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**Option 51.0 Relocate or Change Timing of Existing Hatchery Salmon Runs**

This option entails shifting the location and, possibly, the timing of salmon runs released from hatcheries. For instance, hatchery-produced sockeye runs in Prince William Sound might be changed to result in adults returning to hatcheries earlier in the season. This strategy could decrease fishing pressure on wild-stock pink salmon which use similar migration corridors but return later in the season. Alternatively, hatchery fish could be released and harvested at remote sites not heavily utilized by wild-stocks. In either case, the objective is to decrease interception of injured, wild-stock pink salmon returning to spawning streams. If fishing effort is directed away from migration corridors used by wild-stocks, interceptions will decrease and the injured populations will recover more rapidly.

Implementing this option requires considerable planning and coordination between agency biologists, aquaculture associations and Regional Planning Teams. Factors to be considered include the impacts of shifting run timing or location on existing runs of hatchery and wild fish. Obviously, it would not be desirable to decrease interception of one run at the expense of greatly increasing interceptions of another. The types of information required to implement these changes include surveying locations of wild-stocks, evaluating existing and potential degrees of wild-stock interception, and possible genetic impacts on wild-stocks caused by straying of hatchery fish.

**How will this help recovery?**

This option is designed to reduce interception of injured, wild-stock pink salmon by commercial fishermen who are targeting runs of hatchery-reared salmon. By shifting the location and, possibly, the timing of returning hatchery runs, fishing could, in some cases, be directed away from injured stocks. Recovery of wild-stock pink salmon would be aided by reducing fishing mortalities. This option would effectively promote recovery of wild-stocks suffering population-level injuries, but would not be particularly effective for restoring sublethal injuries.

**Additional information:**

This option is found in Alternatives 4 and 5 for pink salmon.

The injury description for pink salmon is found on page \_\_\_\_.

Analysis of similar projects in other areas will be conducted. The information will be incorporated into the project design.

Evaluation and feasibility determinations of potential projects for restoration, replacement or enhancement of bivalve shellfish in more remote areas, but of import to marine mammals, birds and fish will also be accomplished.

#### B. Coordination with other efforts

During the process of needs assessment and feasibility analysis, necessary coordination of efforts needs will also be determined and analyzed. At this time ADF&G is aware of efforts by Alaska native groups to establish a shellfish hatchery and an aquatic farm industry in the oil-affected area. This project is supportive of and will be coordinated with those efforts to insure maximum efficiency and utility.

#### ENVIRONMENTAL COMPLIANCE

Project compliance with the National Environmental Policy Act (NEPA) will be assessed during the feasibility phase. Until project design and specifications are finalized, specific NEPA requirements cannot be determined. Aquatic farms are addressed under a Corps of Engineers' general permit (GP 91-7). If facilities are constructed, a determination of compliance with the Alaska Coastal Management Plan (ACMP) will be required. The required State and Federal permits will be identified and incorporated into the project planning process.

#### WHEN

The feasibility study will occur this budget year (1/1/93 - 9/30/93). The clam restoration/enhancement demonstration project will occur next budget year.

If the project is determined to be feasible and appropriate budgets realized, construction of the facilities will begin in 1993 (Oil Year 6). The facilities will be operational in 1994.

#### BUDGET (\$K)

	ADF&G
Personnel	37.6
Travel	8.0
Contractual	2.0
Commodities	2.4
Equipment	0.0
Capital Outlay	0.0
Sub-total	50.0
General Administration	5.7

negative affects of the Exxon Valdez oil spill on native communities.

## B. Objectives

The initial objectives of the project are to assess the feasibility of a shellfish production hatchery and a mariculture technical center to be used to restore, replace and/or enhance bivalve shellfish populations in oil-impacted areas. A report on the feasibility of the proposed facilities relative to potential uses will be generated from data collected during the year. Alternative configurations will be considered and analyzed. This initial study will also attempt to identify potential species and establish production goals for those species.

Native communities and organizations in the affected area would be involved from the outset in development of this project. Pending the results of the feasibility analysis, they would be the logical entity to operate the production shellfish hatchery.

If full funding for construction of the facilities is not realized from oil spill funds, additional funding sources will be required before they can be built. Though this would not affect the stated objectives, it would alter the project time frames and facility priorities

## WHY

### A. Benefit to Injured Resources/Services

Bivalve shellfish populations were severely impacted by the oil spill and by the cleanup efforts following. All of the affected populations were used to some degree by marine mammals, birds, fishes and in many cases for human subsistence. This project would provide the facilities and infrastructure to research techniques to restore, replace and/or enhance affected populations using shellfish hatchery and aquatic farm-based technology.

## HOW

### A. Methodology

Utilizing concepts already developed for the Seward shellfish hatchery and the ADF&G Mariculture Technical Center, a feasibility analysis of the project will be conducted. Engineering and biological expertise will be retained to conduct the analysis. If construction funds are later approved, direct restoration, replacement and/or enhancement of bivalve shellfish will be accomplished via an onshore production hatchery operated by the private sector using technology developed at a State-operated research center. The combination of the two facilities is necessary to accomplish the overall production objectives of this project because of the lack of technology for indigenous species.

12/10/92

OPTION 50.2

~~OPTION 50.2~~ Bivalve Shellfish Hatchery and Research Center

- local species?

- cover costs by selling to commercial operations

**APPROACH CATEGORY:** Restoration manipulation and/or enhancement

**INJURED RESOURCES AND SERVICES:** Subsistence, shellfish

**INTRODUCTION**

**A. Background on the Resource/Service**

Shellfish resources in the Exxon Valdez oil spill (EVOS) affected area were impacted in several ways. Most obviously, shellfish populations were damaged, destroyed and/or contaminated by the spill and/or subsequent cleaning activities.

**B. Summary of Injury**

Some bivalve shellfish populations were affected directly by the toxic effects of the spilled oil and subsequent cleaning. Still other populations were contaminated or were suspected to be contaminated to the degree that they were unfit for human consumption and/or were negatively affecting birds, mammals and other animals that fed upon those shellfish. Evidence indicates that natural cleansing is not proceeding well in some areas. The sheltered habitats most hospitable to shellfish were also those most protected from natural cleansing action. Oil spill residues continue to persist in these areas.

Native communities in the oil-impacted area were altered by the EVOS. Prior to the EVOS at least one mariculture feasibility study was under way (near Chenega Bay Village). This was terminated because of the spill. Replacement shellfish opportunities are reasonable expectations for impacted villages.

**C. Location**

The project involves two physical facilities. The proposed location for these facilities is in Seward, Alaska. A component of this study is to determine if that is the best location. Target locations for projects resulting from the operation of these facilities include Tatitlek, Chenega Bay, Eyak, Port Graham and Nanwalek.

**WHAT**

**A. Goal**

The goal of this project is to assess the feasibility of using aquatic farming technology to restore, replace or enhance bivalve shellfish populations in oil-affected areas and to mitigate the

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## 30B - Provide Access to Alternative Subsistence Foods

The goal of this option is to minimize interruption of subsistence activities at those native communities most affected by the oil spill. As a result of the oil spill, some resource populations have declined, while others (especially shellfish) continue to be chronically contaminated by persistent pockets of buried oil. This project will provide funds for subsistence hunters from Chenega to travel to eastern Prince William Sound to harvest traditional subsistence resources not injured or contaminated by the oil spill. Funding also would be provided to facilitate subsistence hunters in other native communities (~~to assist~~) to assist the Chenegans by gathering, preserving and forwarding subsistence foods to Chenega. This support will continue until the resources in the subsistence area traditionally used by the Chenegans are no longer contaminated by oil, the resource populations have recovered to pre-spill levels, or the native community is no longer concerned that their traditional foods are contaminated. Cost to implement this option is ~~\$500,000 per year or \$5,000,000~~ over a 10-year duration.

## ~~Develop Shellfish Mariculture in Impacted Subsistence Areas~~

### OPTION 50.1 DEVELOP SUBSISTENCE MARICULTURE SITES

This program will provide the villages of Chenega, Tatitlek, Port Graham, English Bay, Ouzinkie, and Ahkiok with a means to develop an alternative bivalve resource for both subsistence and commercial harvest. The basic strategy for the village mariculture program is to initially concentrate on oyster culture, and subsequently test the feasibility of establishing clam and scallop mariculture.

Tititlek, Eyak and Chenega Bay already have begun to develop oyster culture. Seed of Pacific oyster has been obtained from Washington and Oregon, and excellent growth rates have been achieved with bag and net culture techniques in eastern Prince William Sound. A good market exists for oysters grown in Alaska, and oysters have proven to be an acceptable substitute for local subsistence shellfish species (oysters are not native to Alaska).

For those villages already permitted (Eyak, Tatitlek, Chenega), settlement funds will be used to establish new oyster culture operations or increase existing operations to commercial production levels. A mariculture specialist will be hired to organize village operations, help initiate and sustain a training program, and prepare and implement mariculture development plans. For those villages without permits (Port Graham, English Bay, Ouzinkie, Ahkiok), initial efforts will focus on identification of potential culture sites and the development of permit applications. Activities in ensuing years will include preparation of mariculture development plans, training, establishing production, and development of markets.

The bulk of costs for this program is associated with developing a mariculture management structure in each village and training

*A NOTE: THIS OPTION WILL UNDERGO LEGAL REVIEW.*

4/8/93

**Option 49.0 Provide Subsistence Users Access to Traditional Foods**

As a result of the oil spill, some species traditionally harvested by subsistence communities have declined or are suspected by many subsistence users to be contaminated (e.g., harbor seals, shellfish and waterfowl). This option would provide funds for subsistence users from impacted areas to travel to unimpacted areas to harvest traditional subsistence resources. Funding may also be provided to allow people in other subsistence communities to assist impacted communities by gathering, preserving and sending subsistence foods.

Continuation of harvest activities would also help ensure that traditional hunting skills will continue to be passed down and that the cultural importance of harvesting and sharing foods is not diminished. The option would continue until subsistence resources are no longer contaminated, populations have recovered injuries, and foods are no longer perceived to be contaminated. This option will undergo legal review.

**How will this help recovery?**

The option will improve subsistence recovery by providing traditional subsistence foods to villages for which they are not readily available. It would also minimize the damage to culture and community cohesiveness that could result from continued interruption of subsistence harvests.

**Additional information:**

This option is found under Alternatives 3, 4 and 5.

The injury description for subsistence is found on page \_\_\_\_.

April 1, 1993

48.0 Improve Survival of Salmon Eggs and Fry

This option could be used to restore injured salmon runs to pre-spill levels or to enhance either injured or equivalent runs above pre-spill levels. Two techniques could be applied under this option as described below. As part of a project-level monitoring program, a representative group of fry may be coded-wire tagged to evaluate the success of the program and reduce exploitation of damaged stocks in the fishery. Recoveries of coded-wire tagged fish when they return as adults will provide additional information fishery managers need to direct exploitation away from damaged stocks.

48.1 Improve survival with remote egg takes and rearing in egg boxes or hatcheries.

Artificial spawning techniques could be used to fertilize eggs taken from wild salmon. Fertilized eggs could then be placed in egg boxes adjacent to streams utilized by damaged wild stocks or nearby areas. Fry will outmigrate from the boxes on their own in the spring. Alternatively, wild stock eggs could be incubated in existing hatcheries and released into their native spawning areas when conditions were favorable for survival. The fry would then imprint on their home streams and return there as adults to spawn. Either of these techniques would increase the egg to fry survival rates and, given favorable marine conditions, would increase adult returns.

48.2 Improve survival with remote fry rearing in net pens.

Fry to smolt survival could be increased by rearing and feeding the hatchery fish in net pens until environmental conditions and food availability were optimal for survival. At this time, the fish would be released into their native spawning areas and would, as mentioned above, return to these areas to spawn. It would probably not be cost effective to rear wild fry in net pens, for fry not reared in hatcheries since capturing and transporting large numbers of outmigrant fry would be problematic. It should also be noted that net pen rearing should be done very carefully to mitigate increased risks of disease transmission caused by confining large numbers of fry in a relatively small space.

*some cases, it may be possible to rear wild fry in net pens, for fry not reared in hatcheries since capturing and transporting large numbers of outmigrant fry would be problematic.*

MEANS TO IMPROVE RECOVERY

The fry-to-adult survival of pink and sockeye fry reared under controlled conditions is double the natural survival rate. Marine survival is also much higher than under uncontrolled conditions. Increased stock productivity and adult returns will result from this restoration technique.

Additional information:

This option may be found under alternative 3, 4, and 5 for sockeye salmon and under alternative 5 for pink salmon.

The injury descriptions are found on page \_\_\_\_ for pink salmon and on page \_\_\_\_ for sockeye salmon.

Chris

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March 24, 1993

47.0 Cooperative Program With Subsistence Users to Assess Marine Mammal Harvest Levels

Harbor seals and sea otters are legally harvested by subsistence users in the spill area. This option provides a means for agency wildlife biologists and subsistence users to cooperatively assess the need for voluntary harvest reductions. If it was mutually agreed that an injured species was being overharvested, ~~biologists and subsistence users~~ <sup>and biologists</sup> could mutually determine voluntary reductions in subsistence harvest levels which would remain in place until populations had recovered from oil spill injuries. Harvest reductions would enhance the rate of natural recovery of injured species by reducing harvest pressures. ~~If harvest levels are reduced, plans should be made to provide alternative sources of traditional foods.~~ Subsistence harvest and other services dependent on these species would also benefit in the long-run from population recovery.

Funding would be used to pay for biologists to travel to subsistence areas and meet with subsistence hunters and, possibly, to reimburse subsistence hunters for assistance provided in gathering relevant biological information or samples. This would facilitate regular, face-to face discussion of the latest information on the injury status of subsistence species and would supplement ongoing public information efforts, such as newsletters and videos put out by the Subsistence Division of the Alaska Department of Fish and Game. This option would be closely coordinated with all such ongoing agency programs.

How will this help recovery?

If current subsistence harvest levels are slowing species recovery and voluntary harvest reduction can be mutually agreed upon, reduced harvest pressures could enhance the rate of recovery. Increased communication between agency biologists and subsistence users could help the users decide if their traditional harvest activities might be slowing the recovery of the injured populations. Face-to-face contact between agency researchers and subsistence users increases community trust in scientific data and facilitates discussion of the politically and culturally sensitive topic of subsistence harvest levels. In addition, biological and harvest information provided to agency biologists by subsistence hunters could provide useful supplements to existing data.

Additional information:

This option is found in alternatives 3, 4, and 5.

The injury description for sea otters is found on page \_\_\_\_.  
The injury description for harbor seals is found on page \_\_\_\_.



**Option 46** Develop a cooperative program with commercial fishermen for harbor seal management.

This option could combine an education program along with an observer program between researchers, managers and commercial fishermen. The potential for fishermen to be impacted by regulations designed to protect harbor seals is very great. Developing a cooperative program that is willingly supported by commercial fishermen may help lessen the impact of any such legislation. It would also help the researchers and managers develop a better understanding of commercial fishing interactions and the long-term harbor seal decline.

Note - this is simply a description for Wolcott. The actual wording will be changed for the summary that appears in the draft plan. Have them talk with me if they need more information at this time.

Thanks, {karen  
(KLINGE) (907) 278-8012

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FOUND IN ALTERNATIVES 3, 4 & 5

April 8, 1993

**45.0 Facilitate Changes in Black Cod Fishery Gear**

This option would examine the feasibility of subsidizing a voluntary change of gear types in the Prince William Sound black cod (sablefish) fishery. The existing fishery uses longlines and has historically attracted killer whales. The whales learned to strip the cod off the lines. In the past, this has resulted in harassment and shooting of killer whales. While this has not been a major problem recently, upcoming changes in the way the fishery will be conducted may increase interactions. However, in areas such as British Columbia where black cod are caught in pots, whales are unable to take the fish and are not generally attracted to the boats.

Several factors must be considered to determine the feasibility of subsidizing a gear change, one of which is the willingness of fishermen to make the switch. Also, boats must be above a certain size in order to safely handle pots and, if large numbers of small boats currently participate in the fishery, the gear change would not be feasible. Other factors to study would be the history and location of problem areas, and the impact of the upcoming changes in the way the fishery is regulated, which will result in fewer boats fishing for longer periods. This may provide more sustained opportunities for whales to steal fish from boats they have learned to associate with longline fishing.

**How will this help recovery?**

If changing gear types is feasible and fishermen are willing to make the change, the switch will reduce interactions between fishermen and killer whales. Since killer whales are not able to take black cod from pots, they will not be as attracted to the boats attracted to pot fisheries and won't be as subject to harassment by fishermen. This reduction in disturbance and should facilitate recovery of killer whales in the Prince William Sound area.

**Additional information:**

This option is found in Alternatives 4 and 5.

The description of injury for killer whales is found on page \_\_\_\_.

April 8, 1993

**18.0 Replace Fisheries Opportunities by Creating New Salmon Runs**

This option entails starting new salmon runs to replace fishing opportunities lost due to closures resulting from the oil spill. For example, if Kenai River sockeye fishing is closed or restricted for multiple years, alternative runs could partially compensate the loss. The option restores services by providing replacement harvests, but does not restore injuries suffered by impacted species of fish. Commercial, sport and subsistence fishermen could all potentially benefit.

The option would be implemented by starting terminal runs, originating from and returning to hatcheries or remote release sites. Returning fish would be harvested and brood stock would be used to artificially propagate the next generation. Since the runs would be dependent on artificial fertilization, the new runs could be terminated once recovery of target fisheries occurs.

ADF&G standards and requirements for genetic and disease screening and brood stock selection would have to be met. Also, Regional Planning Teams must approve any proposed actions. Planning concerns include avoiding harmful interactions with wild stocks and interceptions of existing stocks. There may be some areas for which this option is not appropriate.

**How will this help recovery?**

The aim of this option is to minimize additional injuries to user groups by providing alternative fishing opportunities when historical fishing areas are restricted. As an alternative to completely closing fisheries or reducing bag limits, fishing pressures could be redirected to target these new runs until injured stocks recover. This option could also be used to enhance fishing opportunities above pre-spill levels if new runs were continued after target species recover.

**Additional Information:**

This option may be found under Alternatives 3, 4, and 5 for Commercial Fishing and Recreation and Alternative 5 for Subsistence.

Injury descriptions for Commercial Fishing, Recreation and Subsistence are found on pages \_\_\_\_\_.

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