

MEMORANDUM

STATE OF ALASKA
Department of Fish and Game

R.P.W.G.
L

TO: Stan Senner
Restoration Program Manager
Division of OSLAR
Anchorage

DATE: September 28, 1990

FILE NO:

THRU:

TELEPHONE NO: 465-4160

SUBJECT: Restoration Feasibility
Studies

FROM: Brian J. Allee
Director
Division of FRED



Thank you for the opportunity to submit restoration feasibility studies to the Oil Spill Restoration Planning Office. Fisheries enhancement techniques represent an economically viable approach to restoring damaged resources from this event. They also are an efficient tool for restoring services lost from resources that may be difficult to restore to their former population levels. There are also significant spinoffs in improving our knowledge for fishery management and population dynamics information that can be gained from enhancement.

To the extent possible, I am making FRED Division technical staff available to you for the purpose of providing assistance on application of fishery enhancement, rehabilitation, and development techniques to restoration. The contact names for the proposed feasibility projects are attached. Due to the short response time, we have elaborated on only one of the projects in the attached Brief Restoration Feasibility Proposal. Some of the feasibility studies on the list will be developed further by the end of the first week of October.

Formal economic information exists for many of the species so that it may be possible to provide further insights into the costs and benefits of specific enhancement alternatives as they are compared with other restoration options.

Please feel free to contact me if you need further details or have any questions.

Attachments

cc: Brian Allee
Bob Burkett
Jim Cochran
Nick Dudiak
Jeff Hartman
Johnny Holland
Jeff Koenings
Tom Kron
Jerry Madden
Larry Peltz
Keith Pratt
Lonnie White

DRAFT
AGGREGATE LIST OF FRED DIVISION
PROPOSED RESTORATION FEASIBILITY STUDIES

September 27, 1990

The following is a list of proposed feasibility studies for restoration of damages from the Exxon Valdez oil spill. It is being submitted to Stan Senner, ADF&G representative with the Oil Spill Impact, Assessment and Restoration Planning Office by Director Brian J. Allee of the Division of Fisheries Rehabilitation, Enhancement and Development (FRED).

This preliminary submission will undergo further revision in the future and is intended to be a working document for formulation of more detailed plans. Additional brief project proposals are being prepared by FRED Division staff and will be available through the identified project leader. Project order on this list has not been based on predetermined priorities.

1. Feasibility of Enriching Nearshore Environments with Either Organic or Inorganic Fertilizer to Optimize Survival of Rearing Salmonids

Principal Investigator: Jeff Koenings (FRED Division, Soldotna) and University of Alaska-Southeast

2. Feasibility of Enriching Stream Environments with Either Organic or Inorganic Fertilizer to Optimize Survival of Rearing Salmonids

Principal Investigator: Jeff Koenings (FRED Division, Soldotna)

- * 3. Evaluation and Modeling of Wild Pink Salmon Stock Population Size in Prince William Sound, Including Potential Interactions with Enhanced Stocks

Principal Investigators: Larry Peltz (FRED Division, Cordova) and FRED Division Biometrician

4. King Crab Culture Techniques and Feeding Trials

Principal Investigators: Lonnie White (FRED Division, Kodiak) and Tom Shirley (University of Alaska-Southeast)

5. King Crab Rehabilitation: Gulf of Alaska Site Selection

Principal Investigators: Lonnie White (FRED Division, Kodiak) and Tom Shirley (University of Alaska-Southeast)

6. King Crab Evaluation of Rehabilitation Success

Principal Investigators: Lonnie White (FRED Division, Kodiak) and Tom Shirley (University of Alaska-Southeast)

7. Tanner and Dungeness Crab Rehabilitation Techniques

Principal Investigator: Jim Cochran (FRED Division, Juneau)

8. Halibut Egg-Collection Techniques

Principal Investigator: Keith Pratt (FRED Division, Anchorage)

9. Halibut Culture Techniques

Principal Investigator: Keith Pratt (FRED Division, Anchorage)

10. Shellfish and Finfish Artificial Habitat Investigation. This feasibility study will explore the application of artificial reef design, site selection, and evaluation for several species of finfish and shellfish.

Principal Investigator: Keith Pratt (FRED Division, Anchorage)

11. Replacement of Aquatic Plants

Principal Investigator: Jim Cochran (FRED Division, Juneau)

12. Scallop Enhancement Techniques

Principal Investigator: Jim Cochran (FRED Division, Juneau)

13. Black Cod Larval Collection Techniques

Principal Investigator: Keith Pratt (FRED Division, Anchorage)

14. Black Cod Culture Techniques

Principal Investigator: Nick Dudiak (FRED Division, Homer)

15. Herring Early Life Stage Rehabilitation

Principal Investigator: Nick Dudiak (FRED Division, Homer)

16. Clam and Mussel Collection, Culture, and Seeding Techniques

Principal Investigator: Jim Cochran (FRED Division, Juneau)

*pop. dependant
sport/subst. effort.*

17. Dolly Varden Rehabilitation Techniques

Principal Investigator: Larry Peltz (FRED Division, Cordova)

18. Cutthroat Trout Rehabilitation Techniques

Principal Investigator: Larry Peltz (FRED Division, Cordova)

+traditional hatch boxes

*just a few streams in PWS
provide alternatives*

Brief Restoration Feasibility Proposal

I. DESCRIPTION

1. Title: **Red King Crab Rehabilitation Feasibility Study**
2. Goal: Test feasibility of culturing red king crab embryos to their first benthic stage, evaluate settlement of the young crabs in two "seeded" and one control bay, report and make recommendations based on findings.
3. Location: Kodiak
4. Team: Lonnie White, FB III, Leader. Cooperative effort with Commercial Fisheries Division staff.
5. Schedule: Start March 1991; Three-year study.
6. Background: Red king crab populations were at a very low level prior to the Exxon Valdez oil spill. If impacted, some stocks would be at increased risk, and recovery could extend for many years: 50? Culture of crabs could be a tool to accelerate recovery of stocks. Culture of red king crab has been accomplished by the Japanese.

II. JUSTIFICATION

1. Need: Red king crab are a high-value product. Restoring populations to higher numbers would allow fisheries to occur.
2. Benefits: This feasibility study would provide information needed to evaluate this culture approach with red king crab in Alaska.
3. Criteria
 - A. Relationship to NRDA studies and injured natural resources.
 - B. Identified public concern: Item E. Mariculture in the fish and shellfish matrix would encompass this approach.
 - C. Ability to implement the study in the near future: Study plan has been developed and is ready to implement as soon as funds are available.
 - D. Reasonable likelihood of success: Team leader Lonnie White has a proven track record in mariculture and fisheries project accomplishment. Staff are available. Japanese success improves probability of success. It is highly likely that a feasibility study will be completed and needed information produced and reported.
 - E. Cost relative to funds available: Yearly cost of \$111,330 for each of three years.

III. OBJECTIVES

1. Method: This project will test the feasibility of culturing red king crab from embryos to the first benthic stage. Research will involve culturing of young crabs and evaluation of the success of their settlement in two bays.

- A. Culture and Research
- B. Evaluation of Settlement
- C. Recommendations and Design for Expansion

The project involves cooperative work with the Commercial Fisheries Division.

- 2. Evaluation: Final evaluation will be based on successful settlement of crabs in the two seeded bays, as compared to the control bay. Enumeration of crabs stocked and crabs settled are an important part of the study. Of the budget, 35% or \$39,000 is for the evaluation task.

IV. APPROACH

- 1. Method: This is a three-year project. The first year will focus on establishing the crab culture facilities and trial runs with proposed methods. The second year is when major production numbers will be collected. The third year will be a replicate of year two.
- 2. Evaluation: Enumeration of crab stocked and crab settled are key data.

V. BUDGET ESTIMATE

- 1. By Task: Culture: \$72,330; Evaluation: \$39,000. Total: \$111,330/year.
- 2. Future Costs: Year Two: \$111,330. Year Three: \$111,330.

VI. ABSTRACT

To restore red king crab through culture. Test feasibility of culturing red king crab embryos to the first benthic stage, evaluate the settlement of young crabs in two seeded bays and one control bay, and report with recommendations.

To: Stan Senner
Restoration Program Manager
OSIAR Division

Stan Senner

from C Meacham

From: Wayne Donaldson *Wayne*
Shellfish Biologist
Commercial Fisheries
Cordova

September 25, 1990

Project ideas for restoration studies.

- 1) Two species of intertidal clams were affected by spilled oil and cleanup activities. The littleneck clam (Protothaca staminea) and butter clam (Saxidomus giganteus) are native to the spill area and are utilized by subsistence, personal use and sport fishermen. Various marine mammals, such as sea otters also utilize clams. Recovery of the intertidal clam resource can be enhanced by stocking intertidal areas with seed from indigenous clams. This study would obtain adult clams from the spill area and send them to a hatchery for spawning. The resultant seed would be stocked into the spill area to enhance the natural recovery process.
- 2) There is insufficient knowledge about the habitat requirements of juvenile spot shrimp (Pandalus platyceros) in Prince William Sound. The literature suggests that juvenile spot shrimp rear in shallow water. Most of the impact associated with the spill has occurred in shallow water areas. Identification of the habitat(s) of juvenile spot shrimp will help enhance the shrimp stock. Both state and federal resource agencies will be able to assess impacts of current cleanup activities. Habitat characteristics will greatly aid the evaluation of future clean up operations and future development in shallow water areas of the Sound.
- 3) Continuation of resource abundance surveys for spot shrimp will improve the management of this species for commercial, subsistence, personal use and sport fishing uses. A very limited data base of annual abundance should be continued to provide resource managers information on juvenile, male and female stock segments upon which to base future harvest rates.

cc: Meacham
Hilsinger
Ackley
✓ Trowbridge

271-2467

To Stan Senner
from C Meacham

TO: Stan Senner
Restoration Program Manager
OSIAR Division

9-28-90 DATE: September 28, 1990

TELEPHONE: 465-4210

FROM: David Ackley
Marine Fisheries Biometrician
Division of Commercial Fisheries

SUBJECT: Restoration
Suggestions

Stan, below are some suggestions for potential restoration projects. Please contact me if you have any questions.

Distribution and abundance of littleneck clams (Protothaca staminea) and butter clams (Saxidomus giganteus) within Prince William Sound (PWS)

A current NRDA impact assessment project has collected data on clams at specific sites within Prince William Sound and is in the process of investigating the potential effects of the oil spill on clam growth. Although necessary for restoration considerations, little is currently known about the distribution and density of clams within PWS. This study would inventory clam populations across various habitat types within PWS, expand the impact assessment results to clam populations throughout PWS, and identify suitable habitats for clam population enhancements through restorative transplants. The Alaska Department of Fish and Game is the lead agency.

Transplant of clams from healthy habitats to areas affected by the oil spill or cleaning efforts.

Clam populations within PWS were damaged by the oil spill, by beach cleanup efforts, and by removals due to oil spill impact assessment studies. This study will transplant adult clams into the spill area from unaffected locations to restore populations to healthy levels throughout PWS. A transplant experiment was successfully conducted as part of an NRDA impact assessment study. The Alaska Department of Fish and Game is the lead agency.

Seeding of areas in PWS affected by the oil spill by juvenile clams grown under controlled conditions.

Assuming a demonstrable impact on clam populations within the path of the oil spill, it is possible that affected populations may be restored through a seeding project. Under this study, clams would be taken from healthy areas and spawned under controlled laboratory conditions. Clams grown to the juvenile stage under controlled conditions would be introduced into substrate which had been heavily impacted by oil or by cleaning efforts. The advantages of spawning and rearing clams to a juvenile stage in a controlled environment are twofold. First, adult clams can be induced to spawn several times during a growing season, and second, survival of the larval stage is greatly enhanced under protected conditions. The Alaska Department of Fish and Game is the lead agency.

Investigation of juvenile spot shrimp (Pandalus platyceros) abundance and habitat.

An NRDA impact assessment study has sampled adult spot shrimp habitat in order to determine the possible impacts of the PWS oil spill on the adult spot shrimp population. Although adult spot shrimp inhabit deep waters, it is believed that juvenile shrimp inhabit shallower waters likely to have been impacted by the spill. Little is known about the abundance, nursery areas or vertical distribution of juvenile (under 30 mm) spot shrimp. This study would sample potential nursery areas and depth strata for juvenile shrimp and provide information about areas which should be protected or enhanced to rehabilitate shrimp stocks which are already at low levels due in part to commercial exploitation. The Alaska Department of Fish and Game is the lead agency.

Investigation of reef habitat distribution within PWS and estimation of associated species.

Reef structures comprise an important habitat to many species, including rockfish, and provide a protective area for the juvenile stages of several species. Because this habitat is necessary to many species, it is important to determine whether habitat availability is a limiting factor in species diversity and abundance. This study would determine the extent of reef habitat within PWS, catalog the species present at a representative sample of reef sites, and determine areas of PWS deficient in reef structures. The Alaska Department of Fish and Game is the lead agency.

Colonization of artificial reefs by various species within
PWS.

Reef structures comprise an important habitat to many species, including rockfish, and provide a protective area for the juvenile stages of several species. An increase in the availability of this habitat type may lead to a subsequent increase in associated species and further enhance commercial and sport fishing opportunities within PWS. This study would introduce artificial reef structures into selected areas within PWS and monitor colonization rate, species diversity and effectiveness of material use and placement. The Alaska Department of Fish and Game is the lead agency.

cc: Gordon Kruse
Chuck Meacham
John Hilsinger

MEMORANDUM**STATE OF ALASKA****TO:** Stan Senner**Date:** September 25, 1990**FROM:** Dana Schmidt and Bruce Barrett
Commercial Fisheries Division
Kodiak**SUBJECT:** Restoration Program

We offer the following comments in response to your restoration matrix and request for 1991 restoration feasibility/research studies.

We can anticipate a reduced salmon harvest in the Kodiak Management Area (KMA) if the overescapement that occurred from the EXXON Valdez spill in 1989 causes negative impacts. The KMA salmon stocks are managed on escapement goals with harvest opportunity permitted only when there are fish surplus to escapement requirements. Thus we inherently have a restoration mechanism built into our salmon fisheries management plan with the restoration accomplished at the expense of lost harvest opportunity to ensure escapement.

Meeting escapement goals by decreasing fishing time would restore fish available for non-marine wildlife to the same levels as non-impacted systems. Marine species which feed on salmon would be affected but should be recovered in a single generation by meeting escapement goals of returning fish. The above mechanism would not be true only if impacts were of such a magnitude that escapement goals were not met. In that case, multiple years may be necessary to restore runs to pre-spill levels. Standard enhancement practices such as those used by the FRED Division could accelerate the restoration process and mitigate potential future damages to commercial, subsistence, and sport fisheries and wildlife dependent upon salmon.

Within the Kodiak Management Area there are several important salmon producing systems which could be better managed for commercial, subsistence, and sport interests with more precise monitoring of escapements. These include the Karluk, Ayakulik, and Buskin Rivers. Currently the annual salmon escapements into these systems are counted through rigid aluminum weirs which are operated by seasonal employees. These weirs regularly do not withstand flood events and carcass buildups associated with massive pink salmon escapements. Since the salmon runs to these systems are regulated on escapement counts, management precision is compromised each time a weir washout occurs which can often be several times a year. The installation and operation of floating weirs on these systems would likely permit ADF&G to obtain complete escapement counts through flood events and pink salmon carcass buildup periods. In turn this would permit more precise fisheries management for ensuring that escapement requirements are met

Stan Senner
September 25, 1990
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and resource users are afforded an ample opportunity to harvest surplus fish. If restoration research funds were made available this year, a floating weir design could be tested on the Karluk, Ayakulik, and Buskin Rivers as early as 1991.

cc: L. Nicholson
C. Meachum

RPWG
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SUGGESTED CRITERIA

DRAFT

For Restoration Feasibility Studies

SUPRATIDAL
RYE GRASSES

MURRELET
NESTING

HARELQUIN
NESTING

1) ACCESSIBILITY

2) MOORING AND/OR LCM CAPABILITY

{3) FIELD CAMP CAPABILITIES-This may apply to some sites and not to others- also depends on whether or not a floating camp is decided upon. Either way, a monitor will have to be designated to the site(s) for the summer months to measure success and mitigate damage/problems}

4)CULTURAL RESOURCES-will restoration efforts exacerbate the preservation of theses resources, or can the restoration effort be combined to give a double benefit (2 for the price of one)?

5)CLEANED OR NOT?

A)Not cleaned:

Feasible

N/A

Feasible

B)Cleaned

Feasible

Feasible

Feasible

6)DEGREE OF OILING

Oiled and unoiled

N/A

Oiled and unoiled

7)SIZE

LARGE

N/A

N/A

8)HUMAN USE FACTORS:

A)Supports Fisheries/subsistence/recreation

Ideal

Ideal

Ideal

B)Human Impacts

1)pre-spill impacts (recreational, mining, etc.)

Possible

Ideal

Ideal

2)post-spill impacts (cleanup, camps, waste storage sites, etc.)

Recommended but
potentially
unfeasible
according to
previous case
studies

Recommended

Recommended

9)PRE-SPILL CONDITION IN GENERAL (impacted by earthquakes, tsunami's, rock-slides, avalanches, other non-human impacts)

Not recommended

Recommended

Recommended

SUGGESTED CRITERIADRAFT**DRAFT**For Restoration Feasibility StudiesIntertidalFucusMarshes

1) ACCESSIBILITY

2) MOORING AND/OR LCM CAPABILITY

{3) FIELD CAMP CAPABILITIES-This may apply to some sites and not to others- also depends on whether or not a floating camp is decided upon. Either way, a monitor will have to be designated to the site(s) for the summer months to measure success and mitigate damage/problems}

4)CULTURAL RESOURCES-will restoration efforts exacerbate the preservation of these resources, or can the restoration effort be combined to give a double benefit (2 for the price of one)?

5)CLEANED OR NOT?

A)Not cleaned:

FeasibleFeasibleP o t e n t i a l l y
Feasible

B)Cleaned

FeasibleFeasibleP o t e n t i a l l y
Feasible

6)DEGREE OF OILING

No oil presentSlight oiling onlyOiled and unoiled

7)SIZE

LARGE?LARGELARGE

8)HUMAN USE FACTORS:

A)Supports Fisheries/subsistence/recreation

IdealIdealIdeal

B)Human Impacts

1)pre-spill impacts (recreational, mining, etc.)

PossibleIdealNot feasible

2)post-spill impacts (cleanup, camps, waste storage sites, etc.)

RecommendedRecommendedRecommended, but
p o t e n t i a l l y
u n f e a s i b l e
a c c o r d i n g t o
p r e v i o u s c a s e
s t u d i e s

9)PRE-SPILL CONDITION IN GENERAL (impacted by earthquakes, tsunami's, rock-slides, avalanches, other non-human impacts)

Not recommendedRecommendedNot recommended