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ID Team Meeting - 2/8/94

Attending: Gerry Sanger (FWS); Bill Hauser (ADF&G); Fred Clark (FS); Karen Klinge (FS); and Rod Kuhn (FS) - Leader

(The meeting got off to a late start. It was originally scheduled to begin at 11 am. but didn't start until approximately 11:45. This was due to Rod being involved in a teleconference with ADF&G. Fred and Bill arrived late and the meeting began.)

Rod began the meeting with an overview of key documents and events leading up to this EIS. Copies of key documents were given to those who did not already have copies.

List of documents:

- Restoration Framework - Vol. 1
- Restoration Plan Brochure
- Supplement to Draft Restoration Plan
- Summary of Public Comment on Alternatives
- Walcoff Contract PDEIS
- Draft Restoration Plan (11/93)

Karen offered to meet with each specialist to familiarize them with the information she has from her involvement with the restoration planning group and the interviews with the principle investigators.

Rod described the contents of each chapter in the EIS. He also described the "no action" alternative as being no further spending of the restoration funds and relying on natural recovery to restore the resources. No restoration funds would be spent on monitoring or research either.

Rod went on to describe the concepts of "impact," "impact topic," "short-term and long-term impacts," and "cumulative effects."

Rod went on to describe the content of chapter 4 of the EIS in greater detail. He pointed out that each specialist would be writing the analyses for their resources for each alternative.

Rod described the limitation on what needed to be analyzed being tied to the Trustee Council approving the expenditure of funds. If the Council only recommends that an agency follow a particular management strategy, then the resulting action is an individual agency decision and would be their responsibility to comply with NEPA.

Rod went into what is meant by the concept of this being a "programmatic EIS." He tried to make it clear that specific projects may require further site specific NEPA documentation.

Rod asked each team member to do the following:

1. Read Chapter 3 Walcoff and see if they can live with what it contains. if not to make necessary changes.
2. Get with Karen and learn what information is available.

3. Come up with a brainstormed list of potential projects that would benefit their resources.
4. Begin thinking (and if possible writing) about the No Action alternative impacts.

The meeting concluded with a discussion of impact topics. These would be the specific things that would be impacted by the various actions contained in the alternatives. Some examples would be:

pink salmon
sockeye salmon
rockfish*
herring
cutthroat trout*
dolly varden trout*

* these may be able to be eliminated from detailed analysis because of their degree of injury/recovery status and the level; of public concern.

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IDT MTG

ATTENDING - GERRY SANGER, BILL HAUSER, FRED CLARK, KAREN KLINGE, ROD KUHN

ACTIONS

[illegible]

EDUCATION

HABITAT (ACQUISITION) PROTECTION (# OF ACRES / ALTERNATIVE)

[illegible] MUDFLAT BEDS - DUCKS / [illegible]

MIGRATION CORRIDOR IMPROVEMENT - PINKS & ~~REDS~~ SOCKEYE

NUTRIENT ENRICHMENT - SOCKEYE

EGG BOXES
NET PENS
HATCHERY REARING
} BOOTH

HABITAT IMPROVEMENT - PINKS

RELOCATE HATCHERY RUNS - BOOTH

KILL FOXES -

[illegible] RATS -

TRANSPLANT EAGLES -

RESTRICT PREDATOR ACCESS

ACTIONS

ARCH – SEE BROCHURE + INVENTORY + EXCAVATION

TRANSPLANT FOCUS

MARICULTURE CLAMS

CLEAN SEDIMENT

CLEAN MUSSEL BEDS

CREATE NEW FISHERIES

FACILITIES:

ARCHAEO REPOSIT – KODIAK (FUNDED)

~~SEWARD INSTITUTE OF MARINE SCIENCE~~

AK MARINE RESEARCH INSTITUTE

OTHERS POSSIBLE

ENDOWMENT

IMPACT TOPICS

PUBLIC IDENTIFIED:

- "ALL INJURED RESOURCES"
- SUCKER
- FINES
- HERRING
- SUBSISTENCE
- RECREATION &
- TOURISM

INJURED RESOURCES & SERVICES

- SEE TABLE B-1 - DRP

IMPACT TOPICS DROPPED

- BIRDS OF PREY - RECOVER (R)
- ✓ CUTTHROAT - MINOR PART OF PROG.; RECOVERY UNKNOWN
- ✓ DUSKY WARBLER - " " " " ; RU
- ✓ BLACK OYSTERCATCHERS - R
- ✓ KILLER WHALES - R (OVERALL ECOSYSTEM BENEFITS WILL ALSO BENEFIT OTHER)
- ✓ RIVER OTTER - SMALL PART OF PROGRAM - RU
- ✓ ROCKFISH - RU
- ✓ SOME INTERTIDAL SPECIES - ALL BUT -
- ✓ SOME SUBTIDAL SPECIES - ALL BUT -

SPORT HUNTING - NO ACTIONS PROPOSED; AGENCY REGULATION

PASSIVE USES - NO ACTIONS PROPOSED; GENERAL BENEFITS FROM RESTOR

IMPACT TOPICS ANALYZED:

- ✓ COMMERCIAL FISHING
- ✓ [illegible]
- ✓ PINK SALMON
- ✓ [illegible]
- ✓ SUB[illegible]
- ✓ HARBOR SEALS
- ✓ [illegible]AMS
- ✓ [illegible]
- ✓ SEA OTTERS
- ✓ COMMON MURRES
- ✓ HARLEQUI[illegible]
- ✓ MARBLED MURRELET
- ✓ PIGEON GUILLEMOT
- ✓ [illegible]
- ✓ VISUAL RESOURCES
- ✓ ECOSYTEM GENERAL
- ✓ SPORT FISHING
- ✓ [illegible]
- ✓ TOURISM
- ✓ DESIGNATED WILDERNESS (STUDY AREAS ALSO)

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February 24, 1994

IDT Members,

The attached table is intended to display what we came up with in our meeting last week. I would like you each to look it over and make your own estimate of what actions fit with which alternative. Please look at the brochure to be sure that your responses are within the bounds of the alternatives (1-4) described in it. We will be meeting to come up with what we believe "fits" it best. There are blanks provided for you to add items if you think of any. The comment block is for you to jot down notes to clarify what needs clarifying.

When marking columns, it would be good for you to estimate the number of each type of project you see being done under each alternative.

The additional sheets are the notes from the flipcharts etc. from our meeting.

This is not intended to restrict your creativity in anyway! Have at it!

Thanks!
Rod

IMPACT TOPICS AND ASSOCIATED PROPOSED ACTIONS BY ALTERNATIVE							
		Alternatives					
Impact topic	Action	1 **No Action**	2 **Habitat Protection**	3 **Limited restoration**	4 **Moderate Restoration**	5 (Proposed Action) **Comprehensive Restoration** (Modified) (draft Restoration Plan)	Comments
Pink Salmon	Habitat protection						
	Migration corridor improvements						
	Egg boxes						
	Net pens						
	Hatchery rearing						
	Habitat improvement						
	Relocate hatchery runs						

IMPACT TOPICS AND ASSOCIATED PROPOSED ACTIONS BY ALTERNATIVE							
		Alternatives					
Impact topic	Action	1 **No Action**	2 **Habitat Protection**	3 **Limited restoration**	4 **Moderate Restoration**	5 (Proposed Action) **Comprehensive Restoration** (Modified) (draft Restoration Plan)	Comments
Sockeye Salmon	Habitat protection						
	Migration corridor improvements						
	Nutrient enrichment						
	Egg boxes						
	Net pens						
	Hatchery rearing						
	Relocate hatchery runs						
Pacific herring							

IMPACT TOPICS AND ASSOCIATED PROPOSED ACTIONS BY ALTERNATIVE

Impact topic	Action	Alternatives					Comments
		1 **No Action**	2 **Habitat Protection**	3 **Limited restoration**	4 **Moderate Restoration**	5 (Proposed Action) **Comprehensive Restoration** (Modified) (draft Restoration Plan)	
Clams	Mariculture clams						
	Clean sediment						
Fucus	Transplant *Fucus*						
Harbor seals	Habitat protection						
	Education						
Sea otters	Habitat protection						
	Clean mussel beds						
	Education						

IMPACT TOPICS AND ASSOCIATED PROPOSED ACTIONS BY ALTERNATIVE							
		Alternatives					
Impact topic	Action	1 **No Action**	2 **Habitat Protection**	3 **Limited restoration**	4 **Moderate Restoration**	5 (Proposed Action) **Comprehensive Restoration** (Modified) (draft Restoration Plan)	Comments
Common murres	Habitat protection						
	Predator control						
	Education						
Harlequin duck	Habitat protection						
	Clean mussel beds						
Marbled murrelet	Habitat protection						
	Predator control						
Pigeon guillemot	Habitat protection						
	Predator control						

IMPACT TOPICS AND ASSOCIATED PROPOSED ACTIONS BY ALTERNATIVE								
		Alternatives						
Impact topic	Action	1 **No Action**	2 **Habitat Protection**	3 **Limited restoration**	4 **Moderate Restoration**	5 (Proposed Action) **Comprehensive Restoration** (Modified) (draft Restoration Plan)	Comments	
Commercial fishing	Habitat protection							
	Enhance or create replacement runs							
	Enhance existing runs of uninjured pink and sockeye salmon							
	Hatchery rearing							
	Relocate hatchery runs							
Sport fishing	Habitat protection							
	Create new fisheries							

IMPACT TOPICS AND ASSOCIATED PROPOSED ACTIONS BY ALTERNATIVE

Impact topic	Action	Alternatives					Comments
		1 **No Action**	2 **Habitat Protection**	3 **Limited restoration**	4 **Moderate Restoration**	5 (Proposed Action) **Comprehensive Restoration** (Modified) (draft Restoration Plan)	
Recreation	Habitat protection						
	Construct new facilities						
	Improve existing facilities						
Tourism	Habitat protection						
	Construct new facilities						
	Improve existing facilities						
Subsistence	Habitat protection						
	Clean mussel beds						
	Mariculture clams						
	Food testing						
	Access assistance						

IMPACT TOPICS AND ASSOCIATED PROPOSED ACTIONS BY ALTERNATIVE							
		Alternatives					
Impact topic	Action	1 **No Action**	2 **Habitat Protection**	3 **Limited restoration**	4 **Moderate Restoration**	5 (Proposed Action) **Comprehensive Restoration** (Modified) (draft Restoration Plan)	Comments
Archaeology	Archaeology Repository						
	Inventory sites						
	Excavate sites						
	Implement site stewardship program						
	Preserve sites (stabilization)						
	Acquire replacement artifacts						
Visual resources	Habitat protection						
Designated wilderness	Habitat protection						
	Remove residual oil						

IMPACT TOPICS AND ASSOCIATED PROPOSED ACTIONS BY ALTERNATIVE							
		Alternatives					
Impact topic	Action	1 **No Action**	2 **Habitat Protection**	3 **Limited restoration**	4 **Moderate Restoration**	5 (Proposed Action) **Comprehensive Restoration** (Modified) (draft Restoration Plan)	Comments
Ecosystem	Habitat protection						
	Marine research institute						
	Clean sediment						
?	Waste oil facility						
All Resources	Endowment						

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SANGER'S INPUT FOR 02-28-94 EIS TEAM MEETING

RE: Rod's summary outline matching Impact Topic (resources, etc), Alternatives, and Actions. Numbers below refer to corresponding numbers on summary outline.

Alternative 1: No Action

1. Common Murre: No **Habitat Protection** would have little impact on COMU pops since major colonies are already protected under FWS refuge status. Loss of some small colonies on SW Kodiak coast may be a very remote possibility. Land status "state or municipal."

2. Common Murre: No **Predator Control** would have little effect on recovery within the spill zone, although **Predator Control** at selected islands on AMNWR land downstream from the spill zone planned by the FWS would be affected, and overall populations in the Gulf of Alaska therefore would be slower to recover to pre-spill levels.

3. Common Murre: No directed **Education** may result in tour and fishing boat operators and general public becoming aware of their potential harmful impacts on COMU colonies at a slower rate than may happen with specific, directed education programs. ADF&G, Chugach National Forest and FWS already have general Watchable Wildlife and public education programs.

4. Harlequin Duck: No **Habitat Protection** may mean loss of nesting habitat, and possibly some foraging habitat, to logging or other development or other activity that destroys or intrudes upon nesting habitat, including tourism and/or recreation development. However, such destruction/intrusion would seem to be best determined on a case-by-case basis; not all habitat not already in a protected status may be equally valuable to HADU's.

5. Harlequin Duck: Not **Cleaning Mussel Beds** may mean a temporary loss/reduction in foraging habitat. This may result in slower recovery in specific segments of the HADU population in the oiled zone. However, the overall affect on Sound-wide population may be negligible, since July post-spill HADU population appears to have been stable in 1990, 1991 and 1993 (no 1992 survey) (Agler et al DRAFT ms).

6. Harlequin Duck: No **Directed Management** re: restricted hunting seasons may mean smaller population to enhance reproduction/natural recovery.

7. Marbled Murrelet: No **Habitat Protection** may mean loss of nesting habitat, and possibly some foraging habitat, to logging or other activity that destroys or intrudes upon forest nesting habitat, including tourism and/or recreation development. However, such destruction/intrusion would seem to be best determined on a case-by-case basis; not all habitat not already in a protected status may be equally valuable to MAMU's.

8. Marbled Murrelet: No **Predator Control** would likely have little impact on MAMU

recovery, because of the practical constraints on controlling MAMU predators. Although predation on MAMU's has been witnessed on Naked Island (Kuletz), it may have been magnified because predators (crows) apparently located MAMU nests by watching biologists working on the nests. Regardless, MAMU's have such an extremely dispersed nesting distribution that predator control would not be a practical consideration. A possible exception would be to eliminate (kill) avian predators on a case-by-case basis near known nest sites; this could cause agency PR problems, however.

9. Pigeon Guillemot. No **Habitat Protection** could possibly mean loss of nesting habitat. However, PIGU's nesting habitat consists of a very narrow strip of land immediately adjacent to the intertidal zone, and usually in rocky, steep, and generally inaccessible locations. Also, with only two exceptions, the largest PIGU colonies in PWS are on CNF land that is not slated for logging or other development (B. Vanzee, pers comm.). Development of coastal facilities such as harbors that happened to be at or near colonies may impact PIGU recovery. From a practical standpoint, the two colonies on native land in PWS are on remote, exposed, steep and rocky sites, on The Pleiades Islands and at the SE corner of Bligh Island, and do not appear to be suitable for any development that would hinder PIGU breeding anyway.

10. Pigeon Guillemot. No **Predator Control** could hinder PIGU restoration in PWS. Predation has been suggested as a possible factor in declining PIGU pops in PWS, although there are very few data on the extent and nature of predation on PIGU's in the spill zone or elsewhere in PWS.

Alternative 2: Habitat Protection

11. Common Murre: Maximizing **Habitat Protection** as allowed under this alternative would have relatively little impact on COMU populations since major colonies are already protected under FWS refuge status. However, purchasing The Triplets (owned by Ouizinkie Corp?), in Marmot Bay, between Kodiak and Afognak Islands, would assure protection of a colony of about 1,300 COMU (1977 census). Similarly, assuring protection of the few small colonies State/Municipal on SW Kodiak coast would affect a small portion of the COMU population in the spill area.

12. Common Murre: Theoretically, **Predator Control** would address an injured resource and would provide improvement over natural recovery. However, the degree of predation on COMU's within the spill zone alone (Alt 2 policy) may be insignificant. Red foxes and avian predators occur naturally adjacent to colonies on the mainland and Kodiak, but it seems unlikely that introduced predators are a factor within the spill zone.

13. Common Murre: **Education** funds may be limited under this alternative.

14. Harlequin Duck: **Habitat Protection** under this alternative would maximize protection of HADU nesting habitat, and possibly some foraging habitat. However, without knowing breeding population sizes on individual parcels of land, it is difficult to say what affect the protection of any given parcel would have on overall harlequin population size. Sound-wide population estimates showed a decline in the oiled zone after the spill (Klosiewski and Laing Draft ms). However, estimates for the entire Sound, oiled and unoiled zones combined, suggest that populations in March were essentially the same before and after the spill, and that they actually increased significantly in July between 1972, and 1990, 1991 and 1993 (Klosiewski and Laing DRAFTms, Agler et al DRAFT ms).

If the above estimates are accurate, it implies that, while there was a population decline in the oiled zone of PWS, which corroborates Patten's studies, the decline was more than offset by an overall population increase in the non-oiled zone. The three-year post-spill population estimates for July were consistent at approximately 5,500 - 11,500, but more years of data are needed to determine if there is a trend. We should not ignore the fact that the best data for PWS population size does not support a conclusion of a declining population in PWS. FWS data should be examined for frequency of duckling broods in July data as index of production to corroborate/refute Patten's data.

15. Harlequin Duck: **Cleaning Mussel Beds** would likely enhance recovery by speeding up recovery of mussels and other HADU prey, thus broadening the food base. However, the overall affect on Sound-wide population may be difficult to determine.

16. Harlequin Duck: **Directed Management** re: restricted hunting seasons may mean a larger population to enhance reproduction/natural recovery.

17. Marbled Murrelet: **Habitat Protection** would enhance population stability by not allowing a decrease in nesting habitat. However, the most recent PWS population assessment suggests that the population has been stable for years 89, 90, 91 and 93; more years of data are needed to determine if this is a satistical trend. The population estimate is still lower than the 200,000 - 400,000 estimated in 1972, although the July 93 estimate (117,000 to 200,000) is higher than the prior three years of post-spill data, and it is approaching the lower limit of the 1972 estimate.

Practical considerations re: murrelets: It would be difficult if not impossible to assess overall affect of forest habitat protection for individual parcels of land without knowing breeding population size on each parcel. In my view, the best available data (Agler et al) suggest that the population as a whole is more likely to be stable than declining.

18. Marbled Murrelet: **Predator Control** would likely have little impact on MAMU recovery, because of the practical constraints on controlling MAMU predators. Isolated cases of predation on MAMU's has been witnessed on Naked Island (Kuletz), but it may have been magnified because predators (crows) apparently located MAMU nests by watching biologists working on them. Regardless, MAMU's have such an extremely dispersed nesting distribution

that predator control would not be a practical consideration. A possible exception would be to eliminate (kill) avian predators on a case-by-case basis near known nest sites; this could cause agency PR problems, however.

Alternative 3: Limited Restoration

21. Common Murre: **Habitat Protection** as allowed under this alternative would have relatively little impact on COMU populations since major colonies are already protected under FWS refuge status. Protection of The Triplets (owned by Ouizinkie Corp?), in Marmot Bay, between Kodiak and Afognak Islands, would assure protection of a colony of about 1,300 COMU (1977 census). Similarly, assuring protection of the few small colonies State/Municipal on SW Kodiak coast would affect a small portion of the COMU population in the spill area. However, since these are not major colonies, and thus would not produce substantial improvement in population recovery, it seems doubtful that these actions would fall under this alternative.

22. Common Murre: **Predator Control** within the spill zone would not seem to provide substantial improvement over natural recovery. The degree of predation on COMU's within the spill zone alone (Alt 2 policy) is unknown.

23. Common Murre: **Education** directed specifically to tour and fishing boat operators would increase their awareness of *their* potential harmful impacts on EVOS-impacted COMU colonies. This would help maximize improvement over natural restoration. This is reportedly a growing problem near the Barren Islands; e.g., noise from guns discharged to kill halibut on fishing charter boats flushes adult COMU's from nesting cliffs, which knocks eggs and chicks off the cliffs. It's unlikely that this is a problem in the Kodiak area, but Kodiak charter operators should also be made aware of the situation.

24. Harlequin Duck: **Habitat Protection** under this alternative would help protect HADU nesting habitat, and possibly some foraging habitat. However, without knowing breeding population sizes on individual parcels of land, it is difficult to say what affect the protection of any given parcel would have on overall harlequin population size. The Sound-wide population estimates showed a decline in the oiled zone after the spill (Klosiewski and Laing Draft ms). However, the population estimate for the entire Sound, oiled and unoiled zones combined, suggest that populations in March were essentially the same before and after the spill, and that they actually increased significantly in July between 1972, and 1990, 1991 and 1993 (Klosiewski and Laing DRAFTms, Agler et al DRAFT ms).

These estimates imply that the decline in the oiled zone was more than offset by an overall population increase in the non-oiled zone. The three-year post-spill population estimates for July were consistent at approximately 5,500 - 11,500, but more years of data are needed to determine if there is a population trend. I could not say confidently that the trend is decreasing. Given that this alternative strives for *substantial* improvement over natural recovery, this action may not be justified unless substantial populations are discovered nesting on specific parcels of land being considered for protection.

25. Harlequin Duck: **Cleaning Mussel Beds** would likely enhance recovery by speeding recovery of mussels and other HADU prey, thus broadening the food base. However, the overall affect on Sound-wide population may be difficult to determine. This alternative aims for *substantial* improvement over natural recovery, so this action may not be justified unless substantial populations are discovered utilizing specific parcels of land being considered.

26. Harlequin Duck: **Directed Management** re: restricted hunting seasons may mean a larger population to enhance reproduction/natural recovery. This relatively inexpensive action would seem to fall under this alternative.

27. Marbled Murrelet: **Habitat Protection** would enhance population stability by not allowing a decrease in nesting habitat. However, the most recent PWS population assessments (89, 90, 91 and 93) suggest that the population may be stabilizing. I would not confidently say the population has decreased since the spill. More years of data are needed to determine any trend. The population estimate is still lower than the 200,000 - 400,000 estimated in 1972, although the July 93 estimate (117,000 to 200,000) is higher than the prior three years of post-spill data, and it is approaching the lower limit of the 1972 estimate.

Practical considerations re: murrelets: It would be difficult if not impossible to assess overall affect of forest habitat protection for individual parcels of land without knowing breeding population size on each parcel. In my view, the best available data (Agler et al) suggest that the population as a whole is more likely to be stable or increasing than declining.

28. Marbled Murrelet: **Predator Control** would likely have little impact on MAMU recovery, because of the practical constraints on controlling MAMU predators. Predator control does not seem to be a viable avenue to help substantial improvement over natural recovery, especially considering that PWS population may be stabilizing.

29. Pigeon Guillemot. **Habitat Protection** would not seem to be to be a strong enhancement for substantial improvement over natural recovery. Except for the northern Afognak Island area, knowledge of colonies outside PWS are largely unknown. If large colonies are discovered on non-protected land during future surveys, this action may be considered under this alternative.

30. Pigeon Guillemot. **Predator Control** This action does not seem to be addressed directly under this alternative, but some general observations may give some perspective here too. Any consideration of this action is hampered by the general lack of knowledge about the significance of predation on PIGU populations. Determining whether this action would give substantial improvement over natural recovery should be determined on a case-by-case basis, after necessary studies are completed.

Alternative 4: Moderate Restoration

31. Common Murre: **Habitat Protection** as allowed under this alternative would have some impact on COMU populations if smaller colonies at The Triplets (owned by Ouizinkie Corp?), in Marmot Bay, between Kodiak and Afognak Islands, and the few small colonies on State/Municipal land on SW Kodiak coast would be protected; other colonies appear to be protected under FWS refuge status.

32. Common Murre: **Predator Control** within the spill zone would not seem to provide substantial improvement over natural recovery. The degree of predation on COMU's within the spill zone alone (Alt 2 policy) is unknown. Affect of predator control downstream from spill zone unknown, but would be allowed under this alternative. I have little personal knowledge of the degree of predation on murres at colonies downstream from the spill zone, but predator control program being supported in 1994 by Trustee Council funds establishes a precedent.

33. Common Murre: **Education** directed specifically to tour and fishing boat operators would increase their awareness of *their* potential harmful impacts on EVOS-impacted COMU colonies. This action seems particularly justified under this alternative, although it's unlikely a much of a problem at present away from the Barren Islands, and possibly Kodiak area and near the Chiswell Islands.

34. Harlequin Duck: **Habitat Protection** under this alternative would help protect HADU nesting habitat, and possibly some foraging habitat. However, without knowing breeding population sizes on individual parcels of land, it is difficult to say what affect the protection of any given parcel would have on overall harlequin population size.

35. Harlequin Duck: **Cleaning Mussel Beds** would likely enhance recovery by speeding recovery of mussels and other HADU prey, thus broadening the food base. However, the overall affect on Sound-wide population may be difficult to determine. There is little knowledge of population status outside PWS.

36. Harlequin Duck: **Directed Management** re: restricted hunting seasons may mean a larger population to enhance reproduction/natural recovery. This relatively inexpensive action would seem to fall under this alternative.

37. Marbled Murrelet: **Habitat Protection** would enhance population stability by not allowing a decrease in nesting habitat. However, the most recent PWS population assessments (89, 90, 91 and 93) suggest that the population may be stabilizing. More years of data are needed to determine if this is a trend, which would be easier to obtain given the added M&R funds available. Also, the FWS has identified MAMU's as one of several ecosystem monitoring species. It is one of the few PWS species for which pre-spill feeding ecology data are available. More frequent monitoring would also enhance monitoring population trends. Again, the best available data (Agler et al) suggest that the population as a whole is more likely to be stable or increasing than declining, and population M&R would be easier to justify under this alternative..

38. Marbled Murrelet: **Predator Control** would likely have little impact on MAMU recovery, because of the practical constraints on controlling MAMU predators.

39. Pigeon Guillemot. **Habitat Protection** would again not seem to be to be a strong enhancement for *substantial* improvement over natural recovery, given the protective status of the large majority of potential MAMU nesting habitat. If large colonies are discovered on non-protected land during future surveys, this action maybe considered under this alternative.

40. Pigeon Guillemot. **Predator Control** This action may be most easily justified under this alternative. But again, any consideration of this action is hampered by the general lack of knowledge about the significance of predation on PIGU population status. Determining whether this action would result in improvement over natural recovery should be determined on a case-by-case basis, after necessary studies are completed.

41. Black-legged Kittiwake and other species. The FWS has given this species a very high priority as a key element in any ecosystem monitoring study in PWS. Should be included in our assessment for Alternative 4. Population in PWS has been stable since the spill, but productivity has been down. The PI states in his final report that lowered productivity "may or may not" have been from the spill. Other seabird species that would lend themselves to an ecosystem study include pigeon guillemots, horned and tufted puffins, and parakeet auklets because of prior data and/or the relative ease of studying their feeding habits.

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ID Team Meeting Agenda

Time: 1:30 p.m. **Date:** March 17, 1994

Location: TC Room

Agenda:

Presenter:	Topic:	Time:	Decision/Info:
Rod	Review Agenda	0:15	D
Kay Tracy	Introduce MMS Editors	0:10	I
Kay Tracy	Editorial Process	1:00	I/D
Rod	EIS Document - Intermediate Deadlines	0:30	I

Additions:

Bin Items:

Critique:

Dotted lines are grid layout imaginary lines

(Column widths shown in picas)

(USDA/FS identifiers. *9-point helvetica)*

(Cover Title. 36-point helvetica. 38 points leading)

3.5 10 1 32 4.5

Ag Seal Here

United States Department of Agriculture

Forest Service

Tongass National Forest
R10-MB-40 *(to be assigned by RO PAO)*

Alaska Pulp Corporation Long-term Timber Sale Contract

(Cover Subtitle. *24 point helvetica. 26 points leading)*

Draft Supplement to the Environmental Impact Statements for the 1981-86 and 1986-90 Operating Periods

Cover

Dotted lines are grid layout imaginary lines

(Column width is shown in picas)

3.5 | 10 | 1 | 32 | 4.5

18 point helvetica bold, unhyphenated. Place 30 points between baseline of last line of the paragraph, to baseline of first line of first degree head. Place 14-point space between baseline of last line of first degree head to baseline of first line of next paragraph.

Wildlife (first degree heading)

(Body Copy. *10-point roman times. 12-point leading.)*

Wildlife Habitats (second degree heading)

12-point helvetica bold, unhyphenated. Place second degree heads in narrow column; align horizontally, top of head with the top of type of first paragraph for that head. One line space will separte one second degree section from the next.

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Running Feet *8-point helvetica bold. Running feet are first degree heads repeated hat appear on a particular page.*

4 Affected Environment

(Chapter and Section Identifiers) *Starting with the second page of every section of chapter, the chapter number and title are repeated. For left-hand pages, the number is set in 36-point helvetica and placed in the uppermost left corner of the grid. This is followed by the title in two lines, set in 14-point helvetica bold. For right-hand pages, it is reversed.*

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Recreation Opportunities

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(align photo captions at top or bottom of photo. May also be placed underneath)

Streams on 75 of the 79 Pacific Northwest Region Forests provide spawning and rearing habitat.

(18 points of space from photo to text)

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Visual Resources

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Dotted lines are grid layout imaginary lines

(Column width is shown in picas)

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(**Divider Page Headings.** 48-point helvetica)

Chapter 5

(**Divider Page Subheadings.** 36-point helvetica)

Environmental Consequences

Divider Page

Dotted lines are grid layout imaginary lines

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(**Chapter Headings.** 48-point helvetica)

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Chapter 5

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Environmental Consequences

Introduction

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Chapter Headings

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TABLES: Tables begin and end with 1-point rules extending the width of the table. Tables are numbered sequentially within each chapter. Example: Table 3-1 is the first table in chapter 3. This is set in 9-point helvetica. The table title is 12-point helvetica bold, the rest of the text is set in 10-point Times Roman with Italic and bold faces as shown in the layout. Footnotes to the tables are 8-point Times Roman. Allow approximately 18-points space between body text and table rules, above and below. Allow approx.

CHARTS. (Pie charts, bar graphs, line graphs). Figure identifications are set in 9-point helvetica and titles in 12-point helvetica gold. Figure information is 9-point helvetica and figure footnotes are set in 8-point Times Roman. Charts will have a 1-point rule above and below, separated by 6-points of space between rule and type. Separate footnotes from chart with a 1/2 point rule. Insert approximately 18-points of space between body text and charts. All charts should be limited to 32 picas in width, and contain no more than three comparisons. If necessary, create more figures.

This WHMU includes the areas within the AHMU buffer of anadromous or resident fish streams. These rivers and streams overlap high value bear habitat during salmon runs, and are important habitats for water-oriented furbearers.

Key Deer Winter Range

This WHMU includes land outlined by the following criteria:

- Area less than or equal to 500 feet in elevation on aspects from 90 to 135 degrees and from 225 to 270 degrees.
- Area less than or equal to 1000 feet in elevation on aspects from 135 to 225 degrees.
- Includes areas occupied by deer during severe winters but that may not conform to the other criteria. TLMP maps and local ADF&G biologists assisted in the identification of these areas.

Intermediate Deer Winter Range

All lands not in alpine, subalpine or KDWR are classified as IDWR.

Potential Management Indicator Species (PMIS)

Old-growth timber is important to many wildlife species because of the vertical and horizontal diversity it contains and it provides forbs for deer during winters of heavy snow accumulation. The timber harvest history and amount of old growth remaining within the Wildlife Habitat Management Units are presented in Table 3-5.

Table 3-5
Acres and Percent of Old Growth within WHMUs

WHMU	Harvest in WHMU[1]	WHMU Remaining	Acres of Previous Percent of Old-Growth in WHMU[1]
Key Winter Range	16,032	16,737	51
Inter. Winter Rge	7,505	9,066	55
Estuarine	39	213	82
Beach	2,770	8,916	76
Streamside	848	588	41
Lakeside	376	640	63
Subalpine	20	475	96
Alpine	0	0	100
General Forest	19,984	21,147	51
Totals	**24,037**	**31,939**	**57**

[1] Winter Range can overlap other WHMUs

Peregrine Falcon

The endangered Arctic and American subspecies of the Peregrine falcon nest farther north, but could pass over the project area during migration. The Peale's subspecies is not listed as endangered or threatened, but is covered by a provision of "similarity of appearance" which broadens the scope of protection for all Peregrine falcons (USFWS-Alaska 1984). A preliminary survey of Peregrine falcons in southeast Alaska was conducted by the U.S. Fish and

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Starting from the original $900,000,000, and subtracting the past and future estimated reimbursements, it is assumed that $650,000,000 remains to be allocated under the various alternatives. The first three fiscal years budgets and their array of projects have been decided by the Trustee Council in response to the immeninent need to begin the restoration. There has been a effort to restrain from committing to large projects apart from having completed development of a final Restoration Plan. Now that a draft Restoration Plan and alternatives to it are being analyzed as part of the EIS, the first three years of the program will be included in all alternatives. Thus, there is a need to subtract $108,060,500 from the $650,000,000 to arrive at the remaining balance of $541,939,500 yet to be decided upon in the final Restoration Plan program.

This table only looks at the two restoration categories with environmental impacts. They are Habitat Protection and Acquisition and General Restoration. The other categories generally do not impact the resources with the exception of economically. The General Restoration category is reduced by 33% to focus only on those expenditures which would have impacts on resources aside from economics which would be analyzed in the EIS. This 33%/67% breakdown was arrived at by examining the past three years budgets.

The data gathering, surveys, analysis, and other management activities which do not directly affect the resources analyzed in the EIS represent approximately 33% of the General Restoration budgeted projects. An example would be coded wire tagging. This is needed to gather data to manage the resource, but generally has no significant impact on the resource.

Budget Assumptions for Analysis Purposes Only

Restoration Category	Alt.	Budget Years: Total Budgeted FY1992 thru FY1994	Budget Years: Balance Remaining FY1995 thru FY2002	Budget Years: Project Implementation Balance FY1995 thru FY2002	Total Estimated Expenditure by Alternative
Habitat Protection and Acquisition	2	$43,296,400	$548,203,600*	N/A	$591,500,000
	3		$444,203,600	N/A	$487,500,000
	4		$281,703,600	N/A	$325,000,000
	5		$216,703,600	N/A	$260,000,000
General Restoration (x .67 = project implementation)	2	$13,155,100 (project implementation $7,757,600)	$0	$0	$13,155,100
	3		$64,844,900	$43,446,083	$78,000,000
	4		$214,344,900	$143,611,083	$227,500,000
	5		$181,844,900	$121,836,083	$195,000,000
Restoration Reserve	2	$12,000,000	$0	N/A	$12,000,000
	3		$0	N/A	$12,000,000
	4		$0	N/A	$12,000,000
	5		$38,050,000	N/A	$50,050,000

GENERAL RESTORATION BUDGET BREAKDOWN BY IMPACT TOPIC BY ALTERNATIVE							
		Alternatives					
		3 **Limited restoration**		4 **Moderate Restoration**		5 (Proposed Action) **Comprehensive Restoration** (Modified) (draft Restoration Plan)	
Impact topic	"Shares"	Total	Annual	Total	Annual	Total	Annual
Pink Salmon (wild stocks)	3 (2 in Alt. 3)	$3,342,006.00	$417,751.00	$15,386,901.00	$1,923,363.00	$13,053,867.00	$1,631,733.00
Sockeye Salmon (wild stocks)	4	$6,684,012.00	$835,502.00	$20,515,868.00	$2,564,484.00	$17,405,156.00	$2,175,644.00
Pacific herring	3 (2 in Alt. 3)	$3,342,006.00	$417,751.00	$15,386,901.00	$1,923,363.00	$13,053,867.00	$1,631,733.00
Clams	2	$3,342,006.00	$417,751.00	$10,257,934.00	$1,282,242.00	$8,702,578.00	$1,087,822.00
Fucus	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Harbor seals	2	$3,342,006.00	$417,751.00	$10,257,934.00	$1,282,242.00	$8,702,578.00	$1,087,822.00
Sea otters	2	$3,342,006.00	$417,751.00	$10,257,934.00	$1,282,242.00	$8,702,578.00	$1,087,822.00

GENERAL RESTORATION BUDGET BREAKDOWN BY IMPACT TOPIC BY ALTERNATIVE							
		Alternatives					
		3 **Limited restoration**		4 **Moderate Restoration**		5 (Proposed Action) **Comprehensive Restoration** (Modified) (draft Restoration Plan)	
Impact topic	"Shares"	Total	Annual	Total	Annual	Total	Annual
Common murres	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Harlequin duck	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Marbled murrelet	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Pigeon guillemot	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Commercial fishing	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Sport fishing	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Recreation	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Tourism	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Subsistence	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Archaeology	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Designated wilderness	1	$1,671,003.00	$208,875.00	$5,128,967.00	$641,121.00	$4,351,289.00	$543,911.00
Ecosystem	None						
Totals	28 (26 in Alt. 3)	$43,446,081.00		$143,611,080.00		$121,836,097.00	

EIS
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ID Team Meeting Agenda

Time: 9:30 p.m. **Date:** March 17, 1994

Location: TC Room

Agenda:

Presenter:	Topic:	Time:	Decision/Info:
Rod	Review Agenda	0:15	D
Kay Tracy	Introduce MMS Editors	0:10	I
Kay Tracy	Editorial Process	1:00	I/D
Rod	EIS Document - Intermediate Deadlines	0:30	I

Additions:

Bin Items:

Critique:

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(Cover Title. 36-point helvetica. 38 points leading)

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United States Department of Agriculture

Forest Service

Tongass National Forest
R10-MB-40 *(to be assigned by RO PAO)*

Alaska Pulp Corporation Long-term Timber Sale Contract

(Cover Subtitle. *24 point helvetica. 26 points leading)*

Draft Supplement to the Environmental Impact Statements for the 1981-86 and 1986-90 Operating Periods

Cover

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18 point helvetica bold, unhyphenated. Place 30 points between baseline of last line of the paragraph, to baseline of first line of first degree head. Place 14-point space between baseline of last line of first degree head to baseline of first line of next paragraph.

Wildlife (first degree heading)

Body Copy. *10-point roman times. 12-point leading.)*

Wildlife Habitats (second degree heading)

12-point helvetica bold, unhyphenated. Place second degree heads in narrow column; align horizontally, top of head with the top of type of first paragraph for that head. One line space will separte one second degree section from the next.

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4 Affected Environment

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Recreation Opportunities

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Streams on 75 of the 79 Pacific Northwest Region Forests provide spawning and rearing habitat OR align as below.

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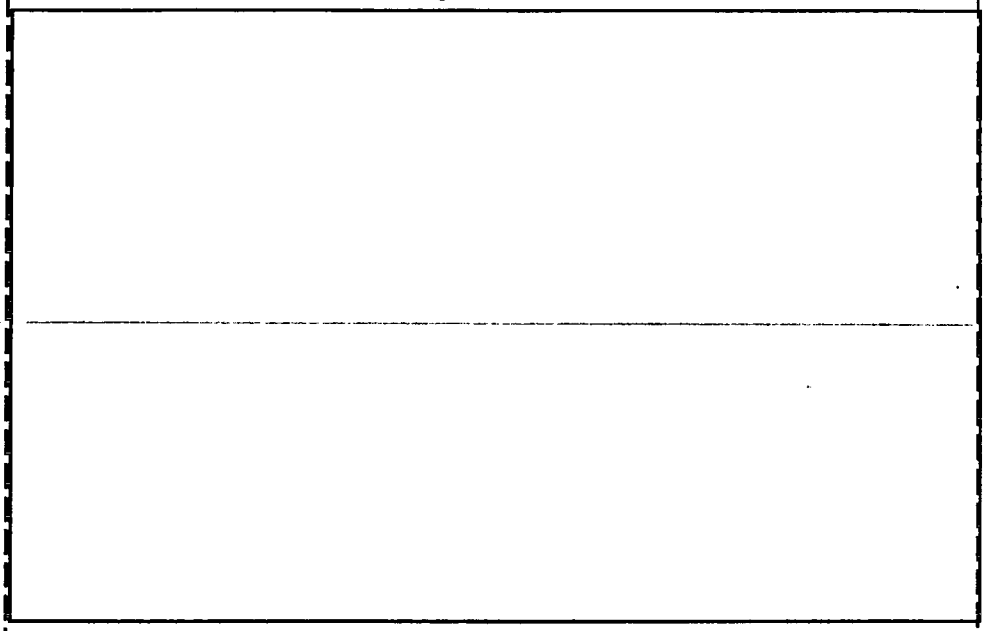

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Folios *Each section will have a title as part of its folio. For example: Chapter One will say "Chapter 1" set all in caps, 8-point helvetica regular. This is followed by a 5-point space and a solid square, the same size as the cap. This is followed by another 5-point space, the folio number in 8-point helvetica bold. For left pages, the number is first, for right pages, it is last.*

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Environmental Consequences

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Environmental Consequences

Introduction

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Chapter Headings

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TABLES: Tables begin and end with 1-point rules extending the width of the table. Tables are numbered sequentially within each chapter. Example: Table 3-1 is the first table in chapter 3. This is set in 9-point helvetica. The table title is 12-point helvetica bold, the rest of the text is set in 10-point Times Roman with Italic and bold faces as shown in the layout. Footnotes to the tables are 8-point Times Roman. Allow approximately 18-points space between body text and table rules, above and below. Allow approx.

CHARTS. (Pie charts, bar graphs, line graphs). Figure identifications are set in 9-point helvetica and titles in 12-point helvetica gold. Figure information is 9-point helvetica and figure footnotes are set in 8-point Times Roman. Charts will have a 1-point rule above and below, separated by 6-points of space between rule and type. Separate footnotes from chart with a 1/2 point rule. Insert approximately 18-points of space between body text and charts. All charts should be limited to 32 picas in width, and contain no more than three comparisons. If necessary, create more figures.

This WHMU includes the areas within the AHMU buffer of anadromous or resident fish streams. These rivers and streams overlap high value bear habitat during salmon runs, and are important habitats for water-oriented furbearers.

Key Deer Winter Range

This WHMU includes land outlined by the following criteria:

- Area less than or equal to 500 feet in elevation on aspects from 90 to 135 degrees and from 225 to 270 degrees.
- Area less than or equal to 1000 feet in elevation on aspects from 135 to 225 degrees.
- Includes areas occupied by deer during severe winters but that may not conform to the other criteria. TLMP maps and local ADF&G biologists assisted in the identification of these areas.

Intermediate Deer Winter Range

All lands not in alpine, subalpine or KDWR are classified as IDWR.

Potential Management Indicator Species (PMIS)

Old-growth timber is important to many wildlife species because of the vertical and horizontal diversity it contains and it provides forbs for deer during winters of heavy snow accumulation. The timber harvest history and amount of old growth remaining within the Wildlife Habitat Management Units are presented in Table 3-5.

Table 3-5
Acres and Percent of Old Growth within WHMUs

WHMU	Harvest in WHMU[1]	WHMU Remaining	Acres of Previous Percent of Old-Growth in WHMU[1]
Key Winter Range	16,032	16,737	51
Inter. Winter Rge	7,505	9,066	55
Estuarine	39	213	82
Beach	2,770	8,916	76
Streamside	848	588	41
Lakeside	376	640	63
Subalpine	20	475	96
Alpine	0	0	100
General Forest	19,984	21,147	51
Totals	**24,037**	**31,939**	**57**

[1] Winter Range can overlap other WHMUs

Peregrine Falcon

The endangered Arctic and American subspecies of the Peregrine falcon nest farther north, but could pass over the project area during migration. The Peale's subspecies is not listed as endangered or threatened, but is covered by a provision of "similarity of appearance" which broadens the scope of protection for all Peregrine falcons (USFWS-Alaska 1984). A preliminary survey of Peregrine falcons in southeast Alaska was conducted by the U.S. Fish and

EIS
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ID Team Meeting Agenda

Time: 1:00 pm **Date:** March 23, 1994

Location: Rod's Office or TC Room if available

Agenda:

Presenter:	Topic:	Time:	Decision/Info:
Rod	Review agenda	0:15	D
Rod	Formating in Documents for EIS (Headers/Footers; Fonts; Tables; Spaces; Tabs)	0:20	I
Rod	Discuss Chapter 4 writing. (Short/Long-term Impacts)	0:30	I/D
Rod	Where we are and how will we get everything done.	0:15	I/D
Rod	Intermediate deadlines:	0:30	D

1. No Action : MARCH 28
2. Alt 2: - APR 1
3. Alt 3: - APR 4
4. Alt 4: - APR 8
5. Alt 5: - APR 11

Additions:

Bin Items: - 1 30 TUESDAY
- RPT ON HABITAT ACQ

Critique: - HAVE BARBARA COME TO RECORD MTGS,

E15
C

ID Team Meeting Agenda

Time: 1:30 pm **Date:** April 5, 1994

Location: TC Room

Agenda:

Presenter:	Topic:	Time:	Decision/Info:
Rod	Review agenda	0:15	D
IDT	Where we are and what we still need to do. (Round robin of IDT)	0:30	I
Rod	What I know on the "Habitat" problem	0:30	I

Additions:
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Bin Items:

Critique:

EIS
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April 12, 1994

This may not be the best time to point out what remains to be done that hasn't be assigned yet, but here goes.

Other EIS tasks that need to be completed:

1. "Cumulative Effects Analysis" - we need a paragraph or two for each impact topic analyzing the additional effects of other actions and how those combined with effects of Alternative 5 impact the resources and services.

   The other actions we need to consider are:

   - Bering River coal development
   - Whittier road access
   - Cordova road access
   - Lower Cook Inlet oil development
   - Cordova harbor dredging
   - Trans-Alaska Gas pipeline
   - Childs Glacier recreation development

2. "Unavoidable Adverse Impacts" - we need a statement that addresses this CEQ requirement. Unless you tell me otherwise, I will draft this saying there are none except for economic impacts changing employment patterns in the long-term.

3. "Relationship between short-term uses and enhancement of long-term productivity" - I'll do this as well.

4. "Irreversible and Irretrievable impacts" - I can do this as well.

The above need to be done this week or at least by 4/19.

We also need the bibliographical information by 5/9 at the latest.

I really appreciate the great effort put forth by each of you and I hope and pray that you can continue the hard work for a short while longer. We can all celebrate when this thing goes to the printer!

Thanks again for your patience,
Rod

F. CUMULATIVE IMPACTS

1. Impact on Biological Resources

The cumulative effects on the wildlife resources of past, ongoing, and planned projects in addition to the proposed Federal Subsistence Management Program are discussed in this section. Cumulative impacts on the wildlife resources include the alteration of the carrying capacity of the wildlife habitat to support healthy populations of wildlife.

In the cumulative case, the projects could affect specific wildlife species by either increasing, decreasing, or not changing wildlife habitat capability. Since different species have different ecological requirements, the intensity of the cumulative effect could vary in isolated cases. The projects considered in this analysis are: oil and gas development, primarily on the Arctic National Wildlife Refuge (ANWR); major mineral developments such as the Red Dog or Greens Creek mine; timber resource development, primarily on the Tongass National Forest; ecosystem management programs, such as spruce bark beetle infestation management or fire management; and sport hunting impacts on wildlife populations.

a. Caribou: The combined current and proposed oil and gas development activities in the Prudhoe Bay, the National Petroleum Reserve-Alaska, ANWR, and the Canadian MacKenzie River Development could have some long-term, moderate disturbance or displacement impacts on caribou herds if the animals avoided significant parts of the calving areas of either the Western Arctic, Central Arctic, Teshekpuk, or Porcupine herd for the life of the projects, and a resulting reduction in caribou distribution or abundance occurred. Depending on the timing, extent, and specific location of oil development and the duration and intensity of the disturbance, effects on the caribou could range from low to moderate.

Facilities associated with offshore oil and gas development would have low cumulative disturbance and habitat alteration effects on caribou because on-shore development associated with offshore leases generally would be limited to small shore-bases and would not affect caribou over a large geographic area.

Cumulative reduction in local habitat use within about 3 km of construction and the avoidance by caribou cows with calves of habitat areas with high levels of road and air traffic could have a moderate effect on the distribution of one or more of the North Slope caribou herds.

Of the major actions, the development of ANWR has the most potential to affect caribou. Although the probability of any or all planned and ongoing projects reaching developmental stages is generally unknown, this analysis assumes that all the projects discussed reach developmental stages. The Porcupine caribou herd (PCH) uses the potential oil development area as a major calving area. Major effects on the PCH could result if the entire potential oil development area in ANWR were leased and all oil prospects contained economically recoverable oil were developed. The associated activities may lead to a reduction in calving habitat values. Primary causes are thought to be reduced access to insect-relief areas, obstacles to free movement required for foraging and predator avoidance areas, increased energy expenditure because of disturbance, higher levels of stress, and other factors cold cumulatively could affect caribou physiology.

It is estimated that about 37% of the PCH calving areas would be disturbed by the development activities. Insect free and insect avoidance habitats are important to caribou, and it has been calculated that from 18 to 52 % of this valuable habitat would be isolated by pipeline construction. Caribou that cannot gain access to the insect avoidance habitats along the Arctic coastal areas would be forced to find relief in the low lying hills to the south that have a high concentration of grizzly bears and wolves. At a minimum a change in caribou distribution is reasonably expected. The effects would manifest themselves as a widespread, long-term change in habitat availability or quality, which in turn would likely modify natural abundance or distribution of the PCH. If these major adverse effects were to coincide with a low population in the natural cycle of the Porcupine caribou herd, the effects would be greater than when populations were at a high point in the cycle.

Because it as not been demonstrated that the present level of on-shore oil development in the Prudhoe Bay area has affected the abundance or overall distribution of any North Slope caribou herd, in particular the Central Arctic herd, potentially high impacts that would occur if caribou were displaced from or avoided calving habitats and summer ranges during oil exploration, construction, production, transportation, or rehabilitation (causing long-term reduction in herd productivity and leading to a population decline) are not expected.

Because it is assumed that subsistence management regulations promulgated under the Federal Subsistence Management Program would conserve the health of caribou populations, particularly over the long term, the proposed regulations are expected to contribute little to the cumulative effect on caribou.

Conclusion (Cumulative Impacts on Caribou): Taking into account all of these impact factors, the cumulative impacts on caribou are minimal throughout the State. An exception is a potentially high cumulative impact on the Porcupine caribou herd if all oil prospects were fully developed. The impacts from the proposed action would be a negligible component of this cumulative impact.

b. Moose: Within the State of Alaska moose populations generally fluctuate in response to changing environmental conditions, or they can be affected by excessive exploitation, either by hunters or other non human predators. The combination of State managed hunting programs and multiple agency management of moose habitat could act cumulatively to affect moose population dynamics. Most of the GMU's where moose herds are located have checkerboard land ownership patterns with interspersed Federal, State, and private lands. The complexity of management in these situations, where herds cross jurisdictional boundaries, could create a short term impact on moose herds within specific locations.

Equilibrium between moose populations and their short term food supply is not common. This is because of their dependence on early successional stage vegetation such as often occurs after a fire. This makes managing for stable moose populations difficult. The most important factor in regulation of the size is thought to be dependent on the changes in habitat quality and severity of the winter weather, particularly the snow depth. Mortality factors such as those associated with predation, hunting, or disease are often related to the population status. Coady (1982) suggests that fluctuations of moose populations can only be minimized by careful monitoring of the populations and timely regulation of all components of the ecosystem to produce some semblance of equilibrium between moose density and food supply. It is highly unlikely that this intensive management can stabilize

moose population because of the over-riding importance of the forest succession and changing winter snow conditions. These factors are the main a limiting factor on moose.

Conclusion (Cumulative Impacts on Moose): Taking into account all of these impact factors, the cumulative impacts on moose would be negligible.

c. Sitka black-tail deer: Timber harvest has caused the most influential change in the landscape of any activity on the Tongass National Forest and other areas where Sitka black-tail deer occur. Between the turn of the century and the early 1950's, timber harvest averaged about 35 million board feet annually (or about 1000 to 3000 acres per year). Although relatively small amounts of timber were harvested during this time, much of it came from high volume timber stands located along the coast. Stands such as those harvested before the 1950's along the coastal fringes of Southeast are today considered important wildlife habitat for wintering deer herds.

After the early 1950's, long term timber sale contracts were negotiated. Timber harvests since the mid-1950's have averaged 352 million board feet per year (USFS, Analysis of the Management Situation, 1990). A present, approximately 7 percent of the productive timber stands and about 7 percent of the Tongass National Forest have road access. This has resulted in an estimated Sitka black- tailed deer winter range capability is estimated of 93% of the 1954 capability.

Timber harvest on the Tongass is currently converting about 8,200 acres of old-growth forested habitat to second growth timber each year. Timber harvest of the old-growth stands during the implementation of the Tongass Land Management Plan (since 1979) has converted approximately 2 percent of the productive forested base. Approximately 100 miles of road are constructed annually to access the timber harvest during this period.

The long term timber harvest levels on the Tongass National Forest could range from 298 million board feet and 11,460 acres to 471 million board feet and 17,220 acres according to the Tongass Land Management Plan Revision Supplement. The various alternatives are predicted to reduce the winter range capability to a range of 87 to 90 percent of the 1954 level in the next decade depending on the intensity of timber management indicated above. If the harvest continues at the rate that it has occurred since the implementation of the current Forest Plan, over the next ten years, 82,000 acres can be expected to be converted to second-growth (an additional 1.4 percent of the productive forest land).

Tracts of private land owned by Native Corporations adjacent to the Tongass National Forest support extensive timber harvest operations. Due to the large size of clearcut harvests and rate of timber harvest on these lands over the last ten years, old growth associated wildlife capability on the private land, especially for deer, has declined and will decline over the next two decades. Native owned tracts are located in Alaska Department of Fish and Game Management Units 1A, 1C, 2, 3, 4, and 5. Consequently, lower deer density on private land may increase demand for subsistence and sport hunting opportunities on adjacent National Forest lands.

Assuming that most remaining private timber will be removed within the next 10 to 12 year (USFS, Analysis of the Management Situation, 1/90. ANSCA-Native Timber, 3-347, January, 1990), there will be a reduction in the amount of high volume old-growth habitat on these lands. Harvesting has occurred on lands around Kake, Hoonah, Cube Cove,

Hobert Bay, Craig, Hollis, Klawok, Hydaburg, Metlakatla, and Yakutat. In the future, as second growth timber stands mature, there will be a reduction in understory biomass (Alaback, 1984). The combination of reduction in forage, loss of high volume timber winter habitat, and poor juxtaposition of habitats will cause habitat capability to decline in the long term. Within five years, the mean winter capability is predicted to decline by about 50% (USFS, Ketchikan Pulp company 1989-94 Operating Period FEIS, Section 4, page 218). As clearcuts age and become less suitable for deer and other game species, hunters may move into the National Forest, thereby increasing hunting pressure on the National Forest. This may lead to reduced hunter success and may lead to more restrictive bag limits or elimination of sport hunting to ensure priority for subsistence harvests.

Conclusion (Cumulative Impacts on Deer): Taking into account all of these impact factors, the cumulative impacts on Sitka black-tail deer could significantly affect populations in areas where timber harvest reduces important winter habitat. The impacts from the proposed action would be a negligible component of this cumulative impact.

d. Dall sheep: Developmental activities within the State have little potential to alter Dall sheep habitat on a Statewide basis. There could be cases, particularly mine developments within sheep range that may reduce the habitat capability or provide ready hunter access to sheep populations. This could have an impact on local sheep populations, but would have negligible impact on sheep populations for all Federal land units in Alaska.

State hunting regulations are generally for rams only, and restricted to 7/8 curl or more. Currently the statewide population is estimated at more than 70,000 (Table III-B-4). With an annual natural rate of increase of 0.2 in wild sheep populations (Lawson and Johnson, 1982), the annual ram recruitment to the population would be approximately 7,500. This annual increase can be compared to the estimated annual subsistence and sport hunting mortality of 1627. From this analysis it appears that there should be no cumulative impact from the combination of subsistence and sport hunting.

Conclusion (Cumulative Impacts on Dall Sheep): Taking into account all of these impact factors, the cumulative impacts on Dall sheep populations would be negligible.

e. Mountain Goat: The combination of State managed sport hunting and the proposed action should not adversely affect the conservation of healthy populations of goats. The predicted mountain goat subsistence use ranges from 175 to 399. Combined with sport hunting uses in 1990, the total range is expanded to 565 to 789. Compared to the current Statewide goat population of 19,230, the predicted goat use is accounts for only 4% of the current goat population. This is below the utilization level that could impact population numbers given the assumption of fairly even distribution of harvest effort.

Statewide development projects are not projected to reduce the mountain goat habitat capability, so there should negligible reduction in populations due to changes in vegetation. The primary example of this is the Tongass National Forest, which is assumed to have the most intensive multiple resource development of all Federal lands in Alaska where goats range. The remaining habitat capability, at the end of this decade, is estimated at 99% of 1954 levels. From this it is apparent that little change in goat habitat capability is expected from development activities in the State.

It is important to note that mountain goats are susceptible to disease and predation and these factors must be considered when determining healthy goat populations. Also, on going or proposed projects, such as the Greens Creek Mine or timber sale road development, that provide easier access to previously inaccessible goat habitat could act cumulatively, to create a short term impact on goat population levels on a very local scale. Mitigative measures, such as road management programs, have proven fairly successful in preventing long term losses.

Conclusion (Cumulative Impacts on Mountain Goat): Taking into account all of these impact factors, the cumulative impacts on Mountain Goats would be negligible.

f. Brown and Black Bear: The developmental activities could act in concert with the FSMP to create a short term loss in brown and black bear numbers. These environmental consequences can be estimated as effects due to vegetational changes and the estimated effects due to potential human/bear conflicts. The estimated changes in habitat capability in bear habitat are the primarily the result of timber sale activities discussed under the Sitka black-tail deer discussion in IVF.c. Using these data, the estimated change in brown bear and black bear habitat is 96 to 98 percent of the habitat that existed in 1954 for the areas on the Tongass National Forest. No figures exist for other parts of the State, but are assumed to be lower than Southeast Alaska, where most of the vegetation changes in the State have occurred, and thus are assumed to be near 100%.

Natural resource management and development, which increases human activity in brown and black bear habitat, may result increased direct human-induced mortality of bears. As access and development increases human activity in occupied habitat, there is a potential for the quality and capability to decline. These reductions in habitat capability have been estimated by Schoen (1988) for brown bear and Suring (1988) for black bear. Overall, the estimated changes, from both vegetation and human/bear conflict in the Tongass National Forest brown and black bear habitat is approximately 94% of the original capability. Based on these figures from the Tongass Land Management Plan Revision Supplement, estimated brown and black bear habitat capabilities are expected to meet subsistence and sport hunting needs, except brown bear in GMU 5A. Here subsistence and sport hunting use are estimated to exceed capability and uses will have to be restricted to maintain healthy populations of brown bear. Also, there may be individual Wildlife Analysis Areas (a further subdivision of GMU subunits) that because of access may receive more hunting pressure than the habitat can support, and allocation between subsistence users may be warranted. Subsistence harvest regulations will have to address these issues. No similar data are available for the rest of the State, but the Tongass is considered the most intensively managed Federal public land unit, and thus would present the case for the greatest potential cumulative impact. The development activities are predicted to cause a small long term reduction in the habitat capability. Given this small reduction, there is adequate capability to provide for subsistence and non subsistence needs for brown and black bear.

Conclusion (Cumulative Impacts on Brown and Black Bear): Taking into account all of these impact factors, the cumulative impacts on black and brown bears would be minimal.

g. Furbearers: Most furbearer populations in Alaska are regulated by natural processes. The effects of human nonconsumptive activities are of no great consequence except in very local instances.

An exception is marten in southeast Alaska where loss of habitat from logging activities and spruce bark beetle infestations combined with human activities such as increased access for trappers by construction of logging roads are a concern to many managers. The susceptibility of marten and the current high demand for their pelts may act in a cumulative way to impact some marten populations.

Oil spills present another potential cumulative impact on furbearers. While oil spills of any magnitude are a threat to all components of the ecosystem including furbearers, those spills subject to wide dispersal by ocean or tidal currents could have a serious impact over a large area on river otter and mink, both of which frequent riparian coastal habitats.

Predator control programs, of course, impact furbearer populations. In recent years predator control programs in Alaska have fallen into two categories. The first category is eradication programs designed to eliminate a target species from an area. The scope of these programs is long-term, but limited in geographical extent. An example would be the fox eradication programs conducted by the Fish and Wildlife Service on selected islands in the Aleutians to restore seabird or migratory waterfowl populations. The second category is population reduction programs designed to allow a prey species to recover from very low levels of abundance. The scope of these programs is short-term, but often over a relatively large area. If successful, these programs can result in greater predator populations than those that existed before the program was implemented. An example would be the wolf control programs conducted by the Alaska Department of Fish and Game in selected Game Management Units in interior Alaska designed to encourage increases in moose populations. Cumulative impacts on wolves could be expected if vigorous predator control were initiated in areas where there is a high traditional subsistence use of wolves.

Conclusion (Cumulative Impacts on Furbearers): Taking into account all of these impact factors, the cumulative impacts on furbearers would be low. The impacts from the proposed action would be a negligible component of this cumulative impact.

2. Impact on Sociocultural Systems

Cumulative impacts on sociocultural systems include impacts of the proposed action and other ongoing or planned projects in the State of Alaska (such as ANWR, Greens Creek Mine, Red Dog Mine, Tongass National Forest timber harvest, OCS development, Cominco Mine, the gas pipeline, State and private land hunts, and the Kenai Bug Kill management). The probability of any or all of the ongoing and planned projects reaching the development stage is unknown; however, the following discussion assumes that all of these projects would occur. As in the proposed action, the impacts of projects in the cumulative case on sociocultural systems would occur because of changes in social organization, cultural values, and stress on social systems. As discussed in impacts on sociocultural systems under Alternative IV, the proposed action, this analysis is concerned with the sociocultural systems of rural Alaska.

In the cumulative case, impacts on sociocultural systems could result from changes in rural determinations. Impacts would be primarily in the larger communities (with populations above 2,500) that also might be experiencing impacts from other development, such as Barrow (affected by possible OCS development, ANWR, and the natural gas pipeline). These impacts would be similar to those described for the proposed action; however, the levels of impact could be increased, depending on the location of the community, due to the increased level of activity in the cumulative case. A shift from a rural to non-rural determination would be expected to be long term and create additional stress in the community, resulting in psychic stress and socially maladaptive behavior. If access to sport hunting were denied under a Tier II hunt (or Sec. 804 of ANILCA), if State lands were not available for hunting, and if fishing were limited, then impacts would be expected to be more severe on the small proportion of the population who depend on subsistence harvests. For these people, impacts would be long term and might lead toward a displacement of existing institutions as exhibited in disruptions to their kinship ties, sharing networks, task groups, and other social bonds. Impacts on sharing networks and subsistence task groups could cause a breakdown in family ties and the communities' well-being as well as tensions and anxieties, leading to high levels of social discord. Other impacts might be a decreasing emphasis on a central cultural value--subsistence as a way of life--with an increased emphasis on wage employment, individualism, and entrepreneurialism. In addition, it would be expected that such changes would be exhibited in an increase in social problems, e.g., rising rates of alcoholism, suicide, breakdown in family ties, etc. Many rural communities already are experiencing rising rates of social problems, and, with other projects, these problems can be expected to increased. The proposed action would add to cumulative case impacts and intensify impacts that were already causing displacement of sociocultural systems.

CONCLUSION (Cumulative Impacts on Sociocultural Systems): In the small number of communities affected by other projects, whose rural determination status would change in the next 10 years from rural to non-rural (Sitka, Unalaska, and Kodiak), a small proportion of the population who depend on a subsistence lifestyle could experience long-term reduced access to subsistence resources. As a result of these changes, there would be increased stress. The social health in these communities would be affected and sociocultural systems--including social organization and cultural values--would be disrupted with tendencies towards displacement of sociocultural systems. Overall impacts would be the same as for the proposed action, Alternative IV.

3. Impact on Subsistence Use Patterns

Cumulative impacts on subsistence use patterns include impacts of the proposed action and other ongoing or planned projects in the State of Alaska (such as ANWR, Greens Creek Mine, Red Dog Mine, Tongass National Forest timber harvest, OCS development, Cominco Mine, the gas pipeline, State and private land hunts, and the Kenai Bug Kill management). The probability of any or all of the ongoing and planned projects reaching the development stage is unknown; however, the following discussion assumes that all of these projects would occur. As in the proposed action, the impacts of projects in the cumulative case on subsistence use patterns
reductions in subsistence resources and changes in subsistence resource distribution patterns. Factors which might impact subsistence use patterns are changes in regulations, increased human populations, and/or shifts in the populations of wildlife.

Impacts on subsistence are described in terms of: (1) the kind of change (subsistence resources would become unavailable or available in greatly reduced numbers); and (2) the amount of time over which change will occur (momentary, temporary, seasonal, short term, or long term).

In the cumulative case, impacts on subsistence use patterns could result from changes in rural determinations. Impacts would be primarily in the larger communities (with populations above 2,500) that also might be experiencing impacts from other development, such as Barrow (affected by possible OCS development, ANWR, and the natural gas pipeline) as well as population growth. These impacts would be similar to those described for the proposed action; however, the levels of impact could be increased, depending on the location of the community, due to the increased level of activity in the cumulative case. A shift from a rural to non-rural determination would be expected to be long term.

Under the proposed action Sitka, Kodiak, and Unalaska are likely to change from rural to non-rural in 10 years. Residents or a portion of the residents in each of these communities participates in a subsistence lifestyle. A change in rural status would mean that the residents in that community could no longer subsistence hunt and fish on Federal lands. With the exception of Sitka where hunting occurs almost entirely on Federal lands, at least some portion of State or Native corporation land would remain available to local residents in Kodiak and Unalaska for subsistence hunting and fishing and Federal land would remain available for sport hunting. However, without access to Federal lands, hunting and fishing by residents in Sitka, Kodiak, and Unalaska potentially could decrease and shifts in subsistence use patterns might be expected. The location of subsistence harvests could be expected to change and some harvest levels also could be expected to decrease.

Sport hunting on Federal lands would remain available to local residents in these communities, unless Section 804 were enacted under ANILCA (which in some areas of the State has already been done). Enactment of Section 804 could affect residents in a non-rural community, even though they are not allowed to subsistence hunt. For example, GMU 4 Sitka black-tail deer populations, harvested by Sitka, Angoon, Kake, and Hoonah residents, are at levels low enough that it is likely that Section 804 will be enacted within the next 10 years, particularly near Hoonah. Under the No Action Alternative Sitka would be non-rural within 10 years. Sitka residents hunt deer, which is considered a primary subsistence resource, in GMU 4, including the Hoonah area. If 804 were enacted and Sitka had already been designated as non-rural, Sitka residents would not be allowed to sport hunt for deer in those 804 designated areas while rural residents in the region who demonstrated customary and direct dependence on deer would be allowed to hunt deer in these areas. In Sitka it would be likely that deer would remain available for use but harvests could be reduced--possibly even significantly--and areas where deer are harvested might shift, impacting subsistence use patterns. In the cumulative case, Sitka would be further impacted by Tongass National Forest timber harvests (USDA,FS, 1991), which is expected to cause a reduction in Sitka subsistence harvests, particularly of Sitka black-tail deer. This impact is expected to be long term.

Under the proposed action it is possible that harvests in Unalaska and Kodiak also could be impacted and a reduction of subsistence resources could occur. However, while subsistence harvests on Federal lands might be impacted, these communities most likely could hunt on other lands. In addition, Kodiak and Unalaska also are heavily dependent on marine resources which would be unaffected by the FSMP. In the cumulative case Unalaska

potentially will serve as a shore base for OCS development in Bristol Bay and also is being affected by the bottom fish industry. Subsistence use patterns in Unalaska due to impacts from OCS are expected to be long term with reduction in subsistence harvests (USDOI, MMS, 1985). Kodiak also could experience long term impacts on subsistence harvest patterns as a result of OCS development (USDOI, MMS, 1984; 1987). In the cumulative case, the impact of rural determinations as a result of the proposed action on subsistence use patterns combined with cumulative case developments could be long term (more than 2 years), causing a reduction of subsistence harvests and a shift of harvest areas in Sitka, Unalaska, and Kodiak.

CONCLUSION (Cumulative Impacts on Subsistence use patterns): In the cumulative case, impacts on subsistence use patterns could occur in Sitka, Kodiak, and Unalaska as a result of shifts in rural determination status in the next 10 years under the proposed action. These impacts would increase as a result of OCS development in Kodiak and Unalaska and Tongass National Forest timber harvests in Sitka. Impacts are expected to be long term (more than 2 years) resulting in a reduced harvests of subsistence resources and a shift in subsistence use patterns.

4. Impact on Sport Hunting

Cumulative impacts on sport hunting include impacts of the proposed action and other ongoing or planned projects in the State of Alaska (such as ANWR, Greens Creek Mine, Red Dog Mine, Tongass National Forest timber harvest, OCS development, Cominco Mine, the gas pipeline, State and private land hunts, and the Kenai Bug Kill management). The probability of any or all of the ongoing and planned projects reaching the development stage is unknown; however, the following discussion assumes that all of these projects would occur. As in the proposed action, the impacts of projects in the cumulative case on sociocultural systems would occur because of changes in social organization, cultural values, and stress on social systems.

As discussed in impacts on sport hunting under Alternative IV, the proposed action, this analysis is concerned with the sport hunting opportunities in Alaska. In the cumulative case, impacts on sport hunting could result from changes in rural determinations. Impacts would be primarily in the larger communities (with populations above 2,500) that also might be experiencing impacts from other development, such as Barrow (affected by possible OCS development, ANWR, and the natural gas pipeline). These impacts would be similar to those described for the proposed action; however, the levels of impact could be increased, depending on the location of the community, due to the increased level of activity in the cumulative case. A shift from a rural to non-rural determination would be expected to be long term and create additional demand for sport hunting opportunities so the individuals could continue to hunt for food. If access to sport hunting were denied under a Tier II hunt (or Sec. 804 of ANILCA), if State lands were not available for hunting, and if fishing were limited, then impacts would be expected to be more severe as competition for available sport hunting opportunities increased.

Development projects that would decrease the quality of wildlife habitat could lower the numbers of animals available for sport harvest. None of the projects listed above is expected to degrade wildlife habitat to such a degree to lower habitat carrying capacities on a broad enough scale to significantly impact sport hunting opportunities.

Wildlife management programs by the state of Alaska have the greatest potential impact on sport hunting opportunities. The State is responsible for assessing wildlife populations Statewide and establishing the sport hunting seasons and bag limits. They also are responsible for managing subsistence hunting on all lands that are not Federal public lands. Recent decisions that all State residents, not only rural residents, are potentially eligible for subsistence priority on these lands could have a significant impact on sport hunting opportunities.

CONCLUSION (Cumulative Impacts on Sport Hunting): In the small number of communities affected by other projects, whose rural determination status would change in the next 10 years from rural to non-rural (Sitka, Unalaska, and Kodiak), competition for sport hunting opportunities will increase. The State of Alaska will maintain responsibility for establishing sport hunting regulations and their actions will have the greatest potential impact on sport hunting opportunities. Taking into account all of these impact factors, the cumulative impacts on sport hunting would be low to moderate.

G. UNAVOIDABLE ADVERSE IMPACTS

1. Impact on Biological Resources

There are no unavoidable impacts to the wildlife resources from the proposed action. Wildlife would be managed to conserve healthy populations. If total harvest demand exceeds a level consistent with the conservation of healthy populations, then harvest must be restricted. Subsistence uses would be given a priority over other consumptive users on Federal public lands.

2. Impact on Social Systems

The Alaska statewide economy is not expected to experience any unavoidable adverse impacts. Government- and community-supported social programs with adequate funding could mitigate many of the sociocultural consequences of the proposed FSMP and particularly alleviate some of the social stress that might be experienced. In the few communities (Unalaska, Kodiak, and Sitka) whose rural determination status could change in the next 10 years from rural to non-rural, there could be adverse impacts as a result of decreased harvests and shifts in harvest patterns of Sitka black-tail deer. These impacts would be unavoidable as long as the population of Sitka continues to grow. Even if Sitka were able to maintain its rural status, Section 804 of ANILCA would be likely to be enacted for deer harvests. In this case, those residents who could not demonstrate customary and traditional dependence on deer would not longer be able to hunt deer for subsistence or sport hunting, which would be an adverse impact on these residents. As a result of impacts on subsistence use patterns, impacts on sociocultural systems could be unavoidable. As a community changes from a subsistence economy to a cash economy with corresponding new values, breakdown of family ties, and a disruption of sharing networks (see Sec. IV.B.3), impacts on the social organization and cultural values could be unavoidable.

3. Impact on Sport Hunting

The unavoidable adverse impact to sport hunting will occur where the allowable harvest of a wildlife population cannot accommodate the demand from both subsistence users and sport hunters. In those instances, subsistence use of wildlife resources will be given a priority over all other consumptive uses.

H. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

In this section, the short-term impacts and uses of various components of the environment are related to long-term impacts and the maintenance and enhancement of long-term productivity. The impacts of the proposed action would vary in kind, intensity, and duration.

1. Impact on Biological Resources

The short-term and long-term impacts to wildlife resources from the proposed action are described in detail within the description of the environmental consequences, Alternative I through IV. Tables IV.B.1-1 through IV.D.1-7 describe the quantity of animals removed from the wildlife populations on a temporary (less than 1 year) basis. Short-term impacts on wildlife because of the proposed action will not have adverse impact on the long-term productivity of wildlife resources. In some instances, if a change in wildlife management strategy occurred that emphasized a maximum subsistence harvest rather than providing for trophy sport hunting opportunities, there could be a gradual long-term change in population structures and age class distribution.

2. Impact on Social Systems

In the communities whose rural determination status would change in the next 10 years from rural to non-rural (Unalaska, Sitka, and Kodiak), both short-term and long-term impacts would occur, without enhancement of long-term productivity. In Sitka and possibly Kodiak and Unalaska, there would be short-term impacts on subsistence use patterns. Harvest levels may be reduced and subsistence use harvest areas may change; these impacts would be short term, but would be likely to occur chronically, causing long-term consequences. These impacts would be expected to continue through time as long as the FSMP is in place and as long as populations continue to grow, pushing communities into non-rural status. As a result of impacts on subsistence use patterns, impacts on sociocultural systems are expected to occur. These impacts should be short term, as a result of changes to cultural values, social organization, and increased stress on a community's social health, but they could have long-term consequences if they occur chronically. In such an event, impacts as a result of changes in rural determinations could have long-term consequences on sociocultural systems.

3. Impact on Sport Hunting

The short-term impact of the management of subsistence uses of wildlife resources may be the reallocation of resources for other users. As some wildlife populations experience short-term declines in because of natural cycles of disease, predation, or other factors, short term disruptions in sport hunting opportunities may occur in order to provide for subsistence priority. The requirement of ANILCA to conserve healthy wildlife populations will minimize any long-term disruption of broad scale sport hunting opportunities. Certain small, isolated populations may require the total allowable harvest to allocated to subsistence users resulting in localized, long-term disruption of sport hunting opportunities.

I. IRREVERSIBLE AND IRRETRIEVABLE IMPACTS

1. Impact on Biological Resources

There are no irreversible impacts associated with the proposed action. There is a low probability of impacts of irretrievable nature associated with all alternatives. These are impacts are due to the lost production that could occur if wildlife populations are managed at density levels that are either too high or too low. In these situations, a loss of potential production would occur. The loss is not permanent, but could take several years, or in limited instances, decades, for the population to return to a natural level.

2. Impact on Social Systems

Many important aspects of rural culture, especially Native culture, are centered around subsistence activities (see Sec. III.C.3). If a community's rural determination status changes in the next 10 years from rural to non-rural (this is only expected in Unalaska, Sitka, and Kodiak), irreversible and irretrievable impacts could occur. This change in status would mean that the residents in that community could no longer hunt and fish for subsistence use on Federal lands, impacting harvest levels and harvest areas. If this occurred, it would be likely that the trend in that community towards dependency on a cash economy would intensify and a higher percentage of residents would be forced to participate in wage-labor. However, it would be expected that under the proposed action for at least a portion of a community of 2,500 to 7,000 or more residents, this trend towards wage-labor already would have occurred. In many areas of the State, at least some portion of State land would remain available to local residents for subsistence hunting and fishing. Without access to Federal lands, but even with access to State lands, hunting and fishing most likely would decrease. In addition, fishing on navigable waters would remain available, and fishing constitutes a large percentage of subsistence resources. Sport hunting also would remain available to local residents in the non-rural area, unless a Tier II hunt under State regulations or Section 804 were enacted under ANILCA--which in some areas of the State has already been done. In other areas, establishment of Tier II hunts or Section 804 are highly likely in the next 1 to 10 years. If hunting were not available on either State or Federal lands (subsistence hunting on State lands or sport hunting on Federal lands), the impacts of rural determination on social organization, cultural values, and social health would increase. To eliminate the ability to hunt would cause a significant amount of stress in the community (in communities already experiencing stresses of acculturation [see Sec. IV.E.3 for this analysis]). These impacts would be expected to continue through time as long as subsistence hunting were not available. An inability to subsistence hunt would have irreversible and irretrievable impacts on the social organization and cultural values through the loss of the central cultural value--subsistence as a way of life--sharing, reciprocity, and fundamental aspects of Native identity.

3. Impact on Sport Hunting

The only irreversible and irretrievable impact of the proposed management program on sport hunting is the lost opportunity that would occur if sport hunting had to be restricted to allow opportunity for subsistence uses to meet their needs. These situations are expected to occur infrequently, and generally in localized situations.

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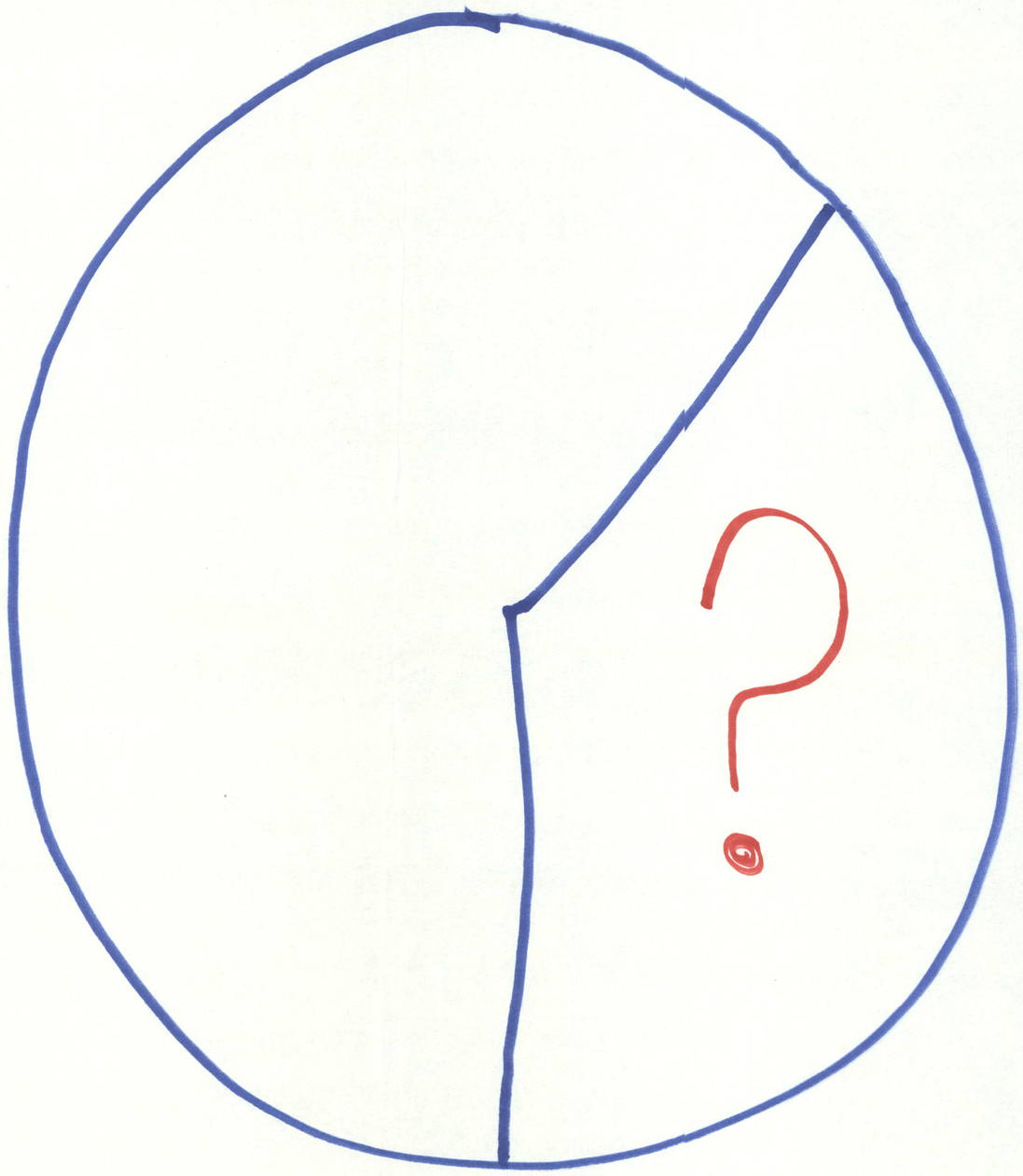
How To Divide The General Restoration $



POLICY & REALITY

1) ALL RECOURCES/SERVICES SHOULD GET SOME $.

2) RECOURCES IMPORTANT TO COMM. FISH & SUBSISTENCE SHOULD GET MORE $.

3) ACTIONS FOR SOME R/S ARE MUCH MORE EXPENSIVE THAN OTHERS.

4) SOME R/S HAVE MORE RESTORATION OPPORTUNITIES THAN OTHERS.

1) DIVIDE THE PIE EVENLY

(WHAT ABOUT RESOURCES NOT CONSIDERED IN THE EIS?)

2) WEIGHT RESOURCES BASED ON COMM. FISH/SUBSISTENCE... EXPENSIVENESS?

3) Divide by # of "projects"

ALTERNATIVE 2 - NO $ FOR GEN. RES.

ALTERNATIVE 3 - $66,000,000.

2/3 = 43,995,600

ALTERNATIVE 4 - $192,500,000

2/3 127,050,000

ALTERNATIVE 5 - $165,000,000

2/3 = 108,900,000

								TOTAL
COMMERCIAL FISHING	1							1
SUBSISTENCE	1							1
RECREATION / ~~TOURISM~~ TOURISM	1							1
SPORT FISHING	1							1
PINK SALMON	1	Not in 3	1	1				3
SOCKEYE SALMON	1		1	1	1			4
PACIFIC HERRING	1	Not in 3	1	1	1			4
HARBOR SEALS	1		1	1	1			4
SEA OTTERS	1		1?					2?

				TOTAL
CLAMS	1	1	1 ~ commercial ?	2
FUCUS COMMUNITIES	1			1
COMMON MURRES	1			
HARLEQUIN DUCKS	1			
MARBLED MURRELETS	1			
PIGEON GUILLEMOTS	1			
ARCHAEOLOGY	1			
DESIG. WILDERNESS	1			
ECOSYSTEMS				
				28

ASSIGN EACH R/S 1 SCORE.

ASSIGN ADDITIONAL POINTS (1 EACH) FOR IMPORTANCE TO SUBSISTENCE etc...

FOR EXAMPLE: SOCKEYE SALMON

1pt ~ For the resource

1pt ~ importance to subsistence

1pt ~ " " commercial fishing

1pt ~ " " recreation = Sport Fish?

4 points TOTAL

ALTERNATIVE 5 ~ $108,900,000

27 points (pieces) allotted.

$108,900,000 = 4,033,333

4,033,333 x 4 = $16,133,333 TOTAL

$16,133,333 ÷ 8 years = $2,016,666/yr

for sockeye salmon

3/7

900

−250 REIM

650 ← 5 ALT

1009 ← FY 92-94 BUD.

→ 541

3/7

PCB	AVG to DATE	5 (MOD)
H 66%	29.4%	40.
MHR 9	16.3	15.
GR 16	14.3	30.
ADM. 5	15.6	5.
END 20	11.1%	10.
116%	86.7% (13.3% D.A.)	100%

SERVICES

		ALTERNATIVES 3	4	5
	Resource options shown above also benefit many services.			
RECREATION	Develop new backcountry public recreation facilities to protect existing recreation use.	X	X	X
	Develop backcountry public recreation facilities to protect and increase existing resource use.		X	X
	Encourage appropriate new recreation use, such as:			X
	Marketing public land for commercial operators and recreationists to use public lands.			
	Creating new visitor centers or building a marine environmental institute to increase public awareness of the nature of injury and recovery and understanding of the ecosystem of that area.			
	Replace lost harvest opportunities by creating new fisheries for salmon or trout.	X	X	X
COMMERCIAL TOURISM	The restoration options, and the alternatives they appear in, are identical to those described above for RECREATION	X	X	X
SUBSISTENCE	Replace lost harvest opportunities by creating new salmon runs.			X
	Test subsistence foods for continued contamination as a means of restoring confidence in the safety of subsistence resources within the spill area.	X	X	X
	Provide new access to traditional foods in areas outside the spill area to restore lost use. This option will undergo legal review.	X	X	X
	Develop subsistence mariculture sites to benefit subsistence users by providing a source of uncontaminated shellfish for their diets.			X
	Develop a shellfish hatchery and technicall research center to benefit subsistence users by providing a source of uncontaminated shellfish for their diets.			X
COMMERCIAL FISHING	Replace harvest opportunities by creating new fish runs to replace commercial fishing opportunities lost due to fishing closures or reduced harvest.	X	X	X
PASSIVE USE	No options other than habitat protection have been identified for this resource.			

ADDING HATCHERY RUNS ALSO ADD CHUMS ETC.

DESIGNATED WILDERNESS AREAS

	ALTERNATIVES 3	4	5
No options have been identified for Designated Wilderness Areas or Wilderness Study Areas.			

ARCHAEOLOGICAL RESOURCES

	ALTERNATIVES 3	4	5
Develop a site stewardship program using local residents to monitor nearby archaeological sites to discourage looting and vandalism.	X	X	X
Increase law enforcement and agency presence to patrol and monitor archaeological sites within the spill area would protect sites from looting and vandalism.	X	X	X
Preserve archaeological sites and artifacts within the spill area to provide some measure of permanent protection for select archaeological resources.	X	X	X
Acquire replacements for artifacts from the spill area as a means of preserving and studying artifacts which were taken from the spill area prior to the spill.	X	X	

COASTAL HABITAT

		ALTERNATIVES 3	4	5
INTERTIDAL ORGANISMS	◆ Accelerate the recovery of the upper intertidal zone to aid intertidal resources in localized areas.	X	X	X
SUBTIDAL ORGANISMS	No restoration options have been identified.			

FISH

		3	4	5
SOCK-EYE SALMON	◆ Intensify management of sockeye salmon on the Kenai River and ~~Red Lake~~ to reduce the ~~risk of~~ overescapement.			X
	Improve access to salmon streams by building fish passes to increase the area where salmon can successfully spawn and rear. This would have benefits in local areas only.			X
	Fertilize lakes to improve sockeye rearing success within the lake and increase sockeye population.		X	X
	◆ Improve survival rates of salmon eggs to fry by using egg boxes, net pens or hatchery rearing. ~~ETC. ETC.~~		X	X
PINK SALMON	◆ Intensify management by incorporating coded-wire tagging and stock separation to ensure and accelerate the recovery of the wild stock.			X
	Construct salmon spawning channels and other instream improvements to increase spawning production and provide long-term enhancement. This would have benefits in local areas only.			X
	Improve access to salmon streams by building fish passes to increase the area where salmon can successfully spawn and rear. This would have benefits in local areas only.			X
	◆ Relocate hatchery runs of pink salmon to reduce the interception rate of wild stocks of pink salmon.		X	X
	Improve survival rates of salmon eggs to fry by using egg boxes, net pens, or hatchery rearing. This would have benefits in local areas only.			X
	Update the Alaska Anadromous Streams Catalog to ensure that the necessary protection and regulation is provided for all listed salmon streams in the spill area.			X
CUT-THROAT TROUT	◆ Intensify management of cutthroat trout and its dependent sport fishery by determining local distribution, abundance, and productivity.		X	X
	Update the Alaska Anadromous Streams Catalogue to ensure necessary protection and regulation for all listed anadromous streams in the spill area.		X	X
DOLLY VARDEN	◆ Intensify management of Dolly Varden and its dependent sport fishery by determining local distribution, abundance and productivity.		X	X
PACIFIC HERRING	◆ Intensify management to improve recovery by allowing increased precision in stock assessment and manipulation of harvest levels.		X	X
ROCK-FISH	◆ Intensify management of the rockfish fishery to modify the harvest to compensate for injury from the spill.		X	X

BIRDS		ALTERNATIVES 3	4	5
BLACK OYSTER-CATCHER	Accelerate the recovery of the upper intertidal zone to improve the rate of recovery in site-specific areas. This would have benefits in local areas only.			X
	◆ Remove predators from islands that previously supported black oystercatchers. Effectiveness varies by location.	X		X
COMMON MURRE	Reduce disturbance at breeding colonies to eliminate factors which could slow the recovery of affected murre colonies. EDUCATION			X
	◆ Use artificial stimuli such as decoys or vocalizations to encourage recovery at affected colonies and accelerate recolonization of historic colonies.	X	X	X
	◆ Remove predators at injured colonies or remove predators from islands that previously supported murres. TRANS PLANT EAGLES KILL FOXES, RATS	X	X	X
HARLEQUIN DUCK	Modify sport hunting harvest guidelines in the areas of injured populations to speed the rate of recovery during the recovery phase. REG M&R			X
	◆ Determine if eliminating oil from mussel beds removes a potential source of continuing contamination in feeding areas and take appropriate action. This would have benefits in local areas only.	X	X	X
MARBLED MURRELET	◆ Minimize the incidental capture of birds in fishing nets by changes in gear or timing of fishing. M&R + REC	X	X	X
PIGEON GUILLEMOT	◆ Control predator access or remove predators from islands that previously supported birds.	X	X	X
BALD EAGLE	No options other than habitat protection have been identified.			

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

/AB ACQ

Y

M&R

STEP

EST OR SUCCESS FROM EDUCATION

+3 +2 +1 HAB ACQ

+1 +2 +3 CLEAN MUSSEL BEDS

EDUCATION

Table B-1 List of Injured Resources and Lost or Reduced Services

INJURED RESOURCES			LOST OR REDUCED SERVICES (Human Uses)
BIOLOGICAL RESOURCES		OTHER	
Recovering Bald eagle Black oystercatcher Intertidal organisms (some) Killer whale Sockeye salmon (Red Lake) Subtidal organisms (some)	**Not Recovering** Common murre Harbor seal Harlequin duck Intertidal organisms (some) Marbled murrelet Pacific herring Pigeon guillemot Pink salmon Sea otter Sockeye salmon (Kenai River) Subtidal organisms (some)	Archaeological resources Designated Wilderness Areas	Commercial fishing Passive uses Recreation and Tourism including sport fishing, sport hunting, and other recreation uses Subsistence
Recovery Unknown Clams Cutthroat trout Dolly Varden River otter Rockfish			

IMPACT TOPICS

COMM FISH .

- SOCKEYE
- PINKS
- HERRING

SUBSISTENCE

HARBOR SEALS

CLAMS

SEAWEED

SEA OTTER

SEA BIRDS - MURRES ETC

~~KILLER WHALES~~

ARCHAEOLOGY

VISUAL RESOURCES

ECOSYSTEM-GENERAL

IMPACT TOPICS

SPORT FISHING

RECREATION/
TOURISM

PASSIVE USES - DROP FOR DEIS -CHAP 1

DESIGNATED WILD.?

STUDY AREAS ALSO

~~WILDERNESS POTENTIAL~~

INTER

SUB

ACTIONS

KILL FOXES

KILL RATS

TRANSPLANT EAGLES

RESTRICT PREDATOR ACCESS

SEE ARCH-

TRANSPLANT FUCUS

MARICULTURE - CLAMS

CLEAN SEDIMENT

CLEAN MUSSEL BEDS

CREATE NEW FISHERIES

2PM
Mtg

ACTIONS

MONITORING

RESEARCH >

EDUCATION - REDUCING TAKE

HAB ACQ (# OF ACRES/ACT)

CLEAN MUSSEL BEDS - DUCKS/SUBS/SEA OTT

MIGRATION CORRIDOR IMPROVEMENT (BOTH) PINKS/REDS

NUTRIENT ~~LATE~~ ENRICHMENT - SOCK

EGG BOXES
NET PENS
HATCHERY REARING } BOTH

HABITAT IMPROVEMENT - PINKS

RELOCATE HATCHERY RUNS - ~~PINKS~~ BOTH

DROP?

M&R ALL ↓

BALD EAGLES – RECOVERING

CUTTHROAT – MONITOR & RESEARCH (M&R)

MINOR PART OF PROG

DOLLY VARDEN – M & R

BLACK OYSTER – RECOVERING

KILLER WHALE – RECOV – M&R

(OVERALL ECOSYS BENEFITS WILL ALSO BENEFIT WHALES)

INTER TIDE (SOME)

SUB TIDE (SOME)

RIVER OTTERS

ROCKFISH ← RESEARCH

SPORT HUNTING – NO ACTIONS PROP.

PASSIVE USES – BENEFITS FROM RESTORATION IN GENERAL