	x
* PINK SALMON: Intensify management by incorporating coded-wire tagging and stock separation to ensure and accelerate the recovery of the wild stock.	x	x	
Construct salmon spawning channels and other instream improvements to increase spawning production and provide long-term enhancement. This would have benefits in local areas only.			x
Improve access to salmon streams by building fish passes to increase the area where salmon can successfully spawn and rear. This would have benefits in local areas only.			x
* Relocate hatchery runs of pink salmon to reduce the interception rate of wild stocks of pink salmon.	x	x	
Improve survival rates of salmon eggs to fry by using egg boxes, net pens, or hatchery rearing. This would have benefits in local areas only.			x
Update the Alaska Anadromous Streams Catalog to ensure that the necessary protection and regulation is provided for all listed salmon streams in the spill area.			x
* CUTTHROAT TROUT: Intensify management of cutthroat trout and its dependent sport fishery by determining local distribution, abundance, and productivity.	x	x	
Update the Alaska Anadromous Streams Catalog to ensure necessary protection and regulation for all listed anadromous streams in the spill area.			x
* DOLLY VARDEN: Intensify management of Dolly Varden and its dependent sport fishery by determining local distribution, abundance and productivity.	x	x	
* PACIFIC HERRING: Intensify management to improve recovery by allowing increased precision in stock assessment and manipulation of harvest levels.	x	x	
* ROCKFISH: Intensify management of the rockfish fishery to modify the harvest to compensate for injury from the spill.	x	x	
BIRDS	Alternatives		
	3	4	5
BLACK OYSTERCATCHER: Accelerate the recovery of the upper intertidal zone to improve the rate of recovery in site-specific areas. This would have benefits in local areas only.			X
* Remove predators from islands that previously supported black oystercatchers. Effectiveness varies by location.	X	X	

COMMON MURRE: Reduce disturbance at breeding colonies to eliminate factors which could slow the recovery of affected murre colonies.				X
* Use artificial stimuli such as decoys or vocalizations to encourage recovery at affected colonies and accelerate recolonization of historic colonies.	X	X	X	
* Remove predators at injured colonies or remove predators from islands that previously supported murre.	X	X	X	
HARLEQUIN DUCK: Modify sport hunting harvest guidelines in the areas of injured populations to speed the rate of recovery during the recovery phase.				X
* Determine if eliminating oil from mussel beds removes a potential source of continuing contamination in feeding areas and take appropriate action. This would have benefits in local areas only.	X	X	X	
* MARbled MURRELET: Minimize the incidental capture of birds in fishing nets by changes in gear or timing of fishing.	X	X	X	
* PIGEON GUILLEMOT: Control predator access or remove predators from islands that previously supported birds.	X	X	X	
BALD EAGLE: No options other than habitat protection have been identified.				

COASTAL HABITAT	Alternatives	3	4	5
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* INTERTIDAL ORGANISMS: Accelerate the recovery of the upper intertidal zone to aid intertidal resources in localized areas.	x	x	x	
SUBTIDAL ORGANISMS: No restoration options have been identified.				

DESIGNATED WILDERNESS AREAS	3	4	5
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No options have been identified for Designated Wilderness Areas or Wilderness Study Areas.

ARCHAEOLOGICAL RESOURCES	3	4	5
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Develop a site stewardship program using residents to monitor nearby archaeological sites to discourage looting and vandalism.	x	x	x	
Increase law enforcement and agency presence to patrol and monitor archaeological sites within the spill area would protect sites from looting and vandalism.	x	x	x	
Preserve archaeological sites and artifacts within the spill area to provide some measure of permanent protection for select archaeological resources.	x	x	x	

Acquire replacements for artifacts from the spill area as a means of preserving and studying artifacts which were taken from the spill area prior to the spill. x x

SERVICES	3	4	5
Resource options shown above also benefit many services.			

RECREATION: Develop backcountry public recreation facilities to <u>protect existing recreation use.</u>	x	x	x
Develop backcountry public recreation facilities to <u>protect and increase existing resource use.</u>	x	x	
<u>Encourage appropriate new recreation use, such as:</u>			x
Marketing public land for commercial recreational use to provide additional opportunities for commercial operators and recreationists to use public lands.			
Creating new visitor centers or building a marine environmental institute to increase public awareness of the nature of injury and recovery and understanding of the ecosystem of the area.			
Replace lost sport fishing opportunities by creating new fisheries for salmon or trout.	x	x	x
COMMERCIAL TOURISM: The restoration options, and the alternatives they appear in, are identical to those described above for Recreation.	x	x	x
SUBSISTENCE: Replace lost harvest opportunities by creating new salmon runs.			x
Test subsistence foods for continued contamination as a means of restoring confidence in the safety of subsistence resources within the spill area.	x	x	x
Provide new access to traditional foods in areas outside the spill area to restore lost use. This option will undergo legal review.	x	x	x
Develop subsistence mariculture sites to benefit subsistence users by providing a source of uncontaminated shellfish for their diets.			x
Develop a shellfish hatchery and technical research center to benefit subsistence users by providing a source of uncontaminated shellfish for their diets.			x
COMMERCIAL FISHING: Replace harvest opportunities by creating new fish runs to replace commercial fishing opportunities lost due to fishing closures or reduced harvest.	x	x	x
PASSIVE USE: No options other than habitat protection have been identified for this resource.			