

MEMORANDUM

To: RPWG

From: Karen

Date: May 3, 1993

This is a portion of the "SPECIAL GUEST CHAPTER". I apologize for not having the whole thing complete, but I wanted you to see where I was headed with it before we meet later this week. Chris is going to help me finish the rest of this chapter. I am beginning to work on the Services portion this afternoon and hope to be able to give you part of a draft for Wednesday.

Please note that there are two possible formats that I think could work - they both take about the same amount of space, but one has fewer words than the other. I have completed Harbor seals both ways as an example. I also expect that this section will either be at the end of Chapter 5 or later.

*Where does this
fit best? After ch 5?*

*Help Karen on Services end of this effort,
look at why?*

WHAT CAN WE DO TO HELP INJURED RESOURCES AND SERVICES RECOVER?

As described earlier, part of the evaluation process used to determine which restoration options belong in each alternative differed between resources and services. For general restoration options directed at resources, the evaluation was based on their predicted effectiveness for improving the estimated recovery time, or in preventing additional stress on the recovering populations. For restoration options for services (human uses) that were not focused on the recovery of a key injured resource, the options were evaluated based on the opportunities for human uses that could be created or protected.

How would the injured resources or services be benefited by implementing general restoration options? This chapter describes how the options are expected to influence the recovery of the injured resources and services. These results are based largely on best professional judgement and are therefore subject to change as new information becomes available. New options that could be included are continually being suggested and may be added as the final restoration plan is developed.

RESOURCES

Some important points to look for in this section are the number of options that actually are thought to have the ability to affect the recovery of the injured resources. Unfortunately, there is very little that can be done directly for some species. Some options that have the potential to affect the recovery of a resource are experimental and have to be tested before they can be considered for broad-scale application. These are clearly identified by (**Special Study**) printed after the option name. Other options may be effective only in localized areas. These options are identified as providing "localized benefits only".

*insure that
who reads
has info on
what Group
and 2 mean*

Options that are thought to be able to provide "**substantial**" improvement in recovery or prevention on either a localized or broad scale are in Group 1 and appear as General Restoration Options in Alternatives 3-5. Options that are thought to provide "**some**" improvement are in Group 2 and appear only in Alternative 5. Cumulative effects of any combination of these options may provide more benefit than is recognized in this evaluation. All **special study** options were placed in Group 1.

Options for Habitat protection and acquisition are described in this section for only a few resources. For these resources, protecting (or acquiring) habitat from realistic (forseeable?) changes was thought to prevent a notable additional decline in the injured population. Many other resources benefit by habitat acquisition - even when an area may have been identified for a different resource or service. These important secondary benefits are not discussed here, but are included in the habitat evaluation

process which focuses largely on the degree of linkage that a particular parcel has to all the injured resources and services.

MAMMALS

HARBOR SEALS: Only a few methods have been identified that may actively aid harbor seal recovery. The causes of the long term population decline in harbor seals since the 1970s are unknown, therefore it is difficult to develop restoration options that will enable the population to increase. The restoration options presented here are protective: protecting harbor seal haul-outs from disturbance, cooperative programs with commercial fishing groups to protect harbor seals, and cooperative programs with subsistence users.

Disturbance at haul-out sites within the oil spill area is not considered a significant problem at this time. However, other studies have shown that disturbance can cause additional pup mortality and increase the stress on adults. Therefore, preventing unnecessary disturbance at haul-out sites was thought to provide some improvement in preventing additional stress or mortality (Group 2).

The two options that would develop cooperative programs between subsistence users or commercial fishermen and the harbor seal managers and researchers (Options XX and XX, respectively) are believed to have the most potential for improving harbor seal recovery. Both options are in Group 1. Creating greater communication and cooperation between the groups of people who interact most with harbor seals in the affected area would improve our understandings of the injured population and may help to identify ways to prevent or slow any additional decline.

KILLER WHALES: Three options were considered to help the one injured whale pod increase its numbers to pre-spill levels. The experts interviewed did not believe that two of these, reducing disturbance at rubbing beaches, and changing water management practices, would have any effect on recovery. The third option, facilitating gear changes in the black cod fishery (Group 1), was thought to have the greatest potential to allow the pod to recover without additional stresses. A gear change from long-lines to pots would prevent the whales from marauding the fishermen's catch and eliminate the need for fishermen to defend their harvest.

RIVER OTTERS: There is very little that has been identified that can be done to address the injuries to river otters. This is partially due to the difficulties in assessing the actual injuries, but it is also due to the life history patterns of the otters. Several options (List option #'s) should provide secondary benefits to river otters in the area, but none of these are expected to benefit more than a few individuals at a time.

Currently, the only option that could provide some benefits (Group 2), is to coordinate with the Board of Game to adjust trapping guidelines for otters within the oiled areas.

SEA OTTERS: In addition to the individuals killed directly by the oil in 1989, researchers believe that there has been poor weanling pup survival and higher than normal mortality in prime-age adults (based on post-spill studies in Prince William Sound). The causes or extent of these additional problems are not known, but researchers speculate that the otters may still be exposed to oil by eating food from subtidal and intertidal areas.

There are three options that appear to have potential to help the sea otter populations recover. Two require preliminary research (**special studies**) before their effectiveness can be accurately evaluated. A **special study** option to determine the effects of removing oil from mussel beds may show that it substantially improves survival (Group 1); unfortunately, implementing this option is only expected to provide localized benefits. The other **special study** would determine the effects of upland disturbances on nearby concentrations of sea otters. If these studies indicate that upland disturbances negatively effect sea otter productivity then options that protect private or public lands from such disturbances could be considered (i.e. Habitat protection and acquisition or altering management practices on public lands). Overall, experts felt that the benefits from these protective measures would have some improvement over current recovery conditions; therefore, this option is in Group 2.

The third option would develop a cooperative program between subsistence users and the managers and researchers of the sea otter populations. This type of cooperative program could have substantial benefits by improving the overall understanding of sea otter population and its recovery status (Group 1).

BIRDS

BALD EAGLES: No continuing effects of the sublethal injuries have been documented since 1990, and the population of bald eagles monitored in Prince William Sound is expected to reach its pre-spill numbers by 1996. Because The Bald Eagle Protection Act of 19.. provides considerable protection of eagles and their nest trees, no restoration options other than habitat protection have been identified.

BLACK OYSTERCATCHERS: There are two options that have been identified for black oystercatchers. Accelerating the recovery of the upper intertidal zone where black oystercatchers feed (option XX) could provide some benefit in localized areas (Group 2). Because black oystercatchers do not breed close to other pairs, this option would have to be implemented over a huge area in order to have a substantial impact on the population.

The second option would focus mostly on oystercatchers **outside** of the oil spill area. Removing introduced predators (rats and foxes) from islands (probably in the Aleutian Islands) that once had breeding black oystercatchers could increase the state-wide population of the birds. Fox removal projects have shown substantial increases in black oystercatcher populations on the treated islands. **(i think i have some real numbers to put in here later)**

COMMON MURRES: Many possible methods for restoring murre colonies have been considered for the injured colonies within the oil spill area. Unfortunately, the difficult locations and physical characteristics of these colonies make techniques that are being used elsewhere have limited application. There are three options that have potential application. These include enhancing breeding activity through social stimuli, reducing man-caused disturbances at the colonies and reducing predation. Of these, predator reduction is most likely to produce notable changes in the recovery of the colonies.

Enhancing murre breeding productivity through social stimuli would be experimental at the injured colonies (**special study - Group 1**). These methods have been used for establishing new colonies (or re-establishing abandoned colonies) for other seabirds, but they have not been used to try and synchronize breeding. There are signs that the injured colonies are slowly returning to normal breeding times which means that this option may no longer be necessary; however, it may be useful to determine if the techniques would work so the information is available if it is needed in the future.

Reducing predation is the most certain way to increase productivity (Group 1) if predation can be shown to be a significant factor in egg and chick mortality. Within the oil spill area, gulls and ravens are the primary predators. These birds are native to the colonies so the cost to these species must be carefully considered. **(this needs work!)** Outside of the spill area, there are islands that have introduced foxes and rats that have decimated seabird colonies. It has been shown that murres will return and recolonize areas once predators are removed.

Man-caused disturbance at breeding murre colonies does not seem to be a significant problem at the injured colonies. However, some benefit would probably be gained by reducing disturbances such as gun shots near the colonies (this option has been ranked in Group 2).

HARLEQUIN DUCKS: Post oil-spill studies in Prince William Sound have shown that productivity (number of chicks observed) continues to be lower than expected. Restoration actions that have been identified for harlequins include further restrictions on hunting within the oil spill area, determining the linkage of injury to oiled mussels, and habitat protection.

Harlequin ducks are one of the species that is likely to gain extra benefit from habitat protection in the oil spill area. Habitat loss and alteration in the Lower 48 states is thought to be a major factor in the declining populations in the rest of the country. Protecting habitat in the oil spill area would prevent additional stress on the injured population.

Continuing exposure to oil through their diet, is one of the hypotheses that researchers have proposed to explain the continuing reduced reproductive success. Mussels are known to be a primary food source, and 'fresh oil' was found in mussel beds as late as 1992. A **special study** (Group 1) would attempt to determine if the oiled mussels are responsible for the poor reproductive success. If the link is established then restoration options that look at removing the remaining oil could be implemented in some areas. Unfortunately, removing oil is likely to only have localized benefits.

The Alaska Board of Game has restricted hunting of harlequin ducks in Prince William Sound until the migrant birds arrive for the winter. Continuing this closure and potentially extending the closure would provide some additional protection to the injured population (Group 2).

MARBLED MURRELETS: As with harlequin ducks, protecting nesting habitat may be especially important. In the Pacific Northwest, habitat loss is thought to be one of the causes of the declining population that has led to the marbled murrelet being listed as threatened (?) under the Endangered Species Act of 1973. At this time, the only other restoration action that has been identified to help the injured population is a **special study** (Group 1) that determines the effects of entanglement in fishing nets, and would develop ways to minimize incidental catch of marbled murrelets. Currently, incidental capture in fishing nets is not known to be a significant problem; however, it has been documented to occur and may provide some additional benefit to the injured species.

Marbled murrelets were in decline before the oil spill. The cause of the population decline is unknown.

PIGEON GUILLEMOTS: Few methods have been identified for aiding pigeon guillemot populations. Outside of the spill area, removing introduced foxes or rats from islands, primarily in the Aleutian Islands chain, has the greatest potential for increasing the state-wide population. Pigeon guillemots tend to nest in loose colonies (not high density nesting), there are a few colonies within the spill area where nesting density is high enough that predator control may provide an opportunity to restore the injured population. Pigeon guillemots are one of the species injured by the oil spill that was in decline before 1989. The cause of this decline is unknown.

Note: This may be the format that we want to use for the draft plan. However, it is easier to write the text version and then shorten it this way than vice versa.

HARBOR SEALS: Only a few methods have been identified for actively aiding harbor seal recovery. The causes of the long term population decline in harbor seals since the 1970s are unknown, therefore it is difficult to develop restoration options that will enable the population to increase. The restoration options presented here are protective.

Disturbance at haul-out sites within the oil spill area is not considered a significant problem at this time, but reducing disturbance has been shown to decrease pup mortality and stress on adults in other areas. Creating greater communication and cooperation between the groups of people who interact most with harbor seals (subsistence users, commercial fishermen, researchers and managers) in the affected area would improve our understandings of the injured population and may help to identify ways to prevent or slow any additional decline.

"Substantial"- Implement cooperative programs between subsistence users and agencies.

Implement cooperative programs between commercial fishermen and agencies.

"Some" - Reduce disturbance of harbor seals at haul-out sites.


Gorbier comments

klinge draft 10 April 93

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CHAPTER IV. RESTORATION OPTIONS AND EVALUATION

Since 1989, the ~~restoration planning process~~ ^{Trustees have} has identified the widest range of restoration ideas and projects based on suggestions from a public symposium (RWS, 1990a), public "scoping" meetings (RPWG, 1990b), and a technical workshop (because of pending litigation, the workshop was closed to the public and a proceedings was not published). These ideas were combined into similar categories called restoration options. Figure xx. illustrates the genesis of one of the current restoration options.

fish ladders
steep passes  Improve access to spawning and rearing habitat.
remove barriers

An option may be applied for more than one resource or service. In the example above, improving access to spawning and rearing habitat could be applied for pink salmon as well as sockeye salmon. In most situations, implementing the option would be different for each different species because the specific project designs would have to be ~~tailored~~ ^{tailored} for the targetted resource or service. Two options, monitoring and public information/education applied to so many of the injured resources and services, and were felt to be an integral part of any comprehensive program that they became "programmatic options". A total of thirty-five candidate restoration options were identified and presented in the Restoration Framework (Exxon Valdez Oil Spill Trustees, 1992a) for review and comment.

Throughout the life of this restoration plan the list of options will certainly change as new ideas are presented and as these options prove their effectiveness. The options discussed in this Draft Restoration Plan are presented in Table XX and are described in more detail in Appendix XX. They have undergone extensive evaluation and review as part of the planning process. Initially, options were evaluated to determine that they (1) met the terms of the civil settlement, (2) were technically feasible (or warranted research on the feasibility), and (3) were not likely to cause substantial harm to injured resources. Restoration ideas which did not meet these criteria were rejected from further consideration. A list of these ~~options~~ ^{ejected} appears ~~at the end of~~ ^{at the end of} Appendix XX.

The remaining restoration options were evaluated using criteria developed from the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. 9601). These criteria included:

- (1) The effects of any other actual or planned response or restoration actions. *This is important to avoid duplication or conflicts with ongoing activities.*
- (2) potential effects of the action on human health and safety;
- (3) The relationship of expected costs to expected benefits; [note

Maybe? Is this embodied into the effectiveness question?
 For example, social stimuli w/murres - didn't we consider the high cost of implementing on a wide basis when we ranked effectiveness?
 Klinge draft 10 April 93

to reviewers...did we ever actually use this criterion to reject or modify an option? If not, should we drop it or put it in the appendices?]

- (4) The potential for additional injury resulting from the option; This pertains to ~~over~~ injured and uninjured resources and services, and
- (5) The degree to which the option benefits more than one resource or service. Multiple species benefits are considered an efficient means of restoration.

why not
 them
 here?

Other criteria that were used in this stage of the evaluation are described in Appendix AX.

The above criteria were used to develop the list of appropriate options, but further evaluation was needed to determine which options could be the most effective in aiding the recovery of injured resources. (and services?). ~~Determining the potential for an option to improve the rate or degree (relative to 100% recovery) is very difficult because of the great deal of uncertainty which surrounds the injuries and the possible unaided recovery times.~~ ^{measurable?}

Further Evaluation of Resource Options

In order to estimate the effectiveness of different options on the recovery of injured resources, agency scientists and peer reviewers were interviewed. They were asked to predict what would happen to the species that they study if the Trustees were to conduct no restoration actions. This estimate of natural (or unaided) recovery provided the basis for determining the effects of the options. They were then asked to estimate what effect implementing a specific option would have on natural recovery, and asked to describe their level of uncertainty. ^{therefore} At least two experts were interviewed for each of the injured resources and their responses were compared and combined to evaluate each option.

never?

The interviews resulted in dividing the estimates of option effectiveness into three categories:

- 1) options that were not expected to provide more than a 10 percent improvement (these options were no longer considered viable for the specific resource in question);
- 2) options that provide at least some improvement over natural recovery; and,
- 3) options that could provide substantial improvement over natural recovery.

Because of the difficulties in predicting natural recovery as well as the outcome of implementing restoration options, the categories of "some" improvement and "substantial" improvement were based on ~~changes in~~ ^{improvements} confidence as well as ~~changes in~~ ^{a decrease} the estimated time to

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reach recovery. This process is described in more detail in the ~~methodologies~~ Appendix _____ .

As new restoration ^{options} ~~ideas~~ are developed to address injured resources, they will need to undergo a similar evaluation. A proposed process for developing and evaluating new restoration options is described in the ~~methodologies~~ Appendix _____ .

Further Evaluation of Services Options

For services it became apparent (public and peer reviewer comments) that the restoration options described in the 1990 Restoration Framework document did not adequately address the scope of actions that could be taken to benefit services. Services are dependent upon the health of resources and are therefore benefited by options that are implemented to help the specific resource recover. However, other actions that are not necessarily focused on an injured resource can also be implemented to aid services. In order to identify and evaluate potential options a survey was conducted. This 'key informant' survey helped to develop options A-G.

Evaluating the "effectiveness" of restoration options for services can not be applied in the same context as for resources. Therefore, the options for services were divided into categories that described the level of opportunities for human uses. (relative to use levels prior to 1989? - I need help here.) 2

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Throughout the life of this restoration plan the list of options will certainly change as new ideas are presented and as these options prove their effectiveness. The options discussed in this Draft Restoration Plan are presented in Table XX and are described in more detail in Appendix XX. They have undergone extensive evaluation and review as part of the planning process. Initially, options were evaluated to determine that they met the terms of the civil settlement, were technically feasible (or warranted research on the feasibility), and were not likely to cause substantial harm to injured resources. Restoration ideas which did not meet these criteria were rejected from further consideration. A list of these options appears at the end of Appendix XX.

emphasis here

The remaining restoration options were evaluated using criteria developed from the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. 9601). These criteria included:

the effects of any other actual or planned response or restoration action;

potential effects of the action on human health and safety;

*This was where use of this
criteria broke down. Effectiveness
of the activities could be measured
better than the benefit in \$.*
Klinger and April 93

the relationship of expected costs to expected benefits; [note to reviewers...did we ever actually use this criterion to reject or modify an option? If not, should we drop it or put it in the appendices?]

the potential for additional injury resulting from the option;

and, the degree to which the option benefits more than one resource or service.

Other criteria that were used in this stage of the evaluation are described in Appendix AX.

The above criteria were used to develop the list of appropriate options, but further evaluation was needed to determine which options could be the most effective in aiding the recovery of injured resources. (and services?). Determining the potential for an option to improve the rate or degree (relative to 100% recovery) is very difficult because of the great deal of uncertainty which surrounds the injuries and the possible unaided recovery times.

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The interviews resulted in dividing the estimates of option effectiveness into three categories:

- 1) options that were not expected to provide more than a 10 percent improvement (these options were no longer considered viable for the specific resource in question);
- 2) options that provide at least **some** improvement over natural recovery; and,
- 3) options that could provide **substantial** improvement over natural recovery.

Because of the difficulties in predicting natural recovery as well

as the outcome of implementing restoration options, the categories of "some" improvement and "substantial" improvement were based on changes in confidence as well as changes in the estimated time to reach recovery. This process is described in more detail in the methodologies Appendix.

will we have this as low level it be part of plan? - EIS?

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