RPWG
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RESTORATION PLANNING WORK GROUP/TECHNICAL REVIEW MEETING
October 19-21, 1992

Sign-in Sheet

October 19, 1992

Name	Affiliation
RAY THOMPSON	RPWG – USForestService
John Strand	RPWG – NMFS
Mark Fraker	RPWG – ADFG
Jon Isaacs	Jon Isaacs & Associates
Bob Loeffler	RPWG – DEC
BOB SPIES	AMS
Ken Reckhow	Duke Univ.
ART WEINER	ADNR – HPWG
JIM RUTTENBAR	UNIVERSITY OF COLORADO
Jim Richardson	Resource Econ
CH "Pete" Peterson	Univ. of North Carolina – Peer Reviewer
Michael Frey	Univ. Calif, Davis
Brian Sharp	Ecological Perspectives
Sanford Rabinowitch	RPWG – DOI/NPS
Phil Mundy	Fish Peer Reviewer AMS
Karen Klinge	RPWG – USFS
VERONICA GILBERT	RPWG – DNR
Ken Rice	RT USFS
Carol Gorbics	RPWG – USFWS
Byron Morris	RT – NOAA

October 16, 1992

AGENDA FOR THE RESTORATION PLANNING REVIEW MEETING

Monday, October 19, 1992
10:00 am to 10:30 am

Welcome, introductions and overview of Meeting - Strand

10:30 am to 12:00 pm

Overview of Process: Presentation and discussion of the methodology which will be used to develop the restoration plan alternatives and the building blocks they will be based on - Loeffler and Klinge

12:00 pm to 1:00 pm LUNCH

1:00 pm to 3:00 pm

Continuation of morning agenda item.

3:00 pm to 5:00 pm

CONCURRENT SESSION A: Decision Process
Moderator: Loeffler
Discussion, analysis and development of action items related to the decision process and alternative development.
Primary Participants: Reckhow, Ruttenber

CONCURRENT SESSION B: Fish and Intertidal Resources
Moderator: Strand
Discussion, analysis and development of action items related to the injured fish and intertidal resources and the restoration options associated with them.
Primary Participants: Peterson, Mundy

CONCURRENT SESSION C: Bird Resources
Moderator: Gorbics
Discussion, analysis and development of action items related to the injured bird resources and the restoration options associated with them.
Primary Participants: Fry, Sharp

Tuesday, October 20, 1992
8:30 am to 9:00 am

JOINT SESSION: Status report and discussion.

9:00 am to 12:00 pm

Continuation of CONCURRENT SESSIONS A, B AND C.

12:00 pm to 1:00 pm LUNCH

1:00 pm to 5:00 pm

Moderator: Thompson
Presentation and discussion of the results of the CONCURRENT SESSIONS.

Wednesday, October 21, 1992
8:00 am to 8:15 am

JOINT SESSION: Status report and discussion.

8:15 am to 11:00 am

CONCURRENT SESSION D: Archaeological Resources and Other Services
Moderator: Rabinowitch
Discussion, analysis and development of action items related to the injured archaeological resources and other services and the restoration options associated with them.
Primary Participants: Rice, Isaacs, Mundy and Richardson

CONCURRENT SESSION E: Marine and Terrestrial Mammals
Moderator: Fraker
Discussion, analysis and development of action items related to the injured marine and terrestrial mammals and the restoration options associated with them.
Primary Participants: Spies

11:00 am to 12:00 pm

Moderator: Gilbert
Presentation and discussion of the results of CONCURRENT SESSIONS D and E.

12:00 pm to 12:30 pm

Closing Remarks - Strand

RESTORATION PLANNING REVIEW MEETING
OCTOBER 20, 1992
8:30 a.m.

ATTENDEES

Ray Thompson
John Strand
Mark Fraker
Bob Loeffler
Sandy Rabinowitch
Karen Klinge
Veronica Gilbert
Carol Gorbics
Chris Swenson
Byron Morris
Bob Spies
Ken Reckhow
Art Weiner
Pete Peterson
Michael Fry
Brian Sharp
Phil Mundy
Ken Rice

JOINT SESSION: STATUS REPORT AND DISCUSSION

John gave an overview of yesterday's session and asked for salient points from the concurrent sessions. Bob stated that there were some specific suggestions about dealing with criteria. Veronica stated one was how to address uncertainty. Criterion 1A, the most important criteria, has three concepts: rate, degree of recovery and potential to prevent further degradation. One proposed suggestion would separate criteria 1A into two criteria: 1) improvement in the rate of recovery and 2) improvement in the degree of recovery. 1B would stand on its own as a third criteria. The Peer Reviewers could assign a notion of certainty to each criteria. Ken Reckhow gave suggestions for expressing this. Fry stated that another criteria would be technical feasibility. Ken stated that there should be a best estimate of the rate of recovery and a quantitative measure of the uncertainty. If this can't be done, then the next fall back would be to express it in categories or words presently being used. Ken recommends restructuring the first criterion and changing the rating from words to numbers. Carol asked if a point estimate between 1 and 10 biases the process; that is, suggests that more is known than is really the case. Ken stated that a probability distribution would reflect the uncertainty but you can give an expected value. The first number is a point estimate. Brian asked if this is assuming there are unlimited resources. Ken stated that this exercise was just what

they would like to do. Bob stated that you rate the option as it is described so that everyone is looking at the same thing. This assumes not unlimited resources. Carol expressed concern that we are creating the semblance of quantification when it is just not there. We don't have quantifiable information. Ken disagreed and stated that all you have to do is accompany this information with the uncertainty factor. It is his sense that this can be obtained. Fry is disturbed that we are trying to reduce things to a single digit ranking. Cost also comes into play. Byron stated you want to quantify the following: rate of recovery, rate stability, and degree of recovery. All these are things we don't have information on. Peterson stated in the lower 48, destruction of habitats has caused decline. Carol asked what do we get out of this and how does it advance our product. Ken stated it advances it by making the assessment more specific than it currently is. It asks the scientist to quantify for those involved in the decision and analysis process. Mark stated that this will dissect the product into more pieces. Mark also added that this gives resolution beyond high, medium, and low.

Bob stated he would like to visualize this in terms of an example. John suggested one of the salmon enhancement options because it is based on current technology. Byron asked what the units of measure are. Mark stated the measurement is percentages to pre-spill level. Brian suggested just using degree. Peterson expressed concern about the dollar part of this. The number is a function of how much money is thrown at it. Art stated they discussed ranges which might be acceptable to the public and the Trustees. Veronica stated that costs are assigned in order of range, with your best estimate in an upper and lower range. There was also discussion about looking at the cost for the smallest unit of activity. An example of per unit cost is per cluster of cabins. Fry stated enhancing social stimuli could be a large murre project to increase productivity; however, this will not be easy to do. Improving the physical characteristics may not improve the nest sties. Eliminating introduced foxes is an enhancement project and may improve the numbers of birds along the lower Aleutian Peninsula. Shooting the bald eagles and putting poison eggs out is another example of something that would assist the target species. Purchasing private lands aren't threats to the murre colonies. There is a whole series of very intertwined things that can be done. To be able to determine incremental cost will be incredibly difficult. Veronica stated that the options may be dividing a project. Spies stated that he is concerned we are getting overly analytical. Phil stated that one criticism is you can't put communities together from the database, nor can you do interactions. It is important to identify community relationships. Karen stated that this has been one of her concerns. The next step would be what you can do to address those injuries. Once you come up with individual options for addressing injures, you need to put interrelationships together. Phil agreed and stated that you would do this after you have the options widely agreed upon. You would have to have a number

variable you could sort on. Consequently, the database would be quite a bit larger. Bob stated that a first step to divide 1A is to imagine what you would think is a reasonable project. Veronica suggested assigning a number. Bob stated the metric for degree of recovery would be percent of pre-spill. Byron stated they are not independent. John suggested assuming a linear rate of recovery. Carol suggested that we should talk about certainty, rate, and degree of recovery and record the peer reviewers' comments. Sandy raised the issue of whether anyone in RPWG had the background to make these assessments of certainty. Ken stated that the experts will determine the measure of certainty, and added that if he were a decision maker he would want some measure beyond high, medium, and low. Having this quantitatively expressed by the experts makes the information more useful. Brian objected to the ratings category of high, medium, and low and stated the medium category is overly generous. Fry stated that low could be 1-2-3, medium could be 4-5-6 and high 8-9-10. This would give you a better blend. Carol stated this would not replace them but give them a range of 1-10. Bob asked Brian to specify which of the mediums he likes. Brian stated that medium has a connotation. Ken Rice stated that The Nature Conservancy uses range based on an order of magnitude. Mark asked if this means low, medium, and high are exponential. Brian stated that this is exponential in a sense. Carol explained that the last two columns in the evaluation table deal with the new theory. Mark stated that there is some ambiguity in what was applied. The rate of recovery could be discussed several ways. Veronica stated that one column should be expected value and the other would be the range. John suggested that Ken guide us in what he meant. Ken stated that this should refer back to pre-spill conditions. Peterson expressed concern with the time dependency factor. Some of these resources are on a down turn. The percentage of pre-spill conditions may not be a good question. Veronica stated that you may have to qualify each answer for each species. Byron questioned if the evaluation table pertains to options. Spies stated that the only things which will fit these categories are harvestable resources. Peterson stated that the time to reach pre-spill level or some fraction thereof should be compared to natural recovery. Karen asked the peer reviewers to make an estimate of this time. Fry stated that enhancement could postpone extinction of some species, and added there is one simple yes or no question which Spies can answer, with no action, will the species recover. Art stated that these improvements to the database will give the Trustee Council a better idea of what they are getting for their money. It will also give the public an idea of the return for their investment.

Bob suggested using red salmon as example to use in the evaluation exercise and asked John to explain this option. John stated that as a consequence of overescapement (low harvest), too many fish reached the spawning grounds and spawned successfully. There, then were not enough nutrient to provide for larvae and juveniles in freshwater, resulting in poor survivorship and return in that year

class. There was overescapement in 1987, 1988 and 1989. Phil stated that he likes the option which addresses manipulating the trophic structure of the lake. There were studies from Southeast Alaska, Kodiak, and the Kenai Peninsula, which provided fairly good data sets. Some data compares primary and secondary levels, and you could probably get the numbers in some range. He is uncertain; however, if you have to do this right now. Phil suggested that a genetic bottle necking is an example. Sandy gave an archaeological site example. The numbers at 35 sites have been reviewed and show damage. Archaeologist anticipate that there are 300-500 sites out there. Spies added that vandalism is a special issue because the damage can be ongoing. Ken stated that someone has to decide if the lost information is of some consequence to require expenditure of restoration funds. Spies stated that an issue not captured is if the oil spill hadn't happened, we would have lost some resources anyway. Bob stated that this example doesn't meet anything; therefore, Veronica suggested dropping 1C. Fry suggested adding status of current population to the table. Carol suggested using marbled murrelets - land acquisition as an example. Rice stated that the baseline would be higher aided with habitat acquisition. Art stated that there is an assumption that regulations are inadequate. Brian stated that we don't know where we are proposing to acquire the land. Fry stated that the potential to prevent further degradation through acquisition of land is positive. Bob questioned if today's level is an upper bounds. Carol stated the evaluation exercise gives us different information, and questioned how the level of certainty will be used for comparison. Ken stated that if you had the time, you could go through a formal judgement procedure and make this clear. John asked if this exercise could be taken to the smaller groups to work on. The meeting was adjourned to allow Barbara time to prepare the attached exercise form.

Veronica and Carol diagramed an evaluation table and the following species and resources were reviewed:

Resource/Service: Sockeye Salmon

Option #: Lake fertilization to mitigate effects of overescapement

With no action, will the species recover (Yes or No)? Yes

	Status of Current Population	H M L	Expected Value	Certainty: Upper and Lower Range
1a. Rate of Recovery* Aided			10 years	5-15
Unaided		H	30 years	20-40 years****
1b. Degree of Recovery** Aided			100%	80-100%***
Unaided		H	100%	80-100% within a 30 year time period
1c. Potential to prevent further degradation or decline		H		

* measured in terms of years

** time to reach pre-spill level or fraction thereof compared to time for natural recovery

*** the mean fluctuates substantially; need to measure over a few generations

**** note genetic bottle neck issue; if numbering that low, could take much longer

Resource/Service: Archaeology

Option #:_____

With no action, will the species recover (Yes or No)?

	Status of Current Population	H M L	Expected Value	Certainty: Upper and Lower Range
1a. Rate of Recovery* Aided				
Unaided				
1b. Degree of Recovery** Aided				
Unaided				100% certainty
1c. Potential to prevent further degradation or decline				

* measured in terms of years

** time to reach pre-spill level or fraction thereof compared to time for natural recovery

Resource/Service: Marbled Murrelet

Option #: Land Acquisition

With no action, will the species recover (Yes or No)?

	Status of Current Population	H M L	Expected Value	Certainty: Upper and Lower Range
1a. Rate of Recovery* Aided	30%		No change	Might eventually recover Might go to extirpation
Unaided	20-40%		18 years	Might eventually recover Might go to extirpation
1b. Degree of Recovery** Aided			30%	30-0%
Unaided			<30%	<30-0%***
1c. Potential to prevent further degradation or decline				

* measured in terms of years

** time to reach pre-spill level or fraction thereof compared to time for natural recovery

*** need to find out proportion of habitat in private land

RESTORATION PLANNING WORKING GROUP
EXXON VALDEZ OIL SPILL OFFICE
645 "G" STREET
ANCHORAGE, ALASKA 99501

MEMORANDUM

TO: Peer Reviewers

FROM: John Strand

DATE: October 13, 1992

SUBJECT: Next Week's Meeting

I am very pleased that you have agreed to attend the Restoration Planning Review Meeting scheduled for October 19 - 21, 1992, in Anchorage. The RPWG believes it is essential that both our process as well as our product, in this case the proposed restoration options, be given a thorough review before the Draft Restoration Plan is assembled in late November.

To optimize our time together, I am enclosing a packet of information that hopefully you will have time to peruse before the meeting. This packet contains:

1. Draft Annotated Outline of Draft Restoration Plan - Working outline of the Draft Restoration Plan.

2. Creating Alternatives Using the Options Evaluation Database - This describes the process used to evaluate candidate restoration options and create the Options Evaluation Database.

3. Draft Summary Table of Injury - The Injury Summary was recently prepared by Bob Spies for inclusion in a section of the Draft Restoration Plan (see Annotated Outline) that lists resources and services that meet injury criteria.

4. Draft Evaluation Criteria - These criteria were developed to help determine which of the many restoration options are most appropriate and beneficial.

5. Draft Restoration Options (short forms) - Thirty-five candidate restoration options have been identified from suggestions made by the public and agency scientists.

6. Options Evaluation Database - The database evaluates how each option affects each injured resource or service. The database also is used to organize the options into alternatives.

7. Draft Alternative Themes - This paper provides a generalized description of four candidate alternatives that could be included in the Draft Restoration Plan.

Conspicuously absent from the packet is an agenda for the subject meetings. This we will FAX to each of you later in the week. Also, I assume that you have a copy of the Restoration Framework, Vol. 1, which was distributed to the public last summer. That document explains the overall process that guides restoration of injured resources and services.

cc: Bob Spies
RPWG
Restoration Team

OPTION EVALUATION DATABASE

MEMORANDUM

State of Alaska
DEPARTMENT OF FISH & GAME

TO: RPWG

DATE: October 2, 1992

FILE NO.:

TELEPHONE NO.: 278-8012

SUBJECT: Second Draft of Option Evaluation Database

FROM: Chris Swenson CS

The attached package contains the second draft of the Option Evaluation Database. Please note that the database has not yet undergone peer review and may well change again.

This package includes the following:

1. Copy of the Option Rating Sheet
2. List of Option Names and Numbers
3. Description of the Columns and Values Used in the Database
4. Option Evaluation Database Sorted by Option (without footnotes)
5. Option Evaluation Database Sorted by Resource or Service (without footnotes)
6. Second Draft of Option Evaluation Database with a complete set of footnotes for each option

RESOURCE OR SERVICE: DATE:

CRITERIA	OPTIONS RATING										
1A. Potential to improve the rate or degree of recovery											
1B. Potential to prevent further degradation or decline											
2. Technical feasibility											
3. Degree to which proposed action benefits more than one resource or service											
4. Degree to which proposed action enhances the resource or service											
5. Potential for NO additional injury to: a. other target or nontarget resources b. other target or nontarget services											
6. Potential effects of the action on human health and safety											
7. The relationship of the expected costs of the proposed action to the expected benefits											
8. Will the restoration opportunity be lost if implementation is delayed? (Y/N)											
9. Public Comments											

COMMENTS:

1

Code	Name of Option
1.0	Archeological site stewardship program
2.0	Increase fish and shellfish management
2.1	Incease fish/shellfish management: species already with plans
2.2	Increase fish/shellfish management: for species without plans
4.0	Reduce disturbance at marine bird colonies and mammal haulout
7.0	Increased agency field presence
8.0	Restrict/eliminate legal harvest: mammals and sea ducks
8.1	temporarily restrict/close harvest
8.2	educate public to voluntarily restrict harvest (sport, subsist.)
9.0	Minimize incdidental take of marine birds by commercial fisheries
10.0	Preserve archaeological sites/artifacts
11.0	Improve freshwater wild salmon spawning/rearing habitats
11.1	Supplement fry production (salmon)
11.2	Improve access to spawning areas (salmon)
11.3	Improve spawning and rearing habitat (salmon)
12.0	New recreation facilities
12.1	New backcountry recreation facilities
12.2	New commercial, (lodge, fuel facilities) recreation facilities
13.0	Eliminate oil from mussel beds
14.0	Accelerate recovery of upper intertidal zone
15.0	Supplement or clean marine spawning substrates
15.1	Supplement intertidal substrates for herring
15.2	Clean intertidal salmon spawning substrates
16.0	Restore murre productivity
16.1	Enhance social stimuli (Common murre)
16.2	Improve physical characteristics of nest sites (Common murre)
17.0	Predator control to benefit marine birds
17.1	Elminate introduced foxes (for nesting marine birds)
17.2	Reduce predator access to seabird colonies
18.0	Replace fisheries opportunities by alternative salmon runs
18.1	Establish additional hatchery (salmon) runs
18.2	Transplant (salmon) hatchery-reared fish to depleted areas
18.3	Wild egg take to establish new runs (salmon)
19.0	Update and expand Alaska's Anadromous Fish Stream Catalog
26.0	Amend Forest Practices Act
27.0	Designate long-term Ecological Research Sites
28.0	Acquire access for sport-fishing and recreation

Wilderness/intrinsic values

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	H	H	N/A	H	L	H	M	No	PR	Y	N	N	Y

Concept is purchase of large area (or inholding affecting one) to protect wilderness qualities. 1a: Lands managed as wilderness remain in natural wild condition & thus maintain high quality hab. for wide array of injured natural res. & services. 1b: Lands managed as wilderness remain in natural wild condition & thus maintain high quality hab. for wide array of injured natural res. & services. 2: Clearly meets the criteria. 3: Clearly meets the criteria. 4: Can't repair perception of wilderness beyond pre-spill level. 5a: Clearly meets the criteria. 5b: Affected services are any potential developed uses. 7: Would expect less than outstanding benefits at modest or low cost. 8: Clearly meets criteria.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	H	H	N/A	H	L	H	M	No	PR	Y	N	N	Y

Concept is large-scale designation protecting wilderness qualities. 1a: Lands protected under spec. design. remain in primarily nat. cond. & thus maintain high quality hab. for wide array of inj. nat. res. & services. 1b: Lands protected under spec. design. remain in primarily nat. cond. & thus maintain high quality hab. for wide array of inj. nat. res. & services. 2: Clearly meets the criteria. 3: Clearly meets the criteria. 4: Can't repair perception of wilderness beyond pre-spill level. 5a: Clearly meets the criteria. 5b: Affected services are potential developed uses. Not necessarily low for NPS land. 7: Would expect less than outstanding benefits at modest or low cost. 8: Clearly meets criteria.

Subsistence

30.0 Test subsistence foods for hydrocarbon contamination

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	N/A	H	L	L	H	H	H	H	No	MH	N	N	N	Y

1a: Low harvest rates are largely due to public perceptions that subsistence foods are contaminated. 1b: Harvest effort is still low but is not likely to decline further. 2: Testing and public education are highly feasible. 3: Action primarily benefits subsistence users. 4: Action is not likely to enhance harvest efforts above pre-spill levels. 5a: No adverse species impacts are expected. 5b: No adverse impacts on services are expected. 7: High benefits are expected for low to moderate costs. 8: Restoration opportunities would not be lost if this action were delayed for a short time.

Evaluation of Options by Resource: DRAFT for RPWG Review

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	L	H	H	L	H	H	H	H	No	PR	Y	N	N	Y

Concept is upland stream protection. (Remember, it is for public land.) 1a: Restriction of dvlpmntm activities near anadromous streams on public lands will not significantly increase recovery rate of injured sockeye pop. 1b: Development activities on public lands don't pose population level threats of further injuries. 2: Action is highly feasible. 3: Salmon are a key species in the ecosystem and support commercial, sport and subsistence fisheries 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential to harm other species. 5b: Development activities near anadromous streams may be impacted. 7: Moderate benefits expected for low costs. 8: No opportunities will be lost by delaying this action.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; HU = Management of Human Use; PR = Protection.

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	H	H	L	H	L	H	L	No	PR	N	N	N	Y

1a: Additional restriction of ongoing logging activities near anadromous streams will not significantly increase recovery rate of injured sockeye pop. 1b: Additional stream buffers obtained by amending the FPA will not provide significant protection for injured sockeye on a population level. 2: Action is highly feasible. 3: Salmon are a key species in the ecosystem and support commercial, sport and subsistence fisheries 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential to harm other species. 5b: Logging industry will be impacted. 7: Low benefits expected for low to moderate costs. 8: No opportunities will be lost by delaying this action.

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	M	H	H	L	H	M	H	M	No	PR	Y	Y	N	Y

Concept is purchase of upland riparian habitat. 1a: Upland development activities are not currently a limiting factor in sockeye recovery. 1b: Restriction of future upland development activities may prevent further decline of injured populations. 2: Action is highly feasible. 3: Salmon are a key species in the ecosystem and support commercial, sport and subsistence fisheries 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential to harm other species. 5b: Development activities near anadromous streams may be impacted. 7: Moderate benefits expected for low costs. 8: Yes, if imminent threat exists.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	H	M	M	H	H	M	No	MR	Y	N	Y	Y

1a: Action establishes replacement runs for fisheries and takes harvest pressures off a moderate portion of the injured stocks. 1b: Diverting fishing pressure could protect injured stocks from further injury. 2: Establishing new runs via egg takes is highly feasible. 3: Salmon are a key species in the ecosystem and support commercial, sport and subsistence fisheries 4: *Action has potential to cause moderate population increases above pre-spill levels. 5a: *Action could impact existing salmon runs. 5b: Assumes that land-use conflicts taken care of during hatchery siting and permitting procedures. 7: Moderate benefits are expected for a moderate to high cost. 8: Restoration opportunities will not be lost by delaying this action.

19.0 Update and expand Alaska's Anadromous Fish Stream Catalog

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	M	H	H	L	M	H	H	M	No	PR	N	N	N	Y

1a: Restriction of ongoing instream activities will not significantly increase recovery rate of injured stocks. 1b: Restriction of instream activities may prevent further decline of injured stocks. 2: Action is high feasible. 3: Salmon are a key species in the ecosystem and support commercial, sport and subsistence fisheries 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential to harm other species. 5b: Low potential for significant impact to services. 7: Moderate benefits expected for low costs. 8: No opportunities will be lost by delaying this action.

26.0 Amend Forest Practices Act

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	H	M	M	H	H	M	No	MR	Y	N	Y	Y

1a: Action establishes replacement runs for fisheries and takes harvest pressures off a moderate portion of the injured stocks. 1b: Diverting fishing pressure protects injured stocks from further injury. 2: Establishing hatchery runs is highly feasible. 3: Salmon are a key species in the ecosystem & support commercial, sport & subsistence fisheries. 4: Action has potential to cause moderate population increases above pre-spill levels. 5a: Action could impact existing salmon runs. 5b: Assumes land-use conflicts taken care of during hatchery siting & permitting procedures. 7: Moderate benefits are expected for a moderate to high cost. 8: Restoration opportunities will not be lost by delaying this action.

18.2 Transplant (salmon) hatchery-reared fish to depleted areas

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	L	H	H	L	H	H	H	M	Yes	MR	Y	N	Y	Y

1a: Action has high potential to restore populations, assuming habitat recovery has occurred. 1b: Sockeye introduced to depleted areas will not take significant fishing pressure off inj. stocks trying to return to the same areas. 2: Transplanting fish is highly feasible. 3: Salmon are a key species in the ecosystem and support commercial, sport and subsistence fisheries 4: Action has low potential to enhance populations. 5a: *Assuming hatchery-reared fish from same gntc. stock as inj. pop., spec. inj. shouldn't occur. 5b: *No injuries to services are anticipated. 7: Moderate benefits are expected for a moderate to high cost. 8: Restoration opportunities will not be lost by delaying this action.

18.3 Wild egg take to establish new runs (salmon)

Sockeye salmon

2.1 Incease fish/shellfish management: species already with plans

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	M	H	L	H	H	H	H	Yes	MH	N	N	Y	Y

Would include research to separate stock before nearing spawning streams. 1a: Reduced or redirected fishing pressures will facilitate natural recovery of injured populations. 1b: Reduced or redirected fishing pressures could prevent further decline of injured populations. 2: Fisheries mngmnt. technically feasible but mixed results obtained for stock separation & mngmnt. 3: Salmon are critical component of ecosystem & support commercial, sport & subsistence fisheries. 4: Action is unlikely to increase population beyond pre-spill levels. 5a: Managing fisheries for injured stock protection unlikely to damage other resources. 5b: *Assumed that stock separation studies would allow redirection of fishery, rather than closure. 7: *High benefits are expected for moderate costs. 8: Delays implementing fisheries mngmnt. could result in addtnl. inj. to SS & associated fisheries.

11.0 Improve freshwater wild salmon spawning/rearing habitats

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	H	H	M	H	H	H	H	Yes	MR	Y	Y	Y	Y

Injury is poor quality rearing/spawning habitat due to overescapement. 1a: Improving poor quality habitat could greatly benefit injured stocks and prevent further decline, if implemented on a wide scale. 1b: Improving poor quality habitat could greatly benefit injured stocks and prevent further decline, if implemented on a wide scale. 2: Habitat enhancement is highly feasible. 3: Salmon are a key species in the ecosystem & support commercial, sport & subsistence fisheries. 4: *Depending on extent of hab. improvements, inj. stocks could be taken beyond pre-spill levels. 5a: Carefully controlled and monitored habitat enhancement should not injure other species. 5b: No injury to services is anticipated. 7: *High benefits are expected for moderate costs. 8: Delays in restoration of injured habitat could result in additional injury & prolonged recovery.

18.1 Establish additional hatchery (salmon) runs

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; HU = Management of Human Use; PR = Protection.

Evaluation of Options by Resource: DRAFT for RPWG Review

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	M	H	L	H	M	H	M	No	PR	Y	N	N	Y

Management tool sought is ability to regulate boat traffic, etc., near haulouts & concentration areas. 1a: May provide additional protection from activities causing disturbance. Actual level of existing disturbance is unk. If high, rating High. 1b: Decrease in potential disturbance may be useful in preventing additional injury. 2: Habitat protection through Special Designations is feasible. 3: Although protection will focus on SO habitat, other species using same areas will also benefit. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential harm to other species. 5b: Tourism, sport & commercial fishing, & development activities in coastal areas may be impacted. 7: Moderate benefits expected for low cost. 8: No opportunities will be lost by delaying this action.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; HU = Management of Human Use; PR = Protection.

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	M	L	L	H	M	H	M	No	MH	N	N	Y	Y

1a: This option would be limited to voluntary restriction of subsistence harvest. Subsistence harvest level is unknown; it is believed to be small. 1b: Subsistence harvest is unknown; it is believed to be small. 2: This option has been used successfully for other harvested resources. 3: No other resources or services would benefit. 4: Unlikely to enhance resource beyond pre-spill levels. 5a: No potential harm to other species. 5b: May have an adverse effect on subsistence users of sea otters. 7: Potential benefits are believed to be low for a moderate cost. 8: No opportunities will be lost by delaying this action.

13.0 Eliminate oil from mussel beds

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	H	H	L	M	H	H	H	Yes	MR	N	N	N	Y

1a: Linkage unproven; thus rating speculative. If significant oil from disaggregated mussels, then L. 1b: This rating assumes linkage exists between oiled mussels in mussel beds and consumption by otters. 2: It is feasible to clean oiled mussel beds. 3: Several other species depend on mussels as prey. 4: Will not enhance resource beyond pre-spill levels. 5a: Mussels could be potentially adversely affected over the short term. 5b: No potential harm to services. 7: Potential benefits are believed to be high for a moderate cost. 8: Yes, there is potential for continuing adverse effects to sea otters consuming contaminated prey.

40.0 Special Designations

Sea otter

4.0 Reduce disturbance at marine bird colonies and mammal haulout

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	M	L	L	H	M	H	L	No	MH	Y	N	N	Y

1a: Uncertainty regarding level of disturbance, but believed to be low. Locations of haulouts are widespread, making implementation difficult. 1b: Decrease in potential disturbance may be useful in preventing adtnl. inj. during rcvry. period only if disturbance is a factor limiting recovery. 2: Difficult to reduce disturbance at SO haulouts because of the dispersed nature of haulouts. 3: This option would benefit only sea otters. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential harm to other species. 5b: Tourism, sport & commercial fishing & development activities in coastal areas may be impacted. 7: Potential benefits are low for the expected cost. 8: No opportunities will be lost by delaying this action.

8.1 temporarily restrict/close harvest

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	M	L	L	H	L	H	L	No	MH	N	N	Y	Y

Unsure if otter population depleted per definition under MMPA. If not, option doesn't apply. 1a: The conditions of the MMPA would allow implementation of this option only if population is determined to be depleted, which it is not believed. 1b: The subsistence harvest level is unk; however, it is believed to be small. 2: This option has been used successfully for other harvested resources. 3: No other resources or services would benefit. 4: Unlikely to enhance resource beyond pre-spill levels. 5a: No potential harm to other species. 5b: Will have an adverse effect on subsistence harvest of sea otters. 7: Potential benefits are believed to be low for a moderate cost. 8: No opportunities will be lost by delaying this action.

8.2 educate public to voluntarily restrict harvest (sport, subsist.)

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; MU = Management of Human Use; PR = Protection.

Rockfish

2.2 Increase fish/shellfish management: for species without plans

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	Unk	Unk	H	M	L	H	M	H	Unk	Yes	MH	N	N	Y	Y

1a: Spill impacts on pop. unk., although commercial fishing of species has increased dramatically since spill; unk. whether overfishing is occurring. 1b: Spill impacts on pop. unk., although commercial fishing of species has increased dramatically since spill; unk. whether overfishing is occurring. 2: Fishery management is technically feasible. 3: Option primarily benefits rockfish and, in the long run, commercial fishermen. 4: Unlikely to enhance population. 5a: No additional resource injury will result. 5b: Management actions could restrict commercial fishing, if population found to be declining. 7: Unknown, given that 1a and 1b are unknown. 8: Unk., but commercial fishing pressure may be unsustainable & could cause serious pop. damage.

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	M	H	H	L	H	M	H	M	No	PR	Y	Y	N	Y

Concept is large-scale purchases of strips of streamside and coastal habitat. 1a: Purchase of habitat will not accelerate recovery. 1b: Purchase of habitat will prevent additional damage to otter habitat. 2: It is feasible to buy land. 3: Other species would benefit from the protection from development. 4: Would not enhance. 5a: No other resources would be affected. 5b: Affected services include any development of streamside or coastal areas. 7: Purchase of land is costly; not balanced by outstanding benefits. 8: Rating is No, because of large-scale purchases. Large-scale imminent threat unlikely.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	L	H	H	L	H	M	H	M	No	PR	Y	N	N	Y

Concept is protection of a strip of streamside and coastal habitat (coastal is most important). 1a: Protecting habitat will not accelerate recovery. 1b: Protecting habitat will prevent additional damage to otter habitat. 2: It is possible to use special designations to protect otter habitat. 3: Other species would benefit from protection of habitat. 4: Would not enhance. 5a: No other resources would be affected. 5b: Affected resource is any potential development along streams or coast. 7: No outstanding benefits expected. 8: Yes, if imminent threat.

River otter

8.1 temporarily restrict/close harvest

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	H	L	L	H	M	H	H	No	MH	N	N	Y	Y

1a: Harvest is believed to be low, affecting only a small part of the oiled area. 1b: Harvest is believed to be low, affecting only a small part of the oiled area. 2: There are means to further restrict harvest. 3: Otter prey species would benefit to some degree. 4: Action would not enhance otters. 5a: No additional injury to other resources; would affect few people. 5b: Assume that harvest restrictions will be short term. 7: Benefits limited. 8: No opportunities will be lost by delay.

13.0 Eliminate oil from mussel beds

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	H	H	L	M	H	H	M	Yes	MR	N	N	N	Y

Treat mussel beds to remove oil; this would be helpful if oil from mussel beds is cause of continuing injury to RO. 1a: H rating assumes that linkage is valid; however, this has not been firmly established. 1b: H rating assumes that linkage is valid; however, this has not been firmly established. 2: Techniques to accomplish mussel bed clean up have been tested. 3: If oil in mussel beds is affecting other species, rating is H. 4: Action would not enhance. 5a: Possible short-term harm to the mussels themselves. 5b: No services affected. 7: May be key to recovery if linkage is true. 8: Assumes oil ingestion is causing continuing injury.

14.0 Accelerate recovery of upper intertidal zone

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	Unk	Unk	Unp	H	L	H	H	H	Unk	Yes	MR	N	N	N	Y

Concept is that intertidal zone is habitat for some prey species of river otters. 1a: Need to call PI for info. 1b: Need to call PI for info. 2: Techniques to restore the upper intertidal unproven. 3: Upper intertidal zone is important for many species. 4: Action would not enhance. 7: Need to call PI for info. 8: Need to call PI to confirm.

37.0 Purchase private lands (fee title or less than fee title)

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?
Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; MU = Management of Human Use; PR = Protection.

Recreation: undeveloped

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	H	H	H	H	H	L	H	M	No	PR	Y	Y	Y	Y

Concept is purchase of large area (or an inholding affecting area) to protect wilderness qualities. 1a: Purchase of habitat does not of itself improve recovery. 1b: Of great value particularly where there is existing disturbance to injured resources or services. 2: Works well to provide backcountry experiences. 3: Land areas are inclusive of any number of resources which are of value in backcountry recreation. 4: Unless there are existing disturbances. 5b: Affected service is potential developed uses. 7: High benefits at moderate to high cost. 8: Yes, if imminent threat.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	H	H	H	L	H	L	H	M	No	PR	Y	Y	Y	Y

Concept is large-scale designation protecting wilderness qualities. 1a: A designation prevents degradation but does not prompt recovery (except as replacement). 1b: Ability to prevent significant degradation over the long-term. 2: Have ability to do a designation. 3: A recreation designation would affect multiple species and trophic levels. 4: Cannot enhance by protecting. 5b: Affected service is any potential developed use. 7: High indirect costs. 8: Yes, if imminent threat.

Recreation: concentrated

33.2 Education: visitor center, interpretive and educational facilities

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	N/A	H	L	N/A	H	H	H	M	No	MH	N	Y	N	N

Assume visitor-center type dvpment. on highway, in town, or elsewhere already designated for the use. 1a: Equivalent resource option; therefore, N/A. 1b: Equivalent resource option; therefore, N/A. 2: Easily developed and effective. 3: Primarily benefit recreation at concentrated sites. 4: Equivalent resource option; therefore, N/A. 5a: Education of users is generally not detrimental to resources. 5b: Located on highway, in town, or elsewhere already designated for the use. 7: Can be costly to develop. 8: Can be done most any time with similar benefits.

34.0 Marine environmental institute

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	N/A	H	M	N/A	H	H	H	M	No	MH	N	Y	N	N

Assume visitor-center type dvpment. on highway, in town, or elsewhere already designated for the use. 1a: Equivalent resource option; therefore, n/a. 1b: Equivalent resource option; therefore, n/a. 2: Existing facilities provide great benefits consistently. 3: Potential to benefit more than one service as well as resources. 4: Equivalent resource option; therefore, n/a. 5a: Assumes on highway, in town, or elsewhere already designated. 5b: Assumes on highway, in town, or elsewhere already designated. 7: Many benefits at high cost. 8: Can be done at any time and yes if an imminent threat.

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	H	H	H	H	H	L	H	M	No	PR	Y	Y	Y	Y

Concept is large-scale purchase of an area (or inholding that affects large area). 1a: If damaging activity is occurring prior to purchase then rate as H. 1b: Purpose of purchase is to limit degrading activities. 2: Works well to limit habitat degrading activities. 3: Resources and services within purchase would receive benefits. 4: Most cases, particularly where purchase provides undisturbed hab., species & rec. opportunities. 5a: Most cases, particularly where purchase provides undisturbed habitat for resources. 5b: Affected service would be potential developed uses. 7: Purchases are a high cost activity providing many benefits. 8: Yes, if imminent threat.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	H	H	H	L	H	L	H	M	No	PR	Y	Y	Y	Y

Large-scale protective designation for upland, tideland, and water (or inholding affecting an area). 1a: Changing land use designations does not restore but is a replacement option. 1b: Changing land use designation will likely prevent degrading activities. 2: Works well to limit degradation. 3: Resources and services within designated area receive benefit. 4: Localized designations affect small units and the resources and services within them. 5a: Resources benefit from lower disturbance affected by special designation. 5b: Most potential development affected. 7: Moderate costs in dollars and opportunity for services not balanced by outstanding benefits. 8: Unless there is an imminent threat.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; HU = Management of Human Use; PR = Protection.

Recreation: backcountry developed

12.1 New backcountry recreation facilities

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	N/A	H	M	M	M	L	H	M	No	MH	Y	Y	Y	N

1a: Assume land-use impacts taken account of in siting and permitting. 1b: This is a service replacement option. 2: Experience has shown success in area. 3: Confines most use and adds to recreational experience. 4: Will add some service beyond existing level. 5a: Because of service to surrounding area. 5b: Affected resource is wild, non-developed recreation. 7: A low cost with moderate benefits. 8: These activities can be done at any time.

12.2 New commercial, (lodge, fuel facilities) recreation facilities

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	N/A	H	M	H	L	H	H	M	No	MH	N	Y	Y	N

Concept is fuel facilities, lodge, etc. 1a: Assume land-use impacts taken into account in siting & permit process. Replacement, therefore n/a. 1b: Replacement; therefore, n/a. 2: These activities can be done efficiently. 3: Net benefit to a variety of clients (services). 4: A new facility type enhancing existing opportunities. 5a: Long-term impact is disturbance, but assume proper mgmt. Therefore, not severe. 5b: Not evaluating land-use impacts. Assume area already designated for use. 7: Many benefits at a high implementation cost. 8: This will not be lost through later implementation.

28.0 Acquire access for sport-fishing and recreation

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	H	H	M	M	M	H	H	M	No	MH	Y	Y	Y	N

1a: Permanent access needed to insure current use and give assurance of future access. 1b: Permanent access needed to insure current use and give assurance of future access. 2: Can be completed using current authorities. 3: Provides access for a variety of uses. 4: Access may be provided where it is needed or controlled. 5a: Permanent access may increase the demands on resources. 5b: Great value to recreational activities. 7: Likely moderate cost to less than outstanding benefit. May also be some cost to resource base. 8: If imminent threat, then Yes. Yes for "17b" easements because conveyance is imminent threat.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?
Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; MU = Management of Human Use; PR = Protection.

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	M	H	H	L	H	M	H	M	No	PR	Y	Y	N	Y

Purchase of additional buffers along anadromous streams and coastal intertidal spawning. 1a: Restriction of ongoing development activities will not significantly increase recovery rate of injured wild stocks. 1b: Restriction of development activities may prevent further decline of wild stocks. 2: Action is highly feasible. 3: Salmon are a key species in the ecosystem & support commercial, sport & subsistence fisheries. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: There is no potential to harm other species. 5b: Development activities in coastal areas and near anadromous streams may be impacted. 7: Moderate benefits expected for low costs. 8: Yes, if imminent threat.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	H	H	L	H	M	H	M	No	PR	Y	N	N	Y

Concept is stream protection extending to public uplands and around intertidal spawning. 1a: Restriction of ongoing development activities on public lands will not significantly increase recovery rate of injured wild stocks. 1b: Development activities on existing public lands don't pose population level threats of further injuries. 2: Action is highly feasible. 3: Salmon are a key species in the ecosystem & support commercial, sport & subsistence fisheries. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: There is no potential to harm other species. 5b: Development activities in coastal areas and near anadromous streams may be impacted. 7: Moderate benefits expected for low costs. 8: No opportunities will be lost by delaying this action.

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	H	H	L	H	H	M	No	MR	Y	N	Y	Y

This is an enhancement/replacement option. 1a: Action has moderate potential to decrease fishing pressures on injured wild stocks. 1b: Action has moderate potential to decrease fishing pressures on injured wild stocks. 2: Action is highly feasible. 3: Salmon are a key species in the ecosystem & support commercial, sport & subsistence fisheries. 4: *Population level can be enhanced. 5a: *Difficult to target newly est. wild runs for fisheries without causing damage to inj. wild pop. 5b: No injuries to services are anticipated. 7: Moderate benefits would result, with low to moderate costs. 8: No opportunities will be lost by delaying this action.

19.0 Update and expand Alaska's Anadromous Fish Stream Catalog

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	M	H	H	L	H	H	H	M	No	PR	N	N	N	Y

1a: Restriction of ongoing instream activities will not significantly increase recovery rate of injured wild stocks. 1b: Restriction of instream activities may prevent further decline of wild stocks. 2: Action is high feasible. 3: Salmon are a key species in the ecosystem & support commercial, sport & subsistence fisheries. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: There is no potential to harm other species. 5b: There is low potential for significant impact to services. 7: Moderate benefits expected for low costs. 8: No opportunities will be lost by delaying this action.

26.0 Amend Forest Practices Act

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	H	H	L	H	L	H	L	No	PR	N	N	N	Y

1a: Additional restriction of ongoing logging activities near anadromous streams will not significantly increase recovery rate of injured wild stocks. 1b: Additional stream buffers obtained by amending the FPA will not provide significant protection for inj. wild stocks on a population level. 2: Action is highly feasible. 3: Salmon are a key species in the ecosystem & support commercial, sport & subsistence fisheries. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: There is no potential to harm other species. 5b: Logging industry will be impacted. 7: Low benefits expected for low to moderate costs. 8: No opportunities will be lost by delaying this action.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; MU = Management of Human Use; PR = Protection.

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	M	H	L	M	H	M	L	Yes	MR	N	N	N	Y

1a: May be some locations where cleaning worthwhile (where H or M), but it is generally L. 1b: May be some locations where cleaning worthwhile (where H or M), but it is generally L. 2: Cleaning is technically feasible in most cases, but effectiveness can vary. 3: Salmon are a key species in the ecosystem & support commercial, sport & subsistence fisheries. 4: Cleaning is not an enhancement action. 5a: Cleaning can cause some injury to other species through disturbance or re-oiling. 5b: No injury to services is anticipated. 7: "L" rating since 1a/1b are "L". 8: "Yes" answer assumes that different streams contain distinct genetic stocks.

18.1 Establish additional hatchery (salmon) runs

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	H	H	H	L	L	H	L	No	MR	Y	N	Y	Y

1a: "L" since action may ultimately damage wild stocks. 1b: "L" since action may ultimately damage wild stocks. 2: Action is highly feasible. 3: Salmon are a key species in the ecosystem & support commercial, sport & subsistence fisheries. 4: Population level can be enhanced. 5a: Potential to further injure wild stocks through straying of hatchery stock to wild streams. 5b: Potential to hurt services through damage to wild stocks. 7: "L" since 1a/1b are "L". 8: No opportunities will be lost by delaying this action.

18.2 Transplant (salmon) hatchery-reared fish to depleted areas

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	H	H	H	L	L	H	L	No	MR	Y	N	Y	Y

1a: "L" since action may ultimately damage wild stocks. 1b: "L" since action may ultimately damage wild stocks. 2: Action is highly feasible. 3: Salmon are a key species in the ecosystem & support commercial, sport & subsistence fisheries. 4: Population level can be enhanced. 5a: *Potential to further injure wild stocks through straying of hatchery stock to wild streams. 5b: *Potential to hurt services through damage to wild stocks. 7: "L" since 1a/1b are "L". 8: No opportunities will be lost by delaying this action.

18.3 Wild egg take to establish new runs (salmon)

Pink salmon

2.1 Incease fish/shellfish management: species already with plans

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	M	H	L	H	M	H	M	Yes	MH	N	N	Y	Y

1a: Reduced fishing pressures will facilitate natural recovery of injured wild stocks. 1b: Reduced fishing pressures could prevent further decline of wild stocks. 2: Fisheries management is technically feasible; mixed results for stock separation & management. 3: Salmon are a critical component of ecosystem & support commercial, sport & subsistence fisheries. 4: Unlikely to increase population beyond pre-spill levels, given rate of decline. 5a: *Managing fisheries for wild stock protection unlikely to damage other resources. 5b: Could require short-term restrictions on commercial fisheries (for long-term gain). 7: *High benefits at high cost; research necessary to implement; management is often expensive. 8: Yes, answer assumes different streams contain distinct genetic stocks.

11.0 Improve freshwater wild salmon spawning/rearing habitats

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	H	H	H	H	H	H	M	Yes	MR	Y	Y	Y	Y

1a: Expanding limited spawning habitat could greatly benefit wild stocks, if implemented on a wide scale. 1b: Expanding limited spawning habitat could greatly benefit wild stocks, if implemented on a wide scale. 2: Habitat enhancement is highly feasible. 3: Salmon are a key species in the ecosystem and support commercial, sport & subsistence fisheries. 4: *Depending on extent of hab. improvements, wild stocks could be taken beyond pre-spill levels. 5a: H assumes that populations are not increased past pre-spill levels. 5b: No injury to services is anticipated. 7: *High benefits at potentially high costs, depending on type & no. of hab. improvement projects. 8: Yes answer assumes that different streams contain distinct genetic stocks.

15.2 Clean intertidal salmon spawning substrates

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	M	M	H	L	H	M	H	L	No	PR	Y	Y	N	Y

Concept is purchase of strips along coastlines. 1a: May provide adtnl. protection from activities causing disturbance. Actual lvl. of existing disturbance unk. If high disturbance, High rating. 1b: Decrease in potential disturbance may be useful in preventing additional injury. 2: Land acquisition or habitat protection is feasible. 3: Although acqtn. focuses on PG hab., other species using nesting areas/adj. coastal areas benefit. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential harm to other species. 5b: No potential harm to services. 7: Benefits are not considered outstanding, cost may be high. 8: Yes, if imminent threat. Imminent threat on a broad scale basis unlikely for pigeon guillemot.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	M	M	H	L	H	M	H	M	No	PR	Y	N	N	Y

Concept is protection of habitat along coastlines. 1a: May provide adtnl. protection from activities causing disturbance. Actual lvl. of existing disturbance unk. If high disturbance, High rating. 1b: Decrease in potential disturbance may be useful in preventing additional injury. 2: Habitat protection through Special Designations is feasible. 3: Although prtctn. focuses on PG hab., other species using nesting areas/adj. cstl. areas benefit. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential harm to other species. 5b: Development in coastal areas may be impacted. 7: Moderate benefits expected for low cost. 8: Yes, if imminent threat exists. Imminent threat on a broad scale unlikely for pigeon guillemots.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; HU = Management of Human Use; PR = Protection.

Pigeon guillemot

17.1 Elminate introduced foxes (for nesting marine birds)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	N/A	H	H	N/A	H	H	H	H	No	MR	Y	Y	N	N

Replacement option for all marine seabirds. Evaluated on ability to affect marine birds on targeted islands. 1a: This rating is meant to mean that this is an effective replacement option. 1b: N/A because it is replacement. 2: Has been successfully implemented on some islands. 3: Multiple seabird species will benefit. 4: Option is replacement (would enhance marine bird species on islands) relative to pre-spill. 5a: Foxes were introduced to islands. No injury to other species anticipated. 5b: No injuries to services anticipated. 7: High benefits for low cost. 8: No opportunities will be lost by delay.

17.2 Reduce predator access to seabird colonies

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	M	L	M	H	H	H	M	No	MR	N	N	Y	Y

1a: Predators may be a high cause of chick mortality, thereby reducing recruitment to the population. 1b: It is unlikely to benefit a large portion of the population. 2: Project would be attempted as a feasibility project; proven useful for other locations & species. 3: Option would benefit only pigeon guillemots and, potentially, other adjacent colonial breeders. 4: It is unlikely to enhance populations beyond pre-spill levels. 5a: No injury to additional resources is anticipated. 5b: No injury to services is anticipated. 7: Potential bnfts. may be substantial if possible to enhance rcvry. of PG for modest cost. 8: No opportunities will be lost by delaying this action.

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	H	L	H	L	H	L	No	PR	Y	Y	N	Y

Purchase of large amounts of nesting habitat once we know where it is & how much will be affected. 1a: It is unknown what proportion of the potential nesting habitat would be affected. 1b: It is unknown what proportion of the potential nesting habitat would be affected. 2: Land purchase is highly feasible. 3: Multiple species will benefit. 4: Does not enhance beyond pre-spill conditions. 5a: No injuries to other species will occur. 5b: Timber harvest or other large-scale habitat conversions. 7: High costs for modest benefit to species because of the amount of potential nesting habitat. 8: Yes, if imminent threat for the loss of habitat

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	H	L	H	L	H	L	No	PR	Y	N	N	Y

Concept: No disturbance during nesting or of habitat anytime. 1a: Few anticipated habitat alterations on public land. It is unknown what proportion of nesting habitat would be affected. 1b: Few anticipated habitat alterations on public land. It is unknown what proportion of nesting habitat would be affected. 3: Benefits all resources in designated area. 4: Does not enhance. 5b: Development on public land such as timber harvest resulting in large-scale habitat conversion. 7: Few habitat alterations are anticipated. 8: Unless there is imminent threat for loss of habitat.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; MU = Management of Human Use; PR = Protection.

Marbled murrelet

9.0 Minimize incdidental take of marine birds by commercial fisheries

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	M	M	L	H	L	H	L	No	MH	N	N	Y	Y

This is a study/feasibility option. 1a:Only partial data avail. on incidental take. In PWS numbers may be sig. on local scale not pop. wide. Rating could be M in other areas. 1b: Only partial data avail. on incidental take. In PWS mortality may be sig. on local scale, not popl wide. Rating could be M in other areas. 2: Some technical aspects of this option have not been tried for MM. 3: Benefits murrelets and other seabird entangled in nets. 4: Not likely to enhance population above pre-spill levels unless 'take' is shown to be significant. 5a: No injuries to other species anticipated. 5b: Techniques to decrease mortality may have an adverse effect on commercial fishing. 7: Lack data on amount of incidental take, currently appears low, if significant, rating could be M. 8: No opportunities will be lost by delay.

17.1 Elminate introduced foxes (for nesting marine birds)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	N/A	H	H	N/A	H	H	H	H	No	MR	Y	Y	N	N

Replacement option for all marine seabirds. Evaluated on ability to affect marine birds on targeted islands. 1a: This rating is meant to mean that this is an effective replacement option. 1b: N/A because it is replacement. 2: Has been successfully implemented on some islands. 3: Will benefit multiple seabird species. 4: Option is replacement (though would enhance marine bird species on islands) relative to pre-spill 5a: Foxes were introduced to islands. No injury to other species anticipated. 5b: No injuries to services anticipated. 7: High benefits for low cost. 8: No opportunities will be lost by delay.

37.0 Purchase private lands (fee title or less than fee title)

Killer whale

4.0 Reduce disturbance at marine bird colonies and mammal haulout

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	M	M	M	L	H	M	H	M	No	MH	Y	N	N	Y

Concept is buffer zone to prevent disturbance around rubbing beaches. 1a: If there is current disturbance preventing use of rubbing beaches, then should be rated. No current disturbance is documented 1b: Rating assumes potential for increased disturbance. 2: Mixed results for this because identifying rubbing beaches may bring more disturbance to area. 3: Would be fairly site-specific buffers. 4: Does not enhance beyond pre-spill conditions. 5b: Affected services are commercial fishing, tourism and recreation. 7: Site-specific protection, benefits of rubbing beaches not understood, modest costs. 8: No opportunities will be lost by delay.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	M	M	M	L	H	M	H	M	No	PR	Y	N	N	Y

Buffer zone to control boat traffic, etc., within Marine Sanct. or other designation. 1a: If current disturbance preventing use of rubbing beach, this should be rated. 1b: This assumes the potential for increased disturbance. 2: Difficult to enforce protection for killer whales (i.e. MMPA). 3: Enabling legislation would focus on reducing disturbance to marine mammals. 4: Enhancement is unlikely. 5a: Multiple species will benefit. 5b: Affected services are commercial fishing, tourism, and recreation. 7: Mixed results at modest to high costs. 8: No opportunities will be lost by delay.

Evaluation of Options by Resource: DRAFT for RPWG Review

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	Unk	H	H	L	H	L	H	M	No	PR	Y	N	N	Y

Concept is more protective management. Bob thinks evaluation is error because mgmt tools exist now. 1a: N/A, unless there is ongoing evidence of human disturbance; population level injury is equivocal; therefore, restoration may not be needed. 1b: Population level injury is equivocal; therefore, restoration may not be needed. 2: Marine sanctuaries, research reserves, refuges, critical areas have been established in lower 48. 3: Designation has potential to protect the entire ecosystem. 4: Low probability to enhance productivity of stocks. 5a: Little or no adverse effects on other natural resources. 5b: Designation could but does not necessarily have to affect human services. 7: Less than outstanding costs at modest benefits. 8: This can be done at almost any time.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; MU = Management of Human Use; PR = Protection.

Herring

2.1 Incease fish/shellfish management: species already with plans

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	Unk	Unk	H	L	M	H	M	H	L	No	MH	N	N	Y	Y

Option would first fund significant research into the species. 1a: Population level injury is equivocal; therefore, restoration may not be needed. 1b: Population level injury is equivocal; therefore, restoration may not be needed. 2: Existing management plan is easily revised. 3: Management plan only addresses herring. 4: Rating depends on specific mgmt. action adopted; could be H. 5a: Increasing local stocks of herring will have little or no adverse effect on other fish species. 5b: Developed use in subtidal is affected; could be H depending on mgmt. action. 7: Outstanding benefits can be achieved at low costs. 8: This can be done almost any time.

15.1 Supplement intertidal substrates for herring

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	Unk	Unk	M	H	M	H	H	H	M	No	MR	Y	N	Y	Y

1a: Population level injury is equivocal; therefore, restoration may not be needed. 1b: Population level injury is equivocal; therefore, restoration may not be needed. 2: Approach documented in literature. 3: Added substrate creates habitat for other marine organisms. 4: Benefits are unknown, but indications are less than outstanding. 5a: Increasing herring stocks will have no adverse effects on other species. 5b: Increasing herring stocks will have no adverse effects on fishing-related services. 7: Less than outstanding benefits at modest costs. 8: This can be done at almost any time.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	H	H	L	M	H	H	M	Yes	MR	N	N	N	Y

Treat mussel beds to remove oil; this would be helpful if oil from mussel beds is the cause of continuing breeding failure of HD. 1a: H rating assumes linkage is valid; however, this has not yet been firmly established. 1b: H rating assumes that linkage is valid; however, this has not been firmly established. 2: Techniques to accomplish mussel bed clean up have been tested. 3: If oil in mussel beds is affecting other species, rating is high. 4: Action would not enhance. 5a: Possible short-term effects to the mussel beds themselves. 5b: No services would be affected. 7: May be key to recovery if linkage is true. 8: Oil ingestion may be causing injury.

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	H	H	H	L	H	M	H	L	No	PR	Y	Y	N	Y

Concept is to purchase habitat that includes HD nesting sites that might be affected (e.g. by logging). 1a: Nesting habitat not known to be limiting. 1b: While nesting habitat is not known to be limiting, protecting land near streams from logging would benefit birds nesting in protected areas. 2: It is feasible to buy land. 3: Other resources/services would benefit from the protection from logging. 4: Would not enhance. 5a: No other resources would be affected. 5b: Affected service is forestry. 7: Purchase of land is costly; not balanced by outstanding benefits. 8: If imminent threat, then Yes.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	H	L	H	M	H	M	No	PR	Y	N	N	Y

Concept is to protect habitat that includes HD nesting sites that might be affected (e.g. by logging). 1a: Nesting habitat not known to be limiting. 1b: While nesting habitat is not known to be limiting, protecting land near streams from logging would benefit birds nesting in the protected area. 2: It is feasible to impose restrictions on land use. 3: Other resources and services would benefit from habitat protection. 4: Would not enhance. 5a: No other resource would be affected. 5b: Impact to logging would be minimal; restrictions are riparian only + public land. 7: Moderate cost would not be balanced by corresponding benefits. 8: If imminent threat, yes.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; HU = Management of Human Use; PR = Protection.

Harlequin duck

8.1 temporarily restrict/close harvest

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	L	L	H	M	H	M	Yes	MH	N	N	Y	Y

1a: Hunting pressure is thought to be very low; if hunting is greater than currently believed, effect could be greater. 1b: Hunting pressure is thought to be very low; if hunting is greater than currently believed, effect could be greater. 2: There are means to further regulate harvest. 3: Action would not benefit others. 4: Action would not enhance. 5a: Action will not cause additional injury. 5b: Affected service is hunting. 7: Benefits expected to be low; effort required to implement change to hunting regulations. 8: Population not recovering.

8.2 educate public to voluntarily restrict harvest (sport, subsist.)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	M	L	L	H	M	H	L	Yes	MH	N	N	Y	Y

Educate people to understand that the HD pop. in the oiled area has been injured and to enlist their support to voluntarily restrict their take. 1a: Harvest is believed to be small; affected area small. 1b: Harvest is believed to be small; affected area small. 2: Expect moderate influence of voluntary compliance. 3: Action would not benefit others. 4: Action would not enhance. 5a: Action will not cause additional injury. 5b: Affected service is hunting. 7: Low benefits at modest cost. 8: Population not recovering.

13.0 Eliminate oil from mussel beds

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; MU = Management of Human Use; PR = Protection.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	H	H	L	H	M	H	H	Yes	PR	Y	N	N	Y

Management tool needed is ability to control boat traffic, etc. around haul-outs and pupping area. 1a: Disturbance at haulouts may be significant. 1b: Disturbance at haulouts may contribute to the long-term decline. 2: Haulouts are discrete and well-known. 3: Other species using the haulouts would also benefit. 4: Would not enhance. 5a: No other resources would be affected. 5b: Affected resource is commercial tourism and recreation (restricted near haulouts, etc.) 7: Disturbance at haulouts may be significant. 8: Population in rapid decline.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; HU = Management of Human Use; PR = Protection.

Harbor seal

4.0 Reduce disturbance at marine bird colonies and mammal haulout

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	H	L	L	H	M	H	H	Yes	MH	Y	N	N	Y

1a: Human activities can significantly affect use of haulouts by harbor seals. 1b: Same as 1a. 2: It is feasible to protect haulouts, which are few and well defined. 3: Harbor seal haulouts are not used by other species. 4: Would not enhance. 5a: No other resources would be affected. 5b: Commerc'l tourism & recreat'n may be affected. Rating may be upgraded depending on restrictions. 7: Because seals are concentrated on haulouts, it is relatively easy to protect a large proportion. 8: Population in rapid decline.

8.1 temporarily restrict/close harvest

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	H	M	L	H	L	H	M	No	MH	N	N	Y	Y

1a: There has been an apparently significant subsistence harvest. 1b: There has been an apparently significant subsistence harvest. 2: Action is highly feasible. 3: No other resources would be affected. 4: Would not enhance. 5a: No other resources would be affected. 5b: Affected service is subsistence hunting. 7: Considerable effort would be required to implement the parts of the MMP Act to restrict harvest. 8: Rating is No because of other opportunities to achieve the same results (8.2) without the cost.

8.2 educate public to voluntarily restrict harvest (sport, subsist.)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	H	M	L	L	H	M	H	M	Yes	MH	N	N	Y	Y

1a: There has been an apparently significant subsistence harvest. 1b: There has been an apparently significant subsistence harvest. 2: Education programs have been used elsewhere in Alaska to reduce harvest of certain species. 3: No other resources would be affected. 4: Would not enhance. 5a: No other resources would be affected. 5b: Affected resource is subsistence hunting. 7: It is not expected that voluntary restraint will achieve complete protection. 8: Populaton in rapid decline.

Evaluation of Options by Resource: DRAFT for RPWG Review

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	M	H	H	L	H	M	H	M	No	PR	Y	N	N	Y

Concept is upland stream protection. 1a: N/A, unless there is evidence of ongoing disturbance. 1b: Could slow or prevent further degradation by protection of key aquatic habitat. 2: Documented evidence exists that designation can restore and protect salmonid resources. 3: Has potential to protect entire ecosystem. 4: Low probability to increase productivity of trout above pre-spill levels. 5a: Will have no adverse impacts on other resources. 5b: Affected service is forestry and potentially other developed uses of riparian areas. 7: Less than outstanding benefits at modest costs. 8: This could be done at any time.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; HU = Management of Human Use; PR = Protection.

19.0 Update and expand Alaska's Anadromous Fish Stream Catalog

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	M	H	H	L	H	H	H	M	No	PR	N	N	N	Y

1a: Small improvement possible due to listing; prevents other disturbance. 1b: N/A, because population assumed to be stable and improving from initial injury. 2: Used within the State of Alaska. 3: Could benefit all resources in target stream, river, etc. 4: Low probability to increase productivity above pre-spill levels. 5a: Will have little or no adverse effect on other aquatic resources. 5b: Will have little or no adverse effect on services. 7: Less than outstanding benefits at modest costs. 8: This can be done at any time.

26.0 Amend Forest Practices Act

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	H	H	L	H	L	H	L	No	PR	N	N	N	Y

1a: Small improvement possible by amending the Act. 1b: Could prevent further degradation by reducing possible disturbance. 2: Forest Practices Act routinely amended. 3: Could benefit other aquatic and riparian species. 4: Low probability to increase productivity above pre-spill levels. 5a: Will have no adverse effects on other resources. 5b: Could have adverse effect on timber harvest. 7: There is a high cost not balanced by outstanding benefits. 8: This can be done at any time.

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	M	H	H	L	H	M	H	L	No	PR	Y	Y	N	Y

Concept is purchase of buffers along streams. 1a: N/A, unless there is evidence of ongoing disturbance. 1b: Could slow or prevent further degradation by protection of key habitat. 2: Documented evidence exists that buffers lessen the impacts of logging and other development. 3: Has potential to protect major elements of ecosystem. 4: Low probability to increase productivity of trout above pre-spill levels. 5a: Will have no adverse impact on other resources. 5b: Could have adverse impact on timber harvest. 7: There is a high cost not balanced by outstanding benefits. 8: This could be done at any time; yes, if imminent threat.

40.0 Special Designations

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?
Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; MU = Management of Human Use; PR = Protection.

Dolly varden trout

2.1 Incease fish/shellfish management: species already with plans

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	L	L	H	M	H	M	Yes	MH	N	N	Y	Y

1a: Has potential to make small improvement over large portion of affected stocks. 1b: Has potential to prevent further degradation. 2: In wide use for salmonids. 3: Could benefit other salmonid species. 4: Could result in moderate increase in productivity above pre-spill level. 5a: Will have little or no adverse effects on other fish species. 5b: Sport fishing could be temporarily curtailed. 7: Outstanding benefits at low costs. 8: Important to prevent further inj. by closure of fishery; size of CT stocks are relatively small.

11.0 Improve freshwater wild salmon spawning/rearing habitats

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	N/A	H	M	M	H	H	H	M	No	MR	Y	Y	Y	Y

1a: Has potential to make small improvement over large portions of stocks. 1b: N/A, because status of population assumed to be stable and improving from initial injury. 2: In wide use for salmonids. 3: Could benefit other salmonid species. 4: Could result in moderate increase in productivity above pre-spill levels. 5a: Will have little or no adverse effect on other fish species. 5b: Will have no adverse effect on fishing. 7: Less than outstanding benefits at modest costs. 8: This can be done at almost any time.

14.0 Accelerate recovery of upper intertidal zone

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	N/A	Unp	H	L	H	H	H	M	No	MR	N	N	N	Y

1a: Trout feed intertidally in spring and summer months. 1b: N/A, because status of population assumed to be stable and improving from initial injury. 2: Unk., thought to accelerate recovery of food base for juvenile trout feeding intertidally. 3: Will benefit most organisms in the intertidal zone. 4: Low probability to increase productivity above pre-spill level. 5a: Will have little or no adverse effect to other species. 5b: Will have no adverse effect on fishing. 7: Less than outstanding benefits at modest costs. 8: This can be done at almost any time.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?
Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; HU = Management of Human Use; PR = Protection.

Evaluation of Options by Resource: DRAFT for RPWG Review

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	M	H	H	L	H	M	H	M	No	PR	Y	N	N	Y

Concept is upland stream protection. 1a: N/A, unless there is evidence of ongoing disturbance. 1b: Could slow or prevent further degradation by protection of key aquatic habitat. 2: Documented evidence exists that designation can restore and protect salmonid resources. 3: Has potential to protect entire ecosystem. 4: Low probability to increase productivity of trout above pre-spill levels. 5a: Will have no adverse impacts on other resources. 5b: Affected service is forestry and potentially other developed uses of riparian areas. 7: Less than outstanding benefits at modest costs. 8: This could be done at any time.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; MU = Management of Human Use; PR = Protection.

19.0 Update and expand Alaska's Anadromous Fish Stream Catalog

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	M	H	H	L	H	H	H	M	No	PR	N	N	N	Y

1a: Small improvement possible due to listing; prevents other disturbance. 1b: N/A, because population assumed to be stable and improving from initial injury. 2: Used within the State of Alaska. 3: Could benefit all resources in target stream, river, etc. 4: Low probability to increase productivity above pre-spill levels. 5a: Will have little or no adverse effect on other aquatic resources. 5b: Will have little or no adverse effect on services. 7: Less than outstanding benefits at modest costs. 8: This can be done at any time.

26.0 Amend Forest Practices Act

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	H	H	L	H	L	H	L	No	PR	N	N	N	Y

1a: Small improvement possible by amending the Act. 1b: Could prevent further degradation by reducing possible disturbance. 2: Forest Practices Act routinely amended. 3: Could benefit other aquatic and riparian species. 4: Low probability to increase productivity above pre-spill levels. 5a: Will have no adverse effects on other resources. 5b: Could have adverse effect on timber harvest. 7: There is high cost not balanced by outstanding benefits. 8: This can be done at any time.

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	M	H	H	L	H	M	H	L	No	PR	Y	Y	N	Y

Concept is purchase of buffers along streams. 1a: N/A, unless there is evidence of ongoing disturbance. 1b: Could slow or prevent further degradation by protection of key habitat. 2: Documented evidence exists that buffers lessen the impacts of logging and other development. 3: Has potential to protect major elements of ecosystem. 4: Low probability to increase productivity of trout above pre-spill levels. 5a: Will have no adverse impact on other resources. 5b: Could have adverse impact on timber harvest. 7: There is a high cost not balanced by outstanding benefits. 8: This could be done at any time; yes, if imminent threat.

40.0 Special Designations

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; MU = Management of Human Use; PR = Protection.

Cutthroat trout

2.1 Incease fish/shellfish management: species already with plans

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	L	L	H	M	H	M	Yes	MH	N	N	Y	Y

1a: Has potential to make small improvement over large portion of affected stocks. 1b: Has potential to prevent further degradation. 2: In wide use for salmonids. 3: Could benefit other salmonid species. 4: Could result in moderate increase in productivity above pre-spill level. 5a: Will have little or no adverse effects on other fish species. 5b: Sport fishing could be temporarily curtailed. 7: Outstanding benefits at low costs. 8: Important to prevent further inj. by closure of fishery; size of CT stocks are relatively small.

11.0 Improve freshwater wild salmon spawning/rearing habitats

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	N/A	H	M	M	H	H	H	M	No	MR	Y	Y	Y	Y

1a: Has potential to make small improvement over large portions of stocks. 1b: N/A, because status of population assumed to be stable and improving from initial injury. 2: In wide use for salmonids. 3: Could benefit other salmonid species. 4: Could result in moderate increase in productivity above pre-spill levels. 5a: Will have little or no adverse effect on other fish species. 5b: Will have no adverse effect on fishing. 7: Less than outstanding benefits at modest costs. 8: This can be done at almost any time.

14.0 Accelerate recovery of upper intertidal zone

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	N/A	Unp	H	L	H	H	H	M	No	MR	N	N	N	Y

1a: Trout feed intertidally in spring and summer months. 1b: N/A, because status of population assumed to be stable and improving from initial injury. 2: Unk., thought to accelerate recovery of food base for juvenile trout feeding intertidally. 3: Will benefit most organisms in the intertidal zone. 4: Low probability to increase productivity above pre-spill level. 5a: Will have little or no adverse effect to other species. 5b: Will have no adverse effect on fishing. 7: Less than outstanding benefits at modest costs. 8: This can be done at almost any time.

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	M	L	H	H	H	L	No	PR	Y	Y	N	Y

1a: May provide adtnl. protection from activities causing disturbance. Actual lvl. of existing disturbance unk. If high disturbance, rating High. 1b: Decrease in potential disturbance may be useful in preventing additional injury. 2: Land acquisition or habitat protection is feasible. 3: Although acqstn. focuses on common murre habitat, other species using nesting areas benefit also. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential harm to other species. 5b: No potential harm to services. 7: Moderate benefits expected for moderate cost. 8: Yes, if imminent threat exists. Imminent threat on a broad scale basis unlikely for common murre.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	M	L	H	M	H	H	No	PR	Y	N	Y	Y

Concept is ability to regulate boating disturbance and shooting (halibut) near breeding colonies. 1a: May provide adtnl. protection from activities causing disturbance. Actual lvl. of existing disturbance unk. If high disturbance, rating is High. 1b: Decrease in potential disturbance may be useful in preventing additional injury. 2: Habitat protection through Special Designations is feasible. 3: Although prtctn. focuses on common murre habitat, other species using nesting areas also benefit. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5b: Affected resource is tourism and commercial fishing. 7: Moderate benefits expected for low cost. 8: Yes, if imminent threat exists. Imminent threat on broad scale basis unlikely for common murres.

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	Unp	L	L	M	H	H	M	Yes	MR	N	N	N	Y

1a: Impacts moderate portion of population. 1b: Prevents decline for moderate portion of population. 2: Techniques unproven. 3: Includes different projects not difficult to implement, but broadscale success is questionable. 4: Impacts only this species. 5a: Potentially affected resource is murres. 5b: No impacts to services anticipated. 7: Moderate benefits for low cost. 8: Population declining.

17.1 Elminate introduced foxes (for nesting marine birds)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	H	N/A	H	H	N/A	H	H	H	H	No	MR	Y	Y	N	N

Replacement option for all marine seabirds. Evaluated on ability to affect marine birds on targeted islands. 1a: This rating is meant to mean that this is an effective replacement option. 1b: N/A because it is replacement. 2: Has been successfully implemented on some islands. 3: Multiple seabird species will benefit. 4: Option is replacement (would enhance marine bird species on islands) relative to pre-spill. 5a: Foxes were introduced to islands. No injury to other species anticipated. 5b: No injuries to services anticipated. 7: High benefits for low cost. 8: No opportunities will be lost by delay.

17.2 Reduce predator access to seabird colonies

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	Unk	L	M	M	L	M	H	H	M	No	MR	N	N	Y	Y

1a: Relationship between synchrony and predators needs to be defined. Is this project useful to do if breeding is not synchronized? 1b: Although this project has potential to decrease additional injury, the extent of benefit throughout the injured population is uncertain. 2: Project would be attempted as a fsblty. project; proven useful for other locations and species. 3: This option would benefit only murres and, potentially, other adjacent colonial breeders. 4: It is unlikely to enhance populations beyond pre-spill levels. 5a: Possible this project could have a negative short-term effect on murres or other colonial birds. 5b: No injury to services is anticipated. 7: Potential benefits may be substantial if possible to enhance recovery of murres for modest cost. 8: No opportunities will be lost by delaying this action

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Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?
Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; HU = Management of Human Use; PR = Protection.

Common murre

4.0 Reduce disturbance at marine bird colonies and mammal haulout

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	M	L	H	M	H	H	Yes	MH	Y	N	N	Y

1a: There is uncertainty regarding level of disturbance. May be elevated to a High rating if disturbance is substantial. 1b: Decrease in potential disturbance may be useful to prevent addnl. inj. during recovery period. May be elevated to High if substantial disturbance. 2: It is feasible to require reduced disturbance. 3: This option would benefit other colonial birds also present at murre colonies. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential harm to other species. 5b: Tourism, sport and commercial fishing activities in coastal areas may be impacted. 7: Potential high benefits expected for low cost. 8: Yes, adtnl. stresses to nesting hab. will cont. to alter nesting bhvr. & reduce annual prdctvty.

16.1 Enhance social stimuli (Common murre)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	M	L	L	M	M	H	H	Yes	MR	N	N	N	Y

1a: Project assumes that social stimuli creates synchronization among the breeding population. Social structure of murre colonies has been altered. 1b: Although this project has potential to decrease additional injury, the extent of benefits throughout the injured population is uncertain. 2: Project would be attempted as a fsblty. prjct.; has proven useful for other locations & species. 3: This option would benefit only murres. 4: It is unlikely to enhance populations beyond pre-spill levels. 5a: Possible this project could have a negative short-term effect on murres or other colonial birds. 5b: No injury to services is anticipated. 7: Potential benefits may be substantial if possible to enhance rcvry. of murres for a modest cost. 8: Yes, adtnl. stresses to nesting habitat will cont. to alter nesting bhvr. & reduce annual prdctvt

16.2 Improve physical characteristics of nest sites (Common murre)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	N/A	H	H	L	H	H	H	L	No	MR	N	N	N	Y

1a: There are a few areas where this would be very helpful, i.e., where L is incorrect rating. 1b: Coastal habitat is stable; this option doesn't prevent a future disturbance. 2: Spill cleanup demonstrated the techniques. 3: Because of salmon's role in the river systems, restoring healthy runs is a trophic level effect. 4: Cannot clean to cleaner than pre-spill levels. 5a: Cleaning techniques should not hurt other resources. 5b: Cleaning will not hurt services. 7: Expensive with low benefits (except in a few cases where it would be worthwhile. 8: If do not clean today, it will still be there tomorrow (and salmon pops. stable).

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	H	H	L	H	L	H	M	No					

Concept is designation to minimize human activities within damaged area. 1a: Because of remoteness and lack of current activities, would not have much effect. 1b: Same as 1a note. 2: Designations are technically feasible. 3: Helping the intertidal habitat creates a trophic level effect. 4: Cannot protect into enhancement. 7: Low benefits, but low cost. 8: Opportunity to create a designation will not be lost.

Coastal habitat: intertidal

13.0 Eliminate oil from mussel beds

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	N/A	H	H	L	M	H	H	M	Yes	MR	N	N	N	Y

1a: Assume that mussel beds are great improvement for small area; if oil in dissaggregated beds = L. 1b: N/A because the intertidal habitat is recovering and not getting worse. 2: H for cleaning mussel beds. If oil in dissagregated mussels, then L. 3: High because it is a trophic level effect: many resources use mussels. 4: One cannot enhance by cleaning back to pre-spill levels; therefore, L. 5a: Could impact the intertidal community itself. 5b: No negative effects on services. 7: if oil in dissaggregated mussels, then L. 8: Yes because the oil is still being distributed and plagueing some resources.

14.0 Accelerate recovery of upper intertidal zone

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	N/A	Unp	H	L	M	H	H	M	No	MR	N	N	N	Y

1a: If it works, it is likely to help only the specific area where it is used. Unlikely to be applied spill-wide. 1b: Habitat is stable, not declining; therefore, N/A. 2: Unproven. The methods are still in the feasibility stage. 3: Establishing Fucus will bring benefits throughout the food chain. 4: Goal is to bring fucus to pre-spill levels; not enhance. 5a: Possible short-term damage to the organisms currently present. 5b: No negative effects on anything. 7: Widespread application could have significant costs, therefore, M. 8: If not apply technique this year, can do so any year until Fucus recovers.

15.2 Clean intertidal salmon spawning substrates

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; HU = Management of Human Use; PR = Protection.

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	H	H	H	L	H	L	H	M	No	PR	Y	Y	N	Y

Concept is threatened critical areas and broad-scale purchase of bear habitat. 1a: N/A, no existing disturbance would be removed, thus rate & degree of recovery would not increase or improve. 1b: If large enough areas were protected, there would be the opportunity to prevent substantial degradation. 2: Clearly meets the criteria. 3: Would have to be applied on a broad-scale basis which covers concentrated sites used by bears. 4: Enhancement would not be anticipated. 5a: Clearly meets the criteria. 5b: Affected resource is forestry and other developed uses. 7: Clearly meets criteria. 8: Clearly meets criteria.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	L	M	H	L	H	M	H	M	No	PR	Y	N	N	Y

Concept: broad apln of sensitive mgmt to protect bear habitat (greater than existing agency mgmt). 1a: N/A, no existing disturbance would be removed, thus rate & degree of recovery would not increase or improve. 1b: Clearly meets criteria. 2: To be effective specially designated areas would be large; bear's home range is typically large. 3: Special designation of areas for BB would protect areas for other injured resources and services. 4: Clearly meets criteria. 5a: Clearly meets criteria. 5b: Any injury to services would be minor or short-term, uses would be various kinds of development. 7: Would expect less than outstanding benefits at modest or low cost. 8: Clearly meets criteria.

Brown bear

8.1 temporarily restrict/close harvest

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	M	H	L	M	H	M	H	M	No	MH	N	N	Y	Y

1a: Hunting pressure is low and there are existing regulatory methods; stopping harvest would not significantly increase reproduction. 1b: Stopping harvest could prevent small degradation or decline for portion of spill areas where hrvst. pressure is above the average of spill area. 2: Clearly meets criteria. 3: Clearly meets criteria. No trophic level effect. 4: Stopping hrvst. could bring pop. level up a moderate amt. in moderate portion of spill area. 5a: Clearly meets the criteria. 5b: Sport hunting for bears could be minorly impacted, would be stopped for a period of time. 7: Less than outstanding benefits at low cost (meets criteria). 8: Clearly meets criteria.

13.0 Eliminate oil from mussel beds

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	L	L	H	H	L	M	H	H	L	No	MR	N	N	N	Y

1a: Unproven link, but bears commonly forage in intertidal areas. 1b: Unproven link, but bears commonly forage in intertidal areas. 2: H for cleaning mussel beds; if oil in disaggregated mussels, then L. 3: High because it is a trophic level effect; many resources use mussels. 4: One cannot enhance by cleaning back to pre-spill levels; therefore, L. 5a: There may be some mortality to mussels, themselves. Expected to be minor and short-term. 5b: Clearly meets criteria. 7: Low benefits expected. 8: Clearly meets criteria.

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	M	H	L	H	M	H	L	No	PR	Y	Y	N	Y

Concept is to protect habitat and prevent disturbance in narrow upland strips adjacent to coast. 1a: Birds are widely dispursed on public and private lands, a moderate or small portion of pop. would benefit. 1b: Prevent potential for aggrevating injury. 2: Purchasing coastal habitat has been implemented for other species. 3: Potentially benefits all organisms in purchased area. 4: Does not enhance beyond pre-spill conditions unless there is current disturbance which is unk. 5b: Some coastal development may be affected. 7: Long strips of coastlines would have to be purchased to benefit many birds, would be high cost. 8: Yes, if imminent threat to critical habitat.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	M	H	L	H	M	H	M	No	PR	Y	N	N	Y

Concept is to protect habitat and prevent disturbance in narrow upland strips along the coast. 1a: Birds are widely dispursed so ability to affect large portion of pop. is limited. 1b: Same as above. 2: Special designations have been implemented for other species. 3: Benefits all organisms in designated area. 4: No enhancement beyond pre-spill conditions. 5b: Some development along the coast may be affected. 7: Because of dispersal of birds and current disturbance levels, modest benefits.

Black oystercatcher

13.0 Eliminate oil from mussel beds

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	Unp	H	L	M	H	H	M	No	MR	N	N	N	Y

Option rated for mussel beds. 1a/b would be rated 'L' if problem is from dissaggregated mussels. 1a: Link unproven. Pot. for higher chick predation & lower weight due to greater travel distances. 1b: Prevention of continuing injury. 2: For cleaning mussel beds H, for dissaggregated mussels L and the ability to affect BO unproven. 3: Mussels provide food for many higher trophic levels. 4: Will not enhance beyond pre-spill conditions. 5a: Some injury to mussel beds, but it will be minor and short-term. 5b: None expected. 7: Less than outstanding benefits because other prey species are affected; birds are dispersed. 8: Some evidence of recovery occuring now.

14.0 Accelerate recovery of upper intertidal zone

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	Unp	H	L	M	H	H	M	No	MR	N	N	N	Y

BO eat limpets and other species which live in the upper intertidal area. 1a: Assume more prey provided which will give nestlings more food with reduced predation potential. 1b: Prevention of continuing injury. 2: Technical feasibility is unproven. 3: Potential benefits to species which support multiple trophic levels. 4: Will not enhance beyond pre-spill conditions. 5a: Some minor & short-term injury to intertidal species currently present. 5b: 7: Less than outstanding benefits at modest to high cost. 8: Some evidence of recovery occurring now.

37.0 Purchase private lands (fee title or less than fee title)

Bald eagle

37.0 Purchase private lands (fee title or less than fee title)

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	H	H	M	L	H	M	H	M	No	PR	Y	Y	N	Y

Prevent disturbance (sounds & some activities) nr nests. Coastal strips or protective nest buffers. 1a: May prevent distrubance near nests. Assume that it will be possible to acquire coastal strips or protective nest buffers. 1b: Eagles are susceptible to disturbance. Decrease in potential disturbance has been demonstrated useful in preventing injury. 2: Land acquisition of habitat protection is feasible. 3: Although acqtn. focuses on bald eagle habitat, other species using coastal area may benefit too. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential harm to other species. 5b: Development activities in coastal areas and near anadromous streams may be impacted. 7: Moderate benefits expected for moderate cost. 8: Yes,if imminent threat to some critical habitat. On broad-scale basis, imminent threat unlikely.

40.0 Special Designations

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	M	M	H	M	L	H	M	H	M	No	PR	Y	N	N	Y

Prevent disturbance (sounds & some activities) nr nests. Apply to coastal strips or nest buffers. 1a: May prevent disturbance near nests. Assume that it will be possible to acquire coastal strips or protective nest buffers. 1b: Development activities on public lands do not pose threats for substantial additional injury or a large portion of the population. 2: Habitat protection through special designations is feasible. 3: Although acqtn. focuses on bald eagle habitat, other species using coastal area may benefit too. 4: Protection from potential disturbance is unlikely to enhance populations beyond pre-spill levels. 5a: No potential harm to other species. 5b: Development activities in coastal areas and near anadromous streams may be impacted. 7: Moderate benefits expected for low cost. 8: No opportunities will be lost by delaying this action.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

Legend: H = High; M = Medium; L = Low; N/A = Not applicable; Unk = Unknown; Unp = Unproven; DRest = Direct Restoration; Rep = Replacement; Enh = Enhancement; AofE = Acquisition of Equivelent Resources; FramAlt = Framework Alternatives; MR = Manipulation of Resources; MU = Management of Human Use; PR = Protection.

Archaeology

1.0 Archeological site stewardship program

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	H	M	M	L	H	H	H	H	Yes	MH	N	N	N	Y

1a: N/A, archaeological site and artifacts are not capable of recovering. 1b: Implementation of this outside Ak has shown greater success when enforcement is incorporated. 2: Implementation outside AK has shown greater success when enforcement is incorprated. 3: May provide social benefits to local communities. 4: Not enhance the physical resource, but increases knowledge base in the community. 5a: Clearly meets criteria. 5b: Clearly meets criteria. 7: Using volunteers lowers cost and generates benefits. 8: Program cannot operate without funding.

10.0 Preserve archaeological sites/artifacts

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	M	H	L	L	H	H	H	M	Yes	MR	Y	N	N	Y

1a: N/A, archaeological site and artifacts are not capable of recovering. 1b: Clearly meets criteria. 2: Archaeologists are experienced and skilled at this work. 3: Benefits only archaeological sites and artifacts. 4: Sites and artifacts cannot be enhanced. 5a: Clearly meets criteria. 5b: Clearly meets criteria. 7: Costs expected to be high & outstanding benefits are not currently anticipated due to locations. 8: When critical sites subj. to looting or erosion ID'd, project should be implemented immediately.

35.0 Acquire archaeologic artifacts from outside the spill area

Criteria:	1a	1b	2	3	4	5a	5b	6	7	8	FrAlt	Rep	AofE	Enh	DirR
	N/A	N/A	H	L	N/A	M	H	H	L	No	MR	Y	N	N	N

1a: Replacement option. 1b: Replacement option. 2: Artifacts can be prioritized for importance and then purchased. 3: Benefits only archaeological resources. 4: N/A, replacing missing artifacts will not enhance the lost resource, it can only replace them. 5a: If purchase from pvt mkt, could cause black market effect. If done correctly, no problem. 5b: Clearly meets criteria. 7: Clearly meets criteria. 8: Artifacts can be purchased at any time.

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

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OPTION EVALUATION DATABASE

October 1, 1992

The options are listed by resource and service, with each resource/service on a separate page.

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* Some numbers are missing. (That is, we occasionally skip a number. So don't worry, you are not missing a page.)

Evaluation of Options, order by RESOURCES/SERVICE: DRAFT for RPWG Review

Option	Resource or Service	Criteria										FrWork Alternative	Settlement Char			
		1a	1b	2	3	4	5a	5b	6	7	8		DR	Rep	AofE	Enh
40.0 Special Designations	Recreation: backcountry developed	N/A	H	H	H	L	H	L	H	M	No	PR	Y	Y	Y	Y
33.2 Education: visitor center, interpretive and educational faciliti	Recreation: concentrated	N/A	N/A	H	L	N/A	H	H	H	M	No	MH	N	N	Y	N
34.0 Marine environmental institute	Recreation: concentrated	N/A	N/A	H	M	N/A	H	H	H	M	No	MH	N	N	Y	N
37.0 Purchase private lands (fee title or less than fee title)	Recreation: undeveloped	N/A	H	H	H	H	H	L	H	M	No	PR	Y	Y	Y	Y
40.0 Special Designations	Recreation: undeveloped	N/A	H	H	H	L	H	L	H	M	No	PR	Y	Y	Y	Y
8.1 temporarily restrict/close harvest	River otter	L	L	H	L	L	H	M	H	H	No	MH	Y	N	N	Y
13.0 Eliminate oil from mussel beds	River otter	H	H	H	H	L	M	H	H	M	Yes	MR	Y	N	N	N
14.0 Accelerate recovery of upper intertidal zone	River otter	Unk	Unk	Unp	H	L	H	H	H	Unk	Yes	MR	Y	N	N	N
37.0 Purchase private lands (fee title or less than fee title)	River otter	N/A	M	H	H	L	H	M	H	M	No	PR	Y	Y	Y	N
40.0 Special Designations	River otter	N/A	L	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
2.2 Increase fish/shellfish management: for species without plans	Rockfish	Unk	Unk	H	M	L	H	M	H	Unk	Yes	MH	Y	N	N	Y
4.0 Reduce disturbance at marine bird colonies and mammal haulout	Sea otter	L	L	M	L	L	H	M	H	L	No	MH	Y	Y	N	N
8.1 temporarily restrict/close harvest	Sea otter	L	L	M	L	L	H	L	H	L	No	MH	Y	N	N	Y
8.2 educate public to voluntarily restrict harvest (sport, subsist.)	Sea otter	L	L	M	L	L	H	M	H	M	No	MH	Y	N	N	Y
13.0 Eliminate oil from mussel beds	Sea otter	H	H	H	H	L	M	H	H	H	Yes	MR	Y	N	N	N
40.0 Special Designations	Sea otter	L	L	M	H	L	H	M	H	M	No	PR	Y	Y	N	N
2.1 Incease fish/shellfish management: species already with plans	Sockeye salmon	H	H	M	H	L	H	H	H	H	Yes	MH	Y	N	N	Y
11.0 Improve freshwater wild salmon spawning/rearing habitats	Sockeye salmon	H	H	H	H	M	H	H	H	H	Yes	MR	Y	Y	Y	Y
18.1 Establish additional hatchery (salmon) runs	Sockeye salmon	M	M	H	H	M	M	H	H	M	No	MR	Y	Y	N	Y
18.2 Transplant (salmon) hatchery-reared fish to depleted areas	Sockeye salmon	H	L	H	H	L	H	H	H	M	Yes	MR	Y	Y	N	Y
18.3 Wild egg take to establish new runs (salmon)	Sockeye salmon	M	M	H	H	M	M	H	H	M	No	MR	Y	Y	N	Y
19.0 Update and expand Alaska's Anadromous Fish Stream Catalog	Sockeye salmon	L	M	H	H	L	H	H	H	M	No	PR	Y	N	N	N
26.0 Amend Forest Practices Act	Sockeye salmon	L	L	H	H	L	H	L	H	L	No	PR	Y	N	N	N
37.0 Purchase private lands (fee title or less than fee title)	Sockeye salmon	N/A	M	H	H	L	H	M	H	M	No	PR	Y	Y	Y	N
40.0 Special Designations	Sockeye salmon	N/A	L	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
30.0 Test subsistence foods for hydrocarbon contamination	Subsistence	H	N/A	H	L	L	H	H	H	H	No	MH	Y	N	N	N
37.0 Purchase private lands (fee title or less than fee title)	Wilderness/intrinsic values	H	H	H	H	N/A	H	L	H	M	No	PR	Y	Y	N	N
40.0 Special Designations	Wilderness/intrinsic values	H	H	H	H	N/A	H	L	H	M	No	PR	Y	Y	N	N

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Option	Resource or Service	Criteria										FrWork Alternative	Settlement Char			
		1a	1b	2	3	4	5a	5b	6	7	8		DR	Rep	AofE	Enh
40.0 Special Designations	Dolly varden trout	N/A	M	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
4.0 Reduce disturbance at marine bird colonies and mammal haulout	Harbor seal	H	H	H	L	L	H	M	H	H	Yes	MH	Y	Y	N	N
8.1 temporarily restrict/close harvest	Harbor seal	H	H	H	M	L	H	L	H	M	No	MH	Y	N	N	Y
8.2 educate public to voluntarily restrict harvest (sport, subsist.)	Harbor seal	H	H	M	L	L	H	M	H	M	Yes	MH	Y	N	N	Y
40.0 Special Designations	Harbor seal	H	H	H	H	L	H	M	H	H	Yes	PR	Y	Y	N	N
8.1 temporarily restrict/close harvest	Harlequin duck	M	M	H	L	L	H	M	H	M	Yes	MH	Y	N	N	Y
8.2 educate public to voluntarily restrict harvest (sport, subsist.)	Harlequin duck	L	L	M	L	L	H	M	H	L	Yes	MH	Y	N	N	Y
13.0 Eliminate oil from mussel beds	Harlequin duck	H	H	H	H	L	M	H	H	M	Yes	MR	Y	N	N	N
37.0 Purchase private lands (fee title or less than fee title)	Harlequin duck	M	H	H	H	L	H	M	H	L	No	PR	Y	Y	Y	N
40.0 Special Designations	Harlequin duck	M	M	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
2.1 Incease fish/shellfish management: species already with plans	Herring	Unk	Unk	H	L	M	H	M	H	L	No	MH	Y	N	N	Y
15.1 Supplement intertidal substrates for herring	Herring	Unk	Unk	M	H	M	H	H	H	M	No	MR	Y	Y	N	Y
40.0 Special Designations	Herring	N/A	Unk	H	H	L	H	L	H	M	No	PR	Y	Y	N	N
4.0 Reduce disturbance at marine bird colonies and mammal haulout	Killer whale	N/A	M	M	M	L	H	M	H	M	No	MH	Y	Y	N	N
40.0 Special Designations	Killer whale	N/A	M	M	M	L	H	M	H	M	No	PR	Y	Y	N	N
9.0 Minimize incdidental take of marine birds by commercial fisherie	Marbled murrelet	L	L	M	M	L	H	L	H	L	No	MH	Y	N	N	Y
17.1 Elminate introduced foxes (for nesting marine birds)	Marbled murrelet	H	N/A	H	H	N/A	H	H	H	H	No	MR	N	Y	Y	N
37.0 Purchase private lands (fee title or less than fee title)	Marbled murrelet	M	M	H	H	L	H	L	H	L	No	PR	Y	Y	Y	N
40.0 Special Designations	Marbled murrelet	M	M	H	H	L	H	L	H	L	No	PR	Y	Y	N	N
17.1 Elminate introduced foxes (for nesting marine birds)	Pigeon guillemot	H	N/A	H	H	N/A	H	H	H	H	No	MR	N	Y	Y	N
17.2 Reduce predator access to seabird colonies	Pigeon guillemot	M	M	M	L	M	H	H	H	M	No	MR	Y	N	N	Y
37.0 Purchase private lands (fee title or less than fee title)	Pigeon guillemot	L	M	M	H	L	H	M	H	L	No	PR	Y	Y	Y	N
40.0 Special Designations	Pigeon guillemot	L	M	M	H	L	H	M	H	M	No	PR	Y	Y	N	N
2.1 Incease fish/shellfish management: species already with plans	Pink salmon	H	H	M	H	L	H	M	H	M	Yes	MH	Y	N	N	Y
11.0 Improve freshwater wild salmon spawning/rearing habitats	Pink salmon	H	H	H	H	H	H	H	H	M	Yes	MR	Y	Y	Y	Y
15.2 Clean intertidal salmon spawning substrates	Pink salmon	L	L	M	H	L	M	H	H	L	Yes	MR	Y	N	N	N
18.1 Establish additional hatchery (salmon) runs	Pink salmon	L	L	H	H	H	L	L	H	L	No	MR	Y	Y	N	Y
18.2 Transplant (salmon) hatchery-reared fish to depleted areas	Pink salmon	L	L	H	H	H	L	L	H	L	No	MR	Y	Y	N	Y
18.3 Wild egg take to establish new runs (salmon)	Pink salmon	M	M	H	H	H	L	H	H	M	No	MR	Y	Y	N	Y
19.0 Update and expand Alaska's Anadromous Fish Stream Catalog	Pink salmon	L	M	H	H	L	H	H	H	M	No	PR	Y	N	N	N
26.0 Amend Forest Practices Act	Pink salmon	L	L	H	H	L	H	L	H	L	No	PR	Y	N	N	N
37.0 Purchase private lands (fee title or less than fee title)	Pink salmon	L	M	H	H	L	H	M	H	M	No	PR	Y	Y	Y	N
40.0 Special Designations	Pink salmon	L	L	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
12.1 New backcountry recreation facilities	Recreation: backcountry developed	N/A	N/A	H	M	M	M	L	H	M	No	MH	N	Y	Y	Y
12.2 New commercial, (lodge, fuel facilities) recreation facilities	Recreation: backcountry developed	N/A	N/A	H	M	H	L	H	H	M	No	MH	N	N	Y	Y
28.0 Acquire access for sport-fishing and recreation	Recreation: backcountry developed	M	H	H	M	M	M	H	H	M	No	MH	N	Y	Y	Y
37.0 Purchase private lands (fee title or less than fee title)	Recreation: backcountry developed	N/A	H	H	H	H	H	L	H	M	No	PR	Y	Y	Y	Y

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Option	Resource or Service	Criteria										FrWork Alternative	Settlement Char			
		1a	1b	2	3	4	5a	5b	6	7	8		DR	Rep	AofE	Enh
1.0 Archeological site stewardship program	Archaeology	N/A	H	M	M	L	H	H	H	H	Yes	MH	Y	N	N	N
10.0 Preserve archaeological sites/artifacts	Archaeology	N/A	M	H	L	L	H	H	H	M	Yes	MR	Y	Y	N	N
35.0 Acquire archaeologic artifacts from outside the spill area	Archaeology	N/A	N/A	H	L	N/A	M	H	H	L	No	MR	N	Y	N	N
37.0 Purchase private lands (fee title or less than fee title)	Bald eagle	M	H	H	M	L	H	M	H	M	No	PR	Y	Y	Y	N
40.0 Special Designations	Bald eagle	M	M	H	M	L	H	M	H	M	No	PR	Y	Y	N	N
13.0 Eliminate oil from mussel beds	Black oystercatcher	M	M	Unp	H	L	M	H	H	M	No	MR	Y	N	N	N
14.0 Accelerate recovery of upper intertidal zone	Black oystercatcher	M	M	Unp	H	L	M	H	H	M	No	MR	Y	N	N	N
37.0 Purchase private lands (fee title or less than fee title)	Black oystercatcher	M	M	M	H	L	H	M	H	L	No	PR	Y	Y	Y	N
40.0 Special Designations	Black oystercatcher	M	M	M	H	L	H	M	H	M	No	PR	Y	Y	N	N
8.1 temporarily restrict/close harvest	Brown bear	L	M	H	L	M	H	M	H	M	No	MH	Y	N	N	Y
13.0 Eliminate oil from mussel beds	Brown bear	L	L	H	H	L	M	H	H	L	No	MR	Y	N	N	N
37.0 Purchase private lands (fee title or less than fee title)	Brown bear	N/A	H	H	H	L	H	L	H	M	No	PR	Y	Y	Y	N
40.0 Special Designations	Brown bear	N/A	L	M	H	L	H	M	H	M	No	PR	Y	Y	N	N
13.0 Eliminate oil from mussel beds	Coastal habitat: intertidal	M	N/A	H	H	L	M	H	H	M	Yes	MR	Y	N	N	N
14.0 Accelerate recovery of upper intertidal zone	Coastal habitat: intertidal	M	N/A	Unp	H	L	M	H	H	M	No	MR	Y	N	N	N
15.2 Clean intertidal salmon spawning substrates	Coastal habitat: intertidal	L	N/A	H	H	L	H	H	H	L	No	MR	Y	N	N	N
40.0 Special Designations	Coastal habitat: intertidal	L	L	H	H	L	H	L	H	M	No					
4.0 Reduce disturbance at marine bird colonies and mammal haulout	Common murre	M	M	H	M	L	H	M	H	H	Yes	MH	Y	Y	N	N
16.1 Enhance social stimuli (Common murre)	Common murre	M	M	M	L	L	M	H	H	H	Yes	MR	Y	N	N	N
16.2 Improve physical characteristics of nest sites (Common murre)	Common murre	M	M	Unp	L	L	M	H	H	M	Yes	MR	Y	N	N	N
17.1 Elminate introduced foxes (for nesting marine birds)	Common Murre	H	N/A	H	H	N/A	H	H	H	H	No	MR	N	Y	Y	N
17.2 Reduce predator access to seabird colonies	Common murre	Unk	L	M	M	L	M	H	H	M	No	MR	Y	N	N	Y
37.0 Purchase private lands (fee title or less than fee title)	Common murre	M	M	H	M	L	H	H	H	L	No	PR	Y	Y	Y	N
40.0 Special Designations	Common murre	M	M	H	M	L	H	M	H	H	No	PR	Y	Y	N	Y
2.1 Incease fish/shellfish management: species already with plans	Cutthroat trout	M	M	H	L	L	H	M	H	M	Yes	MH	Y	N	N	Y
11.0 Improve freshwater wild salmon spawning/rearing habitats	Cutthroat trout	M	N/A	H	M	M	H	H	H	M	No	MR	Y	Y	Y	Y
14.0 Accelerate recovery of upper intertidal zone	Cutthroat trout	H	N/A	Unp	H	L	H	H	H	M	No	MR	Y	N	N	N
19.0 Update and expand Alaska's Anadromous Fish Stream Catalog	Cutthroat trout	L	M	H	H	L	H	H	H	M	No	PR	Y	N	N	N
26.0 Amend Forest Practices Act	Cutthroat trout	L	L	H	H	L	H	L	H	L	No	PR	Y	N	N	N
37.0 Purchase private lands (fee title or less than fee title)	Cutthroat trout	N/A	M	H	H	L	H	M	H	L	No	PR	Y	Y	Y	N
40.0 Special Designations	Cutthroat trout	N/A	M	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
2.1 Incease fish/shellfish management: species already with plans	Dolly varden trout	M	M	H	L	L	H	M	H	M	Yes	MH	Y	N	N	Y
11.0 Improve freshwater wild salmon spawning/rearing habitats	Dolly varden trout	M	N/A	H	M	M	H	H	H	M	No	MR	Y	Y	Y	Y
14.0 Accelerate recovery of upper intertidal zone	Dolly varden trout	H	N/A	Unp	H	L	H	H	H	M	No	MR	Y	N	N	N
19.0 Update and expand Alaska's Anadromous Fish Stream Catalog	Dolly varden trout	L	M	H	H	L	H	H	H	M	No	PR	Y	N	N	N
26.0 Amend Forest Practices Act	Dolly varden trout	L	L	H	H	L	H	L	H	L	No	PR	Y	N	N	N
37.0 Purchase private lands (fee title or less than fee title)	Dolly varden trout	N/A	M	H	H	L	H	M	H	L	No	PR	Y	Y	Y	N

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The Options Evaluation Database
Sorted by RESOURCE OR SERVICE
October 1, 1992

The short form (without footnotes)

Evaluation of Options by Resource: DRAFT for RPWG Review

Resource or Service	Option	Criteria										FrWork Alternative	Settlement Char			
		1a	1b	2	3	4	5a	5b	6	7	8		DR	Rep	AofE	Enh
Recreation: concentrated	33.2 Education: visitor center, interpretive and educational faciliti	N/A	N/A	H	L	N/A	H	H	H	M	No	MH	N	N	Y	N
Recreation: concentrated	34.0 Marine environmental institute	N/A	N/A	H	M	N/A	H	H	H	M	No	MH	N	N	Y	N
Archaeology	35.0 Acquire archaeologic artifacts from outside the spill area	N/A	N/A	H	L	N/A	M	H	H	L	No	MR	N	Y	N	N
Bald eagle	37.0 Purchase private lands (fee title or less than fee title)	M	H	H	M	L	H	M	H	M	No	PR	Y	Y	Y	N
Black oystercatcher	37.0 Purchase private lands (fee title or less than fee title)	M	M	M	H	L	H	M	H	L	No	PR	Y	Y	Y	N
Brown bear	37.0 Purchase private lands (fee title or less than fee title)	N/A	H	H	H	L	H	L	H	M	No	PR	Y	Y	Y	N
Common murre	37.0 Purchase private lands (fee title or less than fee title)	M	M	H	M	L	H	H	H	L	No	PR	Y	Y	Y	N
Cutthroat trout	37.0 Purchase private lands (fee title or less than fee title)	N/A	M	H	H	L	H	M	H	L	No	PR	Y	Y	Y	N
Dolly varden trout	37.0 Purchase private lands (fee title or less than fee title)	N/A	M	H	H	L	H	M	H	L	No	PR	Y	Y	Y	N
Harlequin duck	37.0 Purchase private lands (fee title or less than fee title)	M	H	H	H	L	H	M	H	L	No	PR	Y	Y	Y	N
Marbled murrelet	37.0 Purchase private lands (fee title or less than fee title)	M	M	H	H	L	H	L	H	L	No	PR	Y	Y	Y	N
Pigeon guillemot	37.0 Purchase private lands (fee title or less than fee title)	L	M	M	H	L	H	M	H	L	No	PR	Y	Y	Y	N
Pink salmon	37.0 Purchase private lands (fee title or less than fee title)	L	M	H	H	L	H	M	H	M	No	PR	Y	Y	Y	N
Recreation: backcountry developed	37.0 Purchase private lands (fee title or less than fee title)	N/A	H	H	H	H	H	L	H	M	No	PR	Y	Y	Y	Y
Recreation: undeveloped	37.0 Purchase private lands (fee title or less than fee title)	N/A	H	H	H	H	H	L	H	M	No	PR	Y	Y	Y	Y
River otter	37.0 Purchase private lands (fee title or less than fee title)	N/A	M	H	H	L	H	M	H	M	No	PR	Y	Y	Y	N
Sockeye salmon	37.0 Purchase private lands (fee title or less than fee title)	N/A	M	H	H	L	H	M	H	M	No	PR	Y	Y	Y	N
Wilderness/intrinsic values	37.0 Purchase private lands (fee title or less than fee title)	H	H	H	H	N/A	H	L	H	M	No	PR	Y	Y	N	N
Bald eagle	40.0 Special Designations	M	M	H	M	L	H	M	H	M	No	PR	Y	Y	N	N
Black oystercatcher	40.0 Special Designations	M	M	M	H	L	H	M	H	M	No	PR	Y	Y	N	N
Brown bear	40.0 Special Designations	N/A	L	M	H	L	H	M	H	M	No	PR	Y	Y	N	N
Coastal habitat: intertidal	40.0 Special Designations	L	L	H	H	L	H	L	H	M	No					
Common murre	40.0 Special Designations	M	M	H	M	L	H	M	H	H	No	PR	Y	Y	N	Y
Cutthroat trout	40.0 Special Designations	N/A	M	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
Dolly varden trout	40.0 Special Designations	N/A	M	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
Harbor seal	40.0 Special Designations	H	H	H	H	L	H	M	H	H	Yes	PR	Y	Y	N	N
Harlequin duck	40.0 Special Designations	M	M	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
Herring	40.0 Special Designations	N/A	Unk	H	H	L	H	L	H	M	No	PR	Y	Y	N	N
Killer whale	40.0 Special Designations	N/A	M	M	M	L	H	M	H	M	No	PR	Y	Y	N	N
Marbled murrelet	40.0 Special Designations	M	M	H	H	L	H	L	H	L	No	PR	Y	Y	N	N
Pigeon guillemot	40.0 Special Designations	L	M	M	H	L	H	M	H	M	No	PR	Y	Y	N	N
Pink salmon	40.0 Special Designations	L	L	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
Recreation: backcountry developed	40.0 Special Designations	N/A	H	H	H	L	H	L	H	M	No	PR	Y	Y	Y	Y
Recreation: undeveloped	40.0 Special Designations	N/A	H	H	H	L	H	L	H	M	No	PR	Y	Y	Y	Y
River otter	40.0 Special Designations	N/A	L	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
Sea otter	40.0 Special Designations	L	L	M	H	L	H	M	H	M	No	PR	Y	Y	N	N
Sockeye salmon	40.0 Special Designations	N/A	L	H	H	L	H	M	H	M	No	PR	Y	Y	N	N
Wilderness/intrinsic values	40.0 Special Designations	H	H	H	H	N/A	H	L	H	M	No	PR	Y	Y	N	N

Criteria Summary. 1a: Potential to improve the rate or degree of recovery. 1b: Potential to prevent further degradation or decline. 2: Technical feasibility 3: Degree to which proposed action benefits the more than one resource or service. 4: Degree to which proposed action enhances the resc or svc. 5: Potential for NO additional injury to: other target or non-target a: resources; b: services. 6. Potential effects of the proposed action on human health & safety. 7. Relationship of the expected costs of the proposed action to the expected benefits. 8. Will the restoration opportunity be lost if implementation is delayed?

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Evaluation of Options by Resource: DRAFT for RPWG Review

Resource or Service	Option	Criteria										FrWork Alternative	Settlement Char			
		1a	1b	2	3	4	5a	5b	6	7	8		DR	Rep	AofE	Enh
Black oystercatcher	14.0 Accelerate recovery of upper intertidal zone	M	M	Unp	H	L	M	H	H	M	No	MR	Y	N	N	N
Coastal habitat: intertidal	14.0 Accelerate recovery of upper intertidal zone	M	N/A	Unp	H	L	M	H	H	M	No	MR	Y	N	N	N
Cutthroat trout	14.0 Accelerate recovery of upper intertidal zone	H	N/A	Unp	H	L	H	H	H	M	No	MR	Y	N	N	N
Dolly varden trout	14.0 Accelerate recovery of upper intertidal zone	H	N/A	Unp	H	L	H	H	H	M	No	MR	Y	N	N	N
River otter	14.0 Accelerate recovery of upper intertidal zone	Unk	Unk	Unp	H	L	H	H	H	Unk	Yes	MR	Y	N	N	N
Herring	15.1 Supplement intertidal substrates for herring	Unk	Unk	M	H	M	H	H	H	M	No	MR	Y	Y	N	Y
Coastal habitat: intertidal	15.2 Clean intertidal salmon spawning substrates	L	N/A	H	H	L	H	H	H	L	No	MR	Y	N	N	N
Pink salmon	15.2 Clean intertidal salmon spawning substrates	L	L	M	H	L	M	H	H	L	Yes	MR	Y	N	N	N
Common murre	16.1 Enhance social stimuli (Common murre)	M	M	M	L	L	M	H	H	H	Yes	MR	Y	N	N	N
Common murre	16.2 Improve physical characteristics of nest sites (Common murre)	M	M	Unp	L	L	M	H	H	M	Yes	MR	Y	N	N	N
Common Murre	17.1 Elminate introduced foxes (for nesting marine birds)	H	N/A	H	H	N/A	H	H	H	H	No	MR	N	Y	Y	N
Marbled murrelet	17.1 Elminate introduced foxes (for nesting marine birds)	H	N/A	H	H	N/A	H	H	H	H	No	MR	N	Y	Y	N
Pigeon guillemot	17.1 Elminate introduced foxes (for nesting marine birds)	H	N/A	H	H	N/A	H	H	H	H	No	MR	N	Y	Y	N
Common murre	17.2 Reduce predator access to seabird colonies	Unk	L	M	M	L	M	H	H	M	No	MR	Y	N	N	Y
Pigeon guillemot	17.2 Reduce predator access to seabird colonies	M	M	M	L	M	H	H	H	M	No	MR	Y	N	N	Y
Pink salmon	18.1 Establish additional hatchery (salmon) runs	L	L	H	H	H	L	L	H	L	No	MR	Y	Y	N	Y
Sockeye salmon	18.1 Establish additional hatchery (salmon) runs	M	M	H	H	M	M	H	H	M	No	MR	Y	Y	N	Y
Pink salmon	18.2 Transplant (salmon) hatchery-reared fish to depleted areas	L	L	H	H	H	L	L	H	L	No	MR	Y	Y	N	Y
Sockeye salmon	18.2 Transplant (salmon) hatchery-reared fish to depleted areas	H	L	H	H	L	H	H	H	M	Yes	MR	Y	Y	N	Y
Pink salmon	18.3 Wild egg take to establish new runs (salmon)	M	M	H	H	H	L	H	H	M	No	MR	Y	Y	N	Y
Sockeye salmon	18.3 Wild egg take to establish new runs (salmon)	M	M	H	H	M	M	H	H	M	No	MR	Y	Y	N	Y
Cutthroat trout	19.0 Update and expand Alaska's Anadromous Fish Stream Catalog	L	M	H	H	L	H	H	H	M	No	PR	Y	N	N	N
Dolly varden trout	19.0 Update and expand Alaska's Anadromous Fish Stream Catalog	L	M	H	H	L	H	H	H	M	No	PR	Y	N	N	N
Pink salmon	19.0 Update and expand Alaska's Anadromous Fish Stream Catalog	L	M	H	H	L	H	H	H	M	No	PR	Y	N	N	N
Sockeye salmon	19.0 Update and expand Alaska's Anadromous Fish Stream Catalog	L	M	H	H	L	H	H	H	M	No	PR	Y	N	N	N
Cutthroat trout	26.0 Amend Forest Practices Act	L	L	H	H	L	H	L	H	L	No	PR	Y	N	N	N
Dolly varden trout	26.0 Amend Forest Practices Act	L	L	H	H	L	H	L	H	L	No	PR	Y	N	N	N
Pink salmon	26.0 Amend Forest Practices Act	L	L	H	H	L	H	L	H	L	No	PR	Y	N	N	N
Sockeye salmon	26.0 Amend Forest Practices Act	L	L	H	H	L	H	L	H	L	No	PR	Y	N	N	N
Recreation: backcountry developed	28.0 Acquire access for sport-fishing and recreation	M	H	H	M	M	M	H	H	M	No	MH	N	Y	Y	Y
Subsistence	30.0 Test subsistence foods for hydrocarbon contamination	H	N/A	H	L	L	H	H	H	H	No	MH	Y	N	N	N

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Evaluation of Options by Resource: DRAFT for RPWG Review

Resource or Service	Option	Criteria										FrWork Alter-native	Settlement Char			
		1a	1b	2	3	4	5a	5b	6	7	8		DR	Rep	AofE	Enh
Archaeology	1.0 Archeological site stewardship program	N/A	H	M	M	L	H	H	H	H	Yes	MH	Y	N	N	N
Cutthroat trout	2.1 Incease fish/shellfish management: species already with plans	M	M	H	L	L	H	M	H	M	Yes	MH	Y	N	N	Y
Dolly varden trout	2.1 Incease fish/shellfish management: species already with plans	M	M	H	L	L	H	M	H	M	Yes	MH	Y	N	N	Y
Herring	2.1 Incease fish/shellfish management: species already with plans	Unk	Unk	H	L	M	H	M	H	L	No	MH	Y	N	N	Y
Pink salmon	2.1 Incease fish/shellfish management: species already with plans	H	H	M	H	L	H	M	H	M	Yes	MH	Y	N	N	Y
Sockeye salmon	2.1 Incease fish/shellfish management: species already with plans	H	H	M	H	L	H	H	H	H	Yes	MH	Y	N	N	Y
Rockfish	2.2 Increase fish/shellfish management: for species without plans	Unk	Unk	H	M	L	H	M	H	Unk	Yes	MH	Y	N	N	Y
Common murre	4.0 Reduce disturbance at marine bird colonies and mammal haulout	M	M	H	M	L	H	M	H	H	Yes	MH	Y	Y	N	N
Harbor seal	4.0 Reduce disturbance at marine bird colonies and mammal haulout	H	H	H	L	L	H	M	H	H	Yes	MH	Y	Y	N	N
Killer whale	4.0 Reduce disturbance at marine bird colonies and mammal haulout	N/A	M	M	M	L	H	M	H	M	No	MH	Y	Y	N	N
Sea otter	4.0 Reduce disturbance at marine bird colonies and mammal haulout	L	L	M	L	L	H	M	H	L	No	MH	Y	Y	N	N
Brown bear	8.1 temporarily restrict/close harvest	L	M	H	L	M	H	M	H	M	No	MH	Y	N	N	Y
Harbor seal	8.1 temporarily restrict/close harvest	H	H	H	M	L	H	L	H	M	No	MH	Y	N	N	Y
Harlequin duck	8.1 temporarily restrict/close harvest	M	M	H	L	L	H	M	H	M	Yes	MH	Y	N	N	Y
River otter	8.1 temporarily restrict/close harvest	L	L	H	L	L	H	M	H	H	No	MH	Y	N	N	Y
Sea otter	8.1 temporarily restrict/close harvest	L	L	M	L	L	H	L	H	L	No	MH	Y	N	N	Y
Harbor seal	8.2 educate public to voluntarily restrict harvest (sport, subsist.)	H	H	M	L	L	H	M	H	M	Yes	MH	Y	N	N	Y
Harlequin duck	8.2 educate public to voluntarily restrict harvest (sport, subsist.)	L	L	M	L	L	H	M	H	L	Yes	MH	Y	N	N	Y
Sea otter	8.2 educate public to voluntarily restrict harvest (sport, subsist.)	L	L	M	L	L	H	M	H	M	No	MH	Y	N	N	Y
Marbled murrelet	9.0 Minimize incdidental take of marine birds by commercial fisherie	L	L	M	M	L	H	L	H	L	No	MH	Y	N	N	Y
Archaeology	10.0 Preserve archaeological sites/artifacts	N/A	M	H	L	L	H	H	H	M	Yes	MR	Y	Y	N	N
Cutthroat trout	11.0 Improve freshwater wild salmon spawning/rearing habitats	M	N/A	H	M	M	H	H	H	M	No	MR	Y	Y	Y	Y
Dolly varden trout	11.0 Improve freshwater wild salmon spawning/rearing habitats	M	N/A	H	M	M	H	H	H	M	No	MR	Y	Y	Y	Y
Pink salmon	11.0 Improve freshwater wild salmon spawning/rearing habitats	H	H	H	H	H	H	H	H	M	Yes	MR	Y	Y	Y	Y
Sockeye salmon	11.0 Improve freshwater wild salmon spawning/rearing habitats	H	H	H	H	M	H	H	H	H	Yes	MR	Y	Y	Y	Y
Recreation: backcountry developed	12.1 New backcountry recreation facilities	N/A	N/A	H	M	M	M	L	H	M	No	MH	N	Y	Y	Y
Recreation: backcountry developed	12.2 New commercial, (lodge, fuel facilities) recreation facilities	N/A	N/A	H	M	H	L	H	H	M	No	MH	N	N	Y	Y
Black oystercatcher	13.0 Eliminate oil from mussel beds	M	M	Unp	H	L	M	H	H	M	No	MR	Y	N	N	N
Brown bear	13.0 Eliminate oil from mussel beds	L	L	H	H	L	M	H	H	L	No	MR	Y	N	N	N
Coastal habitat: intertidal	13.0 Eliminate oil from mussel beds	M	N/A	H	H	L	M	H	H	M	Yes	MR	Y	N	N	N
Harlequin duck	13.0 Eliminate oil from mussel beds	H	H	H	H	L	M	H	H	M	Yes	MR	Y	N	N	N
River otter	13.0 Eliminate oil from mussel beds	H	H	H	H	L	M	H	H	M	Yes	MR	Y	N	N	N
Sea otter	13.0 Eliminate oil from mussel beds	H	H	H	H	L	M	H	H	H	Yes	MR	Y	N	N	N

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The Options Evaluation Database
Sorted by OPTION
October 1, 1992

The short form (without footnotes)

	ALT #1	ALT #2	ALT #3	ALT #4
Alternative: Title	Natural Recovery (No Action)[1]	Natural Recovery with Protection	Active Restoration: Emphasis on Resource Restoration	Active Restoration: Emphasis on Resource Restoration and Human Use
Explanation	o Assumes that natural resources and services will recover without human intervention. o Nothing is done beyond pre-spill management activities. o Monitoring	o Natural recovery o Protection from further degradation to injured resources and services. o Active restoration (including replacement) when an injured resource or service is not recovering. o Monitoring.	o Over the life of the settlement, use all effective techniques to address the range of injured resources. o Addresses services by addressing injuries to resources they are based upon. o In light of limited funds, schedule options according to immediate needs and most effective techniques. o Monitoring.	o Same as Alternative #3; uses effective techniques to accelerate resources' restoration but puts additional emphasis on those options that will ensure the continuity or enhancement of human use -- fishing, hunting, recreation, and subsistence -- that was interrupted by the spill. o Monitoring.
Resources: Manipulation & Replacement	None	When a resource is not recovering.	Use all effective techniques scheduled according to immediate needs and effectiveness across all injured resources.	Same as #3 except, emphasize those techniques which contribute resources that are part of the human use of the spill area.
Management of Human Use	Normal agency management.	Management to protect injured resources. Management could entail some cost to human use.	Protective management applied where it significantly accelerates recovery of a resource.	Avoid protective management that causes significant cost to human use. Do so by substituting, if possible, manipulation or replacement options.
Protection and Acquisition	None	Recommend that state and federal agencies use protective management until resources recover. Emphasis on acquiring private habitat to prevent further stresses and degradation to injured resources.	Targeted habitat acquisition as needed to ensure protection of the injured resources as they recover.	Same as Alternative #3. For differences in acquisitions between Alternatives #3 and #4, see Services.

Alternatives (cont'd)	Alt #1	Alt #2	Alt #3	Alt #4
Services: Manipulation & Human Use	Normal agency management.	None; however, incidental benefit from protection options directed at resources.	Injuries to services are addressed by addressing the injuries to the resources they are based upon.	Those options which accelerate recovery of services.
Protection & Acquisition	None	None	None	Purchases to include public recreation sites and access.
Other Special Designations Etc	None	Use special designation(s) appropriate to increased protection.		

Note: Monitoring is done in all alternatives.

[1] There is some question whether or not Alternative #1, Natural Recovery, would qualify under NEPA as a "no action" alternative. For example, some money would be spent for monitoring. If this alternative is not the "no action" alternative, another "no action" alternative will be needed. RPWG hopes that such an alternative can be avoided, because Natural Recovery/No Monitoring is an unrealistic alternative. It would be a straw-man alternative that the agencies would be unwilling to stand behind.

SHORT FORMS

DRAFT

October 12, 1992

OPTION 1 Archaeology Resource Protection

SUMMARY

Beach clean up activities resulted in increased public knowledge of exact locations of archaeological sites throughout the oil spill area. Archaeological sites and artifacts affected by looting and vandalism, directly attributable to the oil spill, is occurring at an unprecedented level. The remoteness of most sites makes traditional enforcement of archaeological protection laws difficult. A site stewardship program could establish a core of local citizens to watch over threatened archaeological sites thereby providing a significant means of resource protection.

DESCRIPTION

Site stewardship is the recruitment, training, coordination, and maintenance of a corps of local interested citizens to watch over threatened archeological sites located within their home districts. Local citizens' groups and Native Corporations will be brought into the project as cooperators to facilitate communications and operations. The Trustee Council has already begun work on this sub-option by approving a project for a Site Stewardship program in February 1992. However, to yield any beneficial results the project must be carried out over several years.

Although the Trustee Council approved a project in February 1992, it will take until the summer of 1993 before people involved in the program will be in the field carrying out their duties.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

Damage to archaeological sites and artifacts as a result of the Exxon-Valdez oil spill continues to occur as sites are looted and/or vandalized. In some locations, oil continues to seep into the sites themselves oiling artifacts and the surrounding strata. Inherently, archaeological sites and artifacts are not restorable. The site stewardship program seeks to stop the continuing damage to these resources from looting and vandalism by establishing a strong locally based deterrent to such activity.

Damage assessment studies indicate that looting and vandalism has occurred at 19 of 35 sites studied so far and that it is suspected to have occurred at an additional 16 sites. This suggests that 34 of 35 sites studied throughout the oil spill area have suffered losses from looting and vandalism. The use of local people, who volunteer their services, is believed to be a very practical method to accomplish the stated goals. It is expected to take several years to fully accomplish option goals.

INDIRECT EFFECTS

Socio-economic

People will see that the state and federal governments are dealing directly with the looting and vandalism problem associated with archaeologic sites in the oil spill area. Further, they will learn that they can participate directly in restoration if they are interested in seeking out this opportunity. The site stewardship volunteers will become more knowledgeable of Alaska's past and are likely to share their experience and knowledge with others in their communities. Volunteers may receive small cash payments for expenditures associated their volunteer duties. The addition of cash in small communities may benefit some local businesses.

Human health and safety

People participating in this program may be subject to risks associated with travel in boats and small aircraft.

OTHER INFORMATION

CITATIONS

* An Evaluation of Archaeological Injury Documentation Exxon-Valdez Oil Spill, M. Jesperson and K. Griffin, May 14, 1992, Alaska Office of History and Archaeology and the National Park Service

* Restoration Framework, Exxon-Valdez Oil Spill Trustees, April 1992.

* "Archaeological Resource Protection - 1992 Restoration Project Proposal, C. Holmes and S. Morton, Alaska Office of History and Archaeology and the National Park Service

* personal communication, Cordell Roy, 257-2526

* personal communication, Susan Morton, 257-2559

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DRAFT

October 9, 1992 Authors: Ken Chalk/Chris S.

OPTION 2: Increase Fisheries Management

INJURED RESOURCES AND SERVICES: Pink salmon, sockeye salmon, herring, rockfish, Dolly Varden, cutthroat trout, and the resources and services which depend on these species were injured by the spill.

SUMMARY

More refined fisheries management could speed the natural recovery of injured stocks by restricting existing fisheries or redirecting them to alternative sites, while attempting to minimize impacts on human uses. However, successful management depends on the ability to control stock-specific exploitation rates. Restoration based on stock-specific management requires additional data on stock characteristics such as age and size composition, natural mortality rates, seasonal movements, stock abundance and recruitment. Separation of discrete stocks through genetics research and other studies is also needed. Based on the data, the Alaska Department of Fish and Game will make management recommendations to the Board of Fisheries, which has the power to implement them in the form of new fishing regulations. Costs involved with this option are variable. Data acquisition and plan implementation would take about two years.

Steps involved in implementation include:

- Acquire necessary biological data on population structure and dynamics, seasonal movements and stock separation for injured species.
- Develop a management plan based on this data that addresses specific restoration actions through redirection or restriction of harvests.
- Make specific recommendations to the Board of Fisheries for regulations on harvest quotas, seasons, gear types, harvest area closures, etc. to accomplish management objectives.
- When necessary, implement emergency closures to accomplish management objectives.
- Monitor and evaluate the effectiveness of management plans in achieving targeted harvest rates and population levels of injured species.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

There are considerable fishing pressures on injured stocks throughout the spill area. For instance, commercial fisheries are often mixed-stock fisheries that harvest both injured and healthy

stocks. If fisheries can be redirected through intensified management and selectively target only healthy stocks, injured stocks will have a better chance of recovery.

Reducing human use of injured stocks is an effective restoration option that can greatly facilitate natural recovery of injured populations and the fisheries dependent on them. When specific stocks have been identified and the health of these stocks determined, commercial, sport and subsistence fishing pressure will be directed away from injured stocks and toward healthy stocks or harvests will be temporarily closed. Management actions will attempt to minimize negative impacts on human uses.

INDIRECT EFFECTS

There could be socio-economic impacts to commercial, sport and subsistence fishermen if areas are closed to protect injured stocks or opened in locations not previously fished.

There could be adverse effects on rockfish populations depending on the methods used to gather baseline information and monitoring of restoration efforts. Non-destructive sampling methods should be used wherever possible.

October 9, 1992

OPTION 4: Through regulations, establish or expand protective buffer zones to reduce disturbance at marine mammal haul-out sites and rubbing beaches and at breeding colonies of marine birds.

INJURED RESOURCES AND SERVICES Common and thick-billed murres, sea otters, harbor seals and killer whales.

DESCRIPTION

Human disturbance can adversely affect the fitness and reproductive success of marine birds and mammals. Species that gather in large numbers and traditionally make use of small, discrete sites are especially vulnerable. Disturbance at these important habitats can result in increased mortality of offspring or reduced health of adults. Existing management capabilities at important habitat sites are not always adequate to provide the extra protection from disturbance that is needed to help injured species recover. This option considers establishing buffer zones as special designation areas around important marine bird and marine mammal habitats.

Buffer zones can vary considerably between specific sites and are designed to meet the needs of each location. Most existing buffer zones encircle areas used by the species for reproducing or for resting during periods of physiological stress (i.e. harbor seal haul-out sites during molting). Restrictions within buffer zones can range from limiting the speed of boat traffic within a couple hundred feet of a specific site for a short time each year, to prohibiting boat or air traffic within a half mile or mile of the location.

Implementation of this option is likely to take 2 to 3 years depending on the information that is available. The effects of disturbance on marine mammals and on murre breeding colonies have been documented outside of the oil spill area; however, the current level of disturbance at many of the important sites within the oil spill area have not been assessed. This information will be needed in order to determine if establishing buffer zones is necessary at any given location. It will also define what level of protection needs to be established to protect an area.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

Human disturbance creates different problems for different species of marine birds and mammals. For common murres, loud noise can cause the adults to flush from the breeding ledges, kicking eggs off the cliffs and leaving eggs and young exposed to predators. The lower density and asynchronous nesting at the colonies within the oil-spill area already make the eggs and young more vulnerable

to predation than prior to the oil spill. Modifying boat traffic around these colonies may reduce additional disturbance factors.

Haul-out sites are especially important for harbor seals. Rocks, isolated beaches, protective cliffs and sand/mud bars are used for resting, pupping and nursing young. Pair-bonds between females and their new pups can be weakened when the females are disturbed from the haul-out site, this can lead to the abandonment and death of the pups. Pups are sometimes crushed when the adults are forced to stampede into the water. Harbor seals rely on haul-out sites for resting during the molt. Protective measures for harbor seals should extend from mid-May to September to cover pupping and molting periods.

The importance of haul-out sites for sea otters is less understood. It is believed that haul-out sites may be important for sea otters in northern climates because of the colder water temperatures. The importance of beach rubbing by killer whales is also poorly understood but it may be associated with removal of parasites, resting and socialization. For both of these species it is reasonable to assume that haul-out sites or rubbing beaches in some way help maintain the health of the animals and therefore affects their ability to reproduce. However, the irregular haul-out pattern of sea otters make chronic problems of human disturbance less likely than for harbor seals.

INDIRECT EFFECTS

Creating buffer zones would also provide protection for other non-target species which utilize the areas. Ultimately, the buffer zones would provide a long-term gain in wildlife viewing opportunities as the populations approach their pre-spill population levels.

The effects on human use of the area would depend on the level of restrictions needed to reduce disturbance. The less stringent regulations could require tour- or charter-boat companies to change their use patterns for part of the year, but would not prohibit access. The most restrictive buffer zones could prevent access to a favorite viewing or fishing location and should only be applied in critical situations.

DRAFT

OPTION 8A Restrict or eliminate legal harvest of marine and terrestrial mammals and sea ducks.

INJURED RESOURCES AND SERVICES Sea Otter, Harbor Seal, Brown Bear, River Otter, and Harlequins and other seaducks.

SUMMARY

Brown bears forage seasonally in the intertidal and supratidal areas of the Alaska Peninsula and the Kodiak Archipelago. Preliminary analysis showed that some bears were exposed to petroleum hydrocarbons. A few river otter carcasses were found by oil spill clean-up workers and preliminary analysis indicate that petroleum hydrocarbons are being accumulated by this species. Harbor seals and sea otters were both substantially impacted by the oil spill. Studies indicate that sea otters continue to suffer long-term effects from exposure to petroleum hydrocarbons. Seaducks, especially Harlequin Duck, were substantially impacted by the oil spill. Surveys indicate harlequin population declines and a near total reproductive failure in oiled areas of Prince William Sound.

Suboption A discusses temporary restriction or closure of harvest of the injured species on the oil-spill area which would require recommendations from the Trustee Council to the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service to initiate changes in the sport and subsistence harvest regulations. Suboption B discusses an education program which would encourage voluntary reductions in subsistence harvest.

SUBOPTION A Temporarily restrict or close harvests of injured species in the oil-spill area.

TARGET RESOURCES AND SERVICES

Sea Otter, Harbor Seal, Brown Bear, River Otter, and Harlequins and other seaducks.

DESCRIPTION

Trustees would recommend that the Fish and Wildlife Service reduce subsistence harvest of marine mammals and harlequin ducks on Federal lands in the spill zone. Trustees would recommend that the Alaska State Board of Game reduce or close sport hunting of brown bear in the spill zone. Trustees would also recommend that sport and subsistence bag limits on harlequin duck be reduced, season closed entirely, or season limited to such time when migrants and wintering ducks are present in the spill zone. Trustees would recommend that trapping of river otters be adjusted to limit to subsistence use only, reduced bag limits for commercial trappers, or reduction and/or closure to both subsistence and commercial trappers.

Harvest regulations are created by the Alaska Department of Fish and Game, Board of Game. The Board meets twice a year, in the spring and in the fall. Proposals for regulation changes may be submitted to the Board for review during the bi-annual meetings. 60-day public notices are required for any proposed regulation changes. An "emergency order" is the quickest way to change a harvest regulation. Emergency orders can be issued by the Alaska Department of Fish and Game within 24-48 hours and are effective for 120 days.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

Reduction in harvest of injured species would mean a greater opportunity for the spill zone populations to reproduce and increase their numbers by eliminating additional mortality.

Brown bears forage seasonally in the intertidal and supratidal areas of the Alaska Peninsula and the Kodiak Archipelago. Preliminary analysis showed that some bears were exposed to petroleum hydrocarbons. It is not known what impacts the oil spill will have on brown bear populations. If populations are substantially affected by exposure to petroleum hydrocarbons, then restrictions on sport harvest could potentially improve recovery by reducing or eliminating a source of mortality.

A few river otter carcasses were found by oil spill clean-up workers and preliminary analysis indicate that petroleum hydrocarbons are being accumulated by this species. Populations in western Prince William Sound were impacted by the oil spill but the extent of the impacts are not yet clear. River otters are trapped throughout western Prince William Sound. Restrictions on trapping could potentially improve recovery of the species by eliminating a source of mortality.

Harbor seals and sea otters were both substantially impacted by the oil spill. Studies indicate that sea otters continue to suffer long-term affects from exposure to petroleum hydrocarbons. Although these marine mammals are protected by the Marine Mammal Protection Act, an exemption for Alaska Natives allows take for subsistence. It is not known how much subsistence harvest of marine mammals occurs within Prince William Sound, but sea otters are harvested for subsistence purposes around Kodiak Island. The Marine Mammal Protection Act protects the harvest of marine mammals for subsistence purposes unless the harvest is accomplished in a wasteful manner, or unless the population is determined to be depleted. Although regional population levels for sea otters likely were affected as a result of the spill, a determination of depletion of the species or stock would be extremely difficult. Because of the provisions of the Act, stock depletion would likely be considered on a state-wide basis rather than a regional basis, making the impacts to the sea otters in the oil spill area relatively insignificant. However, harbor seal populations throughout the state are in a serious decline. Although determining the contribution of the oil spill to stock or

population depletion would not be possible, it may be that other factors would be considered in making the determination.

Seaducks, especially Harlequin Duck, were substantially impacted by the oil spill. Surveys indicate harlequin population declines and a near total reproductive failure in oiled areas of Prince William Sound. It is not known how many ducks are harvested by sport hunters in Prince William Sound because the harvest figure is reported for all of Southcentral Alaska. It is said that the harvest is small. However, a harvest in September would take almost exclusively resident birds because migrants have not yet arrived from breeding grounds further north. A delayed harvest in Prince William Sound could potentially improve recovery of the resident Harlequin Duck by eliminating a source of mortality during a time when only resident birds are present.

INDIRECT EFFECTS

Sport hunters would be indirectly impacted by closure or restriction of duck and bear hunting seasons in the oil spill zone. Subsistence users may be impacted if subsistence regulations close the season or implement a reduced harvest. However, if voluntary reduction in harvest is encouraged, should need prevail, subsistence users would not be barred from taking the resource. It is not known to what extent trapping occurs, or how many people would be affected should trapping of river otters be restricted.

OTHER INFORMATION

This option seeks both to restore injured species and the injured services which they provide, as described in the Memorandum of Agreement to the civil settlement. No permits should need to be obtained to implement any action in this suboption. These activities are generally categorically excluded from a detailed NEPA process.

Alaska Department of Fish and Game manages hunting/trapping levels of brown bears, river otters and harlequin ducks and monitors the harbor seal populations. NOAA/NMFS would be involved with marine based programs related to harbor seals. USFWS has management responsibilities for sea otters. The primary agencies with land management responsibilities within the oil-spill area include DNR, NPS, USFS, and USFWS.

CITATIONS

Information on harvest provided by Roy Nowlin, Cordova Area Biologist; 424-3215.

Information on harvest regulations provided by Jim Lieb, Dept. of Wildlife Conservation, 267-2261.

October 12, 1992

SUBOPTION 8B Encourage voluntary reductions of subsistence, commercial and sport harvest levels

TARGET RESOURCES AND SERVICES Sea otter, harbor seal, brown bear river otter and harlequin duck

DESCRIPTION

Many subsistence users within the spill area have voluntarily reduced their take of marine mammals in an effort to help the recovery of sea otters and harbor seals. Providing information on the status of the populations and on the value of the reduced take, may encourage more people to reduce their harvest levels until the populations can better sustain the additional loss. This suboption focuses primarily on subsistence users since pure education programs are less likely to succeed in influencing hunters and trappers. However, hunters and trappers could be better informed of legal restrictions which guide the harvest of brown bears, river otters and harlequin ducks in areas that have depleted populations and in nearby areas that could provide animals for natural recolonization.

Development of an education/interpretive plan should take about a year to complete but could vary depending on the type of media selected. Similar education-information programs implemented in other parts of the country and Canada, continue for several years. For the Exxon-Valdez oil spill area the program should continue until the subsistence users and researchers believe the targeted population could sustain an increased harvest.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

Because of the requirements of the litigation process many subsistence users of the oil-spill area are unaware of the extent of the injuries on the species they hunt. Many of these users would be willing to change their use patterns if they were convinced of the need to reduce further impacts on specific resources. Providing information on especially sensitive areas would help users decide if their activities might slow the recovery of the harvested population. Likewise, it will be necessary to provide current information on the recovery of specific resources so that subsistence activities can return to their pre-spill status at the earliest date.

Subsistence use of sea otters is believed to be relatively low (less than 50?) in the oil spill area since these animals are rarely used for food. The subsistence harvest of harbor seals varies tremendously throughout the oil spill area. Tatitlek villagers may harvest several hundred seals for food each year

while other villages such as English Bay may harvest less than 20 per year (ADF&G Subsistence Division census data).

Subsistence use of harbor seals has decreased somewhat since the oil spill. This is believed to be partially due to concerns over the safety of the meat, as well as concern about the seal population.

INDIRECT EFFECTS

Indirect environmental effects could include a more rapid recovery of injured species (through lessened disturbance). Potentially, subsistence activity could shift to different species which would experience higher than normal harvest levels. Greater awareness of subsistence users of the health of the harvested population would help to ensure the long-term health of the population.

Indirect socio-economic effects would include a reduced opportunity for village residents to carry out a tradional activity. Although this impact would be voluntary and could be short termed, habits changed as a result of decreased subsistence activities could be long lasting. However, this program could lead to placing a higher value on these traditional activities that may translate into a greater significance for the users.

Providing updates on the recovery of species used for subsistence could ensure that people can return to the pre-spill subsistence harvests without concern about their impacts to the harvested population (i.e. once they know that the populations can sustain the traditional harvest).

Other indirect effects would include a long-term gain in viewing opportunities for tourists as the numbers of fish and wildlife approach their pre-spill population levels.

Effects on human health and safety could cause negative effects on some residents by causing a change in diet away from customary foods. This is more likely to be a problem for elderly residents.

OTHER INFORMATION

Subsistence use within the oil spill area is managed by the Federal government on Federal lands and the Alaska Department of Fish and Game on state and private lands. Subsistence regulations do not include designated harvest levels for sea otters and harbor seals in the oil-spill area. Changing the harvest levels for these species would require declaring the populations as "depleted" under the Marine Mammal Protection Act.

October 9, 1992

OPTION 9 Minimize incidental take of marine birds by commercial fisheries

INJURED RESOURCES AND SERVICES Marine birds including common murres, marbled murrelets and other marine birds

SUMMARY

Entanglement of marine birds in gillnets deployed in high seas and coastal fisheries in the North Pacific is a recognized conservation problem. Within and adjacent to the area affected by the Exxon Valdez oil spill, there are several coastal gillnet fisheries for salmon, including the Prince William Sound drift and setnet, Cook Inlet drift and setnet, and Kodiak setnet fisheries. Under this option, the extent of marine bird mortality in these fisheries would be examined. If this mortality is found to represent a significant source of mortality for marine bird populations in the spill area, an effort to develop new technologies or strategies for reducing encounters between marine birds and gillnets would be made.

DESCRIPTION

Mortality of marine birds in North Pacific high seas gillnet fisheries has been relatively well-studied through observer programs. Mortality of marine birds in coastal gillnet fisheries has been less well studied, and only a few studies of mortality in North Pacific coastal fisheries have been conducted.

Studies have documented mortality to common murres and marbled murrelets due to entanglement in gillnets particularly in California and British Columbia. Within Alaska, the only studies of marine bird entanglement and marine bird mortality in the Exxon Valdez spill area are those carried out for the National Marine Fisheries Service. The studied fisheries included the Prince William Sound drift and setnet fisheries and the Alaska Peninsula drift fishery. In both 1990 and 1991, observers found that only a small percentage of birds that came within 10 m of driftnets became entangled; almost no birds became entangled in setnets. The majority of birds that became entangled in driftnets, however, died. Murres and murrelets were the most frequently entangled and killed species. Extrapolating based on estimated fishing effort, it is estimated that over 460 common murres and about 300 marbled murrelets died due to entanglement in Prince William Sound driftnets in 1991.

The significance of this level of mortality to the common murre and marbled murrelet populations of Prince William Sound is unknown. Common murres and marbled murrelets, however, were two

marine bird species that the subject to injury from the Exxon Valdez oil spill.

To implement this option, a number of steps would have to be taken: (1) research and document the extent of marine bird mortality in coastal gillnet fisheries in the area affected by Exxon Valdez oil spill; (2) research new technologies or strategies for reducing encounters between marine birds and gillnets; and (3) incorporate relevant methodologies and strategies to reduce encounters between marine birds and gillnets into State of Alaska fishery management plans until populations recover.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

This option could facilitate recovery of marine bird species whose populations were reduced by the Exxon Valdez oil spill by reducing a ongoing source of mortality and reducing the time needed for injured marine bird populations to return to pre-spill levels. However, determining the potential effect of this option on injured resources is difficult because the extent of marine bird mortality due to gillnet entanglement has not been determined.

This option is technically feasible. It generally follows the approach used in addressing other fishery-bycatch problems. This approach involves study of the problem followed by management actions aimed at reducing bycatch. In most cases, the action that has been taken is closure of the fishery, but technical solutions are also possible. A variety of techniques could be examined including: experiments with nets that are suspended one, two and three meters below the surface; removing the lower portion of the nets; temporary seasonal and area closures; and elimination of night fishing. In addition, a management plan directing fishing pressure away from injured marine bird habitats may be an effective restoration option.

Although this approach suggested here is technically feasible, the importance of political considerations must be recognized. No changes in fishing practices are possible until a significant problem has been demonstrated which raises the concern of the public and politicians. The observer program that has operated in the Prince William Sound gillnet fisheries during the past two years was mandated by Congress, which is a sign of the level of concern about the problem of marine mammal entanglement. Although Congress has shown some interest in the entanglement of marine birds in high seas fisheries, Congress has not, as yet, expressed significant interest in the mortality of marine birds in coastal fisheries. Without such high level political support for changes to reduce mortality of marine birds, the possibility of such changes is doubtful.

INDIRECT EFFECTS

The indirect effects of implementing this option could include:

- changes in the efficiency of coastal gillnet fisheries;
- closure of coastal gillnet fisheries;
- reductions in economic viability of coastal gillnet fisheries, which could have economic and social effects on communities such as Cordova, Valdez, Homer, and Kodiak;
- changes in the incidental bycatch of marine mammals.

October 9, 1992

SUBOPTION 9 B **Encourage voluntary reductions of subsistence, commercial and sport harvest levels**

TARGET RESOURCES AND SERVICES Sea otter, harbor seal, brown bear river otter and harlequin duck

DESCRIPTION

Many subsistence users within the spill area have voluntarily reduced their take of marine mammals in an effort to help the recovery of sea otters and harbor seals. Providing information on the status of the populations and on the value of the reduced take, may encourage more people to reduce their harvest levels until the populations can better sustain the additional loss. This suboption focuses primarily on subsistence users since pure education programs are less likely to succeed in influencing hunters and trappers. However, hunters and trappers could be better informed of legal restrictions which guide the harvest of brown bears, river otters and harlequin ducks in areas that have depleted populations and in nearby areas that could provide animals for natural recolonization.

Development of an education/interpretive plan should take about a year to complete but could vary depending on the type of media selected. Similar education-information programs implemented in other parts of the country and Canada, continue for several years. For the Exxon-Valdez oil spill area the program should continue until the subsistence users and researchers believe the targeted population could sustain an increased harvest.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

Because of the requirements of the litigation process many subsistence users of the oil-spill area are unaware of the extent of the injuries on the species they hunt. Many of these users would be willing to change their use patterns if they were convinced of the need to reduce further impacts on specific resources. Providing information on especially sensitive areas would help users decide if their activities might slow the recovery of the harvested population. Likewise, it will be necessary to provide current information on the recovery of specific resources so that subsistence activities can return to their pre-spill status at the earliest date.

Subsistence use of sea otters is believed to be relatively low (less than 50?) in the oil spill area since these animals are rarely used for food. The subsistence harvest of harbor seals varies tremendously throughout the oil spill area. Tatitlek villagers may harvest several hundred seals for food each year

while other villages such as English Bay may harvest less than 20 per year (ADF&G Subsistence Division census data).

Subsistence use of harbor seals has decreased somewhat since the oil spill. This is believed to be partially due to concerns over the safety of the meat, as well as concern about the seal population.

INDIRECT EFFECTS

Indirect environmental effects could include a more rapid recovery of injured species (through lessened disturbance). Potentially, subsistence activity could shift to different species which would experience higher than normal harvest levels. Greater awareness of subsistence users of the health of the harvested population would help to ensure the long-term health of the population.

Indirect socio-economic effects would include a reduced opportunity for village residents to carry out a tradional activity. Although this impact would be voluntary and could be short termed, habits changed as a result of decreased subsistence activities could be long lasting. However, this program could lead to placing a higher value on these traditional activities that may translate into a greater significance for the users.

Providing updates on the recovery of species used for subsistence could ensure that people can return to the pre-spill subsistence harvests without concern about their impacts to the harvested population (i.e. once they know that the populations can sustain the traditional harvest).

Other indirect effects would include a long-term gain in viewing opportunities for tourists as the numbers of fish and wildlife approach their pre-spill population levels.

Effects on human health and safety could cause negative effects on some residents by causing a change in diet away from customary foods. This is more likely to be a problem for elderly residents.

OTHER INFORMATION

Subsistence use within the oil spill area is managed by the Federal government on Federal lands and the Alaska Department of Fish and Game on state and private lands. Subsistence regulations do not include designated harvest levels for sea otters and harbor seals in the oil-spill area. Changing the harvest levels for these species would require declaring the populations as "depleted" under the Marine Mammal Protection Act.

DRAFT

October 12, 1992

OPTION

#10 Preservation of archaeological sites and artifacts

INJURED RESOURCES AND SERVICES

Archaeological sites and artifacts

SUMMARY

Conservative estimates based on injury studies to date suggest that between 300 and 500 archeological sites located on State and Federal land within the Exxon Valdez oil spill pathway sustained at least some degree of injury from oiling, oil spill cleanup activities, or vandalism. Site-specific injury is documented in oil spill response records for a sample of 35 known sites. Types of injury range from the contamination of radiocarbon dating specimens to the illegal excavation of sites by looters. In a few cases, there is sufficient available information to determine if specific restoration measures are necessary to the continued preservation of the site values, and if so, which restorative activities are appropriate to the need. However, in many cases the injury data available from response records is not sufficiently detailed to reach an informed decision on treatment. If the Archeological Resource Protection ACT (ARPA) regulations are employed as a guide, individual, detailed assessments of injury are a first essential step in the restoration process. Once there is sufficient information, two basic categories of restorative treatment may be considered, physical repair or data recovery.

These two types of restorative treatment are not mutually exclusive and they are often employed in conjunction with each other. Physical repair includes such actions as restoring trampled protective vegetation at a site or filling in a looter's pothole. Data recovery is used to recover what bits of information can be salvaged from the area of an illegal excavation--in a sense, restoring to the public what information has been potentially lost by means of scientific investigations.

DESCRIPTION

The purpose of this option is two-fold, first, to conduct individual, site-specific restoration assessments at sites with documented injury, but where there is insufficient information upon which to determine appropriate treatment. Second, is to carry out the indicated restorative action--either physical repair and/or data recovery. The initial focus would include the 35 archeological sites for which there is clear evidence of injury. The results would include the prevention of further injury and professional documentation on the restorative actions taken.

Three years would be sufficient time to treat the 35 known sites with detailed injury information. Project length could be extended to address any additional injured sites that come to light in the next several years. An exact time span cannot be estimated at this time given the available information.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

Since archaeology artifacts can not, in a biological sense recover from injury or looting, recovery will not be aided. However, this option has the potential to significantly reduce further degradation or decline of the resources and services associated with archaeological sites and artifacts.

INDIRECT EFFECTS

Socio-economic

People will see that the state and federal governments are dealing directly with the looting and vandalism problem associated with archaeologic sites in the oil spill area.

Archaeologists will spend considerable time, in the field to accomplish this work. With some certainty, they will spend funds in near by communities for needed supplies and services, thereby indirectly benefitting local economies in a modest way.

Human health and safety

People participating in this program may be subject to risks associated with travel in boats and small aircraft.

CITATIONS

* Ted Birkedal, NPS, Chief of Cultural Resources 257-2657

* "Site-Specific Archeological Restoration (Interagency)", June 1992, EVOS Trustee Council Restoration Ideas (1993)

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DRAFT

OPTION 11: Improve or supplement stream and lake habitats for spawning and rearing of wild salmonids.

INJURED RESOURCES AND SERVICES: Pink and sockeye salmon

SUMMARY

There are a variety of well-established techniques for improving or supplementing spawning and rearing habitats to restore and enhance the wild salmon populations. These include construction of spawning channels and fish passes, removal of barriers impeding access to spawning habitats, and addition of woody debris to provide cover and food for fish. A survey of the oil-spill impact area will be conducted to determine where mitigation will be required. This information will be used to scale the effort applied to improving or replacing spawning habitat.

Unlike pink and chum salmon which swim to sea in their first year, young sockeye salmon grow in lakes for 1-3 years before emigrating to sea. Appropriate restoration and enhancement techniques for sockeye salmon are determined by the amount of spawning and rearing habitat in the lake system. If possible, these two habitat characteristics should be balanced. In lake systems with inadequate spawning habitat, spawning channels or fish passes may be appropriate to increase the amount of available spawning habitat. In lake systems with damaged rearing habitat, chemical fertilizers may be added to temporarily supplement the nutrients needed to sustain the prey on which fry feed. Once the run is restored, the decomposition of salmon carcasses provides a natural source of nutrients to sustain the food chain.

SUBOPTION A Supplement fry production using such methods as egg boxes and net pens for fry rearing.

DESCRIPTION

This restoration technique includes construction of egg boxes adjacent to damaged wild stock spawning streams or nearby streams. Artificial spawning techniques will be used to fertilize eggs taken from wild salmon. Fertilized eggs will be placed in the egg boxes. Fry will outmigrate from the boxes on their own in the spring.

This restoration technique also includes rearing fry in net pens and releasing fry when conditions in the natural environment are favorable for survival. In addition, 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 the information fishery managers need to direct exploitation away from damaged stocks.

Time needed to implement Suboption A at five sites is six years:

Survey area to identify sites for egg boxes:
July 1993-August 1994.
Capture outmigrant fry and rear in net pens:
April 1993-June 1998.
Construct egg boxes and conduct first egg take:
June 1994-August 1994.
Conduct annual egg takes:
June 1995-August 1998.
Recovery monitoring: Begins June 1994.

Costs of implementing Suboption A at five sites is estimated at $2.5M.

SUBOPTION B **Improve access to spawning areas (e.g., fish passes, remove instream barriers).**

DESCRIPTION

This restoration technique involves constructing fish passes to provide wild salmon access to spawning habitat to replace damaged habitat. A survey of potential fish pass sites will be conducted to determine the best sites for fish pass construction. The genetic stock affected and benefit-cost ratio will be the principal criteria used to evaluate potential fish pass sites. Access to unutilized spawning habitat can also be achieved by removing instream barriers such a log jams.

Time needed to implement Suboption B at five sites is five years:

Survey areas to location mitigation sites:
June 1993-October 1994.
Construct instream structures:
February 1995-October 1996.
Recovery monitoring: Begins June 1997.

Costs to implement Suboption B at five sites is estimated at $1.3M.

SUBOPTION C **Improve spawning and rearing habitat (e.g., create spawning channels, add woody debris, improve substrate, lake fertilization, reduce siltation rates).**

DESCRIPTION

This restoration technique involves construction of spawning channels to create new spawning habitat to replace damaged habitat. A survey of the oil-spill impact area will be conducted to determine the most appropriate locations for spawning channels. Channels will be designed specifically for the cold climate in this

area to insure high egg-to-fry survival. Fertilization may be appropriate to restore sockeye salmon producing lakes that have been damaged by overescapement or over-exploitation. In systems damaged by overescapement, the resident zooplankton stocks that provide the food base for sockeye salmon fry have been reduced through over-grazing. In systems that have been damaged by over-exploitation, sockeye salmon fry may have been replaced in the lake ecosystem by competitor species or decreased nutrient input by salmon carcasses may have reduced lake productivity. In either case, addition of chemical fertilizers will restore the natural productivity of the lake ecosystem and its capacity to rear sockeye salmon fry.

Time to implement Suboption C on two drainages is seven years:

Apply fertilizer annually and monitor ecosystem effect:
June 1993-October 1998
Recovery monitoring: Begins June 1995

Costs of implementing Suboption C on two drainages is estimated at $4.8M.

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. Wild pink salmon populations are expected to increase because of the greater spawning areas and increased spawning capacity following improvements. The egg-to-fry survival of salmon in spawning channels is 5 to 6 times greater than survival in unimproved streams. Lake fertilization will greatly improve over-winter survival and smolt-to-adult survival, because the fish are larger in the fall and at outmigration into the ocean. Increased stock productivity and adult returns will result from these restoration techniques.

Monitoring of recovery will be an important part of each of the above improvement efforts. Recovery monitoring, whether by natural means or through specific restoration actions, will generally depend on the severity of injury, the capacity of injured resources or services to recover, and the time necessary to establish a trend for recovery.

INDIRECT EFFECTS

Other species directly depend on salmon runs for their survival. Bears, otters and birds will benefit from this project because returns of wild stocks would be nearer normal levels

There will be socio-economic impacts to commercial, sport and subsistence users of all of these resources when certain areas are closed to protect injured stocks or opened in areas not previously fished when management plans for sockeye are developed and implemented (Option 2 and 3). The potential of such impacts will be discussed and evaluated in the Environmental Impact Statement to be prepared by the Trustees.

Human health and safety issues will increase when population baseline acquisition activities begin. Field activities will increase from their present level and continue until the populations recovery to pre-spill levels. Field investigators will be required to work on the water, travel to and from remote work sites by boat, helicopter or float plane. These risks, however, are considered to be minimal.

Other fisheries resources such as cutthroat trout, Dolly Varden, and coho salmon will benefit from these actions.

OPTION 12: Creation of new recreation sites and facilities through replacement or construction

INJURED RESOURCES AND SERVICES: Recreation

SUMMARY

The area impacted by the Exxon Valdez Oil Spill contains an assemblage of private, State of Alaska and federal lands that provide recreational services to the public. The public lands include the Chugach National Forest, National Monuments, National Parks, National Wildlife Refuges, and several Alaska State Parks. These lands are in Prince William Sound, on the Kenai Peninsula, Alaska Peninsula and Kodiak Island. A full range of private and commercial backcountry oriented recreation activity occurs in these areas, supported by facilities like mooring buoys, boat ramps, recreational-user cabins, camping sites and trails.

Developed commercial recreation sites do not exist. This service is provided by communities within the spill area such as Cordova, Whittier, Seward, and Kodiak. Commercial services include fly-in and boat-in related activites,s well as cruise lines.

Suboptions A and B are consistent with the terms of the settlement aimed at restoring natural resources and replacing or enhancing services within the spill area.

SUBOPTION A: Construct or rehabilitate backcountry structures and services to enhance user experiences

DESCRIPTION:

As was evidenced during the evaluation of injury to resources and services on federal and state lands, recreation services within the National Forest System, the National Park System and the National Wildlife Refuge System, and the Alaska State Marine Park system were impacted by the EVOS. There is a management concern that actual recreation visitor use of lands and facilities declined after the spill and throughout intensive cleanup efforts. Visitors may perceive their destinations differently after the spill and may have changed use patterns.

It is important for both Federal and State agencies, and concerned citizens to have information on the type and degree of injury suffered by individual units, as well as effects perceptions of injury may be having (have had) on users of recreation units and sites within the oiled area. The full impact to recreation activities and opportunities needs to be determined by the management agencies and damage assessment personnel. Dissemination of tnjury information to affected parties would be a subsequent step. The following four steps would provide the information and focus for backcountry use restoration and enhancement:

1. Additional Injury Assessment

2. Information resources with photos and synopses of oil spill related impacts

3. Recreation opportunity guide

4. New sites and activities to enhance recreation

To focus this information and devolop a responsive restoration plan these general processes are appropriate. As an interagency activity, with public participation; a. define the types and location of facilities and sites within the oil spill area, b. establish priorities for implementation of facility and site development plans, c. complete necessary permit and environmental compliance, and d. implement.

Development of an education/recreation opportunity guide should take about one year. Interagency activities may take longer.

Construction activities normally take 3 to 4 years from concept and design to a completed structure. Continuity of funding is required during this period to complete a facility in an efficient, cost-effective manner.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

Management and development enhancing the visitors' backcountry experience is the focus of this restoration activity. Recovery will be effected by the development of resources equivalent to those injured in the spill. User information and site development will enhance pre-spill recreation opportunities. Providing backcountry opportunities which develop the vision of a pristine water and land environment will take time.

Visitors are attracted to areas when facilities are available for their use and enjoyment. Managers can better attend to the needs and demands of visitors when they have some control over their activities and the locations of those activities. New and/or rehabilitated sites and facilities can provide managers a focus for implementation of their information and education programs.

INDIRECT EFFECTS

Environmental: It is perceived that the activities associated with site enhancement and rehabilitation will potentially add to the injury, or the perception of injury, that already occurred in the area. It is also an expressed concern that better sites and facilities will draw more people into the area, localizing their impacts, possibly distracting from the perceived pristine nature of the area.

Socio-economic: Managers will provide a socially valuable service through backcountry site and facility enhancement and information management. It is certain that the development activity, whether it be rehabilitation, enhancement or replacement of sites and facilities, will increase the economic activity within the spill area.

Human health and safety: Restored, rehabilitated, enhanced and newly constructed sites and areas would focus human activity. This would focus agency management. Appropriate visitor information services at these sites and areas provides recreationists with information and services needed to enjoy the surroundings in a safe and environmentally sound manner.

OTHER INFORMATION

Both Federal and State managers have long-term plans for management and enhancement of resources within their jurisdiction. The oil spill event changed types of projects needed and the priorities for their implementation. All site reconstruction and enhancement as well as information development and distribution will necessarily fit into management plans for National Parks and Monuments, Wildlife Refuges, National Forests and State Parks. Projects which will respond to restoration needs, but are outside currently approved plans, and which are a high priority for the manager would likely be adopted and implemented through agency plan amendment procedures.

* * *

SUBOPTION 12B: Construction of commercial recreation facilities

DESCRIPTION

FEDERAL: Permiting opportunities exist for the development of commercial recreation sites and facilities within the oil spill area. Typical development such as lodges, fuel depots, and multi-unit campgrounds are not present on public land, but can be developed by entepreneurs under permit from federal agencies. These facilities would enhance existing recreation opportunities. Current recreation management activities of the federal agencies within Prince William Sound and along the Kenai and Alaskan Peninsulas would change commensurate with the type, location and number of commercial sites permitted and constructed.

STATE: Several units of the ALaska State Marine Park system in Western Prince William Sound were directly impacted by the Oil Spill. These recreation sites offer opportunities for development of large scale and commercial facilities. Plannign efforts would determine the utility of these opportunities.

It is important for both the Federal and State agencies to have information on the type and degree of injury suffered by individual units, as well as effects perceptions of injury may be having (have had) on users of

recreation units and sites within the oiled area. Using this information and the desires of potential commercial operators, recreation activities, opportunities and development needs will be determined.

Additionally commercial sites would provide an information outlet. Appropriately focused information sources could provide a significant service to all types of recreationists. The sites would also be used for interpretive opportunities.

Site development would follow planning procedures similar to those for dispersed backcountry site with greater attention given to social and environmental impacts of implementation. Commercial site development would take 1 to 2 years for an in-depth assessment of environmental impacts. Design, development and construction takes 2 to 4 years. Staged construction lengthens the time sites are disturbed.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

User information and facility development will enhance pre-spill recreation opportunities. Commercial recreation opportunities would be expanded over what they were pre-spill. Information enhancement will be effected by distribution within the damaged area for a hands-on and look-see assessment by the individual persons. Providing facilities and education on environmental awareness will enhance both the manager's capabilities and public knowledge for a common goal of sustained, sensitive, high-quality interaction with the environment.

As described above all activities under this option may be implemented under existing laws and regulations. Management decisions will be needed to implement actions. These actions on federal land will need an environmental analysis and appropriate documentation. Permits of various kinds from both federal and state agencies may be required for any singular or group of activities.

Both Federal and State managers have long-term plans for management and enhancement of resources within their jurisdiction. The oil spill event changed types of projects needed and the priorities for their implementation. All site reconstruction and enhancement as well as information development and distribution will necessarily fit into management plans for National Parks and Monuments, Wildlife Refuges, National Forests and State Parks. Projects which will respond to restoration needs, but are outside currently approved plans, and which are a high priority for the manager, would likely be adopted and implemented through agency plan amendment procedures.

Development of planned facilities and sites is feasible. Scale and timing of development could greatly effect cost factors. Compliance with environmental laws and regulations on large-scale projects would insure public participation in evaluation processes and decisions.

Visitors are attracted to areas when facilities are available for their use and enjoyment. Managers can better attend to the needs and demands of visitors when they have some control over their activities and the locations of those activities. New and/or rehabilitated sites and facilities provides the manager focus for implementation of their education programs. Commercial operations provide entepreneurs with business opportunties.

INDIRECT EFFECTS

Environmental: It is perceived that the activities associated with site enhancement and rehabilitation will potentially add to the injury, or the perception of injury, that already occurred in the area. It is also an expressed concern that better sites and facilities will draw more people into the area, further distracting from its perceived pristine nature. Large-scale construction and long-term occupancy of areas poses some risk to the environment, particularly in the immediate proximity of the development.

Socio-economic: Managers will provide a socially valuable service through site and facility enhancement and information management. Commercially developed sites provide the "base of operations" for those traveling into undeveloped country. Commercial site such as lodges can provide destination services in an otherwise primitive environment.

The variety of users now in the oil spill area demand different services. In the long run well placed developed sites may be of benefit to most users. It is certain that the development activity, whether it be rehabilitation, enhancement or replacement of sites and facilities, will increase the economic activity within the spill area.

Human health and safety: Newly constructed sites and recreation areas would focus human activity. This focus would be managed by the agencies who would likely have more presence in the areas affected by the site work. Managed sites and maintained facilities are actively sought by visitors. Appropriate visitor information services at these sites and areas provides recreationists with information and services needed to enjoy the surroundings in a safe and environmentally sound manner.

Monitoring of public and agency impressions and use statistics for any individual as well as the cumulative developments will be necessary to evaluate the success of development.

OTHER INFORMATION

Large-scale commercial development on public land in the spill area is a new venture. Environmental consequenses on these actions would have to be determined, sometimes at great effort and expense. The economic benefits to developers is unknown. Environmentally concerned people are doubtful such development is appropriate in harsh environment of the spill area.

October 6, 1992

OPTION 13 Eliminate Sources of Persistent Contamination of Prey and Spawning Substrates.

INJURED RESOURCES AND SERVICES

Coastal habitat, blue mussels, harlequin ducks, sea otters, black oystercatchers, river otters, fish and subsistence.

SUMMARY

The spring, 1992 survey of beaches in the affected area confirmed the presence of contamination on numerous beaches.The majority of this persistent oil is located under the surface, rocky armor or beneath mussel beds. Persistent oil adjacent to mussel beds or anadromous streams represents a potential threat to living resources that utilize them as food or habitat. Chemical analyses of mussel tissue and sediments from contaminated mussel beds revealed very high levels of petroleum contamination.

DESCRIPTION

The objective of this option to determine the geographic extent of persistent oil in and adjacent to oiled mussel beds and anadromous streams in Prince William Sound. The study will also determine the concentration of oil remaining in mussels, the underlaying organic mat and substrate. This study will determine and implement, if necessary, the most effective and least intrusive method of cleaning oiled mussel beds and areas of contamination adjacent to anadromous streams. This study will also provide chemical data to assess the possible linkages of oiled mussel beds to harlequin ducks, black oystercatchers, juvenile sea otters, juvenile and adult river otters, and other organisms.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

By exposing buried oil to the air, residual oil also will be eliminated through weathering and microbial degradation. Stripping or tilling of contaminated mussel beds will increase flushing of residual oil. Consequently, less oil will be available for bioaccumulation by mussels and other invertebrates. Less oil also will be available as contaminated prey for predator species such as harlequin duck, black oystercatcher, sea otter and river otter.

INDIRECT EFFECTS

Although there will likely be no adverse socio-economic and human health and safety effects associated with treating the mussel beds, there will be some environmental cost. There will probably be a minimal direct loss of mussels and associated invertebrates and algae. This loss needs to be weighed against the benefit of accelerating the rate at which contamination is eliminated from this habitat, and the benefit of decreasing the probability that potentially harmful petroleum hydrocarbon residues will be passed up the food chain.

OTHER INFORMATION

This option includes a monitoring component designed to assess the efficacy of stripping on elimination of oil from mussel beds. Both the fate of oil in mussels and in the substrate and the effects of oil on growth and reproduction of mussels will be followed at oiled and unoiled-control study sites.

CITATIONS

Exxon Valdez Oil Spill Trustees 1992. Exxon Valdez Oil Spill Restoration. Volume II. 1992 Draft Work Plan. Exxon Valdez Oil Spill Trustee Council, Anchorage, Alaska.

DRAFT

October 6, 1992

OPTION 14 Accelerate Recovery of Upper Intertidal Zone

INJURED RESOURCES AND SERVICES Upper intertidal community of algae and invertebrates (upper *Fucus* zone).

SUMMARY

Much of the upper intertidal zone within the oil spill area was heavily oiled and subjected to intense clean-up. This zone is dominated by the brown alga, *Fucus gardneri* (popweed), which has been slow to recover. Moreover, many of the other life forms that use the upper intertidal zone are dependent upon *Fucus* for both cover and food. The scientific literature documents that *Fucus* is slow to recover and that its recovery affects the recovery of the rest of the intertidal community. It is the objective of this restoration option to accelerate the recovery of this important habitat.

DESCRIPTION

It will be the objective of this option to test approaches of accelerating the rate of recovery of *Fucus* assemblages. These include: 1) Installation of trickle irrigation system to enhance moisture retention, 2) Use of biodegradable materials, e.g., burlap, placed to provide additional substrate for germling attachment and cover, and 3) transplants of adult plants attached to small rocks and cobble. The proposed feasibility study will include an analysis of cost versus benefit.

Two additional field seasons will be required to test the feasibility of these techniques. Assuming proven feasibility, implementation of one or more of these restoration approaches at appropriate beaches will occur over three additional field seasons. Monitoring will be continued over the entire five year period, but will likely be reduced in frequency thereafter.

MEANS TO IMPROVE RECOVERY

In 1990, research was initiated aimed at developing a better understanding of the underlying mechanisms limiting *Fucus* populations. These studies included an evaluation of important abiotic and biotic factors (texture of substrate, canopy shading and presence/absence of local adults, etc.) affecting recruitment of this alga. Monitoring its recovery in relation to the quantity of residual oil in the upper intertidal zone also was undertaken. Additionally, preliminary experiments were conducted on the feasibility of using transplants to accelerate recovery.

If a new *Fucus* canopy can be established, other seaweeds, invertebrates and even terrestrial animals will be afforded a suitable habitat and/or source of food. It also has been observed that new *Fucus* plants are more likely to recruit in rock cracks, other rough surfaces and not on tar or bare rock; and the presence of adult *Fucus* enhanced local recruitment. Restoration approaches based on these research results could significantly increase the rate of *Fucus* recovery.

INDIRECT EFFECTS

Construction will be kept to a minimum, and research (habitat manipulation) will not further degrade the integrity of the intertidal ecosystem. Where possible, monitoring will be conducted using non-destructive and the least intrusive methods available.

CITATIONS

De Vogelaere, A. P. and M. S. Foster. 1990. Status Report: Fucus Restoration Project. University of Alaska, Fairbanks Contract No. 53-0109-9-00276 Mod #4. Moss Landing Marine Laboratories, Moss Landing, CA.

Houghton, J. P., D. C. Lees, H. Teas, III., H. L. Cumberland, S Landino, and T. A. Ebert. 1991. Evaluation of the Condition of Intertidal and Shallow Subtidal Biota in Prince William Sound following the *Exxon Valdez* Oil Spill and Subsequent Shoreline Treatment. NOAA WASC Contract Nos. 50ABNC-0-00121 and 50ABNC-0-00122. NOAA, Hazardous Materials Response Branch, Seattle, WA.

Others

OPTION 15: Supplements to subtidal spawning substrates and egg transplants for Pacific herring.

INJURED RESOURCES AND SERVICES Pacific herring.

DESCRIPTION

Herring eggs, larvae and spawning substrates were adversely impacted by the oil spill and subsequent cleanup. Direct effects on eggs and larvae were observed in 1989 but to a lesser extent in 1990. No direct effects were observable in 1991. Indirect effects on substrates including marine plants were observed in 1989 and 1990. The potential effects of the oil spill on year-class strenth, however, will not be known until 1993, when fish exposed to oil in 1989 as eggs or larvae will first spawn.

It will be the objective of this option to test the feasibility of increasing herring spawning by employing both natural (macroalgae) and artificial substrates and by transplanting dislodged-stranded eggs to underutilized areas.

A possible study location for this feasibilty study is the northern and western portions of Montague Island. Hair kelps and other species of red kelps will be collected from areas on southern Montague Island and anchored in nearshore experimental (oiled) and control areas prior to herring spawning. Also, artificial substrates consisting of plastic and wood lath will be fabricated and anchored in study areas. After spawniing, experimental and control sites will be monitored every 4-5 days until most of the eggs have hatched to measure eggs survival and hatching success. After hatching, larval trawls will be used to measure larval densities.

In a related approach and after storm events, eggs dislodged and deposited on the beach will be carefully collected and transported by skiff to offshore incubation facilities. The incubators will be sampled periodically to measure egg survival and percent hatch.

The timeframe for the field portion of this study is April to mid-May. Data analyses will be completed during the following winter. The decision to implement this approach on a wider scale will be made following interpretation of the data.

MEANS TO IMPROVE RECOVERY

Supplementing herring spawning substrate to enhance even local herring stocks is unproven in North America. In the Soviet Union, fish culturists heve sucessfully employed both artificial and natural substates in an effort to enhance local stocks of herring. Intuitively, where substrate is limiting, an increse in substrate should result in an increse in egg survival and hatching success, assuming that the number of spawners also is not limiting.

Canadian biologists also have transplanted dislodged-stranded eggs to underutilized areas where successful hatching was observed.

INDIRECT EFFECTS

Although there will be no adverse socio-econonmic and human health and safety effects associated with the collection of macroalgae for eventual transplant, there will be some minimal biological cost. There will probably be some direct los of individual macroalgae, especially those that are cut or broken from their holdfast. There also could be a small economic loss to commercial or subsistence fishers if there is a need to close the fishery in an area to support this study. These potential losses need to be weighed against the potential benefits of accelerating recovery of local herring stocks. Such costs and benefits will be addressed in futiure project-level environmental assessments and environmental impact statements.

OTHER INFORMATION

There is some information to suggest that herring egg survival and hatching varies with the type of kelp subatrate used for spawning and with the number of egg layers deposited. Generally kelp species with large interstitial spaces (hair and fern kelps) provide better oxygen exchange and spacing among eggs, which enhances hatching success. Also, as the number of egg layers deposited increase, fertilization rate, egg survival and hatching success decrease. Therefore, increasing spawning substrate in an area where substrate is limiting should decrease egg density per unit area and enhance survival.

DRAFT

October 12, 1992

OPTION 16 Increase productivity and success of murre colonies

APPROACH CATEGORY Manipulation of Resources

INJURED RESOURCES AND SERVICES Common murres

SUMMARY

Numerically, common murres suffered the greatest direct mortality from the oil spill of any bird species. Based on restoration work with related species and an understanding of murre behavior, there are several techniques that hold some promise of increasing murre productivity. Methods that could be considered include enhancing social stimuli (e.g., use of decoys and recorded calls - See Suboption A) to encourage nesting activity, and improving the physical characteristics of nest sites (e.g., adding sills to ledges Suboption B) to increase productivity. These techniques are experimental and possibly intrusive, but if effective, have the potential to reduce the recovery time of murres nesting in colonies in such places as the Barren Islands. Careful monitoring of experimental and control sites is necessary to determine the effectiveness of these direct restoration techniques. Without intervention, the time to recovery is now estimated to be in the decades.

SUBOPTION A Test the feasibility of enhancing murre productivity through increased social stimuli.

TARGET RESOURCES AND SERVICES Common murres

DESCRIPTION

Design and implement a feasibility study which experiments with techniques which could increase murre productivity by enhancing social stimuli. Common murres have a synchronized breeding strategy which helps reduce predation pressure. This synchronization was disrupted by the oil-spill and some populations have not resumed normal breeding patterns. The lack of synchrony could be a function of either the reduced numbers of birds, or the age and experience of the remaining birds. Enhancing social stimuli, such as using decoys and recorded calls to give the illusion of typical breeding densities may encourage a return to normal breeding patterns. These techniques have been successfully used on a variety of seabirds, including Alcids. Japan is currently using murre decoys in an attempt to attract common murres to a new colony site; the results of this study are not yet available.

While it is technically feasible to use decoys and recordings to attract murres to colonies, it is unknown whether the technique would influence the breeding synchrony of the injured populations.

This option would first be implemented as a feasibility study. A management plan would be written to implement this option on a larger scale if the feasibility study is successful.

Any work which involves on-site manipulation of murre nesting habitat, must be accomplished before the birds arrive at the colony. Arrival dates vary somewhat between colonies, but most birds arrive from mid-April to late May.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

Nesting density is known to be an important factor in influencing breeding success at murre colonies (Birkhead 1977). Murres have their highest breeding success when they nest in high densities (greater than 10 birds/meter^2). The dense congregation of birds allows for protection from avian predators and is believed to help synchronize egg laying so that hatching and fledging occur simultaneously. Vocalizations are also believed to provide breeding stimulus. Synchronization is important because it allows for predator swamping and group defense of eggs and chicks. Studies have shown that chicks left alone on a ledge with their parents were 100 times more likely to be depredated than chicks fledging together.

If successful, decoys and recordings will make the birds believe they are in a healthy, productive colony. Wooden eggs would provide a visual stimulus for laying.

NRDA studies from 1991 have shown that murre colonies at the Chiswell Islands, Barren Islands and Paule Bay had not yet resumed synchronized breeding and had poor reproductive success (nearly complete failure). These colonies lost up to 70 percent of their breeding population during the oil spill. Murres are not expected to have recovery rates of more than 10 percent per year once they have started normal breeding behavior, and the predicted recovery time for populations injured by the Exxon Valdez Oil Spill is expected to exceed 70 years.

On site manipulation may allow the populations to resume normal breeding patterns more rapidly, and may reduce predation of the existing breeding birds. Prebreeding murres often visit colonies other than their natal colony to investigate nesting space. Using playback recordings of murres at a large colony, may attract prospecting murres to the depleted colonies and reduce the recovery time of the population.

INDIRECT EFFECTS

Potential Negative Effects: The following concerns have been expressed by seabird biologists. Because murres have very strong site tenacity, placing decoys on ledges may displace a pair from their preferred nesting site. The decoys may create gaps between

birds on a breeding ledge which could be used by predators. Depending on where decoys are placed (on ledges vs on the water) they may send "mixed signals" to the birds. Mirrors may cause the birds to behave aggressively towards their own image, or may cause the birds to fly into the cliff. The recordings may contain alarm calls which could further disrupt the breeding birds.

SUBOPTION B Test the feasibility of improving the physical characteristics of nest sites to increase murre productivity

DESCRIPTION

Develop and implement a feasibility study to improve the physical characteristics of the nesting ledges to increase murre productivity. These techniques are largely experimental. Several ideas have been proposed by experts (Roby, 1991). These ideas included: provide breeding ledges with sills, add partitions and/or roofs on nesting ledges, blanket-off or cover portions of breeding cliffs, enlarge nesting ledges on cliff faces and clear debris etc...from otherwise suitable nesting sites. An implementation plan will be developed to expand this work if the feasibility study is successful.

Any work which involves on-site manipulation of murre nesting habitat, must be accomplished when the birds are away from the colony. Arrival dates vary somewhat between colonies, but most birds arrive from mid-April to late May, and the birds leave the colony by early September (this may be delayed at the injured colonies due to a 30-45 day delay in breeding).

MEANS AND POTENTIAL TO IMPROVE RECOVERY

Common and thick-billed murres lay their eggs on the bare surface of cliff ledges. Eggs are often lost when the adults are disturbed from the ledges and knock the eggs off of the cliffs. Sometimes the ledges are sloped outward which places the eggs in very precarious positions. Providing sills to the ledges could prevent or reduce this additional loss.

The natural recovery rate for common and thick-billed murres is believed to be less than 10 percent per year for a healthy colony (Nur and Ainley 1992). Many of the young are lost to predation or accidents before they leave the colony. Eggs are knocked off or roll off of ledges when the adults are disturbed. Predators such as gulls, eagles and ravens are especially effective when the density of nesting birds is low (Birkhead 1977). Constructing partitions or creating roofs over nesting ledges may reduce predator access to the breeding birds. Techniques which reduce the loss of eggs from falling off of the ledges, or reduce the ability of predators to take eggs and chicks, will increase the productivity of a colony and thereby increase the rate of recovery.

INDIRECT EFFECTS

Potential Negative Effects: Several types of modifications to nesting ledges have been proposed. Modifications such as attaching sills to the ledges are less likely to create disturbance than larger modifications such as creating partitions on the ledges. Any action which may prevent a pair of murres from returning to their traditional nesting ledge may prevent the pair from breeding successfully.

CITATIONS

Birkhead, T.R. 1977. The effect of habitat and density on breeding success in the common guillemot (Uria aalge). J. Animal Ecology. 46:751-764.

Nur, N. and D.G. Ainley. 1992. Comprehensive review and critical synthesis of the literature on recovery of marine bird populations from environmental perturbations. Unpublished Final Report to the Restoration Planning Work Group. (Contract COOP-91-039).

Roby, Daniel D. Memorandum to Restoration Planning Work Group. 17 December 1991. "Annotated list of restoration options for common murres in the aftermath of the Exxon Valdez Spill". RPWG files.

Tuck, L. M. 1960. The murres. Canadian Wildlife Series:1. Queen's Printer, Ottawa.

DRAFT

October 12, 1992 Author: Gorbics/Klinge

OPTION 17: Eliminate introduced foxes and rodents from islands important to nesting marine birds

INJURED RESOURCES AND SERVICES Marine birds

SUMMARY

Fox and certain rodents are not indigenous to many of the islands of the Aleutian chain and Gulf of Alaska. Fox were introduced on more than 400 islands to be raised and trapped for their furs. Introduced fox reduced and even eliminated populations of surface, burrow and in some cases cliff-nesting birds in a matter of years. Birds were also harmed by incidental introductions of rodents, many of which were released to the islands to provide food for the fox. Programs to eradicate red and arctic ("blue") fox on islands in the western Gulf of Alaska and in the Aleutians where such fox are not indigenous, and the islands were important to nesting alcids (murres, puffins, auklets, murrelets), storm-petrels, gulls and terns, and waterfowl such as eiders and Canada geese have been successful in the past and would increase Alaska's population of marine birds.

DESCRIPTION

The goal of this option would be to remove introduced fox from islands along the Alaska Peninsula and the Aleutians. Several steps would need to be taken to accomplish this: (1) identify and prioritize target islands, (2) work with the Environmental Protection Agency and Department of Agriculture to secure registration for toxicants, and (3) remove fox from up to 4 islands per year for a total of approximately 20 islands.

It would take over 5 years to complete the project. Additional time may be required to obtain toxin registration.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

On some small islands, spectacular increases in breeding birds have been documented after the disappearance or removal of fox. Their removal allows a variety of native birds, including seabirds and waterfowl, to reinhabit these islands. Fox are voracious predators of chicks and eggs and climb among the nesting birds to feed. Their removal will allow the productivity of these islands to increase with increased survival of chicks and eggs.

The adverse impacts of fox appeared as early as 1811, only about 20 years after arctic fox were introduced. Birds were also harmed by incidental introductions of rodents, many of which were released to the islands to provide food for the fox.

The best means of eliminating fox from islands, toxicants or poison, was essentially banned in 1972 (Federal Environmental

Pesticide Control Act). A special exemption by the Environmental Protection Agency for restoration of Aleutian Canada Geese allowed the use of certain toxicants in 1986. However, with the increase in the Aleutian Canada Geese populations, permission to use the toxicants has now been withdrawn, precluding further use for fox eradication until new registration is obtained.

Since toxicants became highly restricted in 1972, additional attempts to remove foxes from islands within the Alaska Maritime National Wildlife Refuge relied principally on traps. Eliminating the last few trap-shy fox is exceedingly difficult, if not impossible, therefore, trapping is a viable eradication method only on small and moderate-sized islands.

Shooting fox, particularly where concentrated around seabird colonies, is locally fruitful, but nowhere has this technique been successful in eliminating all individuals from an island.

An experiment using five vasectomized male and five female red fox was initiated in 1983 on a small island in the eastern Aleutians. The larger and more aggressive red fox will outcompete the arctic fox by usurping dens and other limited resources. Once the arctic fox are gone, the red fox population dies out since no young are being produced. It appears that this may be successful on at least small islands.

Various combinations of eradication techniques are best suited to different islands, depending on size, topography, presence of non-target species, and other factors. Toxicants cannot be used until they are re-registered for fox eradication due to the Exxon Valdez oil spill. Multiple years of treatment must be considered for larger islands. Continued surveillance for several years will be necessary to ascertain the absence of fox on larger islands.

INDIRECT EFFECTS

With poisons and traps, some danger to non-target species also exists. River otters, common ravens (Corvus corax) and ground squirrels are among the most commonly trapped and poisoned non-target animals on islands off the Alaska Peninsula.

Although in 1924 there were 33 fox farming permits in the Chugach National Forest, and some natives still trapped on a few islands as late as 1947, additional demand for farming is unlikely. Government policy changed from facilitation of fox farming as one of the purposes of the Aleutian Islands Reservation to active eradication of fox to protect and restore birds, beginning with Amchitka Island in 1949. Fox farming is no longer profitable throughout the spill area and further along the Aleutian Islands, therefore, it is unlikely that there would be adverse economic effects as a result of removal of fox.

SUBOPTION 17b Reducing predators at depleted marine bird nesting areas.

INJURED RESOURCES OR SERVICES Common and thick-billed murres, Pigeon guillemot

DESCRIPTION

Determine the extent of predation at injured murre colonies, or on coastlines with nesting pigeon guillemots, and implement a predator control program. Predation can have a significant affect on the productivity of seabirds. Eagles, gulls are known predators of murres and other seabirds. If other activities to help the recovery of bird populations in the oil spill area are being negated by the effects of predation a program to reduce predators could be implemented. Mammals such as foxes and mink have been known to prey on murres and guillemots, however they are not known to be present at the injured murre colonies. Option 17a discusses a fox removal program on the Aleutian Islands.

Reducing predators at murre colonies is feasible, but would be difficult to implement for long term effects. Eagle predation could be reduced by providing young eagles to the eagle reintroduction program in the lower 48 states. However, reducing predation during the early stages of recovery may be crucial in helping the populations rebound. Reducing predation for nesting pigeon guillemots would be more difficult due to the dispersed nest locations. Initial predation studies would need to be completed to determine the feasibility of benefiting guillemots through predator removal. At least one season of intensive research is needed to determine if this program can be justified.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

Glaucous-winged gulls and northern ravens are effective predators on murre colonies in the oil spill area. Murre eggs and chicks are especially vulnerable when the colony density is reduced or when nesting is not synchronized. These are both problems at colonies injured by the oil-spill. Gulls are believed to be a major source of egg mortality at some colonies, sometimes accounting for 40% of the egg loss (Roby 1991). Reducing gull populations at murre colonies could increase the productivity. Because the gulls reproduce much more quickly than common murres, a temporary population reduction would not threaten the gull population.

Bald eagles also prey on murre colonies. Not only do they take adult and juvenile murres. They also cause the adult murres to panic off of the nesting ledges causing eggs to be knocked off, or exposing the eggs and young to other avian predators (Roby 1991).

Murres rely on high nesting densities for protection against predators and possibly for synchronizing their breeding. Any activity which reduces predation or accidental loss of chicks and eggs would increase the rate of recovery.

INDIRECT EFFECTS

Other seabirds would benefit from the removal of avian predators.

Bald eagles reproduction in the oil-spill area is believed to have returned to pre-spill levels so the population would not be affected by removing juvenile eagles from murre colonies.

Secondary effects from removing gulls or mammalian predators near seabird nesting areas would depend on the technique used to eliminate the predators. Species specific techniques would have little impacts on non-target species, however, broader techniques such as poisoning could injure other species. A predator reduction program which creates long-term effects on endemic predator populations would not be implemented.

CITATIONS

Roby, Daniel D. Memorandum to Restoration Planning Work Group. 17 December 1991. "Annotated list of restoration options for common murres in the aftermath of the Exxon Valdez Spill". RPWG files.

9 Oct 92

OPTION 18: Promote the recovery of injured wild salmon stocks by replacing harvest opportunities with alternative salmon runs.

APPROACH CATEGORY: Manipulation of Resources

INJURED RESOURCES AND SERVICES: Pink and sockeye salmon; associated commercial, sport, and subsistence fisheries

PROPOSED ACTION

Establish new salmon runs to provide alternative opportunities for commercial, sport, and subsistence fishing to relieve harvest pressure on injured stocks of pink and sockeye salmon.

SUMMARY

There is a variety of well-established techniques for transplanting fish into new locations to create or establish new fish stocks. These new stocks could provide alternative fishing opportunities that could relieve or remove fishing pressure from injured pink and sockeye salmon stocks. Techniques that might be applied include establishing new hatchery runs and creating new "wild" runs by transplanting hatchery-reared fish to vacant habitat and using eggs from suitable wild stock fish to initiate runs in vacant habitat. (Habitat might be vacant owing to stream blockages or depleted fish stocks.) These techniques may be used alone or in conjunction with others, such as lake fertilization, barrier removal, or creation of new habitat (e.g. spawning channels; see Options 11&15). In most areas, most available habitat is already occupied, so this option would usually have to be applied in conjunction with other options that create new habitat. While hatchery stocks may be convenient to use, it is important to use stocks that are genetically well suited to the particular site or need. There are also fish health considerations. Consequently, ADF&G standards and requirements for genetic and disease screening and brood stock selection must be followed before new runs are established. Regional Planning Team members must also agree with any proposed actions to establish new fish runs.

SUBOPTION 18A Establish additional hatchery salmon runs.

DESCRIPTION

Rearing of juvenile fish under controlled conditions and releasing them at optimal times can:

- stock fry, pre-smolts, and smolts to establish new hatchery runs that will provide alternative opportunities instead of injured wild stocks;
- increase fry survival in the marine environment;
- increase number of returning spawners;
- mitigate for reduced runs of pink, chum, and sockeye salmon expected over the next several years;
- minimize further injury to other stocks;
- facilitate recovery of wild stocks to pre-spill conditions.

This suboption would aim to establish runs that can be fished distinctly, spatially and/or temporally, from wild runs.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

The aim of this suboption is to remove or reduce fishing mortality from injured stocks of salmon by creating alternative fish stocks and redirecting fishing pressure to them. This reduction in mortality will allow larger numbers of fish from injured stocks to return to their natal streams to spawn. This suboption would require a redirection of fishing effort (Option 2) to the new alternative salmon runs to be most effective. In addition, this option would allow for the maintenance of fishing services even while restricting fishing on injured stocks.

The effectiveness of projects carried out under this suboption will depend on the characteristics of particular injured stocks, such as species, numbers, run timing, availability of suitable alternate stocks, etc. The tools provided here may be critically important in some cases.

Hatchery fish have been used to provide greatly increased commercial harvests in Alaska. To the extent that the fish produced for harvest under this suboption exceed the numbers that would have been provided by uninjured wild stocks, this suboption will enhance commercial fisheries. They may also enhance sport and subsistence fisheries. However, the aim of this suboption is to provide alternatives only until the injured stocks have recovered to pre-spill conditions.

INDIRECT EFFECTS

Salmon are of key importance to the ecosystem and to certain species in particular. Bears, otters, and certain bird and fish species will benefit when wild stocks return to pre-spill levels.

There will be socio-economic impacts to commercial, sport, and subsistence users when areas may have to be closed to protect injured stocks, while other areas are opened to redirect effort to fish provided under this suboption.

OTHER INFORMATION

There are important considerations regarding the genetics and possible pathology of fish used in introductions. Because of the availability of nearby salmon runs, these concerns should be minimal. All introductions and transfers will have to conform with Alaska Department of Fish and Game policies on Fish Genetics and Fish Pathology and will require the concurrence of the Regional Planning Team.

SUBOPTION 18B Transplant hatchery-reared salmon to vacant areas.

DESCRIPTION

Vacant habitat may result from improvement of presently unsuitable habitat (see Options 11&15) or from the extinction of stocks for whatever reason. In some cases, additional habitat can be made available by removing obstructions to fish passage, some of which resulted from the 1964 earthquake. This suboption would provide for the rapid occupation of vacant areas. It is intended that once runs are established, they will sustain themselves. This suboption would aim to establish runs that can be fished distinctly, spatially and/or temporally, from wild runs.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

The aim of this suboption is to remove or reduce fishing mortality from injured stocks of salmon by creating alternative fish stocks and redirecting fishing pressure to them. This reduction in mortality will allow larger numbers of fish from injured stocks to return to their natal streams to spawn. This suboption would require a redirection of fishing effort (Option 2) to the new alternative salmon runs to be most effective. In addition, this option would allow for the maintenance of fishing services even while restricting fishing on injured stocks.
POTENTIAL TO IMPROVE RECOVERY OR ENHANCE THE RESOURCE/SERVICE

The effectiveness of projects carried out under this suboption will depend on the characteristics of particular injured stocks, such as species, numbers, run timing, availability of suitable alternate stocks, etc. The tools provided here may be critically important in some cases.

To the extent that the fish produced for commercial harvest under this suboption exceed the numbers that would have been provided by uninjured wild stocks, this suboption will enhance commercial fisheries. If the new stocks persist after injured stocks recover, they should provide enhanced fishing opportunities.

INDIRECT EFFECTS

Salmon are of key importance to the ecosystem and to certain species in particular. Bears, otters, and certain bird and fish species will benefit when wild stocks return to pre-spill levels. Newly established runs should have a similar effect. It expected that the runs established under this option will be permanent.

There will be socio-economic impacts to commercial, sport, and subsistence users when areas may have to be closed to protect injured stocks, while other areas are opened to redirect effort to fish provided under this suboption.

OTHER INFORMATION

There are important considerations regarding the genetics and possible pathology of fish used in introductions. Because of the availability of nearby salmon runs, these concerns should be minimal. All introductions and transfers will have to conform with Alaska Department of Fish and Game policies on Fish Genetics and Fish Pathology and will require the concurrence of the Regional Planning Team.

SUBOPTION 18C Transplant wild salmon eggs to vacant areas.

DESCRIPTION

Vacant habitat may result from improvement of presently unsuitable habitat (see Options 11 &15) or from the extinction of stocks for whatever reason. In some cases, additional habitat can be made available by removing obstructions to fish passage, some of which resulted from the 1964 earthquake. This suboption would provide for the occupation of vacant areas, aided by the transplantation of wild eggs. It is intended that once runs are established, they will sustain themselves. This option would aim to establish runs that can be fished distinctly, spatially and/or temporally, from wild runs.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

The aim of this suboption is to remove or reduce fishing mortality from injured stocks of salmon by creating alternative fish stocks and redirecting fishing pressure to them. This reduction in mortality will allow larger numbers of fish from injured stocks to return to their natal streams to spawn. This suboption would require a redirection of fishing effort (Option 2) to the new alternative salmon runs to be most effective. In addition, this option would allow for the maintenance of fishing services even while restricting fishing on injured stocks.

The effectiveness of projects carried out under this suboption will depend on the characteristics of particular injured stocks, such as species, numbers, run timing, availability of suitable alternate stocks, etc. The tools provided may be critically important in some cases.

To the extent that the fish produced for commercial harvest under this suboption exceed the numbers that would have been provided by uninjured wild stocks, this suboption will enhance commercial fisheries. They may also enhance sport and subsistence fisheries. If the new stocks persist after injured stocks recover, they should provide enhanced fishing opportunities.

INDIRECT EFFECTS

Salmon are of key importance to the ecosystem and to certain species in particular. Bears, otters, and certain bird and fish species will benefit when wild stocks return to pre-spill levels. Newly established runs should have a similar effect. It expected that the runs established under this option will be permanent.

There will be socio-economic impacts to commercial, sport, and subsistence users when areas may have to be closed to protect injured stocks, while other areas are opened to redirect effort to fish provided under this suboption.

OTHER INFORMATION

There are important considerations regarding the genetics and possible pathology of fish used in introductions. Because of the availability of nearby salmon runs, these concerns should be minimal. All introductions and transfers will have to conform with Alaska Department of Fish and Game policies on Fish Genetics and Fish Pathology and will require the concurrence of the Regional Planning Team.

DRAFT

October 9, 1992 Author: Chris Swenson

OPTION Option 19: Update and Expand the State's Anadromous Waters Catalog and Atlas

INJURED RESOURCES AND SERVICES Numerous anadromous streams were affected by the spill and cleanup. Injuries have been documented in anadromous fish, including salmon, cutthroat trout and Dolly Varden. These species contribute to important commercial, sport and subsistence fisheries, which were also impacted by the spill.

SUMMARY

This option pertains to updating the state's Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes and its associated atlas. Updating these documents through additional stream surveys would increase protection of injured anadromous species, their habitat, species that feed on them, and the services they provide. Anadromous streams listed in the catalog are automatically afforded legal protection under Alaska Department of Fish and Game (ADF&G) statutes and, on state and private lands, the State Forest Practices Act. In addition, the information acquired during stream surveys will be necessary for the Trustees' evaluation of management, protection and acquisition options for restoring anadromous fish and their habitats. While many of the anadromous streams in the spill area are listed in the catalog, the list is not complete. Many new streams were noted during the spill response but incompletely surveyed, others have never been surveyed, and many surveys need to be updated. Total costs and time requirements for this option depend on the geographical extent of the stream surveys, which cannot be determined at this point.

Implementation of this option involves the following steps:

1) Identify and prioritize public and private lands where an imminent threat or high potential for habitat degradation exists.

2) Determine areas within the threatened lands defined in step # 1 where anadromous fish data is incomplete or lacking.

3) Survey streams and collect data on species presence and upper extent of stream use.

4) Enter data into the anadromous waters catalog and atlas.

5) Continue ongoing enforcement and permitting activities.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

Listing anadromous streams in the state catalog will facilitate

natural recovery of injured resources and services by providing protection against human activities stressful to already damaged species and habitats. Streams listed in the catalog are protected by state statutes and permit requirements not applicable to unlisted streams. State statutes regulate all instream disturbances and activities in the anadromous waters and require that ADF&G be informed of and issue permits for all such activities. The State Forest Practices Act requires that logging operations leave 100 foot riparian buffer zones around anadromous streams on state lands and up to 66 foot buffers on private lands. The implementation of this option could prevent future habitat degradation and potentially improve natural recovery rates.

Existing regulatory authorities provide a general level of protection for wildlife, water quality and water use, but do not generally provide as much protection to anadromous fish, their spawning and rearing areas, or adjacent riparian habitat as the ADF&G statutes and the State Forest Practices Act. Application of these regulatory tools is the most effective option for protecting unsurveyed anadromous streams.

There are several streams within the spill area which have not been surveyed for anadromous fish or were surveyed several years ago and need to be updated. Recreational and commercial uses in these areas, such as logging and mining, are ongoing and present potential threats to anadromous species and their habitats. Regulation of these activities, via inclusion of anadromous streams in the state catalog, could provide the protection necessary to facilitate the natural recovery of injured resources and services. In addition, species dependent on anadromous fish, such as bald eagles, harlequin ducks and marine mammals would benefit from healthy fish populations and stream habitat.

INDIRECT EFFECTS

1) Species not targeted for restoration efforts could benefit from enhanced habitat protection.

2) Healthier ecosystems resulting from enhanced resource protection could provide socioeconomic benefits by attracting tourists, providing increased harvest and recreational opportunities and improving the quality of life.

3) Enhanced habitat protection could have negative economic impacts due to increased regulatory restrictions on certain recreational activities and development projects involving anadromous waters.

DRAFT

October 12, 1992 Author: John Strand

OPTION 27 - Designate Long-Term Ecological Research Site(s).

INJURED RESOURCES AND SERVICES Marine, intertidal and adjacent uplands habitats and the biological communities supported by these habitats.

DESCRIPTION

It is the objective of this option to obtain continuing support through the NSF for one or more LTERs. LTER(s) would be established in habitats important to the recovery of species injured during the EVOS. With NSF support, protected research and monitoring sites at oiled, oiled-treated, oiled-untreated and unoiled (control) locations within the spill zone could be established to follow and better understand recovery of injured resources. LTER support also would allow for the establishment of baseline environmental conditions to use as reference standards when assessing damages from future disturbances. Support from NSF could provide for continued research and monitoring beyond the 10-year life of the settlement.

Because NSF is a granting agency and is not concerned with land ownership, site operation or management per se, the land where an LTER will be established must already be owned and protected by the State of Alaska or the Federal Government; or if in private hands, the private landowner must be willing to sign an agreement assuring long-term protection. Fee title acquisition with protection and protection without fee title of lands suitable for establishing an LTER are described in Options 23 and 25.

Although somewhat dependent upon the site, a successful proposal could take up to a year to write. This assumes that sufficient data are available to prepare the proposal. Otherwise, even a cursory site characterization will add one to three years to the process. NSFs' panel review will take one year from the time a call for proposals is issued.
Grants from NSF average $350K per year but may be as much as $525K per year over a five year period.

The cost to develop a sufficiently large database to attract NSF-LTER support is not easily estimated, and it will most certainly vary with site location. While most LTERs were operated as research sites prior to designation and had developed large databases which helped justify their designation, a few LTERs were approved with little or no supporting data. A notable example is the Arctic Tundra LTER Site in the Brooks Range, Alaska, which was established in 1975. Long-term aquatic research began in 1975, and terrestrial ecologists began working there in 1976.

Even if new data on a candidate site is not required, there is still a cost associated with preparing a proposal to NSF in support of LTER support. Conservatively, this effort will cost $50K.

MEANS TO IMPROVE RECOVERY

Obtaining NSF support for one or more LTER sites could improve or enhance recovery of injured resources. LTER support can facilitate monitoring to assess both the rate of natural recovery and the efficacy of restoration. Monitoring can identify where additional restoration may be appropriate, and determine when injury has been delayed. LTER support could also facilitate determining how and to what degree important physical, chemical and biological environmental factors affect recovery. Finally, LTER support will allow for the establishment of an environmental baseline. This baseline with the addition of manipulative research can be used to evaluate the effects of future disturbance; and as well, improve our ability to manage affected resources and services over the long-term.

INDIRECT EFFECTS

There need be no significant adverse environmental, socio-economic, and human health and safety effects associated with the designation of a research site that will receive LTER support; however, the potential for adverse effects as well as beneficial effects are the subject of NEPA review conducted at the program-level by the Trustees, and at the site specific-level by the agency establishing the site. By the nature of the Trustees' program, every effort is extended to protect the environment. Construction will be kept to a minimum and research (even manipulation) will not impact the representative ecological character and integrity of the site.

OTHER **INFORMATION** None.

October 11, 1992 (Bob Loeffler)

OPTION 28a Purchase access to sport-fishing and recreation areas.

INJURED SERVICE: The spill decreased the amount and quality of sport-fishing and all varieties of recreation use such as beachcombing, site-seeing, camping, and hiking.

SUMMARY. Many valuable sport-fishing sites and recreation areas are privately owned, mostly by Native Corporations. Private ownership prevents legal use by the public. (Many areas are used in trespass). Providing for legal public use -- whether it is to fish in the stream, camp, hike, beachcomb, or have access to public land blocked by private ownership -- would increase the quality of public use and provide alternative sites for those damaged by the spill. In addition, acquiring access can redirect public use to specific areas and decrease the human pressure on areas and resources still recovering from the oil spill.

Agencies can purchase a variety of access rights. They can buy a site, or purchase only an easement. An easements would entitle the public to only specific rights. These could include all or some of the rights to walk, stop to fish, camp, or other use. In some cases the public management of the acquired rights could be specified in the purchase agreement, in others cases, it would be decided using the planning and management processes of the managing agency.

Where there is private ownership, it is the uplands above mean high tide that are privately owned, the tidelands and the lands beneath streams are publicly owned. In a few cases where permits, leases or other devices extend private rights to the tidelands or stream bottom without providing for public access, but these cases are rare. In the vast majority of cases, the land below mean high tide line on the ocean, and ordinary high water mark on streams is owned by the public.

MEANS AND POTENTIAL TO IMPROVE RECOVERY. This option is potentially valuable wherever significant private land exists: in Prince William Sound, Kenai Fiords, Cook Inlet, and Kodiak. There is little private land in Katmai National Park and south along Shelikof Straights. In addition, the option is most valuable where significant public use overlaps private ownership: most frequently in Prince William Sound, Cook Inlet, and on Kodiak and nearby islands.

The cost of this option is impossible to estimate. Cost vary dramatically depending on the size of the area purchased, and its value. Costs can also include staff time to negotiate purchase, survey fees (which can proportionally expensive on small, remote sites), title searches, assessment, and legal fees. A site can be acquired free (if the owner donates access rights), or it can be extremely expensive. Public agencies will use this option only to acquire rights from a willing seller. They will not condemn land or otherwise force an unwilling owner to sell.

In rare cases, negotiation and purchase can occur in a few months from when a site is identified, more frequently it requires years, sometimes many years.

Sites to be acquired can be identified from existing nominations, new public nominations, proposals from landowners, or knowledge of agency personnel.

INDIRECT EFFECTS. In some cases the main cost is the purchase and associated costs. In others, it is the on-going management cost. Once acquired, managing the land (or access rights) will become the job of one of the state or federal agencies such as the US Forest Service, or the Alaska Department of Natural Resources. Managing the land with significant public use can sometimes be expensive: it may require picking up trash, preventing erosion, accepting liability, etc.

Other indirect benefits of this option include reducing trespass, relieving pressure on available public sites (including those recovering from the spill), and increasing recreation and sport-fishing opportunities which ar a form of economic development.

October 11, 1992 (Bob Loeffler)

OPTION 28c Purchase access to sport-fishing and recreation areas: "17(b)" easements.

INJURED SERVICE: The spill decreased the amount and quality of sport-fishing and all varieties of recreation use such as beachcombing, site-seeing, camping, and hiking.

SUMMARY. Section 17(b) of the Alaska Native Claims Settlement Act (ANCSA) provides for public access to Native Corporation land at periodic distances along waterways.

The state and federal government locate easements in the normal course of their work, and the Alaska DNR publishes atlases locating easements. This option would accelerate that work. That is, the 2-person staff in the Department of Natural Resource's is responsible for this program throughout Alaska. This option would provide funding to allow the department to concentrate effort on the spill area: to locate easements and publish atlases within two years of funding, rather than many years from now as might be the case under normal agency practices.

Section 17(b)(1) of ANCSA directs the government to "identify public easements across lands selected by Village Corporations and the Regional Corporations and at period points along the courses of major waterways which are reasonable necessary to guarantee international treaty obligations, a full right of public use and access for recreation, hunting, transportation, utilities, docks, and other public uses..."

Easements are identified and included in documents conveying land to the Native Corporations. In Prince William Sound some conveyance documents provided for negotiated identification of easements after conveyance. The Bureau of Land Management coordinates identification of 17(b) easements for the federal government and records them in the conveyance documents. The Alaska Department of Natural Resources coordinates easement identification for the state.

These easements are limited in size. Camping easements are usually only a few acres. Access easements are generally narrow.

The Department of Natural Resources publishes 1:63,360-scale atlas (1 inch = 1 mile) showing the location of easements including 17(b) easements. None are currently published for the spill area.

MEANS AND POTENTIAL TO IMPROVE RECOVERY. Many valuable sport-fishing sites and recreation areas are privately owned, mostly by Native Corporations. Private ownership prevents legal use by the public. (Many areas are used in trespass). Providing for legal public use -- whether it is to fish in the stream, camp, hike, beachcomb, or have access to public land blocked by private ownership -- would increase the quality of public use and provide alternative sites for those damaged by the spill. In addition, acquiring access can redirect public use to specific areas and decrease the human pressure on areas and resources still recovering from the oil spill.

This option is available where land is being conveyed to Native Corporations: Prince William Sound, Kenai Fiords, Cook Inlet and Kodiak. There is no corporate ownership on the west side of Shelikof Straits in Katmai National Park or further south.

The direct cost of this option is at most a few hundred thousand dollars for the entire spill area, spread over approximately two years. Only government agencies have the right to assert location of easements; thus, that part of this option is an agency task. Publishing the atlases could be completed by agencies or private firms. (It is usually done by the state).

INDIRECT EFFECTS. The cost discussed above includes only the agency cost of locating easements and publishing their location. There is also the on-going cost of managing the easements. Once acquired, managing the land (or access rights) will become the job of one of the state or federal agencies such as the US Forest Service, or Alaska Department of Natural Resources. Managing the land with significant public use can sometimes be expensive: it may require picking up trash, preventing erosion, accepting liability, etc.

Other indirect benefits of this option include reducing trespass, relieving pressure on available public sites (including those recovering from the spill), and increasing recreation and sport-fishing opportunities which ar a form of economic development.

This option does not acquire sites as large or as usable as does option 18a.

DRAFT

October 11, 1992 (Bob Loeffler)

OPTION: 33b: Education: visitor's center, interpretive and education facilities

INJURED RESOURCE OR SERVICE. This option is a replacement for some of the human effects of the spill in general.

SUMMARY. This option proposes that the Trustees fund construction and operation of a large visitor-center somewhere in the affected area. Possible locations include Cordova, Valdez, Anchorage, Seward, Homer, or Kodiak.

Residents and visitors alike seek information about the oil spill and the status of recovery. By developing informational and educational products, and locating a visitor center dedicated to that information, the Trustees can help the public become better informed about this significant event in Alaska's history. Through information, people can understand what happened, and how they can participate in the efforts to speed recovery of injured resources.

This option assumes that the visitor center would be located in a town, or in some area designated for this use. It does not assess the land-use effects of locating the center.

MEANS AND POTENTIAL TO IMPROVE RECOVERY. A visitor's center and its staff wold design and develop information available from the damage assessment and restoration process to inform the public about the spill, and about how they can help injured resources recover from the spill and from the clean-up. Specifically, the information would explain the history of the spill, changes to the ecosystem, status of recovery, and how people can lessen any harmful effects they create when using the spill area. Information from the visitor's center could also be available to other visitor's centers, government agencies, organizations in the spill area, and school curricula.

This option would require significant funds (HOW MUCH?) to build, and a targeted endowment (HOW MUCH?) to provide for on-going operation.

INDIRECT EFFECTS. The main effect of this option is public education. However, it could also provide economic development benefits associated with an important tourist and visitor attraction.

October 7, 1992

OPTION 34 Establish a Marine Environmental Institute

INJURED RESOURCES AND SERVICES All

SUMMARY

The proposed action is to establish a new marine environmental institute within the oil spill affected area in order to both study the marine environment and provide public education. The institute would also serve to coordinate recovery monitoring, basic and applied research and environmental education programs dealing with the effects of the spill. Public exhibits and marine aquaria will be an integral part of the institute. These will provide both support for the research scientists and as well as living examples of Alaskan marine habitats, plants animals and seabirds .

DESCRIPTION

Aside from the lingering effects of the spill, the natural environment within Prince William Sound and the adjacent Gulf of Alaska is relatively unaffected by human impact. Consequently, the area represents a perfect location for the establishment of a research/teaching facility for both basic marine research and for spill recovery monitoring. The intertidal habitats and nearshore waters of southcentral Alaska contain highly diverse invertebrate and finfish communities as well as diverse and abundant populations of seabirds and marine mammals. Moreover, the economically important tourist, commercial and sport fishing industries are dependent upon an understanding of nearshore marine systems.

Research in the institute would focus on the ecology of nearshore Alaskan marine habitats; the biology of Alaskan sea life, marine mammals and seabirds and the monitoring of the effects of the Exxon Valdez oil spill on the marine environment. Research efforts and support would be coordinated with the University of Alaska's Institute of Marine Science. Environmental education programs would have the same goal. The public education effort would be facilitated by the live exhibits of both animals and habitats that are created and used by the scientists for their research. Field trips, for the public, would be conducted by institute staff. These field trips would visit nearby marine habitats that would be readily accessible by small boat or on foot. The environmental education program would be coordinated with that of the Alaska public school system and University of Alaska.

A major resource management effort would be based at the Institute. The goal of this program would be to develop baseline information on both species and habitat diversity within the oil spill affected area. The program would identify the animals and plants that utilize this area as habitat and then map those habitats on a Geographic Information System [GIS]. These kinds of information were sorely lacking at the time of the spill. If made available, as a result of this program, these data would provide invaluable assistance to oil spill response planners and for future damage assessment and restoration efforts in the event of another spill.

A key element of the proposed institute is the relationship between the public exhibits and the needs of the research scientists. These exhibits, especially the aquaria, would allow the public to closely observe marine creatures and habitats that they otherwise would probably never see. These same facilities would serve as holding and observation tanks for researchers. This arrangement has worked quite well in other parts of the country. Examples are the Rosenstiel School of Marine and Atmospheric Sciences [University of Miami] and the Miami Seaquarium; and the Monterey Aquarium and the Monterey Marine Lab [Stanford University].

The institute should be located in an area that provides quick, easy and ice-free boat access to the oil spill affected area. The site should lie immediately adjacent to a source of pollution-free sea water that is not subject to wide fluctuations in salinity or temperature. The site should be connected by paved road to the state road system in order to accommodate both the public and institute staff. A nearby airport with regularly scheduled flights to and from Anchorage is desirable. Reliable electrical power and telecommunications would also be necessary. The time frame for implementation of this option would include: site selection, planning and design, construction, and staffing time.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

The institute would provide support and coordination for direct restoration projects, feasibility studies and monitoring of injured resources and services. Environmental education programs developed and implemented by the institute would help to minimize additional impacts on injured resources and services. Living exhibits would introduce the public to animals and habitats injured by the spill and facilitate an understanding of their life histories and sensitivities to human disturbance.

OTHER INFORMATION

The institute's research, monitoring and education programs would be coordinated with those of the University of Alaska's Institute of Marine Science and the Alaska public school system. Research would also be coordinated with the Prince William Sound Science Center and resource agencies. Monitoring programs funded by the Trustees and those supported by the Prince William Sound Regional Citizens Advisory Council will also be coordinated with that of the institute.

INDIRECT EFFECTS

The institute would have a significant socio-economic impact upon the local community and region. The institute would probably attract numerous tourists, Alaska residents and school children with consequent impacts on the local economy and the regional road system. Staff would require housing as well as urban infrastructure support.

DRAFT

October 12, 1992

OPTION 35 Replacement of archaeological artifacts

INJURED RESOURCES AND SERVICES

Archaeological sites and artifacts

SUMMARY

Conservative estimates based on injury studies to date suggest that between 300 and 500 archeological sites located on State and Federal land within the Exxon Valdez oil spill (EVOS) pathway sustained at least some degree of injury from oiling, oil spill cleanup activities, or vandalism. Site-specific injury is documented in oil spill response records for a sample of 35 known sites. This option seeks to replace and/or recover those artifacts that have been lost and place them in or return them to public ownership for appropriate public display and for scientific uses.

DESCRIPTION

This option would identify institutions (non-Alaskan) and individuals with archaeological artifacts from the oil spill region who would be willing to sell some or all of their artifacts to the Exxon-Valdez oil spill Trustees (member agencies). In turn, the Trustees would transfer acquired artifacts to appropriate public institutions within the oil spill area for public display (i.e. museums) and appropriate scientific uses and study.

Steps to implement this option include: Identify owners of artifacts; prepare list of artifacts available for sale; determine public value of list items (non-monetary value) and prioritize list for public acquisition; acquire artifacts within spending limits; identify appropriate public institutions in the oil spill area for housing and public display of artifacts acquired; transfer artifacts to institutions in oil spill area.

It is estimated that preparation of a list of owners, prioritization of, and actual acquisition would take a period of two years.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

This option will not improve recovery. It will return artifacts to appropriate public agencies and institutions in the oil spill area as a replacement for those artifacts lost.

INDIRECT EFFECTS

Socio-economic

People will see that the state and federal governments are dealing

directly with the lost archaeologic artifacts in the oil spill area by replacing them through acquisitions.

CITATIONS

none

SUBOPTION

35 (b) Investigate incidents of looting and vandalism and strive to regain possession of publicly owned artifacts

DESCRIPTION

This suboption would establish agency and possibly inter-agency teams of law enforcement officers and archaeologists who would investigate cases of looting and vandalism. These teams would operate in the EVOS spill area and strive to recover artifacts taken from the area. Recovered artifacts would be returned to the appropriate public land managing agency, or other public institutions for scientific and public uses.

Approximately three years would be required to establish agency teams, investigate all know incidents of looting and vandalism and take appropriate actions to regain possession of publicly owned artifacts.

MEANS AND POTENTIAL TO IMPROVE RECOVERY

This option will not improve recovery. It will return illegally obtained artifacts to appropriate public agencies and institutions.

INDIRECT EFFECTS

<u>Socio-economic</u>

People will see that the state and federal governments are dealing directly with the looting and vandalism problem associated with archaeologic sites in the oil spill area.

d:sandy\opt#35.sum

October 13, 1992

OPTION 40 Designate Protected Areas

INJURED RESOURCES AND SERVICES This option targets nearshore, coastal and upland habitats supporting injured resources and services. Injured species include seabirds, waterfowl, marine mammals, salmon, trout, herring, rockfish, invertebrates, seagrasses and intertidal algae. Injured services include commercial, subsistence and sport harvests; and aesthetic and recreational uses, such as camping, fishing, birdwatching and kayaking.

SUMMARY

Marine and intertidal areas, and uplands in public ownership can be placed into special state or federal land designations which provide increased levels of regulatory protection. An important feature of special designations is that they can provide a regulatory basis for managing an area on an ecosystem level, with the primary objective of restoring spill injuries. Special designations are appropriate when they provide a beneficial level of protection for multiple recovering resources and services or valuable restoration monitoring opportunities that is not provided by existing regulations. Special designations may not be appropriate when they do not meet the above criteria or place significant restrictions on services injured by the spill.

Different designations place varying amounts of emphasis on providing resource protection, opportunities for public uses, and scientific research. Appropriate designations can be determined by examining: 1) which injured resources and services and research opportunities are supported by an area; 2) what type of additional regulatory protection, if any, is required to continue recovery; and 3) existing and planned human uses of the area. Designations under consideration include: Alaska State Parks, Alaska Department of Fish and Game special areas, National Marine Sanctuaries, Estuarine Research Reserves, U.S. Forest Service Research Natural Areas, National Recreation Areas, and Federal Wilderness areas.

DRAFT ANNOTATED OUTLINE

Draft Annotated Outline
DRAFT RESTORATION PLAN

10/9/92

i. Cover Letter **(front/back [Trustee signatures]) Editor (1 pg)**

ii. Acknowledgements **(Planning Team) John**

iii. Table of Contents **Editor**

iv. Executive Summary **Editor/John/Bob L.**

I. Introduction

A. Purpose of document

Presents the proposed action (see Restoration Framework, page 1) and explains the function of the Draft Restoration Plan as providing overall direction for the restoration process and guidance for implementation of annual work plans, including all anticipated annual and periodic activities. Explains the relationship among alternatives, options and restoration projects and types of actions to implement them. **John/Bob L. (1 pg)**

B. Background

Summarizes the history of the oil spill, including the cleanup; pre-settlement NRDA program; A summary of Trustee Activity since the settlement, including the role of the U.S. District Court of Alaska; criminal and civil settlements; and the EVOS trustee organization and administration. Presents the number and nature of the public's comments received on the Restoration Framework and how they were used. **Ray/Veronica (5-10 pgs)**

C. Spending guidelines for EVOS settlement

1. Civil settlement

Summarizes guidelines for spending civil settlement money. Includes a description of the decision-making process for expenditures. **Chris (2 pgs)**

2. Criminal settlements (state and federal)

Summarizes state and federal guidelines for spending criminal settlement money. Explains

relationship to civil settlement guidelines. **Chris (2 pgs)**

D. Relationship to Draft Environmental Impact Statement

Following a brief outline of the NEPA process, the relationship of the Draft Environmental Impact Statement (DEIS) to the Draft Restoration Plan will be explained. Explains that the DEIS will be programmatic in nature and the impacts of the preferred restoration alternative will be presented and compared with those of all other restoration alternatives. **Ray (1 pg)**

II. Injured Resources and Services

A. Criteria for selecting injured resources and services

Injury criteria will be listed and briefly explained. Any changes from those in the Restoration Framework will be explained. **Sandy (2-3 pgs)**

B. How criteria are applied

The decision-making process for applying the injury criteria will be explained. **Bob L./Sandy (2-3 pgs)**

C. Conclusions: List of resources and services injured: tables/graphics of resources and services that meet the injury criteria

Presents summary of information on the range of injuries from the ecosystem level to individual resources and services as we now understand it. Injuries will be explained in terms of injured life history stages or user groups, the geography of the injury, and the status and prospects for natural recovery. **Bob Spies/Veronica/Sandy/Bob L. (40-80 pgs)**

III. Restoration Options

A. Explanation of restoration options

Briefly explains restoration options: their origins, the evolution of these public and professional ideas into options and the central importance of them to the plan. ***Karen (3 pgs)***

B. Evaluate restoration options

1. Criteria for evaluating restoration options

Identifies and defines criteria that are used in evaluating and ranking candidate restoration options. Explains any changes from Restoration Framework. **Karen (3 pgs)**

2. How criteria are applied

Describes the process used in ranking options (as high, medium, or low) for each criteria. Includes a description of the process used to generate candidate restoration alternatives. Bob L. (3-5 pgs)

C. Evaluate habitat protection and acquisition options

Describes the evaluation process that will be used in identifying and prioritizing habitat for protection and acquisition, including how protection for services will be approached. Includes description of threshold criteria, habitat types, and the imminent threat analysis for determining whether accelerated protection is required due to immediate threats to restoration potential.

Description of other habitat acquisition issues including 1) land management: which agencies would manage the acquired land; how land management considerations (such as the need for survey, and locatable, contiguous blocks) influence purchases; 2) tools for land acquisition: describes the range of potential tools from development moratoriums to fee-simple purchase; 3) multi-species analysis: describes how the decision to purchase may depend on the benefits provided to more than one resource or service type. Bob L./Art/Veronica (10 pgs)

IV. Restoration Plan Alternatives

Indicates that this section presents a range of restoration alternatives. It explains that while a preferred alternative is presented, clearly no final decision will be made as to the selection of a preferred alternative until the public has had opportunity to comment and the Trustees can take full consideration of the public's opinion. The reason for presenting a preferred alternative at this time is the Trustee's desire to indicate direction at this point in the process and to facilitate compliance with the National Environmental Policy Act of 1969, as amended, i.e., simultaneous publication of the Draft Environmental Impact Statement. **Bob L./Sandy will write up-front (5 pgs)**

A. Description of alternatives

3 - 5 Alternatives will be presented.

1. No action alternative (natural recovery)

   Describes the scope and nature of the no action alternative. Explains reliance on natural processes and the limited activities that would occur. Distinguishes between these and the more active restoration options presented in other alternatives. **Bob L./Carol/Karen/Veronica (? pgs)**

2. Other alternative

   Describes the scope and nature of one of the other alternatives (not including the preferred alternative). Presents a summary of the options included in the alternative and considers the following: responsiveness to recognized injuries and the proposed action, timing of implementation, geographic scope of application, and relative amounts of funding required for option categories presented in the alternative (e.g., management of human uses, habitat protection, etc.). **Bob L./Carol/Karen/Veronica (? pgs)**

3. Preferred alternative

   Describes the scope and nature of the preferred alternative. Presents a summary of the options included and considers the following: responsiveness of the alternative to recognized injuries and the proposed action, timing of implementation, geographic scope of application, and relative amounts of funding required for option categories (e.g., management of human uses, habitat acquisition and protection, etc.). **Bob L./Carol/Karen/Veronica (? pgs)**

4. Other alternative

   See annotation for V.A.2. **Bob L./Carol/Karen/Veronica (? pgs)**

B. Comparison of alternatives

   Describes the significant differences between the alternatives so the public can readily see the choices presented. ***Sandy/Veronica (3-5 pgs)***

V. Implementation Process for Life of the Settlement

A. Development of annual budget and work plans (i.e., selection of projects/studies for a given year legal compliance etc...)

Describes the process and timeline the Trustee Council will follow in prioritizing annual research and restoration needs. **Mark F. (3-5 pgs)**

B. Operations/Administration

How the Trustee Council, staff, etc. will operate the restoration program. This will include an organization chart/flow diagram of how restoration program will operate. **Dave Gibbons (3-5 pgs)**

C. Funding mechanisms

1. Current mechanism

Describes the current funding mechanism (court registry account). Explains how the process functions and its effects on the nature, extent and future of the restoration program. **Mark Brodersen (3-4 pgs)**

2. Endowment

Describes the various approaches to endowments that could be suitable for the restoration program. Explains how endowments could function and affect the nature, extent and future of the restoration program. **Mark Brodersen (3-4 pgs)**

D. Monitoring/Evaluation

Presents elements of an integrated, long-term monitoring program designed to follow the rate of recovery of injured resources and services and to evaluate the effectiveness of restoration activities. Also presents an evaluation process to determine if plans, projects and related activities have been implemented as designed. **John/Mark F. (5-7 pgs)**

E. Public participation/Public education

Describes how the Trustee Council will continue to provide for meaningful public involvement over the life of the settlement. This will include information about the Public Advisory Group (i.e., the process used to establish it and any accomplishments to date) and all other efforts by Trustee Council staff to accomplish this goal.

Explains what actions the Trustee Council will take to provide for an appropriate level of public education about the restoration program. Although this is related to public participation efforts, it differs in that the Trustee Council will generate educational products relating to restoration. Educational efforts may, in part, take the form of annual work plan projects. **Peg/LJ Evans (10-15 pgs)**

F. Amendments to the final Restoration Plan

Describes the process for amending the final plan. **Mark F. (2 pgs)**

Appendices

A. Restoration options

Summarizes all options and suboptions. The descriptions will be more detailed than those in the Restoration Framework. **Various authors (70 pgs)**

B. Charter of the Public Advisory Group

Copy of the Public Advisory Group charter **Editor**

List of PAG principal interests Editor

List of current PAG members and their affiliation Editor

C. List of other publications **Editor**

(i.e., 1990 Progress Report, etc...)

D. Court settlement documents **Editor**

E. Glossary **Editor/Chris**

Brochure

Annotation

The brochure summarizes the draft plan and includes the comment sheet for the plan. It is a stand-alone summary that can be distributed separately from the plan for those who are uninterested in reading the full document. **Bob L./Sandy/Editor/Illustrator (2-4 newspaper size pages)**

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PROCESS

CREATING ALTERNATIVES USING THE OPTIONS EVALUATION DATABASE
Description of RPWG's Process

The Basics: Three Questions. The draft restoration plan is built on the answers to three questions concerning each injured resource or service.

- Was it injured?
- Is it recovering?
- What are the possibilities for restoration?

The correct answers to these questions are the basics upon which we construct the restoration plan. The only reason why we do not do all useful restoration options is their combined cost is more than we have available. Thus, we have to make decisions. We construct alternatives -- groups of restoration options for public review -- in order to gather public preferences on the options, and to show the implications of choosing some projects over another.

Options: Groups of Restoration Projects. Rather than make decisions among hundreds (thousands?) of different restoration projects, RPWG grouped similar projects into categories of projects. For example, there are a variety of potential techniques to increase the breeding productivity of murres: decoys, sound recordings, and many physical nest site improvements, all of these are grouped into Option 16 "Increase productivity and success of murre colonies". We used the name Restoration Options for these categories. The options are categories of similar restoration projects. The grouping used the following approach:

1. Ask the public, agencies and resource or service experts what they can think of to do. (1990)
2. Group projects into similar categories: options. (1990)
3. Apply simple criteria to eliminate ineffective projects and groups of projects (ones which will not have significant effect on the resources or services, or which are not within the guidelines of the settlement.) (1991)
4. Ask the public and agencies to review our options. (Restoration Framework Vol I, 1992)
5. Modify options based on public review. (Summer 1992)

Why a database? Answer: Be Systematic. RPWG developed criteria to evaluate options for their effect on an injured resource or service (including some indirect effects such as benefit/cost, or negative impacts on other resources or services). These criteria are presented separately in this package. The criteria definitions were used to evaluate each relevant option for each injured resource or service. In this way, RPWG hoped to eliminate biases from the evaluation and create a systematic repeatable process for developing alternatives. The database evaluates how each option will affect each resource or service. The most important evaluations are: will the option help the rate or degree of recovery, prevent an additional stress from habitat degredation that will hurt the resource or service, enhance the resource or service. Others address technical feasibility, cost, adverse impacts, etc.

In completing the ratings RPWG considered the type of injury. For example, an injury to habitat is usually most effectively restored with an option that addresses habitat. Productivity problems such as non-breeding are not addressed by options that focus on protection only. The database also includes descriptive categories that identify if the focus of an option is manipulation, management of human uses, or protection as well as if it qualifies as direct restoration, replacement, acquisition of equivalent resources or enhancement as described in the settlement document.

The Next Step: Creating Alternatives. RPWG can use the database to organize the options into alternatives. By sorting the database using different perspectives on either the resource/services or on some combination of criteria we are able to identify which options would be included in a particular alternative. For example, what alternatives are available to address the most severely injured species that we know aren't recovering. Which of those are the most effective. The database can also be used to guide implementation of the options and will help RPWG create a coordinated restoration plan.

This step is not yet complete. The purpose of next week's peer review is to look at the overall process to ensure that there are no serious errors, and to review the database evaluation to ensure that we evaluated the options correctly.

BOB SPIES

SUMMARY OF INJURY

Table XX. Summary of injury from Exxon Valdez oil spill.

RESOURCE	INJURY (uncertainty 1-5)*				geographic extent of injury			Degree of recovery (1991)††
	eggs/young	subadults	adults	Total Adult Mortality	PWS	Kenai Peninsula/ Kodiak Island	Alaskan Peninsula	
Harbor seals	yes (2)	yes (2)	yes (2)	approx 200	yes	unknown	unknown	Differences between oiled and unoiled areas persist in PWS, but there is an upward population trend in the oiled area.
Sea otters	yes (1)	yes (1)	yes (1)	approx 4,600	yes	yes	yes	Boat survey data have not established a significant recovery, a large proportion of prime-age animals are still being found on beaches.
River otters	unknown	unknown	yes (4)	approx. 12	yes	unknown	unknown	Some sub-lethal indicators of possible oil exposure remain in 1991.
Killer whales	no	yes (3)**	yes (3)**	13	yes	unknown	unknown	The AB pod has grown by 2 whales since 1990.
Common murres	yes (1)***	yes (1)****	yes (1)	175,000 to 300000	no	yes	yes	Breeding is still inhibited in some colonies in the Gulf of Alaska.
Marbled murrelets	no	yes (1)	yes (1)	8,000 to 12000	yes	?	?	
Black oyster catchers	yes (4)	?	yes (3)	approx. 120	yes	yes	unknown	Differences in egg sizes between oiled and unoiled areas persist.
Bald eagles	yes (4)	unknown	yes (3)	150+	yes	yes	unknown	Population estimates unaffected and productivity returned to normal in 1990.
Pigeon guillemots	no	probably	yes (1)	approx 3,000	yes	yes	unknown	Unknown.
Harlequin ducks	yes	probably	yes (2,4)	approx 1,000	yes	yes	unknown	Still very little breeding in the spill areas of PWS.
Other sea birds	yes	yes	yes	375,000 to 435000	yes	yes	yes	In general total sea bird recovery has not been measured.
Pink salmon	yes (1)	yes (4)	no (5)	not detected	yes	unknown	unknown	Egg mortality continues to be high in oiled streams of PWS in 1991.
Sockeye salmon	yes (1)	yes (1)	unknown	unknown	no	yes	no	Smolt survival continues to be poor in the Kenai River system as

Table XX. Summary of injury from Exxon Valdez oil spill.

RESOURCE	INJURY (uncertainty 1-5)*				geographic extent of injury			Degree of recovery (1991)††
	eggs/young	subadults	adults	Total Adult Mortality	PWS	Kenai Peninsula/ Kodiak Island	Alaskan Peninsula	
								a result of the overescapements in 1987, 1988, and 1989.
Pacific herring	yes (2)	unknown	unknown	unknown	yes	unknown	unknown	Effects on eggs and larvae were evident in 1989 and to a lesser extent in 1990. In 1991 there were no differences between oiled and unoiled areas.
Rockfish	no	unknown	yes (3,4)	greater than 5 individuals	yes	unknown	unknown	Unknown.
Dolly varden	no	no	yes (2)†	unkown	yes	unknown	unknown	In 1991 differences in survival between anadramous adult populations in the oiled and unoiled areas persisted despite the decrease in exposure indicators.
Cutthroat trout	no	no	yes (2)	unkown	yes	unknown	unknown	In 1991 differences in survival between anadramous adult populations in the oiled and unoiled areas persisted despite the decrease in exposure indicators.
Intertidal organisms / communities	yes (1)	yes (1)	yes (1)	not calculated	yes	yes	yes	Upper intertidal zone has not yet recovered.
Subtidal communities	unknown	yes (2)	yes (2)	not calculated	yes	unknown	unknown	Recovery is not known, but differences between oiled and unoiled areas established in 1990.

* 1. dead organisms found or measurable affect on populations with comparisons to pre-spill conditions, little doubt of injury
2. Few dead organisms found after spill, or measurable difference in populations between oiled and unoiled areas
3. A small number of adults killed, no effects determined on population
4. Significant exposure to hydrocarons and some sub-lethal effects determined, but no effects established on population.
5. Significant exposure to hydrocarbons but no effects established

**The coincidence of 13 whales missing from AB at the time of the spill is very suggestive of an effect, but there is also much evidence to suggest that they could not have been killed by the spill.

***The loss of eggs was due to poor reproductive success in affected colonies, such as those on the Barren Islands in 1989-1992.

****The carcasses have not been aged but it is thought that at least some sub-adults were affected by the spill.

† Differences have been measured in the rate of return of tagged fish to oiled and unoiled streams in 1990 and 1991.

†† Data from the 1992 field season has not been evaluated in most cases .

DRAFT EVALUATION CRITERIA

OPTIONS EVALUATION DATABASE
Draft Evaluation Criteria
Rating Restoration Options for their Effect on each Resource and Service

CRITERIA

1a. **Potential to improve the rate or degree of recovery:** Will implementation of the restoration option accelerate the recovery of an injured resource or service?

Further Explanation: This criterion answers the question, "How much will the option help the targeted injury?" It evaluates whether the option will decrease the amount of time required for an injured resource or service to recover. In evaluating options under this criterion, the working group assumes that the option will perform as expected. For example, the group assumes that an option that uses decoys to synchronize murre breeding in a colony will indeed synchronize the breeding. The question of will the option produce the outputs it promises (e.g., restore breeding in murres, actually clean mussel beds, etc.) is considered in criteria #2, technical feasibility.

Rating Categories:

High = Potential to greatly improve the rate or degree of recovery for a significant portion of the injured resource or service.

Medium = Has potential to either:

a. greatly improve the rate or degree of recovery for at least a small portion of the injured resource or service; or,

b. produce a small improvement in the rate or degree of recovery for a large portion of the injured resource or service; or

c. produce a moderate effect in the rate or degree of recovery for a moderate portion of the injured resource or service.

Low = Potential for a small improvement in the rate or degree of recovery over a small portion of the injured resource or service area.

1b. Potential to prevent further degradation or decline? Will implementation of the restoration prevent further degradation or decline in an injured resource or service?

Rating Categories:

High = Potential to prevent substantial degradation or decline for a significant portion of the injured resource or service.

Medium = Has potential to either:

a. prevent substantial degradation or decline for at least a small portion of the injured resource or service; or,

b. prevent small degradation or decline for a large portion of the injured resource or service; or

c. prevent moderate degradation or decline for a moderate portion of the injured resource or service.

Low = Potential to prevent small degradation or decline for a small portion of the injured resource or service area.

NA = Not applicable; option focuses on restoration, not prevention of degradation or decline.

2. Technical feasibility: Are the technology and resource management skills available to successfully implement the restoration option in the environment of the oil-spill area?

Further Explanation: Techniques for restoring different injuries from the oil spill vary from the experimental to the proven. In this criterion, options are rated for the documented evidence that they can meet the objectives they aim for. If the objective is to increase the breeding ability of a bird species, this criterion is used to evaluate the team's confidence that the option can, in fact, achieve that objective. For feasibility options, this criterion is rated with a Yes or No. If Yes, the option is carried on in the evaluation process. If No, it is rejected.

Rating Categories:

High = There is documented evidence that the option works consistently when applied to the injured resource or service.

Medium = There is documented evidence that the option has the potential to restore a similar resource or service; or has produced mixed results when applied to the injured resource or service.

Unproven = The technical feasibility is unproven, but there is reason to believe it is feasible. If an option has unproven technical feasibility, it may be appropriate for a feasibility study and be re-evaluated before it is fully implemented.

3. **Degree to which proposed action benefits more than one resource or service:** Would the restoration option benefit multiple resources or services, both injured target resources or services, as well as non-target resources or services?

   Further Explanation: This criterion evaluates whether the option will help more than one resource or service, or whether it will restore a resource that provides food or habitat for many others.

   Rating Categories:

   High = Benefits more than one resource including at least one that supports multiple trophic levels (e.g. mussels, *Fucus*, salmon etc...). Benefiting these resources will produce high benefits for multiple resources or services which depend on them.

   Medium = Benefits more than one resource or service.

   Low = Benefits one resource or service.

4. **Degree to which proposed action enhances the resource or service:** Would the restoration option improve on the quality or create an additional quantity of natural resources or services that go beyond pre-spill levels?

   Rating Categories:

   High = The option has the potential to bring the resource or service greatly beyond pre-spill levels for a significant portion of the spill area.

   Medium = Has the potential to either:

   a. bring the resource or service greatly beyond pre-spill levels for at least a small portion of the injured resource or service; or,

   b. bring the resource or service beyond pre-spill levels by a small amount for a large portion of the injured resource or service; or

   c. bring the resource or service beyond pre-spill levels by a moderate amount for a moderate portion of the injured resource or service.

   Low = Would **not** bring the resource or service beyond pre-spill levels for a significant portion of the spill area.

5a. **Potential for no additional injury *to resources* resulting from proposed actions, including long-term and indirect impacts:** Will implementation of the restoration option result in additional injury to target or nontarget resources: Is the project of net environmental benefit?

Further Explanation: This and the following criteria considers injuries that an option might cause to other resources and services. For ease of evaluation, the injuries to resources and to services are recorded separately; that is, criterion 5a records additional injury to resources; and 5b, to services.

Rating Categories[1]:

High = There is no expectation of additional injury *to resources.*
Medium = Any additional injury *to resources* will be minor or short-term.
Low = Major or long-term injury *to resources* could result from implementation of this option.

5b. **Potential for no additional injury *to services* resulting from proposed actions, including long-term and indirect impacts:** Will implementation of the restoration option result in additional injury to target or nontarget services: Is the project of net environmental benefit?

Rating Categories[1]:

High = There is no expectation of additional injury *to services.*
Medium = Any additional injury *to services* will be minor or short-term.
Low = Major or long-term injury *to services* could result from implementation of this option.

[1] For purposes of evaluating these criteria, returning to a condition that existed pre-spill is not considered an injury. For example, if the spill decreased the population of a predator species which, in turn, caused an increase in the prey species, and if restoring the predator species to pre-spill levels will cause the prey species to return to its pre-spill levels, then the fall in prey population not an additional injury for purposes of these criteria.

6. **Potential effects of the action on human health and safety:** Are there hazards to or adverse impacts on humans associated with implementation of the restoration option?

Rating Categories:

High = There is no evidence for adverse effects on human health or safety to the public.
Medium = There is evidence for some adverse effects on human health or safety to the public.
Low = There is evidence for significant adverse affects on human health and safety to the public.

7. **The relationship of the expected costs of the proposed actions to the expected benefits:** Do benefits equal or exceed costs?

   Further Explanation: This is not intended to be a straight cost/benefit analysis, but a broad consideration of the direct and indirect costs [including lost uses] and the primary and secondary benefits associated with implementation of the restoration option.

   Rating Categories:

   High = There are outstanding benefits associated with improving the rate or degree of recovery of the resource or service, and it can be done at low or modest cost.

   Medium = Less than outstanding benefits at modest or low cost, or high benefits at high cost.

   Low = There is a high cost that is not balanced by outstanding benefits.

TRACKING CRITERIA. These criteria are used to track information that may be useful to RPWG, the RT, and the Trustees. They may be used to develop recommendations for implementation and for ranking options within an alternative.

9. **Will the restoration opportunity be lost if implementation of the option is delayed?** Would delay in the option result in further injury to a resource or service, or would we forego a restoration opportunity?

   Further Explanation: This criterion is important for scheduling implementation. For example, timing is critical if the Trustees are to purchase habitat under an imminent threat scenario, if we are to restore a species population that is currently not breeding in adequate numbers, or if we are to prevent the decline of threatened archaeologic resources.

   Rating Categories:
   Yes = An opportunity will be lost if implementation is delayed.
   No = An opportunity will not be lost if implementation is delayed.

10. **Public comments.** This portion of the evaluation records whether or not significant numbers of public comments were received concerning an option. An accompanying field includes a summary of the comments.

    Categories:
    Positive = Generally supportive comments received.
    Negative = Generally negative comments received.
    Mixed = Both positive and negative comments received.
    No rating = Did not receive significant public comments specific to the option.

ADDITIONAL CHARACTERISTICS FOR EVALUATION DATABASE

We anticipate that the following characteristics will be useful in describing the alternatives (e.g., What portions of the alternatives are Habitat Acquisition versus Management etc...).

The following characteristics will be answered with Yes or No:

FRAMEWORK ALTERNATIVES

1. Management of Human Use
2. Manipulation of Resources
3. Habitat Protection

Note: The categories below are not mutually exclusive. It is possible say "Yes" to more than one components under any of the three headings.

SETTLEMENT CATEGORIES

1. Direct Restoration
2. Replacement
3. Acquisition of Equivalent Resources
4. Enhancement

OTHER CRITERIA FROM THE RESTORATION FRAMEWORK. The criteria below are from the Restoration Framework. They were considered but will not be used in the evaluation of individual options for the reasons noted below.

Criterion: **The effects of any other actual or planned response or restoration actions:** Are there other actions, such as additional clean-up work, that bear on the recovery of a resource targeted by the restoration option?

Reason: On an option level, this criteria overlaps with number 3 (Degree to which proposed action benefits more than one resource or service) and number 5 (Potential for additional injury resulting from proposed actions...). It remains useful on a project-specific level to ensure coordination between projects. Therefore it should be taken into account on annual work plans which will implement the restoration plan.

Criterion: **Cost Effectiveness:** Does the restoration option achieve the desired objective at the least cost?

Reason: Useful on an implementation level; however, the criterion is useful to choose between projects within an option (if two projects give similar outputs, but one is cheaper). On the option level, this criterion is not an effective measure.

Criterion: **Consistency with applicable Federal and State laws and policies:** Is the restoration option consistent with the directives and policies with which the Trustee agencies must comply? Potential conflicts must be resolved prior to implementation.

Reason: All options comply with this criteria. Thus, it is not useful to compare options to each other. As the criteria indicates, any potential conflict must be resolved before implementation. Projects done to implement the restoration plan must still comply with NEPA, agency permitting requirements, etc.

INDEX FOR OPTION SUMMARIES

AVIAN ENVIRONMENTAL SCIENCES

Wildlife Toxicology and Avian Ecology

D. Michael Fry

RECEIVED
OCT 2 7 1992
OIL SPILL OFFICE

John Strand, Chairman
Restoration Planning Work Groups
NOAA/NMFS
11305 Glacier Hwy
Auke Bay, AK 99821

Dear John,

I was particularly pleased to be able to participate in the Restoration Team's planning session held in Anchorage, October 19-21, 1992 and to be able to make forthright recommendations concerning the framework for developing a coherent restoration plan for the Exxon Valdez Oil Spill. I think the meetings went extremely well, with frank discussion of both philosophy and implementation of projects.

I would like to offer some additional comments pertinent to injury and restoration of bird populations involved in the spill.

There were significant differences of opinion expressed by Peer Reviewers for birds concerning the utility and wisdom of conducting specific restoration projects. The relative merit of these projects compared to broad, large scale protection efforts to purchase lands or designate special use areas.

I wish to specifically endorse the efforts of the many Principal Investigators, USFWS administrators and Restoration Team members who have developed the species and site specific restoration projects for birds after several years of intensive study. The majority of projects have high merit, and the care and specificity with which they have been designed is, in my opinion, clear. Many of these projects will be technically difficult to accomplish, and some are not without risk of failure. I believe strongly, however, that the very high value of the injured ecosystem and the high visibility of the spill and response demand every reasonable effort to attempt restoration. The ecosystems and the oil spill disaster are both unique, and both have set precedents in law, and in response technology. A parallel pioneer effort in restoration is justified. I commend your attempts.

My companion Peer Reviewer, Brian Sharp, is much less hopeful that many of the restoration projects are worthwhile, and feels that much more emphasis should be placed on special designation of large areas and purchase of lands for permanent protection. In my opinion, he has abandoned efforts to restore injured populations and is no longer working to aid the Agency personnel who have worked to develop restoration projects. Some may seem

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risky, some have been described by non-scientists as almost absurd. They are not. Now is not the time to retrench and withdraw into the position of using settlement monies to only acquire lands and to make simplistic policy decisions to designate areas as special or important. Projects must be implemented to correct the injury, not just preserve the injured status quo and hope that time and mother nature will restore the ecosystem.

I would like to recommend to you to very seriously consider funding most, if not all, of the innovative restoration projects which have been proposed. They have been designed by very competent scientists, with much experience, and deserve serious support.

The settlement monies provided by Exxon are unprecedented. They should be expended carefully, but they should be divided into broad categories including protection, action and education. Action is especially justified, since the ecosystem is so unique. Please give very serious consideration to funding the proposed bird restoration projects.

I would like to offer my expertise in assisting specific design and implementation of any projects considered high risk, in an effort to improve them whenever possible to increase the probability of success. I think the development of an innovative Restoration Plan is extremely important. If everyone's effort is not encouraged, the restoration efforts here and for future oil spills may be lost.

The Restoration Team and Trustees are in a position to make positive gains for the future.

Thank you,

D. Michael Fry
Peer Reviewer for Birds
Dept. of Avian Sciences
UC Davis
Davis CA 95616