AGENDA C-2
OCTOBER 2001

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Clarence Pautzke
Executive Director

DATE: September 24, 2001

SUBJECT: Steller Sea Lion Measures

ESTIMATED TIME
16 HOURS

ACTION REQUIRED

(a) Receive final report from the independent review team.
(b) Receive staff reports on the draft SEIS and the draft Biological Opinion.
(c) Take final action to identify the preferred Alternative and recommend emergency rules for the 2002 fisheries.

BACKGROUND

(a) Independent review

Two reviews of the Biological Opinion and its underlying science have been contracted by the Council using our special SSL funding: the National Academy of Science (NAS) review and a short- term review by an independent team of scientists. The short-term review has been completed by the review team. Members of that review team are (1) Dr. Don Bowen (Chair) from the Bedford Institute of Oceanography, DFO, Nova Scotia; (2) Dr. Dan Goodman, Systems Ecologist, Department of Biology, MSU; (3) Dr. John Harwood, Sea Mammal Research Unit of the Gatty Marine Lab, University of St. Andrews, Scotland; and, (4) Dr. Gordon Swartzman, School of Fisheries and Center for Quantitative Science, UW. Team members will be on hand at this meeting to report on their findings.

(b) Draft SEIS and Biological Opinion

In September, the Council reviewed the draft Supplemental Environmental Impact Statement (DSEIS) on Steller sea lion protection measures, together with a draft biological opinion (BiOp). The DSEIS evaluated five alternatives to modify fisheries in such a way that the fisheries neither jeopardized the continued existence of Steller sea lions, nor modified their critical habitat. The National Marine Fisheries Service had tentatively identified Alternative 4, the area and fishery specific approach, as the preferred alternative. This was the alternative originally proposed by the Council's RPA Committee. The draft biological opinion, pursuant to the Endangered Species Act Section 7, concluded that the proposed action implemented by this alternative would not be likely to cause jeopardy or adverse modification. The DSEIS and biological opinion are available on the NMFS Alaska region website (www.fakr.noaa.gov).

The Council, during its review in September, adopted Alternative 4 (with additional clarifications and details) as its preliminary preferred alternative. The Council added several clarifying details for Alternative 4, along with revisions and additional information to be included in the final SEIS and BiOp, as recommended by the Advisory Panel and Scientific and Statistical Committee. Staff will report on how those recommendations have been addressed prior to the Council adopting a final preferred alternative.

A brief list of the alternatives is provided below, with more thorough descriptions in section 2.3 of the draft SEIS.

Alternative 1 — No action. Regulatory measures implemented by emergency rule, and designed to protect Steller sea lions, would expire. Note this alternative is presumed to violate the Endangered Species Act.

Alternative 2 — The low and slow approach. This alternative is derived from the Draft Programmatic SEIS for the Alaska groundfish fisheries (NMFS 2001a). Essentially, the approach is to establish lower total allowable catch levels (TACs) for pollock, Pacific cod, and Atka mackerel, prohibit trawling in critical habitat, and implement measures to spread out catches through the year.

Alternative 3 — The restricted and closed area approach. This alternative is the RPA detailed in the November 30, 2000, Biological Opinion. Essential elements of this approach are to establish large areas of critical habitat where fishing for pollock, Pacific cod, and Atka mackerel is prohibited, and to restrict catch levels in remaining critical habitat areas.

Alternative 4 — The area and fishery specific approach. This alternative was developed by the Council's RPA Committee. This approach allows for different types of management measures in the three areas (AI, BS, and GOA). Essential measures include fishery specific closed areas around rookeries and haulouts, together with seasons and catch apportionments. Three options for closure areas are examined for this alternative.

Option 1: Chignik small boat exemption.
Option 2: Unalaska small boat exemption.
Option 3: Gear specific zones for GOA Pacific cod fisheries.

Alternative 5 — The critical habitat catch limit approach. This alternative is derived from the suite of RPA measures that were in place for the 2000 pollock and Atka mackerel fisheries, and measures considered for the Pacific cod fishery that include seasonal apportionments and harvest limits within critical habitat. Essentially, this alternative limits the amount of catch within critical habitat to be in proportion to estimated fish biomass.

A review of how issues from the September 2001 Council action on Steller sea lion Draft SEIS have been addressed

In September, the Council reaffirmed its selection of Alternative 4 as the preferred alternative with the following modifications:

A Incorporate all of the additional recommendations of the RPA committee included in the minutes of the Aug. meeting:

1 W/C-GOA pollock C season start date of Aug. 25.
[This change has been made to Chapter 2.3.4. No additional analysis is necessary]

2\. Revised platooning for the Atka Mackerel fleet.
[This revision has been made to Chapter 4 and the RIR.]

3 Additional restrictions for the Bering Sea cod and pollock fishery

c) Closure of Area 8 haulouts (at Reef, Lava, Bishop Pt) to 10 miles for {catcher-processors >= 60 ft using hook and line gear} ~~longliners >60'~~.
[Due to the exemption for catcher vessels made later in the motion, the prohibition would apply only to catcher-processors. This revision has been made to Chapter 2.3.4, and will be illustrated in revised maps for the final SEIS]

d) Implement a 3 season split of trawl cod at 60/20/20 (50/30/20 for CP and 70/10/20 for CV) with rollover provisions.
[This change has been made to Chapter 2.3.4, and Chapter 4.12]

e) Limit A season SCA pollock harvest to 28% of annual TAC prior to April 1st.
[This change has been made to Chapter 2.3.4, and Chapter 4.12]

B Incorporate the following recommendations on issues identified by staff, and presented by RPA Committee Chairman Cotter:

1 The 19 additional "RPA" haulouts should be treated consistently with CH haulouts.
[This clarification was added to Chapter 2.3.4 and will be illustrated in revised maps for the final SEIS. No additional analysis is necessary]

2 The 5 northern BS 20 mile haulout closures should apply to the Atka Mackerel, pollock, and P.cod fisheries only.
[This clarification was added to Chapter 2.3.4 and will be illustrated in revised maps for the final SEIS. No additional analysis is necessary]

3 Assignment to mackerel platoons should be random (so switching of assignments between vessels is not allowed) and apply to a specific vessel (not a permit).
[This clarification was added to Chapter 2.3.4. No additional analysis is necessary]

4 Seasonal splits of P. cod do not apply to {pot and hook&line vessels} ~~longliners~~ <60 (catch fixed gear vessels <60 between the open access seasons accrues to the <60 reserve quota).
[This clarification was added to Chapter 2.3.4. No additional analysis is necessary]

5 Maintain the <99' safety exemption in the SCA. NMFS should set aside such A season pollock quota in the SCA as needed for vessels <99' to harvest their full A season pollock quota in the SCA during the period from Jan. 20th – Mar. 31st.
[This clarification was added to Chapter 2.3.4 and discussed in the RIR]

6 The SCA pollock limit in the A season should be allocated amongst the sectors proportionally (each sector would be limited to 28% of its annual pollock allocation.)
[This clarification was added to Chapter 2.3.4. No additional analysis is necessary]

7 300,000lb trip limits in the GOA and tender restrictions east of 157 degrees W lon in the GOA, as well as stand-down provisions and exclusive registration provisions would be retained.

[This clarification was added to Chapter 2.3.4 and discussed in the RIR. Stand-down provisions for the pollock and cod fisheries in the GOA and BSAI were implemented permanently prior to the AFA (679.23(h))]

8 Cod rollovers within the trawl sector should occur within a season prior to allocating to other gear types. Rollovers will continue into subsequent seasons but may be reapportioned if one sector is unable to reach its TAC.

[This clarification was added to Chapter 2.3.4. No additional analysis is necessary]

9 Jig gear is exempt from haulout closures except in Area 9 and in the Seguam Foraging Area.

[This clarification was added to Chapter 2.3.4. and will be illustrated in revised maps for the final SEIS. No additional analysis is necessary]

The Council also requested that the Alaska Board of Fisheries seriously consider adopting parallel restrictions in the parallel cod, pollock and mackerel fisheries in state waters in a timely manner.

[The ADF&G and Board representatives at the Council meeting agreed to bring the issue before the Board at its Oct 11-13 work session. NMFS staff has been communicating with ADF&G regarding restrictions and monitoring tools]

Additionally, the AP added an option to Alternative 4, or some other remedy, which would create an exemption for longline cod catcher vessels >60 in Area 8 to operate between 3-10 miles.

[Staff interpreted the failed motion by Bundy to mean that this exemption would be included as a base regulation within Alternative 4; i.e., not treated as an option]

Other Items

A Review the use of the CS+/- methodology for consistency (are effects evaluated primary, secondary, or tertiary effects – do secondary or tertiary effects rely on assumptions or documented causal relationships). Clarify that there is no weighting assigned to these findings (one CS+ for species "A" doesn't necessarily cancel one CS- for species "B"), and that these ratings are only relative comparisons of the alternatives (option 1 may be negative relative to option 2, but the underlying condition may be negative, positive, or trivial in both options.)

[NMFS has contracted with Larry Cantor to revise this section for consistency for the final SEIS. URS has been similarly contracted to revise the cumulative impacts section, per the SSC minutes]

B Include a table (as presented by Chairman Cotter) of the rookery/haulout closures by gear type listing each site (as per table 21 for 2001 RPAs) and clarify that table 3.6 does not reflect the Alt. 4 closure specifications.

[A final table will be included in Chapter 2]

C Review using 1998 TAC as the reference point for "question 2" (prey availability) is the SSL CS+/- analysis.

[Revisions will be made to this section for the final SEIS]

D A more extensive discussion of the importance of AFA in the gathering of data, monitoring of the fishery, enforcement and management.

[Staff believes that these issues are fully discussed in Chapter 4.11.4]

E Amplify the discussion on VMS issues, including:

10. implementation schedule
11. reliability
12. consequences of failures

13. fisheries and sectors where VMS monitoring may not be needed to achieve quota monitoring goals.
[Clarification has been added to Chapter 2 and additional discussion added to Chapter 4]

F Clarify that application of Alt. 4 Global Control Rule reduces TAC to the amount necessary for bycatch and puts that species on MRB only status.
[This clarification was added to Chapter 2.3.4 and Chapter 4. No additional analysis is necessary]

G Analysis of the economic impacts to industry of management and enforcement measures as proposed in each alternative, including compliance costs for vessels to carry observers, observer costs, increased transit costs, impact of lost crew space on production.
[Additional discussion will be added to Chapter 4]

Staff were tasked with completing these modifications to the best of their ability within the time available before the October Council meeting when final action is scheduled. The Council also requested that comments provided by the Scientific and Statistical Committee be incorporated in the analyses to the extent practicable.
[Many of the SSC comments have been addressed in the BiOp; remaining concerns will be addressed in the final SEIS]

DRAFT

Revised Description of Alternative 4, based on September 2001 Council action

2.3.4 Alternative 4: Area and Fishery Specific Approach (Preferred Alternative)

This alternative was developed by the Council's RPA committee and adjusted by the Council at its special September 2001 meeting. This approach allows for different types of management measures in the three areas (AI, BS, and GOA). Essential measures include fishery specific closed areas around rookeries and haulouts, together with seasons and catch apportionments. The mapable features of this alternative are illustrated in Figure 2.3-4 through 2.3-6 (map packet). Details are as follows:

Applicable to all fisheries:

- No transit zones around 37 rookeries and no groundfish fishing within 3 nm of 39 rookeries.

Applicable to all pollock, cod, and mackerel fisheries:

- **A modified global control rule would be applied. If the spawning biomass of pollock, Pacific cod, or Atka mackerel in the BSAI or GOA is estimated to be less than 20% of the projected unfished biomass, directed fishing for that species would be prohibited. The TAC would be limited to amounts needed for bycatch in other fisheries. Essentially, the ABC control rule would remain unchanged, but the regulations would specify that should biomass fall below B20% for one of these species, then directed fishing for that species in the relevant management area would be prohibited.**

- The Seguam Pass foraging area, Area 9 (Bogoslof) and Area 4 (Chignik), would be closed to all gear types fishing for pollock, Pacific cod, and Atka mackerel. The Area 4 (Chignik) restriction does not apply to vessels using jig gear.

- No pollock, Pacific cod, or Atka mackerel fishing within 0-20 nm of the 5 northern haulouts in the Bering Sea, except jig gear. These include the Round (Walrus Islands), Cape Newenham, Hall Island, St Lawrence SW Cape, and St. Lawerence Island, South Punuk Island haulouts.

- **The 19 additional "RPA" haulouts would be treated consistently with CH haulouts for the purpose of these regulatory changes affecting the pollock, Pacific cod, and Atka mackerel fisheries.**

Applicable to AI pollock fisheries:

- No fishing for pollock in critical habitat in the AI.

- In the AI, there would be one season with January 20 opening.

Applicable to BSAI cod fisheries:

- Establish seasons and TAC apportionments by gear type:

trawl:	January 20 to March 31 (60%), April 1 to June 10 (20%), June 10 through October 31 (20%)
trawl CV	January 20 to March 31 (70%), April 1 to June 10 (10%), June 10 through October 31 (20%)
trawl CP	January 20 to March 31 (50%), April 1 to June 10 (30%), June 10 through October 31 (20%)
longline, jig:	January 1 to June 10 (60%), June 10 through December 31 (40%)
pot:	January 1 to June 10 (60%), September 1 through December 31 (40%)
pot CDQ	January 1 through December 31
pot or H&L < 60 ft LOA	January 1 to December 31

[*Note: the harvest of cod by the <60' pot and hook and line vessels should account towards the 1.4% quota when the season for vessels >=60' using pot or hook and line gear is closed. At other times it counts to the 18.3% or 0.3% quotas as appropriate.*]

- NMFS would roll over seasonal apportionments of TAC so as to maximize the opportunities for Pacific cod harvests by the trawl sector. Cod rollovers within the trawl sector would occur within a season prior to allocating to other gear types. Such rollovers would continue into subsequent seasons, but may be reallocated if one sector is unable to reach its TAC.

- Establish area restrictions based on gear type:

In the Aleutian Islands

Longline and Pot:	No fishing in critical habitat east of 173° West to western boundary of Area 9, 0-10 nm closures at Buldir, 0-20 nm closure at Agligadak.
Trawl:	East of 178° West longitude: 0-10 nm closures around rookeries, except 0-20 nm at Agligadak; 0-3 nm closures around haulouts.
Trawl	West of 178° West longitude: 0-10 nm closures around haulouts and rookeries until the Atka mackerel fishery inside CH A or B season,

respectively, is completed, at which time trawling for cod can occur outside 3 nm of haulouts and 10 nm of rookeries.

In the Bering Sea:

0-3 nm closures around all rookeries and haulouts (except with jig gear around haulouts).

0-10 nm closures around all rookeries and haulouts for trawl gear (except the Pribilof haulouts that would be closed 0-3 nm).

0-7 nm closure around Amak rookeries for longline and pot gear.

0-10 nm closure around Bishop Point and Reef Lava haulouts in Area 8 for catcher-processors >= 60 ft using hook and line gear.

Applicable to BSAI Atka mackerel fisheries:

- Establish two seasons and TAC apportionments: January 20 - April 15(50%), September 1 - November 1 (50%).

- TAC would be further apportioned inside and outside of critical habitat, with 70% inside and 30% outside.

- During each season, fishing would begin first in Area 541. Fishing would begin in Areas 542 and 543 48 hours following the closure of Area 541.

- A system of platoon management would be implemented for Areas 542 and 543 in each season. Platoons will only affect fishing inside critical habitat.

  Vessels wishing to fish in critical habitat would register with NMFS to fish in Area 542, in Area 543, or in both Areas 542 and 543. The vessels registering to fish in an area would be assigned to the "group" for that area. There would be an Area 542 group and an Area 543 group. Vessels registering for both areas would be placed in both groups.

  Two directed fisheries would be defined for each area. Directed fisheries in an area would take place in sequence with defined start and stop dates; directed fisheries could last no longer than 14 days.

  Half of the vessels in each group would be assigned (at random) to a "platoon" to participate in each of the directed fisheries (although one platoon would have one more vessel than the other if there were an odd number of vessels in the group). A vessel wishing to fish in critical habitat in Area 542 and Area 543 would be first assigned to an Area 542 platoon at random. That vessel would then be automatically assigned to a platoon in Area 543 that participated in a directed fishery taking place at a different time. Thus a vessel in the 542 and 543 groups that was assigned, at random, to the platoon for the first directed fishery in Area 542 would automatically be in the platoon for the second directed fishery in Area 543. If the vessel had been randomly assigned to the platoon for the second directed fishery in Area 542, it would be in the platoon for the first directed fishery in Area 543.

Once registered for a critical habitat area directed fishery, vessels would be prohibited from fishing in any other fishery until the assigned critical habitat fishery is closed. If they have registered for both areas, this applies only to the first directed fishery to which they are assigned.

The CH limit (70% of the annual TAC) for the area is divided between the platoons in proportion to the number of vessels in the platoon compared to the number of vessels in the area group. Directed fisheries close when the TAC limit to the fishery has been reached or the closure date is reached.

The platoon system does not extend to waters outside of critical habitat. These waters remain open to the operations of vessels in either platoon or vessels that are not in either platoon.

- No directed fishing for Atka mackerel in critical habitat east of 178° West longitude (including critical habitat in the Bering Sea management area).
- 0-10 nm closures around rookeries west of 178° West longitude, and 0-15 nm at Buldir.
- 0-3 nm closures around haulouts (except with jig gear).
- Two observers are required for each vessel fishing in critical habitat.

Applicable to Bering Sea pollock fisheries:

- Establish seasons and TAC apportionments: January 20 to June 10 (40%), June 10 to November 1 (60%).
- No fishing for pollock during the A season within an area north of Alaska peninsula and Aleutian Islands chain approximately 10 nm from shore, based on a series of straight lines that are tangent to haulouts in the area. (Bering Sea Pollock Restriction Area (BSPRA))
- 0-10 nm closures around all rookeries and haulouts (except the Pribilof haulouts that would be closed 0-3nm).
- The 'Catcher Vessel Operational Area' would be closed to trawl catcher/processors during the B season (June 10 to November 1).
- A limit on the amount of pollock taken within the SCA would be established at no more than 28% of the annual TAC prior to April 1 each year. The remaining portion of TAC available prior to June 10, or 12% of the annual TAC, may be harvested outside of the SCA before April 1 or inside SCA after April 1. If the 28% was not taken in the SCA prior to April 1, the remainder can be rolled over to be taken inside after April 1. The SCA harvest limits would be allocated to sectors proportionately, so that each sector can harvest no more than 28% of its allocation prior to April 1 in the SCA.

- NMFS would set aside such A season pollock quota in the SCA as needed for vessels < 99 feet LOA to harvest their full A season pollock quota in the SCA during the period from January 20th through March 31.

- **Catcher vessel exclusive fishing seasons for Bering Sea and GOA pollock would continue so that:**
  Catcher vessels are prohibited from participating in directed fishing for pollock under the following conditions. Vessels less than 125 ft (38.1 m) LOA are exempt from this restriction when fishing east of 157°00' W. long.

If you own or operate a catcher vessel and engage in directed fishing for pollock in the	During the...	Then you are prohibited from subsequently engaging in directed fishing for pollock in the...
Bering Sea subarea	A season (1/20 - 6/10)	GOA until the following C season (8/25)
	B season (6/11 - 11/1)	GOA until the A season of the next year (1/20)
GOA	A season (1/20 - 2/25)	BS until the following B season (6/11)
	B season (3/10 - 5/31)	BS until the following B season (6/11)
	C season (8/25 - 9/15)	BS until the A season of the following year (1/20)
	D season (10/1 - 11/1)	BS until the A season of the following year (1/20)

Applicable to Gulf of Alaska pollock fisheries:

- Establish seasons and TAC apportionments:
  A season = January 20 to February 25 (25%)
  B season = March 10 to May 31 (25%)
  C season = August 25 to September 15 (25%)
  D season = October 1 to November 1 (25%)
  [Note: Rollovers of TAC apportionment are allowed, provided that no rollover is more than 30% of annual TAC for an individual management area.]

- Catcher vessels would continue to be prohibited from retaining on board, at any time, more than 300,000 pounds (136 mt) of unprocessed pollock. Tender vessels would continue to be prohibited from (i) operating as a tender vessel east of 157° W. longitude and (ii) operating as a tender vessel west of 157° W longitude while retaining on board at any time more than 600,000 pounds (272 mt) of unprocessed pollock.

- **Catcher vessel exclusive fishing seasons for BS and GOA pollock would continue (see Bering Sea pollock fisheries).**

- No directed pollock fishing in the areas listed:

Area 1: 0-20 nm from all rookeries and haulouts, except 0-10 nm around Middleton Island

Area 2: 0-10 nm from all haulouts. 0-20 nm closures at Pye Island and Sugarloaf rookeries. 0-15 nm closures at Marmot Island in the first half of the year, and 0-20 nm in the second half of the year.

Area 3: 0-10 nm from all rookeries and haulouts except 0-3 nm at Cape Barnabus and Cape Ikolik. 0-10 nm closures at Gull Point and Ugak Island during the first half of the year and 0-3 nm during the second half of the year.

Area 4: 0-20 nm from all haulouts and rookeries.

Area 5: 0-20 nm from all rookeries and haulouts, except 0-3 nm at Mitrofania, Spitz, Whaleback, Sea Lion Rocks, Mountain Point, and Castle Rock..

Area 6: 0-10 nm from all rookeries and haulouts, except 0-3 nm at Caton and the Pinnacles.

Areas 10 and 11: 0-20 nm from all rookeries and haulouts

Applicable to Gulf of Alaska cod fisheries:

- Establish seasons and TAC apportionments:
  A-season = 60% of TAC: January 1 hook-and-line, pot, or jig, January 20 trawl, until June 10
  B-season = 40% of TAC: September 1 all gear types to November 1 for trawl gear and December 31 for non-trawl gear

- No trawling for cod in the areas listed:

Area 1: 0-20 nm from all rookeries and haulouts, except 0-10 nm around Middleton Island.

Area 2: 0-10 nm from all haulouts. 0-20 nm closures at Pye Island and Sugarloaf rookeries. 0-15 nm closures at Marmot Island in the first half of the year, and 0-20 nm in the second half of the year.

Area 3: 0-10 nm from all rookeries and haulouts except 0-3 nm at Cape Barnabus and Cape Ikolik. 0-10 nm closures at Gull Point and Ugak Island during the first half of the year and 0-3 nm during the second half of the year.

Area 4: 0-20 nm from all haulouts and rookeries.

Area 5: 0-20 nm from all rookeries and haulouts, except 0-3 nm at Mitrofania, Spitz, Whaleback, Sea Lion Rocks, Mountain Point, and Castle Rock.

Area 6: 0-10 nm from all rookeries and haulouts, except 0-3 nm at Caton and the Pinnacles.

Areas 10 and 11: 0-20 nm from all rookeries and haulouts.

- No jig gear fishing from 0-3 nm of all rookeries.

- No directed fishing for cod with pot or hook and line gear in the areas listed.

Area 1: 0-3 nm from all rookeries.

Area 2: 0-10 nm closures at Pye Island, Sugarloaf, and Marmot.

Area 3: 0-3 nm around Cape Barnabus and Cape Ikolik haulouts.

Area 4: 0-20 nm from all haulouts and rookeries.

Area 5: 0-3 nm from all rookeries and Mitrofania, Spitz, Whaleback, Sea Lion Rocks, Mountain Point, and Castle Rock haulouts.

Area 6: 0-3 nm at Caton and the Pinnacles.

Areas 10 and 11: 0-20 nm from all rookeries and haulouts for pot gear; 0-10 nm from all rookeries and haulouts for longline gear.

- Three options for closure areas applicable to the GOA Pacific cod fisheries under this alternative were considered. However in September 2001 the Council concurred with the recommendation of it's RPA Committee and did not adopt them in the preferred alternative (see Figure 2.3-7 (map packet)). These alternatives were:

  Option 1: Chignik small boat exemption. This option would establish a fishing zone in the Chignik area (area 4) for non-trawl gear out to ten (10) miles from Castle Cape to Foggy Cape for vessels under 60 ft.

  Option 2: Unalaska small boat exemption. This option would establish a fishing zone in the Dutch Harbor area (area 9) for non-trawl gear out to ten (10) miles from Cape Cheerful to Umnak Pass for vessels under 60 ft.

  Option 3: Gear specific zones for GOA Pacific cod fisheries. This option would establish zones (0-3 nm, 3-12, nm, 12-20 nm, and >= 20 nm), as measured from land, from which vessels of certain sizes, and using certain listed gear types could participate.

0-3 nm	3-12 nm	12-20 nm	Outside 20 nm
pot vessels with 60 pot limit, and jig vessels with a 5 machine limit	pot vessels with 60 pot limit, jig vessels with a 5 machine limit, and longline vessels < 60'	all pot vessels, all jig vessels, and all longline vessels	all vessels and gears

The following provide examples of how the 2001 TACs would have been determined under Alternative 4 (values in metric tons).

Bering Sea Pollock

Season	A	B	Total
Season Dates	1/20 to 6/10	6/10 to 11/1	
Season Apportionment	40%	60%	
CDQ	56,000	84,000	140,000
AFA	483,840	725,760	1,209,600
ICA			50,400
Total			1,400,000
Catch Limit Inside the SCA			
Season Dates	**Before 4/1**		
Catch Limit	28% of annual TAC		
CDQ	39,200		
AFA	338,688		
Total	377,888		

Aleutian Islands Pollock

One season opening on January 20, with no directed fishing for pollock inside critical habitat. The follows TAC would be available.

Total pollock TAC:	23,800 mt
CDQ Reserve	2,380 mt
AFA	19,420 mt
ICA	2,000 mt

Bering Sea and Aleutian Islands Pacific Cod

CDQ Reserve	A	B	Total
Season Dates	1/1 to 6/10	6/10 to 12/31	
% Allocation	60%	40%	
Seasonal Allocation	8,460	5,640	14,100

Trawl Gear	A	B	C	
Season Dates	1/20-3/31	4/1-6/10	6/10-11/1	
% Allocation	60%	20%	20%	
Seasonal Allocation	49,039	16,347	16,347	81,733
CV %	70%	10%	20%	
CV allocation	28,606	4,088	8,173	40,867
CP %	50%	30%	20%	
CP allocation	20,433	12,259	8,174	40,866

Non-trawl Gear	A	B	
Season Dates			
Hook and line, jig	1/1-6/10	6/10-12/31	
Pot	1/1-6/10	9/1 to 12/31	
% Allocation	60%	40%	
Seasonal Allocation	53,213	35,475	92,167
Total BSAI Pacific Cod TAC			188,000

Bering Sea and Aleutian Islands Atka Mackerel

Season	A	B	Total
Season Dates	1/20 to 4/15	9/1-11/1	
Season Allocation (%)	50%	50%	
Bering Sea/Eastern Aleutian Islands			
CDQ Reserve	293	293	
Non-CDQ, jig	72	72	
Non-CDQ, other gears	3,535	3,535	
Total	3,900	3,900	7,800
Central Aleutian Islands			
Total TAC for Area			
CDQ Reserve	1,260	1,260	
Non-CDQ	15,540	15,540	
Total	16,800	16,800	33,600
Limit Inside Critical Habitat	70%	70%	
CDQ Reserve	882	882	
Non-CDQ	10,878	10,878	
Total	11,760	11,760	23,520
Western Aleutian Islands			
Total TAC for Area			
CDQ Reserve	1,046	1,046	
Non-CDQ	12,904	12,904	
Total	13,950	13,950	27,900
Limit Inside Critical Habitat	70%	70%	
CDQ Reserve	732	732	
Non-CDQ	9,033	9,033	
Total	9,765	9,765	19,530

Gulf of Alaska Pollock (Western and Central Regulatory Areas)

Management measures for ABC and TAC levels under Alternative 4 include: 1) modifying the NMFS 2000 Biological Opinion GCR to be used in establishing an ABC (in this example using the 2001 GOA pollock stock assessment would not result in an adjustment of GOA pollock ABC); 2) apportioning the annual pollock ABC among management areas based the most recent seasonal (and A/B or winter/spring and a C/D or summer/fall) distribution of pollock biomass; and 3) establishing four equal seasonal apportionments of pollock TAC among four management areas in the A, B, C and D seasons. The 2001 GOA pollock TACs under Alternative 4 would be apportioned as follows (values in metric tons):

Season	A	B	C	D	Total
Season Dates (trawl gear)	1/20 to 2/25	3/10 to 5/31	8/25 to 9/15	10/1 to 11/1	
Season Apportionment	25	25	25	25	
Area					
Shumagin (610)	7,039	7,039	10,191	10,191	34,460
Chirikof (620)	15,148	15,148	6,054	6,054	42,404
Kodiak (630)	2,037	2,037	7,980	7,980	20,034
Total	24,224	24,224	24,224	24,224	96,896

Gulf of Alaska Pacific Cod

Management measures for ABC and TAC levels for GOA Pacific cod under Alternative 4 include: 1) modifying the NMFS 2000 Biological Opinion GCR to be used in establishing an ABC (in this example using the 2001 GOA Pacific cod stock assessment would not result in an adjustment of GOA Pacific cod ABC); 2) apportioning the annual Pacific cod ABC among management areas based the most recent estimates of distribution of Pacific cod; and 3) establishing two seasonal apportionments of Pacific cod TAC among three management areas. The 2001 GOA Pacific cod TACs under Alternative 4 would be apportioned as follows (values in metric tons):

Season	A	B	Total
Season Dates	1/1 to 6/10 non-trawl gear 1/20 to 6/10 trawl gear	9/1 to 12/31 non-trawl gear 9/1 to 11/1 trawl gear	
Seasonal Apportionment	60%	40%	
Area			
Western GOA	10,980	7,320	18,300
Central GOA	17,393	11,595	28,988
Eastern GOA	2,136	1,424	3,560
Total	30,509	20,339	50,848

Note: Does not include allocation between inshore (90%) and offshore (10%) components.

Table 2.3-1 Alternative 4 Site Closures by Fishery

9/24/01

Site name	Management Region	Site Type	No transit 3 nm	3 nm Groundfish Closure	Pollock Closure	Atka Mackerel Closure	P. Cod Trawl closure	P. Cod Jig Gear[7]	P. Cod Hook and Line Gear	P. Cod Pot Gear	area
St. Lawrence I./S Punuk I.	Bering Sea	H			20	20	20		20	20	8
St. Lawrence I./SW Cape	Bering Sea	H			20	20	20		20	20	8
Hall I.	Bering Sea	H			20	20	20		20	20	8
St Paul I./Sea Lion Rock	Bering Sea	H			3	20	3				8
St Paul I./NE Pt.	Bering Sea	H			3	20	3				8
Walrus I. (Pribilofs)	Bering Sea	R	Y	3	10	20	10	3	3	3	8
St. George I./Dalnoi Pt.	Bering Sea	H			3	20	3				8
St. George I./S Rockery	Bering Sea	H			3	20	3				8
Cape Newenham	Bering Sea	H			20	20	20		20	20	8
Round (Walrus Islands)	Bering Sea	H			20	20	20		20	20	8
Attu I./Cape Wrangell[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Agattu I./Gillon Pt[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Attu I./Chirikof Pt.[11]	Aleutian Islands	H			20	3	20, 3				13
Agattu I./Cape Sabak[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Alaid I.[11]	Aleutian Islands	H			20	3	20,3				13
Shemya I.[11]	Aleutian Islands	H			20	3	20,3				13
Buldir I.[11]	Aleutian Islands	R	Y	3	20	15	20, 10	3	10	10	13
Kiska I./Cape St. Stephen[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Kiska I./Sobaka & Vega[11]	Aleutian Islands	H			20	3	20, 3				13
Kiska I./Lief Cove[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Kiska I./Sirius Pt.[11]	Aleutian Islands	H			20	3	20, 3				13
Tanadak I. (Kiska)[11]	Aleutian Islands	H			20	3	20, 3				13
Segula I.[11]	Aleutian Islands	H			20	3	20, 3				13
Ayugadak Point[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Rat I./Krysi Pt.[11]	Aleutian Islands	H			20	3	20, 3				13
Little Sitkin I.[11]	Aleutian Islands	H			20	3	20, 3				13
Amchitka I./Column Rocks[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Amchitka I./East Cape[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Amchitka I./Cape Ivakin[11]	Aleutian Islands	H			20	3	20, 3				13
Semisopochnoi/Petrel Pt.[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Semisopochnoi I./Pochnoi Pt[1]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Amatignak I./Nitrof Pt.[11]	Aleutian Islands	H			20	3	20, 3				13
Unalga & Dinkum Rocks[11]	Aleutian Islands	H			20	3	20, 3				13
Ulak I./Hasgox Pt.[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Kavalga I.[11]	Aleutian Islands	H			20	3	20, 3				13
Tag I.[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13
Ugidak I.[11]	Aleutian Islands	H			20	3	20, 3				13
Gramp Rock[11]	Aleutian Islands	R	Y	3	20	10	20, 10	3	3	3	13

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Site name	Management Region	Site Type	No transit 3 nm	3 nm Groundfish Closure	Pollock Closure	Atka Mackerel Closure	P. Cod Trawl closure	P. Cod Jig Gear[7]	P. Cod Hook and Line Gear	P. Cod Pot Gear	area
Tanaga I./Bumpy Pt.[12]	Aleutian Islands	H			20	20	3				13
Bobrof I.	Aleutian Islands	H			20	20	3				13
Kanaga I./Ship Rock	Aleutian Islands	H			20	20	3				13
Kanaga I./North Cape	Aleutian Islands	H			20	20	3				13
Adak I.	Aleutian Islands	R	Y	3	20	20	10	3	3	3	12
Little Tanaga Strait	Aleutian Islands	H			20	20	3				12
Great Sitkin I.	Aleutian Islands	H			20	20	3				12
Anagaksik I.	Aleutian Islands	H			20	20	3				12
Kasatochi I.	Aleutian Islands	R	Y	3	20	20	10	3	3	3	12
Atka I./N. Cape	Aleutian Islands	H			20	20	3				12
Amlia I./Sviech. Harbor[3]	Aleutian Islands	H			20	20	3	SFA	SFA	SFA	12
Sagigik I.[3]	Aleutian Islands	H			20	20	3	SFA	SFA	SFA	12
Amlia I./East[3]	Aleutian Islands	H			20	20	SFA	SFA	20	20	12
Tanadak I. (Amlia)[3]	Aleutian Islands	H			20	20	3	SFA	20	20	12
Agligadak I.[3]	Aleutian Islands	R	Y	3	20	20	20	SFA	20	20	12
Seguam I./Saddleridge Pt.[3]	Aleutian Islands	R	Y	3	20	20	10	SFA	20	20	12
Seguam I./Finch Pt.	Aleutian Islands	H			20	20	3		20	20	12
Seguam I./South Side	Aleutian Islands	H			20	20	3		20	20	12
Amukta I. & Rocks	Aleutian Islands	H			20	20	3		20	20	12
Chagulak I.	Aleutian Islands	H			20	20	3		20	20	12
Yunaska I.	Aleutian Islands	R	Y	3	20	20	10	3	20	20	12
Uliaga[5, 13]	Bering Sea	H			20	20	10	BFA	BFA	BFA	9
Chuginadak	Gulf of Alaska	H			20	NDF	20		10	20	11
Kagamil[5, 13]	Bering Sea	H			20	20	10	BFA	BFA	BFA	9
Samalga	Gulf of Alaska	H			20	NDF	20		10	20	11
Adugak I.[5]	Bering Sea	R	Y	3	10	20	10	BFA	BFA	BFA	9
Umnak I./Cape Aslik[5]	Bering Sea	H			BFA	BFA	BFA	BFA	BFA	BFA	9
Ogchul I.	Gulf of Alaska	R	Y	3	20	NDF	20		10	20	11
Bogoslof I./Fire Island[5]	Bering Sea	R	Y	3	BFA	BFA	BFA	BFA	BFA	BFA	9
Polivnoi Rock[4]	Gulf of Alaska	H			20	NDF	20		10	20	11
Emerald I[4]	Gulf of Alaska	H			20	NDF	20		10	20	11
Unalaska/Cape Izigan[4]	Gulf of Alaska	H			20	NDF	20		10	20	11
Unalaska/Bishop Pt[6, 10]	Bering Sea	H			10	20	10		10	3	8
Akutan I./Reef-lava[6, 10]	Bering Sea	H			10	20	10		10	3	8
Unalaska I./Cape Sedanka[4]	Gulf of Alaska	H			20	NDF	20		10	20	10
Old Man Rocks[4]	Gulf of Alaska	H			20	NDF	20		10	20	10
Akutan I./Cape Morgan[4]	Gulf of Alaska	R	Y	3	20	NDF	20	3	10	20	10

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Site name	Management Region	Site Type	No transit 3 nm	3 nm Groundfish Closure	Pollock Closure	Atka Mackerel Closure	P. Cod Trawl closure	P. Cod Jig Gear[7]	P. Cod Hook and Line Gear	P. Cod Pot Gear	area
Akun I./Billings Head[6]	Bering Sea	R	Y	3	10	20	10	3	3	3	8
Rootok[4]	Gulf of Alaska	H			20	NDF	20		10	20	10
Tanginak I.	Gulf of Alaska	H			20	NDF	20		10	20	10
Tigalda/Rocks NE[4]	Gulf of Alaska	H			20	NDF	20		10	20	10
Unimak/Cape Sarichef[6]	Bering Sea	H			10	20	10		3	3	8
Aiktak[4]	Gulf of Alaska	H			20	NDF	20		10	20	10
Ugamak I.[4]	Gulf of Alaska	R	Y	3	20	NDF	20		10	20	10
Round (GOA)[4]	Gulf of Alaska	H			20	NDF	20		10	20	10
Sea Lion Rock (Amak)[6]	Bering Sea	R	Y	3	10	20	10		7	7	7
Amak I. and rocks[6]	Bering Sea	H			10	20	10		3	3	7
Bird I.	Gulf of Alaska	H			10	NDF	10				6
Caton I.	Gulf of Alaska	H			3	NDF	3		3	3	6
South Rocks	Gulf of Alaska	H			10	NDF	10				6
Clubbing Rocks (S)	Gulf of Alaska	R	Y	3	10	NDF	10	3	3	3	6
Clubbing Rocks (N)	Gulf of Alaska	R	Y	3	10	NDF	10	3	3	3	6
Pinnacle Rock	Gulf of Alaska	R	Y	3	3	NDF	3	3	3	3	6
Sushilnoi Rocks	Gulf of Alaska	H			10	NDF	10				6
Olga Rocks	Gulf of Alaska	H			10	NDF	10				6
Jude I.	Gulf of Alaska	H			20	NDF	20				5
Sea Lion Rocks (Shumagins)	Gulf of Alaska	H			3	NDF	3		3	3	5
Nagai I./Mountain Pt.	Gulf of Alaska	H			3	NDF	3		3	3	5
The Whaleback	Gulf of Alaska	H			3	NDF	3		3	3	5
Chernabura I.	Gulf of Alaska	R	Y	3	20	NDF	20	3	3	3	5
Castle Rock	Gulf of Alaska	H			3	NDF	3		3	3	5
Atkins I.	Gulf of Alaska	R	Y	3	20	NDF	20	3	3	3	5
Spitz I.	Gulf of Alaska	H			3	NDF	3		3	3	5
Mitrofania	Gulf of Alaska	H			3	NDF	3		3	3	5
Kak	Gulf of Alaska	H			20	NDF	20		20	20	4
Lighthouse Rocks	Gulf of Alaska	H			20	NDF	20		20	20	4
Sutwik I.	Gulf of Alaska	H			20	NDF	20		20	20	4
Chowiet I.	Gulf of Alaska	R	Y	3	20	NDF	20	3	20	20	4
Nagai Rocks	Gulf of Alaska	H			20	NDF	20		20	20	4
Chirikof I.	Gulf of Alaska	R	Y	3	20	NDF	20	3	20	20	4
Puale Bay	Gulf of Alaska	H			10	NDF	10				3
Kodiak/Cape Ikolik	Gulf of Alaska	H			3	NDF	3		3	3	3
Takli I.	Gulf of Alaska	H			10	NDF	10				3
Cape Kuliak	Gulf of Alaska	H			10	NDF	10				3
Cape Gull	Gulf of Alaska	H			10	NDF	10				3
Kodiak/Cape Ugat	Gulf of Alaska	H			10	NDF	10				2
Sitkinak/Cape Sitkinak	Gulf of Alaska	H			10	NDF	10				3
Shakun Rock	Gulf of Alaska	H			10	NDF	10				2
Twoheaded I.	Gulf of Alaska	H			10	NDF	10				3

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Site name	Management Region	Site Type	No transit 3 nm	3 nm Groundfish Closure	Pollock Closure	Atka Mackerel Closure	P. Cod Trawl closure	P. Cod Jig Gear[7]	P. Cod Hook and Line Gear	P. Cod Pot Gear	area
Cape Douglas (Shaw I.)	Gulf of Alaska	H			10	NDF	10				2
Kodiak/Cape Barnabas	Gulf of Alaska	H			3	NDF	3		3	3	3
Kodiak/Gull Point[1]	Gulf of Alaska	H			10,3	NDF	10, 3				3
Latax Rocks	Gulf of Alaska	H			10	NDF	10				2
Ushagat I./SW	Gulf of Alaska	H			10	NDF	10				2
Ugak I.[1]	Gulf of Alaska	H			10,3	NDF	10, 3				3
Sea Otter I.	Gulf of Alaska	H			10	NDF	10				2
Long I.	Gulf of Alaska	H			10	NDF	10				2
Sud I.	Gulf of Alaska	H			10	NDF	10				2
Kodiak/Cape Chiniak	Gulf of Alaska	H			10	NDF	10				2
Sugarloaf I.	Gulf of Alaska	R	Y	3	20	NDF	20	3	10	10	2
Sea Lion Rocks (Marmot)	Gulf of Alaska	H			10	NDF	10				2
Marmot I.[2]	Gulf of Alaska	R	Y	3	15,20	NDF	15, 20	3	10	10	2
Nagahut Rocks	Gulf of Alaska	H			10	NDF	10				2
Perl	Gulf of Alaska	H			10	NDF	10				2
Gore Point	Gulf of Alaska	H			10	NDF	10				2
Outer (Pye) I.	Gulf of Alaska	R	Y	3	20	NDF	20	3	10	10	2
Steep Point	Gulf of Alaska	H			10	NDF	10				2
Seal Rocks (Kenai)	Gulf of Alaska	H			10	NDF	10				2
Chiswell Islands	Gulf of Alaska	H			10	NDF	10				2
Rugged Island	Gulf of Alaska	H			10	NDF	10				2
Point Elrington[8, 9]	Gulf of Alaska	H			20	NDF	20				1
Perry I.[8]	Gulf of Alaska	H									1
The Needle[8]	Gulf of Alaska	H									1
Point Eleanor[8]	Gulf of Alaska	H									1
Wooded I. (Fish I.)	Gulf of Alaska	R		3	20	NDF	20	3	3	3	1
Glacier Island[8]	Gulf of Alaska	H									1
Seal Rocks (Cordova)[9]	Gulf of Alaska	R		3	20	NDF	20	3	3	3	1
Cape Hinchinbrook[9]	Gulf of Alaska	H			20	NDF	20				1
Middleton I.	Gulf of Alaska	H			10	NDF	10				1
Hook Point[9]	Gulf of Alaska	H			20	NDF	20				1
Cape St. Elias	Gulf of Alaska	H			20	NDF	20				1

H = haulout

R = rookery NDF = No directed fishery for Atka Mackerel in the Gulf of Alaska Area

Fishery closures are an area around a site from between 0 nm to the number of nm shown in the cloumn for each site.

[1]The trawl closure between 0 nm to 10 nm is effective from Jan. 20 through May 31 for pollock and from Jan. 20 through June 10 for Pacific cod. Trawl closure between 0 nm to 3 nm is effective from August 25 through October 31 for pollock and from September 1 through October 31 for Pacific cod.

[2]Trawl closure between 0 nm to 15 nm is effective from Jan. 20 through May 31 for pollock and from Jan. 20 through June 10 for Pacific cod. Trawl closure between 0 nm to 20 nm is effective from August 25 to October 31 for pollock and from September 1 through October 31 for Pacific cod.

[3] Some or all of the restricted area is located in the Seguam Foraging Area (SFA) which is closed to all gears types.

[4]Restriction area includes only waters of the Gulf of Alaska Area.

[5]This site lies within the Bogoslof Foraging area (BFA) which is closed to all gear types.

[6] This site is located in the Bering Sea Pollock Restriction Area, closed to pollock trawling from January 1 through June 10.

[7]Jig gear fishing is exempt from haulout closures and from 3nm to 10 nm or 20 nm rookery closures, except in Area 9 of the Bering Sea and in the Seguam Foraging Area.

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Site name	Management Region	Site Type	No transit 3 nm	3 nm Groundfish Closure	Pollock Closure	Atka Mackerel Closure	P. Cod Trawl closure	P. Cod Jig Gear[7]	P. Cod Hook and Line Gear	P. Cod Pot Gear	area

[8]Contact the Alaska Department of Fish and Game for fishery restrictions at these sites.

[9] The 20 nm closure around this site is effective in waters outside of the state waters of Prince William Sound.

[10]Hook-and-line no fishing zones apply only to catcher processor vessels greater than or equal to 60 feet LOA.

[11] Pacific cod trawling is prohibited 0 nm to 20 nm of rookeries and haulouts until the critical habitat Atka mackerel fishery in the A or B season are completed. After closure of the Atka mackerel critical habitat fishery, trawling is prohibited between 0 nm to 10 nm of rookeries and between 0 nm and 3 nm of haulouts.

[12] The 20 nm Atka mackerel fishery closure around the Tanaga I./Bumpy Pt. Rookery is established only for that portion of the area east of 178 degrees W longitude.

[13] The pollock and Atka mackerel closures around these sites applies to 20 nm critical habitat areas specified at 50 CFR 223.202. Pacific cod trawl closures around these sites are effective for the waters inside the BFA only.

Sep 07 01 03:23p Alvin Pedersen 1-907-840-2275

AGENDA C-2
OCTOBER 2001
Supplemental

RECEIVED
SEP 24 2001
N.P.F.M.C

North Pacific Fishery Management Council
605 W. 4th Ave, Suite 306
Anchorage AK 99501-2252

To:Councilmembers, AP Members, and Scientific and Statistical Committee members

I am writing in regards to the recent actions taken by the North Pacific Fishery Management Council meeting on the Steller Sea Lion Critical Habitat areas. The RPA Committee has recommended that Area 4 be closed to Pollock, P-cod and Atka mackerel federal fishing for all gear types for 2002 and beyond to protect Steller Sea Lions. This complete closure to any type of fishing for Pollock, P-Cod, and Atka mackerel is only being applied to Area 4. Other areas at least have some exemptions for species and gear types that allow some fishing to occur. This new proposed area that may be left open from Castle Cape to Foggy cape is really a tough place to fish in the winter months mainly because of prevailing Northwest winds and severe icing conditions. Traditionally two 58 foot steel vessels pot fish the Federal Season for P-Cod in the Mitrofania area, which at least offers some protection from Northwest wind. Sheltered area for winter and spring seasons would be from Kupreanof Point to Castle Cape area. What is really worrisome about this recent action is NMFS has recommended to the Council that unless the Alaska Board of Fisheries change its regulations to match federal SSL protection in State waters for the parallel season. There may not be any federal fishery in area 4 for 2002. This could potentially shut down our State P-Cod fishery also. The Chignik economy is based on commercial fishing for Salmon, P-Cod, and Halibut, in state waters. If Chignik looses P-Cod it would be detrimental to our economy, many fisherman have invested heavily in the pot and jig fishery to try and help alleviate lost income from salmon because of poor prices. The problem is trying to establish a market for P-Cod has been been tough to say the least. Trying to catch our quota in the Chignik are has been tough. Processors have come and gone. Our local processors do not open for P-Cod until late April or May. Some local boats had to fish for pot and jig cod down near Kupreanof in the state season and run them all the way to Sand Point adding to higher operating expenses for fuel. Weather is also a big factor crossing Stepovak. The Governors recent Economic Disaster Declaration for the Bristol Bay region includes, Lake & Peninsula Borough and Aleutians East Borough communities.
Small boat commercial fisherman cannot afford to loose any more fisheries. Final Action on this issue will be taken up at the North Pacific Fishery Management Council meeting in Seattle at the Doubletree Inn, Sea Tac on October 3-8. The advisory panel meets on October1-2.

Alvin Pedersen-Chairman
Lake & Peninsula Borough Fisheries Advisory Committee

RECEIVED
SEP 24 2001
N.P.F.M.C

North Pacific Council
Fax # (907) 271-2817

Dear Council Members:

My name is Peter Schonberg and I own the 58' combination vessel Equinox. We have fished for pacific cod in the central and western Gulf of Alaska since 1988 using pot, longline and trawl gears. This year the p-cod season was split into a season where 60% of the catch was to be taken starting 1/1/01 and the rest starting 9/1/01. The p-cod fishery is very important to my business and generates a very significant percentage of our fishing revenues each year.

When the 60-40 split was announced last winter, I was aware that the fall fishery might be difficult, but we geared up for it. We were prepared to fish with trawl or pot gear. The trawl fishery was closed after five days because of halibut bycatch and the pot fishery was not economical to pursue because the fish are not aggregated at that time of year and are of poor quality.

I am sure that everyone had the best intentions when the split was created, but the fact is that the fall season is not a good time to catch p-cod. The last NMFS statistics show that 69% of the Western Gulf p-cod quota and 72% of the Central Gulf p-cod quota has been caught (as of 9/15/01). I don't expect that number to change significantly before the end of the year. When the trawl fishery reopens 10/1/01, the halibut bycatch will still be very high and will not allow a significant fishery. I believe that the pot fishery will continue to be uneconomical. In the pot fishery it is possible to catch 10,000 lbs in a two day trip which would generate $2500 at current Western Gulf prices. Fuel, food and bait easily consumes the entire amount.

I feel that the set of amendments currently being considered which continue the 60-40 split are poorly conceived. The p-cod are available in the winter and early spring and halibut bycatch is much less of a problem during that period. If the fishery does not occur during that time it will not work. I think that one of the mandates for NMFS and the North Pacific Council is to create reasonable opportunities to harvest available fish. I hope that you will consider this matter at the 10/3-10/8 meeting. It is of great importance to all of the fishers, processors and communities who depend on p-cod for their living.

As a fisherman for thirty years, I have developed a love for the many creatures around us and do not in any way want to be responsible for the demise of a creature as magnificent as the Stellar Sea Lion. I also feel that even if food competition is a real factor in their decline that there are reasonable measures that can be used to mitigate the problem. The fall fishery for p-cod in the Gulf of Alaska is not a reasonable measure. Please go back to the drawing board and create something that works.

Sincerely, Peter Schonberg 9/24/01

Peter Schonberg

PRITCHETT & JACOBSON
ATTORNEYS AT LAW

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E-MAIL: PandJ@nas.com

September 25, 2001

By Facsimile to: (907)271-2817

RECEIVED
SEP 25 2001
N.P.F.M.C

Mr. David Benton, Chairman
North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, AK 99501-2252

Re: October 2001 Meeting
AGENDA ITEM C-2(b) - Steller Sea Lion Measures

Dear Mr. Benton:

I am writing on behalf of the following three Bering Sea cod trawlers, to request that identical safety protections be recommended for small Pacific cod vessels as were recommended by the Council in September for small pollock vessels also fishing in the Sea Lion Conservation Area ("SCA") during the same winter "A" season. This request is made on behalf of:

OMAR ALLINSON (F/V MISS LEONA)
STEVE AARVIK (F/V WINDJAMMER), AND
CHARLES BURRECE (F/V LONE STAR).

The Council Action on the Steller Sea Lion DSEIS of September 2001 includes the following recommendation to protect small pollock vessels in the winter fishery:

B.5 Maintain the <99' safety exemption in the SCA. NMFS should set aside such A season pollock quota in the SCA as needed for vessels <99' to harvest their full A season pollock quota in the SCA during the period from Jan. 20th-Mar. 31st.

Because small Pacific cod trawl vessels fishing in the SCA during A season are exposed to at least as great of dangers as small pollock vessels fishing in exactly the same time period and in exactly the same area, we believe that equal protections are required to preserve cod vessels and the lives of their crews.

All three of the above cod vessels are small vessels for the Bering Sea trawl fisheries (ranging in length overall from 75 to 88 feet). Thus, they are even more at risk than many of the larger under-99' vessels. These three fishermen have often presented testimony to the Council, voicing related safety concerns. Additionally, the historical catch of these three cod boats has been virtually entirely within the SCA during A season. Therefore, we believe that small cod vessels as a group are deserving of identical protections to those recommended by the Council in September for <99' pollock vessels.

Under National Standard 10 (50 CFR §600.355), conservation and management measures must, to the extent practicable, promote safety of human life at sea. The regulations implementing National Standard 10 provide, in part, as follows:

> "Typically, larger vessels can fish farther offshore and in more adverse weather conditions than smaller vessels. An FMP should try to avoid creating situations that result in vessels going out farther, fishing longer, or fishing in weather worse than they generally would have in the absence of management measures. Where these conditions are unavoidable, management measures should mitigate these effects, consistent with the overall management goals of the fishery." §600.355(c)(1).

The safety concerns articulated under National Standard 10 precisely reflect the dangerous conditions which are faced by these fishermen. As noted above, all three vessels are very small vessels for the Bering Sea trawl fisheries. All three vessels are non-AFA, so they do not have the ability of AFA vessels to shift their cod catch to a larger coop vessel, which can safely fish further from shore and further from town. Nor do they enjoy the pollock allocations held by AFA vessels, which give those vessels alternate Bering Sea fisheries, or alternate sources of income through leasing pollock quota.

All three fishermen have long-term dependency on the directed cod trawl fisheries in the Bering Sea, since 1991 for Omar Allinson, since the 1980's for Steve Aarvik, and since the 1970's for Charles Burrece.

In recognition of the fact that these three vessels cannot safely fish in the winter outside of the SCA, we respectfully request that the Council recommend protections for Bering Sea cod trawl vessels 99 feet or less which are identical to those recommended by the Council to protect small pollock vessels and fishermen from loss of life or property during the A season.

Thank you for your consideration of this request.

Respectfully submitted,

Russell W. Pritchett

#128/NPFMC-OCT

Petersburg Vessel Owners Association

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September 25, 2001

Mr. David Benton, Chairman
North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, AK 99501-2252

Subject: October 2001 Agenda Item C-2: Steller Sea Lion Measures

Dear Chairman Benton:

Petersburg Vessel Owners Association is a diverse group of commercial fishermen. Some of our members participate in the fisheries that will be affected by the protective measures the Council adopts for Steller sea lions. We ask that as you take final action at the October meeting, you continue to support alternative four with the additional recommendations of the RPA committee. This is the alternative that has the smallest negative impact commercial fishing, yet still receives a no jeopardy finding with regard to Steller sea lions.

The Steller sea lion issue is a difficult one due to the uncertainty that surrounds it. At this time, it is unknown whether commercial fishing is impacting Steller sea lions, as they show no evidence of nutritional stress. PVOA does not feel that any evidence has been offered to show that commercial fishing is currently negatively impacting Steller sea lions. However, we also recognize that the Council must take protective action at this time. Therefore, we urge the Council to continue to support an action that will result in a finding of no jeopardy while impacting commercial fishing as little as possible.

We ask that the Council continue to support the recommendations of the RPA committee when taking final action. We strongly feel that alternative four with the additional RPA committee recommendations is the best alternative available at this time. In addition, we ask that the Council work closely with the Board of Fish to ensure that appropriate measures are taken in state waters to result in a finding of no jeopardy and allow our fisheries to open on schedule in 2002. Thank you for your consideration of these comments.

Sincerely,

Cora Crome

Cora Crome
Director

(6) The Gulf of Alaska Pollock fishery quotas are apportioned by biomass allocating quota allotments to areas 610, 620, 630, 640 and Shelikof Straits. Apportioning quota based on biomass spatially disperses catch over the entire Gulf, an added conservative measure.

(7) Approximately 6,050 MT of available annual 2001 Pollock quota has been lost and unavailable to roll over to a later season. This represents an ex-vessel loss of approximately 1.1 million dollars. The 2002 fishery structure is more restrictive than in 2001. The A and C seasons in 2002 are shorter, a net loss of fishing time of 10 days. This suggests that there is an increased potential for greater losses during the 2002 fishery.

Table 4. 2001 Pollock fishery -- Loss of Pollock TAC as of NMFS web catch information through Sept. 15

Fishery	Season	Unharvest TAC	Loss TAC*	Closure Date
Shelikof Straits	A season	7808	1601	reg close Mar 1
Shumagins-610	C season	2578	668	close Sept 7
Chirikof - 620	C season	5022	3781	reg close Sep 15
Kodiak - 630	C season	1831	0	close Sept 10
Total Loss	Annual	17239	6050	N/A

*After allowed roll over of maximum of 30% of the annual area TAC provision applied

Table 5. Comparison of A and C season Pollock fishery structures 2001 vs. 2002

Part A. 2001 Fishery Structure

	2001 Fishery Structure		
Season	Open Date	Closure Date	# of day season
A season	20-Jan	1-Mar	40
C season	20-Aug	15-Sep	26

Part B. 2002 Fishery Structure

	2002 Fishery Structure		
Season	Open Date	Closure Date	# of day season
A season	20-Jan	25-Feb	36
C season	25-Aug	15-Sep	21

Thank you for considering these comments.

Sincerely,

Julie G. Bonney

Julie Bonney
Director, AGDB

Alaska **Groundfish Data Bank** P.O. BOX 788 - KODIAK, AK. 99615
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SENT BY FAX – SEPTEMBER 25, 2001 – 3 PAGES

September 25, 2001

Mr. David Benton
North Pacific Fishery Management Council
605 W. 4th Avenue, Suite 306
Anchorage, Alaska 99501-2252

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SEP 25 2001
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Sent Via facsimile to 907-271-2817

Re: Agenda Items C-2

Dear Chairman Benton,

Now that the Gulf trawl vessels have experienced the C season Pollock fishery for 2001 (Aug 20 to Sept 15) we realize that the 2002 RPAs structure for the Gulf Pollock fisheries is too restrictive. During the 2001 Gulf C season Pollock fishery, approximately 9,431 MT of Pollock (38% of the available C season TAC) was not harvested because the fleet ran out of fishing time. According to the tentative preferred Alternative #4 for 2002, next year's C season Pollock fishery will be 5 days shorter than what occurred this year.

Presently, the tentative preferred Alternative # 4 recommends that the 2002 Pollock fishery structure in the Gulf be divided into four fishing seasons of equal TAC allocations. Each season is followed by a stand down period when no directed fishing is allowed (see table 1 below).

Table 1. Alternative 4 Gulf of Alaska Pollock fishery structure

Season	Open Date	Closure Date	# of days season	Stand down
A season	January 20	February 25	36	13
B season	March 10	May 31	82	86
C season	August 25	September 15	21	16
D season	October 1	November 1	31	80
Annual Total	N/A	N/A	170	195

<u>The members of AGDB believe that the stand down period following the A and C seasons should be eliminated.</u> Eliminating the stand down period would give the fleet more fishing time and restructure the fishery as follows:

Table 2. Gulf of Alaska Pollock fishery structure removing stand down periods between fisheries

Season	Open Date	Closure Date	# of days season	Stand down
A season	January 20	March 10	49	0
B season	March 10	May 31	82	86
C season	August 25	October 1	37	0
D season	October 1	November 1	31	80
Annual Total	N/A	N/A	199	166

After reviewing BIOp 3 and BIOp 4 we believe that removing the stand down periods for the Gulf Pollock fishery meets the goals of the Reason and Prudent Alternatives for SSL protection measures and would in fact spread catch over a longer period of time. Points that justify our position include:

(1) The November 30 BIOp 3 proposed Gulf Pollock fishing seasons structure did not have stand down periods between seasons. The BIOp 3 is considered more restrictive than what was proposed for fishing structure recommendations for 2002 in the BIOp 4.

Table 3. Proposed BIOp 3 Gulf of Alaska Pollock fishing seasons

Season	Open Date	Closure Date	# of days season	Stand down
A season	January 20	March 31	70	0
B season	April 1	June 10	70	0
C season	June 11	August 21	71	0
D season	August 22	Oct 31	70	81
Annual Total	N/A	N/A	281	81

(2) One of the main goals of the proposed RPA Steller Sea Lion mitigation measures is to spread catch over time (temporal dispersion). The longer seasons allow catch to be dispersed over more fishing days.

(3) In the Bering Sea Pollock fishery there are no stand down periods between fishing seasons (A season runs from Jan 20 to June 10 and B season runs from June 10 to Nov 1).

(4) The BIOp 4 page 117 "Two seasons are considered appropriate, with roughly 50% of the harvest occurring in each season to minimize the possibility for localized depletions, four seasons would be more conservative, and further reduce the likelihood of competition between fisheries and Steller sea lions." The Gulf Pollock fishery is a four-season fishery and therefore more conservative.

(5) The Alternative 4 analysis for the jeopardy finding of Steller sea lions did not include additional measures that were retained from the 2001 fishery. These measures include the 300,000-pound trip limit in the GOA, tender restrictions east of 157 degrees W longitude in the GOA, as well as stand-down provisions and exclusive registration provisions between the BSAI and Gulf of Alaska; a net benefit for Steller Sea Lions. These additional measures will help slow the 2002 Pollock fisheries catch rates in the Gulf as well.

APPENDIX F3: EFFECTS ON THE PROPOSED ALTERNATIVES ON SUBSISTENCE USE OF MARINE RESOURCES

This appendix addresses the potential effects of the proposed alternatives on subsistence use of marine resources. For the purposes of this analysis, the discussion is split into three sections: subsistence use of groundfish, subsistence use of Steller sea lions, and indirect impacts on other subsistence activities.

Conclusions about effects on these areas are summarized briefly below. As the summary indicates, detailed analysis of effects on groundfish subsistence was deemed unnecessary. With regard to Steller sea lions, subsequent sections describe documented historical subsistence use of the resource and summarize the potential effects of the proposed alternatives on such use. Finally, a summary discussion is presented on the potential indirect impacts of the alternatives on other subsistence resource use.

- **Potential effects on groundfish subsistence use.** There is a relatively low level of subsistence activity associated with groundfish species targeted for commercial harvest. There are no indications that commercial harvest activity is adversely affecting groundfish-specific subsistence activities that do occur. Further, none of the alternatives restrict subsistence fishing directly. Given this current pattern, and the relationship of harvest levels proposed under the various alternatives to those allowed under baseline conditions, the potential direct and indirect (bycatch) effects of any of the proposed alternatives on subsistence use of groundfish resources will not be significant.

- **Potential effects of commercial groundfish fisheries on subsistence use of Steller sea lions.** Impacts to Steller sea lion subsistence use are less straightforward than is the case for groundfish subsistence use. The subsistence harvest of Steller sea lions has declined steadily and substantially since 1992, at the same time that the overall population of Steller sea lions was also declining. However, the relationship between the two is not clear. Furthermore, the complex connections between commercial groundfish fisheries and the decline in Steller sea lion population, discussed elsewhere in this document, render the analysis of impacts of commercial fishing on Steller sea lion based subsistence problematic. It is evident though, that both of these relationships are important for assessing the potential effects of the proposed alternatives on the subsistence use of Steller sea lions. If current levels of groundfish fishing are causing a decline in Steller sea lion population, the fisheries could be contributing indirectly to, if not causing, the declining trend in subsistence harvest and use of the Steller sea lion that has occurred in recent years. The magnitude of this contribution would then depend on the relationship between the population of Steller sea lions and the subsistence harvest of that population. Thus, to the extent that the alternatives achieve their intended protection of Steller sea lion populations, they will have neutral to positive effects on the subsistence use of that resource. The magnitude of the effects would depend on the increase in the Steller sea lion population and the strength of the relationship between the overall Steller sea lion population and the subsistence harvest from that population. More precise judgments are not possible, given the quality and quantity of information available, although qualitatively it is probable that subsistence harvest levels will not be significantly changed by the projected potential changes in the Steller sea lion population resulting from the proposed alternatives. This rather complex argument is presented in somewhat more detail below.

- **Indirect Impacts on Other Subsistence Activities.** Indirect impacts to other subsistence activities could occur through loss of income that would otherwise be directed toward subsistence pursuits, or an effective loss of access to commercial fishing activities and gear that would otherwise be used in a form of joint production of commercial and subsistence harvests. The variables that influence these indirect impacts are numerous and complex. Although some impacts are likely to accrue to a limited number of communities that participate directly in the fishery, quantification of these impacts is problematic. Impacts to subsistence in communities that participate in the fishery primarily through investment and control of quota (the CDQ communities) could occur through loss of income that would be directed toward subsistence pursuits, but quantification of these impacts is also problematic.

(1) Potential Effects of Subsistence Groundfish Use: Subsistence Summary by Region

The following sections provide a region-by-region summary of subsistence activity levels in each of the four Alaska regions analyzed. These summaries focus on the regionally important groundfish communities identified in the main body of this document and place the role of groundfish in the context of overall subsistence activities. (Levels of marine mammal harvest are discussed, but the detailed discussion of Steller sea lion use is presented in its own section.) Analysis of how much of the groundfish utilized for subsistence is effectively retained from what are otherwise commercial catches is not possible with the available data, but in practical terms this does not present difficulties for this analysis. Given the relatively low level of direct subsistence groundfish dependency, and the fact none of the alternatives would restrict subsistence groundfish take, nor cause an increase of commercial utilization of groundfish stocks, the potential impacts of any of the alternatives on subsistence uses of groundfish are not considered to be significant.

Subsistence in the Alaska Peninsula and Aleutian Islands Region

Subsistence resource utilization for residents of the regionally important groundfish communities of Unalaska, Akutan, Sand Point, and King Cove are presented in this section. All of these communities feature subsistence activity, with consumption ranging from about 200 pounds per capita to over 450 pounds per capita. Within this overall consumption, groundfish specifically ranges from four to nine percent of the total.

Residents of Unalaska are reported to harvest and consume about 195 pounds of subsistence resource per capita, based on a 1994 survey of an estimated 700 year round households for a total ADF&G effective population of 1,825 individuals (ADF&G 2000). Of the subsistence total, 28 percent was salmon, 42 percent was non-salmon fish, 5 percent was land mammals, 5 percent was marine mammals, 1 percent was birds and eggs, 14 percent was marine invertebrates, and 6 percent was vegetation. Various groundfish are a component of the non-salmon fish, and average about 7 percent of the total (14 pounds per capita). The major contributors to this component are cod (8 pounds) and rockfish (5 pounds).

Residents of Akutan are reported to harvest and consume about 466 pounds of subsistence resource per capita, based on a 1990 survey of an estimated 31 year round households for a total ADF&G effective population of 102 individuals (ADF&G 2000). Of the subsistence total, 26 percent was salmon, 31 percent was non-salmon fish, 6 percent was land mammals, 23 percent was marine mammals, 6 percent was birds and eggs, 6 percent was marine invertebrates, and 2 percent was vegetation. Various groundfish are a component of the non-salmon fish, and average about 9 percent of the total (43 pounds per capita). The major contributors to this component are cod (29 pounds) and rockfish (11 pounds).

Residents of Sand Point are reported to harvest and consume about 256 pounds of subsistence resource per capita, based on a 1992 survey of an estimated 204 year round households for a total ADF&G effective population of 606 individuals (ADF&G 2000). Of the subsistence total, 54 percent was salmon, 21 percent was non-salmon fish, 11 percent was land mammals, 2 percent was marine mammals, 2 percent was birds and eggs, 7 percent was marine invertebrates, and 3 percent was vegetation. Various groundfish are a component of the non-salmon fish, and average about 9 percent of the total (22 pounds per capita). The major contributors to this component are cod (12 pounds) and rockfish (8 pounds).

Residents of King Cove are reported to harvest and consume about 256 pounds of subsistence resource per capita, based on a 1992 survey of an estimated 158 year round households for a total ADF&G effective population of 560 individuals (ADF&G 2000). Of the subsistence total, 53 percent was salmon, 17 percent was non-salmon fish, 15 percent was land mammals, 1 percent was marine mammals, 4 percent was birds and eggs, 7 percent was marine invertebrates, and 3 percent was vegetation. Various groundfish are a component of the non-salmon fish, and average about 4 percent of the total (10 pounds per capita). The major contributors to this component are cod (6 pounds) and rockfish (2.5 pounds).

Subsistence in the Kodiak Island Region

As noted, Kodiak is the single regionally important groundfish community. Residents of the City of Kodiak are reported to harvest and consume about 151 pounds of subsistence resource per capita, based on a 1993 survey of an estimated 1994 year round households for a total ADF&G effective population of 6,058 individuals (ADF&G 2000). Of the consumption total, 32 percent was salmon, 40 percent was non-salmon fish, 15 percent was land mammals, 6 percent was marine invertebrates, and 7 percent was vegetation. Various groundfish are a component of the non-salmon fish and average about 8 percent of the total (12 pounds per capita). The major contributors to this component are cod (4.8 pounds), rockfish (3.6 pounds), and greenling (2.4 pounds).

Subsistence in the South Central Alaska Region

As noted, Cordova, Homer, Nikiski, Seward, and Anchorage are the regionally important groundfish communities in the South Central region. Subsistence in each of these communities is described in this section. Subsistence data for groundfish for these communities, where known, shows a much lower level of use than is the case for the Aleutian and Kodiak Island regions.

Residents of Cordova are reported to harvest and consume about 179 pounds of subsistence resource per capita, based on a 1997 survey of an estimated 830 year round households for a total ADF&G effective population of 2,507 individuals (ADF&G 2000). Of the total of subsistence resources, 35 percent was salmon, 24 percent was non-salmon fish, 30 percent was land mammals, 2 percent was marine mammals, 1 percent was birds and eggs, 3 percent was marine invertebrates, and 5 percent was vegetation. Various groundfish are a component of the non-salmon fish and average about 4 percent of the total (7 pounds per capita). The major contributors to this component are rockfish (5 pounds) and cod (1 pound).

Homer was designated a "rural" community in May 2000. Prior to that time Homer residents had not been federally qualified subsistence users, so no data has been collected in recent years. Hence, the only available information on Homer's community pattern of subsistence use is fairly old. Residents of Homer are reported to harvest and consume about 94 pounds of subsistence resource per capita, based on a 1982 survey of an estimated 1,798 year round households for a total ADF&G effective population of 5,633 individuals (ADF&G 2000). Of the total of subsistence resources, 21 percent was salmon, 32 percent was non-salmon fish, 25 percent was land mammals, 2 percent was birds and eggs, 18 percent was marine invertebrates, and 2 percent was vegetation. No groundfish were reported as part of the Homer subsistence harvest. This probably indicates a relatively low level of harvest, perhaps as incidental take while targeting some other species, rather than a complete absence of take.

Kenai's community pattern of use of subsistence resources is described as an indicator for Nikiski, as no information exists for Nikiski in the ADF&G subsistence database. Both Nikiski and Kenai had been classified as "non-rural" (non-subsistence) communities until the Federal Subsistence Board changed their classification in May 2000, when the board designated all communities on the Kenai Peninsula as "rural." The ADF&G subsistence database nonetheless includes some historical harvest information for Kenai. Residents of Kenai are reported to harvest and consume about 84 pounds of subsistence resource per capita, based on a 1993 survey of an estimated 2,274 year round households for a total ADF&G effective population of 6,372 individuals (ADF&G 2000). Of the total of subsistence resources, 46 percent was salmon, 19 percent was non-salmon fish, 20 percent was land mammals, 1 percent was marine mammals, 1 percent was birds and eggs, 6 percent was marine invertebrates, and 6 percent was vegetation. The amount of the non-salmon fish harvest was composed of groundfish (0.32 pounds per capita) is not significant.

Anchorage is not described in terms of its residents' subsistence use patterns because Anchorage is defined as a "non-rural" community and thus its residents are not federally qualified subsistence users. It can be assumed that the average Anchorage resident takes a small amount of groundfish while sport fishing. Seward is not described in terms of its residents' subsistence use patterns because there is no available information. Until May 2000, Seward was also classified as a "non-rural" community. Seward's community pattern of subsistence resource use is probably very similar to Homer's.

Subsistence in the Southeast Alaska Region

Subsistence utilization in the regionally important groundfish communities of Petersburg, Sitka, and Yakutat are presented in this section. Total utilization ranges between about 200 and 400 pounds per capita in these communities, with groundfish making up between one and five percent of the total subsistence resources consumed.

Residents of Petersburg are reported to harvest and consume about 198 pounds of subsistence resource per capita, based on a 1987 survey of an estimated 1,123 year round households for a total ADF&G effective population of 3,739 individuals (ADF&G 2000). Of the subsistence resource total, 23 percent was salmon, 22 percent was non-salmon fish, 29 percent was land mammals, 2 percent was birds and eggs, 19 percent was marine invertebrates, and 4 percent was vegetation. Various groundfish are a component of the non-salmon fish and average about 2 percent of the total (3.5 pounds per capita). The major contributors to this component are cod and rockfish.

Residents of Sitka are reported to harvest and consume about 205 pounds of subsistence resource per capita, based on a 1996 survey of an estimated 3,053 year round households for a total ADF&G effective population of 8,535 individuals (ADF&G 2000). Of the subsistence resource total, 28 percent was salmon, 26 percent was non-salmon fish, 25 percent was land mammals, 4 percent was marine mammals, 13 percent was marine invertebrates, and 3 percent was vegetation. Various groundfish are a component of the non-salmon fish, and average about 5 percent of the total (9.9 pounds per capita). The major contributors to this component are rockfish (5 pounds) and greenling (3 pounds).

Residents of Yakutat are reported to harvest and consume about 398 pounds of subsistence resource per capita, based on a 1987 survey of an estimated 169 year round households for a total ADF&G effective population of 589 individuals (ADF&G 2000). Of the subsistence resource total, 54 percent was salmon, 19 percent was non-salmon fish, 4 percent was land mammals, 8 percent was marine mammals, 1 percent was birds and eggs, 10 percent was marine invertebrates, and 4 percent was vegetation. Various groundfish are a component of the non-salmon fish, and average about 1 percent of the total (5 pounds per capita). The major contributors to this component are flounder (2.5 pounds), cod (1.5 pounds), and rockfish (1 pound).

(2) Potential Effects on Subsistence Use of Steller Sea Lions

This section presents the recent historical subsistence harvest of Steller sea lions in Alaska by region, discusses the overall population decline of Steller sea lions and its possible relationship to commercial groundfish fisheries, and assesses the potential effects of the proposed alternatives upon subsistence Steller sea lion harvest and use. The overall conclusion is that, even if a causal linkage exists between the groundfish fishery and declining Steller sea lion populations, the short-term effects of the proposed alternatives on subsistence activities are likely to be negligible or only slightly positive. Alternatives that reduce the commercial groundfish harvest will logically have neutral or positive effects upon Steller sea lion populations. Whether this will increase the subsistence use of the Steller sea lion resource is not clear from the available information. The proposed alternatives, to the extent that they achieve the stated objectives of assisting in the recovery of Steller sea lion populations and given that they do not restrict existing opportunities or abilities to take Steller sea lions for subsistence purposes, will have no negative effects upon subsistence uses of Steller sea lions.

Even if one assumes that the proposed alternatives will have potential effects on the population of Steller sea lions, it is probable that in the short-term any effects on subsistence would be small in magnitude. Even relatively large changes (20 percent) in Steller sea lion populations may not be accompanied by changes in the rate of subsistence use, for the reasons discussed below. Although subsistence harvest is to some degree related to the total population (and density) of animals to be taken, other factors also affect the rate of harvest, especially at low population levels. Unfortunately, little is known about these relationships, so the threshold at which at population is no longer perceived as "low" is not clear, and no information exists on changes in cultural preferences for, and uses of, traditional foods. Thus, the possibility remains that subsistence use of sea lions will increase in direct proportion to any increase in Steller sea lion population, although that does not appear to be the most likely case from the information available.

Steller sea lions are taken by a number of methods throughout the year. Hunting for sea lions is a relatively specialized subsistence activity, and a relatively small core of highly productive hunters from a limited number of households account for most of the harvest. Once harvested, sea lion is widely distributed among a much wider range of households (ADF&G, 1999). For Kodiak Island communities, the sea lion harvest used to take place at their haulouts, and 20 or 30 were transported at a time aboard purse seiners. Thus, one or two hunters could supply an entire village. Currently, hunting sea lions involves two or three individuals using skiffs to hunt swimming sea lions in open water. The hauling capacity of such skiffs is one or two animals, and hunters Kodiak hunters prefer to take young adults of medium size rather than large bulls or young pups. Some sea lions are taken from shore locations where sea lions are known to swim close to the shoreline. The animal is then retrieved using a skiff. Peak months for harvest are October through December (ADF&G, 1991).

Methods in the Aleutians and Pribilof Islands are documented in ADF&G 1995. Pribilof Island residents hunt sea lions almost exclusively from the shore and target swimming juvenile (mid-size) males. On St. Paul Island sea lion hunting is most commonly done from shore at Northeast Point, accessible by truck. St. Paul hunters take advantage of known sea lion "swimways." Once shot, the hunter waits for the wind and sea to bring the carcass to shore, as heavy seas generally preclude the use of a skiff. A "sea dog" (a retrieval device consisting of a piece of wood with hooks attached to a 30 to 40 foot rope) assists in this process. Not all animals are recovered, but hunters try to shoot only those animals for which there is a high probability of eventual recovery. Hunters will at times hunt from skiffs in calm weather. Sea lion hunting on St Paul occurs mainly from September through May. Sea lion hunting on St. George is similar to that of St. Paul, being predominately shore-based. Harvest occurs mainly from January through May. Sea lion harvest in the Aleutian Chain (Atka, Unalaska, Akutan, and Nikolski) occurs mostly from skiffs in open water, and hunters target both sexes. When skiff travel is risky or for a change of pace, sea lion hunting is also done from concealed shore stations. Aleutian Chain hunters will concentrate effort near haulout locations, and take more adult and female animals than do Pribilof Island hunters. Seasonality of sea lion harvest is quite variable, and appears to be dependent on sea lion abundance and distribution.

Historical documented subsistence harvests of Steller sea lions are presented in Tables 1 through 4. Most of this information is for years when Steller sea lions were classified as "threatened," before the western stock of Steller sea lions was reclassified as "endangered" in 1997. It should also be clearly noted that the information in the first table is not totally consistent with the other three, which underscores the general lack of precision in the data. What is evident, however, is that the area of heaviest subsistence use of Steller sea lions is in southwestern Alaska, and is concentrated in a relatively few communities. It is also important to note that while subsistence use of other resources is open to a broader spectrum of residents of coastal Alaskan communities, the take of marine mammals is restricted to the Alaska Native portion of the population under the terms of the Marine Mammal Protection Act of 1972 (as reauthorized in 1994 and amended through 1997; the specific subsistence exemption for Alaska Natives is found in Section 101 [16 U.S.C. 1371]). Therefore, any subsistence impacts to Stellar sea lions would be concentrated among Alaska Native residents of these communities.

Tables 1 through 4 document a sharp decline in subsistence harvest of Steller sea lions in recent years, the same years that have seen an overall decline in the population of Steller sea lions. More recent information on the subsistence take of Steller sea lions is not available, due in part to the fact that NMFS did not renew its contract with ADF&G for data collection after 1998. Co-management agreements between federal marine mammal regulators and subsistence user groups are still in development or awaiting final approval (Tom Loughlin, personal communication, 2000). It is reasonable, however, to assume that the trend of decline in harvest has continued in more recent years in parallel with the overall sea lion population decline.

Table 1. Documented Subsistence Steller Sea Lion Harvest, Alaskan Coastal Communities

Community	Region	Year	Total Community Subsistence Harvest (Edible lbs)	Steller Sea Lion Number Harvested	Steller Sea Lion Edible lbs	Steller Sea Lion % Community Harvest
Alakanuk	W	1980	431,904	9	1,200	0.3%
Quinhagek	W	1982	536,584	16	2,286	0.4%
Sitka	SE	1996	1,749,772	2	400	0.0%
Chenega Bay	SC	1993	27,809	12	997	3.6%
Nanwalek	SC	1997	42,593	5	1,048	2.5%
Tatitluk	SC	1997	322,915	19	3,712	1.1%
Akhiok	SW	1992	25,735	3	600	2.3%
Akutan	SW	1990	47,397	38	7,688	16.2%
Aleknagik	SW	1989	54,079	2	221	0.4%
Atka	SW	1994	37,307	44	8,700	23.3%
False Pass	SW	1988	28,586	1	220	0.8%
Iliamna	SW	1991	82,915	1	130	0.2%
Ivanof Bay	SW	1989	15,677	1	150	1.0%
Manokotak	SW	1985	118,337	16	1,639	1.4%
Nikolski	SW	1990	36,945	26	5,143	13.9%
Old Harbor	SW	1997	88,851	37	7,442	8.4%
Ouzinkie	SW	1997	55,015	1	264	0.5%
Perryville	SW	1989	45,729	11	2,067	4.5%
Port Lions	SW	1993	78,371	2	356	0.5%
Saint George	SW	1994	11,330	3	556	4.9%
Saint Paul	SW	1994	131,814	141	28,214	21.4%
Unalaska	SW	1994	355,081	72	14,423	4.1%

Source: ADF&G CPDB, 2000.
NOTE: Numbers are for the "most typical" year for which information is available. ADF&G does only limited surveys and subsistence use can vary greatly from year-to-year. Communities with documented use but no harvest are not included. Numbers differ from, and are not included in, ADF&G 1997; both are estimates based on samples.

Table 2. Estimated Subsistence Take of Steller Sea Lions, by Alaska Region

Community	Year						
	1992	1993	1994	1995	1996	1997	1998
Southeast Alaska	6	1	5	0	0	0	8
North Pacific Rim	32	35	26	31	14	6	29
Upper Kenai-Cook Inlet	10	11	1	0	3	0	0
Kodiak Island	58	58	61	137	60	38	18
South Alaska Peninsula	2	6	6	8	5	8	9
Aleutian Islands	135	124	122	96	58	52	37
Pribilof Islands	297	245	193	68	46	56	78
South Bristol Bay	0	0	0	0	0	0	0
North Bristol Bay	8	7	1	0	0	4	0
TOTAL	548	487	415	340	186	164	179

Source: ADF&G 1999

Table 3. Estimated Subsistence Take of Steller Sea Lions, Aleutian and Pribilof Communities

Community	Year						
	1992	1993	1994	1995	1996	1997	1998
Atka	39	25	54	40	17	12	17
Akutan	30	23	16	6	16	6	6
Ivanof Bay	0	4	0	0	2	2	2
King Cove	1	1	4	5	0	4	4
Nikolski	8	6	0	0	3	3	1
Perryville	1	0	1	3	3	2	1
Saint George	70	19	20	8	8	28	20
Saint Paul	227	227	173	60	38	28	58
Unalaska	59	43	42	47	22	30	13
TOTAL	434	344	309	166	109	115	122

Source: ADF&G 1995, 1996, 1997a, 1997b, 1998, 1999
NOTE: Numbers differ from, and are not included in, ADF&G CPDB, 2000. Both are estimates based on samples. Numbers in this table have been rounded to the nearest integer.

Table 4. Estimated Take of Steller Sea Lions, Selected Other Alaskan Communities

Community	Year						
	1992	1993	1994	1995	1996	1997	1998
Tatitlek	13	5	16	3	5	4	22
Akhiok	4	0	3	2	7	8	3
Old Harbor	46	33	48	113	50	26	13

Source: ADF&G 1995, 1996, 1997a, 1997b, 1998, 1999
NOTE: Numbers differ from, and are not included in, ADF&G CPDB, 2000. Both are estimates based on samples. Numbers in this table have been rounded to the nearest integer.

The documented Steller sea lion subsistence take is a measure of the past use and reliance upon this resource, and almost certainly does not represent the current harvest, which can be assumed to be much lower. For Atka, Akutan, Saint George, and Saint Paul (and perhaps Unalaska and several other communities) it can be seen that Steller sea lions represented a very significant subsistence resource in terms of relative contribution to overall community subsistence resource consumption

ADF&G has tried to address the possible linkage between the sharp decline in the overall Steller sea lion harvest and the steep decrease in the sea lion subsistence harvest between 1992 and 1998 (ADF&G 1997a, 1998, 1999). They note that while the total number of sea lions harvested has decreased, this can be accounted for by an equivalent decrease in the number of people hunting sea lions. The apparent rate of hunter success has not declined in any measurable way (although ADF&G has not investigated this in a rigorous manner). ADF&G states:

> "... there are probably a variety of local factors related to the year-to-year changes in the number of households hunting sea lions in particular communities, including seasonal hunting conditions, local food needs, and personal circumstances of hunters. It is likely that the declines in the numbers of sea lion hunters in many communities are because sea lions are increasingly harder to find and consequently more difficult and expensive to hunt. As sea lions become scarcer in a community's hunting area, an increasing number of hunters in the community probably choose to stop hunting them. While the hunters that continue to hunt appear to maintain annual harvest rates similar to past years, hunters probably are investing more time and money in pursuit of the sea lions harvest. In addition to these factors, it is quite likely that some sea lion hunters have chosen to reduce their hunting activity because of perceived problems with sea lion populations" (ADF&G 1999:69).

In earlier documents, ADF&G had also suggested that another factor may be the increased availability of seasonal wage employment in local communities (presumably including work the groundfish fisheries). Some hunters may be choosing to work rather than to hunt, as a conscious economic choice of time allocation (ADF&G 1997, 1998). This explanation is not stressed as much in their 1999 report, being included in the phrase "... personal circumstances of hunters" (ADF&G 1999:69). It should be noted that hunting Steller sea lions does require a considerable amount of effort, and in most cases the cooperation of several people, so that time management and allocation could be a significant factor. An additional possible contribution to a decrease in sea lion subsistence harvest would be a cultural change in taste, so that the consumptive demand for sea lion may have decreased. No information exists on this possible factor.

This information provides some support for a direct relationship between the overall Steller sea lion population and the level of subsistence harvest. Such support is not definitive, however, and other factors cannot be excluded. The weighting of factors is also not possible from the evidence available. It does appear that present Steller sea lion harvest methods are likely to be more successful, and certainly more efficient, when resource populations (and density) are higher. In general, the more abundant a subsistence resource is, the more heavily it is used. Thus, our analysis does assume some relationship between the Steller sea lion population level and subsistence harvest from that population. The strength of that relationship cannot be determined given other factors in play.

This lack of precise information, both in terms of precise measurement as well as in terms of causal linkages, is not uncommon when examining human behavior. Human behavior is often "over –determined" in the sense that the same behavior can have several "causes," and sometime the same "causes" can have different results.

The relationship between the existing groundfish fishery and Steller sea lion population dynamics is far from clear, although the alternatives posit a direct linkage between the two (e.g., commercial fisheries are causally linked to sea lion population decline). Since the proposed alternatives decrease fishing relative to the status quo, such a causal linkage would logically result in positive Steller sea lion population effects, and neutral or positive in terms of subsistence use of Steller sea lions. Given the current depressed population of Steller sea lions, it is not clear that a slight improvement in their population would be reflected in increased subsistence take. A number of other variables, such as negotiated agreements, and/or other cultural or social variables that may influence long-term subsistence trends may be at work as well. Thus, the potential subsistence effects of most of the proposed alternatives are either neutral or slightly positive.

Given the lack of availability of precise information, it is not possible to distinguish degrees of positive subsistence impact among the alternatives, either to order them or to determine whether or not such theoretically positive impacts would rise to a level of significance. Logically, those which reduce commercial groundfish harvest the most could have the most potential benefit for the subsistence use of Steller sea lions, but operationally such differences will likely be slight. In general, somewhat positive effects could result if reductions in groundfish harvest would lead to increased sea lion populations, and if higher sea lion populations would result in benefits to subsistence users of sea lions. Such benefits could include higher harvest levels and lower harvest costs for sea lions.

Thus, the degree to which subsistence reliance on Steller sea lions could be affected by the proposed alternatives cannot be quantified given the lack of precise data, but it is not likely to be great. There is the additional complication that subsistence harvest levels normally vary considerably from year-to-year, due to the natural variability of weather, animal abundance and distribution, and other factors. Thus the long-term direction of change (trend) is more important than short-term measures of magnitudes of change. If there is a causal relationship between the commercial groundfish fishery and declining Steller sea lion populations, a reduction in or redirection of commercial groundfish harvest is probably a prerequisite for the increased subsistence harvest of Steller sea lions. It is simply not possible to determine how a specific change in one would result in a specific change in the other. ADF&G has concluded that there is a potential but essentially unknown relationship between sea lion population and the level of sea lion subsistence harvest (ADF&G, 1997a, 1998, 1999). While it is clear that if sea lions approach extinction, then subsistence harvest would likely decline, it is much less clear that if sea lion population increases, then subsistence harvest will also increase. It is likely subsistence harvest changes would "lag behind," and be smaller in magnitude than, potential changes in overall Steller sea lion population. A number of other variables, such as negotiated agreements or other cultural or social variables that may influence long-term subsistence trends may be at work.

In terms of examining impacts on a community level, it is important to note that of all the communities listed in Table 1 as having a documented Steller sea lion harvest, only two of these, Akutan and Unalaska, are identified as "regionally important groundfish communities" (i.e., in Section 3.12.2 and Appendix F(1) of this SEIS) with substantial direct participation in the fishery. In other words, in general, where use of Steller sea lions is important to the community subsistence base, the commercial groundfish fishery is not, and vice versa. The two exceptions to this generalization have their own particular circumstances. In Akutan, as discussed in the community profile in Appendix F(1), the traditional community is essentially distinct from the local seafood processing operation with virtually no overlap in population, although there has been an increase in indirect participation in the fishery by local residents through the CDQ program. In Unalaska, as noted in that community profile in Appendix F(1), there is virtually no direct engagement of the local Aleut population in the commercial groundfish fishery (and Unalaska is not a CDQ community, although the community does benefit from being an ex-officio member of a CDQ group). In sum, the communities and populations that utilize Steller sea lions as a subsistence resource are not the same as those that directly utilize groundfish as a commercial resource, and that would therefore be directly impacted by the changes the proposed alternatives would bring about in commercial groundfish fishery. The communities of Alakanuk, Akutan, Aleknagik, Atka, False Pass, Nikolski, St. George, and St. Paul, listed as having documented Steller sea lion take, do participate in the fishery in various ways and to varying degrees through the CDQ program, and other communities listed also benefit from the fishery in the form of shared fish tax revenues.

(3) Indirect Impacts on Other Subsistence Activities

Beyond direct use of groundfish and Steller sea lions as subsistence resources, the commercial groundfish management measures designed to protect Steller sea lions could have impacts on other subsistence pursuits. These type of impacts fall into two main categories:

- Impacts to other subsistence pursuits as a result of loss of income from the commercial groundfish fishery. This income could be used to purchase fuel, vehicles, other subsistence related gear, or otherwise offset expenses required to engage in a range of subsistence pursuits.

- Impacts to other subsistence pursuits as a result of the loss of opportunity to use commercial fishing gear and vessels for subsistence pursuits. This would result from vessels not being ready to go as a result of being prepared for commercial fishing or from the simultaneous harvest of fish and game resources during commercial fishing forays where these assets are used in such a manner that "commercial and subsistence catches are jointly produced, based on shared use of fixed and variable inputs."

With regards to the first type of potential impact, loss of income resulting in funds not being available for subsistence pursuits, this is a very complex issue. Among the factors involved:

- Loss of income can impact everyone associated with the fishery, and people associated with the fishery live in communities ranging across Alaska and the Pacific Northwest. Of the income that is lost to individuals who live in communities where subsistence is pursued, income may or may not be used for subsistence expenses.

- Income specifically contributed by groundfish pursuits may be a larger or smaller proportion funds used for subsistence by individuals or families.

- The relationship between loss of income to specific subsistence outcomes is not entirely straightforward. Clearly, income is required for contemporary subsistence pursuits and a loss of income could and would decrease subsistence efforts if the loss of income were of a sufficient magnitude across the groups that pool resources (e.g., extended families or entire communities in some cases) or engage in subsistence harvests or sharing. However, factors that influence participation in subsistence activities are many and complex. An increase of income may decrease subsistence activity (e.g. if the source of the income requires a time commitment away from subsistence pursuits) or an increase in subsistence activity (e.g., if the income is used to increase the efficiency of subsistence pursuits that are undertaken). A decrease in income may decrease subsistence involvement (e.g., it is more difficult to afford fuel for vessels used for subsistence) or increase subsistence involvement (e.g., subsistence represents a more attractive alternate activity of income producing activities are curtailed). This type of analytic difficulty in assessing the indirect subsistence outcomes of alternatives that may impact income - i.e., there is not a linear relationship between income and subsistence - is further discussed below.

- Income associated with the groundfish fishery can derive from direct participation (e.g., employment), investment (e.g., vessel or processor ownership), control of quota (e.g. CDQ related revenues).

- CDQ communities represent a special case in that these are virtually the only communities where subsistence is heavily practiced and that benefit from the fishery primarily through investment (and control of quota).

- Different CDQ groups have chosen different organizational structures and strategies for use of funds derived from the program (and have had varying degrees of success with investments). As a result, there are effectively different levels of income to individuals and families in different CDQ communities.

- CDQ programs focused on employment and training may, in turn, indirectly influence individual subsistence spending and participation decisions.

The second type of potential impact, loss of opportunity for joint production, applies to groundfish communities with direct participation in the fishery (i.e., only vessels that currently participate in the commercial fishery can be used for joint production). Below are some general points about the vessels involved, followed by points about the communities involved.

- Not all vessels in the commercial groundfish fishery are used for subsistence in addition to commercial fishing.

- Depending on the community involved, a greater or lesser proportion of fleet engaged in the local commercial groundfish fishery is a non-resident fleet.

- Joint production can occur in at least two fundamentally different ways. Subsistence fish can be retained during what are otherwise commercial trips, or separate trips may be taken that focus on subsistence.

- As a general rule, trips specifically dedicated to subsistence are uneconomic for the larger vessels engaged in the groundfish fishery. Larger vessels also tend to fish more away from the community of residence of owner, skipper, and crew, therefore subsistence use is not practical even during what could otherwise be combined commercial/subsistence trips. For the largest vessels participating in the fishery, there is no indication of any subsistence utilization in any form. (For the large vessels that are based in communities were subsistence does take place, dedicated subsistence trips for fishing may be unusual, but it is known from field interviews that sometimes larger vessels are used to make hunting trips with several persons going at once.)

- Smaller vessels are most likely to be involved in joint production.

- The proportion of the total subsistence production for individual communities that result from joint production from these particular vessels during the groundfish fishery is unknown, but as a general rule of thumb, the smaller vessel classes are less likely to be narrowly specialized than the larger vessels. Nearly all of the smaller class vessels that engage in the groundfish fishery are also involved in some combination of (or all of) the salmon, halibut, sablefish, and herring fisheries. Joint production opportunities would presumably still exist during pursuit of fisheries other than those potentially altered or reduced by the proposed alternatives. This is true both for the vessels engaged in the groundfish fishery, as well as for other vessels in the community that are not engaged in the groundfish fishery. As most if not all vessels are going to be gearing up anyway, the vessel will have had its annual maintenance (fixed costs) taken care of regardless, as long as the vessel is operating in some (any) fishery. Variable costs of subsistence may increase if vessels have to make more dedicated subsistence trips to achieve desired catch levels.

- For those small vessels engaging in other fisheries in addition to the groundfish fishery, the time of the year that the vessel would be available for joint production may decrease if the reduction of the commercial groundfish fishery were of a sufficient magnitude. For example, if a vessel owner decided not to prepare the vessel for pursuit of Pacific cod in March, but rather waited to get the boat ready for the year until a salmon opener in May, there may be crab subsistence opportunities forgone in the period the vessel was not available. Similarly, some vessel owners may put their vessels to bed for the winter sooner than they otherwise would have, such that other joint production subsistence opportunities are foregone at the end of the year.

- In practical terms, joint production opportunities vary by gear type as well as vessel size. Although quantitative data are slim, knowledge of the industry would suggest that little subsistence takes place using trawl vessels compared to other gear types. Among the fixed gear classes, much more time is directed toward sablefish, salmon, and herring than is devoted to groundfish, therefore the joint production opportunities in this class would remain relatively high independent of the groundfish management alternative chosen.

- Field observations and discussions would indicate that almost all commercial vessel owners resident in communities where subsistence takes place also own at least one skiff from which they can engage in subsistence pursuits, so even if the larger commercial vessel is not available for any number of reasons, it will not mean the discontinuation of subsistence efforts. Even if a commercial vessel owner does not individually own a skiff, it is a truism of village life that there will always be other vessels owned by sons, fathers, brothers, other kin, or neighbors. It is also important to note that if commercial fishing time goes down, it is likely that subsistence activities will increase, because the relative importance of subsistence in the household economy (e.g., suppling food for the table) will increase.

- CDQ owned vessels that participate in the groundfish fishery largely do not participate in subsistence activities. Although CDQ communities in general have relatively high levels of subsistence engagement, CDQ owned vessels participating the groundfish fishery may not be based in those communities (i.e., they are an investment that is not directly run out of one of the communities, as is the case for ownership interest in catch processors). Other CDQ owned vessels do not participate in the groundfish fishery (or those portions of the groundfish fishery that will could change as a result of the alternatives) at all, or at only very low levels. For example, some CDQ owned vessels concentrate nearly exclusively on the salmon fishery, while others focus on halibut and sablefish. A more detailed discussion of CDQ owned fleet characteristics is provided in the separate CDQ discussion in this document.

- As noted earlier, factors involved in whether or not individuals engage in subsistence pursuits are multiple and complex, and this applies to vessels as well. Some data from ADF&G (and mentioned in the Steller sea lion subsistence section, above) suggest that in at least some instances, level of engagement in subsistence activities declines when individuals are engaged in commercial pursuits. Therefore it may be the case for at least some individuals that if their commercial groundfishing activity declines, their direct participation in subsistence activities may increase. Field interviews and other studies <<citation>> suggest that in other cases, individuals who are the most economically successful in a given community are often also among the highest subsistence producers. This likely results from these individuals having access to more income to purchase better or more efficient equipment (and to be able to afford to engage in activities that require cash outlay for longer periods of time), and the flexibility of schedule that often comes with higher paying employment, among other individual or personal factors. In sum, the factors leading to subsistence participation are many, and even appear to be contradictory in some cases.

In terms of communities, significant social or community level impacts resulting from the alternatives analyzed are only anticipated in Unalaska, Akutan, King Cove, Sand Point, and Kodiak, based on the information presented in Section 3.12.2 and Appendix F(1), and the analysis presented in Section 4.14.2. (Some brief supplemental information on the characteristics of the Chignik area fleet is presented in Section 1.4 of Appendix F(1). As outlined below, joint production impacts are only considered likely for a subset of these communities.

- In the case of Unalaska, none of the large commercial vessels that deliver groundfish to the local processing plants are owned or crewed by residents of the community. There is a small boat fleet from the community that does jig for cod, although the most recent data available suggest that none or very few of small boat owners derive their income exclusively from commercial fishing. The fact that commercial fishing for small boat owners is generally one part of a (variable) multiple income source strategy of piecing together a living suggests that even if there were a partial reduction opportunity to fish, there would still be incentives to continue to fish. If at least some fishing took place, the opportunity would continue to exist for joint commercial/subsistence production. In terms of the number of participants, this fleet has seen growth and decline in recent years. According to CFEC/ADF&G fish ticket data, three Unalaska/Dutch Harbor jig vessels fished groundfish in 1992, two fished in 1993, and then there was an upsurge in participation with between 13 and 18 vessels reporting per year from 1994 to 1997, inclusive. A decline quickly followed, however, as in 1998, 1999, and 2000, there were 9, 8, and 7 vessels participating each year, respectively.

- In Akutan, like Unalaska, the fleet the delivers at the local processing facility is a non-residential fleet. Unlike Unalaska, however, the small boat fleet from the community comprised nearly exclusively of open-skiff type of vessels that generally do not deliver groundfish to the plant, so the residential fleet from the village/traditional community is essentially not engaged in the commercial groundfish fishery. Therefore, there would be no joint production impacts from any of the alternatives.

- In the case of Sand Point and King Cove, there is a residential fleet that does deliver groundfish in significant volume to the plants in addition to deliveries from non-residential catcher vessels. In 2000, 57 of the 80 total vessels in the AKAPAI region were owned by residents of King Cove and Sand Point (including 6 of the 10 'ghost' vessels). Looking at the vessel classes involved, it is unlikely, for reasons outlined above, that the four local pot boats (all over 85 feet in length) are in part subsistence vessels. It is also unlikely that the two "04-TCV Non-AFA" vessels over 90 feet in length (2 in King Cove and 1 in Sand Point) commonly engage in subsistence, although the third vessel in this class, at 68 feet, is more likely to do so. The rest of the local vessels are of a size that they are likely to engage in subsistence. (One factor to keep in mind is that 'ghost' vessels are so classified because while they made groundfish landings, they did not make enough to put them into a particular class, and therefore they are not likely to be affected by any of the alternatives.)

  In terms of relative engagement in other fisheries, the local fixed gear boats are heavily engaged in non-groundfish fisheries (approximately 65% of ex-vessel value for the FGCV 33-59' class and approximately 75% of FGCV less than 32' class is non-groundfish). Similarly all of the TCV 60 vessels are currently participating in salmon fisheries. Although data are not available to quantify potential impacts of this nature, it would appear likely that if income of larger vessels (i.e., those in the TCV NON-AFA/TCV 60/PCVs classes and some in the FGCV 33-59' vessel class) goes down significantly because of SSL alternatives, it will be more difficult for vessel owners and operators to justify using their large vessel for certain types of subsistence activities. One logical outcome could be that subsistence effort may be shifted toward resources that are more accessible

- For Kodiak, similar to Sand Point and King Cove, there is a residential fleet that delivers significant amounts of groundfish to the local processing plants. The City of Kodiak based vessels account for 95 percent of the groundfish total ex-vessel value of the region, and about 87 percent of all groundfish vessels in the region. Old Harbor and Ouzinkie vessels account for between 1 and 2 percent of the total regional catcher vessel ex-vessel value each. Old Harbor is home to about 6 percent of the groundfish vessels in the region, and Ouzinkie about 3 percent of these vessels. Port Lions and Larsen Bay represent less than 1 percent of value and 2 percent of regional vessels each. As a general rule, the larger vessels in the region tend to be disproportionately associated with the community of Kodiak compared to the smaller villages. All onshore groundfish processing in the region occurs the community of Kodiak, with the exception of a single processor at Atilak. Available data suggest that this facility, however, does not appear to focus strongly on groundfish, and does not appear to take much if any delivery of groundfish from vessels based in the nearby community of Akhiok. Given the concentration of the fleet in Kodiak, and the inherent tendency of smaller vessels (such as those in the smaller villages as well as that portion of the Kodiak fleet) to be less specialized (and therefore have more joint production opportunities), whatever indirect subsistence impacts that do occur in this region as a result of the alternatives are likely to be concentrated in the City of Kodiak itself.

In summary, the indirect impact of the alternatives on subsistence is difficult to assess for the reasons discussed in this section. Impacts are likely to be concentrated among small vessel owners in a relatively small number of communities, although indirect impacts through loss of income may have impacts on subsistence pursuits in a wider range of communities, including the CDQ communities.

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(beneficial or adverse), or if the point at which an effect becomes significant is not supported by scientific data, the qualifier "conditionally" is applied. The qualifier implies that significance is assumed, based on the credible scientific information and professional judgement that are available, but more complete information is needed for certainty. In other words, we may believe that an impact has a significant adverse or a significant beneficial effect, but we do not have a high level of certainty about that finding. This approach provides a heightened sense of where information is lacking, and may guide research efforts in the future. An interesting point to make about this approach is that if an impact is rated as insignificant, there is a high level of confidence that the impact is truly insignificant, or it would have been moved to the "conditional significance" category.

Table 4.0-1 Reference points for significance determinations

Reference Point	Application
Current population trajectory or harvest rate of subject species	(1) Marine mammals (2) Target commercial fish species (3) Incidental catch of non-specified species (4) Forage species (5) Prohibited species bycatch (6) ESA list Pacific salmon (7) Seabirds
Current size and quality of marine benthic habitat and other essential fish habitat	Marine benthic habitat and other essential fish habitat
Application of principles of ecosystem management	Ecosystem
Current management and enforcement activities	(1) State of Alaska managed fisheries (2) Management complexity and enforcement
Current rates of fishing accidents	Human safety and private property (vessels)

4.1 Effects on Marine Mammals

The Draft Programmatic SEIS (NMFS 2001a) examined effects of groundfish fishery management alternatives by focusing analyses around four core questions, modified from Lowry (1982):

1. Is the alternative management regime consistent with efforts to avoid direct interactions with marine mammals (incidental take and entanglement in marine debris)?

2. Does the alternative management regime result in fisheries harvests on prey species of particular importance to marine mammals, at levels that could compromise foraging success (harvest of prey species)?

3. Does the alternative management regime result in temporal or spatial concentration of fishing effort in areas used for foraging by marine mammals (spatial and temporal concentration of removals with some likelihood of localized depletion)?

4. Does the alternative management regime modify marine mammal or forage behavior to the extent that population level impacts could occur (disturbance)?

Those four questions, and the associated rating criteria established (Tables 4.1-1 and 4.1-67), were modified for use in this analysis from the process used in the Draft Programmatic SEIS (NMFS 2001a). The main departure from how they were used in the Draft Programmatic SEIS analysis was it evaluated alternatives with respect to consistency with a policy of marine mammal protection, whereas, in this analysis each suite of specific fishery management measures is evaluated independently against a criteria for significance established for each of the four above questions. Additionally two management tools used in the Draft Programmatic SEIS are not relevant to discussions of effects on marine mammal populations: vessel monitoring requirements and experimental design. As the experimental designs being proposed are directed at gaining answers to questions about Steller sea lions, however, discussion was added (Section 4.1.1.6) evaluating the potential each alternative has for experiments designed to monitor Steller sea lion population recovery in response to the fishery management measures being manipulated, or to evaluate the localized effects of commercial fishing on Steller sea lions. Lastly, question 2 was modified from the Draft Programmatic SEIS evaluation scheme to assess the possible impact of prey removal. Here we used an analysis of daily removals for each alternative and a comparison of deviations from the mean daily removals calculated for all alternatives combined (see explanation under 4.1.1.1). Comparison of differences in actual TAC levels was incorporated into the overall judgement of effects by the analyst but was a secondary consideration in the evaluation. The analysts considered using exploitation rate, and the difference in estimated exploitable biomass and removals (what's left after fishing), as the metric for judging effects under Question 2. The problem with this approach is that the remaining standing biomass after fishing, in the same area where fishing and foraging co-occur, is unknown. Likewise, the difference in total estimated biomass when TAC is removed for each Alternative is relatively small, overall, and because this difference is so small the possible effect of the Alternatives on the marine mammal species in question could not be gauged.

In cases where absolute quantitative criteria for significance could not be established, the fishery management measures in effect in 1998 were used as a benchmark upon which to compare these five alternatives with respect to effects on marine mammals, as expressed by the above questions. That is, once it was determined how much of an effect could be expected, as delineated by the above questions, other alternatives were evaluated relative to the performance of the 1998 benchmark.

This analysis is comprised of three tiers:

a. The effects on each of seven marine mammal species or species groups are discussed separately (Steller sea lions, ESA listed great whales, other cetaceans, northern fur seals, harbor seals, other pinnipeds, sea otters).
b. Each alternative is addressed for each species or species group.
c. Each question (type of effect) is addressed for each alternative within each species or species group.

4.1.1 Effects on Steller Sea Lions

Direct and indirect interactions between Steller sea lions and groundfish fisheries occur due to overlap in the size and species of groundfish harvested in the fisheries that are also important sea lion prey, and due to temporal and spatial overlap in sea lion foraging and commercial fishing activities. Of the groundfish species targeted for harvest, pollock, Atka mackerel, and Pacific cod rank foremost among important sea lion diet items (Sinclair and Zeppelin, submitted) and similar sizes are targeted by sea lions and fisheries. Thus subsequent analyses focus on effects of fisheries targeting those species. A metric was established (Table

4.1-45) for Steller sea lions to assess intensity of effects (harvest of prey species and spatial/temporal concentration, Question 3) and associated percent increase to populations, and new population trends for Steller sea lions. Significance ratings for each question are summarized in Table 4.1-56.

4.1.1.1 Effects of Alternative 1 on Steller Sea Lions

Direct Effects - Incidental Take/Entanglement in Marine Debris (Question 1)

The estimated mean annual mortality from the 1995-1999 groundfish fisheries is 8.4 sea lions (Angliss *et al.*, 2001). Annual levels of incidental mortality were estimated by multiplying the ratio of observed incidental take of dead animals to observed groundfish catch (stratified by area and gear type), to the new projected TAC for each fishery area (NMFS, unpublished observer program data)[1]. The estimated annual incidental take level of Steller sea lions under Alternative 1 in all areas combined is 13 Steller sea lions (with a confidence interval [CI] = 10 - 16 Steller sea lions; Table 4.1-2). Incidental bycatch frequencies, which are typically low, are summarized in Figure 4.1-4; they also reflect locations where fishing effort was highest. In the Aleutian Islands and GOA, incidental takes are often within critical habitat, though in the Bering Sea such bycatch is farther off shore and along the continental shelf. Otherwise there seems to be no apparent "hot spot" of incidental catch disproportionate with fishing effort. It is, therefore, appropriate to estimate catch ratios based on estimated TAC. Noting, however, that if these take rates differ between observed and unobserved vessels then these take estimates would be biased accordingly. These rates also reflect a prohibition of trawling within 10 or 20 nm of 37 rookeries which likely reduces the potential for incidental take, particularly during the breeding season when females are on feeding trips within the critical habitat area. For Alternative 1, it is likely that the same amount of fishing effort will occur, regardless of the number of seasons (two in this alternative).

Entanglement of Steller sea lions in derelict fishing gear or other materials seems to occur at frequencies that do not have significant effects upon the population. From a sample of rookeries and haul-out sites in the Aleutian Islands, of 15,957 adults observed, Loughlin *et al.* (1986) found only 11 (0.07%) entangled in marine debris, some of which was derelict fishing gear. Observations of sea lions at Marmot Island for several months during the same year observed 2 of 2,200 adults (0.09%) entangled in marine debris. During 1993-1997, only one fishery-related stranding was reported from the range of the western stock, a sea lion observed in August 1997 with troll gear in its mouth and down its throat (Angliss *et al.*, in press). Entanglement of sea lions in derelict fishing gear or other marine debris does not appear to represent a significant threat to the population. In conclusion, incidental take and entanglement in marine debris under Alternative 1 is insignificant according to the criteria set for significance (Table 4.1-1).

Direct Effects - Fisheries Harvest of Prey Species (Question 2)

Daily average removal rates were calculated for each Alternative's proposed fishing seasons by dividing the allocated TAC for a season by the duration of that season, and summing as appropriate for pollock, Pacific cod, or Atka mackerel fisheries (Figure 4.1-5). If an Alternative proposed a daily catch limit lower than this daily average, then the value of the limit was used. Actual daily fisheries removal rates may be higher or lower than this value. Deviations from relative mean daily removals for each Alternative were obtained by

[1]Dan Ito, "Personal Communication," National Marine Fisheries Service, 7600 Sand Point Way NE, Seattle, WA 98115.

calculating the average removal rate for each day for all Alternatives (a "grand average"; the zero line in Figure 4.1-6) then dividing that value into the daily average removal rate for each Alternative. For example, Figures 4.1-5, -7, and -9 provide the daily average removal rates for each Alternative calculated by seasonal TAC. Under Alternative 1, approximately 7,500 mt/day of pollock and cod are projected to be harvested on February 1 from the Eastern Bering Sea. In Figure 4.1-6, the deviation of this daily average removal rate from the average for all Alternatives on February 1 is about +0.4, suggesting that, compared to the other four Alternatives, more pollock and cod in the EBS will be removed on that day under Alternative 1 than with the other Alternatives. The effect of the Alternative was then judged based on the overall and seasonal daily average removals by summing the areas under the "curves" in Figures 4.1-6,-8, and -10 for the year resulting in a comparative value that we term the deviation difference (Table 4.1-3). Such values are used to distinguish the relative differences between the Alternatives; they are not additive nor can they be compared statistically. In this case, a positive value suggests more removals than the average and a negative value suggests less removals.

For Alternative 1, the deviation difference for pollock in the Bering Sea and the Aleutian Islands resulted in negative values (less fish removed) and positive values for the Gulf of Alaska (more fish removed). These values were subjectively appraised by the analyst as insignificant (-100 to +100) for pollock in the eastern Bering Sea and Aleutian Islands and Pacific cod in all areas (with cod removals in the Aleutian islands slightly into the CS- category. A CS- (+101 to +250) judgement was assigned to central Aleutian Island mackerel and Gulf of Alaska pollock. Pacific cod deviation differences varied by area but were all relatively small values except for a large positive value for Aleutian Islands cod, and Atka mackerel were both negative and positive. Overall, Alternative 1 had a -15 value, suggesting less fish removed compared to the mean daily removal rate of all Alternatives. The deviation difference for all fisheries and all areas was insignificant with a value of -15, suggesting that the combined removals of walleye pollock, Pacific cod, and Atka mackerel on a daily basis were similar for all Alternatives.

The combined TAC of all groundfish in the Bering Sea results in a bimodal peak of average removal rates during February through April, and September to November (Figure 4.1-5). Compared to removals in the Bering Sea for all other alternatives, Alternative 1 has relatively lower average daily removal rates during the late spring and summer, calculated as the deviation from the daily average removal rate averaged for all fisheries (Figure 4.1-6). Similar patterns are seen in the Aleutian Islands (Figure 4.1-7, Figure 4.1-8). In the GOA projected average daily removal rates of pollock and cod are highest in mid summer (Figure 4.1-9 and 4.1-10).

The combined TAC of pollock, Pacific cod, and Atka mackerel under Alternative 1 is 1,831,297 mt (Table 4.1-~~3~~4). TAC removals at those levels for pollock and Pacific cod, in concert with time and space considerations, were thought to be having a negative effects on Steller sea lions (NMFS 1998b). This component is given a conditionally significant negative rating because many of the analyses were primarily based on qualitative interpretations rather than studies containing quantitative conclusions. Further, based upon sea lion population trends during 1990-2000, it is assumed that the suite of fisheries management measures that would be in place under Alternative 1 will not result in a stable Steller sea lion population. Only to the extent that insufficient data are available to conclude significant negative effects remain, Alternative 1 is determined to be conditionally significant negative with respect to ~~the harvest of prey species~~TAC.- Definitive information on intensity of effects is lacking, but plausible pathways have been described (NMFS, 2000a).

Groundfish fisheries also incidentally take other target fish and non-target fish species, some of which are important Steller sea lion prey such as arrowtooth flounder, salmon, cephalopods, and herring (Sinclair and

Zeppelin, submitted). The amount of these species removed under Alternative 1 is estimated to be less than 3% of the total catch in the Gulf of Alaska, and much lower than 3% of the total catch in the Bering Sea (NMFS unpublished observer program data)[2]. The combination of a negative average daily removal rate (deviation difference) resulting in an insignificant rating, and the TAC ranking of CS- resulted in an overall ranking of Insignificant for this Alternative under question 2.

Indirect Effects - Spatial and Temporal Concentration of Fishery (Question 3)

Applicable to all fisheries, Alternative 1 contains closures within 10 nm of 37 rookeries to all trawling year-round, with some extending to 20 nm on a seasonal basis. Specifically, Alternative 1 contains the following:

The walleye pollock fishery in the BSAI has two seasons, January 20-April 15 (45% of TAC) and September 1-November 1 (55% of TAC). There are eastern BS and AI area apportionments of the TAC. GOA TAC is split into three seasons and the TAC is split 25%, 35%, and 45%, accordingly. Pollock trawling is closed in the CVOA June 10-December 31. The Pacific cod BSAI fishery is apportioned into three seasons and two gear types (trawl – January 20-December 31; and fixed – January 1 - December 31 in three seasons). The Pacific cod TAC is set BSAI-wide. In the GOA, fixed gear opens January 1 and trawl January 20; fishing occurs until the end of the year for both. The Atka mackerel fishery is in two seasons, January to April 15, and September 1 to November 1 with 50% of the TAC apportioned in each season. Atka mackerel harvest is limited to 40% of TAC inside Steller sea lion critical habitat. ~~The combined TAC of all these groundfish in the Bering Sea results in a bimodal peak of average removal rates during February through April. and September to November (Figure 4.1-5). Daily average removal rates were calculated by dividing the allocated TAC by length of season, and summing as appropriate for pollock, Pacific cod, or Atka mackerel fisheries. Actual daily fisheries removal rates may be higher or lower than this value. Compared to removals in the Bering Sea for all other alternatives, Alternative 1 has relatively lower average daily removal rates during the late spring and summer, calculated as the deviation from the daily average removal rate averaged for all fisheries (Figure 4.1-6). Similar patterns are seen in the Aleutian Islands (Figure 4.1-7, Figure 4.1-8). In the GOA projected average daily removal rates of pollock and cod are highest in mid summer (Figure 4.1-9 and 4.1-10).~~

Sinclair and Zeppelin (submitted) showed that regions based on diet similarity closely paralleled the metapopulation clusters defined by York *et al.* (1996), in that Sinclair and Zeppelin's region 1 represents the eastern and central Gulf of Alaska as defined by York *et al.* (1996). Region 2 represents the western GOA in the York *et al.*(1996) scheme, region 3 represents the eastern Aleutian Islands, and region 4 the central and western Aleutian Islands. Because these two analyses result in similar clustering, population projections relevant to York *et al.* (1996) using those regions/areas (e.g., Figure 3.1-9) can be used in the context of comparing diet differences, fisheries allocations, and population trajectories. For this reason, the present analysis was based on Steller sea lion metapopulations rather than on the 13 monitoring areas proposed in NMFS (2000a) *per se*.

In addition, Loughlin and York (2001) provided an accounting of losses to the Steller sea lion population stratified by metapopulation areas using sources of known mortality, including subsistence harvest, incidental take in fisheries, illegal shooting, research, and predation by killer whales and sharks. Some portion of the remaining unknown mortality from the Loughlin and York (2001) study may be attributable to removal of prey by commercial fisheries. For example, in 2001, losses from a stable population would have been 4,710,

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[2]Ibid.

with and additional 1,715 losses accounting for the decline. This totals 6,425 sea lions lost to the population. Of the 1,715 losses, 55%-75% could not be attributed to a specific cause. The following discussion incorporates analyses from Sinclair and Zeppelin (submitted), York *et al.* (1996), and Loughlin and York (2001) to assess the effect of the five alternatives on these losses that were not attributable to a specific source.

Effects of spatial and temporal distributions of fisheries catch on unaccounted mortality were subjectively categorized within metapopulation areas based on the timing and location of fisheries removals relative to the importance of the target species in sea lion diets, critical stages of sea lion development within seasons, and potential of overlap between fisheries removals and sea lion foraging. Benefits to sea lions are likely linked to the extent that an alternative reduces removals of key prey species within sea lion foraging areas, and during critical time periods such as April-June, when energy requirements of late-term pregnant females are greatest and pups from the prior year may begin weaning, and May-August, when females are tied to rookeries while nursing pups.

The proportion of pollock, Pacific cod, and Atka mackerel in the Steller sea lion diet varies by area and season (Figure 4.1-11, Figure 4.1-12). A recent study that examined sea lion scat (Sinclair and Zeppelin, submitted) showed that sea lion diet can be classified into four sea lion regional clusters (Figure 3.1-9). In region 1 (Prince William Sound to the Semidi Islands) pollock comprised 64% of the frequency of occurrence (FO) in summer (May-September) and 56% FO in winter (December-April) of the Steller sea lions diet. For region 2 (Shumagin Islands to the Sanak Islands) pollock comprised 80% FO in summer and 86% FO in winter. In region 3, (Sanak Islands to Ogchul Island) pollock comprised 54% FO in summer and 59% FO in winter. And in region 4 (all islands west of Umnak Island), pollock comprised 10% FO in summer and 3% FO in winter. Sinclair and Zeppelin (submitted) found that Pacific cod in region 1 during summer was 5% FO in summer and 31% FO in winter. In region 2, Pacific cod was 11% FO in summer and 36% FO in winter. For region 3, cod was 6% FO in summer and 20% FO in winter, and for region 4, cod was 7% FO in summer and 17% FO in winter. For Atka mackerel, Sinclair and Zeppelin (submitted), found no occurrence in summer and 2% FO in winter in region 1. For region 2, Atka mackerel occurrence was 2% FO in summer and 4% FO in winter; region 3 had 26% FO in summer and 25% FO in winter. And for region 4, Atka mackerel was 93% FO in summer and 65% FO in winter.

Based upon sea lion population trends during 1990-2000, it is assumed that Alternative 1 will not result in a stable population (Table 4.1-~~4~~5). Thus, changes to the sea lion population would be within 2% of the current trend, and an overall decline would continue at -3.3% to -7.1% per year (Table 4.1-~~4~~5). Overall, the effects of Alternative 1 are conditionally significant negative (Table 4.1-~~5~~6) according to the criteria set for significance in Table 4.1-1.

Indirect Effects - Disturbance Effects (Question 4)

This and all other alternatives contain measures that avoid important forms of disturbance to Steller sea lions at rookeries during the breeding season. In particular, the prohibition of vessel entry within 3 nm of 37 rookeries avoids intentional and unintentional disturbance of hauled-out sea lions, including new born pups, or those animals aggregated near shore. More than 3,250 km^2 around 37 sites is offered for protection under this alternative.

Vessel traffic, nets moving through the water column, or underwater sound production may all represent perturbations, which could affect foraging behavior, but few data exist to determine their relevance to Steller sea lions. We note especially, that the influence of trawl activities on Steller sea lion foraging success cannot be addressed directly with existing data. Foraging could potentially be affected not only by interactions between vessel and sea lion, but also by changes in fish schooling behavior, distributions, or densities in response to harvesting activities. In other words, disturbance to the prey base may be as relevant a consideration as disturbance to the predator itself.

For the purposes of this analysis, we recognize that some level of prey disturbance may occur as a fisheries effect. The impact on marine mammals using those schools for prey is a function of both the amount of fishing activity and its concentration in space and time, neither of which may be extreme enough under Alternative 1 to represent population level concerns. To the extent that fishery management measures under Alternative 1 do impose limits on fishing activities inside critical habitat, we assume at least some protection is provided from these disturbance effects. These protections occur as byproducts of other actions which either reduce fishing effort or create buffer zones to limit impacts on foraging. Also, they occur directly in the case of the 3-nm, no-entry zones around rookeries. Whether the residual levels of disturbance represent significant effects on Steller sea lions can not be determined from data currently available.

Anecdotal evidence, however, suggests that fisheries-related disturbance events are unlikely to be of consequence to the Steller sea lion population as a whole. For instance, vessel traffic and underwater sound production have long been features of the Bering Sea and Gulf of Alaska, at least over much of the twentieth century. Such circumstances have prevailed before, as well as after, the decline of Steller sea lions, suggesting no obvious causal link. Steller sea lions also appear to be tolerant of at least some anthropogenic effects, as noted by their attraction to fish processing facilities and gillnets, as well as their distributions in proximity to ports. Further, the eastern stock of Steller sea lions is increasing, despite anthropogenic activities throughout their range on the west coast of North America and particularly in southeast Alaska. Overall, these circumstances suggest that disturbance effects are likely to be insignificant to Steller sea lions at the population response level. Thus, the effect of Alternative 1 is insignificant according to the criteria set for significance (Table 4.1-1).

4.1.1.2 Effects of Alternative 2 on Steller Sea Lions

Direct Effects - Incidental Take/Entanglement in Marine Debris (Question 1)

With regard to incidental take, Alternative 2 is not likely to result in significant changes in the rate of direct mortality relevant at the population level. Annual levels of incidental mortality were estimated by multiplying the ratio of observed incidental take of dead animals to observed groundfish catch (stratified by area and gear type), to the new projected TAC for each fishery area (NMFS, unpublished observer program data)[3]. Takes of Steller sea lions currently are rare events in all Alaska groundfish fisheries, with no apparent pattern to their temporal or spatial distribution (Figure 4.1-4). For example, the total number of animals killed is expected to be less than 13 (as in Alternative 1) based on allocations of TAC in this Alternative, or about one sea lion per 140,000 mt of groundfish harvested (Table 4.1-2). The level of incidental take in either the BSAI or the GOA has not increased over the past decade (Figure 4.1-4).

Under Alternative 2, TACs for pollock, Pacific cod, and Atka mackerel are reduced; thus, proportional reductions in incidental take could be expected. However, the apportionment of the TAC reductions did not result in the reduction of the expected incidental catch of Steller sea lions (Table 4.1-2). Similarly, reduced fishing activity inside critical habitat, where Steller sea lions may be expected to spend a greater percentage

[3]Ibid.

of their foraging and transit time, could further lower incidental take. The overall effect of any such reductions on population trends, however, would be indistinguishable.

With respect to entanglement in marine debris, Alternative 2 does not alter the effects described under Alternative 1. That is, the effect is insignificant. Although the levels of protection from direct effects are slightly greater than those in Alternative 1, the overall take rates are very low to begin with; consequently, Alternative 2 is rated insignificant according to the criteria set for significance (Table 4.1-1).

Direct Effects - Fisheries Harvest of Prey Species (Question 2)

As defined in 4.1.1.1 daily average removal rates were calculated for the proposed fishing season by dividing the allocated TAC for that season by the duration of the season, and summing as appropriate for pollock, Pacific cod, or Atka mackerel fisheries (Figure 4.1-5). Actual daily fisheries removal rates may be higher or lower than this value. Deviations from relative mean daily removals for each Alternative were obtained by calculating the average removal rate for each day for all Alternatives (a "grand average"; the zero line in Figure 4.1-6) then dividing that value into the daily average removal rate for each Alternative. For example, Figures 4.1-5, -7, and -9 provide the daily average removal rates for each Alternative calculated by seasonal TAC. Under Alternative 2, approximately 6,000 mt/day of pollock and cod were estimated to be harvested on February 1. In Figure 4.1-6, the deviation of this daily average removal rate on February 1 in Alternative 2 is about zero, suggesting that, compared to the other four Alternatives, the same amount of pollock and cod in the EBS will be removed on that day under Alternative 2 than with the other Alternatives. The effect of the Alternative was then judged based on the overall and seasonal daily average removals by summing the areas under the "curves" in Figures 4.1-6,-8, and -10 for the year resulting in a comparative value that we term the deviation difference (Table 4.1-3). Such values are used to distinguish the relative differences between the Alternatives; they are not additive nor can they be compared statistically. In this case, a positive value suggests more removals than the average and a negative value suggests less removals.

For Alternative 2, the deviation difference for pollock in the Bering Sea resulted in +198 value (CS-), partly because this Alternative alone proposes seasonal fishing from November to December. Negative values (I to CS+) were calculated in the Aleutian Islands and Gulf of Alaska for pollock and cod. Atka mackerel removals were positive for the EBS/AI and western Aleutian Island (CS-) and insignificant for the central Aleutian. Overall, Alternative 2 had a +38 value (Table 4.1-3), suggesting more fish removed compared to the mean daily removal rate of all Alternatives. The deviation difference for all fisheries and all areas was insignificant with a value of +38, suggesting that the combined removals of walleye pollock, Pacific cod, and Atka mackerel on a daily basis were similar to all Alternatives.

The combined TAC of all groundfish in the Bering Sea results in quarterly peaks of average removal rates during February/March, April/June, July/August, and September/December (Figure 4.1-5). Compared to removals in the Bering Sea for all other alternatives, Alternative 2 has relatively equal average daily removal rates during most season except winter when the rates are the highest of any Alternative, calculated as the deviation from the daily average removal rate averaged for all fisheries (Figure 4.1-6). Different patterns are seen in the Aleutian Islands and Gulf of Alaska (Figure 4.1-7, -9 and Figures 4.1-8, -10) where the removal rates tend to be less than the mean daily removal rates.

The combined TAC of pollock, Pacific cod, and Atka mackerel under Alternative 2 is 1,646,297 mt (Table 4.1-34). The amount of the fishery removals of all key prey species is reduced by 10%. Reduced competitive effects, in turn, should avoid impacts on fitness or population recovery. Alternative 2 dampens the effects of harvest of the key prey species with different combinations of management measures, and includes reductions in TACs.

Reductions in TAC range from a low of 2% for eastern Bering Sea pollock to a high of 92% for Aleutian Islands pollock. Some of these reductions may be more important to Steller sea lions than others. For example, while a 92% reduction in Aleutians Islands pollock TAC is a large difference, diet studies indicate that pollock become less common in the diet of Steller sea lions in the Aleutian Islands than in the GOA and

Bering Sea (Sinclair and Zeppelin, submitted). In addition to lowering TAC, spatial and temporal restrictions are discussed below.

Groundfish fisheries incidentally take some non-target fish species, some of which are important Steller sea lion prey such as arrowtooth flounder, salmon, cephalopods, and herring (Sinclair and Zeppelin, submitted). The bycatch of these species under Alternative 2, however, is estimated to be less than 4% of the total catch in the Gulf of Alaska, and much lower in the Bering Sea (NMFS unpublished observer program data)[4].

Thus, Alternative 2 provides greater protection from effects of harvesting Steller sea lion prey species than Alternative 1. Further, the reductions in TACs are substantial enough (i.e., more than 20%, for two key species) to rank them as conditionally significant positive ~~(Table 4.1-5)~~ according to the significance criteria established in Table 4.1-1. The combination of a positive average daily removal rate (deviation difference) resulting in an insignificant rating, and the TAC ranking of CS+, resulted in the assignment of an overall ranking of Insignificant for this Alternative under question 2.

Indirect Effects - Spatial and Temporal Concentration of Fishery (Question 3)

Alternative 2 establishes lower total allowable catch levels (for pollock, Pacific cod, and Atka mackerel), prohibits trawling in critical habitat, and implements measures to spread out catches through the year. Applicable to all fisheries is no trawling for any groundfish species within Steller sea lion critical habitat. Relevant measures to the analysis include:

- Four seasons would be established for pollock, Pacific cod, and Atka mackerel fisheries with equal seasonal TAC apportionment: January 20 - March 15 (25%), April 1 - June 1 (25%), June 15 - August 15 (25%), September 1 - Dec 31 (25%). Two week stand-downs would be established between seasons with no rollover of TAC allowed.

Applicable to pollock fisheries:
- The Aleutian Islands would be closed to directed pollock fishing.
- Maximum TACs would be established as a percentage of the maximum ABC as follows: BS pollock TAC, 74.5% of ABC; GOA pollock TAC, 44.8% of ABC.
- Separate TACs would be established for Bering Sea pollock east and west of 170° W longitude, and GOA pollock TACS would be established by management area (e.g., 610, 620, 630) and for Shelikof Strait.
- Maximum daily catch limits would be established for the fleet of vessels fishing in the pollock fisheries as follows: BS pollock, 5,000 mt; GOA pollock, 1,000 mt.

Applicable to the Pacific cod fisheries:
- The Pacific cod TAC would be split from a combined BSAI TAC to separate TACs for the EBS and the AI based on the biomass distribution of the stock.
- Maximum TACs would be established as a percentage of the maximum ABC as follows: BS cod TAC, 71.8% of ABC; AI cod TAC, 71.8% of ABC; GOA cod TAC, 55.0% of ABC.
- Separate TACs would be established for Bering Sea cod east and west of 170° W longitude, separate AI cod TACs would be established by management area (e.g., 541, 542, 543); and GOA cod TACS would be established by management area (e.g., 610, 620, 630) and for the Shelikof Strait.

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[4] Ibid.

- Maximum daily catch limits would be established for the fleet of vessels fishing in the cod fisheries as follows: BS cod, 600 mt; AI cod, 600 mt; GOA cod, 400 mt.
- Foraging area (Seguam, SCA, Shelikof) catch limits would be established at 10% of survey biomass estimate.
- A zonal approach would be implemented for BSAI and GOA Pacific cod fisheries.

Applicable to Atka mackerel fisheries:
- Maximum mackerel TAC would be established at 33% of the maximum ABC.
- Separate TACs would be established for AI management areas (e.g., 541. 542, 543).
- A maximum daily catch limit of 300 mt would be established for the fleet of vessels fishing in the mackerel fishery.

As with Alternative 1, question 3, the effects of spatial and temporal distributions of fisheries catch on unaccounted mortality were subjectively categorized within metapopulation areas based on the timing and location of fisheries removals relative to the importance of the target species in sea lion diets, critical stages of sea lion development within seasons, and potential of overlap between fisheries removals and sea lion foraging.

For the central and eastern GOA metapopulation, a 55% reduction in pollock TAC and 38% reduction in cod TAC would likely benefit sea lion population trends, particularly during the winter when cod is more common in the diet. Closures of critical habitat to trawling could potentially provide a large degree of separation between fisheries removal and foraging which will also benefit sea lions. The same could be said for other metapopulations where the magnitude of TAC reduction is similar. Likewise, the spreading of allowable catch across four seasons with daily catch limits may reduce the likelihood of regional prey competition. However, determining the magnitude of the effect for this alternative on sea lion metapopulations in general is not possible, except that in most cases it is likely to be positive. The fine resolution of management suggested in this alternative exceeds the resolution available on Steller sea lions; thus the effects of Alternative 2 at the metapopulation level, or at finer scales, cannot be determined.

Daily average removal rates were calculated by dividing the allocated TAC by length of season, and summing, as appropriate, for open pollock, Pacific cod, or Atka mackerel fisheries. Actual daily fisheries removal rates may be higher or lower than this value. Projected average daily removal rates of pollock and cod in the Eastern Bering Sea are comparable in magnitude to the other alternatives (Figure 4.1-5, Figure 4.1-6), though with brief closures separating the fishing periods. Curiously, the pollock TAC allocated to the Eastern Bering Sea could not practically be removed because of daily catch limits. Under the management regime of Alternative 2, four seasons of 54 days (Season A), 61 days (B, C), and 121 days (D) were allocated 343,073 mt each, with no TAC rollover allowed between seasons (see Section 2.3.2). Average daily removal rates within each season to meet this TAC are 6353 mt, 5624 mt, 5624 mt and 2835 mt for the A through D seasons, respectively. However, Alternative 2 caps daily pollock removals from the Eastern Bering Sea at 5000 mt per day (Section 2.3.2), so without TAC rollover about 2601 mt would be forgone. This may have been an unintended consequence, because daily limits in the Gulf of Alaska and Aleutian Islands do not seem to result in "lost" TAC. The overall TAC of pollock and Pacific Cod in the Eastern Bering Sea is only reduced by 2% and 18%, respectively (Table 4.1-3). However, the percentage splits in allowed removals east and west of 170° W longitude of 52/48 (A season), 45/55 (B season), and 39/61 C and D seasons), combined with the daily catch limit of 1000 mt/d and no trawling within critical habitat should greatly reconfigure removals from east of 170° W, where most of the pollock were harvested during 1998-2000 (Figure 4.1-15). A similar split is made in pollock and Pacific cod allocations between western and central Gulf of Alaska TACs (see Section 2.3.2). Given the relatively large contribution of pollock in the summer and winter diets of sea lions in the Eastern Aleutian Islands (Figure 3.1-9, Figure 4.1-11, Figure 4.1-12), this could be beneficial to sea lions. Given seasonal movements of Steller sea lions among areas, and the variable amount of foraging occurring inside critical habitat even within a single foraging trip (Figure 4.1-13, Figure 4.1-14), it is not possible to predict how widespread such a benefit could be to the sea lion population in general. Within the western stock of Steller sea lions, the Eastern Aleutian Island metapopulation has exhibited the lowest annual decline rate (-1.75% during 1991-2000) (Loughlin and York 2001).

Because of reduced pollock, Pacific cod, and Atka mackerel TACs in the Gulf of Alaska and Aleutian Islands, average daily removal rates are lower than in the other alternatives (Figure 4.1-7, Figure 4.1-8, Figure 4.1-9, Figure 4.1-10). Also in contrast to other alternatives, Alternative 2 prevents greater removal rates during critical periods of April-June (late pregnancy and beginning of pup weaning) and May-July (pup lactation period on rookeries). Of all the alternatives, Alternative 2 measures appear to result in the least temporal concentration of fishery removals of key sea lion prey species.

Alternative 2 management measures result in much less spatial and temporal concentration of fisheries removals of key Steller sea lion prey species than do measures under other alternatives, and hence rates a conditionally significant positive using the criteria established for significance (Table 4.1-1). The overall TAC, however, is only 10% less than the other alternatives (Table 4.1-~~3~~4), and thus the overall effect on the population may not be as intense. Based upon Steller sea lion population trends during 1990-2000, it is assumed that Alternative 2 will not result in a stable population, changes to the sea lion population would be within 4% of the current trend, and an overall decline would continue at -1.4% to -2.3% per year (Table 4.1-~~4~~5).

Indirect Effects - Disturbance Effects (Question 4)

Regarding disturbance effects, the same general comments made under Alternative 1 apply here. That is, disturbance effects by groundfish fisheries on Steller sea lions cannot be demonstrated with existing data. However, to the extent that Alternative 2 reduces fishing activities inside critical habitat and at haul-out sites, the former by extending closed areas and the latter by a reduction in TACs for pollock, Pacific cod, and Atka mackerel, potential disturbance effects may be further reduced or avoided. Thus, the scale of change in fishing activity imposed under Alternative 2 would result in less disturbance. Given that the level of disturbance established for management measures comparable to 1998 were rated as insignificant according to the significance criteria established (Table 4.1-1), measures which would result in even less disturbance than that which is insignificant are also rated as insignificant.

4.1.1.3 The effects of Alternative 3 on Steller Sea Lions

Direct Effects - Incidental Take/Entanglement in Marine Debris (Question 1)

With regard to incidental take, Alternative 3 is not likely to result in significant changes in the rate of direct mortality relevant at the population level. Annual levels of incidental mortality were estimated by multiplying the ratio of observed incidental take of dead animals to observed groundfish catch (stratified by area and gear type), to the new projected TAC for each fishery area (NMFS, unpublished observer program data)[5]. Takes of Steller sea lions currently are rare events in all of the Alaskan groundfish fisheries, with no apparent pattern to their temporal or spatial distribution. For example, the total numbers of incidental take is expected to be less than 14 (CI = 11-17) based on allocations of TAC in Alternative 3, or about one sea lion per 140,000 mt of groundfish harvested (Table 4.1-2). The level of incidental take in either the BSAI or the GOA has not increased over the past decade (Figure 4.1-4).

With respect to entanglement in marine debris, Alternative 3 does not alter the effects described under Alternative 1. That is, there is an insignificant effect. Although the levels of protection from direct effects are slightly greater than those in Alternative 1, the overall take rates are very low to begin with; consequently, Alternative 3 is rated insignificant according to the criteria set for significance (Table 4.1-1).

Direct Effects - Fisheries Harvest of Prey Species (Question 2)

As defined in 4.1.1.1, daily average removal rates were calculated for the proposed fishing season by dividing the allocated TAC for that season by the duration of the season, and summing as appropriate for pollock, Pacific cod, or Atka mackerel fisheries (Figure 4.1-5). Actual daily fisheries removal rates may be higher or lower than this value. Deviations from relative mean daily removals for each Alternative were obtained by calculating the average removal rate for each day for all Alternatives (a "grand average"; the zero line in Figure 4.1-6) then dividing that value into the daily average removal rate for each Alternative. For example, Figures 4.1-5, -7, and -9 provide the daily average removal rates for each Alternative calculated by seasonal TAC. Under Alternative 3, approximately 4,300 mt/day of pollock and cod were estimated to be harvested on February 1 from the Eastern Bering Sea. In Figure 4.1-6, the deviation of this daily average removal rate on February 1 in Alternative 3 is about -0.2, suggesting that, compared to the other four Alternatives, less pollock and cod in the EBS will be removed on that day under Alternative 3 than with the other Alternatives. The effect of the Alternative was then judged based on the overall and seasonal daily average removals by summing the areas under the "curves" in Figures 4.1-6, -8, and -10 for the year resulting in a comparative value that we term the deviation difference (Table 4.1-3). Such values are used to distinguish the relative differences between the Alternatives; they are not additive nor can they be compared statistically. In this case, a positive value suggests more removals than the average and a negative value suggests less removals.

For Alternative 3, the deviation difference for pollock in the Bering Sea resulted in -36 (I), but high variability occurred by area with the Aleutian Islands ranking as S-, and all other areas as CS-. Pacific cod removals overall ranked as CS+ in the Aleutian Islands and insignificant elsewhere. Atka mackerel removals under Alternative 3 all resulted in positive values with a CS- ranking for the EBSAI area and insignificant for other areas (Table 4.1-3). Overall, Alternative 3 had a -49 value, suggesting less fish removed compared to the mean daily removal rate of all Alternatives. The deviation difference for all fisheries and all areas was insignificant with a value of -49, suggesting that the combined removals of walleye pollock, Pacific cod, and Atka mackerel on a daily basis were similar to all Alternatives.

The combined TAC of all groundfish in the Bering Sea results in relatively constant average removal rates from February through November with an increase of about 2,000 mt/day July to November (Figure 4.1-5). Compared to removals in the Bering Sea for all other alternatives, Alternative 3 has relatively equal average daily removal rates during most season, calculated as the deviation from the daily average removal rate averaged for all fisheries (Figure 4.1-6).

[5] Ibid.

The combined TAC of pollock, Pacific cod, and Atka mackerel under Alternative ~~1~~3 is 1,~~831~~813,~~297~~830 mt (Table 4.1-~~3~~1). Alternative 3 contains a "global control rule" that adjusts TAC relative to surveyed spawning biomass. However, the projected TAC does not differ substantially from that of Alternative 1 (or for that matter Alternatives 4 and 5; Table 4.1-~~3~~4). The largest (and only) reduction is in GOA pollock which is 18% less than the TAC established in Alternative 1.

Groundfish fisheries also incidentally take non-target fish species, some of which are important Steller sea lion prey such as arrowtooth flounder, salmon, cephalopods, and herring (Sinclair and Zeppelin, submitted). However, the bycatch of these species under Alternative 3 is estimated to be less than 4% of the total catch in the Gulf of Alaska, and much lower in the Bering Sea (NMFS unpublished observer program data)[6].

Alternative 3 contains additional management measures beyond those used under Alternative 1 to manage the harvest within critical habitat. Because GOA TAC is reduced between 5% and 20%, using the criteria for determining significance in Table 4.1-1 the effect on Steller sea lion populations under Alternative 3 is rated insignificant (Table 4.1-~~5~~6). The combination of a negative average daily removal rate (deviation difference) resulting in an insignificant rating, and the TAC ranking of CS-, therefore the analyst assigned an overall ranking of Insignificant for this Alternative under question 2.

Indirect Effects - Spatial and Temporal Concentration of Fishery (Question 3)

Essential spatial and temporal elements of this approach are to establish large areas of critical habitat where fishing for pollock, Pacific cod, and Atka mackerel is prohibited, and to restrict catch levels in remaining critical habitat areas. Details are as follows:

Applicable to all pollock, Pacific cod and Atka mackerel fisheries:

- Closure areas to directed fishing for pollock, Pacific cod, and Atka mackerel inside specified sites.
- Trawl fishing for pollock, Pacific cod and Atka mackerel prohibited November 1 January 20.
- Fishing for pollock, Pacific cod and Atka mackerel prohibited from November 1 through January 20 inside critical habitat.
- Outside of critical habitat, two evenly spaced seasons for pollock, Pacific cod, and Atka mackerel fisheries in the EBS, GOA, and AI.

Applicable to pollock fisheries:

- A portion of the Aleutian Islands would be open to pollock fishing (Area 12)

Applicable to the Pacific cod fisheries:

- The Pacific cod TAC would be split from a combined BSAI TAC to separate TACs for the EBS and the AI based on the biomass distribution of the stock.

As with Alternatives 1 and 2, the effects of spatial and temporal distributions of fisheries catch on unaccounted mortality were subjectively categorized within metapopulation areas based on the timing and location of fisheries removals relative to the importance of the target species in Steller sea lion diets, critical

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[6] Ibid.

stages of sea lion development within seasons, and potential of overlap between fisheries removals and sea lion foraging.

Alternative 3 reduces spatial concentration by creating large closures within three broad areas, prohibiting fishing within critical habitat during November 1 through January 20, and creates four rather than two seasons within critical habitat which along with catch limits reduce spatial concentration of fisheries removals. Overall average daily removal rates for Eastern Bering Sea pollock and Pacific cod are fairly evenly distributed throughout the year (Figure 4.1-5, Figure 4.1-6). Likewise, Aleutian Island pollock, Atka mackerel and Pacific cod estimated average daily removal rates are even throughout the year (Figure 4.1-7), though relative to removals of all other alternatives is relatively greater during June through September (Figure 4.1-8), a critical period for Steller sea lion lactation. Similarly, GOA Pacific cod and pollock have relatively greater estimated average daily removal rates and similar TAC allocations compared to other alternatives during June through September, though there are removal limits within critical habitat.

Alternative 3 generally spreads fish removals over time and seasons, and thus results in marginally less spatial and temporal concentration of fisheries removals than Alternative 1, and hence rates as insignificant using the criteria established for significance (Table 4.1-1). The overall TAC, however, is similar to all other Alternatives except Alternative 2, which may reduce the benefit to Steller sea lions. Based upon sea lion population trends during 1990-2000, it is assumed that Alternative 3 will not result in a stable population. Thus, changes to the Steller sea lion population would be within 2% of the current trend, and an overall decline would likely continue at -1.4% to -5.2% per year (Table 4.1-45). Overall, using the criteria for determining significance in Table 4.1-1 the effect on Steller sea lion populations under Alternative 3 is rated conditionally significant positive (Table 4.1-56).

Indirect Effects - Disturbance Effects (Question 4)

Regarding disturbance effects, the same general comments made under Alternative 1 apply here. That is, generally disturbance effects by groundfish fisheries on Steller sea lions cannot be demonstrated with existing data. However, Alternative 3 restricts transit within 3 nm of 37 rookeries and prohibits fishing activities within 3 nm of haul-out sites. It also contains a minor reduction in TACs of less than 1% for pollock, Pacific cod, and Atka mackerel resulting in potential disturbance effects which are not likely to change relative to Alternative 1. Thus, the scale of change in fishing activity imposed under Alternative 3 results in marginally less disturbance. Although the levels of protection from direct effects are slightly greater than those in Alternative 1, the overall take rates are very low to begin with; consequently, rated insignificant according to the criteria set for significance (Table 4.1-1).

4.1.1.4 The effects of Alternative 4 on Steller Sea Lions

Direct Effects - Incidental Take/Entanglement in Marine Debris (Question 1)

Annual levels of incidental mortality were estimated by multiplying the ratio of observed incidental take of dead animals to observed groundfish catch (stratified by area and gear type), to the new projected TAC for each fishery area (NMFS, unpublished observer program data)[7]. The total amount of incidental take under Alternative 4 is expected to be less than 13 (as in Alternative 1) based on allocations of TAC in this

[7] Ibid.

Alternative, or about one sea lion per 140,000 mt of groundfish harvested. The level of incidental take in either the BSAI or the GOA has not increased over the past decade.

With respect to entanglement in marine debris, Alternative 4 does not alter the effects described under Alternative 1. That is, there is no significant effect. Although the levels of protection from direct effects are slightly greater than those in Alternative 1, the overall take rates are very low to begin with; consequently, Alternative 4 is rated as insignificant under the criteria established for significance (Table 4.1-1).

Direct Effects - Fisheries Harvest of Prey Species (Question 2)

As defined in 4.1.1.2, daily average removal rates were calculated for the proposed fishing season by dividing the allocated TAC for that season by the duration of the season, and summing as appropriate for pollock, Pacific cod, or Atka mackerel fisheries (Figure 4.1-5). Actual daily fisheries removal rates may be higher or lower than this value. Deviations from relative mean daily removals for each Alternative were obtained by calculating the average removal rate for each day for all Alternatives (a "grand average"; the zero line in Figure 4.1-6) then dividing that value into the daily average removal rate for each Alternative. For example, Figures 4.1-5, -7, and -9 provide the daily average removal rates for each Alternative calculated by seasonal TAC. Under Alternative 4, approximately 4,700 mt/day of pollock and were projected to be harvested on February 1 from the Eastern Bering Sea. In Figure 4.1-6, the deviation of this daily average removal rate on February 1 in Alternative 4 is about -0.1, suggesting that, compared to the other four Alternatives, less pollock and cod in the EBS will be removed on that day under Alternative 4 than with the other Alternatives. The effect of the Alternative was then judged based on the overall and seasonal daily average removals by summing the areas under the "curves" in Figures 4.1-6,-8, and -10 for the year resulting in a comparative value that we term the deviation difference (Table 4.1-3). Such values are used to distinguish the relative differences between the Alternatives; they are not additive nor can they be compared statistically. In this case, a positive value suggests more removals than the average and a negative value suggests less removals.

For Alternative 4, the deviation difference for pollock in the Bering Sea resulted in -29 (CS+), but high variability occurred by area with the Aleutian Islands ranking as S- with a value of +470, and all other areas as CS-. Pacific cod removals overall ranked as S- in the Aleutian Islands and CS- elsewhere. Atka mackerel removals under Alternative 4 all resulted in negative values with a CS+ ranking (Table 4.1-3). Overall, Alternative had a +58 value, suggesting more fish removed compared to the mean daily removal rate of all Alternatives. The deviation difference for all fisheries and all areas was insignificant with a value of +58, suggesting that the combined removals of walleye pollock, Pacific cod, and Atka mackerel on a daily basis were similar for all Alternatives.

The combined TAC of all groundfish in the Bering Sea results in relatively constant average removal rates from February through November with an increase of about 2,000 mt/day July to November (Figure 4.1-5). Compared to removals in the Bering Sea for all other alternatives, Alternative 4 has relatively equal average daily removal rates during most seasons, calculated as the deviation from the daily average removal rate averaged for all fisheries (Figure 4.1-6). The exception is the high removal of cod during winter when such fishing is not proposed in the other Alternatives.

The combined TAC of pollock, Pacific cod, and Atka mackerel under Alternative 4 is 1,831,299 mt, virtually the same as Alternatives 1, 3, and 5 (Table 4.1-34). Estimated TACs region-wide are the same as under Alternative 1. Alternative 4 contains additional seasonal and gear apportionments to distribute catch relative to Alternative 1.

Groundfish fisheries also incidentally take non-target fish species, some of which are important Steller sea lion prey such as arrowtooth flounder, salmon, cephalopods, and herring (Sinclair and Zeppelin, submitted). However, the bycatch of these species under Alternative 4 is estimated to be less than 4% of the total catch in the GOA, and much lower in the Bering Sea (NMFS unpublished observer program data).

Because the TAC is identical to that of Alternative 1, no additional benefits to Steller sea lions accrue. Therefore, this alternative is rated conditionally significant negative (Table 4.1-56) for TAC according to the criteria established for determining significance in Table 4.1-1. The combination of a negative average daily removal rate (deviation difference) resulting in an insignificant rating, and the TAC ranking of CS-, therefore the analyst assigned an overall ranking of Insignificant for this Alternative under question 2.

Indirect Effects - Spatial and Temporal Concentration of Fishery (Question 3)

This approach allows for different types of management measures in the three areas (AI, BS, and GOA). Essential measures include fishery specific closed areas around rookeries and haul-out sites, together with seasons and catch apportionments. Specific measures are complex and will not be repeated here, they are fully discussed in Section 2.3.4 Alternative 4.

As with Alternatives 1, 2, and 3, the effects of spatial and temporal distributions of fisheries catch on unaccounted mortality were subjectively categorized within metapopulation areas based on the timing and location of fisheries removals relative to the importance of the target species in sea lion diets, critical stages of sea lion development within seasons, and potential of overlap between fisheries removals and Steller sea lion foraging.

Two Eastern Bering Sea pollock and Pacific cod seasons provide fairly uniform estimated average daily removal rates throughout the year, though slightly increased during July-November due to a larger TAC apportionment (Figure 4.1-5, Figure 4.1-6). Temporal distribution of average daily removals is similar to Alternatives 3 and 5. In contrast, combined estimated average daily removal rates of Atka mackerel, pollock, and Pacific cod were the largest of all Alternatives in the Aleutian Islands (Figure 4.1-7, Figure 4.1-8), and particularly greater during the critical spring period (Figure 4.1-8). Gulf of Alaska removals are concentrated in four periods, though estimated removal rates are generally lower relative to other alternatives in spring and summer (Figure 4.1-9, Figure 4.1-10).

Alternative 4 also creates a series of area closures or removal limits to spatially spread fish removals. Management Areas 4 and 9 and the Seguam foraging area are closed to fishing for pollock, Pacific cod and Atka mackerel, and within 20 nm of five northern Bering Sea haul-outs (NMFS 2000 Biological Opinion). The closures of these areas is not likely be of great benefit to sea lions, however, as the amount of pollock (Figure 4.1-15) and Pacific cod (Figure 4.1-16) catch, and Atka mackerel effort (Figure 4.1-17) during 1998-2000 in these areas was minimal. Similarly, because pollock are not a key item in Steller sea lion diet west of 170°W longitude (Figure 4.1-11, Figure 4.1-12), prohibiting pollock fishing in the Aleutian Islands may have little benefit to sea lions. Closures to pollock fishing out to 10 or 20 nm around most rookeries and haul-outs in GOA management Areas 1, 2, 3, 4, 5, 6, 10 and 11 could be beneficial to sea lions given the importance of pollock in their diet in those areas (Figure 4.1-11, Figure 4.1-12), particularly during periods of pup rearing when mothers forage from the rookeries. The benefit of these closures outside of the pupping season becomes less clear, given seasonal movements of Steller sea lions among areas, much greater home ranges during winter (see Section 3.1.1.7.2) and the variable amount of foraging occurring inside critical habitat even within a single foraging trip (Figure 4.1-13, Figure 4.1-14).

Fisheries allocations are shifted by gear types, seasons, and areas, and represent improvements over Alternative 1 in some areas, the measures under Alternative 4 are rated as insignificant under the criteria established for significance (Table 4.1-1). Additionally, the overall amount of TAC removed is the same as all other alternatives except Alternatives 2 and 5. As with the other alternatives, given seasonal movements of Steller sea lions among areas, and the variable amount of foraging occurring inside critical habitat even within a single foraging trip (Figure 4.1-13, Figure 4.1-14), it is not possible to predict how widespread the effects of these measures are to the Steller sea lion population in general. Based upon Steller sea lion population trends during 1990-2000, it is assumed that Alternative 4 will not result in a stable population. Thus, changes to the sea lion population would be within 2% of the current trend, and an overall decline would continue at -3.3% to -7.1% per year (Table 4.1-45).

Indirect Effects - Disturbance Effects (Question 4)

Regarding disturbance effects, the same general comments made under Alternative 1 apply here. That is, generally disturbance effects by groundfish fisheries on Steller sea lions cannot be demonstrated with existing data. However, Alternative 4 restricts transit within 3 nm of 37 rookeries and prohibits fishing activities within 3 nm of haul-out sites. It also contains a variety of schemes to reduce fisheries impacts on Steller sea lions across the GOA and Aleutian Islands. However, the overall TAC is the same as in Alternative 1 for pollock, Pacific cod, and Atka mackerel resulting in potential disturbance effects which are not likely to change relative to Alternative 1. Thus, the scale of change in fishing activity imposed under Alternative 4 results in marginally less disturbance. Although the levels of protection from disturbance effects are slightly greater than those in Alternative 1, the overall take rates are very low to begin with; consequently, Alternative 4 is rated insignificant according to the criteria set for significance (Table 4.1-1).

4.1.1.5 The Effects of Alternative 5 on Steller Sea Lions

Direct Effects - Incidental Take/Entanglement in Marine Debris (Question 1)

Annual levels of incidental mortality were estimated by multiplying the ratio of observed incidental take of dead animals to observed groundfish catch (stratified by area and gear type), to the new projected TAC for each fishery area (NMFS, unpublished observer program data)[8]. The total amount of incidental take under Alternative 5 is expected to be less than 14 (CI = 11-17) Steller sea lions (as in Alternative 1) based on allocations of TAC under Alternative 5, or about one sea lion per 140,000 mt of groundfish harvested (Table 4.1-2). The level of incidental take in either the BSAI or the GOA has not increased over the past decade (Figure 4.1-4).

With respect to entanglement in marine debris, Alternative 5 does not alter the effects described under Alternative 1. That is, there is an insignificant effect. Although the levels of protection from direct effects

[8]Ibid.

are slightly greater than those in Alternative 1, the overall take rates are very low to begin with; consequently, rated insignificant according to the criteria set for significance (Table 4.1-1).

Direct Effects - Fisheries Harvest of Prey Species (Question 2)

As defined in 4.1.1.2, daily average removal rates were calculated for the proposed fishing season by dividing the allocated TAC for that season by the duration of the season, and summing as appropriate for pollock, Pacific cod, or Atka mackerel fisheries (Figure 4.1-5). Actual daily fisheries removal rates may be higher or lower than this value. Deviations from relative mean daily removals for each Alternative were obtained by calculating the average removal rate for each day for all Alternatives (a "grand average"; the zero line in Figure 4.1-6) then dividing that value into the daily average removal rate for each Alternative. For example, Figures 4.1-5, -7, and -9 provide the daily average removal rates for each Alternative calculated by seasonal TAC. Under Alternative 5, approximately 4,500 mt/day of pollock and cod were estimated to be harvested on February 1 from the Eastern Bering Sea. In Figure 4.1-6, the deviation of this daily average removal rate on February 1 in Alternative 5 is about -0.2, suggesting that, compared to the other four Alternatives, less pollock and cod in the EBS will be removed on that day under Alternative 5 than with the other Alternatives. The effect of the Alternative was then judged based on the overall and seasonal daily average removals by summing the areas under the "curves" in Figures 4.1-6,-8, and -10 for the year resulting in a comparative value that we term the deviation difference (Table 4.1-3). Such values are used to distinguish the relative differences between the Alternatives; they are not additive nor can they be compared statistically. In this case, a positive value suggests more removals than the average and a negative value suggests less removals.

For Alternative 5, the deviation difference for pollock in the Bering Sea resulted in -40 (CS+), but high variability occurred by area with the Aleutian Islands ranking as S+, and all other areas as CS+. Pacific cod removals overall ranked as CS- in the Aleutian Islands, insignificant in the BSAI, and CS- elsewhere. Atka mackerel removals under Alternative 5 all resulted in negative values with insignificant rankings for all areas (Table 4.1-3). Overall, Alternative 5 had a -31 value, suggesting less fish removed compared to the mean daily removal rate of all Alternatives. The deviation difference for all fisheries and all areas was insignificant with a value of -49, suggesting that the combined removals of walleye pollock, Pacific cod, and Atka mackerel on a daily basis were similar for all Alternatives.

The combined TAC of all groundfish in the Bering Sea results in relatively constant average removal rates from February through November with an increase of about 2,000 mt/day July to November (Figure 4.1-5). Compared to removals in the Bering Sea for all other alternatives, Alternative 3 has relatively equal average daily removal rates during most season, calculated as the deviation from the daily average removal rate averaged for all fisheries (Figure 4.1-6).

The TAC of pollock, Pacific cod, and Atka mackerel under Alternative 5 is 1,809,497 mt, virtually the same as Alternatives 1, 3, and 4 (Table 4.1-34). The only reduction in TAC results from a prohibition on fishing for pollock in the Aleutian Islands, as in Alternative 2. The benefit to Steller sea lions from this reduction is equivocal. Diet studies indicate that pollock becomes less common in the diet of Steller sea lions in the Aleutian Islands than in the GOA and Bering Sea (Sinclair and Zeppelin, submitted). This alternative limits the amount of catch within critical habitat to be in proportion to estimated fish biomass.

Groundfish fisheries also incidentally take other target and non-target fish species, some of which are important Steller sea lion prey such as arrowtooth flounder, salmon, cephalopods, and herring (Sinclair and Zeppelin, submitted). The amount of bycatch of these species under Alternative 5 is estimated to be less than

4% of the total catch in the GOA, and much lower in the Bering Sea (NMFS unpublished observer program data)[9].

Because TAC under Alternative 5 is within 5% of the Alternative 1 TAC, this alternative is rated as conditionally significant negative (Table 4.1-56) for TAC according to the criteria set for significance in Table 4.1-1. The combination of a negative average daily removal rate (deviation difference) resulting in an insignificant rating, and the TAC ranking of CS-, therefore the analyst assigned an overall ranking of Insignificant for this Alternative under question 2.

[9]Ibid.

Indirect Effects - Spatial and Temporal Concentration of Fishery (Question 3)

Features of this alternative applicable to pollock fisheries include:

- In the Bering Sea pollock fishery: four seasons with harvest limits within sea lion critical habitat foraging areas; and two seasons (40:60% allocation) outside critical habitat.
- In the GOA pollock fishery: fishery distributed over 4 seasons (30%, 15%, 30%, 25%).
- The Aleutian Islands area would be closed to pollock fishing.

Applicable to the Atka mackerel fisheries:
- Two seasons with TAC apportionments would be established: January 20 - April 15 (50%); September 1 - November 1 (50%).
- Harvest limits would be established in critical habitat: (40% inside critical habitat, and 60% outside)

Applicable to the Pacific cod fisheries:
- In the BSAI cod fishery: separate TACs would be established for the Bering Sea and Aleutian Islands, two seasons (A season Jan 20-April 30 at 40% of TAC; B season May 1-November 1 at 60% of TAC) with harvest limits within critical habitat based on best estimates of biomass. Using these estimates, the Bering Sea TAC limits within CH are 20% in the A season and 3.6% in the B season. In the Aleutian Islands, the TAC limits within CH are 20% in the A season and 48.3% in the B season.
- In the GOA cod fishery: two seasons (A season Jan 20-April 30 at 40% of TAC; B season May 1-November 1 at 60% of TAC) would be established with harvest limits within critical habitat based on best estimates of biomass. Based on these estimates, the TAC limits within CH to start with are 20% in the A season and 31.8% in the B season.

As with Alternatives 1, 2, and 3, the effects of spatial and temporal distributions of fisheries catch on unaccounted mortality were subjectively categorized within metapopulation areas based on the timing and location of fisheries removals relative to the importance of the target species in sea lion diets, critical stages of sea lion development within seasons, and potential of overlap between fisheries removals and sea lion foraging.

Spatial apportionments under Alternative 5 result in estimated daily average fish removal rates similar to those of Alternatives 3 and 4 for Eastern Bering Sea pollock and Pacific cod (Figure 4.1-5, Figure 4.1-6). Relative to Alternative 1, the removals are evened out over the seasons (Figure 4.1-5). Conversely, they are bimodal with peak removal rates of Atka mackerel Pacific cod, and pollock in spring and autumn from Aleutian Island fishing areas (Figure 4.1-7), though of much lower magnitude (Figure 4.1-8). Compared to other alternatives, estimated daily average removal rates from Aleutian Islands areas are lower during critical spring and summer months than in the other alternatives (Figure 4.1-8). Pacific cod and pollock estimated average daily removal rates in the Gulf of Alaska are most similar to the seasonal distribution of Alternative 4 (Figure 4.1-9), and results in stepwise decreases from winter to summer (Figure 4.1-10).

Alternative 5 also has a series of regional closures and apportionments to reduce spatial fishery concentration. As with other alternatives, an Aleutian Island pollock fishing prohibition may be of marginal benefit to Steller sea lions because pollock are not a key item of Steller sea lion diet west of 170°W longitude (Figure 4.1-11, Figure 4.1-12). Catch limits and multiple seasons within critical habitat reduce the rate at which fish are harvested, though as with the other alternatives, the benefit to Steller sea lions is unclear, given seasonal movements of sea lions among areas, much greater home ranges during winter (see Section

3.1.1.7.2) and the variable amount of foraging occurring inside critical habitat even within a single foraging trip (Figure 4.1-13, Figure 4.1-14).

Alternative 5 measures result in marginally less spatial and temporal concentration of fishery removals of key Steller sea lion prey species than do measures under Alternative 1, and is therefore rated insignificant (Table 4.1-~~5~~6) under the criteria established for significance in Table 4.1-1. TAC levels are similar to those of the other alternatives except for Alternative 2, and hence the ultimate benefit to the sea lion population may not be as great. Based upon sea lion population trends during 1990-2000, it is assumed that Alternative 5 will not result in a stable population. Thus, changes to the sea lion population would be within 2% of the current trend, and an overall decline would continue at -3.3% to -5.2% per year (Table 4.1-~~4~~5).

Indirect Effects - Disturbance Effects (Question 4)

Regarding disturbance effects, the same general comments made under Alternative 1 apply here. That is, generally disturbance effects by groundfish fisheries on Steller sea lions cannot be demonstrated with existing data. Alternative 5 restricts transit within 3 nm of 37 rookeries and prohibits fishing activities within 10 or 20 nm of 37 rookeries to trawling year-round. It also contains a reduction in TAC of 92% for pollock in the Aleutian Islands (bycatch only), which is an overall reduction of less than 1% for the groundfish TAC for pollock, Pacific cod, and Atka mackerel, resulting in potential disturbance effects which are not likely to change relative to Alternative 1. Given that the level of disturbance established for management measures comparable to 1998 were rated as insignificant according to the significance criteria established in Table 4.1-1, measures which would result in even less disturbance than that which is insignificant are also rated as insignificant (Table 4.1-~~5~~6).

4.1.1.6 Summary of Effects, Experimental Design Potential, and Re-initiation of Section 7 Consultation for Steller Sea Lions

In conclusion, significance determinations suggests that the effects of the alternatives on Steller sea lion are insignificant for all five alternatives with regard to the questions of incidental take/ entanglement in marine debris~~ and disturbance. On the question for~~, harvest of prey species~~ in the fisheries, Alternatives 1, 4 and 5 were found to be conditionally significant negative. Alternative 2 was found to be conditionally significant positive, and Alternative 4 was found to have insignificant effect.~~, and disturbance (Table 4.1-6). On the question for spatial and temporal concentration of the fisheries, Alternative 1 was found to have a conditionally significant ~~positive~~negative effect, Alternatives 2 and 3 were found to have a conditionally significant positive effect~~. These results are summarized in~~ (Table 4.1-~~5~~6). Alternatives 3 through 5 generally add additional provisions to spread fisheries harvests over time and areas in an attempt to reduce the likelihood of localized depletions on a broad range (from course to fine) of spatial/temporal scales. These alternative management schemes, in particular Alternatives 2 (Low and Slow) and 4 (Area and Fishery Specific Approach), have reached a fine degree of resolution for which harvests are apportioned among areas, seasons, and gear types. Unfortunately, the resolution at which Steller sea lion and other marine mammal foraging behavior is understood is at much courser temporal and spatial scales than the proposed fishery management measures. Much about the effects determinations remain unknown. Thus analyses involving reductions in TAC, or broad scale seasonal or regional allocations could be more readily evaluated within the context of current understanding of marine mammal foraging and life histories than could effects of small scale (within several nautical miles) or patchwork fishery limits or closures. Alternatives which were rated insignificant for one or more elements do contain measures which would be expected to have some beneficial impacts on localized populations of Steller sea lions however these localized impacts are not expected to be sufficient to reverse of the downward trajectory of the endangered western population of Steller sea lion number and hence were deemed insignificant.

Experimental Design Potential

The management regime proposed in Alternative 3 is similar to that in the NMFS 2000 Biological Opinion (NMFS, 2000a) and the monitoring program suggested therein could be applied to the Alternatives. Because of the reduced level of the sea lion population at present, however, implementation and success of the monitoring scheme may be difficult to gauge. Prior to the 2000 Biological Opinion experimental design, NMFS planned an experiment to test the efficacy of the no-trawl zones. It may be applicable to all the alternatives (NMFS, 1999c). All Steller sea lion fishery management measures include the presumption that fisheries cause reduced prey availability to sea lions or that by manipulation of the fishery, sea lion population trends will be effected. The efficacy of no-trawl zones experiment (NMFS 1999c) includes two studies addressing the possible effects of fishing on prey abundance and distribution. The first study has begun at Seguam Island and will address Atka mackerel issues, and the second study at Kodiak Island is addressing walleye pollock biology. Both studies are designed to determine whether fisheries result in localized depletion of the target fish, and if so, whether or not Steller sea lions may be compromised because of the depletion of prey. Both studies began in the late 1990s and will require five or more years to complete. Some physiological, behavioral, and ecological variants appropriate to measure to demonstrate food limitation, and by inference, localized depletion, are discussed in the study plan.

Re-initiation of Consultation under Section 7 of the ESA is appropriate for the proposed action

Section 402.16(c) requires re-initiation of consultation on an action "if the identified action is subsequently modified in a manner that caused an effect to the listed species or critical habitat that was not considered in the biological opinion..." The NMFS 2000 Biological Opinion was a comprehensive analysis of the BSAI and GOA groundfish fisheries and for all species listed as endangered or threatened. The proposed action, however, contain modifications to fishery management measures for pollock, Pacific cod and Atka mackerel fisheries to protect Steller sea lion that are different than the specific fishery management measures that were analyzed in the 2000 Biological Opinion. Because the determination of what constitutes differences in management measures that may be important to the determination of jeopardy to the listed Steller sea lion or adverse modification of critical habitat is quite subjective, the agency determined re-initiation of consultation is appropriate.

Section 402.16(b) also requires re-initiation of formal consultation "if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered...". Since the 2000 Biological Opinion, new information about Steller sea lion movements based on telemetry studies and new analysis of Steller sea lion scat samples have become available. An examination of that information as it relates to necessary protection measures is warranted.

NMFS recognized consultation under Section 7 of the ESA was appropriate early in this process. The consultation, limited in scope to Alternative 4, is proceeding in parallel with preparation of this SEIS. The draft Biological Opinion is contained in this SEIS (Appendix A). As such, the draft Biological Opinion undergoes public review with this Draft SEIS and all comments received on it are reproduced and will be responded to in the Final SEIS.

Table 4.1-1 Criteria for determining significance of effects to pinnipeds and sea otters.

Effects	Score					
	S-	CS-	I	CS+	S+	U
Incidental take/ entanglement in marine debris	Take rate increases by >50%	Take rate increases by 25-50%	Level of take below that which would have an effect on population trajectories	NA	NA	Insufficient information available on take rates
Harvest of prey species	Deviation of average daily removal rates is >+251; TAC removals of one or more key prey species increased by more than 5%	Deviation of average daily removal rates is +101 to +250; TAC removals of one or more key prey species increased or reduced from 1998 levels by less than 5%	Deviation of average daily removal rates is ±100; TAC removals of one or more key prey species reduced by 5-20%	Deviation of average daily removal rates is -101 to -250; TAC removals of one or more key prey species reduced from 1998 levels by more than 20%	Deviation of average daily removal rates is <-251; TAC removals of all key prey species (pollock, Pacific cod, Atka mackerel) reduced by more than 20%	Insufficient information available on key prey species
Spatial/ temporal concentration of fishery	Much more temporal and spatial concentration in all key areas	Similar temporal and spatial fishery distribution in some, but not all, key areas	Marginally less temporal and spatial concentration than 1998 fisheries	Much less temporal and spatial concentration in some, but not all key areas	Much less temporal and spatial concentration in all key areas	Insufficient information as to what constitutes a key area
Disturbance	Much more disturbance (all closed areas reopened)	Marginally more disturbance (some closed areas reopened)	Similar level of disturbance as that which was occurring in 1998	NA	NA	Insufficient information as to what constitutes disturbance

S = Significant, CS = Conditionally Significant, I = Insignificant, U = Unknown
NA = Not Applicable
TAC = Total Allowable Catch

Percentages used in determining the significance of effects are given as a plausible a point of departure to initiate discussion as opposed to being deemed statistically meaningful per se. Incidental takes attributed to the fisheries and entanglement in fishing gear and marine debris occur at low levels thought to be insignificant to Steller sea lion populations. The ideal level is undoubtably zero, however even a reduction to zero is considered to be insignificant to pinniped and sea otter populations. Therefore NMFS considers effect ratings of conditionally significant positive and significantly positive as not applicable to this analysis. A similar interpretation of significance has been made for disturbance effects on pinnipeds and sea otters. Given that the level of disturbance established for management measures comparable those in effect for 1998 were deemed insignificant, the additional management measures contained in Alternatives 2 through 5 which could result in even less disturbance than that which is insignificant is also deemed insignificant to Steller sea lion populations. Therefore NMFS considers effect ratings of conditionally significant positive and significantly positive as not applicable to this analysis. In establishing criteria for rating the significance to pinniped and sea otter populations of management measures affecting the harvest levels to be established for prey species and the temporal and spatial concentrations of harvest NMFS considered management measures resulting in similar levels of TAC removals and similar temporal and spatial patterns of harvest as in 1998 to be conditional significant negative and that to achieve a rating of insignificant marginal reductions in TAC levels or marginal decreases in the concentration temporal and spatial patterns of the fisheries must be reasonably expected to occur as a result of the implementation of the management measures contained in the alternative under consideration. To achieve ratings of conditionally significant positive or significantly positive substantial reductions in TAC levels or substantial decreases in the temporal and spatial concentrations to some or all key prey species and to some or all key pinniped or sea otter foraging areas must be reasonably expected to occur as a result of the implementation of the management measures contained in the alternative under consideration.

Table 4.1-2 Estimated incidental take of Steller sea lions and other marine mammals by commercial pollock, Pacific cod, and Atka mackerel fisheries under each alternative.

		1		2		3		4		5	
Fishery and Area	Species or Group	Mean	CI	Mean	CI	Mean	CI	Mean	CI	Mean	CI
Eastern Bering Sea Pollock	Steller sea lion	5	3-7	5	3-7	5	3-7	5	3-7	5	3-7
(areas 508 to 530) (Trawl gear only)	All marine mammals	18	15-21	18	15-21	18	15-21	18	15-21	18	15-21
Aleutian Islands Pollock	Steller sea lion	1	0-2	1	0-2	1	0-2	1	0-2	1	0-2
(areas 541,542,543) (Trawl gear only)	All marine mammals	1	0-2	1	0-2	1	0-2	1	0-2	1	0-2
GOA Pollock (W&C)	Steller sea lion	1	0-2	1	0-2	1	0-2	1	0-2	1	0-2
(areas 610,620,630) (All gears)	All marine mammals	3	0-8	1	0-6	2	0-7	3	0-8	3	0-8
Pollock subtotal	Steller sea lion	7	5-9	7	5-9	7	5-9	7	5-9	7	5-9
	All marine mammals	22	16-28	20	14-26	21	15-27	22	16-28	22	16-28
Bering Sea Pacific cod	Steller sea lion	1	0-3	1	0-3	1	0-3	1	0-3	1	0-3
(areas 508 to 530) (All gears)	All marine mammals	3	0-6	2	0-5	3	0-6	3	0-6	3	0-6
Aleutian Islands Pacific cod	Steller sea lion	0	0-1	1	0-2	1	0-2	0	0-1	1	0-2
(areas 541,542,543) (All gears)	All marine mammals	0	0-2	1	0-3	1	0-3	0	0-2	1	0-3
WGOA Pacific cod	Steller sea lion	1	0-2	1	0-2	1	0-2	1	0-2	1	0-2
(area 610) (All gears)	All marine mammals	2	0-7	1	0-6	2	0-7	2	0-7	2	0-7
CGOA Pacific cod	Steller sea lion	0	0-0	0	0-0	0	0-0	0	0-0	0	0-0
(areas 620,630) (All gears)	All marine mammals	1	0-2	1	0-2	1	0-2	1	0-2	1	0-2
EGOA Pacific cod	Steller sea lion	0	0-0	0	0-0	0	0-0	0	0-0	0	0-0
(area 640) (All gears)	All marine mammals	0	0-0	0	0-0	0	0-0	0	0-0	0	0-0
Pacific cod subtotal	Steller sea lion	2	0-4	3	1-5	3	1-5	2	0-4	3	1-5
	All marine mammals	6	0-12	5	0-11	7	1-13	6	0-12	7	1-13
EBSAI Atka mackerel	Steller sea lion	1	0-3	1	0-3	1	0-3	1	0-3	1	0-3
(Areas 508 to 541) (All gears)	All marine mammals	1	0-4	1	0-4	1	0-4	1	0-4	1	0-4
WAI Atka mackerel	Steller sea lion	1	0-2	1	0-2	1	0-2	1	0-2	1	0-2
(Area 543)	All marine mammals	1	0-2	1	0-2	1	0-2	1	0-2	1	0-2
CAI Atka mackerel	Steller sea lion	2	1-3	1	0-2	2	1-3	2	1-3	2	1-3
(Area 542)	All marine mammals	2	0-4	1	0-3	2	0-4	2	0-4	2	0-4
Atka mackerel subtotal	Steller sea lion	4	2-6	3	1-5	4	2-6	4	2-6	4	2-6
	All marine mammals	4	0-8	3	0-7	4	0-8	4	0-8	4	0-8
All Fisheries Combined	Steller sea lion	13	10-16	13	10-16	14	11-17	13	10-16	14	11-17
(Areas 508 to 640) (All gears)	All marine mammals	32	23-41	28	19-37	32	23-41	32	23-41	33	24-42
Percentage difference relative to Alternative 1											
All Fisheries Combined	Steller sea lion			0%		8%		0%		8%	
(Areas 508 to 640) (All gears)	All marine mammals			-13%		0%		0%		3%	

Table 4.1-3. **Yearly sum of relative mean daily removal rate deviates (deviation difference) based on projected allocations of total allowable catch for each Alternative. Deviates are not additive within columns.**

	Alternative				
Fishery and Area	**1**	**2**	**3**	**4**	**5**
Pollock (all areas)	-59	154	-27	-29	-40
Eastern Bering Sea pollock	-91	198	-36	-36	-36
Aleutian Islands pollock	-55	-346	277	470	-346
GOA pollock	118	-120	169	-75	-93
WGOA pollock	96	-128	231	-99	-100
CGOA pollock	133	-114	131	-64	-87
Pacific cod (all areas)	20	-141	-57	202	-23
Bering Sea/AI Pacific cod	-24	-80	-19	152	-29
Aleutian Islands Pacific cod	104	-250	-196	505	-163
GOA Pacific cod	-5	-150	20	24	112
WGOA Pacific cod	17	-144	-30	29	127
CGOA Pacific cod	-19	-154	49	20	102
Atka mackerel (all areas)	149	-65	115	-84	-115
EBSAI Atka mackerel	-103	63	194	-62	-92
WAI Atka mackerel	-41	144	101	-91	-114
CAI Atka mackerel	180	-87	118	-95	-116
All Fisheries and Areas	-15	38	-49	58	-31

Table 4.1-34 Projected total annual catch (TAC) for Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska pollock, Pacific cod, and Atka mackerel by fishery area.

Fishery and Area		Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Eastern Bering Sea pollock	TAC (mt)	1,400,000	1,372,290	1,400,000	1,400,000	1,400,000
	Change from Alt. 1 (mt)		-27,710	0	0	0
	Change from Alt. 1 (%)		-2%	0%	0%	0%
Aleutian Islands pollock	TAC (mt)	23,800	2,000	23,800	23,800	2,000
	Change from Alt. 1 (mt)		-21,800	0	0	-21,800
	Change from Alt. 1 (%)		-92%	0%	0%	-92%
GOA pollock Subtotal	TAC (mt)	99,349	44,509	81,882	99,351	99,349
	Change from Alt. 1 (mt)		-54,840	-17,467	2	0
	Change from Alt. 1 (%)		-55%	-18%	0%	0%
WGOA pollock	TAC (mt)	34,474	15,438	29,440	34,460	34,474
	Change from Alt. 1 (mt)		-19,036	-5,034	-14	0
	Change from Alt. 1 (%)		-55%	-15%	0%	0%
CGOA pollock	TAC (mt)	62,391	27,972	50,420	62,437	62,391
	Change from Alt. 1 (mt)		-34,419	-11,971	46	0
	Change from Alt. 1 (%)		-55%	-19%	0%	0%
EGOA pollock	TAC (mt)	2,484	1,099	2,022	2,454	2,484
	Change from Alt. 1 (mt)		-1,385	-462	-30	0
	Change from Alt. 1 (%)		-56%	-19%	-1%	0%
Pollock subtotal	TAC (mt)	1,523,149	1,418,799	1,505,682	1,523,151	1,501,349
	Change from Alt. 1 (mt)		-104,350	-17,467	2	-21,800
	Change from Alt. 1 (%)		-7%	-1%	0%	-1%
Bering Sea/AI Pacific cod	TAC (mt)	188,000	153,652	188,000	188,000	188,000
	Change from Alt. 1 (mt)		-34,348	0	0	0
	Change from Alt. 1 (%)		-18%	0%	0%	0%
GOA Pacific cod subtotal	TAC (mt)	50,848	31,639	50,848	50,848	50,848
	Change from Alt. 1 (mt)		-19,209	0	0	0
	Change from Alt. 1 (%)		-38%	0%	0%	0%
WGOA Pacific cod	TAC (mt)	18,300	11,390	18,300	18,300	18,300
	Change from Alt. 1 (mt)		-6,910	0	0	0
	Change from Alt. 1 (%)		-38%	0%	0%	0%
CGOA Pacific cod	TAC (mt)	28,988	18,034	28,988	28,988	28,988
	Change from Alt. 1 (mt)		-10,954	0	0	0
	Change from Alt. 1 (%)		-38%	0%	0%	0%
EGOA Pacific cod	TAC (mt)	3,560	2,215	3,560	3,560	3,560
	Change from Alt. 1 (mt)		-1,345	0	0	0
	Change from Alt. 1 (%)		-38%	0%	0%	0%
Pacific cod subtotal	TAC (mt)	238,848	185,291	238,848	238,848	238,848
	Change from Alt. 1 (mt)		-53,557	0	0	0
	Change from Alt. 1 (%)		-22%	0%	0%	0%

Table 4.1-34 Continued. Projected total annual catch (TAC) for Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska pollock, Pacific cod, and Atka mackerel by fishery area.

Fishery and Area		Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
EBSAI Atka mackerel	TAC (mt)	7,800	4,753	7,800	7,800	7,800
	Change from Alt. 1 (mt)		-3,047	0	0	0
	Change from Alt. 1 (%)		-39%	0%	0%	0%
WAI Atka mackerel	TAC (mt)	27900	16,993	27900	27900	27900
	Change from Alt. 1 (mt)		-10,907	0	0	0
	Change from Alt. 1 (%)		-39%	0%	0%	0%
CAI Atka mackerel	TAC (mt)	33600	20,462	33600	33600	33600
	Change from Alt. 1 (mt)		-13,138	0	0	0
	Change from Alt. 1 (%)		-39%	0%	0%	0%
Atka mackerel subtotal	TAC (mt)	69,300	42,207	69,300	69,300	69,300
	Change from Alt. 1 (mt)		-27,093	0	0	0
	Change from Alt. 1 (%)		-39%	0%	0%	0%
Combined Total	TAC (mt)	1,831,297	1,646,297	1,813,830	1,831,299	1,809,497
	Change from Alt. 1 (mt)		-185,000	-17,467	2	-21,800
	Change from Alt. 1 (%)		-10%	-1%	0%	-1%

Table 4.1-45 **Intensity of effects categories (harvest of prey species and spatial/temporal concentration) and associated percent increase to population, and new population trends for Steller sea lions.**

Intensity of Effect[1]	Observed Percent Annual Change to Population	New Annual Population Trend (r, %/yr)[2]
↑	12	6.2
	11	5.3
	10	4.3
	9	3.4
	8	2.4
	7	1.5
	6	0.5
Much less	5	-0.4
↑	4	-1.4
Marginally less	3	-2.3
↑	2	-3.3
	1	-4.2
Same	0	-5.2
	-1	-6.1
↓	-2	-7.1
Marginally more	-3	-8.0
↓	-4	-9.0
Much more	-5	-9.9
	-6	-10.9
	-7	-11.8
	-8	-12.8
	-9	-13.7
↓	-10	-14.7

[1] Note: Intensity of effect combined for harvest of prey species and spatial/temporal concentration.
[2] Note: base trend is current overall annual decline rate of -5.18%.

Table 4.1-56 Summary of effects of Alternatives 1 through 5 on Steller sea lion.

Steller Sea Lion	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Incidental take/entanglement in marine debris	I	I	I	I	I
Harvest of prey species	~~CS-CS+~~I	I	~~CS-~~I	~~CS-~~I	I
Spatial/temporal concentration of fishery	CS-	CS+	CS+	I	I
Disturbance	I	I	I	I	I

S = Significant, CS = Conditionally Significant, I = Insignificant, U = Unknown, + = positive, - = negative

4.1.2 Effects on Other ESA Listed Cetaceans (Listed Great Whales)

Seven species of large whales that occur in Alaskan waters are listed under the ESA including: the North Pacific right whale, blue whale, fin whale, sei whale, humpback whale, sperm whale, and bowhead whale. Each proposed alternative will be discussed in terms of four potential effects on these whales: 1) direct (or incidental) take/entanglement in marine debris, 2) harvest of prey species, 3) temporal/spatial concentration of the fishery, and 4) disturbance. Direct interactions with groundfish fishery vessels have been documented between 1989 and 2000 for three of the seven species: fin, humpback, and sperm whales. Several cases of entanglements in marine debris also have been reported for humpback and bowhead whales. Four of the seven species listed consume groundfish as part of their diet: fin, sei, humpback, and sperm whales. Discussions of each potential effect will focus principally on the species noted above.

The criteria for determining significance of effect in this and cetacean species groups is outlined in Table 4.1-67 differs from those developed specifically for pinnipeds and sea otters (Table 4.1-1). The differences are with respect to rating significance and insignificance for the questions of harvest of prey species and spatial/temporal concentration of fishery.

Direct (or Incidental) Take/Entanglement in Marine Debris

Direct mortalities of endangered whales from entanglement in fishing gear have been observed and reported infrequently in the groundfish fishery. Since 1989, three of the seven listed species have been killed incidental to the fishery. The criteria for determining significance of incidental take (Table 4.1-6) were applied to evaluate level of take for each alternative. Total allowable catch was used to project incidental take within each fishery (Table 4.1-2). A rating of insignificant is, therefore, a take rate that is below that which would have an effect on population trajectories. A rating of conditionally significant negative is a take rate that increases by 25% to 50% the average annual incidental take for the years 1996-2000. A rating of significantly negative is a take rate that increases by more than 50% the average annual incidental take for the years 1996-2000. Increasing take rate significance ratings in increments of 25% are coupled more with scientific uncertainty about knowledge of the actual take rate more than indicating progressively negative degrees of significance (Table 4.1-6). Incidental takes attributed to the fisheries and entanglement in fishing gear and marine debris occur at low levels thought to be insignificant to marine mammal populations. The ideal level is undoubtably zero, however even a reduction to zero is considered to be insignificant to marine mammal populations. Therefore NMFS considers effect ratings of conditionally significant positive and significantly positive as not applicable to this analysis. Closures to fishing areas were also considered when evaluating this effect by comparing the portion of takes that occurred within proposed closed areas to total incidental take for the fishery from 1989-1999.

A single fin whale mortality was reported in the GOA pollock trawl fishery operating south of Kodiak Island and Shelikof Strait in autumn 1999. Fin whales were reported in this region year-round, most often in the summer and autumn (POP, 1997). The mortality may have been the result of prey competition, although pollock have not been identified as a key prey species of fin whales in the GOA (see Harvest of Prey Species, next page). Humpback whales are present year-round in Alaska waters but are most frequently reported during the summer and autumn. In 1997, a dead humpback was found entangled in netting and trailing orange buoys near the Bering Strait. It is often difficult to determine if the entanglement occurred with active or derelict gear, or to identify the fishery the derelict gear originated from. Two mortalities (in October 1998 and February 1999) were reported by observers in the BS pollock trawl fishery operating near Unimak Pass. The extent of interactions between bowhead whales and the groundfish fishery are not known. Bowhead whales are present in the Bering Sea during winter and early spring but are usually associated with ice-covered regions. Rope entanglement injuries and deaths as well as ship-strike injuries appear to be rare. Of 236 bowhead whales examined from the Alaskan subsistence harvest (from 1976 to 1992), three had visible ship-strike injuries from unknown sources and six had ropes attached or scars from fishing gear (primarily pot gear), one found dead was entangled in ropes similar to those used with fishing gear in the Bering Sea (Philo *et al.*, 1992). Since 1992, additional bowhead whales have been observed entangled in pot gear or with scars from ropes.[10] Sperm whale interactions with the groundfish fishery have primarily been documented in the GOA longline fishery targeting sablefish in management zones 640 and 650 (Hill *et al.*, 1999). Two of the three entanglements reported between 1997 and 2000 resulted in release of the animal without serious injury. The extent of the injuries to the third animal was not known though it was alive at the time of release.

Harvest of Prey Species

One or more of the target species (pollock, Atka mackerel and Pacific cod) of the GOA and BSAI groundfish fisheries have been identified as prey species of fin, sei, humpback, and sperm whales. To evaluate changes to the harvest of prey for each alternative, significance criteria were developed as described above in Section 4.1 with respect ~~to span~~ deviation differences of average daily removal rates, and spanning TAC removals ranging from more than 5% to 20% compared to projected TAC for Alternative 1. Therefore, where removals of one or more key prey species of cetaceans remains the same (within ±5%) as that proposed in past TACs, or the deviation difference was ±100, a rating of insignificant is given. Decreasing and increasing removals of prey species ~~(Table 4.1-1)~~ result in significance ratings that are progressively positive and negative, respectively (Table 4.1-67). Sizes of prey species consumed by cetaceans, where available, were also considered when evaluating this effect.

The consumption of pollock by fin whales appears to increase in years where euphausiid and copepod abundance is low (Nemoto, 1957; 1959). Regional variation in diet has also been documented. Pollock consumption was greatest in fin whales occupying shelf waters of the Bering Sea while this prey item was not found in animals in the GOA or western North Pacific Ocean (Kawamura, 1982). Pollock consumed were less than 11.7 in (30 cm) in length, within the size range targeted by the fishery: 5.9- 19.5 in (15-50 cm). Atka mackerel and Pacific cod have also been identified as prey of fin whales though their importance is not known. The diet of sei whales is comprised almost entirely of copepods. Although young mackerel and other small schooling fish were present in a few of the sei whale stomachs sampled in Japan waters, these

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[10] J.C. George, "Personal Communication," North Slope Borough, P.O. Box 69, Barrow, AK 99723

fish species also prey on copepods and may have been consumed incidentally (Nemoto and Kawamura, 1977). Atka mackerel and walleye pollock are preferred prey species of humpback whales found in waters near the Aleutian Islands (Nemoto, 1959). Atka mackerel consumed were between 5.8-11.7 in (15-30 cm) in length, and were probably juveniles (adult fish targeted by the fishery usually ranged in size from 14-19 in (35-50 cm; Fritz and Lowe, 1998). Walleye pollock eaten by humpback whales were identified as adults but lengths were not provided (Nemoto, 1959). Other important prey species include euphausiids, herring, anchovy, eulachon, capelin, saffron cod, sand lance, Arctic cod, rockfish, and salmon. Sperm whales feed primarily on mesopelagic squid, however, fish consumption becomes more evident near the continental shelf break and along the Aleutian Islands (Okutani and Nemoto, 1964). Diet composition of sperm whales in the Bering Sea is roughly 70% - 90% squids and 10% - 30% fish which include Atka mackerel, Pacific cod, pollock, salmon, lantern fishes, lancetfish, saffron cod, rockfishes, sablefish, sculpins, lumpsuckers, lamprey, skates, and rattails (Tomilin, 1967; Kawakami, 1980; Rice, 1986a). Pollock do not appear to be a key prey species in any area but have been observed in whales taken in the northwestern Pacific (Kawakami, 1980). The importance of Pacific cod and Atka mackerel to sperm whales is not known (Yang, 1999).

Temporal/Spatial Concentration of Fishery

Proposed changes to the fishery include area closures, season closures, and seasonal allocations of TAC. Temporal and spatial concentration criteria qualitatively rate the significance of the effect of the alternatives on the ESA listed great whales. A rating of insignificant indicates the same temporal and spatial distribution of the fishery, while "marginally" less or more temporal or spatial concentration of the fisheries yields a rating of conditionally significant positive or negative, respectively, and "much" less or more yields a rating of significantly positive or negative, respectively. For those species where prey competition is not evident or changes in TAC are not greater than ±5% under an alternative, increases or decreases in concentrations of fish removals will have an insignificant effect. However, area and season closures may benefit these species by reducing incidental interactions and disturbance.

Disturbance

The effects of disturbance caused by vessel traffic, fishing operations, or underwater noise associated with these activities on baleen whales (North Pacific right, blue, fin, sei, humpback, and bowhead whales) and toothed whales (sperm whales) in the GOA and BSAI are largely unknown. Most baleen whales appear to tolerate or habituate to fishing activity, at least as suggested by their reactions at the surface. Collisions with ships have been a major source of mortality of North Atlantic right whales (Kenney and Kraus, 1993). Blue, fin, and sei whales react strongly by diving or moving away when vessels approach on a direct course or make fast erratic approaches (reviewed in Richardson *et al.*, 1995). Humpback reactions to vessels are highly variable. Observed short-term effects have included avoidance and on rare occasions "charging" at the vessel while long-term effects included abandoning high-use areas (reviewed in Richardson *et al.*, 1995). However, long-term negative effects were not apparent at the population level (Bauer *et al.*, 1993). Bowheads often attempt to outswim vessels, turning perpendicular away from the vessel track only when the ship is about to overtake it. Displacement can be as much as a few kilometers while fleeing (Richardson *et al.*, 1995). When chased, sperm whales often change direction and travel long distances underwater (Lockyer, 1977). However, sperm whales sometimes accompany vessels for extended periods of time when the vessels are operating nonaggressively (e.g., GOA sablefish longline fishery). Reaction to gear, such as pelagic trawls is unknown, although the rarity of incidental takes suggests either partitioning or avoidance. Given their distribution throughout the fishing grounds, at least some individuals may be expected to occasionally avoid contact with vessels or fishing gear, which would constitute a reaction to a disturbance. Assuming these instances occur, the effects are likely temporary.

Vessel noise and the routine use of various sonar devices are audible to whales and may be disturbance sources. When disturbed by vessels: right whales were consistently silent (Watkins, 1986), fin whales continued to vocalize but low-frequency vessel noise often masked social calls (Edds, 1988), and humpbacks tended to be silent when vessels were near (Watkins, 1986). Wintering humpback whales have been observed reacting to sonar pulses by moving away (Maybaum, 1990; 1993). Bowheads stopped calling after bombs were detonated during the Native subsistence harvest.[11] Calling behavior of sperm whales was little affected by boats (Gordon *et al.*, 1992), however, sperm whales sometimes fell silent when they heard acoustic pingers pulsed at low levels, 6-13 kHz (Watkins and Schevill, 1975). The criteria used to describe the disturbance effects of the alternative are qualitative. A rating of insignificant indicates the same level of disturbance, while "marginally" more disturbance results in a rating of conditionally significant negative, and "much" more results in a rating of significantly negative. Given that the level of disturbance established for management measures comparable those in effect for 1998 were deemed insignificant, the additional management measures contained in Alternatives 2 through 5 which could result in even less disturbance than that which is insignificant is also deemed insignificant to marine mammal populations. Therefore NMFS considers effect ratings of conditionally significant positive and significantly positive as not applicable to this analysis.

4.1.2.1 Effects of Alternative 1 on ESA Listed Cetaceans

Direct Effects - Incidental Take/Entanglement in Marine Debris (Question 1)

Under Alternative 1, the take rate for the pollock fishery would not change greater than ±25%, therefore, the intensity of this effect is rated insignificant. Assuming only one Alaska stock of fin whales exists, population level effects would be insignificant. Estimated incidental take rates for the fisheries operating where the humpback whale mortalities occurred (EBS Pollock and EBSAI Mackerel) would not change greater than ±25% under Alternative 1, therefore, the intensity of this effect is rated insignificant (Table 4.1-7). Although take levels are low, the western North Pacific stock numbers below 400 whales and rates of mortality and serious injury cannot be considered insignificant and approaching zero (Angliss *et al.*, 2001). Population level effects are uncertain because it is not known what portion of the western North Pacific stock utilizes these areas and whether gear entangling some whales originated from the U.S. groundfish fishery. Changes to groundfish fishery operations in the Bering Sea would not alter incidental take by more than ±25%, therefore, the intensity of this effect is rated insignificant for bowhead whales. Population level effects would be insignificant given the current increasing trend in abundance of Bering Sea bowhead whales under a managed subsistence harvest. Alternative 1 does not propose changes to the sablefish longline fishery where all incidental takes of sperm whales have occurred, therefore, the intensity of this effect is rated insignificant. Population level effects are uncertain because reliable abundance estimates are not available for the North Pacific stock.

Direct Effects - Fisheries Harvest of Prey Species (Question 2)

Assuming pollock represent a key prey species to EBS fin whales, the ~~proposed changes to the EBS Pollock Fishery TAC does~~projected deviation difference of average daily removal rates (see 4.1.1.1 for description) for pollock under this Alternative is -91 (Table 4.1-3), and changes to TAC do not exceed 2% (Table 4.~~1-3~~1-4), both resulting in insignificant effects (Table 4.1-7). Bycatch of other fin whale prey (herring, capelin, arctic cod, saffron cod, Pacific cod, Atka mackerel, rockfishes, smelt and salmon) in the Bering Sea Pollock

[11] Ibid.

Fishery does not exceed 1% for each of these species (NMFS unpublished observer data)[12]. Because removals of key prey species do not change greater than ±5%, and the overall deviation difference of relative mean daily removals of pollock is -59 (Table 4.1-3), the intensity of this effect is rated insignificant fin whales. The intensity of this effect is also rated insignificant for sei whales. Under Alternative 1, TAC changes proposed for the Atka mackerel fishery would not be greater than ±5%, and bycatch of Atka mackerel in all other groundfish fisheries is well below 1% of total catch (NMFS unpublished observer data)[13].

Sightings of humpback whales reported in the POP database occurred more frequently in regions utilized by the EBS and GOA pollock fisheries and the BS EAI Atka mackerel fishery (compared to other reported species such as sperm whales, minke whales, killer whales, and Dall's porpoise that were also found in AI pollock and CAI Atka mackerel fishery management zones). Changes proposed for the EBS and GOA Pollock TAC and BS EAI Atka Mackerel TAC are not greater than ±5% for Alternative 1 (Table 4.1-34). Bycatch summaries for other prey species do not exceed 1% except rockfishes (which do not exceed 7% of the total catch). Assuming pollock and Atka mackerel are key prey species of humpback whales, the intensity of this effect is rated insignificant under Alternative 1.

Sperm whales have been observed preying on sablefish caught on commercial longline gear in the GOA (Hill *et al.*, 1999). Bycatch of sablefish for the entire GOA fishery is roughly 7% of total catch (NMFS unpublished observer data).[14] Assuming sablefish are a key prey species of sperm whales in the GOA, removals of this species do not change greater than ±5% and the intensity of this effect is rated insignificant.

Indirect Effects - Spatial and Temporal Concentration of Fishery (Question 3)

Prey competition is not evident or changes in TAC are not greater than ±5% for fin, sei and sperm whales, therefore, temporal and spatial concentration of fish removals would have an insignificant effect. For humpback whales, where prey competition may be occurring and TAC does change, the extent of prey overlap may be low because these whales appear to be consuming mostly juvenile fish while the fishery is targeting adults. Therefore, any increase or decrease in concentrations of prey removed would not necessarily effect this species at a population level. The intensity of this effect is rated insignificant under Alternative 1.

Indirect Effects - Disturbance Effects (Question 4)

Given the continued occupation of the fishing grounds by these animals, disturbance from vessels and sonar, if it occurs in the BSAI or GOA, does not appear to have population level effects though it may disrupt communication temporarily. The intensity of this effect is rated insignificant (same level of disturbance) under Alternative 1.

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[12]D. DeMaster, National Marine Mammal Laboratory, 7600 Sand Point Way NE, Seattle, WA 98115.

[13]Ibid.

[14]Ibid.

4.1.2.2 Effects of Alternative 2 on ESA Listed Cetaceans

Direct Effects - Incidental Take/Entanglement in Marine Debris (Question 1)

The incidental take rates of all marine mammals relative to TAC for all fisheries combined (Table 4.1-2) is -13% under Alternative 2, therefore, the intensity of this effect is rated insignificant (take rate is similar (±25%)). However, under this Alternative, the region where the fin whale mortality occurred would be closed to trawl fishing. While this may benefit fin whales occupying Shelikof Strait it is not known whether these whales represent a distinct segment of the population. Assuming only one Alaska stock exists, population level effects would be insignificant. For humpback whales, area closures to pollock and trawl fishing proposed under Alternatives 2 could potentially reduce interactions (closures include the area where the two mortalities occurred). The significance of this effect may be beneficial for humpback whales given it is not known what portion of the western North Pacific stock utilizes these areas and whether gear entangling some whales originated from the U.S. groundfish fishery. However the potential for reducing takes from a level which has been deemed insignificant in 1998, while desirable, is still rated insignificant (Table 4.1-6). For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for bowhead and sperm whales under Alternatives 2.

Direct Effects - Fisheries Harvest of Prey Species (Question 2)

The deviation difference for pollock in the Bering Sea resulted in +198 value (CS-), partly because this Alternative alone proposes seasonal fishing from November to December. Negative values (I to CS+) were calculated in the Aleutian Islands and Gulf of Alaska for pollock and cod. Atka mackerel removals were positive for the EBS/AI and western Aleutian Island (CS-) and insignificant for the central Aleutian. Overall, Alternative 2 had a +38 value (Table 4.1-3), suggesting more fish removed compared to the mean daily removal rate of all Alternatives. The deviation difference for all fisheries and all areas was insignificant with a value of +38, suggesting that the combined removals of walleye pollock, Pacific cod, and Atka mackerel on a daily basis were similar to all Alternatives.

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for fin whales. For sei whales that occasionally consume Atka mackerel, TAC for the BSAI Atka mackerel fishery is reduced by 67%, ~~equating to a rating of significantly positive under Alternative 2. However,~~but it is unlikely that the TAC changes proposed would effect sei whales at the population level because Atka mackerel do not appear to be key prey for this species, therefore this effect is rated insignificant under Alternative 2~~.~~. For humpback whales, changes proposed for the EBS pollock TAC are not greater than ±5%~~. However, under Alternative 2,~~though the GOA pollock fishery TAC would be reduced by 54% and the BS EAI Atka mackerel TAC would be reduced by 67%. The result is an 8% reduction in TAC under Alternative 2 (Table 4.1-4). Deviation differences of summed relative mean daily removal rates (see 4.1.1.1 for explanation) are -120 for GOA pollock, and +63 for EBSAI Atka mackerel (Table 4.1-3), and +154 for the pollock fishery overall and -65 for the overall Atka mackerel fishery. Bycatch summaries for other prey species do not exceed 1% except for rockfishes (which do not exceed 7% of the total catch). Assuming pollock and Atka mackerel are key prey species of humpback whales, the intensity of this effect is rated conditionally significant positive (Table 4.1-7) ~~for humpback whales under Alternative 2~~with respect to TAC (5%-20% reduction in TAC of one or more key prey species) for humpback whales. The significance of this effect is uncertain because it is not known if humpback whales are exclusively consuming groundfish within these fishery management zones or what portion of the central and western Alaska stocks utilize these areas. Thus, the combination of a positive average daily removal rate (deviation difference) resulting in an insignificant rating, and the TAC ranking of CS+ resulted in an overall ranking of insignificant for this

Alternative under question 2 for humpback whales. For sperm whales, bycatch of sablefish for the entire GOA fishery is roughly 7% for all Alternatives except Alternative 2, where it increases to a little over 12% (NMFS unpublished observer data)[15]. Assuming sablefish are a key prey species of sperm whales in the GOA, removals of this species do not change greater than ±5% so the intensity of this effect is rated insignificant.

Indirect Effects - Spatial and Temporal Concentration of Fishery (Question 3)

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for all great whales under Alternative 2.

Indirect Effects - Disturbance Effects (Question 4)

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for all great whales under Alternative 2.

4.1.2.3 Effects of Alternative 3 on ESA Listed Cetaceans

Direct Effects - Incidental Take/Entanglement in Marine Debris (Question 1)

The incidental take rates of all marine mammals relative to TAC for all fisheries combined (Table 4.1-2) do not change under Alternative 3, therefore, the intensity of this effect is rated insignificant (take rate is similar (±25%)). For humpback whales, area closures to pollock and trawl fishing proposed under Alternatives 3 could potentially reduce interactions (closures include the area where the two mortalities occurred). The significance of this effect may be beneficial for humpback whales given it is not known what portion of the western North Pacific stock utilizes these areas and whether gear entangling some whales originated from the U.S. groundfish fishery. However the potential for reducing takes from a level which has been deemed insignificant in 1998, while desirable, is still rated insignificant (Table 4.1-6). For the same reasons listed under Alternative 1, the intensity of this effect would be insignificant for fin, bowhead, and sperm whales under Alternative 3.

Direct Effects - Fisheries Harvest of Prey Species (Question 2)

For Alternative 3, the deviation difference for pollock in the Bering Sea resulted in -36 (I), but high variability occurred by area with the Aleutian Islands ranking as S-, and all other areas as CS-. Atka mackerel removals under Alternative 3 all resulted in positive values with a CS- ranking for the EBSAI area and insignificant for other areas (Table 4.1-3). Overall, Alternative 3 had a -49 value, suggesting less fish removed compared to the mean daily removal rate of all Alternatives. The deviation difference for all fisheries and all areas was insignificant with a value of -49, suggesting that the combined removals of walleye pollock, Pacific cod, and Atka mackerel on a daily basis were similar to all Alternatives.

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for fin, sei, and sperm whales under Alternative 3 (Table 4.1-78). For humpback whales changes proposed for the EBS Pollock TAC are not greater than ±5%. However, under Alternative 3, the GOA Pollock Fishery TAC would

[15]Ibid.

be reduced by 15%. The result is a 1% reduction in TAC overall under Alternative 3 (calculated from Table 4.1-34). Bycatch summaries for other prey species do not exceed 1% except for rockfishes (which do not exceed 7% of the total catch). Assuming pollock and Atka mackerel are key prey species of humpback whales, the intensity of this effect is rated conditionally significant positive Table 4.1-78) under Alternative 3 (same removals of one or more key prey species (±5%)) for TAC. Overall however the significance of TAC reductions under Alternative 3 is unknown because it is not known if humpback whales are exclusively consuming groundfish within these fishery management zones or what portion of the central and western Alaska stocks utilize these areas. Combined with the combination of a negative average daily removal rate (deviation difference) resulting in an insignificant rating, and the analyst assigned an overall ranking of insignificant for humpback whales under question 2.

Indirect Effects - Spatial and Temporal Concentration of Fishery (Question 3)

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for all great whales under Alternative 3.

Indirect Effects - Disturbance Effects (Question 4)

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for all great whales under Alternative 3.

4.1.2.4 Effects of Alternative 4 on ESA Listed Cetaceans

Direct Effects - Incidental Take/Entanglement in Marine Debris (Question 1)

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for all great whales under Alternative 4.

Direct Effects - Fisheries Harvest of Prey Species (Question 2)

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for all great whales under Alternative 4.

Indirect Effects - Spatial and Temporal Concentration of Fishery (Question 3)

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for all great whales under Alternative 4.

Indirect Effects - Disturbance Effects (Question 4)

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for all great whales under Alternative 4.

4.1.2.5 Effects of Alternative 5 on ESA Listed Cetaceans

Direct Effects - Incidental Take/Entanglement in Marine Debris (Question 1)

The incidental take rates of all marine mammals relative to TAC for all fisheries combined (Table 4.1-2) is +3% under Alternative 5, therefore, the intensity of this effect is rated insignificant (take rate is similar (±25%)). Area closures proposed under Alternative 5 do not include the region where the fin whale mortality occurred. For humpback whales, area closures to pollock and trawl fishing proposed under Alternatives 5 could potentially reduce interactions (closures include the area where the two mortalities occurred). The significance of this effect may be beneficial for humpback whales given it is not known what portion of the western North Pacific stock utilizes these areas and whether gear entangling some whales originated from the U.S. groundfish fishery. However the potential for reducing takes from a level which has been deemed insignificant in 1998, while desirable, is still rated insignificant (Table 4.1-6). For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for bowhead and sperm whales under Alternative 5.

Direct Effects - Fisheries Harvest of Prey Species (Question 2)

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for all great whales under Alternative 5.

Indirect Effects - Spatial and Temporal Concentration of Fishery (Question 3)

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for all great whales under Alternative 5.

Indirect Effects - Disturbance Effects (Question 4)

For the same reasons listed under Alternative 1, the intensity of this effect is rated insignificant for all great whales under Alternative 5.

4.1.2.6 Summary of Effects and Re-initiation of Section 7 Consultation on ESA Listed Cetaceans

The criteria for determining significance of effect in this and other cetacean species groups presented below in Table 4.1-67 differs from those developed specifically for pinnipeds and sea otters (Table 4.1-1). The differences are with respect to rating significance and insignificance for the questions of harvest of prey species and spatial/ temporal concentration of fishery. Harvest levels of prey species and the temporal and spatial concentration of fisheries with levels and patterns similar to those of 1998 are considered to have insignificant effects on cetacean populations in consideration of these species life histories, dependence upon pollock, Pacific cod, and Atka mackerel as prey species, and foraging behavior (Sections 3.1.2 and 3.1.3).

Table 4.1-67 Criteria for determining significance of effects to cetaceans.

Effects	Score					
	S-	CS-	I	CS+	S+	U
Incidental take/ entanglement in marine debris	Take rate increases by >50%	Take rate increases by 25-50%	Level of take below that which would have an effect on population trajectories	NA	NA	Insufficient information available on take rates
Harvest of prey species	TAC removals of one or more key prey species increased by more than 20%; Deviation of average daily removal rates is >+251	TAC removals of one or more key prey species increased by 5%- 20%; Deviation of average daily removal rates is +100 to +250	TAC removals of prey species equivalent to 1998 harvests (within 5% + or -); Deviation of average daily removal rates is ±100	TAC removals of one or more key prey species reduced by 5%-20%; Deviation of average daily removal rates is -100 to -250	TAC removals of all key prey species (pollock, Pacific cod, Atka mackerel) reduced by more than 20%; Deviation of average daily removal rates is <-251	Insufficient information available on key prey species
Spatial/ temporal concentration of fishery	Much more temporal and spatial concentration in all key areas	Marginally more temporal and spatial concentration than 1998 fisheries	Similar temporal and spatial fishery distribution as in 1998 fisheries	Much less temporal and spatial concentration in some, but not all key areas	Much less temporal and spatial concentration in all key areas	Insufficient information as to what constitutes a key area
Disturbance	Much more disturbance (all closed areas reopened)	Marginally more disturbance (some closed areas reopened)	Similar level of disturbance as that which was occurring in 1998	NA	NA	Insufficient information as to what constitutes disturbance

'S = Significant, CS = Conditionally Significant, I = Insignificant, U = Unknown
NA = Not Applicable
TAC = Total Allowable Catch

Percentages used in determining the significance of effects are given as a plausible a point of departure to initiate discussion as opposed to being deemed statistically meaningful per se. Incidental takes attributed to the fisheries and entanglement in fishing gear and marine debris occur at low levels thought to be insignificant to marine mammal populations. The ideal level is undoubtably zero, however even a reduction to zero is considered to be insignificant to marine mammal populations. Therefore NMFS considers effect ratings of conditionally significant positive and significantly positive as not applicable to this analysis. A similar interpretation of significance has been made for disturbance effects on marine mammals. Given that the level of disturbance established for management measures comparable those in effect for 1998 were deemed insignificant (~~citation ?~~4.1.2.1), the additional management measures contained in Alternatives 2 through 5 which could result in even less disturbance than that which is insignificant is also deemed insignificant to marine mammal populations. Therefore NMFS considers effect ratings of conditionally significant positive and significantly positive as not applicable to these analyses.

Table 4.1-~~7~~8 Summary of effects of Alternatives 1 through 5 on ESA listed cetaceans.

ESA Listed Cetaceans	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Incidental take/entanglement in marine debris	I	I	I	I	I
Harvest of prey species	I	I ~~(CS+ for humpback whales)~~	I ~~(CS+ for humpback whales)~~	I	I
Spatial/temporal concentration of fishery	I	I	I	I	I
Disturbance	I	I	I	I	I

S = Significant, CS = Conditionally Significant, I = Insignificant, U = Unknown, + = positive, - = negative

In all but one case, the direct and indirect effects are expected to have insignificant or unknown effects on listed great whales (Table 4.1-6~~7~~). The case that differs is the effects of reduced harvest of prey species for humpback whales under Alternative 2 . The conclusion that the effect on takes may be beneficial to humpback whales under Alternatives 2, 3, and 5 which close certain areas to fishing assumes that the incidental takes that are occurring are affecting the smaller western North Pacific stock of humpback whales. Identifying mortalities to stock (i.e., conducting genetic tests on biopsy samples and/or photo-identification) would resolve whether takes are occurring in the western stock or in the central stock. The effects of incidental take on the central stock would be insignificant at the population level given current estimates of abundance (about 4,000 whales) and that the stock appears to be increasing (Angliss *et al.*, 2001). However the potential for reducing takes of humpback whales from a level which has been deemed insignificant in 1998, while desirable, is still rated insignificant (Table 4.1-6).

<u>Re-initiation of Consultation under Section 7 of the ESA is unnecessary</u>

Effects were evaluated to determine if a need to reinitiate formal consultation, pursuant to Section 7 of the ESA would be necessary as a result of any of the alternatives. None of the alternatives are expected to negatively effect ESA listed cetaceans by an increase in incidental take. Critical habitat has not been designated for ESA listed cetaceans. In addition, no new information has become available since or alternative actions modified in a manner not previously considered by the NMFS (2000a) Biological Opinion that would be expected to change the conclusion that no adverse effect to ESA listed cetaceans will result from any of the alternatives. Consequently, re-initiation of ESA Section 7 consultation is not necessary for ESA listed cetaceans.

4.1.3 Effects on Other Cetaceans Besides ESA Listed Species

Ten species of whales and dolphins occur in Alaskan waters and are protected under the MMPA (but not listed under the ESA) including: the gray whale, minke whale, beluga whale, killer whale, Pacific white-sided dolphin, harbor porpoise, Dall's porpoise and beaked whales (Baird's, Cuvier's and Stejneger's). Each proposed alternative will be discussed in terms of four potential effects on these cetaceans: 1) direct (or incidental) take/entanglement in marine debris, 2) harvest of prey species, 3) temporal/spatial concentration of the fishery, and 4) disturbance. To date, direct interactions with groundfish fishery vessels have been

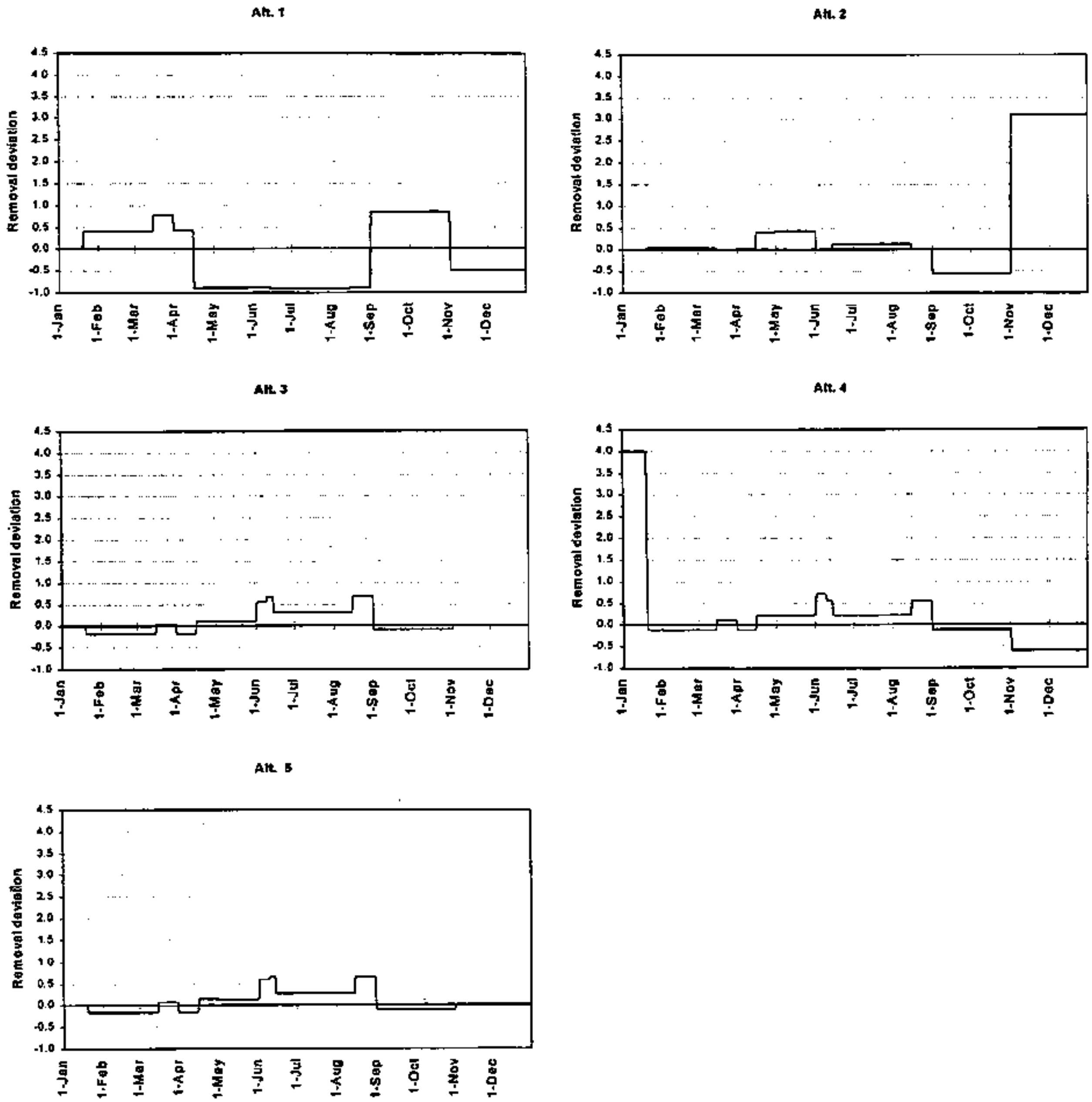


Figure 4.1-6 Deviations of relative mean daily removal rates for Eastern Bering Sea pollock and Pacific cod fisheries based on projected seasonal allocation of total allowable catch for each Alternative.

APPENDIX F4: CDQ REGION AND PROGRAM EXISTING CONDITIONS

1. Introduction

The western Alaska Community Development Quota (CDQ) program was established to enable residents of rural communities in western Alaska to participate in the fisheries off their shores in a way that will bring significant economic development to the Bering Sea region. Originally involving only the pollock fishery, the program has in recent years has expanded to become multi-species in nature, encompassing both groundfish and non-groundfish fisheries.

The CDQ program is a federal program that allocates a portion of the total allowable catch (TAC) for federally managed Aleutian Island and Bering Sea species to eligible communities in western Alaska. The CDQ program includes such species as pollock, Pacific cod, Atka mackerel, flatfish, sablefish, and other groundfish, along with halibut, and crab. Currently, the CDQ program is allocated portions of the groundfish fishery that range from 10 percent for pollock to 7.5 percent for most other species. The CDQ program was granted in perpetuity through the Magnuson-Stevens Act authorized by the U.S. Congress in 1996. The State of Alaska is responsible for the administration and monitoring of the program. The State administers the program jointly thorough the Alaska Department of Community and Economic Development (the lead agency) and the Alaska Department of Fish and Game.

Sixty-five Alaska Native Claims Settlement Act (ANCSA) villages near the Bering Sea have established eligibility under federal and state regulations. These villages formed six non-profit CDQ groups: Aleutian Pribilof Island Community Development Association (APICDA); Bristol Bay Economic Development Corporation (BBEDC); Central Bering Sea Fishermen's Association (CBSFA); Coastal Villages Region Fund (CVRF); Norton Sound Economic Development Corporation (NSEDC); and Yukon Delta Fisheries Development Association (YDFDA). The groups have established partnerships with fishing corporations. Local hire and reinvestment of proceeds in fishery development projects are a required part of the program.

In recent years the program has provided more than 1,000 jobs annually for region residents. Yearly wages have exceeded $8 million. This program has also contributed to infrastructure development projects within the region as well as loan programs and investment opportunities for local fishermen.

Reports summarizing and/or reviewing the activities of the CDQ program have been prepared for several purposes (NPFMC 1998, NRC 1999, DCED 2001). In addition, each of the CDQ groups file a management plan with the State when they apply for their requested share of the overall CDQ allocation. Each group also files quarterly reports that detail their activities and tracks their progress in relation to the goals they have set in their management plans. The State can adjust the percentages awarded to each group from one allocation period to the next, based on the State's evaluation of various factors – documented need, adequacy of the proposed plans to use the requested allocation to meet those needs, past performance, and perhaps others.

1.1 Overview: Community Development Quota Program and Communities

CDQ Allocations and Harvest

In 1991, the NPFMC recommended to the Secretary of Commerce that a fishery CDQ program be created. The purpose of the CDQ program was to extend the economic opportunities of the productive fisheries in the Bering Sea and Aleutian Islands (especially pollock) to small, rural communities in proximity to these valuable living marine resources. As initially envisioned, the proposed program set aside 7.5 percent of the Bering Sea and Aleutian Island's annual TAC for Alaska pollock for allocation to qualifying rural Alaskan communities. The program was initially proposed to run for a period of four years, lasting from 1992 through 1995, but was subsequently extended for an additional three years, carrying it through 1998. In subsequent actions, a CDQ program for BSAI halibut and sablefish was implemented in 1995. A CDQ program for BSAI crab was implemented in 1998, and the multi-species groundfish CDQ program was implemented in late 1998. The NPFMC also extended the pollock CDQ allocations permanently by including pollock in the multi-species groundfish CDQ program. The American Fisheries Act of 1998 increased the pollock allocation for the CDQ program to 10 percent of the annual TAC.

Under the current regulations all groundfish and prohibited species caught by vessels fishing for CDQ groups accrue against the CDQ allocations and none of the groundfish or prohibited species caught in the groundfish CDQ fisheries accrue against the non-CDQ apportionment of the TAC or prohibited species catch limits. The CDQ groups are required to manage their catch to stay within all of their CDQ allocations. The CDQ allocations recommended by the State for 2001-2002 are displayed in Table 1. In 2001, these percentages represented approximately 185,00 metric tons of groundfish (Table 2).

Table 1. CDQ Allocation Percentages by Species and Group, 2001-2002

	Allocation (Percent)						
	APICDA	BBEDC	CBSFA	CVRF	NSEDC	YDFDA	Total
Halibut							
4B	100	0	0	0	0	0	100
4C	10	0	90	0	0	0	100
4D	0	26	0	24	30	20	100
4E	0	30	0	70	0	0	100
Crab							
Bristol Bay Red King	18	18	0	18	18	18	100
Norton Sound Red King	0	0	0	0	50	50	100
Pribilof Red & Blue King	0	0	100	0	0	0	100
St. Matthew Blue King	50	12	0	12	14	12	100
Bering Sea C. Opilio Tanner	10	19	19	17	18	17	100
Bering Sea C. Bairdi Tanner	10	19	19	17	18	17	100
Sablefish & Turbot							
Sablefish, Hook & Line – A1	15	20	0	30	20	15	100
Turbot-AI	16	20	5	21	20	18	100
Sablefish, Hook & Line – BS	15	22	18	0	20	25	100
Turbot-BS	20	22	7	15	15	21	100
Pacific Cod	16	20	10	17	18	19	100
Pollock							
Bering Sea/ AI/Bogoslof	14	21	4	24	23	14	100
Atka mackerel:							
Eastern	30	15	8	15	14	18	100
Central	30	15	8	15	14	18	100
Western	30	15	8	15	14	18	100
Yellowfin sole	28	24	8	6	7	27	100
Flatfish:							
Other Flats	25	23	9	10	10	23	100

	Allocation (Percent)						
	APICDA	BBEDC	CBSFA	CVRF	NSEDC	YDFDA	Total
Rocksole	24	23	8	11	11	23	100
Flathead	20	20	10	15	15	20	100
Other Species	18	20	10	16	16	20	100
Other Rockfish							
O. Rockfish-BS	25	21	7	12	13	22	100
O. Rockfish – AI	23	17	7	18	17	18	100
Arrowtooth	24	22	9	11	10	24	100
Pacific Ocean Perch Complex							
True POP-BS	18	21	7	18	18	18	100
Other POP-BS	23	18	8	16	16	19	100
True POP – AI							
Eastern	30	15	8	15	14	18	100
Central	30	15	8	15	14	18	100
Western	30	15	8	15	14	18	100
Sharp/Northern-AI	30	15	8	15	14	18	100
Short/Rougheye – A1	22	18	7	18	17	18	100
Sablefish, Trawl – A1	24	23	9	10	10	24	100
Sablefish, Trawl – BS	17	20	10	17	18	18	100
Prohibited Species							
Halibut (mt)	22	22	9	12	12	23	100
Chinook salmon (#)	15	21	4	23	23	14	100
Other salmon (#)	15	21	5	23	22	14	100
Opilio (#)	24	22	9	11	10	24	100
C. Bairdi – Zone 1 (#)	26	24	8	8	8	26	100
C. Bairdi – Zone 2 (#)	23	22	9	12	11	23	100
Red King Crab (#)	29	23	8	7	7	26	100

Source: DCED (2001)

Table 2. CDQ Allocation Amounts by Species and Group, 2001

CDQ Species	2001 TAC	2001 CDQ Allocation	CDQ Group Amounts (Metric Tons)					
			APICDA	BBEDC	CBSFA	CVRF	NSEDC	YDFDA
BS FG Sablefish	780	156	23	34	28	0	31	39
AI FG Sablefish	1,875	375	56	75	0	113	75	56
BS Sablefish	780	59	10	12	6	10	11	11
AI Sablefish	625	47	11	11	4	5	5	11
BS Pollock - total	1,400,000	140,000	19,600	29,400	5,600	33,600	32,200	19,600
AI Pollock	2,000	200	28	42	8	48	46	28
Bogostof Pollock	1,000	100	14	21	4	24	23	14
Pacific Cod	188,000	14,100	2,256	2,820	1,410	2,397	2,538	2,679
WAI Atka Mackerel	27,900	2,093	628	314	167	314	293	377
CAI Atka Mackerel	33,600	2,520	756	378	202	378	353	454
EAI/BS Atka Mackerel	7,800	585	176	88	47	88	82	105
Yellowfin Sole	113,000	8,475	2,373	2,034	678	509	593	2,288
Rock Sole	75,000	5,625	1,350	1,294	450	619	619	1,294
BS Greenland Turbot	5,628	422	84	93	30	63	63	89
AI Greenland Turbot	2,772	208	33	42	10	44	42	37
Arrowtooth Flounder	22,011	1,651	396	363	149	182	165	396
Flathead Sole	40,000	3,000	600	600	300	450	450	600
Other Flatfish	28,000	2,100	525	483	189	210	210	483
BS Pacific Ocean Perch	1,730	130	23	27	9	23	23	23
WAI Pacific Ocean Perch	4,740	356	107	53	28	53	50	64
CAI Pacific Ocean Perch	2,560	192	58	29	15	29	27	35
EAI Pacific Ocean Perch	2,900	218	65	33	17	33	31	39
BS Other Red Rockfish	135	10	2	2	1	2	2	2
AI Sharpchin/Northern	6,745	506	152	76	40	76	71	91
AI Shortraker/Rougheye	912	68	15	12	5	12	12	12
BS Other Rockfish	361	27	7	6	2	3	4	6
AI Other Rockfish	676	51	12	9	4	9	9	9
Other Species	26,500	1,988	358	398	199	318	318	398
Protected Species								
Zone 1 Red King Crab (no.)	97,000	7,275	2,110	1,673	582	509	509	1,892
Zone 1 Bairdi Tanner Crab (no.)	730,000	54,750	14,235	13,140	4,380	4,380	4,380	14,235
Zone 3 Bairdi Tanner Crab (no.)	2,070,000	155,250	35,708	34,155	13,973	18,630	17,078	35,708
Opilio Tanner Crab (no.)	4,350,000	326,250	78,300	71,775	29,363	35,888	32,625	78,300
Pacific Halibut (mt)	4,575	343	75,460	75,460	30,870	41,160	41,160	78,890
Chinook Salmon (no.)	41,000	3,075	461	646	123	707	707	431
Non-Chinook Salmon (no.)	42,000	3,150	473	662	158	725	693	441

Additional details on the harvest amount and wholesale value of the groundfish CDQ allocations are presented in Table 3 and Table 4. As noted above, prior to implementation of the multi-species groundfish CDQ program in 1998, the only groundfish species for which CDQ allocations existed were pollock and sablefish. However, other groundfish species were harvested incidentally. After 1998, CDQ allocations became available for all groundfish species, and the harvest of some species such as Pacific cod (PCOD) and Atka mackerel (AMCK) increased.

Table 3. Harvest Quantity of CDQ Allocations by Species, 1993-2000

	Reported Metric Tons (Thousands)							
Year	AMCK	FLAT	OTHR	PCOD	PLCK	ROCK	SABL	Total
1993	0.75	0.76	0.20	0.45	126.23	0.04	0.02	128.44
1994	0.00	1.02	0.13	1.77	137.51	0.02	0.00	140.45
1995	0.01	0.40	0.19	0.87	97.39	0.03	0.00	98.90
1996	0.00	0.56	0.10	0.75	92.77	0.01	0.00	94.20
1997	0.02	0.64	0.36	0.44	87.58	0.07	0.09	89.21
1998	1.22	1.31	0.71	2.49	83.97	0.45	0.10	90.24
1999	2.59	4.52	1.93	11.63	100.16	0.96	0.15	121.95
2000	4.79	1.79	3.05	13.48	113.71	1.19	0.16	138.18

Source: NMFS Blend and WPR Data, June 2001.

Table 4. Wholesale Value of CDQ Allocations by Species, 1993-2000

	$Millions							
Year	AMCK	FLAT	OTHR	PCOD	PLCK	ROCK	SABL	Total
1993	0.69	0.16	0.00	0.16	47.06	0.03	0.05	48.14
1994	0.00	0.10	0.00	0.59	60.36	0.00	0.00	61.05
1995	0.00	0.00	0.00	0.12	56.82	0.00	0.00	56.94
1996	0.00	0.01	0.00	0.08	51.71	0.00	0.00	51.80
1997	0.00	0.43	0.00	0.10	50.66	0.02	0.48	51.68
1998	0.43	0.65	0.00	2.00	43.10	0.16	0.35	46.70
1999	1.08	1.60	0.06	13.39	76.70	0.47	0.78	94.07
2000	2.06	0.72	0.03	16.01	91.66	0.55	0.77	111.80

Source: NMFS Blend and WPR Data, June 2001.

Table 5 shows the seasonal variability in the value of groundfish catches. The bimodal distribution in the groundfish fishery is a function of the two seasons – the A season, which by regulation opens in late January and continues into March, and the B season, which opens in September. Fishing is usually more lucrative in the A season because of the high value of pollock roe.

Table 5. Wholesale Value of CDQ Allocations by Target Fishery and Month, 1999-2000

Year	Month	$Millions							
		AMCK	FLAT	OTHR	PCOD	PLCK	ROCK	SABL	Total
1999	Jan	0.00	0.00	0.00	0.01	2.01	0.00	0.00	2.02
	Feb	0.00	0.00	0.00	0.00	28.87	0.00	0.00	28.87
	Mar	0.00	0.11	0.00	0.00	14.08	0.00	0.00	14.20
	Apr	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.52
	May	0.47	0.07	0.00	2.96	0.00	0.07	0.01	3.58
	Jun	0.70	0.05	0.00	0.89	0.00	0.05	0.18	1.86
	Jul	0.14	0.14	0.01	0.01	8.15	0.04	0.15	8.65
	Aug	0.04	0.02	0.02	1.46	4.21	0.07	0.13	5.95
	Sep	0.16	0.37	0.00	2.24	12.52	0.00	0.15	15.43
	Oct	0.01	0.28	0.00	0.85	4.10	0.00	0.12	5.36
	Nov	0.16	0.99	0.00	3.01	2.70	0.02	0.00	6.88
	Dec	0.00	0.09	0.00	0.67	0.00	0.00	0.00	0.76
2000	Jan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Feb	0.00	0.00	0.00	0.00	23.18	0.00	0.00	23.18
	Mar	0.00	0.00	0.00	3.67	23.88	0.00	0.00	27.55
	Apr	0.00	0.05	0.00	5.71	2.59	0.00	0.06	8.41
	May	0.81	0.09	0.00	1.50	0.00	0.00	0.11	2.52
	Jun	0.25	0.50	0.00	0.24	0.00	0.00	0.00	0.99
	Jul	0.89	0.19	0.00	0.62	7.37	0.00	0.13	9.21
	Aug	0.39	0.02	0.00	1.41	10.79	0.00	0.00	12.61
	Sep	0.00	0.00	0.01	0.39	12.16	0.00	0.18	12.73
	Oct	0.00	0.00	0.00	0.00	10.79	0.00	0.07	10.86
	Nov	0.55	0.00	0.00	0.22	0.93	0.05	0.01	1.75
	Dec	0.02	0.00	0.00	1.81	0.00	0.16	0.00	1.99

Note: The value shown is the total value of all species caught by the target fishery.
Source: NMFS Blend and WPR Data, June 2001.

CDQ Communities

The purpose of the CDQ program is to facilitate the participation of Bering Sea and Aleutian Islands community residents in the Bering Sea/Aleutian Island fishery, as a means to develop local community infrastructure and increase general community and individual economic and social well-being. CDQ communities are predominantly Alaska Native villages, as shown in Table 6. Alaska Native residents comprise 86.8 percent of the combined total population of all CDQ communities. They are remote, isolated settlements with few natural assets with which to develop and sustain a viable diversified economic base. As a result, economic opportunities have been few, unemployment rates have been chronically high, and communities (and the region) have been economically depressed.

While these communities border some of the richest fishing grounds in the world, they have largely been unable to exploit this proximity. The full Americanization of the Bering Sea/Aleutian Island fisheries occurred relatively quickly. However, the very high capital investment required to compete in these fisheries precluded small communities from participating in their development. The CDQ program serves to ameliorate some of these circumstances by extending an opportunity to qualifying communities to directly benefit from the productive harvest and use of these publicly owned resources.

Table 6. Alaska Native Percentage of Total Community Population, Alaska CDQ Communities, 2000.

Aleutian Pribilof Island Community Development Association	
Akutan	16.4%
Atka	91.3%
False Pass	65.6%
Nelson Lagoon	81.9%
Nikolski	69.2%
Saint George	92.1%
Bristol Bay Economic Development Corporation	
Aleknagik	84.6%
Clark's Point	92.0%
Dillingham	60.9%
Egegik	76.7%
Ekuk	0.0%
Ekwok	93.8%
King Salmon	30.1%
Levelock	95.1%
Manokotak	94.7%
Naknek	47.1%
Pilot Point	86.0%
Port Heiden	78.2%
Portage Creek	86.1%
South Naknek	83.9%
Togiak	92.7%
Twin Hills	94.2%
Ugashik	81.8%
Central Bering Sea Fishermen's Association	
Saint Paul	86.5%
Coastal Villages Fishing Cooperative	
Chefornak	98.0%
Chevak	95.9%
Eek	96.8%
Goodnews Bay	93.9%
Hooper Bay	95.8%
Kipnuk	98.0%
Kongiganak	97.2%
Kwigillingok	97.9%
Coastal Villages Fishing Cooperative (Continued)	
Mekoryuk	96.7%
Napakiak	96.6%
Napaskiak	98.2%
Newtok	96.9%
Nightmute	94.7%
Oscarville	100.0%
Platinum	92.7%
Quinhagak	97.3%
Scammon Bay	97.4%
Toksook Bay	97.6%
Tuntutuliak	98.9%
Tununak	96.9%
Norton Sound Economic Development Corporation	
Brevig Mission	92.0%
Diomede	93.8%
Elim	94.9%
Gambell	95.8%
Golovin	92.4%
Koyuk	94.3%
Nome	58.7%
Saint Michael	93.2%
Savoonga	95.5%
Shaktoolik	94.8%
Stebbins	94.7%
Teller	92.5%
Unalakleet	87.7%
Wales	90.1%
White Mountain	86.2%
Yukon Delta Fisheries Development Association	
Alakanuk	97.9%
Emmonak	93.9%
Grayling	91.8%
Kotlik	96.1%
Mountain Village	93.5%
Nunam Iqua	93.9%
Total All Villages	**86.8%**

Source: U.S. Census Bureau Census 2000

According to Sec. 305(i)(1)(B) of the Magnuson-Stevens Act, to be eligible to participate in the CDQ program a community must–

(i) be located within 50 nautical miles from the baseline from which the breadth of the territorial sea is measured along the Bering Sea coast from the Bering Strait to the western most of the Aleutian Islands, or on an island within the Bering Sea;

(ii) not be located on the Gulf of Alaska coast of the north Pacific Ocean;

(iii) meet criteria developed by the Governor of Alaska, approved by the Secretary, and published in the Federal Register;

(iv) be certified by the Secretary of the Interior pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601 et seq.) to be a Native village;

(v) consist of residents who conduct more than one-half of their current commercial or subsistence fishing effort in the waters of the Bering Sea or waters surrounding the Aleutian Islands; and

(vi) not have previously developed harvesting or processing capability sufficient to support substantial participation in the groundfish fisheries in the Bering Sea, unless the community can show that the benefits from an approved Community Development Plan would be the only way for the community to realize a return from previous investments.

The sixty-five coastal communities currently eligible to participate in the CDQ program are organized into six CDQ groups, with between one and 21 communities in each group. The CDQ communities are geographically dispersed, extending westward to Atka, on the Aleutian chain, and northward along the Bering coast to the village of Wales, near the Arctic Circle. Table 7 summarizes the six CDQ groups in terms of their membership, approximate populations, and office locations. The total population of the 65 CDQ communities in 2000 was estimated to be 27,073. However, this population figure may include a substantial number of individuals who are not year-round residents. The administrative offices of CDQ groups tend to be located in regional hub communities, near government or industry partner offices, and/or near community or other ongoing projects.

Table 7. CDQ Group Communities, Populations and Administrative Locations

CDQ Group	Member Communities		2000 Population[1]	Office Locations
APICDA	Akutan Atka False Pass Nelson Lagoon	Nikolski St. George Unalaska[2]	1,143	Juneau Unalaska Staff also in Homer and Anchorage
BBEDC	Aleknagik Ckark's Point Dillingham Egegik Ekuk Ekwok King Salmon/Savinoski Levelock Manokotak	Naknek Pilot Point Portage Creek Port Heiden South Naknek Togiak Twin Hills Ugashik	5,932	Dillingham Juneau Seattle
CBSFA	St. Paul		532	St. Paul Anchorage
CVRF	Chefornak Chevak Eek Goodnews Bay Hooper Bay Kipnuk Kongiganak Kwigillinook Mekoryuk Mountain Village Napakiak	Napaskiak Newtok Nightmute Oscarville Platinum Quinhagak Scammon Bay Toksook Bay Tuntutuliak Tununak	7,855	Anchorage Bethel
NSEDC	Brevig Mission Diomede/Ignaluk Elim Gambell Golovin Koyuk Nome Savoonga	Shaktoolik St. Michael Stebbins Teller Unalakleet Wales White Mountain	8,488	Anchorage Various
YDFDA	Alakanuk Emmonak Grayling	Kotlik Sheldon Point	3,123	Seattle Seward

[1] The population estimate may include individuals who are not year-round residents.
[2] Unalaska is an *ex-officio* member of APICDA.
Source: DCED 2001, U.S. Census, 2000

2.0 CDQ Group Profiles

Individual groups have followed a variety of strategies for using their CDQ allocations, and for the investment or other use of the proceeds. Most have formed stable partnerships with established fishing industry participants and have, or are seeking to, invest in the fishery. The following CDQ group profiles are adapted from those contained within the inshore/offshore pollock allocation amendment to the Bering Sea groundfish fishery management plan. Each CDQ group is allocated a share of the full suite of the species subject to CDQ allocations, but only pollock and Pacific cod are highlighted in the brief discussions below.

Aleutian Pribilof Island Community Development Association (APICDA)

The communities represented by APICDA are relatively small and located adjacent to the fishing grounds. Unalaska, the largest community in the region and the hub of the Bering Sea fishery, is a non-voting member of the APICDA Board of Directors. Unalaska residents are eligible for APICDA training and education opportunities, many of which are located in Unalaska to take advantage of proximity to the industry, rather than in the other member villages.

Currently, APICDA is allocated 14 percent of the pollock and 16 percent of the Pacific cod CDQ allocations, which are shared among its inshore and offshore partners in such a way as to maximize the benefit to APICDA. Because of proximity to the fishing grounds and year-round access to ice-free waters, APICDA's focus is primarily on community development and employment opportunities that occur in or near each community. These villages do not have the same need for factory trawler employment, as do residents of many other CDQ communities, who do not have the same opportunity for local fishery development. This is reflected in APICDA's employment statistics, which show one of the highest total employment levels, but a relatively low number of pollock processing jobs. APICDA also has a wide variety of investments in different sectors of the fishery, as well as in tourism, and other areas.

APICDA has employment provisions with both its inshore and offshore partners and has invested, both with them and individually, in a number of fisheries-based development projects in several of its villages, creating a variety of employment opportunities. Though the group has placed residents with all three pollock sectors, APICDA residents in general have shown a preference for non-pollock employment, with the single largest source being renovation and operation of a halibut processing plant in Atka.

Bristol Bay Economic Development Corporation (BBEDC)

BBEDC represents 17 villages distributed around the circumference of Bristol Bay, including Dillingham, the second-largest CDQ community with approximately 2,200 residents and the location of BBEDC's home office. BBEDC is currently allocated 21 percent of the pollock and 20 percent of the Pacific cod CDQ harvest.

To date, BBEDC has focused its community development efforts primarily on creating offshore employment opportunities, and it has employed more village residents in pollock processing jobs than any other group. The group changed from one offshore partner to another before the 1996 harvest. BBEDC's current partner is said to hire approximately 20 percent of its crew from CDQ villages.

BBEDC has also invested in a variety of fishing vessels, including part-interest in two pollock catcher processors and a freezer longliner. However, BBEDC also has a program to evaluate investments in regional infrastructure. The group also has active vocational training and internship programs with its offshore partner, and provides internship opportunities with out-of-region and local businesses to develop administrative and other specialized skills. BBEDC is also helping to promote workforce readiness skills through the four Bristol Bay school districts.

Central Bering Sea Fisherman's Association (CBSFA)

CBSFA is unusual among CDQ groups in that it represents a single community, St. Paul in the Pribilof Islands. St. Paul is strategically located to serve the Bering Sea fishing industry. As a result, CBSFA has focused attention on working with other island entities to improve St. Paul's harbor facility and on expanding the island's small boat fleet. The group also operates a revolving loan program to provide boat and gear loans to resident fishermen. CBSFA has primarily invested in crab vessels and has a small ownership interest in American Seafoods. CBSFA has been working with American Seafoods to explore the possibility of developing a multi-processing facility in Saint Paul.

Reflecting the focus of St. Paul residents on developing local fishing ventures and infrastructure, CBSFA has not seen much demand among residents for off-island processing jobs, either offshore or inshore. The group is partnered with a large offshore company and would like to build on the benefits of product offloads at St. Paul harbor and the attendant support services its residents can provide. Currently, CBSFA receives four percent of the pollock and ten percent of the Pacific cod CDQ harvest.

Coastal Villages Region Fund (CVRF)

CVRF currently manages 24 percent of the pollock and 17 percent of the cod CDQ harvest for its 21 member villages. The villages are located along the coast between the southern end of Kuskokwim Bay and Scammon Bay, including Nunivak Island. This remote area is poorly located to engage in the current Bering Sea fisheries. Furthermore, its residents, for the most part, have had little experience with commercial enterprise. CVRF has focused on helping residents adjust to working conditions outside of the immediate area and employs a training coordinator who actively recruits residents for employment and internship opportunities. CVRF sees a distinct employment advantage in the offshore sector for its residents, primarily because of shorter time commitments and higher wages. However, the group currently has both inshore and offshore partners. CVRF has purchased 22.5 percent of American Seafoods, the largest offshore fishing company in the Bering Sea. This investment includes seven factory trawlers.

CVRF provides employment to fishermen through its nearshore CDQ halibut fishery and on a longline vessel that harvests CDQ sablefish. The group continues to be interested in establishing salmon processing facilities both on the Kuskokwim and elsewhere in the region, as well as halibut processing facilities.

Norton Sound Economic Development Corporation (NSEDC)

Fifteen villages make up the region represented by NSEDC, which ranges from St. Michael to Diomede. The geographic expanse and diversity of interests among NSEDC's communities are challenging, as are the hurdles to developing local fisheries in this remote area that is ice-bound in winter.

Nevertheless, NSEDC has actively pursued both local fisheries and Bering Sea pollock investment strategies. The group has purchased approximately 50 percent of its offshore processor partner, Glacier Fish Company (GFC), including two catcher/processors and a seafood marketing subsidiary Together with the GFC, NSEDC owns the Norton Sound Fish Company, which operates a longline vessel and employs significant numbers of region residents. The group also owns independently two tender vessels specially built for the Norton Sound region.

NSEDC has developed or planned fisheries development projects in several villages, including Norton Sound Crab Company in Nome and commercial halibut operations on St. Lawrence Island. GFC hires residents of the Bering Sea region on a preferential basis for CDQ fishery operations. NSEDC operates an employment and training office in Unalakleet. This CDQ group currently receives 23 percent of the pollock and 18 percent of the Pacific cod CDQ allocations.

Yukon Delta Fisheries Development Association (YDFDA)

YDFDA represents five communities. The group's emphasis has been on creating employment opportunities in the Bering Sea fishery both through its mothership partner and through other pollock processors, both inshore and offshore. Another area of focus has been on a comprehensive training program that includes a combination trawl/pot/longline vessel and a 47-foot longline crab vessel. YDFDA has received steadily increasing CDQ pollock allocations and currently receives 14 percent of the pollock and 19 percent of the cod CDQ allocations. YDFDA faces the challenges of representing a region with few natural resources to develop, long distances to most viable fisheries, and relatively undeveloped human resources with respect to active participation in a commercial economy setting. While the group places residents in jobs with all three sectors, it indicates that offshore and mothership employment are most useful for its residents. The group's CDQ royalties fund a variety of training activities encompassing technical and office skills.

3.0 Economic Impacts of the CDQ Program

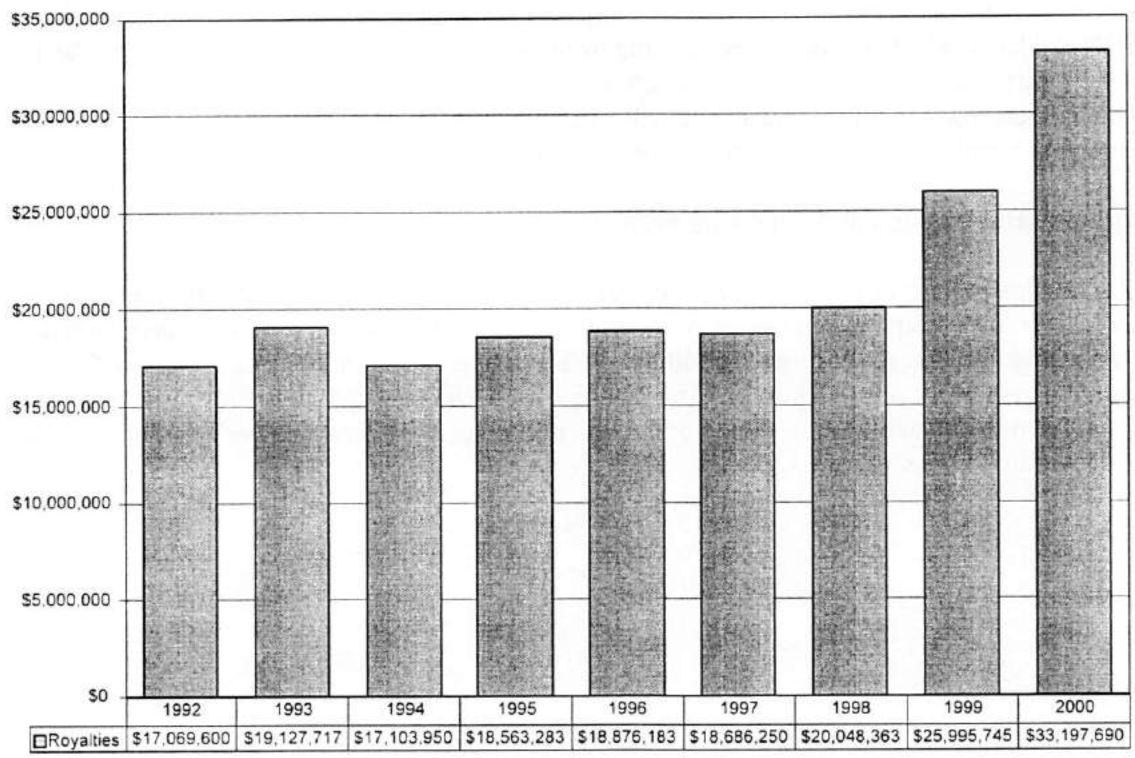
3.1 Revenue Generation

To be eligible to participate in the CDQ program, CDQ communities could have no current or historical linkage to the fisheries in question at the time of the program's implementation. Therefore, it has been necessary (with the exception of some of the halibut CDQs) for each CDQ group to enter into a relationship with one or more of the large commercial fishing companies that participate in the fishery. The CDQ community brings the asset of preferential access to the fish while the partnering firm brings the harvesting/processing capacity and experience in the fishery. The nature of these relationships differs from group to group. In every case, the CDQ community receives royalty payments on apportioned catch shares. Some of the agreements also provide for training and employment of CDQ community members within the partners' fishing operations, as well as other community development benefits. Each of the six groups negotiates a specific price per metric ton for the use of the apportioned CDQ shares, or a base price plus some form of profit sharing.

Based upon reports of consistently high bid-prices for CDQ shares (see, for example, testimony before the NPFMC on the impacts of Inshore/Offshore III on the pollock CDQ program), the partnering companies also apparently receive substantial benefits from these CDQ relationships. These benefits may include preferred access to the resource, resulting in better yields and more valuable product forms (e.g., roe), and the more efficient use of capacity. The positive aspects of the CDQ pollock fishery probably contributed to the successful implementation of the offshore cooperative management system.

Over the duration of the CDQ program, pollock CDQ royalties have consistently exceeded $17 million (Figure 1). Royalty income rose substantially after 1998 because both the TAC and lease price of pollock CDQ shares increased. Stronger overseas markets for groundfish products and a shift by processors to higher value products were among the reasons for the increase in CDQ lease values. In 2000, the CDQ groups received over $33 million in pollock CDQ royalties.

Figure 1. Pollock CDQ Royalties, 1992-2000



Source: DCED (2001)

Royalties from the multi-species program provided an additional $7.5 million to the CDQ groups in 2000 (DCED 2001). The percentage of the total 2000 royalties generated by each non-pollock species are as follows: Pacific cod – 8%; opilio crab – 5%; Bristol Bay red king crab – 3%; and other species, including sablefish, Atka mackerel, halibut and turbot – 2%.

3.2 Asset Accumulation

The revenue stream from the lease of CDQ allocations has permitted the development of considerable savings within the CDQ groups. These savings provide important capital for making investments, and asset accumulation by CDQ communities is one empirical measure of the performance of the program. Amassment of equity interest in real assets represents a clear community development strategy. Data suggest that CDQ groups, when taken as a whole, have retained almost half of their gross revenues in some form of equity, whether vessel ownership, processing facilities, marketable securities, loan portfolios, and IFQ holdings. The value of CDQ assets in aggregate increased from $1.5 million in 1992 to over $157 million in 2000 (DCED 2001).

Another benefit of capital asset acquisitions and venturing with industry participants is the enhanced control communities may exercise over the joint economic activity. As members in fishing companies with ownership interest, the CDQ groups are better able to take part in decisions that directly impact business operations and, thus, profitability. Also, the opportunity for technology transfer and hands-on experience (whether operational or managerial) occurs from the industry partner to the CDQ group. CDQ groups and their residents are able to learn first hand how the industry functions. This increases the likelihood of local control as CDQ residents, who have spent time learning from established industry partners, may one day be in control of their own operations and be able to operate independent of the CDQ program. In the interim, expanded employment opportunities, made available through vessel acquisition and partnering with established industry members, increase the sharing of benefits that accrue from the CDQ activities.

Investments in the Harvesting and Processing Sectors

Increasingly, CDQ groups are using their CDQs to leverage capital investment in harvesting/processing capacity. Acquisition of ownership interest in commercial fishing operations and other fisheries-related enterprises is one important means of directly adding to a CDQ group's economic sustainability, consistent with the program's mandate. Current equity acquisitions in vessels are presented in Table 8. The table also specifies, if applicable, the catcher vessel class or catcher processor class in which each vessel has been included for the sector profiles.

Table 8. Vessel Acquisitions by CDQ Groups

CDQ Group	Vessel Acquisitions (percent ownership in parentheses and vessel class in brackets)
APICDA	• Starbound (20%) 240' pollock factory trawler [FT-CP] • Bering Prowler *(25%)* 124' longline vessel harvesting Pacific cod and sablefish [L-CP] • Prowler *(25%)* 114' longline vessel harvesting Pacific cod and sablefish [L-CP] • Golden Dawn *(25%)* 148' catcher vessel harvesting Pacific cod, pollock and crab [TCV BSP = 125] • Ocean Prowler (20%) 155' longline-processing vessel harvesting Pacific cod and sablefish [L-CP] • Farwest Leader *(25%)* 105' pot vessel harvesting crab and Pacific cod [PCV] • Stardust (100%) 56' longline vessel harvesting Pacific cod and halibut [FGCV 33-59] • Bonanza (100%) 38' longline vessel harvesting halibut [FGCV 33-59] • AP#1, AP#2, AP#3 (100%) 36' longline vessels harvesting halibut and Pacific cod [GHOST or unclassified] • AP#4, AP#5 (100%) 35.5' longline vessels harvesting halibut and Pacific cod [GHOST or unclassified] • Konrad 1 *(75%)* 58' trawler/pot/tender vessel harvesting Pacific cod and pollock, salmon tender [TCV < 60] • Nikka D (100%) 28' vessel harvesting halibut [unclassified] • Agusta D (100%) 28' sportfishing charter vessel [unclassified] • Grand Aleutian (100%) 32' sportfishing charter vessel [unclassified]
BBEDC	• Arctic Fjord (20%) 270' pollock factory trawler [ST-CP] • Bristol Leader (50%) 167' longline vessel harvesting Pacific cod, halibut and sablefish [L-CP] • Neahkahnie (20%) 110' pollock catcher-processor [TCV BSP 60-124] • Northern Mariner (45%) crab vessel [PCV} • Bristol Mariner (45%) 125' crab vessel [PCV] • Nordic Mariner (45%) 121' crab vessel [PCV] • Cascade Mariner (40%) 100' crab vessel [unclassified]
CBSFA	• American Seafoods, LP (22.5%) which owns the following 270-340' catcher processors harvesting pollock, Pacific cod, yellowfin sole and rock sole: American Dynasty [ST-CP], Katie Ann [FT-CP], Northern Eagle [ST-CP], Ocean Rover [ST-CP], Northern Jaeger [ST-CP], American Triumph [ST-CP] and Northern Hawk [ST-CP] • Zolotoi (20%) 98' crab vessel [PCV] • Ocean Cape (35%) 98' crab vessel [FGCV 33-59]
CVRF	• American Seafoods, LP (22.5%) which owns the following 270-340' catcher processors harvesting pollock, Pacific cod, yellowfin sole and rock sole: American Dynasty [ST-CP], Katie Ann [FT-CP], Northern Eagle [ST-CP], Ocean Rover [ST-CP], Northern Jaeger [ST-CP], American Triumph [ST-CP] and Northern Hawk [ST-CP] • Ocean Prowler (20%) 155' longline-processing vessel harvesting Pacific cod and sablefish [L-CP] • Ocean Harvester (45%) 58' longline vessel harvesting halibut and Pacific cod [LCV] • Silver Spray (50%) 116' crab vessel and Pacific cod freezer boat [P-CP]
NSEDC	• Glacier Fish Company (50%) which owns the following 201-276' catcher processors harvesting pollock and Pacific cod: Northern Glacier [FT-CP] and Pacific Glacier [ST-CP] • Norton Sound (49%) 139' longline vessel [L-CP] • Golovin Bay (100%) tender [unclassified] • Norton Bay (100%) tender [unclassified]
YDFDA	• Emmonak Leader (75%) 103' catcher vessel harvesting pollock [TCV BSP 60-124] • Alakanuk Beauty (75%) 105' catcher vessel harvesting pollock [TCV BSP 60-124] • Golden Alaska (19.6%) 308' pollock mothership [MS] • Blue Dolphin (100%) 47' longline/crab vessel [FGCV 33-59] • Lisa Marie (100%) 78' trawl/pot/longline vessel [PCV]

Source: DCED (2001)

All six CDQ groups have acquired ownership interests in the offshore pollock processing sector. In addition, APICDA and NSEDC have invested in inshore processing plants, some of which process groundfish (Table 9). These inshore plants include both shorebased and floating processing facilities.

Table 9. Inshore Processing Plant Acquisitions by CDQ Groups

CDQ Group	Inshore Plant Acquisitions (percent ownership in parentheses)
APICDA	• Atka Pride Seafoods, Inc. (100%) processes halibut • Bering Pacific Seafoods (50%) processes Pacific cod, salmon and other species
NSEDC	• Norton Sound Seafood Products (100%) processes mainly salmon • Norton Sound Crab Company (100%) processes mainly crab

Source: DCED (2001)

In most of the processing ventures in which CDQ groups have invested, the groups are minority owners. However, the revenues derived from these investments may be substantial. An overview of the relative economic importance of investments in the offshore and inshore groundfish processing sector may be acquired by examining the historical quantity and value of groundfish processed by catcher processors and inshore plants in which CDQ groups currently have an equity interest (Table 10 and Table 11). The groundfish processed by these enterprises accounted for about 14 percent of the total tonnage and 15 percent of the total wholesale value of groundfish processed in the Alaska fishery in 1999 and 2000. Overall, it is estimated that the ownership shares of CDQ groups represents approximately 27 percent of the total groundfish revenues of these enterprises based on a weighted average of wholesale product revenue.

Table 10. Quantity of Groundfish Processed by Catcher Processor Vessels and Inshore Plants in which CDQ Groups Currently Have an Equity Interest, 1999-2000

Year	Source of Harvests	AMCK	FLAT	ROCK	OTHR	PCOD	PLCK	SABL	Total
1999	Non-CDQ (1,000 MT)	0.00	10.46	0.09	2.63	18.79	211.14	0.33	243.45
	CDQ (1,000 MT)	0.00	0.52	0.03	0.86	5.42	66.55	0.05	73.43
	CDQ Tons as % of Total	15.4	4.7	23.0	24.6	22.4	24.0	13.8	23.2
2000	Non-CDQ (1,000 MT)	0.00	11.80	0.09	4.14	15.44	240.57	0.26	272.31
	CDQ (1,000 MT)	0.01	0.85	0.03	2.09	8.22	91.78	0.05	103.02
	CDQ Tons as % of Total	98.8	6.7	22.8	33.5	34.7	27.6	16.1	27.4

Source: NMFS Blend Data, June 2001; DCED (2001)

Table 11. Wholesale Product Value of Groundfish Processed by Catcher Processor Vessels and Inshore Plants in which CDQ Groups Currently Have an Equity Interest, 1999-2000

Year	Source of Harvests	AMCK	FLAT	ROCK	OTHR	PCOD	PLCK	SABL	Total
1999	Non-CDQ ($Millions)	0.00	2.16	0.09	0.03	19.99	161.10	1.45	184.82
	CDQ ($Millions)	0.00	0.17	0.01	0.04	6.15	50.46	0.23	57.06
	CDQ Value as % of Total	0.0	7.3	11.5	58.9	23.5	23.9	13.5	23.6
2000	Non-CDQ ($Millions)	0.00	2.20	0.10	0.07	17.77	192.91	1.19	214.25
	CDQ ($Millions)	0.00	0.21	0.01	0.01	9.66	73.64	0.23	83.77
	CDQ Value as % of Total	77.1	8.8	9.0	17.4	35.2	27.6	16.4	28.1

Source: NMFS Blend Data, June 2001; DCED (2001)

The most important component that CDQ groups bring into investments in the offshore groundfish processing sector is quota (DCED 2001). As shown in Table 10 and Table 11, CDQ catch accounts for a substantial portion of the total amount and value of groundfish processed by the companies in which the groups have invested.

The vessel list in Table 8 shows that CDQ groups have also invested in catcher vessels harvesting groundfish and other species. An overview of the relative economic importance of investments in these enterprises may be obtained by examining the historical quantity and value of groundfish caught by catcher vessels in which CDQ groups currently have an equity interest (Table 12). The groundfish harvested by these fishing operations accounted for about two percent of the total tonnage and three percent of the total ex-vessel value of groundfish harvested in the Alaska fishery in 1999 and 2000. Overall, it is estimated that the ownership shares of CDQ groups represents approximately 50 percent of the total groundfish revenues of these enterprises based on a weighted average of ex-vessel revenue.

Table 12. Quantity and Ex-Vessel Value of Groundfish Harvested by Catcher Vessels in which CDQ Groups Currently Have an Equity Interest, 1999-2000

Year	AMCK	FLAT	ROCK	OTHR	PCOD	PLCK	SABL	Total
Retained Tons (Thousands)								
1999	0.04	0.04	0.01	0.00	2.17	30.13	0.14	32.54
2000	0.00	0.03	0.01	0.01	2.04	30.97	0.11	33.16
Ex-vessel Value ($Millions)								
1999	0.00	0.02	0.02	0.00	1.14	5.84	0.57	7.59
2000	0.00	0.01	0.01	0.00	1.34	7.18	0.55	9.09

Source: NMFS Blend Data and Weekly Reports, June 2001; DCED (2001)

3.3 Employment and Income

At the time of the 1990 U.S. Census, all the communities in rural, western Alaska were experiencing relatively high levels of unemployment, ranging from 9 percent in the Bristol Bay area to 31 percent in the Yukon Delta area (DCED 2001). While these high unemployment rates partly reflect the seasonality of employment opportunities and the timing of the census in April, they also may show the effects of limited employment opportunities. All of the communities in the CDQ areas had median incomes that were lower than the state median income (DCED 2001). The median income of the Central Bering Sea area and the Bristol Bay area was less than ten percent below the state level, but in the Yukon Delta area and the Aleutian Pribilof area the median income was only slightly greater than half the state level (DCED 2001). The poverty rates in all the CDQ areas except the Central Bering Sea were at least twice the state rate of seven percent.

Employment opportunities have been one of the most tangible direct effects of the CDQ program for many western Alaska village residents. Indeed, the CDQ program has had some success in securing career track employment for many residents of qualifying communities, and has opened opportunities for non-CDQ Alaskan residents, as well. Jobs generated by the CDQ program included work aboard harvesting vessels, internships with the partner company or government agencies, work at processing plants, and administrative positions.

Table 13 summarizes the total annual CDQ employment and wages presented in quarterly reports. The CDQ program has created an excess of $8 million in wages annually since 1998.

Table 13. CDQ Employment and Wages for all CDQ groups, 1993-2000[1]

	1993	1994	1995	1996	1997	1998	1999	2000
Number Working								
Management/Administration	26	48	58	63	63	79	96	155
CDQ Pollock-Related	186	213	228	261	227	443	244	297
Other Fisheries	64	276	393	691	629	634	786	1146
Other Employment	95	531	157	138	130	194	213	236
Total	371	1068	836	1153	1049	1350	1339	1834
Total Wages ($)								
Management/Administration	586,537	1,012,125	1,218,892	1,636,860	1,803,766	2,284,792	2,661,976	3,084,757
CDQ Pollock-Related	1,000,360	1,280,695	1,866,619	1,686,104	2,660,938	2,649,001	2,149,062	1,741,871
Other Fisheries	609,058	1,000,103	1,132,824	2,280,554	2,756,688	2,075,495	4,201,775	5,959,516
Other Employment	0	1,791,479	1,350,766	723,724	887,338	1,167,173	1,573,358	1,723,054
Total	2,195,955	5,084,402	5,569,101	6,327,242	8,108,730	8,176,461	10,586,171	12,509,198

[1] Employment figures may not represent full-time positions. In addition, some double-counting of employment and wages may have occurred in the compilation of data for quarterly reports.
Source: DCED (2001)

From 1993 through 2000, CDQ management and administration accounted for about six percent of the jobs and 24 percent of the wages. Pollock harvesting and processing accounted for 24 percent of the jobs and 26 percent of the wages. Other fisheries, which include halibut, salmon, sablefish, herring and crab related employment, accounted for 51 percent of the jobs and 34 percent of the wages. Finally, other employment, including internships, accounted for 18 percent of the jobs and 15 percent of the wages.

An overview of the relative impacts of the CDQ program may be gained by comparing income generated by the CDQ program with the total income in CDQ communities. Adjusted gross income data by zip code are available from the Internal Revenue Service for two years during the period that the CDQ program has existed - 1997 and 1998. The total adjusted gross income for all CDQ communities in these two years was $242,200,000 and $252,600,000, respectively. In addition, an estimate of adjusted gross income can be derived for 1999, the most recent year for which personal income data are available from the Regional Economic Information System (REIS) of the U.S. Bureau of Economic Analysis for Alaska boroughs and census areas. In 1997 and 1998, adjusted gross income in CDQ communities was approximately 27.5 percent of the total personal income in the boroughs and census areas in which CDQ communities are located. Applying this percent to the 1999 REIS personal income data yields an estimated adjusted gross income of $259,800,000 in CDQ communities for that year.

Table 14 shows CDQ wages in 1997 and 1998 as reported to DCED and total adjusted gross income for all CDQ communities as estimated above. CDQ-related income accounted for about 4.1 percent of the total income in CDQ communities by 1999.

Table 14. CDQ Wages Compared with Total Adjusted Gross Income in CDQ Communities, 1997-1999

	Total Adjusted Gross Income ($)	CDQ Wages ($)	CDQ Wages as % of Total Adjusted Gross Income
1997	242,200,000	8,108,730	3.3
1998	252,600,000	8,176,461	3.2
1999	259,800,000	10,586,171	4.1

[1] Includes management/administration wages
Sources: DCED (2001); Internal Revenue Service

While this analysis is based on the best information available, it yields only a rough approximation of the contribution of CDQ wages to regional income. As noted above, CDQ management and administration account for nearly one-fourth of CDQ wages. Many of the individuals in administrative positions work and reside in non-CDQ communities (Table 7). By including the wages of those individuals, this analysis overestimates the contribution of CDQ wages to the total income of CDQ communities. Some level of error may also have been introduced in the analysis because IRS income data are reported by zip code. The incomes of a number of small non-CDQ communities that share a zip cope with CDQ communities were included in the figure for total adjusted gross income. However, given the small size of the non-CDQ communities included, it is unlikely that the introduced error appreciably changed the analysis results. Similarly, the incomes of certain CDQ communities (Kongiganak, Napaskiak, Newtok and Oscarville) were omitted from the total adjusted gross income figure because their zip code overlapped with the relatively large non-CDQ community of Bethel. Again, the introduced error is likely insignificant due to the small size of the CDQ communities omitted.

Adjusted gross income data obtained from the IRS for 1997 and 1998 can also be used to examine the contribution of CDQ wages of each CDQ group (Table 15). Among the factors that account for the differences across groups is the presence or absence of communities with comparatively large populations and diverse economies. For example, the CDQ communities of King Salmon and Dillingham in the BBEDC region and Nome in the NSEDC region contributed about half of the total adjusted gross income for all CDQ communities in 1997 and 1998. The higher level of economic activity in these towns results in higher per capita incomes and reduces the relative importance of CDQ wages.

Table 15. CDQ Wages Compared with Total Adjusted Gross Income in CDQ Communities, by CDQ Group, 1997-1999

	APICDA	BBEDC	CBSFA	CVRF	NSEDC	YDFDA
1997						
CDQ Wages ($)[1]	1,343,950	1,480,979	223,201	1,193,590	1,252,493	1,831,355
Total Adjusted Gross Income ($)	11,115,000	74,730,000	8,517,000	33,381,000	97,171,000	17,256,000
CDQ Wages as % of Total Adjusted Gross Income	12.09	1.98	2.62	3.58	1.29	10.61
1998						
CDQ Wages ($)[1]	1,061,750	1,317,694	714,288	1,645,402	1,663,439	1,773,888
Total Adjusted Gross Income ($)	10,209,000	80,655,000	8,010,000	35,719,000	100,375,000	17,659,000
CDQ Wages as % of Total Adjusted Gross Income	10.40	1.63	8.92	4.61	1.66	10.05

[1] Includes management/administration wages
Sources: DCED (2001); Internal Revenue Service; Regional Economic Information System

3.4 Training and Education

Training of CDQ community residents has been a primary objective for all the CDQ groups from the outset of the program and has been promoted as an essential means to a sustainable locally based fishery economy. Each CDQ group provides training for their residents, based not only upon the individual needs of the trainee, but upon the overall needs of the community.

Training programs span the range of educational opportunities, from vocational and technical training, to support for higher education at college and university levels. CDQ groups have spent nearly $8 million directly on training expenditures involving over 7,000 residents since 1993 (DCED 2001).

These investments are wholly dependent upon the revenues generated by the CDQ apportionments and, therefore, are another empirical measure of benefits deriving from the groundfish fisheries of the BSAI management area.

3.5 Indirect Employment and Income Effects

Some of the income earned in CDQ jobs, as well as spending for supplies and services in support of CDQ projects, passes through local merchants, service providers, and others before leaking out of the region in exchange for imports. The additional employment and income generated in this way is referred to as indirect economic impacts. In an area such as western Alaska, where very few goods and services are provided locally, money leaks out of the region relatively quickly. Nevertheless, every extra contribution to jobs and income helps, and these additional economic impacts of the CDQ program should not be overlooked.

References

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National Research Council (NRC), 1999. The community development quota program in Alaska. National Academy Press, Washington, D.C.

3.12.2.9 CDQ Region Existing Conditions

CDQ region existing conditions are discussed in detail in Appendix F(4), and are not recapitulated here. Additional information is also presented in Section 2.5.1.4 ("The CDQ Fishery") and in the RIR (Appendix C to this document) in Section 1.4.3.4.

3.12.2.10 Environmental Justice Existing Conditions

Introduction

Concerns regarding environmental equity are generally termed Environmental Justice. Environmental Justice can also be defined as "the determination of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, and /or socioeconomic status" (Bryant, 2001)

Environmental Justice issues encompass a broad range of impacts including those on the natural and physical environment and related social cultural and economic effects. Executive order 12898 (Environmental Justice, 59 Fed. Reg. 7629 [1994]) requires each federal agency to achieve environmental justice by addressing "disproportionately high and adverse human health and environmental effects on minority and low-income populations."

In order to determine whether Environmental Justice concerns exist, the demographics of the relevant area are examined to determine whether minority populations or low-income populations are present and could be disproportionately impacted by the proposed alternatives. The question as to whether a proposed alternative raises environmental justice issues depends to a large degree on the history or circumstances of of a particular community or population, as well as the specific ties of that community or population to the resources (or access to resources) that will be changed by the alternative.

There is no standardized methodology for identification or analysis of environmental justice issues. The demographics of the affected area should be examined to determine whether minority populations, low income populations are present if so, a determination must be made as to whether the implementation of the alternatives may cause disproportionately high and adverse human health or environmental effects on the minority populations, or low income populations present.

In determining what constitutes a low-income or minority 'population' CEQ guidance, with specific regard to minority populations states: "if the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis." While no available federal guidance addresses the determination of low-income populations, a similar approach has generally been adopted when preparing NEPA documents (King, 2001). The U.S. EPA has stated that addressing environmental justice concerns is entirely consistent with NEPA and that disproportionately high and adverse human health or environmental effects on minority or low-income populations should be analyzed with the same tools currently intrinsic to the NEPA process. NOAA environmental review procedures[1] state that, unlike NEPA, the trigger for analysis under Executive Order 12898 is not limited to actions that are major or significant, and hence Federal agencies are mandated to

[1] NOAA *Environmental Review Procedures for Implementing the National Environmental Policy Act* (Issued 06/03/99)

identify and address, as appropriate "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

Community Variations

The population structure of the regions vary considerably. As discussed below and elaborated in Appendix F(1), within Alaska, and particularly in the Aleutian and Kodiak regions, there is a relationship between the percentage of Alaska Native population and commercial fisheries development. Specifically, communities that have developed as large commercial fishing communities becoming less Native in composition over time compared to other communities in the region. There are many variables involved, but most communities noted the relationship is quite straightforward. The fishery has also had an impact on the male-female population balance for some of the Alaskan communities that are the focus of intensive groundfish processing. This is due to the fact that processing workers reside within these communities for varying durations, and that this workforce is predominately male. While this type of direct impact on population structure attributable to groundfish is seen in few communities, these tend to be the communities with the highest level of groundfish-related processing activities and the highest engagement in, and dependence upon, the fishery. Said differences in the male/female and Native/non-Native population segments are, to a degree, indicative of the type of articulation of the directly fishery-related population with the rest of the community. Again, this varies considerably from place to place and is not apparent in the Alaska Southcentral and Southeast regions in the same way it is in the Aleutian and Kodiak regions.

Interpretation of these data, in terms of engagement with the community, is less straightforward for some regions than for others. As detailed in the regional discussions, and in the community profiles in Appendix F(1), communities are engaged in, and dependent upon, the fishery in quite different ways through resident catcher vessel fleets, onshore processing facilities, and locally associated catcher-processor (and/or mothership) entities. While no consistent data are available, field observations would tend to indicate that ownership and crew demographics of the residential catcher vessel fleet for the relevant Alaska groundfish communities tend to mirror the community demographics at large. This situation would also appear to hold true for the smaller vessel catcher processor sectors based in the various Alaska regions. For the larger vessel catcher-processor and mothership sectors, those are to a large degree associated with the Washington region (with the caveat that ownership patterns have been changing in recent years and the percentage of Alaska based ownership in general and Alaska CDQ ownership in particular has increased, as discussed at length elsewhere in this document), and crews tend to be drawn from a wide area rather than a particular community. These factors are discussed in a separate section below. For the large processing plants that utilize groundfish, the demographics of the workforce and the relation to the 'host' communities tend to be more complex, have substantial environmental justice implications, and are discussed at length below.

In some Alaska groundfish communities, processing plants tend to be industrial enclaves somewhat separate from the rest of the community, while for others there is no apparent differentiation between the processing workforce and the rest of the regional or local labor pool. A further complication for attribution of socioeconomic impacts to a regional base is the fact that for many workers in many of the sectors, groundfish-related work is performed in a region or community that is separate from where they have a number of other socioeconomic ties. It is not uncommon for fishery related workers to spend relatively little money in their work region and to send pay 'home' to another community or region. In this sense, regional employment is indicative of a volume of economic activity, if not a specific level of labor activity directly comparable to other industries. The importance of this flow varies from region to region and from sector to sector, but is most apparent within communities that are most heavily engaged in the processing aspect of the groundfish fishery. For the purposes of this environmental justice analysis, however, these populations will be characterized as being resident in their residential workplace communities, consistent with U.S. Census methodology. One of the current limitations of U.S. Census data however, is that not all of the 2000 data relevant to this environmental justice analysis have been released. Ethnicity by housing type (e.g., by ethnicity by group quarters and non-group quarters), particularly useful for examining resident processing workforce numbers in Alaska coastal communities for this analysis, is not available, so data from the 1990 census are presented. These are supplemented with data gathered from industry sources that characterize their workforce demographics for 2000. These data suggest that the workforce has come to include a much larger minority population component than was the case a decade earlier and reflected in the 1990 census information.

The situation is markedly different for the greater Seattle area. Seattle is, in absolute terms, the community most engaged in the groundfish fishery among many of the important indices of involvement, but it is also the least engaged in terms of the relative importance of the fishery to the overall population and economy of the community (discussed in detail in Appendix F(1)). Summary information relevant to environmental justice considerations is presented at the end of this section.

The CDQ region presents yet another type of environmental justice context, through the nature of the demographic and economic structure of this region, and the nature of the participation of this region and its communities in the fishery through the various mechanisms of the CDQ program as it has been implemented in different subregions by different CDQ groups. This is noted at the end of this section, and discussed in detail in Appendix F(4).

Alaska Peninsula/Aleutian Islands Region

General Community Population Attributes

Alaska Peninsula/Aleutian Island region communities with the strongest direct engagement in, and dependence upon, the North Pacific groundfish fishery are Unalaska, Akutan, Sand Point, and King Cove.[2] These four communities, and their specific ties to the groundfish fishery, are profiled in detail in Appendix F(1). In this section, community level information relevant to environmental justice analysis is summarized.

Table 3.12-44 provides ethnicity information from the 2000 census for each of the four communities.[3] As shown, these communities vary widely in their population structure. For example, Unalaska is the largest community, but has the lowest Alaska Native population percentage, and King Cove and Sand Point have a much higher Alaska Native population component than either of the other two communities. (Akutan, while having a relatively low Alaska Native population percentage is arguably the 'most traditional' Aleut

[2] As noted in Appendix F(1), there are also ties, if less pervasive or historically established ones, to Adak, Chignik, False Pass, and St. Paul, but these communities are not detailed in this section.

[3] As a methodological note, community populations vary quite a bit throughout the year as seasonal workers are brought in to the smaller Alaska communities to provide an adequate workforce for peak seafood processing demand. U.S. Census data do not take yearly averages, but rather represent a one time count. During the 1990 census, for example, information for rural Alaska communities was collected during the months of January through April1990 according to the Institute for Social and Economic Research at the University of Alaska. Although these data cannot represent the complexity of groundfish community the population dynamics, they do represent the best available data set that is comparable across communities and regions.

community, however, as noted below.) Unalaska has a far higher white or non-minority population percentage than the other three communities. Asian residents represent the largest population segment in Akutan, and the second largest Unalaska (behind whites) and King Cove (behind Alaska Natives), and the third largest in Sand Point (behind Alaska Natives and whites.) These communities have quite different histories with respect to the growth of the different population segments present in the community in 2000. Each is summarized briefly below. One important constant across all of these communities is that each is a 'minority community' in the sense that minorities make up a majority of the population in each community.

Table 3.12-44. Ethnic Composition of Population, Selected Alaska Peninsula/Aleutian Island Region Communities, 2000

Race/Ethnicity	Unalaska		Akutan		King Cove		Sand Point	
	N	%	N	%	N	%	N	%
White	1,893	44.2%	168	23.6%	119	15.0%	264	27.7%
African American	157	3.7%	15	2.2%	13	1.6%	14	1.5%
Native American/Alaska Native	330	7.7%	112	15.7%	370	46.7%	403	42.3%
Nat. Hawaiian/Other Pac Islander	24	0.6%	2	0.3%	1	0.1%	3	0.3%
Asian	1,312	30.6%	275	38.6%	212	26.8%	221	23.2%
Some Other Race	399	9.3%	130	18.2%	47	5.9%	21	2.2%
Two Or More Races	168	3.9%	11	1.5%	30	3.8%	26	2.7%
Total	4,283	100%	713	100%	792	100%	952	100%
Hispanic*	551	12.9%	148	20.8%	59	7.4%	129	13.6%

Source: U.S. Bureau of Census.

* 'Hispanic' is an ethnic category and may include individuals of any race (and therefore is not included in the total as this would result in double counting).

Unalaska may be described as a plural or complex community in terms of the ethnic composition of its population. Although Unalaska was traditionally an Aleut community, the ethnic composition has changed with people moving into the community on both a short-term and long-term basis. Not surprisingly, in the latter half of the 20th century, population fluctuations have coincided with periods of resource exploitation and scarcity.[4] For example, the economic and demographic expansion associated with the King crab boom in the late 1970s and early 1980s brought many non-Aleuts to Unalaska, including Euro-North Americans, Filipinos, Vietnamese, Koreans, and Hispanics. The Euro-American population shows a distinct change over the years, comprising around 30 percent of the population in 1970, over 60 percent in 1980 and 1990, and then back to 44 percent in 2000. The growth of Asian/Pacific Islander population (over 30 percent by 2000) is closely associated with the increasingly residential nature of the seafood processing sector workforce. Apart from the War years, prior to the growth of the current commercial-fisheries-based economy, Unalaska was an Aleut community. Since this development, however, the change over the period of 1970 - 1990 is striking. In 1970, Aleut individuals made up slightly over 60 percent of the total community population (and Alaska Natives accounted for a total of 63 percent of the population). In 1980, Alaska Natives, including Aleuts, accounted for 15 percent of the population; by 1990, Aleuts comprised only 7 percent of the total

[4] The most dramatic population shift of this century, however, was brought about by World War II. The story of the War, and the implications for the Aleut population of Unalaska and the other Aleut communities of Unalaska Island, is too complex and profound for treatment in this limited community profile. It may be fairly stated, however, that the events associated with World War II, including the Aleut evacuation and the consolidation of the outlying villages, forever changed the community and Aleut sociocultural structure.

community population (with Alaska Natives as a whole accounting for 8 percent of the population). Overall representation was similar in 2000. This population shift is largely attributable to fisheries and fisheries-related economic development and associated immigration.[5]

Akutan is a unique community in terms of its relationship to the Bering Sea groundfish fishery. It is the site of one of the largest of the shoreplants in the region, but it is also the site of a village that is geographically and socially distinct from the shoreplant. This 'duality' of structure has had marked consequences for the relationship of Akutan to fishery. One example of this may be found in Akutan's status as a CDQ community. Initially (in 1992), Akutan was (along with Unalaska) deemed not eligible for participation in the CDQ program based upon the fact that the community was home to "previously developed harvesting or processing capability sufficient to support substantial groundfish participation in the BSAI . . ." though they met all other qualifying criteria. The Akutan Traditional Council initiated action to show that the community of Akutan, per se, was separate and distinct from the seafood processing plant some distance away from the residential community site, that interactions between the community and the plant were of a limited nature, and that the plant was not incorporated in the fabric of the community such that little opportunity existed for Akutan residents to participate meaningfully in the Bering Sea pollock fishery (i.e., it was argued that the plant was essentially an industrial enclave or worksite separate and distinct from the traditional community of Akutan and that few, if any, Akutan residents worked at the plant). With the support of the Aleutian Pribilof Island Community Development Association (APICDA) and others, Akutan was successful in a subsequent attempt to become a CDQ community and obtained that status in 1996. This action highlights the fundamentally different nature of Akutan and Unalaska. Akutan, while deriving economic benefits from the presence of a large shoreplant near the community proper, has not articulated large-scale commercial fishing activity with the daily life of the community as has Unalaska, nor has it developed the type of support economy that is a central part of the socioeconomic structure of Unalaska. While US Census figures show Akutan had a population of 589 in 1990 and 713 in 2000, the Traditional Council considers the "local" resident population of the community to be around 80 persons, with the balance being considered "non-resident employees" of the seafood plant. This definition, obviously, differs from census, state, and electoral definitions of residency, but is reflective of the social reality of Akutan. The residents of the village of Akutan, proper, are almost all Aleut.

Sand Point and King Cove share a more or less common development history, but and one quite different from either Unalaska or Akutan. Sand Point was founded in 1898 by a San Francisco fishing company as a trading post and cod fishing station. Aleuts from surrounding villages and Scandinavian fishermen were the first residents of the community. King Cove was founded in 1911 when Pacific American Fisheries built a salmon cannery. Early settlers were Scandinavian, European, and Aleut fishermen. Historically, both of these communities saw a large influx of non-resident fish tenders, seafood processing workers, fishers, and crew members each summer. For the last several decades, both communities were primarily involved in the commercial salmon fisheries of the area, but with the decline of the salmon fishery, plants in both communities have diversified into other species. In more recent years, the processing plants in both communities have become heavily involved in the groundfish fishery, although their structural relationships to the fishery have diverted since the passage of the American Fisheries Act (AFA). As detailed in Appendix

[5] The fact that there is a "core" Aleut population of the community with a historical continuity to the past also has implications for contemporary fishery management issues. These include the activities of the Unalaska Native Fisherman Association and active local involvement in the regional CDQ program. While neither of these undertakings exclude non-Aleuts, Aleut individuals are disproportionately actively involved (relative to their overall representation in the community population).

F(1), processing facilities in both communities qualified as AFA entities, however, King Cove qualified for a locally based catcher vessel co-op while Sand Point did not.

The following two tables present information on income, employment, and poverty for the relevant groundfish communities of the region. These tables are based on 1990 U.S. Census data as the comparable 2000 data has not been released as of the time of this writing. Although these data are somewhat dated, they do provide useful comparative information. Table 3.12-45 displays median household and family income. As shown, the range is large for the communities shown. For example, median family income in both King Cove and Unalaska is approximately double the comparable figure for Akutan. This does not reflect the entire range for the region, however, as several communities in the region without commercial groundfish development (Adak, Atka, False Pass, and Nikolski) have lower median family income. In 1990, King Cove had the highest median family income in the region at $63,419 and Nikolski the lowest at $17,250.

Table 3.12-45. Household Income Information, Selected Alaska Peninsula/Aleutian Island Region Communities, 1990

Community	Housing Units	Occupied HU	Vacant HU	Total Households	Average Persons Per HH	Median HH Income	Family Households	Median Family Income
Akutan	34	31	3	31	3	27,813	19	31,875
King Cove	195	144	51	144	3	53,631	118	63,419
Sand Point	272	242	30	242	3	42,083	159	43,125
Unalaska	682	575	107	575	3	56,215	299	61,927

Source: US Bureau of Census

Table 3.12-46 displays data on employment and poverty information for the relevant communities for 1990. As shown, there is virtually no unemployment in these communities, no doubt due in large part to the presence of fishery related employment opportunities. Percentage of poverty varies between the communities, but these communities again do not represent the range of regional variation. In 1990, Atka had the highest unemployment in the region at 25.7 percent, whereas Cold Bay, False Pass, Nelson Lagoon, and Nikolski had no employment as all members of the workforce (a subset of the total population) that were seeking employment were actually employed. This figure is somewhat misleading as in some communities a large portion of the adult population may not be working and not seeking employment. In 1990, Nelson Lagoon was the extreme example of this with 81 percent of the adults not working. In 1990, percent of poverty in the region ranged from zero percent in Cold Bay to 42 percent in St. George. Data do not vary consistently with the presence or absence of commercial fishery development as might be expected. For example, Atka shows a very high rate of unemployment and percent of adults not working, yet there is a smaller percentage of persons in poverty than in Akutan, a community with an unemployment rate of less that one percent. This is attributable, in part, to the fundamentally different natures of the communities, with Atka being a small village and Akutan being a community with a large processing facility adjacent to the traditional village site. False Pass, Nelson Lagoon, Nikolski, and St. George, none of which have fish processing facilities, all have over 50 percent of the adults in the community not working. The contrast between these and the other communities is reflective of both lack of economic development in these communities and the nature of the workforce population in communities with shore plants, where large numbers of processing workers are present, tend not to have non-working adult family members present with them, and tend to be in the community exclusively for employment purposes.

Table 3.12-46. Employment and Poverty Information, Selected Alaska Peninsula/Aleutian Island Region Communities, 1990

Community	Total Persons Employed	Unemployed	Percent Unemployment	Percent Adults Not Working	Not Seeking Employment	Percent Poverty
Akutan	527	2	0.4%	7.4%	40	16.6%
King Cove	276	5	1.8%	24.0%	82	10.0%
Sand Point	438	13	2.9%	32.1%	194	12.5%
Unalaska	2,518	26	1.0%	7.8%	186	15.3%

Source: US Bureau of Census

Population Attributes of the Resident Groundfish Fishery Workforce

Beyond the overall population figures for the individual communities, it is important for the purposes of environmental justice analysis to examine information on the residential groundfish fishery workforces. It is likely that employment and income losses associated with at least some of the alternatives would be felt among the local seafood processing workers, and these workers do not represent a random cross-section of the community demography. One method to examine the relative demographic composition of the local processing workforces is to utilize group quarter housing data from the U.S. Census. This information is presented by community in the following series of tables. Unfortunately, ethnicity by housing type for the 2000 census has not yet been released at the time of this writing. The group ethnicity by housing type data in the following tables are therefore drawn from the 1990 census (and a subsequent section supplements this information with industry provided figures for 2000). This is supplemented by age and sex data from the 1990 and 2000 census to provide a cross check of population structure over this period as well.

Table 3.12-47 provides information on group housing and ethnicity for Unalaska. Group housing in the community is largely associated with the processing workforce. As shown, 52 percent of the population lived in group housing in 1990. Also as shown, the total minority population proportion was substantially higher in group quarters (49 percent) than in non-group quarters (31 percent). With the population growth seen in association with the development of the commercial fishing industry, Unalaska's population has had significantly more men than women. Historically, this has been attributed to the importance of the fishing industry in bringing in transient laborers, most of whom were young males. Table 3.12-48 portrays the changes in proportion of males and females in the population for the years 1970, 1980, 1990, and 2000. Census data from the period 1970-1990 showed a climb in median age from 26.3 years to 30.3 years and then a further jump to 36.5 years in 2000. This is commonly attributed to the relative size of the workforce in comparison to resident families.

Table 3.12-47. Ethnicity and Group Quarters Housing Information, Unalaska, 1990

Unalaska City	Total Population		Group Quarters Population		Non-Group Quarters Population	
	Number	Percent	Number	Percent	Number	Percent
White	1917	62.06	870	53.90	1047	70.98
Black	63	2.04	55	3.41	8	0.54
American Indian, Eskimo, Aleut	259	8.38	20	1.24	239	16.20
Asian or Pacific Islander	593	19.20	434	26.89	159	10.78
Other race	257	8.32	235	14.56	22	1.49
Total Population	3089	100.00	1614	100.00	1475	100.00
Hispanic origin, any race	394	12.75	337	20.88	57	3.86
Total Minority Pop	1252	40.53	795	49.26	457	30.98
Total Non-Minority Pop (White Non-Hispanic)	1837	59.47	819	50.74	1018	69.02

Source: Census 1990 STF2

Table 3.12-48. Population Composition: Age and Sex Unalaska; 1970, 1980, 1990, and 2000

	1970		1980		1990		2000	
	N	%	N	%	N	%	N	%
Male	98	55%	858	65%	2,194	71%	2,830	66%
Female	80	45%	464	35%	895	29%	1,453	34%
Total	178	100%	1,322	100%	3,089	100%	4,283	100%
Median Age	26.3 years		26.8 years		30.3 years		36.5 years	

Source: US Bureau of Census

Table 3.12-49 provides information on group housing and ethnicity for Akutan. Group housing in the community is almost exclusively associated with the processing workforce. As shown, 85 percent of the population lived in group housing in 1990, which represents the extreme of the four communities considered in this region. Also as shown, the ethnic composition of the group and non-group housing segments were markedly different, with the non-group housing population being predominately (83%) Alaska Native, and the group housing population having almost no (1%) Alaska Native representation. Table 3.12-50 shows the population composition by sex in 1990 and 2000, and is clearly indicative of a male-dominated industrial site rather than a typical residential community.

Table 3.12-49. Ethnicity and Group Quarters Housing Information, Akutan, 1990

Akutan	Total Population		Group Quarters Population		Non-Group Quarters Population	
	Number	Percent	Number	Percent	Number	Percent
White	227	37.52	212	42.32	15	17.05
Black	6	0.99	6	1.20	0	0.00
American Indian, Eskimo, Aleut	80	13.22	7	1.40	73	82.95
Asian or Pacific Islander	247	40.83	247	49.30	0	0.00
Other race	29	4.79	29	5.79	0	0.00
Total Population	589	100.00	501	100.00	88	100.00
Hispanic origin, any race	45	7.44	45	8.98	0	0.00
Total Minority Pop	342	56.53	298	59.48	44	50.00
Total Non-Minority Pop (White Non-Hispanic)	247	40.83	203	40.52	44	50.00

Source: Census 1990 STF2

Table 3.12-50. Population Composition by Sex
Akutan; 1990 and 2000

	1990		2000	
	N	%	N	%
Male	449	76%	549	77%
Female	140	24%	164	23%
Total	589	100%	713	100%
Median Age	NA		40.2 years	

Source: US Bureau of Census

Table 3.12-51 provides information on group housing and ethnicity for King Cove. As for the other communities, group housing in the community is largely associated with the processing workforce. As shown, 42 percent of the population lived in group housing in 1990. Also as shown, ethnicity varied between the group and non-group housing, with the non-group housing population being 67 percent Alaska Native and 6 percent Asian or Pacific Islander and the group housing population being 39 percent Alaska Native and 58 percent Asian or Pacific Islander. The male to female ratio shown in Table 3.12-52 is also consistent with a transient workforce.

Table 3.12-51. Ethnicity and Group Quarters Housing Information, King Cove, 1990

King Cove	Total Population		Group Quarters Population		Non-Group Quarters Population	
	Number	Percent	Number	Percent	Number	Percent
White	127	28.16	57	30.16	70	26.72
Black	6	1.33	6	3.17	0	0.00
American Indian, Eskimo, Aleut	177	39.25	1	0.53	176	67.18
Asian or Pacific Islander	125	27.72	109	57.67	16	6.11
Other race	16	3.55	16	8.47	0	0.00
Total Population	451	100.00	189	100.00	262	100.00
Hispanic origin, any race	53	11.75	53	28.04	0	0.00
Total Minority Pop	331	73.39	139	73.54	192	73.28
Total Non-Minority Pop (White Non-Hispanic)	120	26.61	50	26.46	70	26.72

Source: Census 1990 STF2

Table 3.12-52. Population Composition: Age and Sex King Cove; 1990 and 2000

	1990		2000	
	N	%	N	%
Male	292	65%	472	60%
Female	159	35%	320	40%
Total	451	100%	792	100%
Median Age	NA		34.9 Years	

Source: US Bureau of Census

Table 3.12-53 provides information on group housing and ethnicity for Sand Point. As shown, 21 percent of the population lived in group housing in 1990, which is low for the four communities detailed within this region. Also as shown, almost no Alaska Natives live in group quarters, while few Asians live outside of group quarters. As shown in Table 3.12-54, the significant male to female imbalance seen in other communities is present in Sand Point as well.

Table 3.12-53. Ethnicity and Group Quarters Housing Information, Sand Point, 1990

Sand Point	Total Population		Group Quarters Population		Non-Group Quarters Population	
	Number	Percent	Number	Percent	Number	Percent
White	284	32.35	48	25.40	236	34.25
Black	4	0.46	4	2.12	0	0.00
American Indian, Eskimo, Aleut	433	49.32	3	1.59	430	62.41
Asian or Pacific Islander	87	9.91	80	42.33	7	1.02
Other race	70	7.97	54	28.57	16	2.32
Total Population	878	100.00	189	100.00	689	100.00
Hispanic origin, any race	78	8.88	58	30.69	20	2.90
Total Minority Pop	601	68.45	14	7.41	587	85.20
Total Non-Minority Pop (White Non-Hispanic)	277	31.55	175	92.59	102	14.80

Source: Census 1990 STF2

Table 3.12-54. Population Composition: Age and Sex Sand Point; 1990 and 2000

	1990		2000	
	N	%	N	%
Male	557	63%	593	62%
Female	321	37%	359	38%
Total	878	100%	952	100%
Median Age	NA		36.5 Years	

Source: US Bureau of Census

Industry Provided Data

Information on 2000 workforce demographics was obtained for four of the six major groundfish shoreplants in the Alaska Peninsula/Aleutian Islands region. Communities cannot be discussed individually because of confidentiality concerns. However, with regard to these four plants, the total workforce was classified as 21.3 percent white or non-minority, and 78.7 percent minority. Reporting plants ranged from a 75 percent minority workforce to an over 90 percent minority workforce. It is worth noting that different firms provided different levels of detail in the breakout of the internal composition of the minority component of their workforce. For some plants, the total minority figure was not disaggregated, and too few plants within this region provided detailed data to allow region-specific discussion. However, all of the shoreplants in any region that provided detailed data have workforces that are 5 percent or less African American and 5 percent or less Alaska Native/Native American. The group classified as Asian/Pacific Islander was the largest minority group in two-thirds of the plants in any region reporting detailed data, and the group classified as Hispanic was the largest minority group in the remaining one-third. Two entities provided time series data. One provided data spanning a 10 year period, while the other provided information covering a four year span. For the former, the minority workforce component increased over time; for the latter no unidirectional trend existed.

Regional Summary

The communities in the region that are most engaged in, and dependent upon, the groundfish fishery are those with populations comprised of more minority residents than non-minority residents. The structure of the minority population component varies from community to community, as does the proportion of the community population that is comprised of Alaska Native residents. Further, the workforce at the processing plants that would likely feel the impacts of the alternatives are overwhelmingly comprised of minority workers. While no systematic quantitative data are known, field observations would suggest that for a very substantial portion of the workforce, English is a second language (this is reinforced by data from local schools regarding such as Unalaska, where 47 percent of the entering kindergarten students in 2000-2001 were ESL [English as a second language] students) and languages other than English are the commonly utilized in the workplace among processing crews. These factors, along with limited opportunity to acquire job skills in other economic sectors, would tend to indicate that these populations would be less able to easily acquire alternative employment outside of the seafood industry if there were widespread job reductions as a result of the alternatives. However, information on the level of job turnover/rates of rehire (discussed in Appendix F(1)) suggest that there is a fair degree of mobility among at least part of this workforce.

Kodiak Island Region

General Community Population Attributes

Within the Kodiak region, the City of Kodiak is the location of virtually all of the direct links with the groundfish fishery, therefore it will be the only regional community discussed in detail.[6]

Kodiak is a complex community in terms of the ethnic composition of its population. Sugpiaqs (Koniags) were the original inhabitants of Kodiak Island. Beyond earlier development, fishing and military buildup associated with World War II brought many non-Natives to Kodiak, primarily Caucasians but also a substantial number of non-Native minorities, at least initially associated primarily with fish processing employment. Detailed information on community growth and the relative growth of different population segments is provided in Appendix F(1). The Alaskan Native population has remained at approximately the same percentage since the 1970s, but the white (non-minority) population has declined in terms of percentage over time. Overall, there has thus been a gradual, long-term shift in ethnic composition, with Asian and Pacific Islanders increasing in percentage. 2000 Census data detailing ethnicity are presented in Table 3.12-55. As shown, the majority of Kodiak's population is comprised of minority residents.

[6] Processing data does show that groundfish are also run at Atilak, but this is a relatively specialized operation and very small relative to the aggregated operations associated with the City of Kodiak.

Table 3.12-55 Ethnic Composition of Population Kodiak City; 2000

Race/Ethnicity	2000	
	N	%
White	2,939	46.4%
African American	44	0.7%
Native American/Alaska Native	663	10.5%
Native Hawaiian/Other Pacific Islander	59	0.9%
Asian	2,010	31.7%
Some Other Race	276	4.3%
Two or More Races	343	5.4%
Total	6,334	100%
Hispanic*	541	8.5%

Source: U.S. Bureau of Census.

* 'Hispanic' is an ethnic category and may include individuals of any race (and therefore is not included in the total as this would result in double counting).

The following two tables present information on income, employment, and poverty for the City of Kodiak and the Kodiak Island Borough. These tables are based on 1990 U.S. Census data as the comparable 2000 data has not been released as of the time of this writing. Although these data are somewhat dated, they do provide useful comparative information. Table 3.12-56 displays median household and median family income. As shown, the City of Kodiak is above the borough averages. For example, median family income in Kodiak itself is about 4 percent higher than the borough as a whole. Compared to all communities in the region, the City of Kodiak places at the upper end of the range. In 1990 the highest median family income in the region was in the community of Womens Bay, with a figure of $51,537, while the lowest figure was $17,813 for Old Harbor.

Table 3.12-56. Household Income Information, Selected Kodiak Region Communities, 1990

Community	Total Units	Occupied Units	Vacant Units	Total Households	Average Household Size	Median Household Income	Total Family Households	Median Family Income
Kodiak	2,177	2,051	126	2,051	3	46,050	1,399	49,404
Kodiak Island Borough	4,885	4,083	802	4,083	3	44,815	2,982	47,600

Table 3.12-57 displays data on employment and poverty for the City of Kodiak and the Kodiak Island Borough for 1990. As shown, there was very little unemployment in these jurisdictions, presumably due in part to the presence of fishery related employment opportunities, and also the fact that the Kodiak economy is relatively diversified by rural Alaska standards, and particularly in comparison to the Aleutian region communities. The City of Kodiak has the lowest unemployment of any community in the region, whereas the villages of Larsen Bay and Old Harbor are at the opposite end of the continuum, with 40 and 39 percent

unemployment, respectively. Proportions of the population considered to be below the poverty threshold vary between the communities, but as was the case in the Aleutian region, this is somewhat misleading. For example, Akhiok has the lowest poverty rate of any community in the region at 2.4 percent, but at the same time 51 percent of the adults in the community are not working. Old Harbor has the highest poverty rate in the region at 31 percent.

Table 3.12-57. Employment and Poverty Information, Selected Kodiak Region Communities, 1990

Community	Total Persons Employed	Unemployed	Percent Unemployment	Percent Adults not Working	Not Seeking Employment	Percent Poverty
Kodiak	3,644	162	4.40%	23.00%	927	6.20%
Kodiak Island Borough	7,218	346	5.30%	23.90%	1,918	5.50%

Population Attributes of the Resident Groundfish Fishery Workforce

Table 3.12-58 provides information on group housing and ethnicity for Kodiak. Group housing in the community is largely associated with the processing workforce, but not to the nearly exclusive degree seen in the Aleutian communities, due to the greater complexity of the institutional base and range of housing types in Kodiak. As shown, only six percent of the population lived in group housing in 1990. This is a much lower percentage of population residing in group quarters than in the other communities profiled, and is consistent with a workforce more heavily drawn from the local labor pool. Further, while there is still as significant difference between the group quarter and non-group quarter demographics (with the group quarter population being a higher minority group than the community population as a whole), the differences are not as sharp in general or for particular groups as seen in the Aleutian region communities. The male to female imbalance is present in the community, as shown in Table 3.12-59, but it is of a lesser magnitude than seen in the Aleutian region groundfish communities. This is consistent with Kodiak's fishery related workforce being drawn more from the local community labor pool than is the case in the Aleutian communities.

Table 3.12-58. Ethnicity and Group Quarters Housing Information, Kodiak, 1990

	Total Population		Group Quarters Population		Non-Group Quarters Population	
Kodiak City	Number	Percent	Number	Percent	Number	Percent
White	4028	63.28	192	53.93	3836	63.84
Black	29	0.46	3	0.84	26	0.43
American Indian, Eskimo, Aleut	811	12.74	21	5.90	790	13.15
Asian or Pacific Islander	1282	20.14	118	33.15	1164	19.37
Other race	197	3.10	22	6.18	175	2.91
Total Population	6365	100.00	356	100.00	6009	100.00
Hispanic origin, any race	407	6.39	42	11.80	365	6.07
Total Minority Pop	2429	38.16	181	50.84	2248	37.41
Total Non-Minority Pop (White Non-Hispanic)	3936	61.84	175	49.16	3761	62.59

Source: Census 1990 STF2

Table 3.12-59. Population by Age and Sex, Kodiak City; 1990 and 2000

Kodiak City	1990		2000	
	N	%	N	%
Male	3,496	55%	3379	53%
Female	2,869	45%	2955	47%
Total	6,363	100%	6334	100%
Median Age	NA		33.5 years	

Industry Provided Data

Given the nature of the relationship between the processing workforce and the local communities, industry information comparable to that of the Aleutians region was not systematically collected from Kodiak region entities. The information received was not sufficient to be able to disclose precise community level information due to confidentiality concerns. As a generality however, the 2000 data received indicated that at least some shoreplants in this region have workforces with a greater minority population component than the Aleutian regional average (78.7 percent). This is despite the fact that, as a rule of thumb, the Kodiak processing workforce is drawn to a larger degree from a local labor pool than is the case for the Aleutian communities. As was the case for the Aleutian region, different firms provided different levels of detail in the breakout of the internal composition of the minority component of their workforce. For some plants the total minority figure was not disaggregated, and not enough plants within this region provided detailed data to allow region specific discussion. However, as mentioned in the Aleutian region discussion, all of the shoreplants in any region provided detailed data have workforces 5 percent or less African American and 5 percent or less Alaska Native/Native American. For the Kodiak region, the group classified as Asian/Pacific Islander was the largest minority group noted within the limited detailed data received.

Regional Summary

The community in the region that is most engaged in and dependent upon the groundfish fishery (Kodiak) is comprised of more minority residents than non-minority residents. While systematic data do not exist, the data that are available suggest that the workforce at the processing plants that would likely feel the impacts of the alternatives are primarily comprised of minority workers.

Washington Inland Waters Region

General Community Population Attributes

The greater Seattle area is the center for much of economic activity related to the North Pacific groundfish fishery, but the geographic footprint of those activities is difficult to define, and it cannot be attributed to specific communities or neighborhoods in the same manner as Alaska communities may be linked to the fishery, as discussed in Appendix F(1). For comparative purposes, and that the information on the Seattle-based catcher-processor sector described below can be compared to the greater Seattle population base, the Table 3.12-60 provides ethnicity data for the Seattle-Tacoma Consolidated Metropolitan Statistical Area (CMSA) as defined by the U.S. Bureau of the Census.[7] As shown, unlike the Alaska groundfish communities, the white portion of the population comprises a large majority of the overall population (i.e., minorities are actually a distinct mathematical minority, unlike the relevant Alaska communities).

Table 3.12-60. Ethnic Composition of Population, Seattle-Tacoma CMSA, 1990 and 2000

Race/Ethnicity	1990		2000	
	N	%	N	%
White	2,214,579	86.5%	2,819,296	79.3%
African American	121,702	4.8%	165,938	4.7%
Native Amer/Alaskan	32,980	1.3%	41,731	1.2%
Asian/Pacific Islands*	164,386	6.4%	300,533	8.5%
Other**	25,517	1.0%	227,263	6.4%
Total	2,559,164	100%	3,554,760	100%
Hispanic***	71,069	2.8%	184,297	5.2%
Total minority population	383,198	15.0%	816,858	23.0%
Total non-minority population	2,175,966	85.0%	2,737,902	77.0%

Source: U.S. Bureau of Census.

* In the 2000 census, this was split into Native Hawaiian and Other Pacific Islander (pop 19,837 (0.6%)) and Asian (pop 280,696 (7.9%))

** In the 2000 census, this category was Some Other Race (pop 79,353 (2.2%)) and Two or More Races (pop 147,910 (4.2%)).

*** 'Hispanic' is an ethnic category and may include individuals of any race (and therefore is not included in the total as this would result in double counting).

Information on household income and employment and poverty information for the Seattle-Tacoma CMSA comparable to that provided for the relevant Alaska groundfish communities is not presented here. These types of data at the CMSA level are not meaningful for this environmental justice analysis.

[7] A Consolidated Metropolitan Statistical Area (CMSA) consists of two or more contiguous MSAs The Seattle-Tacoma WA CMSA consists of Seattle WA PMSA (1) King and Snohomish Counties, and (2) Tacoma (Pierce County). A Metropolitan Statistical Area (MSA) can be defined as a city of over 50,000 inhabitants together with the county in which it is located and contiguous counties which are economically and socially integrated with the central city. It may also consist of an urbanized area of 50,000 with a total metropolitan area population of at least 100,000.

Population Attributes of the Resident Groundfish Fishery Workforce

Given the nature of engagement with the fishery, the Washington Inland Waters Region does not have the same type of resident workforce focused in individual communities in a manner comparable to that seen in Alaska communities, as discussed in detail in Appendix F(3). Rather, this environmental justice analysis will focus on industry provided sector data as described below.

Industry Provided Data

As noted in the introductory discussion, catcher vessel ownership and crews based in the area are assumed to reflect the overall population structure. Shore processing plants are not present in this region, and the mothership sector data cannot be presented due to confidentiality restrictions based on the small number of entities. As a working assumption, it is assumed that the mothership employment structure is similar to that of the catcher processor sector, although the catcher-processor sector may have a somewhat higher minority representation in the workforce due to more consistent targeted hiring in rural Alaska.

<< Data forthcoming from industry >>

Regional Summary

<< Completion pending receipt of industry data >>

Other/Alaska Native Specific Environmental Justice Issues: CDQ Regions and Community Outreach

The CDQ region of Western Alaska is an area of environmental justice concern with respect to the potential fishery management alternatives covered by this EIS. The CDQ program was specifically designed to foster fishery participation among, and direct fishery benefits toward, low-income populations and minority (Alaska Native) populations in the economically underdeveloped communities in Western Alaska. To the extent that the CDQ program has achieved these objectives, negative impacts to the CDQ program and communities are essentially, by definition, environmental justice impacts. CDQ region existing conditions are discussed in detail in Appendix F(4), and additional information is also presented in Section 2.5.1.4 ("The CDQ Fishery") and in the RIR (Appendix C to this document) in Section 1.4.3.4. (CDQ specific impacts potentially resulting from the alternatives are summarized in Section 4.12.2).

In terms of specific outreach to include Alaska Native populations in this EIS process, in addition to contacts appropriate for government-to-government consultations, Alaska Native groups were contacted individually over and above the regular scoping process notifications. This was to ensure the opportunity for these entities to provide input and receive information consistent with the notification and disclosure intent of environmental justice concerns. Specific notification of Alaska Native communities and entities was conducted utilizing a contact list developed during the recent North Pacific groundfish programmatic SEIS effort. During that effort, NMFS obtained from the Bureau of Indian Affairs (BIA) a list of all governmental entities that are formally recognized by the federal government as tribal governments in Alaska. A subset of this state-wide list was created by employing (and extending) the CDQ eligibility criteria (summarized in Appendix F(4)), including using a 50 nautical mile buffer from the coast, but enlarging the area from just the Bering Sea/Aleutian Islands area to additionally encompass the entire Alaskan Gulf of Alaska coast. All of entities on the BIA list that fell within this 50 nautical mile wide swath inland from the coast were placed on the contact list for the groundfish programmatic SEIS, and this same contact list was, in turn, used for this Steller sea lion SEIS contact process. This list, containing some 125 Alaska Native entities, appears in Appendix B, along with a copy of the letter that was sent to all entities on the list.

Additional References:

Bryant, Bunyan, Ph.D.
2001 "What is environmental justice?" A broad based definition. <http://www-personal.umich.edu/~bbryant/envjustice.html>

King, Gregory
2001 "Addressing Environmental Justice in California." The Environmental Monitor, Summer 2001, 5-11

4.12.2.2.7 CDQ Region Effects

The CDQ Region as used in this analysis is defined along lines of vessel and processor ownership rather than on geographic terms. All catcher vessels and processors in which CDQ organizations currently have an ownership interest are included under this definition of the CDQ region (see Table 8 of Appendix F(4) for a listing CDQ ownership). Tables 4.12-50 through 4.12-56 provide data on engagement in the groundfish fishery as measured by the 21 socioeconomic indicators tracked for the other regions, both for the baseline (Alternative 1) and Alternatives 2 and 4. For Alternatives 2 and 4 additional information on absolute change from the baseline and percentage change from the baseline is also presented, consistent with the information presentation for other regions. All catches, processing amounts, revenues, payments to labor, etc., for the CDQ owned facilities are included in the tables.

In general, CDQ ownership shares in catcher vessels are larger than ownership shares in processors. An examination of revenues and CDQ ownership shares indicates that CDQ groups can claim an average of 50.1 percent ownership of the included catcher vessels and 27.0 percent ownership of the included processors. Thus to the extent that the alternatives affect CDQ owned catcher vessels, CDQ groups are likely to experience impact approximately equal to impacts felt by non-CDQ owners. The extent to which CDQ groups are expected to experience impacts on catcher vessels employment and payments to labor is unknown, because the level of CDQ group employment on CDQ owned catcher vessels is not known.

Compared to CDQ owned catcher vessels, CDQ groups are likely to experience proportionately less of the overall impacts on CDQ owned processors. However, since CDQ owned processing revenues (and presumably returns to owners) are of a much greater magnitude than revenues to CDQ owned catcher vessels, the effect of the Alternatives on CDQ processors is likely to be much more significant for CDQ groups. In addition to effects on group revenues, it is known that much of the employment of CDQ group members in the fishing and processing industry takes place on CDQ owned catcher processors—thus as employment and payments to labor of processing vessels are affected, CDQ groups will also be affected.

Several other issues regarding the CDQ Regions are noted in the following bullets:

- The CDQ Region is defined using the latest information on ownership by CDQ groups. This ownership information has been applied to activities in 1999, which has been used as the basis of all of the regional profiles. Thus even if a CDQ group finalized its purchase of a vessel in 2001, the activities of that vessel in 1999 are included in the CDQ region.

- All of the activities of the CDQ owned facilities were also included in the profiles of the geographic regions based on the owners listed in official registration data. Therefore, it would be inappropriate to add the CDQ Region impacts to impacts of the other regions.

- Because CDQ groups are generally part-owners of the vessels included in the CDQ Region profile, the actual impacts on CDQ groups are likely to be less than the total shown in the profile. It should also be noted that all of the regional profiles may similarly over- or understate the affects that may be experienced within the region. For example, since Alaska based CDQs groups have a significant ownership shares of vessels and processors that are primarily registered to residents of the WAIW region, it is likely that the impacts depicted in the WAIW region are somewhat overstated.

Beyond these 21 socioeconomic indicators, Tables 4.12-57 through 4.12-63 present information relevant to CDQ specific impacts that is different from the type of information presented for the other regions. The impacts shown in these tables reflect the direct impacts of changes to the CDQ allocations under the alternatives. The following bullets describe each of the indicators shown.

- Estimates of CDQ Allocations are taken directly from analytical results provided by NMFS.

- Estimates of CDQ Allocation ex-vessel revenue represent the value of that portion of the CDQ Allocation that is expected to be delivered to shore plants or motherships and is an indicator of overall impacts of reduced CDQ quotas on catcher vessels. The expected proportion of deliveries to processors and ex-vessel prices are taken from activities in the base year (1999).

- Estimates CDQ Allocation wholesale revenue are the projected value of products from processors of CDQ quotas. Product forms, utilization rates, and product prices from CDQ fish are assumed no different than in the non-CDQ fisheries for the base year and are estimated from NMFS Blend and WPR data.

- CDQ Royalties are estimated from data on pollock royalties found in the CDQ Handbook (DCED, 2001) combined with estimated of wholesale revenues from NMFS Blend and WPR data. Data in the CDQ Handbook indicated the total royalties paid for CDQ pollock by year from 1992 through 2000. For the years 1998-2000, CDQ pollock royalties were estimated to have been approximately 38 percent of the estimated wholesale revenue. Therefore, the assessment of impacts under the alternatives assumed that royalties for pollock would be approximately 38 percent of expected wholesale revenue generated from CDQ pollock. Specific data on royalties for Pacific cod and Atka mackerel were not available, and therefore the analysis assumed that, like pollock, royalties from Pacific cod and Atka mackerel would be 38 percent of expected wholesale revenue generated from the CDQ allocations.

- CDQ Royalties per MT by species are estimated by dividing the expected total royalties by the expected CDQ allocations.

Alternative 1 - Baseline Conditions

The sixty-five coastal communities organized into six non-profit CDQ groups, total population of the communities in 2000 was estimated to be 27,073. although this population figure may include a substantial number of individuals who are not year-round residents. The CDQ program encompasses both groundfish and non-groundfish fisheries, with currently allocated portions ranging from 10 percent for pollock to 7.5 percent for most other species. The percentage of the total 2000 royalties generated by each non-pollock species are as follows: Pacific cod – 8%; opilio crab – 5%; Bristol Bay red king crab – 3%; and other species, including sablefish, Atka mackerel, halibut and turbot – 2%. After 1998, CDQ allocations became available for all groundfish species, and the harvest of some species such as Pacific cod (PCOD) and Atka mackerel (AMCK) increased. The CDQ allocations recommended by the State for 2001-2002 represented approximately 185,00 metric tons of groundfish. Over the duration of the CDQ program, pollock CDQ royalties have consistently exceeded $17 million. In 2000, the CDQ groups received over $33 million in pollock CDQ royalties. Royalties from the multi-species program provided an additional $7.5 million to the CDQ groups in 2000 (DCED 2001).

The program has provided more than 1,000 jobs annually for region residents with yearly wages exceeding $8 million. This program has also contributed to infrastructure development projects within the region as well as loan programs and investment opportunities for local fishermen. The value of CDQ assets in aggregate increased from $1.5 million in 1992 to over $157 million in 2000 (DCED 2001). Increasingly, CDQ groups are using their CDQs to leverage capital investment in harvesting/processing capacity. All six CDQ groups have acquired ownership interests in the offshore pollock processing sector. In most of the processing ventures in which CDQ groups have invested, the groups are minority owners, however, the revenues derived from these investments may be substantial.

The groundfish processed by these enterprises accounted for about 14 percent of the total tonnage and 15 percent of the total wholesale value of groundfish processed in the Alaska fishery in 1999 and 2000. Overall, it is estimated that the ownership shares of CDQ groups represents approximately 27 percent of the total groundfish revenues of these enterprises based on a weighted average of wholesale product revenue. The groundfish harvested by these fishing operations accounted for about two percent of the total tonnage and three percent of the total ex-vessel value of groundfish harvested in the Alaska fishery in 1999 and 2000. Overall, it is estimated that the ownership shares of CDQ groups represents approximately 50 percent of the total groundfish revenues of these enterprises based on a weighted average of ex-vessel revenue.

With regard to the impacts to CDQ communities from the analysis of the following alternatives, because CDQ groups are generally part-owners of the vessels included in the CDQ region profiles actual impacts are anticipated to be less than the total outlined. Also, the CDQ region is defined using the latest available information regarding ownership by CDP groups, as such this information has been applied to activities in 1999 and utilised as the basis of all of the regional profiles.

Alternative 2

When compared, the high and low cases for Alternative 2 (Table 4.12.51) show the differences in the harvest of locally owned catcher vessels to be a total of 23 percent, with specifically 24 percent for pollock, 19 percent for Pacific cod and 13 percent for Atka mackerel. Since no shorebased processing facilities exist within CDQ communities, both the total ex--vessel value paid by shore based processors, and total shore based processing tons are not applicable.

Total harvesting and processing payments to labor differ by 12 percent, with 13 percent for pollock, 11 percent for Pacific cod, and 14 percent for Atka mackerel. Employment differences broadly mirror payments to labor with total differences of 13 percent, with 13 percent for pollock, 10 percent for Pacific cod, and 14 percent for Atka mackerel. Thus, as observed generally, uncertainty of the amount of fish to be harvested is much greater for Alternative 2 than for Alternative 4 or 1. For the CDQ communities the uncertainty under Alternative 2 associated with the pollock fishery is slightly greater than that for both the Pacific cod and Atka mackerel fisheries.

Projected differences for Alternative 2 from the baseline of Alternative 1 are best examined using Table 4.12-53. For the high-case of Alternative 2, total combined pollock, Pacific cod, and Atka mackerel harvested by regionally owned catcher vessels declines by about 28 percent, specifically 27 percent for pollock, 45 percent for Pacific cod, and 67 percent for Atka mackerel.

As was the case for the catcher vessel measures, in order to put these declines in context, they must be compared to the relevant processor measures for the regional fisheries as a whole, and for the overall groundfish fishery in the region in particular for the participating entities.

Total Pacific cod, pollock, and Atka mackerel-related harvesting and processing payments to labor accruing to the region would change by similar amounts (20 percent in total, 19 percent for pollock, 25 percent for Pacific cod, and 67 percent for Atka mackerel). Employment levels almost exactly mirror payments to labor with a total decline of 19 percent , with specific declines of 19 percent for pollock, 23 percent for Pacific cod, and 67 percent for Atka mackerel

For the low-case of Alternative 2, the results are more dramatic. The total combined pollock, Pacific cod, and Atka mackerel harvested by regionally owned catcher vessels would decline by 51 percent (51 percent for pollock, 64 percent for Pacific cod, and 80 percent for Atka mackerel). Total Pacific cod, pollock, and Atka mackerel related harvesting and processing payments to labor accruing to the region change more significantly (32 percent in total, with 32 percent for pollock,36 percent for Pacific cod, and 81 percent for Atka mackerel). Employment levels again almost exactly mirror payments to labor with a total decline of 32 percent , with specific declines of 31 percent for pollock, 33 percent for Pacific cod, and 81 percent for Atka mackerel

In summary, depending on the socioeconomic variable chosen, Alternative 2 is projected to reduce CDQ Community participation in the groundfish fishery by between 27 and 51 percent for pollock, between 21and 64 percent for Pacific cod, between 67 and 81 percent for Atka mackerel or approximately 19 and 51 percent in total/when combined. Given the relative dependency upon the groundfish fishery in general, and the pollock and Pacific cod components of the fishery in particular, this would result in significant impacts to the CDQ groups/communities engaged in the fishery/fisheries.

In terms of other CDQ specific indices, for the high case of Alternative 2, CDQ allocations for the three relevant groundfish species combined would decline by 23 percent (including 19 percent for pollock, 44 percent for Pacific cod, and 67 percent for Atka mackerel). CDQ allocation ex-vessel revenue and wholesale revenue would decline by 19 percent and 21 percent, respectively. Overall CDQ royalties would decline by 21 percent. For the low case of Alternative 2, CDQ allocations for the three relevant groundfish species combined would decline by 43 percent (including 52 percent for pollock, 41 percent for Pacific cod, and 82 percent for Atka mackerel). CDQ allocation ex-vessel revenue and wholesale revenue would decline by 41 percent and 42 percent, respectively. Overall CDQ royalties would decline by 42 percent. These declines represent significant impacts.

Alternative 4

When compared, the high and low cases for Alternative 4 (Table 4.12.56) show the differences in the harvest of regionally owned catcher vessels to be a total of 4 percent, with 3 percent for pollock, 10 percent for Pacific cod and 8 percent for Atka mackerel. Since no shorebased processing facilities exist within CDQ communities, both the total ex--vessel value paid by shore based processors, and total shore based processing tons are not applicable.

The level of uncertainty introduced by Alternative 4 is thus increased over that of the baseline but is closer to "normal" risk than is that of Alternative 2. The Pacific cod fishery is more uncertain than is the pollock fishery. Projected differences for Alternative 4 from the baseline of Alternative 1 are best examined using Table 4.12-56. For the high-case of Alternative 4, total combined pollock and Pacific cod harvested by regionally owned catcher vessels does not decline in any statistically significant way. Specifically a total decrease of 27 tons would be experienced (0.04%) of which 26 tons would be Pacific cod. Total Pacific cod, pollock, and Atka mackerel related harvesting and processing payments to labor accruing to the region do not change by a statistically significant amount. Specifically a decrease in payments amounting to $34,567 would be experienced (0.029 percent) of which $34,715 would be attributable to a slightly smaller volume of cod being processed.

For the low-case of Alternative 4, total combined pollock, Pacific cod and Atka mackerel harvested by regionally owned catcher vessels declines by 4 percent (3 percent for pollock, 11 percent for cod, with a gain of 8 percent for Atka mackerel). Total Pacific cod, pollock, and Atka mackerel related harvesting and processing payments to labor accruing to the region change by broadly similar amounts - a decline of 3 percent in total, with specific declines of 3 percent for pollock and 4 percent for cod. An increase of 3 percent is anticipated for Atka mackerel. Employment levels again almost exactly mirror payments to labor with a total decline of 5 percent , with specific declines of 3 percent for pollock and 5 percent for Pacific cod, with an increase of 3 percent for Atka mackerel.

Thus, while Alternative 4 would have some effects upon CDQ communities participation in the fishery, for the most part such effects would be expected to be no worse than those experienced from "normal" fluctuations in the fishery.

In terms of other CDQ specific indices, for the high case of Alternative 4, CDQ allocations for the three relevant groundfish species combined would increase by 1 percent. CDQ allocation ex-vessel revenue would not change from the baseline and wholesale revenue would increase by 1 percent. Overall CDQ royalties would be unchanged. For the low case, CDQ allocations for the three relevant groundfish species combined would decrease by 6 percent. CDQ allocation ex-vessel revenue and wholesale revenue would decrease by 9 percent and 7 percent, respectively. Overall CDQ royalties would decline by 7 percent.

Table 4.12-50 Alternative 1- CDQ region groundfish socioeconomic indicators

CDQ	High				Low			
Annual Summary Table	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
Total Regionally Owned CV Harvest (Tons)	19	3,631	61,764	65,415	15	3,560	61,166	64,741
Total Ex-Vessel Value ($)	1,466	2,416,367	15,130,289	17,548,121	1,149	2,371,440	14,983,539	17,356,128
Total Catcher Vessel Payments to Labor ($)	586	966,547	6,052,115	7,019,248	460	948,576	5,993,416	6,942,451
Total CV Employment (FTE)	0	23	31	55	0	23	31	54
Total Ex-Vessel Value Paid by Shorebased Processors in the Region ($)	0	0	0	0	0	0	0	0
Total Regionally Owned At-Sea Processing (Round-Weight Tons)	431	18,944	370,099	389,475	325	18,438	364,654	383,416
Total Shore Based Processing in the Region (Round-Weight Tons)	0	0	0	0	0	0	0	0
Total Regionally Owned Processing--At-Sea or Shore Based (Round-Weight Tons)	431	18,944	370,099	389,475	325	18,438	364,654	383,416
Total Regionally Owned At-Sea Processing At-Sea Processed Value ($)	181,545	19,977,740	288,682,021	308,841,306	136,583	19,521,343	284,421,706	304,079,632
Total Shore Based Processed Value in the Region ($)	0	0	0	0	0	0	0	0
Total Regionally Owned Processing Value--At-Sea or Shore Based ($)	181,545	19,977,740	288,682,021	308,841,306	136,583	19,521,343	284,421,706	304,079,632
Total Regionally Owned At-Sea Processing Payments to Labor ($)	46,273	5,856,646	75,239,877	81,142,796	34,813	5,724,690	74,128,946	79,888,449
Total Shore Based Processing Payments to Labor in the Region ($)	0	0	0	0	0	0	0	0
Total Administrative Payments to Labor of All Regionally Owned Processors ($)	18,154	1,997,774	28,868,202	30,884,131	13,658	1,952,134	28,442,171	30,407,963
Total Processing Payments to Labor Accruing to the Region ($)	64,428	7,854,420	104,108,079	112,026,927	48,471	7,676,824	102,571,116	110,296,412
Total Regionally Owned At-Sea Processing Employment (FTE)	1	107	1,305	1,413	1	105	1,286	1,391
Total Shore Based Processing Employment in the Region (FTE)	0	0	0	0	0	0	0	0
Total Administrative Employment of All Regionally Owned Processors (FTE)	0	5	65	71	0	5	64	70
Total Processing Employment Accruing to the Region (FTE)	1	113	1,370	1,484	1	110	1,350	1,461
Total Harvesting and Processing Payments to Labor Accruing to the Region ($)	65,014	8,820,966	110,160,195	119,046,175	48,931	8,625,400	108,564,532	117,238,863
Total Harvesting and Processing Employment Accruing to the Region (FTE)	1	136	1,402	1,538	1	133	1,381	1,515

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-51 Alternative 2- CDQ region groundfish socioeconomic indicators

CDQ	High				Low			
Annual Summary Table	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
Total Regionally Owned CV Harvest (Tons)	6	2,002	45,391	47,400	3	1,287	30,201	31,492
Total Ex-Vessel Value ($)	484	1,350,735	11,117,684	12,468,903	229	897,295	7,396,230	8,293,753
Total Catcher Vessel Payments to Labor ($)	194	540,294	4,447,074	4,987,561	91	358,918	2,958,492	3,317,501
Total CV Employment (FTE)	0	15	23	38	0	13	15	28
Total Ex-Vessel Value Paid by Shorebased Processors in the Region ($)	0	0	0	0	0	0	0	0
Total Regionally Owned At-Sea Processing (Round-Weight Tons)	142	13,921	300,470	314,533	61	11,742	252,665	264,468
Total Shore Based Processing in the Region (Round-Weight Tons)	0	0	0	0	0	0	0	0
Total Regionally Owned Processing--At-Sea or Shore Based (Round-Weight Tons)	142	13,921	300,470	314,533	61	11,742	252,665	264,468
Total Regionally Owned At-Sea Processing At-Sea Processed Value ($)	59,904	15,557,780	234,369,663	249,987,347	25,671	13,178,344	196,561,850	209,765,865
Total Shore Based Processed Value in the Region ($)	0	0	0	0	0	0	0	0
Total Regionally Owned Processing Value--At-Sea or Shore Based ($)	59,904	15,557,780	234,369,663	249,987,347	25,671	13,178,344	196,561,850	209,765,865
Total Regionally Owned At-Sea Processing Payments to Labor ($)	15,269	4,552,712	61,084,295	65,652,276	6,543	3,847,180	51,197,511	55,051,234
Total Shore Based Processing Payments to Labor in the Region ($)	0	0	0	0	0	0	0	0
Total Administrative Payments to Labor of All Regionally Owned Processors ($)	5,990	1,555,778	23,436,966	24,998,735	2,567	1,317,834	19,656,185	20,976,587
Total Processing Payments to Labor Accruing to the Region ($)	21,259	6,108,490	84,521,262	90,651,011	9,110	5,165,014	70,853,696	76,027,821
Total Regionally Owned At-Sea Processing Employment (FTE)	0	85	1,059	1,145	0	73	889	961
Total Shore Based Processing Employment in the Region (FTE)	0	0	0	0	0	0	0	0
Total Administrative Employment of All Regionally Owned Processors (FTE)	0	4	53	57	0	4	44	48
Total Processing Employment Accruing to the Region (FTE)	0	89	1,112	1,202	0	76	933	1,009
Total Harvesting and Processing Payments to Labor Accruing to the Region ($)	21,453	6,648,784	88,968,335	95,638,572	9,202	5,523,933	73,812,188	79,345,322
Total Harvesting and Processing Employment Accruing to the Region (FTE)	0	104	1,135	1,240	0	89	948	1,038

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-52 Alternative 2- CDQ region groundfish socioeconomic indicators difference from Alternative 1 (baseline)

CDQ	High Difference from Alternative 1 (Baseline)				Low Difference from Alternative 1 (Baseline)			
Annual Summary Table	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
Total Regionally Owned CV Harvest (Tons)	- 13	-1,629	-16,374	-18,015	- 12	-2,273	-30,964	-33,250
Total Ex-Vessel Value ($)	- 982	-1,065,632	-4,012,605	-5,079,218	- 921	-1,474,144	-7,587,310	-9,062,375
Total Catcher Vessel Payments to Labor ($)	- 393	-426,253	-1,605,042	-2,031,687	- 368	-589,658	-3,034,924	-3,624,950
Total CV Employment (FTE)	0	-8	-9	-17	0	-10	-16	-26
Total Ex-Vessel Value Paid by Shorebased Processors in the Region ($)	0	0	0	0	0	0	0	0
Total Regionally Owned At-Sea Processing (Round-Weight Tons)	- 289	-5,023	-69,630	-74,942	- 264	-6,696	-111,988	-118,948
Total Shore Based Processing in the Region (Round-Weight Tons)	0	0	0	0	0	0	0	0
Total Regionally Owned Processing--At-Sea or Shore Based (Round-Weight Tons)	- 289	-5,023	-69,630	-74,942	- 264	-6,696	-111,988	-118,948
Total Regionally Owned At-Sea Processing At-Sea Processed Value ($)	- 121,641	-4,419,961	-54,312,358	-58,853,959	- 110,912	-6,342,999	-87,859,857	-94,313,767
Total Shore Based Processed Value in the Region ($)	0	0	0	0	0	0	0	0
Total Regionally Owned Processing Value--At-Sea or Shore Based ($)	- 121,641	-4,419,961	-54,312,358	-58,853,959	- 110,912	-6,342,999	-87,859,857	-94,313,767
Total Regionally Owned At-Sea Processing Payments to Labor ($)	- 31,005	-1,303,934	-14,155,582	-15,490,520	- 28,270	-1,877,510	-22,931,435	-24,837,215
Total Shore Based Processing Payments to Labor in the Region ($)	0	0	0	0	0	0	0	0
Total Administrative Payments to Labor of All Regionally Owned Processors ($)	- 12,164	-441,996	-5,431,236	-5,885,396	- 11,091	-634,300	-8,785,986	-9,431,377
Total Processing Payments to Labor Accruing to the Region ($)	- 43,169	-1,745,930	-19,586,817	-21,375,916	- 39,361	-2,511,810	-31,717,420	-34,268,591
Total Regionally Owned At-Sea Processing Employment (FTE)	- 1	-22	-245	-268	- 1	-33	-397	-430
Total Shore Based Processing Employment in the Region (FTE)	0	0	0	0	0	0	0	0
Total Administrative Employment of All Regionally Owned Processors (FTE)	0	-1	-12	-13	0	-2	-20	-21
Total Processing Employment Accruing to the Region (FTE)	- 1	-23	-258	-282	- 1	-34-417	-451	
Total Harvesting and Processing Payments to Labor Accruing to the Region ($)	- 43,561	-2,172,183	-21,191,859	-23,407,604	- 39,729	-3,101,468	-34,752,344	-37,893,541
Total Harvesting and Processing Employment Accruing to the Region (FTE)	- 1	-32	-266	-298	- 1	-44	-433	-478

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-53 Alternative 2- CDQ region groundfish socioeconomic indicators percentage difference from Alternative 1 (baseline)

CDQ	High Percentage Difference from Alternative 1 (Baseline)				Low Percentage Difference from Alternative 1 (Baseline)			
Annual Summary Table	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
Total Regionally Owned CV Harvest (Tons)	-67%	-45%	-27%	-28%	-80%	-64%	-51%	-51%
Total Ex-Vessel Value ($)	-67%	-44%	-27%	-29%	-80%	-62%	-51%	-52%
Total Catcher Vessel Payments to Labor ($)	-67%	-44%	-27%	-29%	-80%	-62%	-51%	-52%
Total CV Employment (FTE)	-67%	-36%	-27%	-31%	-75%	-43%	-51%	-48%
Total Ex-Vessel Value Paid by Shorebased Processors in the Region ($)	0%	0%	0%	0%	0%	0%	0%	0%
Total Regionally Owned At-Sea Processing (Round-Weight Tons)	-67%	-27%	-19%	-19%	-81%	-36%	-31%	-31%
Total Shore Based Processing in the Region (Round-Weight Tons)	0%	0%	0%	0%	0%	0%	0%	0%
Total Regionally Owned Processing--At-Sea or Shore Based (Round-Weight Tons)	-67%	-27%	-19%	-19%	-81%	-36%	-31%	-31%
Total Regionally Owned At-Sea Processing At-Sea Processed Value ($)	-67%	-22%	-19%	-19%	-81%	-32%	-31%	-31%
Total Shore Based Processed Value in the Region ($)	0%	0%	0%	0%	0%	0%	0%	0%
Total Regionally Owned Processing Value--At-Sea or Shore Based ($)	-67%	-22%	-19%	-19%	-81%	-32%	-31%	-31%
Total Regionally Owned At-Sea Processing Payments to Labor ($)	-67%	-22%	-19%	-19%	-81%	-33%	-31%	-31%
Total Shore Based Processing Payments to Labor in the Region ($)	0%	0%	0%	0%	0%	0%	0%	0%
Total Administrative Payments to Labor of All Regionally Owned Processors ($)	-67%	-22%	-19%	-19%	-81%	-32%	-31%	-31%
Total Processing Payments to Labor Accruing to the Region ($)	-67%	-22%	-19%	-19%	-81%	-33%	-31%	-31%
Total Regionally Owned At-Sea Processing Employment (FTE)	-67%	-21%	-19%	-19%	-81%	-31%	-31%	-31%
Total Shore Based Processing Employment in the Region (FTE)	0%	0%	0%	0%	0%	0%	0%	0%
Total Administrative Employment of All Regionally Owned Processors (FTE)	-67%	-21%	-19%	-19%	-81%	-31%	-31%	-31%
Total Processing Employment Accruing to the Region (FTE)	-67%	-21%	-19%	-19%	-81%	-31%	-31%	-31%
Total Harvesting and Processing Payments to Labor Accruing to the Region ($)	-67%	-25%	-19%	-20%	-81%	-36%	-32%	-32%
Total Harvesting and Processing Employment Accruing to the Region (FTE)	-67%	-23%	-19%	-19%	-81%	-33%	-31%	-32%

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-54 Alternative 4- CDQ region groundfish socioeconomic indicators

CDQ	High				Low			
Annual Summary Table	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
Total Regionally Owned CV Harvest (Tons)	19	3,605	61,763	65,388	17	3,153	59,059	62,229
Total Ex-Vessel Value ($)	1,466	2,400,700	15,129,919	17,532,086	1,244	2,098,892	14,467,143	16,567,280
Total Catcher Vessel Payments to Labor ($)	586	960,280	6,051,968	7,012,834	498	839,557	5,786,857	6,626,912
Total CV Employment (FTE)	0	24	31	56	0	20	30	50
Total Ex-Vessel Value Paid by Shorebased Processors in the Region ($)	0	0	0	0	0	0	0	0
Total Regionally Owned At-Sea Processing (Round-Weight Tons)	431	19,100	370,099	389,630	334	17,883	356,048	374,265
Total Shore Based Processing in the Region (Round-Weight Tons)	0	0	0	0	0	0	0	0
Total Regionally Owned Processing--At-Sea or Shore Based (Round-Weight Tons)	431	19,100	370,099	389,630	334	17,883	356,048	374,265
Total Regionally Owned At-Sea Processing At-Sea Processed Value ($)	181,545	20,108,331	288,682,021	308,971,897	140,413	18,863,265	277,365,042	296,368,721
Total Shore Based Processed Value in the Region ($)	0	0	0	0	0	0	0	0
Total Regionally Owned Processing Value--At-Sea or Shore Based ($)	181,545	20,108,331	288,682,021	308,971,897	140,413	18,863,265	277,365,042	296,368,721
Total Regionally Owned At-Sea Processing Payments to Labor ($)	46,273	5,884,568	75,239,877	81,170,719	35,789	5,526,352	72,266,306	77,828,447
Total Shore Based Processing Payments to Labor in the Region ($)	0	0	0	0	0	0	0	0
Total Administrative Payments to Labor of All Regionally Owned Processors ($)	18,154	2,010,833	28,868,202	30,897,190	14,041	1,886,327	27,736,504	29,636,872
Total Processing Payments to Labor Accruing to the Region ($)	64,428	7,895,401	104,108,079	112,067,908	49,831	7,412,678	100,002,811	107,465,320
Total Regionally Owned At-Sea Processing Employment (FTE)	1	108	1,305	1,414	1	102	1,254	1,356
Total Shore Based Processing Employment in the Region (FTE)	0	0	0	0	0	0	0	0
Total Administrative Employment of All Regionally Owned Processors (FTE)	0	5	65	71	0	5	63	68
Total Processing Employment Accruing to the Region (FTE)	1	114	1,370	1,485	1	107	1,316	1,424
Total Harvesting and Processing Payments to Labor Accruing to the Region ($)	65,014	8,855,681	110,160,047	119,080,742	50,328	8,252,235	105,789,668	114,092,231
Total Harvesting and Processing Employment Accruing to the Region (FTE)	1	138	1,402	1,540	1	127	1,346	1,474

Notes:

[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.

[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-55 Alternative 4- CDQ region groundfish socioeconomic indicators difference from Alternative 1 (baseline)

CDQ	High Difference from Alternative 1 (Baseline)				Low Difference from Alternative 1 (Baseline)			
Annual Summary Table	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
Total Regionally Owned CV Harvest (Tons)	0	-26	-2	-27	1	-407	-2,106	-2,512
Total Ex-Vessel Value ($)	0	-15,666	-369	-16,035	95	-272,547	-516,396	-788,848
Total Catcher Vessel Payments to Labor ($)	0	-6,266	-148	-6,414	38	-109,019	-206,558	-315,539
Total CV Employment (FTE)	0	1	0	1	0	-3	-1	-4
Total Ex-Vessel Value Paid by Shorebased Processors in the Region ($)	0	0	0	0	0	0	0	0
Total Regionally Owned At-Sea Processing (Round-Weight Tons)	0	155	0	155	9	-555	-8,605	-9,151
Total Shore Based Processing in the Region (Round-Weight Tons)	0	0	0	0	0	0	0	0
Total Regionally Owned Processing--At-Sea or Shore Based (Round-Weight Tons)	0	155	0	155	9	-555	-8,605	-9,151
Total Regionally Owned At-Sea Processing At-Sea Processed Value ($)	0	130,591	0	130,591	3,830	-658,078	-7,056,664	-7,710,911
Total Shore Based Processed Value in the Region ($)	0	0	0	0	0	0	0	0
Total Regionally Owned Processing Value--At-Sea or Shore Based ($)	0	130,591	0	130,591	3,830	-658,078	-7,056,664	-7,710,911
Total Regionally Owned At-Sea Processing Payments to Labor ($)	0	27,922	0	27,922	976	-198,338	-1,862,639	-2,060,001
Total Shore Based Processing Payments to Labor in the Region ($)	0	0	0	0	0	0	0	0
Total Administrative Payments to Labor of All Regionally Owned Processors ($)	0	13,059	0	13,059	383	-65,808	-705,666	-771,091
Total Processing Payments to Labor Accruing to the Region ($)	0	40,981	0	40,981	1,359	-264,146	-2,568,306	-2,831,092
Total Regionally Owned At-Sea Processing Employment (FTE)	0	1	0	1	0	-3	-32	-35
Total Shore Based Processing Employment in the Region (FTE)	0	0	0	0	0	0	0	0
Total Administrative Employment of All Regionally Owned Processors (FTE)	0	0	0	0	0	0	-2	-2
Total Processing Employment Accruing to the Region (FTE)	0	1	0	1	0	-3	-34	-37
Total Harvesting and Processing Payments to Labor Accruing to the Region ($)	0	34,715	-148	34,567	1,397	-373,165	-2,774,864	-3,146,632
Total Harvesting and Processing Employment Accruing to the Region (FTE)	0	2	0	2	0	-7	-35	-41

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-56 Alternative 4- CDQ region groundfish socioeconomic indicators percentage difference from Alternative 1 (baseline)

CDQ	High Percent from Alternative 1 (Baseline)				Low Percent from Alternative 1 (Baseline)			
Annual Summary Table	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
Total Regionally Owned CV Harvest (Tons)	0%	-1%	0%	0%	8%	-11%	-3%	-4%
Total Ex-Vessel Value ($)	0%	-1%	0%	0%	8%	-11%	-3%	-5%
Total Catcher Vessel Payments to Labor ($)	0%	-1%	0%	0%	8%	-11%	-3%	-5%
Total CV Employment (FTE)	0%	4%	0%	2%	5%	-13%	-4%	-8%
Total Ex-Vessel Value Paid by Shorebased Processors in the Region ($)	0%	0%	0%	0%	0%	0%	0%	0%
Total Regionally Owned At-Sea Processing (Round-Weight Tons)	0%	1%	0%	0%	3%	-3%	-2%	-2%
Total Shore Based Processing in the Region (Round-Weight Tons)	0%	0%	0%	0%	0%	0%	0%	0%
Total Regionally Owned Processing--At-Sea or Shore Based (Round-Weight Tons)	0%	1%	0%	0%	3%	-3%	-2%	-2%
Total Regionally Owned At-Sea Processing At-Sea Processed Value ($)	0%	1%	0%	0%	3%	-3%	-2%	-3%
Total Shore Based Processed Value in the Region ($)	0%	0%	0%	0%	0%	0%	0%	0%
Total Regionally Owned Processing Value--At-Sea or Shore Based ($)	0%	1%	0%	0%	3%	-3%	-2%	-3%
Total Regionally Owned At-Sea Processing Payments to Labor ($)	0%	0%	0%	0%	3%	-3%	-3%	-3%
Total Shore Based Processing Payments to Labor in the Region ($)	0%	0%	0%	0%	0%	0%	0%	0%
Total Administrative Payments to Labor of All Regionally Owned Processors ($)	0%	1%	0%	0%	3%	-3%	-2%	-3%
Total Processing Payments to Labor Accruing to the Region ($)	0%	1%	0%	0%	3%	-3%	-3%	-3%
Total Regionally Owned At-Sea Processing Employment (FTE)	0%	1%	0%	0%	3%	-3%	-2%	-3%
Total Shore Based Processing Employment in the Region (FTE)	0%	0%	0%	0%	0%	0%	0%	0%
Total Administrative Employment of All Regionally Owned Processors (FTE)	0%	1%	0%	0%	3%	-3%	-2%	-3%
Total Processing Employment Accruing to the Region (FTE)	0%	1%	0%	0%	3%	-3%	-2%	-3%
Total Harvesting and Processing Payments to Labor Accruing to the Region ($)	0%	0%	0%	0%	3%	-4%	-3%	-3%
Total Harvesting and Processing Employment Accruing to the Region (FTE)	0%	2%	0%	0%	3%	-5%	-3%	-3%

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-57 Alternative 1- CDQ allocations and royalties

CDQ	High				Low			
CDQ Allocation Impacts	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
CDQ Allocation (MT)	5,198	17,928	140,000	163,126	4,013	17,883	137,480	159,376
CDQ Allocation Ex-vessel Revenue ($) [a]	14,892	138,416	34,282,649	34,435,956	11,497	138,072	33,665,561	33,815,130
CDQ Allocation Wholesale Revenue ($)	2,238,452	10,467,360	118,260,635	130,966,448	1,728,148	10,441,369	116,131,944	128,301,460
CDQ Royalties ($) [b]	838,830	3,922,503	44,316,587	49,077,919	647,600	3,912,763	43,518,888	48,079,251
CDQ Royalties ($/MT)	161.38	218.79	316.55	300.86	161.38	218.79	316.55	301.67

Notes:

[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.

[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-58 Alternative 2- CDQ allocations and royalties

CDQ	High				Low			
CDQ Allocation Impacts	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
CDQ Allocation (MT)	1,716	10,125	113,659	125,500	738	8,535	81,386	90,658
CDQ Allocation Ex-vessel Revenue ($) [a]	4,916	78,171	27,832,341	27,915,428	2,114	65,895	19,929,377	19,997,386
CDQ Allocation Wholesale Revenue ($)	738,974	6,700,435	96,009,802	103,449,211	317,781	5,462,345	68,747,920	74,528,045
CDQ Royalties ($) [b]	276,920	2,510,898	35,978,385	38,766,204	119,084	2,046,940	25,762,361	27,928,385
CDQ Royalties ($/MT)	161.38	247.99	316.55	308.89	161.38	239.83	316.55	308.06

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-59 Alternative 2- CDQ allocations and royalties difference from Alternative 1 (baseline)

CDQ	High Difference from Alternative 1 (Baseline)				Low Difference from Alternative 1 (Baseline)			
CDQ Allocation Impacts	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
CDQ Allocation (MT)	- 3,482	-7,803	-26,341	-37,626	- 3,275	-9,348	-56,094	-68,718
CDQ Allocation Ex-vessel Revenue ($) [a]	- 9,976	-60,245	-6,450,308	-6,520,528	- 9,383	-72,177	-13,736,184	-13,817,744
CDQ Allocation Wholesale Revenue ($)	- 1,499,479	-3,766,925	-22,250,833	-27,517,237	- 1,410,367	-4,979,024	-47,384,024	-53,773,415
CDQ Royalties ($) [b]	- 561,910	-1,411,604	-8,338,201	-10,311,715	- 528,516	-1,865,822	-17,756,527	-20,150,866
CDQ Royalties ($/MT)	0.00	29.20	0.00	8.04	0.00	21.04	0.00	6.39

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-60 Alternative 2- CDQ allocations and royalties percentage difference from Alternative 1 (baseline)

CDQ	High Percentage Difference from Alternative 1 (Baseline)				Low Percentage Difference from Alternative 1 (Baseline)			
CDQ Allocation Impacts	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
CDQ Allocation (MT)	-67%	-44%	-19%	-23%	-82%	-52%	-41%	-43%
CDQ Allocation Ex-vessel Revenue ($) [a]	-67%	-44%	-19%	-19%	-82%	-52%	-41%	-41%
CDQ Allocation Wholesale Revenue ($)	-67%	-36%	-19%	-21%	-82%	-48%	-41%	-42%
CDQ Royalties ($) [b]	-67%	-36%	-19%	-21%	-82%	-48%	-41%	-42%
CDQ Royalties ($/MT)	0%	13%	0%	3%	0%	10%	0%	2%

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-61 Alternative 4- CDQ allocations and royalties

CDQ	High				Low			
CDQ Allocation Impacts	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
CDQ Allocation (MT)	5,198	19,628	140,000	164,826	4,465	19,291	125,664	149,420
CDQ Allocation Ex-vessel Revenue ($) [a]	14,892	151,542	34,282,649	34,449,083	12,792	148,938	30,772,105	30,933,836
CDQ Allocation Wholesale Revenue ($)	2,238,452	11,460,016	118,260,635	131,959,104	1,922,843	11,263,107	106,150,746	119,336,696
CDQ Royalties ($) [b]	838,830	4,294,487	44,316,587	49,449,904	720,560	4,220,698	39,778,568	44,719,826
CDQ Royalties ($/MT)	161.38	218.79	316.55	300.01	161.38	218.79	316.55	299.29

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-62 Alternative 4- CDQ allocations and royalties difference from Alternative 1 (baseline)

CDQ	High Difference from Alternative 1 (Baseline)				Low Difference from Alternative 1 (Baseline)			
CDQ Allocation Impacts	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
CDQ Allocation (MT)	0	1,700	0	1,700	452	1,407	-11,816	-9,956
CDQ Allocation Ex-vessel Revenue ($) [a]	0	13,126	0	13,126	1,295	10,866	-2,893,456	-2,881,294
CDQ Allocation Wholesale Revenue ($)	0	992,656	0	992,656	194,695	821,738	-9,981,198	-8,964,764
CDQ Royalties ($) [b]	0	371,984	0	371,984	72,959	307,935	-3,740,320	-3,359,425
CDQ Royalties ($/MT)	0.00	0.00	0.00	-0.85	0.0	0.0	0.0	-2.4

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

Table 4.12-63 Alternative 4- CDQ allocations and royalties percentage difference from Alternative 1 (baseline)

CDQ	High Percent from Alternative 1 (Baseline)				Low Percent from Alternative 1 (Baseline)			
CDQ Allocation Impacts	Atka	Pacific cod	Pollock	Total	Atka	Pacific cod	Pollock	Total
CDQ Allocation (MT)	0%	9%	0%	1%	11%	8%	-9%	-6%
CDQ Allocation Ex-vessel Revenue ($) [a]	0%	9%	0%	0%	11%	8%	-9%	-9%
CDQ Allocation Wholesale Revenue ($)	0%	9%	0%	1%	11%	8%	-9%	-7%
CDQ Royalties ($) [b]	0%	9%	0%	1%	11%	8%	-9%	-7%
CDQ Royalties ($/MT)	0%	0%	0%	0%	0%	0%	0%	-1%

Notes:
[a] Ex-vessel revenues represent the delivered value of that portion of the CDQ allocations that are harvested by catcher vessels based on 1999 catch data.
[b] Royality are estimates assumed to be 38 percent of wholesale value, which corresponds to the weighted average of royalties for pollock from 1998 through 2000--royalty data specific to Atka mackerel and Pacific cod were not available.

4.12.2.3 Environmental Justice Effects

This discussion in this section is organized into six different topical areas as outlined below. Each topic is discussed in turn, and includes conclusions by region and alternative, consistent with other social impact analysis sections. The individual topics are:

- Community level environmental justice impacts
- Catcher vessel fleet related environmental justice impacts
- Catcher-processor fleet related environmental justice impacts
- Shore processor related environmental justice impacts
- CDQ related environmental justice impacts
- Subsistence related environmental justice impacts

Groundfish Community Level Environmental Justice Impacts

For the Alaska Peninsula/Aleutian Islands region, as noted in Section 4.12.2.2.1, Alternative 2 is projected to reduce participation in pollock and Pacific cod fisheries by 32 to 60 percent, depending on the socioeconomic indicator chosen. Given the relative dependency upon the pollock and Pacific cod components of the fishery, this would result in significant and profound impacts to those communities in the region most engaged in the fishery - Unalaska, Akutan, King Cove, and Sand Point. Beyond impacts to the fisheries related sector of the economy, impacts would ripple through other sectors of the local economy. The degree to which other sectors would decline depends upon the relative level of integration of the processing and harvesting sectors with the rest of the community economy and the diversity within the fisheries specific portion of the economy (these factors are discussed in detail in Appendix F(1)). Unalaska, with its substantial support service sector, would experience additional impacts. Fisheries related local government revenues would also decline significantly, with the specific amount depending on the local tax structure. Given that King Cove and Sand Point are communities where Alaska Natives constitute a plurality, these high and adverse impacts are an environmental justice issue, as they would disproportionately accrue to a minority population. Akutan, with its unique dual traditional community/large groundfish plant industrial enclave structure, plus its CDQ engagement, as described in Appendix F(1), would also likely experience environmental justice impacts, but the local fishery support sectors are relatively undeveloped compared to the other regional groundfish communities. Other predominately Alaska Native communities of the Aleutians East Borough would experience a substantial decline in groundfish related tax revenue as a result of Alternative 2, and economic opportunities are generally limited in these communities. Alternative 4 is not anticipated to have high and adverse impacts in the communities of this region.

For the Kodiak region, commercial groundfish activity is highly concentrated in the City of Kodiak itself, a largely non-Native community. All regional groundfish processors, except one, are located there, as are 87 percent of the regionally owned catcher vessels that, in turn, account for fully 95 percent of the total ex-vessel value of the regionally owned fleet over the period from 1992 to 2000. As noted in Section 4.12.2.2.2, Alternative 2 is projected to reduce Kodiak participation in the groundfish fishery by about 41 to 82 percent for pollock and Pacific cod combined, depending on the socioeconomic variable chosen. This would have significant socioeconomic effects upon the region, and especially the community of Kodiak, given the local engagement in, and dependency upon the groundfish fishery. The City of Kodiak's population is a non-minority plurality, and the Alaska Native population component is relatively small (less than 11 percent). It is not considered likely, therefore, that these would be environmental justice impacts, at least on the community level. Alternative 4 is not anticipated to result in high and adverse impacts to this region.

For the Southcentral and Southeast Alaska regions, the Washington inland waters region, and the Oregon coast region, neither Alternative 2 or Alternative 4 is anticipated to result in high and adverse impacts at the community level. Therefore, neither alternative is considered likely produce environmental justice concerns in these regions.

Catcher Vessel Fleet Related Environmental Justice Impacts

Resident owners and crew of the catcher vessel fleet in the Alaska Peninsula/Aleutian Islands region are assumed to be representative of the overall population of their communities. Given that assumption, the previously described significant impacts to regional catcher vessels resulting from Alternative 2 are considered to be high and adverse, and would disproportionately accrue to a minority (Alaska Native) population in the region, particularly in the communities of King Cove and Sand Point. These communities together accounted for 72 percent of all regionally owned groundfish vessels and 83 percent of the total regionally owned ex-vessel groundfish value over the 1992-2000 period. Some disproportionate impacts would also be likely in Unalaska/Dutch Harbor, where the local fleet accounted for 21 percent of all regionally owned groundfish vessels and 14 percent of the total regionally owned ex-vessel value during this same time span. It is not as clear, however, that this would be an environmental justice issue, given the overall demography of the community (less than 8 percent Alaska Native in 2000), despite the fact that Alaska Native residents may be more likely to be engaged in the catcher vessel sector of the fishery than is the general population due to length of residence and historical engagement in fishery activity in general, among other factors. High and adverse impacts are not anticipated to result from Alternative 4, and therefore environmental justice is not an issue for vessel owners and crews in this region under that alternative.

Vessel owners and crew in the Kodiak region will experience significant impacts under Alternative 2 similar to those seen for the Alaska Peninsula/Aleutian Islands region, but this is not likely to be an environmental justice issue, given the relatively small proportion of Alaska Natives in the overall community population. However, as was in the case of Unalaska/Dutch Harbor, Kodiak region Alaska Native residents may be more likely to be engaged in the catcher vessel sector of the fishery than is the general population, due to length of residence and historical engagement in fishery activity, among other factors. High and adverse impacts are not anticipated to result from Alternative 4, and therefore environmental justice is not an issue for vessel owners and crews in this region under that alternative.

For catcher vessel owners and crew in the Southcentral and Southeast Alaska regions, direct impacts resulting from Alternatives 2 or 4 are noted in earlier sections as not likely to be significant. There are no indications that the impacts that would occur and potentially accrue to minority populations or low-income populations would be high and adverse. Available data does not permit a determination of the minority status of vessel owners and crew from the Washington inland waters or Oregon coast regions, nor is disproportionate minority representation assumed to exist.

Catcher-Processor Related Environmental Justice Impacts

<< to be completed following receipt of industry input >>

Shore Processor Related Environmental Justice Impacts

As discussed in Section 3.12.2.10, the workforce populations associated with the shore based processing plants in the Alaska Peninsula/Aleutian Islands region are significantly different demographically from the overall populations of these communities. These workforces are largely comprised of minority workers, primarily of either Asian or Hispanic ancestry. Industry provided data indicate that in 2000, 79 percent of the workers at the plants are minority individuals, and that individual reporting plants were anywhere from about three-quarters to over 90 percent minority. While a complete sample of processors was not obtained, it is assumed for the purposes of this analysis (and this assumption is based, in part, on previous knowledge of the industry) that the large processors in the region are at least roughly equivalent in their workforce composition, at least with respect to the general proportion of minority hires, if not in the specific combination of minority groups represented at each entity. Therefore, the estimated 1,200 to 2,200 jobs (FTE's) lost to the total shore based processing employment in the region under Alternative 2 (Table 4.12-12) would overwhelmingly be jobs lost by minority workers. This would be a high and adverse impact disproportionately accruing to a minority population, and therefore is an environmental justice impact. These impacts would be further accentuated by the fact that, as noted in Section 3.12.2.10, at least some of these workers have limited English language skills and this, combined with limited opportunity to acquire job skills in other economic sectors, would tend to indicate that these minority workers would be less able to easily acquire alternative employment outside of the seafood industry than average American workers. Alternative 4 is not anticipated to have high and adverse impacts to this sector in the Alaska Peninsula/Aleutian Islands region.

For the Kodiak region, shorebased groundfish processing employment under Alternative 2 is expected to decline by approximately 240 to 340 jobs (FTE's) (Table 4.12-16). Although relatively small in comparison to the job losses anticipated for the Alaska Peninsula/Aleutian Islands region, this is a very substantial proportion (about 50 to 70 percent) of total Pacific cod, pollock, and Atka mackerel groundfish shore processing employment in the Kodiak region. Industry provided data, though incomplete, suggest that these jobs are overwhelmingly held by minority workers. Therefore, this high and adverse impact, accruing disproportionately to a minority population, would be an environmental justice impact. Alternative 4 is not anticipated to result in high and adverse impacts to this sector in this region.

For the Southcentral and Southeast Alaska regions, neither Alternative 2 nor Alternative 4 are anticipated to result in high and adverse employment impacts to shore based processors. Additionally, no Alaska groundfish shore based processors are located in the Washington inland waters or Oregon coast regions. Therefore, environmental justice is not considered an issue for this sector in these regions.

CDQ Related Environmental Justice Impacts

CDQ impacts under Alternative 2, as described in Section 4.12.2.2.7, will result in disproportionate high and adverse impacts to the predominately Alaska Native CDQ region communities. As noted in Appendix F(4), the Alaska Native population component represents 87 percent of the total population of the communities of this region. Further, as recognized by the very initiation of the CDQ program, the region is economically underdeveloped and employment and income alternatives are few. CDQ impacts would be felt in a number of different ways, including employment, income, revenues, royalties, and return on fishery investments, as described in Section 4.12.2.2.7. Impacts deriving from Alternative 4 are not likely to be high and adverse or disproportionately felt in the CDQ region.

Subsistence Related Environmental Justice Impacts

Potential subsistence impacts are described in Appendix F(3). Subsistence impacts in general are an environmental justice issue due to the disproportionate involvement of Alaska Natives in subsistence pursuits (and the exclusive engagement of Alaska Natives in subsistence activities involving taking of marine mammals). As noted in the Appendix F(3) analysis, no direct negative impacts on groundfish subsistence utilization or Steller sea lion subsistence utilization are anticipated for any of the alternatives. Indirect impacts as a result of lost opportunities for joint commercial and subsistence production are possible, however, and would most likely be experienced in King Cove, Sand Point, and Kodiak under Alternative 2 for reasons detailed in Appendix F(3). Given the assumption that the King Cove and Sand Point catcher vessel fleets are reflective of the overall demographic structures of those communities, and given that those communities have a plurality of Alaska Native residents, to the degree that joint production impacts are felt, they would likely be environmental justice impacts. For Kodiak, the white or non-minority residents represent a plurality, and the Alaska Native component of the population only accounts for 10 percent of the total population. Therefore, subsistence impacts in this community are not likely to be a high and adverse environmental justice issue. Indirect subsistence impacts resulting from a loss of commercial fisheries income are also likely under Alternative 2, but these impacts may be felt in a much wider range of communities, and are not possible to quantify with existing data. Subsistence impacts under Alternative 4 are not likely to be significant.

High and adverse impacts to subsistence are not considered likely for either the Southcentral or Southeast Alaska regions under either Alternative 2 or Alternative 4. Subsistence impacts are not applicable to the Washington inland waters region or the Oregon coast region. Therefore, impacts to subsistence is not an environmental justice issue in any of these four regions.

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APPENDIX C - RIR

1.4.3.4 Impacts on Community Development Quota Groups and Communities

1.4.3.4.1 Background

The Western Alaska Community Development Quota (CDQ) Program was created by the North Pacific Fishery Management Council (Council) in 1992, in connection with the inshore/offshore allocation of pollock in the Bering Sea and Aleutian Islands. The purpose of the CDQ Program was to help western Alaska communities to diversify their local economies and to provide new opportunities for stable, long-term employment.

Currently, 65 communities are eligible to participate in the CDQ Program. The CDQ communities are located within 50 nautical miles of the Bering Sea coast or on an island in the Bering Sea. Approximately 27,000 people live in the CDQ communities, which are small communities populated predominantly by Alaska Native people (Table 2.5-5 of this SEIS lists the 65 CDQ communities). These 65 communities have formed the following six non-profit corporations, called "CDQ groups", to manage and administer their CDQ allocations, investments, and economic development projects:

Aleutian Pribilof Island Community Development Association (APICDA)
Bristol Bay Economic Development Corporation (BBEDC)
Central Bering Sea Fishermen's Association (CBSFA)
Coastal Villages Region Fund (CVRF)
Norton Sound Economic Development Corporation (NSEDC)
Yukon Delta Fisheries Development Association (YDFDA)

Through the CDQ Program, a portion of the Bering Sea and Aleutian Islands area (BSAI) TACs for crab, halibut, groundfish, and prohibited species are allocated to eligible western Alaska communities. The percentage of each catch limit allocated to the CDQ Program is determined by the American Fisheries Act (AFA) for pollock (10%), the Magnuson-Stevens Act for crab (7.5%), the Fishery Management Plan for the Groundfish Fisheries of the Bering Sea and Aleutian Islands area (FMP) for all other groundfish and prohibited species (7.5%, except 20% for fixed gear sablefish), and 50 CFR 679 for halibut (20% to 100%). These allocations to the CDQ Program are called "CDQ reserves." Table 2.5-6 of this SEIS summarizes the 2001 CDQ reserves.

With the addition of the remainder of the groundfish species and the prohibited species allocations in 1998, NMFS implemented regulations combining the two separate CDQ fisheries (pollock and fixed gear halibut and sablefish) with the new groundfish and prohibited species into the multispecies groundfish and halibut CDQ fisheries. The CDQ groups are required to manage their catch to stay within all of their CDQ allocations. NMFS implemented this system of strict quota accountability because the Council recommended that all bycatch in all of the CDQ fisheries should accrue against the CDQ allocations and none of this catch should be subtracted from the portion of the quotas available to the non-CDQ fisheries.[1]

In 2000, approximately 180,000 metric tons of groundfish, 3 million pounds of halibut, and 3 million pounds of crab were allocated to the CDQ Program. The primary source of income for the CDQ groups is royalties from leasing their CDQ allocations. In 2000, the six CDQ groups earned $63 million in total revenues, of which about $40 million (63 percent) was from royalties. The remaining 37 percent of revenues was from income from partnerships, interest income, sale of property, leases, loan repayment, and other income.

Pollock is the most valuable species to the CDQ groups, contributing about $33 million in royalties in 2000 (83 percent of royalties). Since 1992, the six CDQ groups have accumulated assets worth approximately $187 million, including ownership of small local processing plants, catcher vessels, and catcher/processors that participate in the groundfish, crab, salmon, and halibut fisheries. The CDQ groups have used their CDQ allocations to develop local fisheries, invest in a wide range of fishing businesses outside the communities, and provide residents with education, training, and job opportunities in the fishing industry (State of Alaska, 2001).

In terms of the pollock, Pacific cod, and Atka mackerel fisheries, the CDQ groups lease quota both to vessels they own and to independent vessels. If CDQ is leased to vessels owned by the CDQ group, they receive both royalties from lease of the quota, as well as a share of any profits (or loss) made by the vessel. If CDQ is leased to independent vessels, the CDQ group receives just the royalties. All of the CDQ groups own a share of catcher/processors or a mothership that participate in the pollock fisheries, and most of their pollock allocations are harvested by these partners. Four of the six groups own a share of longline catcher/processors that participate in the BSAI Pacific cod fisheries. These vessels harvest all of the groups' Pacific cod CDQ, except an amount reserved by the groups as incidental catch in other CDQ fisheries. None of the CDQ groups have purchased vessels that participate in the Atka mackerel fisheries, so all of the Atka mackerel CDQ is leased to vessels that are independent of the CDQ groups. In addition to royalties and profit sharing, the CDQ groups also employ community residents on vessels, in processing plants, and in the offices of the vessels and processors they partner with. Table C-61 lists the vessels and processors owned by CDQ groups that participate in the pollock or Pacific cod fisheries.

Any management measure that decreases the value of the pollock, Pacific cod, or Atka mackerel fisheries in general, also will negatively affect the CDQ groups through reduced royalties, reduced profit-sharing, or increased costs. Individual community residents who already work for CDQ industry partners may be negatively affected if they earn less, because the value of a fishery decreases, or they work fewer days because quotas have decreased. Future workers from CDQ communities may be negatively impacted if fewer jobs are available in the fishing industry.

One of the reasons that the CDQ allocations are valuable is because these quotas are available to fish during times when the non-CDQ fisheries are closed. In addition, the CDQ allocations are not harvested on a competitive basis, as are many of the non-CDQ fisheries. These allocations are made to a specific

[1]The allocation of squid to the CDQ Program was removed in 1999 under an emergency rule and permanently in 2001, so that the bycatch of squid in the pollock CDQ fisheries would not prevent the CDQ groups from fully harvesting their pollock CDQ allocations.

Table C-61. Community Development Quota groups' investments in vessels or processors that participate in the pollock or Pacific cod fisheries off Alaska.

CDQ Group	Vessel or Processor Name	Fishery	Percent CDQ Owns
APICDA	Bering Pacific Seafoods in False Pass	Pacific cod	100%
APICDA	Bering Prowler, longline catcher/processor	Pacific cod	25%
APICDA	Prowler, longline catcher/processor	Pacific cod	25%
APICDA	Ocean Prowler, longline catcher/processor	Pacific cod	25%
APICDA	Golden Dawn, trawl and pot catcher vessel	Pollock, crab	25%
APICDQ	Starbound, trawl catcher/processor	Pollock	20%
BBEDC	Bristol Leader, longline catcher/processor	Pacific cod	50%
BBEDC	Neahkanie, trawl catcher vessel	Pollock	20%
BBEDC	Arctic Fjord, trawl catcher/processor	Pollock	20%
CBSFA	American Seafoods, 7 trawl catcher/processors	Pollock, cod, flatfish	3.47%
CVRF	Ocean Prowler, longline catcher/processor	Pacific cod	20%
CVRF	American Seafoods, 7 trawl catcher/processors	Pollock, cod, flatfish	22.6667%
NSEDC	Glacier Fish Company, 2 trawl catcher/processors, 1 longline catcher/processor, salt cod processing facility	Pollock, cod, halibut, sablefish	50%
YDFDA	Golden Alaska, mothership	Pollock	19.8%
YDFDA	Alakanuk Beauty, trawl catcher vessel	Pollock	75%
YDFDA	Emmonak Leader, trawl catcher vessel	Pollock	75%
YDFDA	Lisa Marie, multi-gear catcher vessel	Pacific cod, halibut	100%

CDQ group and, within some very limited seasonal restrictions, the CDQ group decides when and how to harvest its quota. Because the CDQ allocations are reserved for a particular CDQ group and may be harvested during times when the non-CDQ fisheries are closed, the industry partners do not want to harvest CDQ while they have an opportunity to harvest fish in a non-CDQ fishery. Therefore, with the exception of the AFA pollock fisheries, CDQ harvests occur outside of the time of the directed fisheries. The pollock AFA fisheries operate under a cooperative structure and, in recent years, the CDQ and AFA allocations have been harvested at almost the same time, with vessels sometimes alternating between CDQ and AFA hauls in the same day. Pacific cod CDQ is harvested almost exclusively by longline catcher/processors during in the late spring and summer and again after the non-CDQ fisheries close in the late fall or winter. The Atka mackerel CDQ allocations generally are harvested by one or two trawl catcher/processors in the late spring and early summer.

1.4.3.4.2 CDQ Allocations Under the Alternatives

Table C-62 summarizes the allocations to the CDQ Program under each of the alternatives. Section 2.5 of this SEIS contains a more detailed explanation of how the TAC limits and CDQ reserves are calculated under each alternative. Under Alternative 2 and Alternative 3, the many subdivisions of the TACs result in some relatively small CDQ reserves. For example, under Alternative 2, the Pacific cod CDQ reserve in the Aleutian Islands would be about 100 mt and Atka mackerel CDQ reserves in the Bering Sea/Eastern Aleutian Islands would be 89 mt per season. Under Alternative 3, some of the inside critical habitat area catch limits for the CDQ fisheries are very small (e.g., 21 mt for Aleutian Islands pollock).

Each of the CDQ reserves shown in Table C-62 would be further allocated among the six CDQ groups using the percentage allocations shown in Table C-63 (allocations for 2001 and 2002). Application of these percentage allocations would result in some very small CDQ allocations to individual groups, particularly under Alternatives 2 and 3. Some of these quota amounts are less than could be harvested in a single trawl haul. Very small annual CDQ allocations to individual groups are of concern because it would be difficult for the CDQ groups to manage their catch within their allocations. The groups would have to decide whether to forego harvest of CDQ in the area or risk an overage, which is a violation of NMFS regulations and subject to penalties.

Alternative 2 would divide the BSAI Pacific cod TAC into five area TACs, as described in Section 2.3. Once the Pacific cod CDQ reserve is allocated among the groups, individual groups would receive CDQ allocations for the Central Aleutian Islands of between 10 mt and 20 mt for the year. The largest Pacific cod CDQ allocations would occur in the east of 170° west longitude area, and would range from 200 mt to 300 mt per CDQ group for the year. In contrast, the 2001 BSAI Pacific cod CDQ allocations to individual groups range from 1,400 mt to about 2,600 mt and can be fished in any open area of the BSAI at any time during the year. The Atka mackerel CDQ allocations to individual groups in the Bering Sea and Eastern Aleutian Islands also would be quite small, ranging from seven metric tons to 27 mt. The 2001 Atka mackerel allocations in this area range from 47 mt to 100 mt per CDQ group.

Under Alternative 3, some of the seasonal inside critical habitat area catch limits to individual CDQ groups also would be quite small. The A season inside critical habitat allocation of pollock would range from 1 mt to 5 mt. Other critical habitat area catch limits for Pacific cod and Atka mackerel also would be less than 20 mt for each of the CDQ groups (e.g. AI C season Pacific cod and BS/EAI A season Atka mackerel).

Overall, Alternatives 2 and 3 appear to be the most costly to the CDQ groups because they create so many smaller quota categories. These small quotas would be difficult for the CDQ groups to manage, may result in foregone catch, and may generate lower royalties because they will be more costly to harvest and they represent very little additional fishing time for potential partners.

Table C-62 Estimated amount of pollock, Pacific cod, and Atka mackerel allocations to the CDQ program under each alternative

Alternative 1					
	A	**B**	**Total**		
Seasons	1/20-4/15	9/1-11/1			
BS Pollock	63,000	77,000	140,000		
AI Pollock	2,380		2,380		
BSAI Pacific Cod	na	na	14,100		
BS/EAI Atka Mackerel	na	na	585		
CAI Atka Mackerel	na	na	2,520		
Inside CH	na	na	1,008		
WAI Atka Mackerel	na	na	2,093		
Inside CH	na	na	837		
Alternative 2					
	A	**B**	**C**	**D**	**Total**
	1/20-3/15	4/1-6/1	6/15-8/15	9/1-12/31	
Bering Sea Pollock					
East of 170 W	17,840	15,438	13,380	13,380	60,038
West of 170 W	16,467	18,869	20,927	20,927	
AI Pollock	No Directed Fishing of Pollock in the Aleutian Islands				
Pacific Cod					
East of 170 W	2,079	1,293	1,293	1,597	6,262
West of 170 W	456	1,242	1,242	938	3,878
EAI (541)	128	128	128	128	10,140
CAI (542)	100	100	100	100	401
WAI (543)	118	118	118	118	471
BS/EAI Atka Mackerel	89	89	89	89	356
CAI Atka Mackerel	384	384	384	384	1,536
WAI Atka Mackerel	319	319	319	319	1,276
Alternative 3					
	A	**B**	**C**	**D**	**Total**
Season	1/20-4/1	4/1-6/10	6/10-8/21	8/21-11/1	
Bering Sea Pollock	56,000		84,000		140,000
Limit Inside Area 7	10,220	6,440	1,260	1,960	19,880
Aleutian Islands Pollock	952		1,428		2,380
Limit Inside CH-RFRPA	21	24	43	40	128
BS Pacific Cod	4,963		7,445		12,408
Limit Inside CH-RFRPA	856	161	310	744	2,071
AI Pacific Cod	677		1,015		1,692
Limit Inside CH-RFRPA	232	125	74	164	595
BS/EAI Atka Mackerel	234		351		585
Limit Inside CH-RFRPA	88	88	130	130	436
CAI Atka Mackerel	1,008		1,512		2,520
WAI Atka Mackerel	837		1,256		2,093

Table C-62 Estimated amount of pollock, Pacific cod, and Atka mackerel allocations to the CDQ program under each alternative (Cont.)

Alternative 4					
	A	B	Total		
Bering Sea Pollock					
Season	1/20-6/10	6/10-11/1			
Seasonal Allocation	56,000	84,000	140,000		
Inside SCA	42,000		42,000		
Aleutian Islands Pollock			2,380		
BSAI Pacific Cod					
Seasons (Longline)	**1/1-6/10**	**6/10-12/31**			
Seasons (Pot)			**1/1 - 12/31**		
Seasons (Trawl)					
Seasonal Allocation	8,460	5,640	14,100		
BSAI Atka Mackerel seasons	**1/20-4/15**	**9/1-11/1**			
BS/EAI Atka Mackerel	293	293	586		
CAI Atka Mackerel	1,260	1,260	2,520		
Inside CH	882	882	1,764		
WAI Atka Mackerel	1,046	1,046	2,092		
Inside CH	732	732	1,464		
Alternative 5					
	A	B	C	D	Total
Seasons	1/20-4/1	4/1-6/10	6/10-8/20	8/20-11/1	
Bering Sea Pollock	56,000		84,000		140,000
Limit Inside SCA	34,720	11,480	11,760	19,320	77,280
Aleutian Islands Pollock	No Directed Fishing for Pollock				
	A	B			
Pacific Cod					
Seasons	1/20-5/1	5/1-11/1	Total		
BS Seasonal Allocation	4,963	7,445	12,408		
BS Limit Inside CH-RFRPA	2,482	447	2,929		
AI Seasonal Allocation	677	1,015	1,692		
AI Limit Inside CH-RFRPA	338	817	1,155		
BS/EAI Atka mackerel	na	na	585		
CAI Atka mackerel	na	na	2,520		
Inside CH	na	na	1,008		
WAI Atka mackerel	na	na	2,093		
Inside CH	na	na	837		

Notes:
BSAI = Bering Sea and Aleutian Islands Area
BS = Bering Sea
AI = Aleutian Islands
EAI = Eastern Aleutian Islands (541)
CAI = Central Aleutian Islands (542)
WAI = Western Aleutian Islands (543)
CH = Steller sea lion critical habitat
SCA = Steller sea lion conservation area
CH-RFRPA = Steller sea lion critical habitat under the Revised Final Reasonable and Prudent Alternative in NMFS's 2000 Biological Opinion

Table C-63 Percentage Allocations of Pollock, Pacific Cod, and Atka Mackerel to the CDQ Groups in 2001.

	Percentage Allocations to Each CDQ Group in 2001		
CDQ Group	**Pollock**	**Pacific Cod**	**Atka Mackerel**
APICDA	14	16	30
BBEDC	21	20	15
CBSFA	4	10	8
CVRF	24	17	15
NSEDC	23	18	14
YDFDA	14	19	18

Source: State of Alaska, Department of Community and Economic Development. Western Alaska Community Development Quota Handbook. Published by the Division of Community and Business Development, CDQ Program Office, Juneau, Alaska. June, 2001. 228 p.

1.4.3.4.3 Seasonal Allocations of Atka Mackerel and Pacific Cod Under Alternative 4

Although not specifically stated in the description of Alternative 4 in the Draft SEIS, it was assumed that the seasons and seasonal allocations of Atka mackerel and Pacific cod would apply to the CDQ fisheries. Seasonal allocations have applied to the pollock CDQ reserve since implementation of the pollock CDQ Program in 1992. However, the seasonal allocations for Steller sea lion protection that have been in effect since 1999 for Atka mackerel and 2001 for Pacific cod have not applied to the CDQ reserves for these species. The proposed rule for Steller sea lion protection measures in the Atka mackerel fisheries (63 FR 60288; November 9, 1998) states that the reason the seasonal allocation was not applied to the CDQ reserve was because "jig gear and CDQ fishing occur outside the time period of the open access trawl fishery, and ...are too small, widely dispersed, and slowly paced to lead to localized depletions of Atka mackerel." Rulemaking implementing the seasonal allocation of Pacific cod in 2001 did not specifically address why the seasonal allocation did not apply to the CDQ reserve for Pacific cod (66 FR 7276; January 22, 2001).

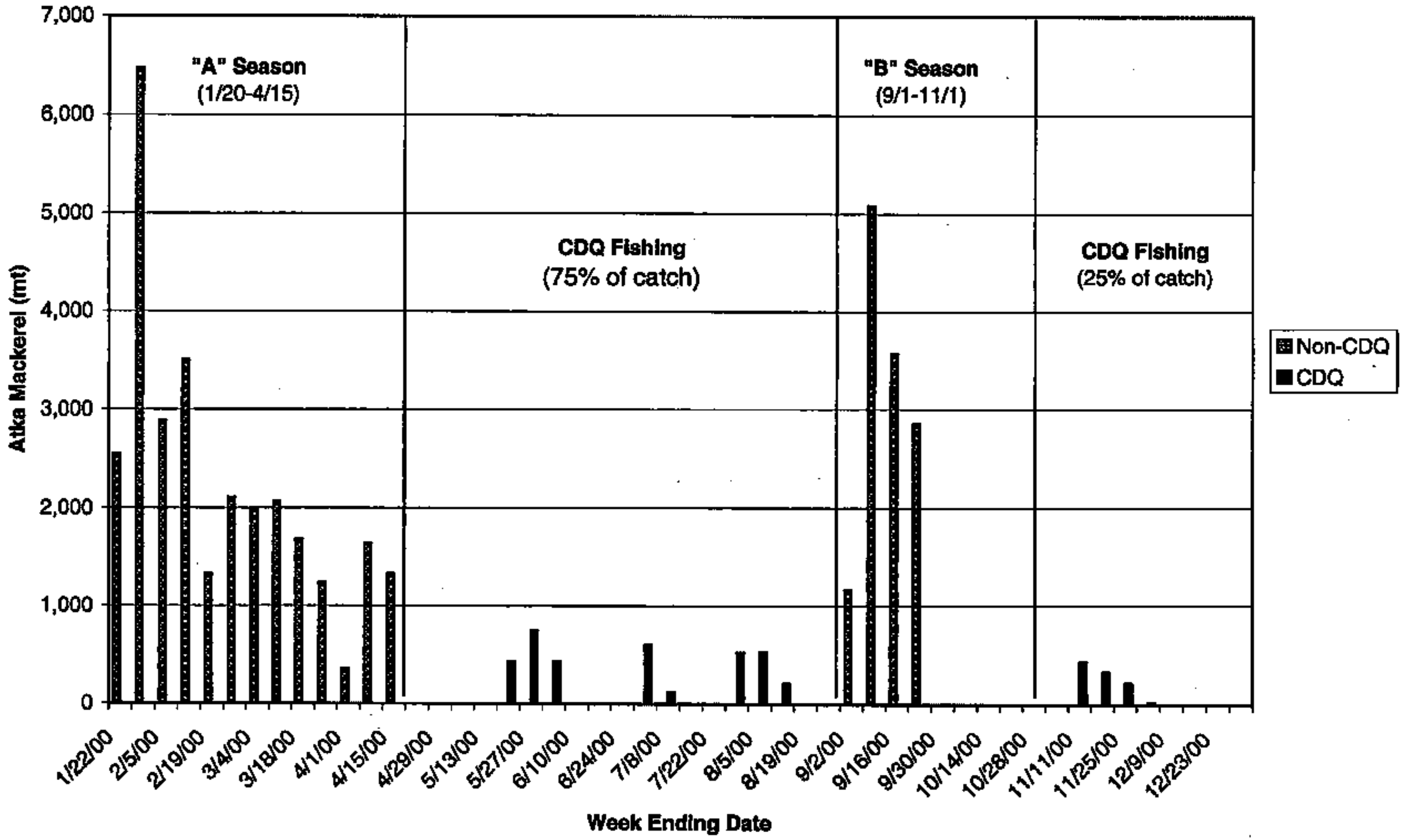
Atka Mackerel: Alternative 4 would apply the seasonal allocation of Atka mackerel to the CDQ fisheries. The Atka mackerel CDQ allocation to each group would be allocated 50 percent to the "A" season (January 20 through April 15) and 50 percent to the "B" season (September 1 through November 1), and would prohibit directed fishing for Atka mackerel by the CDQ groups between April 15 to September 1. This alternative would significantly reduce the time available for the CDQ groups to harvest their Atka mackerel allocations as compared to the 1999 through 2001 CDQ fisheries. Table C-64 summarizes the seasonal distribution of Atka mackerel catch in the 1999 through 2001 CDQ fisheries (2001 data is through 9/16/01). Figure C-X1 shows the timing of Pacific cod catch by the CDQ and non-CDQ fisheries by week in 2000.

The CDQ groups caught almost zero Atka mackerel between January 1 and April 15, because these are the times that their partner vessels are participating in open access Atka mackerel, flatfish, and cod fisheries. In 1999, the CDQ groups caught 78 percent of their annual Atka mackerel catch between April 15 and September 1 and in 2000, they caught 75 percent of the Atka mackerel in this period. They caught 12 percent (in 1999) and 0 percent (2000) of their Atka mackerel during the "B" season (September 1 through November 1). The groups caught the remainder of their Atka mackerel between November 1 and December 31 (9 percent in 1999 and 25 percent in 2000).

Table C-64. **Catch of Atka mackerel in the CDQ fisheries by season, 1999, 2000, and 2001 through September 16, 2001 (values in metric tons and percentages of total annual catch).**

Season and Annual Totals	1999	2000	2001
1/20 - 4/15 Catch (% of total)	0	12 (0.25%)	0
4/15 - 9/1 Catch (% of total)	2,026 (78%)	3,596 (75%)	3,466
9/1 - 11/1 Catch (% of total)	317 (12%)	0	182 (thru 9/16/01)
11/1 - 12/31 Catch (% of total)	244 (9%)	1,179 (25%)	
Annual total catch	2,588 (100%)	4,787 (100%)	3,648 (thru 9/16/01)
Annual allocation	4,980	5,309	5,198
% of annual allocation harvested	52%	90%	70% (9/16/01)

Figure C-X1
Catch of Atka Mackerel in the BSAI Trawl Fisheries in 2000
CDQ vs Non-CDQ by Week



Pacific cod:

Alternatives 4 is assumed to apply seasons and seasonal allocations to the Pacific cod CDQ allocations. However, it is not clear in the current description of Alternative 4 what seasons and seasonal allocations should apply to the CDQ fisheries. Alternative 4 proposes different seasons and allocations for various gear and vessel types, including trawl catcher vessels, trawl catcher/processors, longline and jig gear, and pot gear. This makes sense for the non-CDQ fisheries, because the Pacific cod TAC is allocated among these gear and vessel types. However, the CDQ reserve is not allocated among gear types. Although the CDQ groups have historically used longline catcher/processors to harvest their Pacific cod allocations, they are not required to do so, and they may decide to use other gear types in the future. The only specific reference to the CDQ fisheries in Alternative 4's Pacific cod seasons, was that "pot CDQ" has a season from January 1 through December 31.

NMFS is assuming that, if the Council desires to apply seasonal allocations to the Pacific cod CDQ reserve, it would be appropriate to use the seasons and seasonal allocations that apply to vessels using longline gear. This would allow vessels using longline, pot, and jig gear to fish at any time from January 1 through December 31, but would allocate the cod CDQ reserve 60 percent to January 1 through June 10 and 40 percent from June 10 through December 31. The CDQ groups would be prohibited from using trawl gear to directed fish for Pacific cod before January 20 and after November 1.

The seasonal allocation would prohibit the CDQ groups from catching more than 60 percent of their Pacific cod allocations before June 10. However, "roll-over" provisions for the seasonal allocations would allow the CDQ groups to catch less than 60 percent in the A season and carry forward any remaining quota to be harvested during the B season. Therefore, Alternative 4 would have a negative impact on the CDQ fisheries if they wished to catch more than 60 percent of their Pacific cod allocations prior to June 10.

Table C-65 summarizes the seasonal distribution of Pacific cod catch in the 1999 through 2001 CDQ fisheries (2001 data is through 9/16/01). Figure C-X2 shows the distribution of the Pacific cod catch in the CDQ and non-CDQ fisheries by week in 2000. I

In 1999, the CDQ groups caught about 40 percent of their Pacific cod allocation between January 1 and June 10 and the remaining 60 percent after June 10. In 1999, the non-CDQ fisheries were open between January 1 and April 17; between September 15 and October 19, and again between December 6 and December 31. The last December opening was as a result of reallocating unused Pacific cod from the trawl to non-trawl sector. This type of reallocation often occurs because vessels using trawl gear cannot fully harvest their cod allocations. When this occurs, it makes the non-CDQ longline fishing season longer, thereby reducing the available days to harvest CDQ Pacific cod.

In 2000, the CDQ groups harvest about 60 percent of their Pacific cod allocations between January 1 and June 10 and 40 percent between June 10 and December 31 (see also Figure C-X2). The non-CDQ longline cod fishery was open between January 1 and March 10, and closed about five weeks earlier than in 1999, providing more time for CDQ fishing in the spring of 2000. CDQ fishing continued through the summer right up until the opening of the non-CDQ fisheries again on September 1, 2000. The non-CDQ fisheries were open between September 1 and December 9, 2000. NMFS reallocated about 11,000 mt of Pacific cod from the trawl to non-trawl sectors on October 27, 2000 which contributed to the long fall/winter opening for Pacific cod.

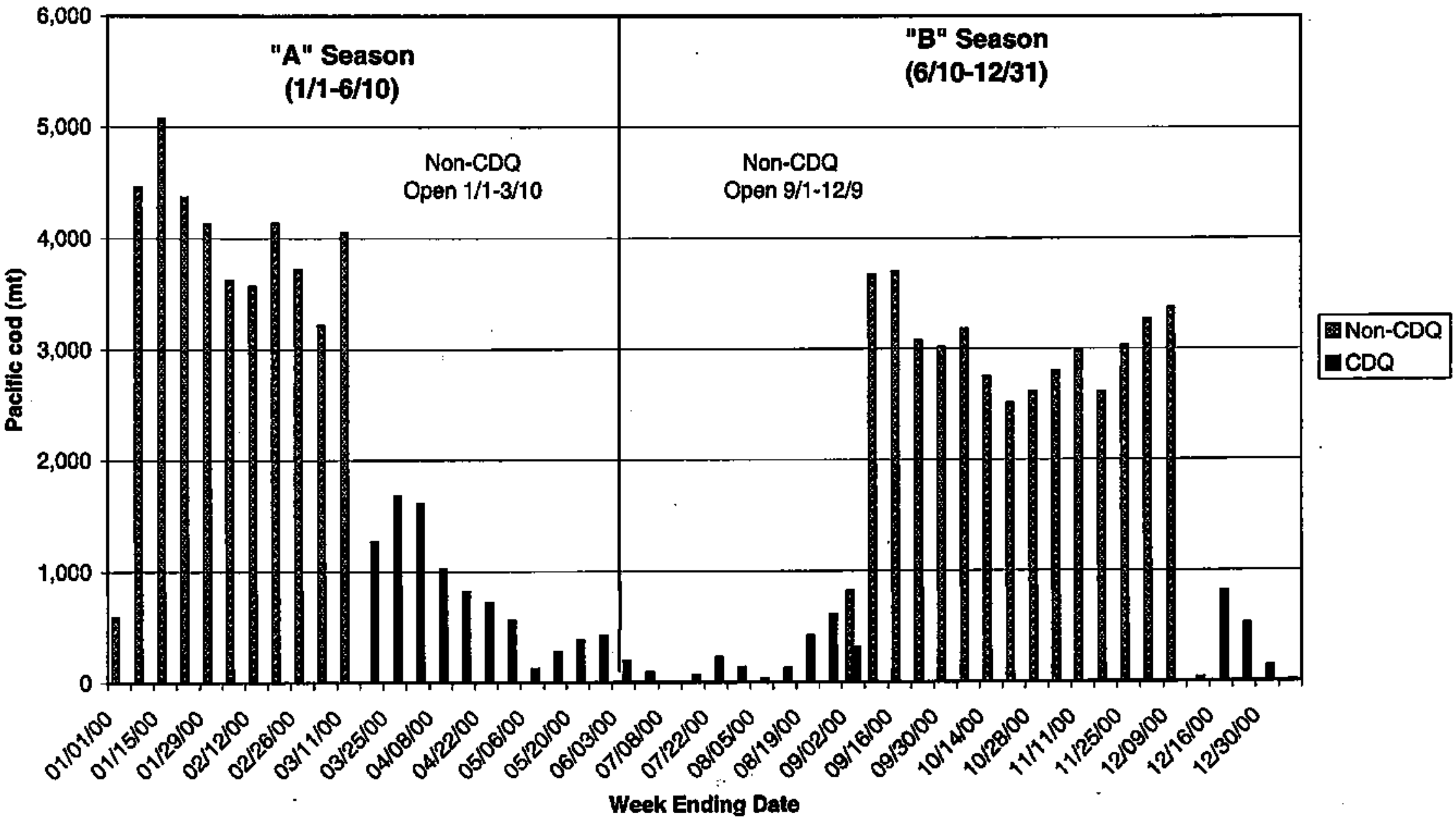
Table C-65. Catch of Pacific cod in the CDQ fisheries by season, 1999, 2000, and 2001 through September 16, 2001 (values in metric tons and percentages of total annual catch).

Season and Annual Totals	1999	2000	2001
1/1 - 6/10 Catch (% of total)	4,854 (39%)	9,305 (69%)	7,821
6/10 - 12/31 Catch (% of total)	7,641 (61%)	4,222 (31%)	2,024 (thru 9/16/01)
Annual total catch	12,495 (100%)	13,527 (100%)	9,845 (thru 9/16/01)
Annual allocation	13,275	14,527	14,100
% of annual allocation harvested	94%	93%	70% (thru 9/16/01)

In 2001, the CDQ groups harvested about 55 percent of their Pacific cod CDQ allocation before June 10. They had a somewhat shorter window of time than in 2000 to harvest cod in the spring and summer because the non-CDQ cod fisheries were open from January 1 to March 25 and re-opened on August 15.

Applying the seasonal allocation to Pacific cod CDQ may make it more difficult for the CDQ groups to find sufficient opportunities to harvest Pacific cod than under current regulations, if they want to be able to harvest more than 60 percent of their cod allocation before June 10, as they did in in 2000. The open seasons for non-CDQ cod fishing by longline catcher/processors are longer than for the trawl fisheries for pollock and Atka mackerel, and fishermen do not want to target Pacific cod for CDQ or non-CDQ quotas in the mid-summer due to high bycatch and low product quality. In the last three years, the opening date for second season cod fisheries has been progressively earlier (September 15 to September 1 to August 15), and the non-CDQ longline fisheries usually are extended by reallocations of cod from the trawl sector. These factors increase the chance that the CDQ groups may not have enough time in the "B" season to fully harvest the cod CDQ allocations.

Figure C-X2
Catch of BSAI Pacific Cod by Vessels Using Longline Gear in 2000
CDQ vs Non-CDQ Catch by Week



State and local reviews of the draft environmental impact statements.

(3) Request comments from the applicant, if any.

(4) Request comments from the public, affirmatively soliciting comments from those persons or organizations who may be interested or affected.

(b) An agency may request comments on a final environmental impact statement before the decision is finally made. In any case other agencies or persons may make comments before the final decision unless a different time is provided under § 1506.10.

§ 1503.2 Duty to comment.

Federal agencies with jurisdiction by law or special expertise with respect to any environmental impact involved and agencies which are authorized to develop and enforce environmental standards shall comment on statements within their jurisdiction, expertise, or authority. Agencies shall comment within the time period specified for comment in § 1506.10. A Federal agency may reply that it has no comment. If a cooperating agency is satisfied that its views are adequately reflected in the environmental impact statement, it should reply that it has no comment.

§ 1503.3 Specificity of comments.

(a) Comments on an environmental impact statement or on a proposed action shall be as specific as possible and may address either the adequacy of the statement or the merits of the alternatives discussed or both.

(b) When a commenting agency criticizes a lead agency's predictive methodology, the commenting agency should describe the alternative methodology which it prefers and why.

(c) A cooperating agency shall specify in its comments whether it needs additional information to fulfill other applicable environmental reviews or consultation requirements and what information it needs. In particular, it shall specify any additional information it needs to comment adequately on the draft statement's analysis of significant site-specific effects associated with the granting or approving by that cooperating agency of necessary Federal permits, licenses, or entitlements.

(d) When a cooperating agency with jurisdiction by law objects to or expresses reservations about the proposal on grounds of environmental impacts, the agency expressing the objection or reservation shall specify the mitigation measures it considers necessary to allow the agency to grant or approve applicable permit, license, or related requirements or concurrences.

§ 1503.4 Response to comments.

(a) An agency preparing a final environmental impact statement shall assess and consider comments both individually and collectively, and shall respond by one or more of the means listed below, stating its response in the final statement. Possible responses are to:

(1) Modify alternatives including the proposed action.

(2) Develop and evaluate alternatives not previously given serious consideration by the agency.

(3) Supplement, improve, or modify its analyses.

(4) Make factual corrections.

(5) Explain why the comments do not warrant further agency response, citing the sources, authorities, or reasons which support the agency's position and, if appropriate, indicate those circumstances which would trigger agency reappraisal or further response.

(b) All substantive comments received on the draft statement (or summaries thereof where the response has been exceptionally voluminous), should be attached to the final statement whether or not the comment is thought to merit individual discussion by the agency in the text of the statement.

(c) If changes in response to comments are minor and are confined to the responses described in paragraphs (a) (4) and (5) of this section, agencies may write them on errata sheets and attach them to the statement instead of rewriting the draft statement. In such cases only the comments, the responses, and the changes and not the final statement need be circulated (§ 1502.19). The entire document with

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7609), and E.O. 11514 (Mar. 5, 1970, as amended by E.O. 11991, May 24, 1977).

SOURCE: 43 FR 55999, Nov. 29, 1978, unless otherwise noted.

§ 1505.1 Agency decisionmaking procedures.

Agencies shall adopt procedures (§ 1507.3) to ensure that decisions are made in accordance with the policies and purposes of the Act. Such procedures shall include but not be limited to:

(a) Implementing procedures under section 102(2) to achieve the requirements of sections 101 and 102(1).

(b) Designating the major decision points for the agency's principal programs likely to have a significant effect on the human environment and assuring that the NEPA process corresponds with them.

(c) Requiring that relevant environmental documents, comments, and responses be part of the record in formal rulemaking or adjudicatory proceedings.

(d) Requiring that relevant environmental documents, comments, and responses accompany the proposal through existing agency review processes so that agency officials use the statement in making decisions.

(e) Requiring that the alternatives considered by the decisionmaker are encompassed by the range of alternatives discussed in the relevant environmental documents and that the decisionmaker consider the alternatives described in the environmental impact statement. If another decision document accompanies the relevant environmental documents to the decisionmaker, agencies are encouraged to make available to the public before the decision is made any part of that document that relates to the comparison of alternatives.

§ 1505.2 Record of decision in cases requiring environmental impact statements.

At the time of its decision (§ 1506.10) or, if appropriate, its recommendation to Congress, each agency shall prepare a concise public record of decision. The record, which may be integrated into any other record prepared by the agency, shall:

(a) State what the decision was.

(b) Identify all alternatives considered by the agency in reaching its decision, specifying the alternative or alternatives which were considered to be environmentally preferable. An agency may discuss preferences among alternatives based on relevant factors including economic and technical considerations and agency statutory missions. An agency shall identify and discuss all such factors including any essential considerations of national policy which were balanced by the agency in making its decision and state how those considerations entered into its decision.

(c) State whether all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why they were not. A monitoring and enforcement program shall be adopted and summarized where applicable for any mitigation.

§ 1505.3 Implementing the decision.

Agencies may provide for monitoring to assure that their decisions are carried out and should do so in important cases. Mitigation (§ 1505.2(c)) and other conditions established in the environmental impact statement or during its review and committed as part of the decision shall be implemented by the lead agency or other appropriate consenting agency. The lead agency shall:

(a) Include appropriate conditions in grants, permits or other approvals.

(b) Condition funding of actions on mitigation.

(c) Upon request, inform cooperating or commenting agencies on progress in carrying out mitigation measures which they have proposed and which were adopted by the agency making the decision.

(d) Upon request, make available to the public the results of relevant monitoring.

40 CFR Parts 1500-1508
CEQ Regulations implementing NEPA

RPA Comm.

August 24, 2001

RPA COMMITTEE
ADDITIONAL RESTRICTIONS TO DRAFT BIOP 4

I. **Bering Sea and Aleutian Islands P. Cod**

A. **Closed Areas**

In the haulouts in Area 8 (Reef-Lava and Bishop Point), long-liners would be excluded from 10-mile circles. Trawlers are already excluded and pot boats would remain in the 3-10 area. Fixed gear vessels under 60 feet would be allowed in the 3-10 mile area.

B. **Temporal Dispersion**

In the Bering Sea and Aleutian Islands (Areas 7, 8, 12 & 13), trawl sector cod would be allocated to three seasons with dates of January 20-March 31, April 1-June 10, and June 11-October 31, and allocations of 60%, 20%, and 20%. Rollovers would be allowed from season to season within the fishing year. Based on historic fishing patterns, trawl cod catcher vessel allocations would be 70%-10%-20% and catcher processors would be 50%-30%-20%. A mechanism will be developed to allow timely rollovers in either direction between the two trawl sectors.

II. **Bering Sea Pollock**

Pollock harvest in the SCA will be limited to 28% of the annual TAC prior to April 1 (70% of the A-B Season harvest). The remaining 12% may be harvested in the SCA on or later than April 1or may be harvested outside the SCA prior to April 1.

III. **Rationale**

A. The exclusion of long-line cod fishing from the 3-10 mile circles in haulouts in Area 8 will limit cod fishing in the most sensitive area to pot boats.

B. The shift of 20% of the A Season cod trawl fishery to the period after April 1will reduce the amount of possible cod removals in the most critical part of the winter season. That 20% will be taken after the pollock fishery has mostly finished, leaving little overall fishing activity near shore.

C. The AFA has changed the cod trawl fishery significantly. The great majority of cod trawl catcher vessels are also AFA-qualified pollock trawlers. Prior to the AFA, those vessels all fished pollock in the Olympic fishery from January 20 until the fishery closed in the first few days of March. Many of the pollock trawlers would shift immediately into cod and fish into April, with some boats fishing into May. The cod trawl fishery was fished at a very low level for the first six weeks of the fishery, followed by two months of high effort. Under AFA coops, 10-20 boats fish cod beginning January 20, with

DRAFT 8/24/2001

2002 RPA Alternative Proposal to RPA Committee

Name of Proposer: Groundfish Forum

Brief statement of proposal: Proposed modifications to the conduct of the Atka mackerel fishery designed to further reduce any potential for competition with sea lion foraging. Elements of the proposal include: (1) Distribution of TAC between inside and outside Critical Habitat (CH) areas to make harvest more proportional to mackerel population and area distribution; (2) Separation of the fleet into two teams so that the fleet is dispersed between the two statistical areas rather than concentrated harvest in one area; (3) Pre-determined season lengths inside CH. Separation of the fleet is predicted to reduce daily fishing rates on a local basis to approximately one-half of daily rates in 2001 "A" season. Additionally, this proposal includes measures from the 1998 Council recommended amendments to the mackerel fishery and the NMFS November 30, 2000 Biological Opinion. The proposal also uses the same open and closed areas that have been established for the Emergency Interim Rule for the second half of 2001.

Elements of the proposal:

Retained from the 1998 Council modifications:

1) A and B seasons, each with 50% of annual TAC;
2) Start dates of January 20th and September 1st for "A" and "B" seasons;
3) End dates of April 15th and November 1st for "A" and "B" seasons respectively; and
4) VMS requirement for vessels fishing Aleutian Islands Atka mackerel.

Retained from November 30, 2000 RPAs:

1) Implementation of RPA Committee proposed Control Rule if stock falls below threshold biomass.

Retained from second half of 2001 ER measures:

1) Closed areas for mackerel encompassing significant portions of sea lion critical habitat where mackerel are found in the Aleutian Islands, GOA, and RPA area 9 (see Note 1 below);

New measures:

1) 70% of the AI mackerel annual TAC to be harvested in CH in order to make fishery removals more proportional to the area and depth distribution of the mackerel population and thus better protect the mackerel stock while reducing rockfish bycatch.

   a. Rockfish bycatch rates are higher in the deeper waters outside of CH. The proposed 70%/30% inside/outside catch distribution is based on the proportion of area within and outside CH in the Aleutians with depths suitable for the Atka mackerel (see NMFS' November 30, 2000 Biological Opinion).
   b. The 70%/30% inside/outside apportionment should be revised in the future if survey data or other relevant scientific information become available to more accurately estimate the distribution of the mackerel population.

c. Revisions should also be made in the event that critical habitat is redefined such that the 70%/30% inside/outside split is no longer pertinent.

2) Reduction of daily catch rate of mackerel within critical habitat in each statistical sub-area to approximately one-half of "A" Season 2001 catch rates per day in the Central and Western Aleutian Islands (AI) and maintaining 2001 ER measures of no fishing inside CH in the Eastern AI. This will address the major issue originally identified by NMFS in 1998 associated with the mackerel fishery wherein a subset of fishing areas showed some evidence of reduced mackerel abundance as measured by CPUE changes in the respective areas. The goal of this part of our proposal is to further reduce potential for localized depletion and foraging competition by reducing catch rates on a localized basis. Reduction in daily catch rates will be accomplished by dividing the vessels into two teams and separating the two team's fishing efforts between the Central and Western AI. This "platoon management system" for the division of vessels between the Central and Western Aleutian Islands would be accomplished as follows:

REGISTRATION AND STAND-DOWN PROVISIONS

a. Vessels wishing to participate in the Central and/or Western Aleutian Island, inside CH Atka mackerel Fishery would register with NMFS Inseason Management 10 days prior to the start of the seasonal fishery. Vessels are not required to participate in the platoon management system but only vessels registered and participating in platoon management are allowed to fish in the inside CH fisheries in the Central and Western AI. This means that vessels not wishing to participate in platoon management or not wishing to fish in Central and Western AI inside CH fisheries can fish in Eastern AI (a fishery occurring outside CH) and in the outside CH fisheries in Central and Western AI.
b. Start dates are January 20th for "A" Season and September 1st for "B" Season. There would be a separate registration process for "A" and "B" Seasons. Participation in the Eastern AI Atka mackerel fishery is not affected by this proposed Management System as fishing in the Eastern AI (Area 541) occurs only outside of CH.
c. NMFS would randomly assign the registered vessels to one of two teams. One team would start in the Central AI and the other in the Western AI. Inside CH TAC would be divided by the total number of vessels registered for the fishery. There is no vessel or company specific allocation of TAC and each team cannot exceed its inside and outside CH allotments.
d. Each team's percentage of TAC would be proportional to the number of vessels assigned to that area. For instance, where five of a total of nine registered vessels were selected to begin in the Central Aleutian Islands, they would fish for 5/9th of the seasonally allowed TAC in the Central AI. Inside CH harvest would be tracked and attributed to the harvesting team. The division of TAC between teams is proportional to the number of vessels registered, but if a vessel leaves the ongoing fishery, the remaining vessels in that team still harvest the team's share.
e. To prevent dilution of the pool of participants and reduce the effects of quota stacking, (hence reductions in the fish available to the customary participants i.e. fairness to traditional participants), vessels are required to stand-down from entering a fishery other than directed fishing for mackerel until after their assigned team's first "inside CH fishery" closure goes into effect. For example, in the case of a vessel that is registered to fish in both inside CH platoon management fisheries (Central and Western AI); the stand-down is effective for the duration of the first inside CH fishery to which the vessel is assigned. If a vessel registers only for Area 542 and was selected to fish for the second

half of the 542 inside CH fishery, that vessel could target other species up until the opening of the second team's 542 inside CH fishery. That vessel would then be precluded from entering another fishery until the predetermined inside CH season in Central AI was completed for the second 542 team.

f. Each team would fish inside CH for the respective area they were assigned for predetermined length of time. Teams would switch areas after the first closure. The teams would then fish in the opposite area for a second predetermined length of time. A vessel could fish in either area outside CH at anytime as long as there was quota remaining to support directed fishing. Outside CH harvest are attributed to the open access fishery and is closed when NMFS In-season Management determines that the quota has been harvested.

PRE-DETERMINED SEASON LENGTH

a. NMFS predetermines the length of the season for each team's inside CH by dividing the team's quota share by the sum of that team's vessels harvest potential. Each vessel's harvest potential is an estimate determined by NMFS based on past production data for the particular vessels. Season lengths for each team would vary depending upon the harvest potential of the particular vessels assigned to the team and the amount of inside CH quota available for each respective area. For instance, if the first team assigned to 542 had four vessels, each with a harvest potential of 125 M/T per day and the team's portion of quota for 542 inside CH was 4000 M/T, then NMFS would set a season length of eight days for that team. NMFS would pre-issue a closure notice for this team effective at noon on January 28th. At noon, January 28th, the first team's vessels would have to stop fishing inside CH in area 542. They could the fish any remaining available quota outside CH in 542, fish in area 541 if still open to directed fishing, or fish to outside area 543 outside CH, until their team's inside CH fishery opened in area 543.
b. The length of the inside CH fishery is set conservatively by NMFS and any quota remaining after the predetermined closure would roll over to open access fishery, outside CH.

Note 1: Areas where mackerel are found in "targetable" concentrations that would be closed to mackerel fishing under this proposal are as follows: Gulf of Alaska (all areas); Bering Sea (all areas including the Bogoslof Foraging Area); Aleutian Islands (all CH east of 178 degrees West Longitude including the Seguam foraging area), and (all CH in listed in Tables 21 and 24)

How does the proposal remove jeopardy and adverse modification? Will it meet the ≥50% CH criteria, ≥50% non-pup protection criteria, and ≥75% pup criteria? In addition to other measures that promote sea lion protections, our proposal includes closure of areas of critical habitat identical to those included in the Council's recommendations for area closures for the second half of 2001 ER measures. Criteria for the sufficiency of closed areas thus far have been applied across all areas (GOA, Bering Sea, and Aleutians) instead of on a specific region basis. Assuming area closures for other fisheries in the Bering Sea, Aleutians, and Gulf of Alaska are "similar" to the Council's April 2001 recommendations, then the area closures overall will exceed the criteria above. Further, if the closed areas in our proposal are viewed from the perspective of the percentage of critical habitat where Atka mackerel are found in targetable concentrations, then we more than exceed the above closed area criteria.

Most importantly, our proposal directly addresses the principle concern in terms of potential adverse modification of sea lion CH that was raised for the mackerel fishery, based on Fritz's 1998 "Do trawl fisheries create localized depletions of Atka mackerel" paper (United States Department of Commerce, 1998). While the mackerel fishery is a relatively small in comparison to other fisheries where NMFS has found jeopardy (annual removals of about 65,000 MT compared to 200,000 MT for cod and 1.3 MMT for pollock). Nonetheless, NMFS' concerns with the mackerel fishery have been that the 1998 CPUE depletion study identified a subset of the traditional mackerel fishing areas where the decline in CPUE was linked to potential for a temporary "fish down" effect in the area where fishing occurs. Since then, seasonal apportionments of the TAC have been implemented (1999) and removals per season are already below the threshold amounts identified with potential localized depletion in years prior to the measures developed by the Council in 1998. Our proposal further reduces potential for foraging competition by dividing the fleet's CH fishing into two groups fishing in different Aleutians sub-areas. This is expected to reduce harvest rates on a statistical sub-area basis to zero in the Eastern Aleutians and approximately one-half of the current rates in the Central and Western Aleutians (about 500 MT per day in contrast to the current rate of about 1,000 MT per day). This addresses the potential for localized depletion and foraging competition in the most direct manner possible. Further, we believe the adoption of inside/outside of CH fishing limits in closer proportion to the real distribution of the mackerel biomass will help to ensure that the Atka mackerel fishery does not negatively affect the mackerel resource for the industry's future and as forage for sea lions.

Lastly, with the retention of existing rookery closed areas at 10 miles and haul out and no-transit sites areas at three miles, a considerable area buffer to separate the area open to fishing for mackerel from sea lion sites. The preliminary results of a recent tagging study conducted over the last two years (Fritz et al., 2001) suggests that there is little mixing between Atka mackerel inside and around the rookeries and mackerel in the outside area open to fishing. While these results are specific to the Eastern Aleutians, an extension of the study to Kiska this summer will soon be available for verification of the spatial separation of the fishery and sea lion closed areas outside of Eastern Aleutians.

How does the proposal minimize social and economic impacts? It preserves the economics of the mackerel fishery in Central and Western Aleutians to the greatest extent possible given the overriding objective of creating effective sea lion protections. It helps to protect the dedicated mackerel participants from increased effort as a result of the measures to slow down catch rates to address potential sea lion competition. At the same time, it protects other groundfish fisheries from increased effort from mackerel boats as a result of measures to subdivide the mackerel TAC in Central and Western Aleutians.

How does the proposal minimize bycatch of PSC and other groundfish?
The mackerel fishery is not constrained by PSC bycatch. It has been hamstrung, however, by sharpchin and northern rockfish bycatch which has closed the fishery with large portions of the TAC unharvested several times since the 1998 fishery modifications became effective and especially when the trawl injunction occurred last fall. This proposal allows most of the mackerel fishing to occur in the depth strata were mackerel are found. Rockfish are far less abundant in the critical habitat areas open to mackerel fishing under this proposal relative to the areas outside critical habitat where mackerel fishing has been attempted. We anticipate that rockfish bycatch will not be a significant issue for the fishery under this proposal. This is beneficial to other Aleutians fisheries as well because if rockfish bycatch approaches removals approaching the rate of fishing associated with the overfishing exploitation rate, then restrictions

can be placed on any and all Aleutians fisheries that have potential for catching rockfish.

How does the proposal promote safety at sea? The division of the sub-area TACs into two equal amounts designated for each team prevents an increase in incentives to race for fish.

Does the proposal adapt itself to a sound experimental design for monitoring?
Yes. The closure of mackerel fishing (in addition to pollock and cod) in area 518 or Bogoslof represents an excellent control area for fishing and no fishing comparisons. Further, should the committee's final RPA recommendation include the separation of the cod and mackerel trawl fisheries at 178 degrees West longitude, then this side by side difference may be useful for scientific comparisons of the effects CH fishing by those fisheries.

What information is available to support your proposal (supply if possible)?

1. Sea State data presented to the RPA committee in March 2001 on daily catch rates of mackerel in CH
2. Rookery, haulout, and no transit area closures as per NMFS' Table 21.
3. NMFS' 1998 EA for modifications to the Atka mackerel fishery ("EA, RIR, IRFA for an amendment to the BS/AI FMP to reapportion total allowable catch of Atka mackerel and reduce fishery effects on Steller sea lions, June 1998") Appendix One includes Fritz paper.
4. Closure notices for the mackerel fishery B seasons (as a result of rockfish bycatch) in 1999-2000.
5. "Efficacy of trawl fishery exclusion zones in maintaining prey availability for Steller sea lions: Description of Atka mackerel tagging project in Seguam Pass, Aleutian Islands, AK." Fritz, Lowell, Suzanne McDermott, and Sandra Lowe. An unpublished draft manuscript available from NMFS Alaska Fisheries Science Center, REFM Division

10/01
MTC

Comments

Appendix A
Steller Sea Lion Protection Measures
Draft Supplemental Environmental Impact Statement
August 2000

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Date:

October 4, 2001

To:

National Marine Fisheries Service
North Pacific Fisheries Management Council

Expanded Analysis of Telemetry Data

The purpose of these comments is twofold.

First, they serve as an example of how NMFS might expand their analysis, to examine in more detail the probability of overlap between areas used by Steller sea lions and those used by groundfish fisheries, through the integration of telemetry and observer data.

Second, they substantiate that NMFS conclusions regarding the relative importance of areas within 0-10 miles, and areas beyond 10 miles are valid, by using GIS analysis of telemetry data of individual Steller sea lions accounting for nearly 90% of location data beyond 10 miles.

Appendix A to the August 2001 Draft SEIS includes an extensive discussion of the telemetry data which constitutes an important component of the new information that serves as the basis for reinitiating consultation on a new set of management measures to address concerns about Steller sea lions. On page 112, line 34 of Appendix A there is a discussion of a "critical assumption" concerning the telemetry data and sea lion foraging. It states, "we can then speculate that about 75% of the foraging effort occurs within 10 miles from shore..." Based on our examination of the telemetry data, we believe that the word "speculate" is inappropriately equivocal.

In a review of the November 2000 BiOp with comments on the draft August 2001 BiOp by Bowen, et al, (the "Blue Jeans" panel) the authors point out on pages 34 and 35 that "there are limitations to the current data, which suggest that the conclusions drawn may not be reliable."

The review panel does not find that NMFS conclusions concerning the relative importance of the area within 10 miles are in error, but that the conclusion "is extremely sensitive to the assumptions made in analyzing the data. As such we have little confidence that this analysis provides a sound basis for drawing conclusions about the effects of the RPAs on the dynamics of SSL."

The "Blue Jeans" panel goes on to discuss the 90% filtering of locations within 2 miles of shore to compensate for a suspected bias in the success of transmissions near shore. The panel suggests that:

1 - there are less arbitrary ways of taking account of bias
2 - that the appropriate sampling unit is the individual
3 - that pooling location data as in table 5.1 results in overrepresentations of individuals

We have undertaken a further analysis of the telemetry data in a manner that attempts to incorporate the panel's suggested approach. This was done using the Location, and Time Line message data provided by NMML for the tagged animals in the Western stock of Steller sea lions.

The location data was examined based on two approaches:

- percent of hits by area, partitioned into area bins
- direct examination of time spent by area using GIS

These data suggest that in summer roughly 2/3rds of the locations outside 10 miles are also beyond the shelf edge. In winter roughly half of the outside hits are also beyond the shelf edge for adults. Only a small percentage of pups and juveniles locations were beyond the shelf edge in winter, however, as reported in table 5.1 of BiOp4 only a very small proportion of these animals are outside 10 miles in winter.

While this may not precisely mirror the filtering used by NMFS, we suggest that NMFS undertake a similar analysis using the approach of partitioning hits outside the shelf break.

GIS Examination of Time Spent by Area

The analysis presented in the BiOp and the accompanying "white papers" examines tabulated telemetry data on the basis of location "hits" by area. This approach is appropriate and useful, but has some limitations. One of the limitations is a result of changing telemetry technology and programming of tags over the last decade (this is described in detail in Loughlin, et al, draft paper "Immature Steller Sea Lion Foraging Behaviour" pages 5-7). Another limitation arises from the changing focus of tagging studies as NMFS has directed its efforts toward the population segment thought to be of greatest concern.

These factors result in a need to sub-divide the data not only by age class, sex, distance from land, bathymetric bins, and season, but also by transmitter type and programming specifications, as well as by deployment area. The next logical step is to employ GIS to look at each animal individually, within the context of the bathymetry of its home range and fisheries that might occur in those areas.

Using GIS mapping, each animal's telemetry data was examined individually, to track its activity over time. All Pollock and P. Cod groundfish fishery observer data for the last decade was plotted with the sea lion telemetry data to determine the potential spatial and temporal overlap with the fishery. After using the same data filtering process as described in the "white paper," transmissions by each individual sea lion were sequenced and date/time stamped, they were then plotted using GIS, and finally trip segments were identified.

A set of sample GIS plots (Figures 1-28) is attached and a summary of the results is as follows:

1. Pre-1999 Buffers: Overlap with the groundfish fisheries was limited even prior to the 1998 RPAs, when the sea lion protection measures were limited to the rookery buffers. This was particularly true for pups less than one year old.

2. Proposed Alt. 4 Buffers: The trawl closures around rookeries, haulouts and RPA sites under Alt. 4 significantly diminished any overlap between fishery observed locations and sea lion telemetry locations.

3. Natural Offshore Area Partitioning: A GIS temporal examination of the location data indicates further partitioning of the use of area outside the Alt. 4 buffers between sea lions and trawl fisheries. Of the animals from the western stock of sea lions tagged by NMFS, only six animals had substantial activity (more than 10 locations that passed the Keating and speed filters) outside ten miles. These same six animals also had more

Table 2 – Information by Individual SSL Presented in Attached Maps

Fig. #	SSLID* #	PTT #	Tag Site	Tag Deployed	Sex	Age Class	Months	Duration Days	At-Sea Location Hit #'s
						Pups			
8	54	14070	Long Is.	2/5/1993	M	P	8	41	92
7	63	14080	Long Is.	1/16/1996	M	P	7	79	72
18 & 19	74	14163	Seguam	2/29/2000	M	P	9	104	206
1 - 3	75	14164	Aiktak	3/8/2000	M	P	9	98	203
6, 21-28	78	21094	Long Is.	3/12/2000	M	P	9	66	130
						Yearlings			
10	58	14078	Long Is.	12/7/1994	F	Y	18	58	53
11	59	14077	Marmot	12/9/1994	M	Y	18	40	59
4 & 5	60	14072	Aiktak	4/13/1995	F	Y	22	56	47
9	77	14170	Long Is.	3/12/2000	M	Y	21	94	210
						Adult Females			
13	19	14072	Chirikof	12/7/1990	F	AF		174	33
14	25	9956	Chirikof	3/7/1991	F	AF		121	171
15-17	49	14073	Akun	3/8/1992	F	AF		67	217

* Note: Because PPT tag numbers were used for more than one animal, a unique identifier (SSLID) was created for purposes of this analysis.

Table 3 –Individual SSL with substantial activity outside 10 miles.

PTT	SSLID	Count >10 miles	Count >20 miles	Count > 1000 fathoms	% of > 10, outside 1000 fm	% of > 20, outside 1000 fm
14073	25	144	144	144	100%	100%
14163	74	76	76	66	87%	87%
21094	78	24	8			
14077	59	21	13	1	5%	8%
14078	58	19	15			
9956	19	17	14	11	65%	79%

Notes on interpreting the attached Figures

Map layers:
These figures are made up of several layers of data, described as follows:

Observer data:
NMFS observer data from the NORPAC database was used for the period from 1990 through 2001, to produce contoured plots of all Pollock and cod haul locations based on density of tow

and B class locations. Howerver, they appear to be included in the calculations for table 5.1 of the BiOp and so were retained for purposes of this examination

Scale: The scale varies between figures, and was set to encompass the full range of at-sea locations in the initial figure for each animal, that met the filter criteria described on page 4 of the ADF&G/NMFS "white paper." Generally, the scale can be inferred from the 10 and 20 miles buffers; in some cases a scale was added to the figure. For some animals, especially those that made a migration, there are multiple figures per animal which capture its range for a subset of time.

Notes on data processing steps in location analysis

The 8312 total records were divided based on those that passed the speed and Keating filters.

Table 4

filtered	# of location hits
0 = Retained	6135
1 = Deleted	*2177*

Table 5 Locations and their Delete status based on speed and Keating filters

DeleteStatus	#hits	Delete cause
-10	27	Argos label for no good
-99	89	PTT operating off animal
0	6135	No error
21	10	PTT # for animal removed from dataset
KE	344	Removed by Keating
S1	38	Removed by speed > 100 km/hr over 1 min
S5	1611	Removed by speed of 10 km/hr over 5 minutes
SA	43	Removed by speed greater than 500 km/hr
Z	15	Argos label for no good

The 6135 retained records were further divided out between at sea versus on land.

For land/sea determination, the closest position in time, from the set of land/sea records was used for each point in the PTT database. The Nwet and Ndry fields show how many wet (at sea) vs dry (on land) mode receptions occurred 20 minutes before or after receiving the closest (in time) status record. Next the timeline data was used in the same fashion, although 3 hours rather than 20 minutes was used for the period over which to count timeline values for Nwet and Ndry. Finally a LandSeaFinal field was derived that is "0" if the animal was on land based on land/sea mode OR based on timeline (that is, timeline overrides transmitter status). If no value was available from either time window in either data series the value was considered Null (which means the land sea status was indeterminate.) All other values in this field (NULL or 1) were assumed to indicate at sea (as best we can tell, although all the 9xxx series were missing land/sea.)

Table10 – At sea locations* by distance and bathymetric bins

PTT	SSLID	At-sea hits based on land/sea data	N hits greater than 10 nm from land	% of all at-sea hits > 10 nm from land	N hits > 20 nm from land	N hits from water deeper than 1000 fm	% of hits > 10 nm and deeper than 1000 fm	% of hits > 20 nm and deeper than 1000 fm
9963	7 - AF	NA*	1	NA	0	0	0%	
9958	9 - AF	NA	1	NA	1	1	100%	100%
9962	11 - AF	NA	1	NA	0	0	0%	
9955	18 - AF	NA	1	NA	1	0	0%	
9956	**19 - AF**	**NA**	**19**	**NA**	**16**	**12**	**63%**	**75%**
14071	23 - AF	NA	1	NA	1	0	0%	0%
14072	24 - AF	NA	1	NA	1	0	0%	0%
14073	**25 - AF**	**NA**	**144**	**NA**	**144**	**144**	**100%**	**100%**
14081	35 - AF	NA	1	NA	1	0	0%	0%
14085	39 - AF	NA	2	NA	1	0	0%	0%
2322	44 - PM	10	2	20%	0	0	0%	
14080	47 - AF	NA	5	NA	0	0	0%	
14072	**49 - AF**	**NA**	**5**	**NA**	**0**	**0**	**0%**	
2326	50 - PM	31	2	6%	1	1	50%	100%
2323	51 - AF	NA	4	NA	1	0	0%	0%
2327	52	7	1	14%	0	0	0%	
14070	**54 - PM**	**109**	**8**	**7%**	**2**	**0**	**0%**	**0%**
14072	55 - AF	NA	3	NA	2	1	33%	50%
14071	56 - PM	16	2	13%	0	0	0%	
14074	57 - PM	61	3	5%	0	0	0%	
14078	**58 - YF**	**48**	**19**	**40%**	**15**	**0**	**0%**	**0%**
14077	**59 - YM**	**56**	**21**	**38%**	**13**	**1**	**5%**	**8%**
14072	**60 - YF**	**42**	**1**	**2%**	**0**	**0**	**0%**	
14079	62 - PF	36	1	3%	0	0	0%	
14080	**63 - PM**	**66**	**6**	**9%**	**1**	**0**	**0%**	**0%**
14075	64 - PF	21	1	5%	0	0	0%	
14076	65 - YF	29	1	3%	0	0	0%	
14081	66 - PM	50	2	4%	0	0	0%	
14111	71 - PF	80	2	3%	0	0	0%	
14163	**74 - PM**	**199**	**76**	**38%**	**76**	**66**	**87%**	**87%**
14164	**75 - PM**	**200**	**3**	**2%**	**2**	**0**	**0%**	**0%**
14170	77 - YM	207	1	0%	0	0	0%	
21094	**78 - PM**	**130**	**24**	**18%**	**8**	**0**	**0%**	**0%**

- * "NA" indicates land/sea not supplied to MCA. For these animals, valid locations greater than 10 nm from shore were assumed to be at-sea, while "Null" locations closer than 10 nm were omitted from the analysis.
- A = adult, Y = yearling, P = Pup, M = male, F = female
- Individuals in **Bold** are shown in attached figures.

About 2/3rd of the SSL with at sea location data, including "nulls," (for animals in the 9000 series of PTT tags no land/sea data was provided) had any activity outside 10 miles. In most of these cases in the percentage of locations outside 10 was well under 10%. The remaining 1/3rd showed no activity outside 10 miles, and are listed in the following table.

Fig. 1

This is animal # SSLID 75, PTT # 14164, a Male 9 month pup, tagged at Aiktak on 3/8/2000 displayed with pollock tows. This image captures all at-sea location hits over a 97 day period. Only 3 at sea locations out of a total of 203 hits were outside 10 miles. (The following two Figures 2 and 3 provide a more detailed look at its movements.)

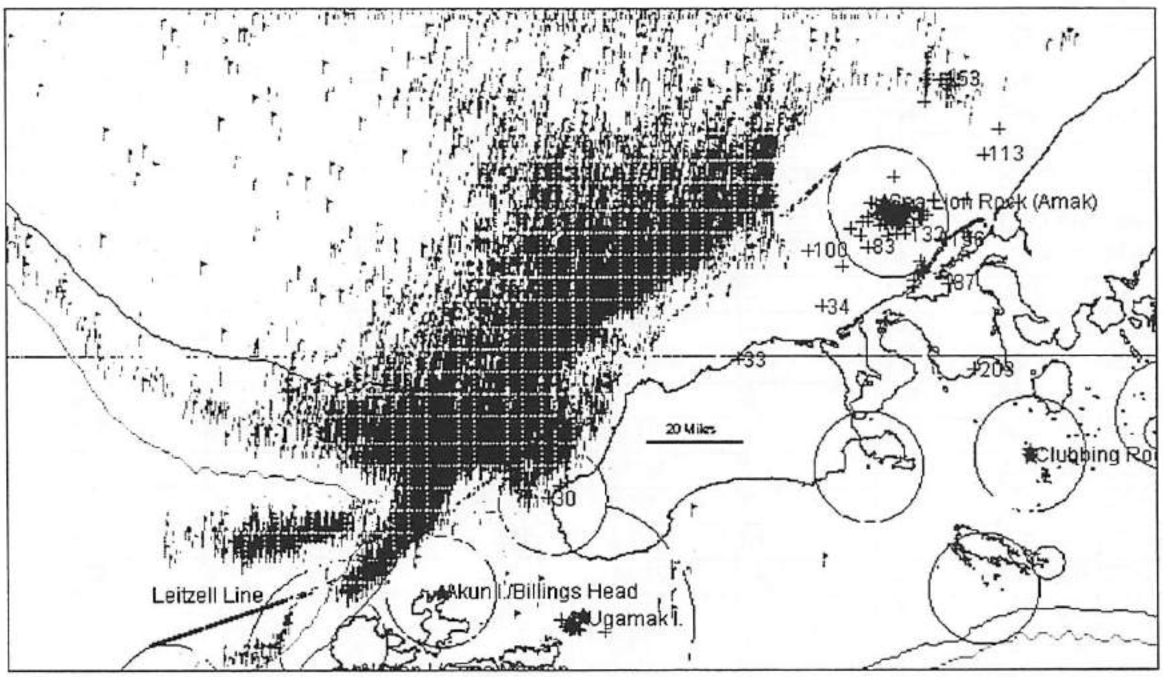


Fig. 2.
This image is a zoom-in on SSLID 75 (male pup, age 9 months) from the previous figure at Aiktak, displayed with cod tows. Cod tows inside the Cape Sarachef haulout would be eliminated under the Alt. 4 measures which consist of 10 and 20 mile closure buffers as well as the closure of the area inside the "Lietzell line."
The animal left Aiktak on 3/21 and transited to Amak via Cape Sarachef, following the beach along Unimak Island.

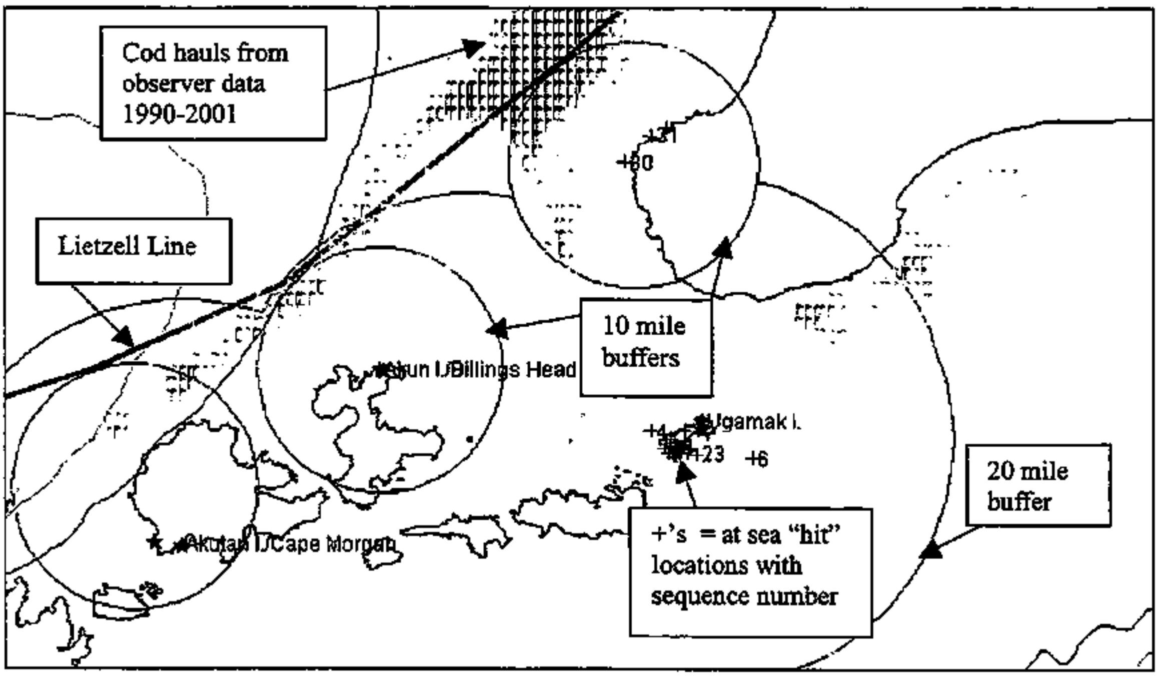


Fig. 3
This is a zoom in on SSLID 75 (from Fig. 1) at Amak, where it remained after transiting from Aiktak. It is displayed against a plot of pollock tows. Tows to the south and east of the Leitzell Line would be eliminated under the Alt. 4 measures.

Note: The single locations to the NE of Amak (hits #'s 153, 187, 137). Each of these isolated positions are very low quality "B" class transmissions, and are succeeded by a higher quality location within about 1 mile of Amak on the same day.

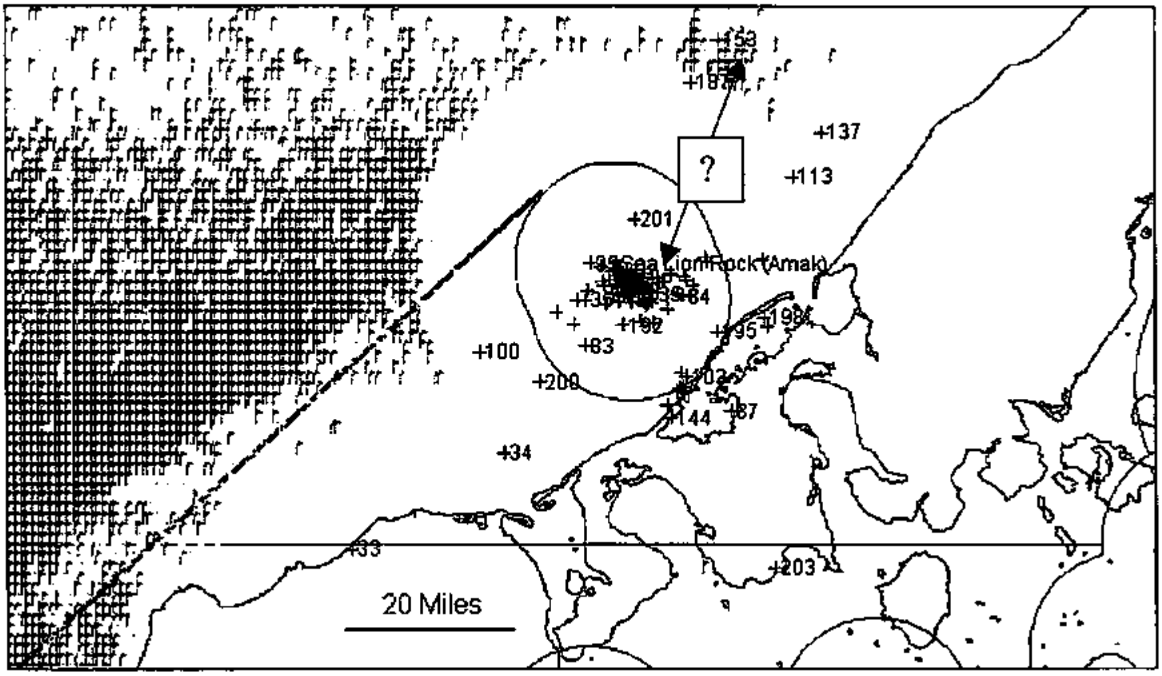


Fig. 4.
This is SSLID 60, PTT14072, a Female 18 month old yearling, tagged at Aiktak, 4/13/95 displayed against pollock tows. This image captures all at-sea location hits over a 56 day period. Pollock tows south and east of the Lietzell Line are eliminated under Alt. 4 measures, though there is minimal indication of overlap with this animal in any case based on the sparse number of tow locations in the observer data for the 10 year period.
Note: The single location outside 10 miles (#21). This was a low quality "B" class transmission, preceded 1 hour earlier by a higher quality location about 1 mile from shore.

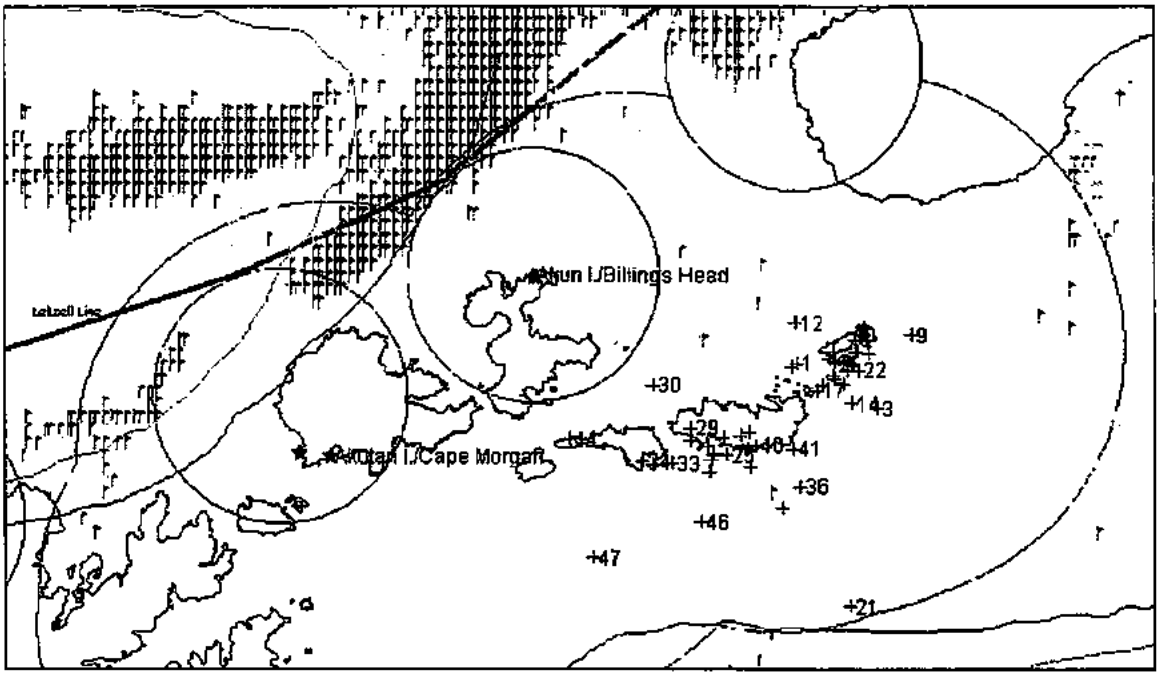


Fig. 5

This is also SSLID 60, the Female 18 month old yearling from Figure 4, during the same period as above, but with cod tows (in green) layered over Pollock tow. Note that the cumulative sea lion protection measures (as represented by the closure buffer circles) have closed off a large amount of important cod fishing grounds in the Unimak pass area, in a manner that effectively partitions the fishery from this animal's observed locations.

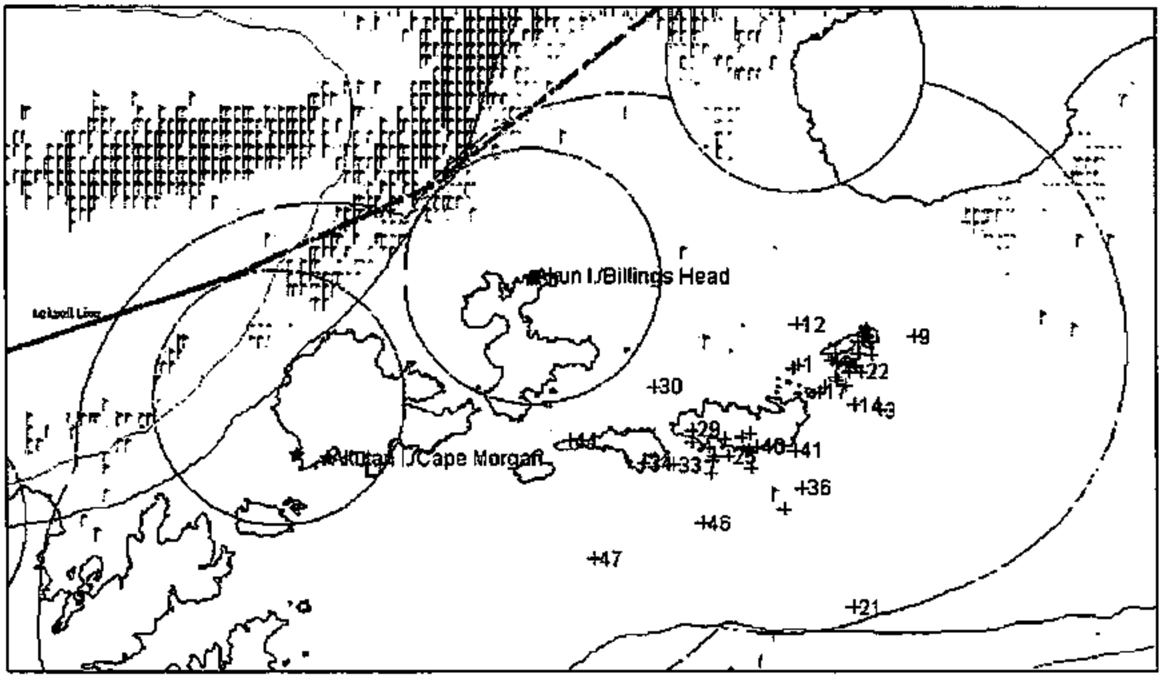


Fig. 6

This is SSLID 78, PTT 21094, a Male 9 month old pup, tagged at Long Island on 3/12/2000, displayed against cod tows overlaid on pollock tows. This image captures all of its at-sea location hits over a 66 day period. Of all the sea lions in the NMML telemetry data set for the western stock, this individual shows the highest degree of potential overlap with fishing activity outside the Alt. 4 closures. However, a more detailed temporal examination presents shows temporal partitioning.

All the at sea locations (25 of 130 hits) outside 10 miles occurred during 2 trips in a 10 day period in May. This animal is featured in fig 4.1-14 Chapter 4 of the SEIS, and was the subject of more detailed set of weekly slides presented at the Sitka Council meeting. That presentation demonstrated that for the rest of the time between tagging in March and the early part of the month of May this animal never left the area inside 10 miles. (Additional figures 21-28 show this animal's activity in more detail in a series of time steps.)

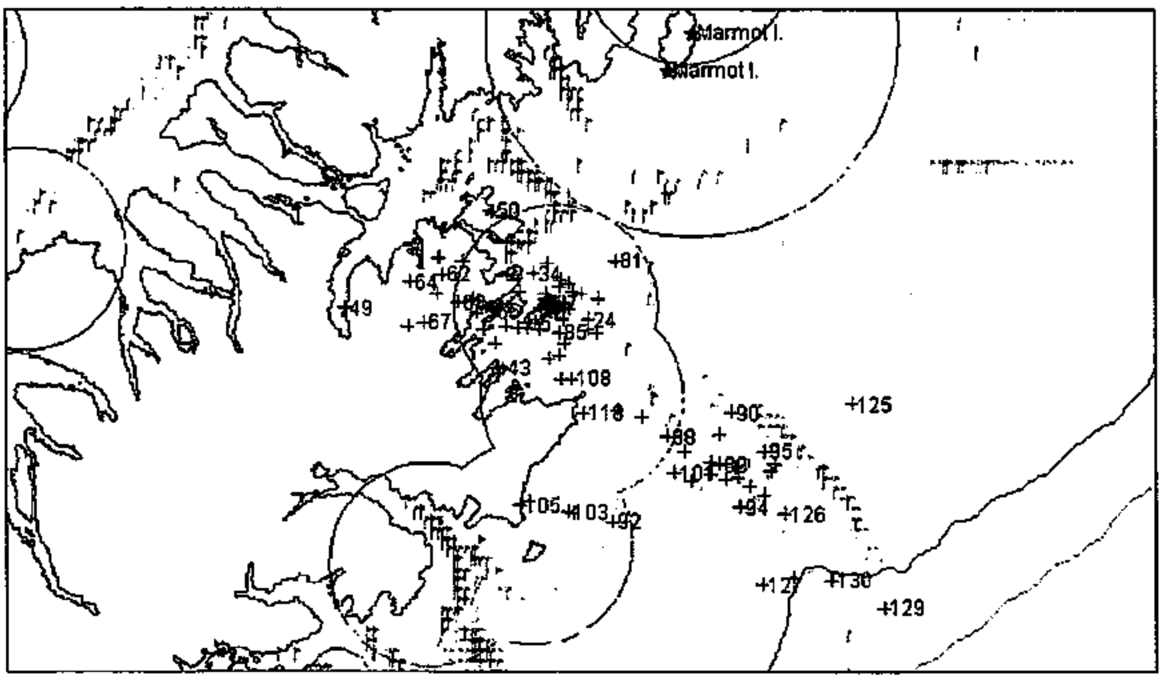


Fig. 7

This is SSLID 63, PTT 14080, a Male 7 month old pup, tagged at Long Is., 1/16/1996, displayed against pollock tows. This image captures all at-sea location hits over a 79 day period.
In this figure the labels for the hits (+'s) reflect the Argos quality code. Low quality hits have a higher error margin.
Note: Three of the four locations outside 10 miles (out of a total of at-sea 72 hits) were "B" quality transmissions. These positions were labeled with the Argos transmission quality code.

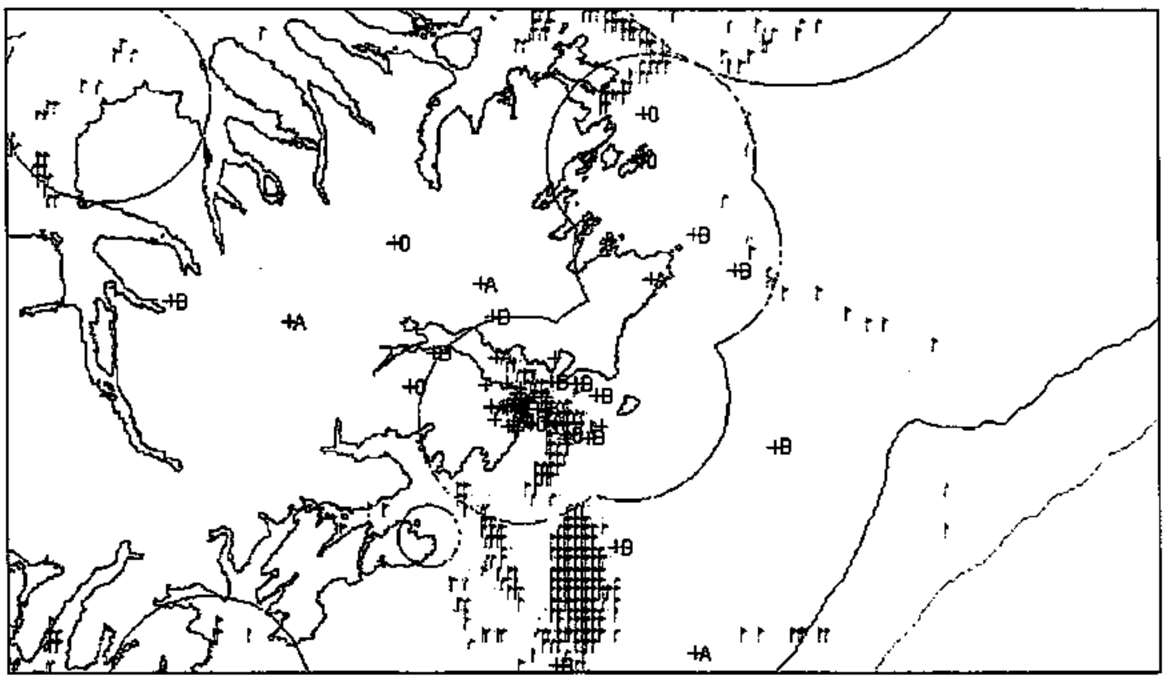


Fig. 8

This is SSLID 54, PTT 14070, a Male 8 month old pup, tagged at Long Is., 2/5/1993, displayed against cod tows overlaid on pollock tows. This image captures all at-sea location hits over a 41 day period. This animal transited from Long Island to Marmot a week later and remained in the Marmot area.

Note: The isolated location #56 was a "-8" quality transmission, bracketed by good quality transmissions on the same day in the area within a few miles of Marmot, which appears to be its normal home range.

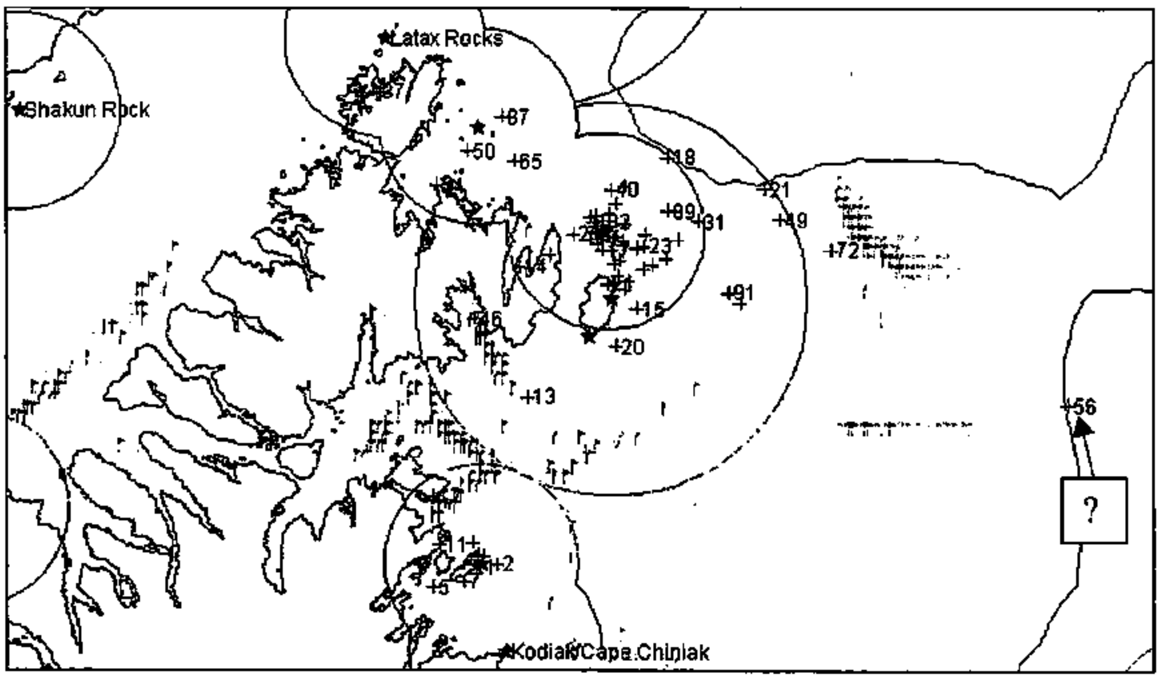


Fig. 9

This is SSLID 77, PTT 14170, a Male 21 month old yearling, tagged at Long Is., 3/12/2000, displayed against pollock tows. This image captures all at-sea location hits over a 94 day period.

This animal transited from Long Island through Kupreanof Straits in the next couple days, it spent the next couple weeks between Kupreanof and Latax Rocks, mostly around Steep Cape, and then moved to Latax Rocks area by end of March, where it remained for the next two months.

Note: The isolated location #120 was a "B" quality transmission, and was the only location more than 10 miles from land out of a total of 210 at-sea positions.

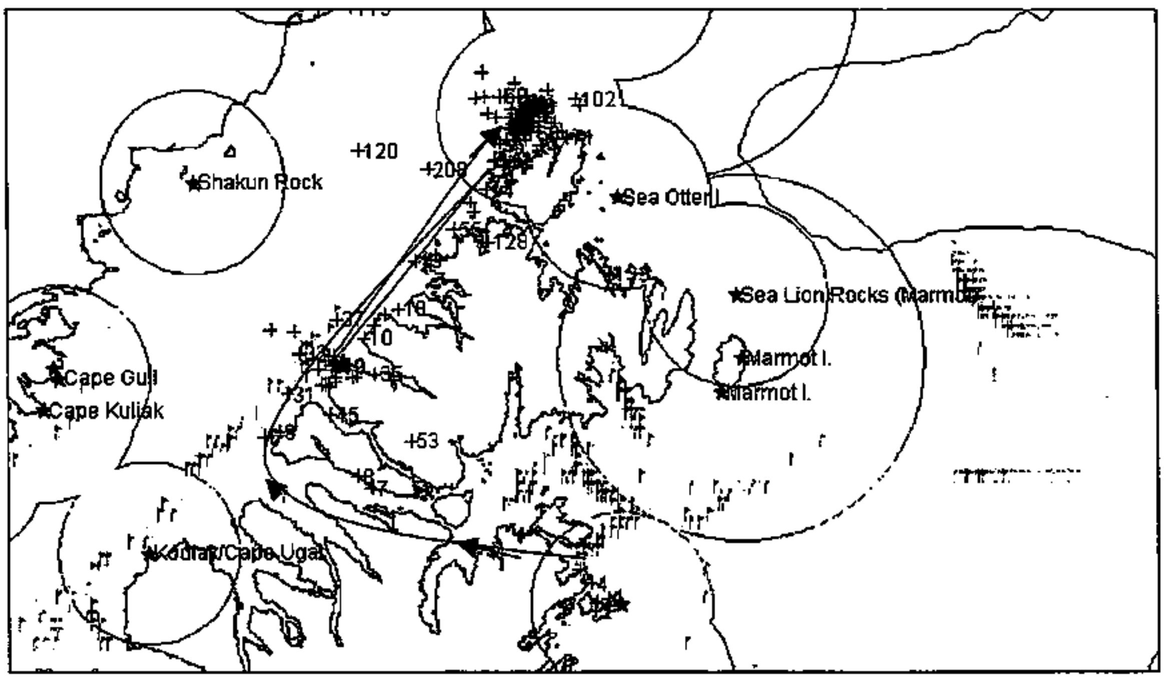


Fig. 10

This is SSLID 58, PTT 14078, a Female 18 month old yearling, tagged at Long Is., 12/7/94, displayed against cod tows overlaid on pollock tows. This image captures all at-sea location hits over a 58 day period. This animal did make offshore trips during December, though about 35 of the 53 at-sea locations were still within 10 miles. Note also that this is a period when trawling is closed.

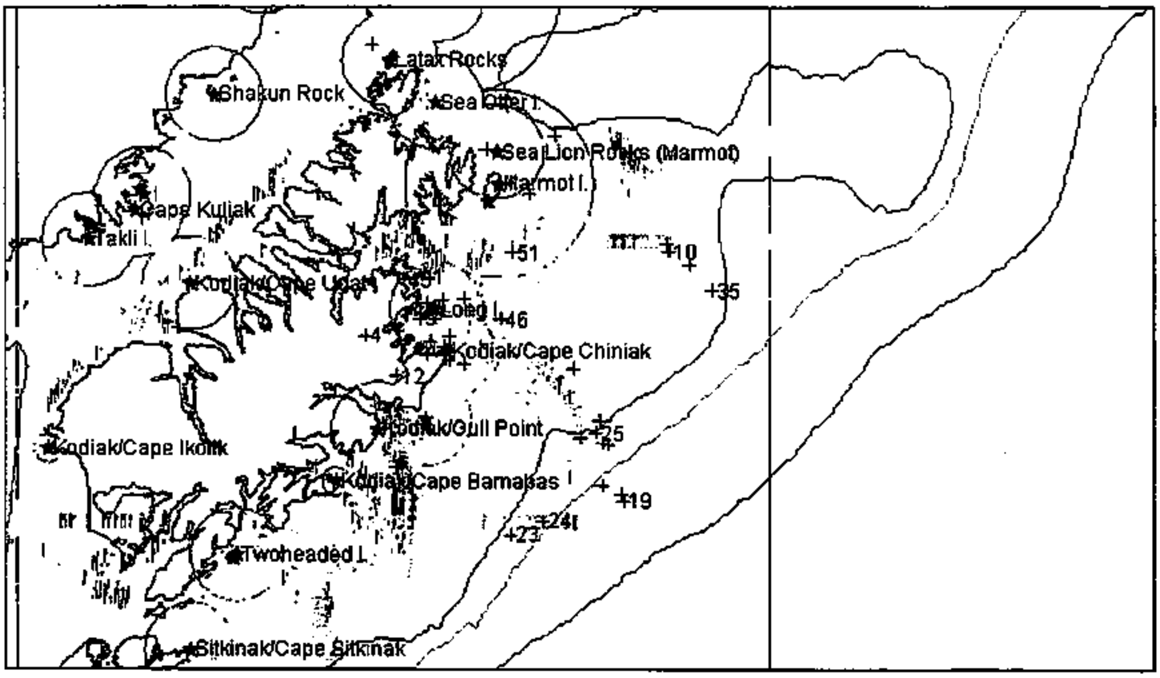


Fig. 11

This is SSLID 59, PTT 14077, a Male 18 month old yearling, tagged at Marmot Is., 12/9/94, displayed against cod tows overlaid on pollock tows. This image captures all at-sea location hits over a 40 day period (though the 1st transmission in the database did not occur until 1/24/994). This animal made an immediate transit trip, following the shelf edge to Middleton Island and arriving at Cape St Elias in a week, where it remained.

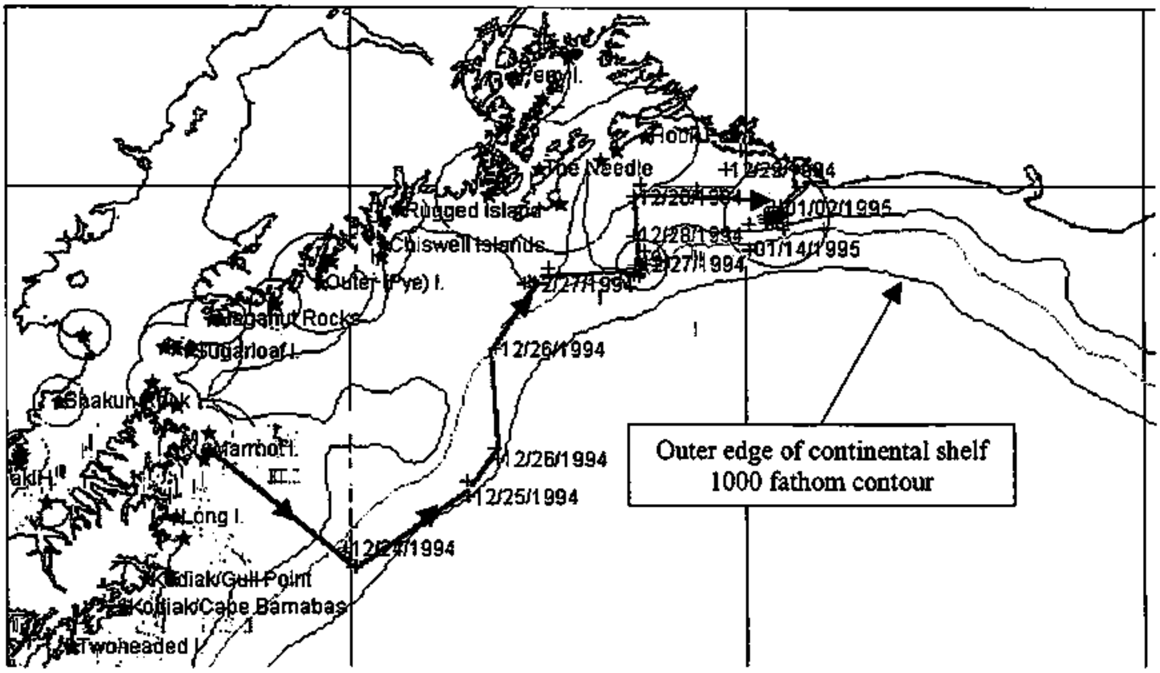


Fig. 12.

This image zooms in on SSLID59, the Male 18 month old yearling from figure 11, after its arrival at Cape St Elias. Though this animal had about 1/3rd of its at-sea locations outside 10 miles, many of these were a function of a fairly direct 200 mile transit trip.

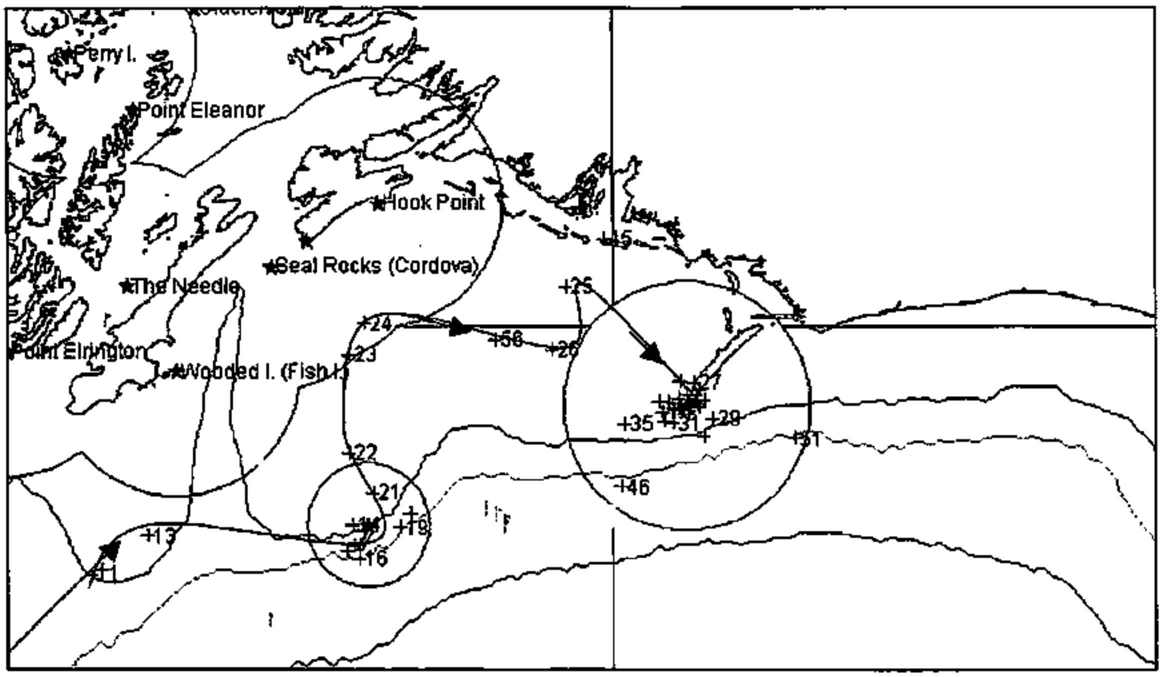


Fig. 13

This is SSLID 19, PTT 14072, an Adult Female, tagged at Chirikof Is., 12/7/90, displayed against pollock tows. This image captures all at-sea location hits over a 174 day period. Though the tag stayed on for 6 months, it was a very early deployment and produced only about 33 usable locations based on the speed and Keating filters, though almost all of its Argos location quality ratings were quite low. However, of the 17 hits outside 10 miles, 11 of these (65%) were also well beyond the continental shelf edge.

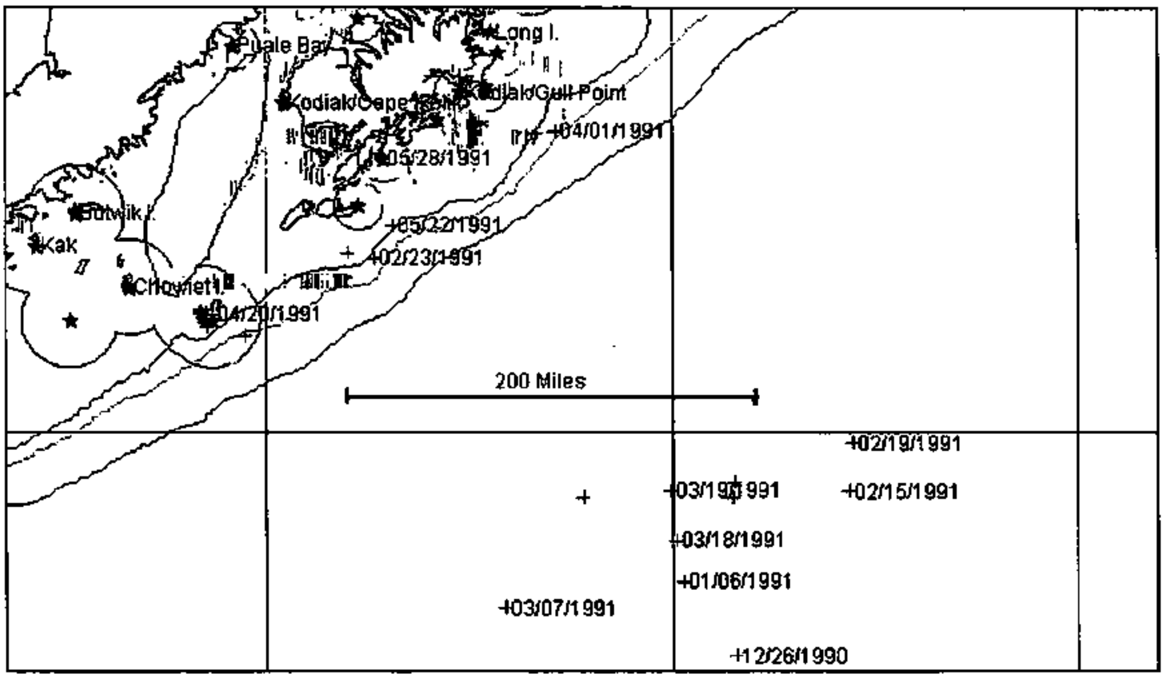


Fig. 14

This is SSLID 25, PTT 9956, an Adult Female, tagged at Chirikof Is., 3/7/1991, displayed against pollock tows. This image captures all at-sea location hits over a 121 day period. This tag was also an early deployment, but was more successful and produced about 171 usable locations. Of these, 144 were from beyond the continental shelf edge. This animal traveled almost 400 miles offshore, spending over two months at sea far beyond the fishery. It is extremely unlikely that this animal was foraging on mackerel, cod or Pollock this far beyond the shelf edge, though there were no groundfish fisheries in the area where it was foraging in any case.

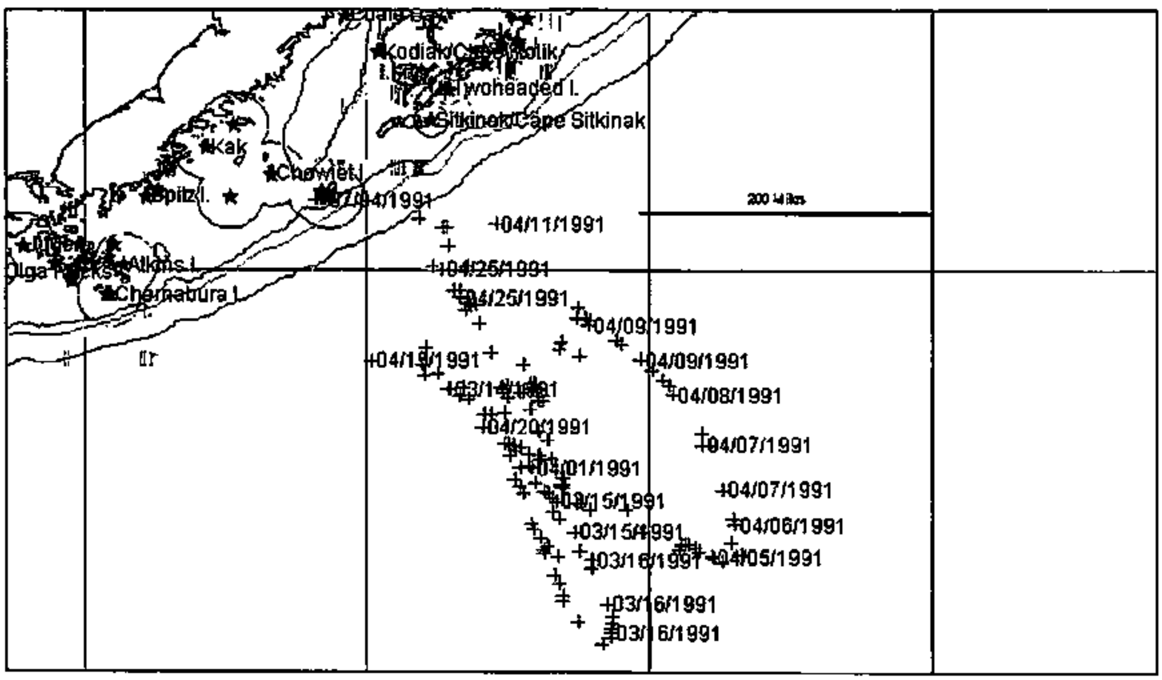


Fig. 15

This is SSLID 49, PTT 1407~~3~~2, an Adult Female, tagged at Akun Is., 3/8/1992, displayed against pollock tows (tows inside Alt.4 buffers "erased"). This image captures all at-sea location hits over a 69 day period. The following figures show its migration toward Amak. The following figures 16 and 17 show this movement in more detail.

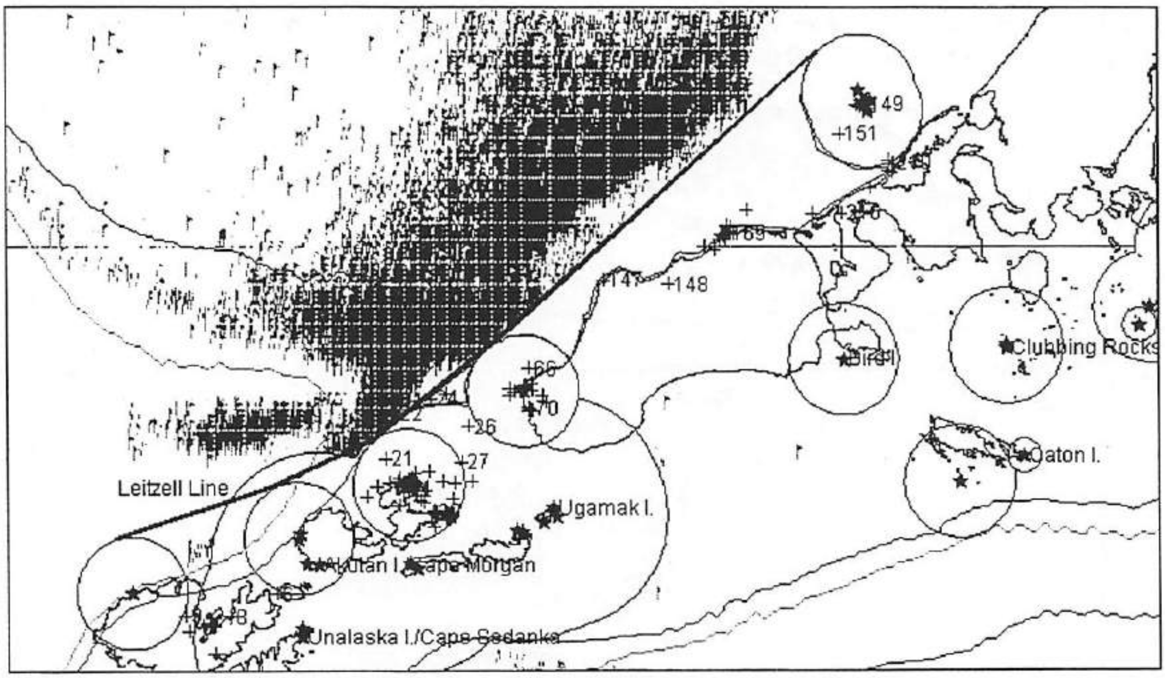


Fig.16

This image zooms in on SSLID 49, the Adult Female from figure 15. It spent most of March and part of April at Akun, shifting to Sarachef for a few days during that time.

Only 5 of its 217 at-sea locations were outside 10 miles, and only two of those are slightly outside the Lietzell line

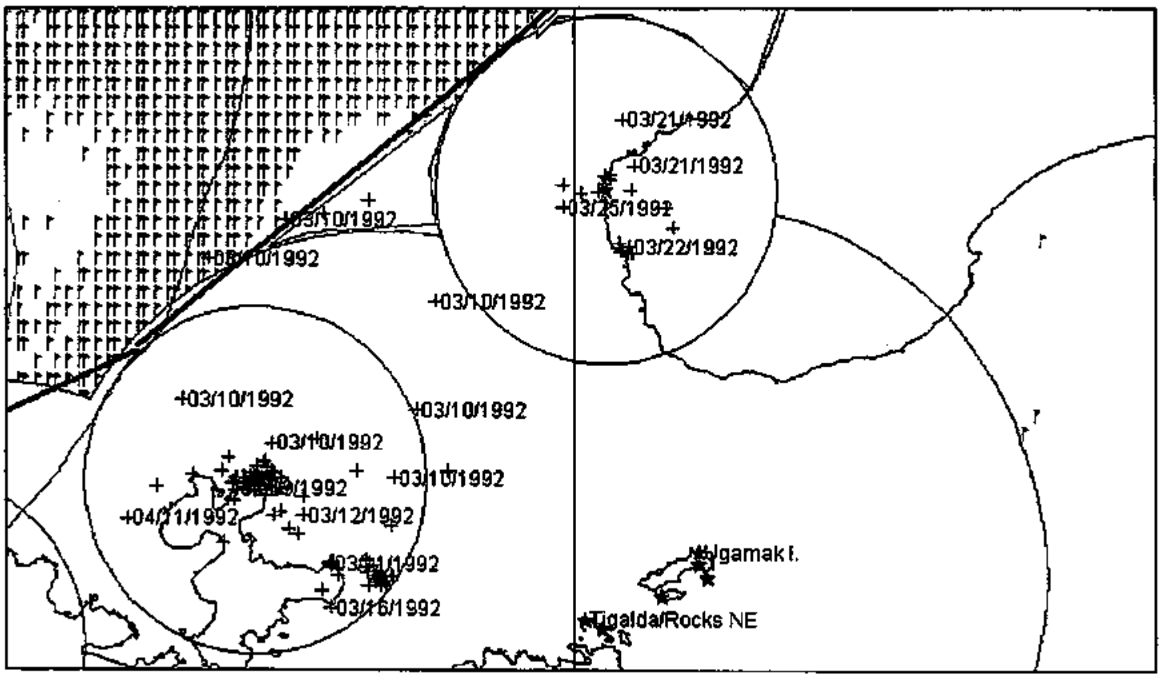


Fig. 17

This image also zooms in on SSLID 49. In April she began to work her way along the coast of Unimak Island to Amak, where she remained until May, then she shifted a new location just west of False Pass the 1st week of May, then ending up off Izembek Lagoon in Mid-may.

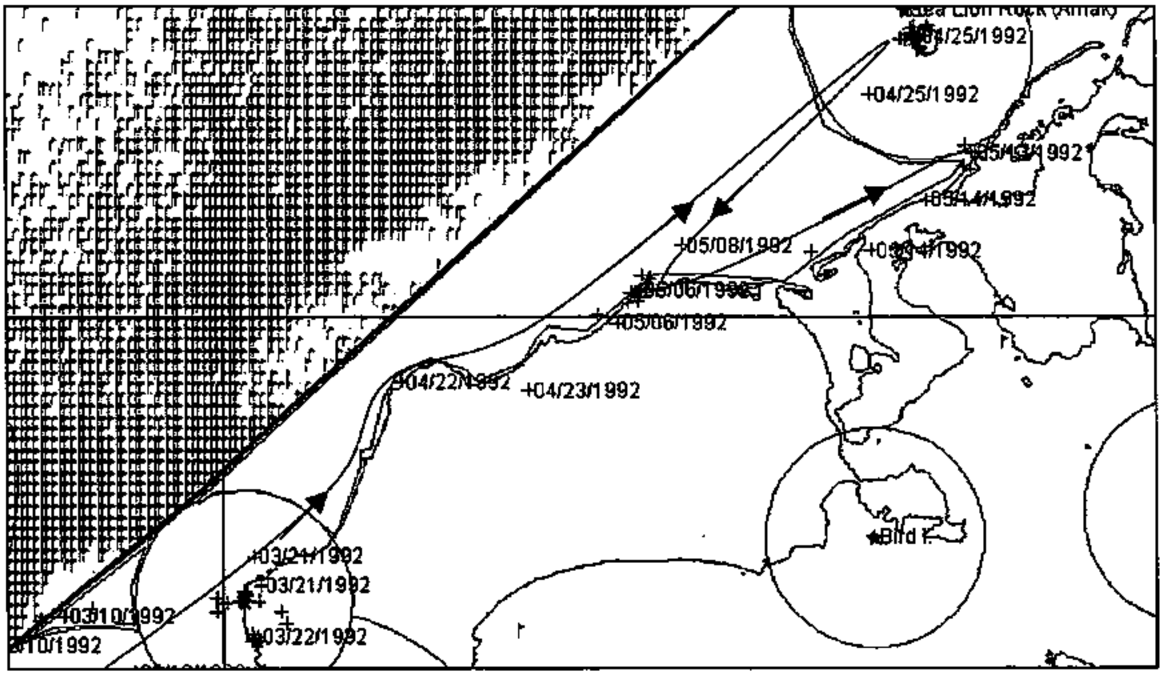


Fig. 18

This image is SSLID 74, PTT 14163, a Male 9 month old pup, tagged at Seguam Is., 2/29/2000, displayed against pollock and cod tows (tows inside respective Alt.4 buffers "erased"). This image captures all at-sea location hits over a 104 day period.

While over 1/3[rd] of the 206 at-sea locations are outside 10 miles, almost all of these offshore tows are well beyond the continental shelf break as represented by the 1000 fathom contour in blue. The following figures show the seasonal nature of its offshore activity.

Note that there is no spatial overlap with the cod fishery (shown in green).

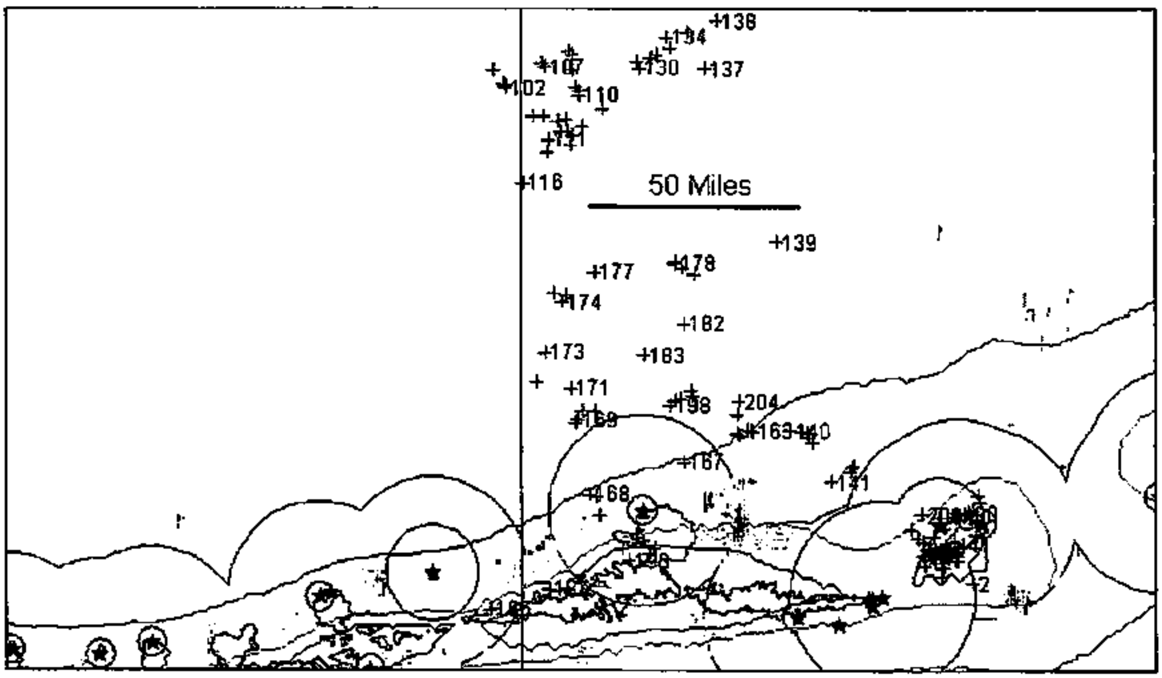


Fig. 19

This image zooms in on SSLID74 the male pup from figure 18, at Seguam Island. All at-sea locations from the time of tagging (2/29/2000) for the next 2 months (until 5/4/200) are contained in this image, and only one location during the period prior to 5/4/2000 is significantly outside 3 miles. After the beginning of May this animal begins to make lengthy offshore trips.

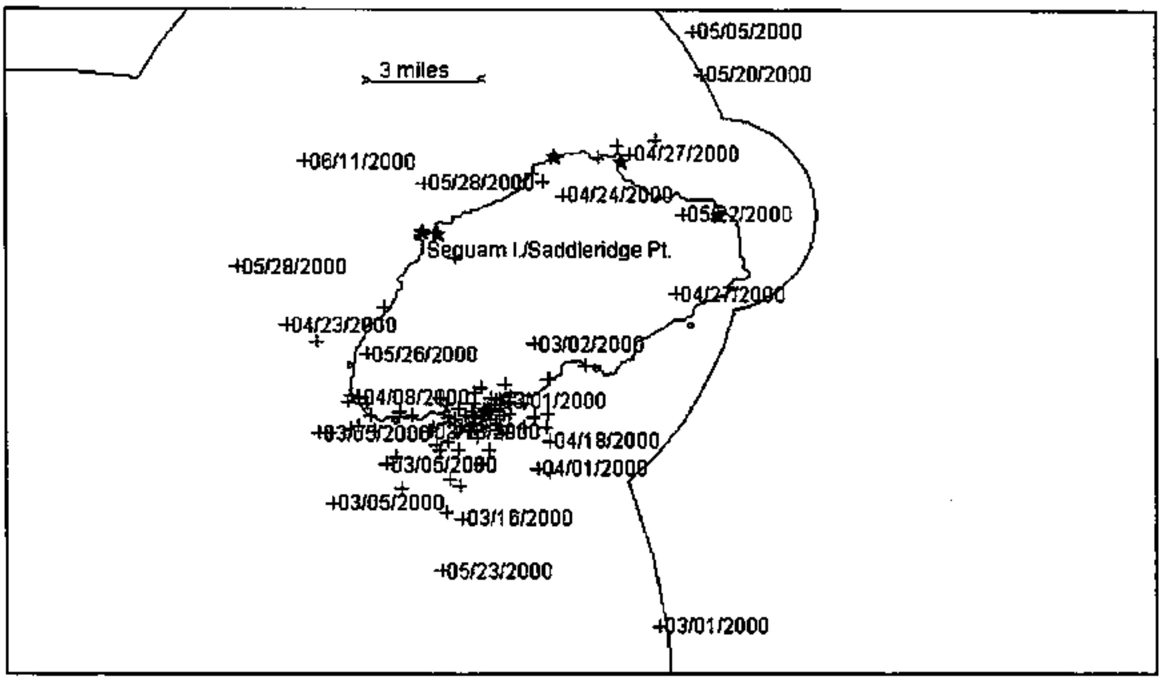


Fig. 20

This image traces the movement of SSLID74, the male pup from figure 18, during period from 5/28 to 6/10.

During this time he wanders offshore far past the continental shelf break, then circles back to the west, making landfall at the west end of Atka Island, then he follows closely along the shoreline heading east for a few days, and finally heads back out past the shelf break again. The portion of the mid-shelf between 50 and 100 fathoms where groundfish are targeted apparently did not hold his interest, rather he appears to be foraging out where the more likely prey is salmon, mictophids, and squid. He crossed the mid-shelf fairly rapidly. The last two offshore hits preceding landfall occurred at 3:37AM and 4:20AM on 6/4. The 1st hit after landfall is at 9:48AM on 6/5. This suggests he traveled a distance is about 50 miles in less than 30 hours. If he was making foraging dives, he didn't dawdle nor did he return to the area. This trip occurred more than a month after the end of cod trawling in the area.

This would be a very interesting segment for which to integrate an examination the dive data. That would provide stronger basis for making judgments concerning the usage of the midshelf area and the potential for spatial overlap with fisheries.

Based on the available telemetry data there is little indication of spatial overlap with cod fishery. There is clearly no temporal overlap with the cod and Pollock trawl fisheries, which are winter fisheries, since this animal doesn't begin going offshore until summer.

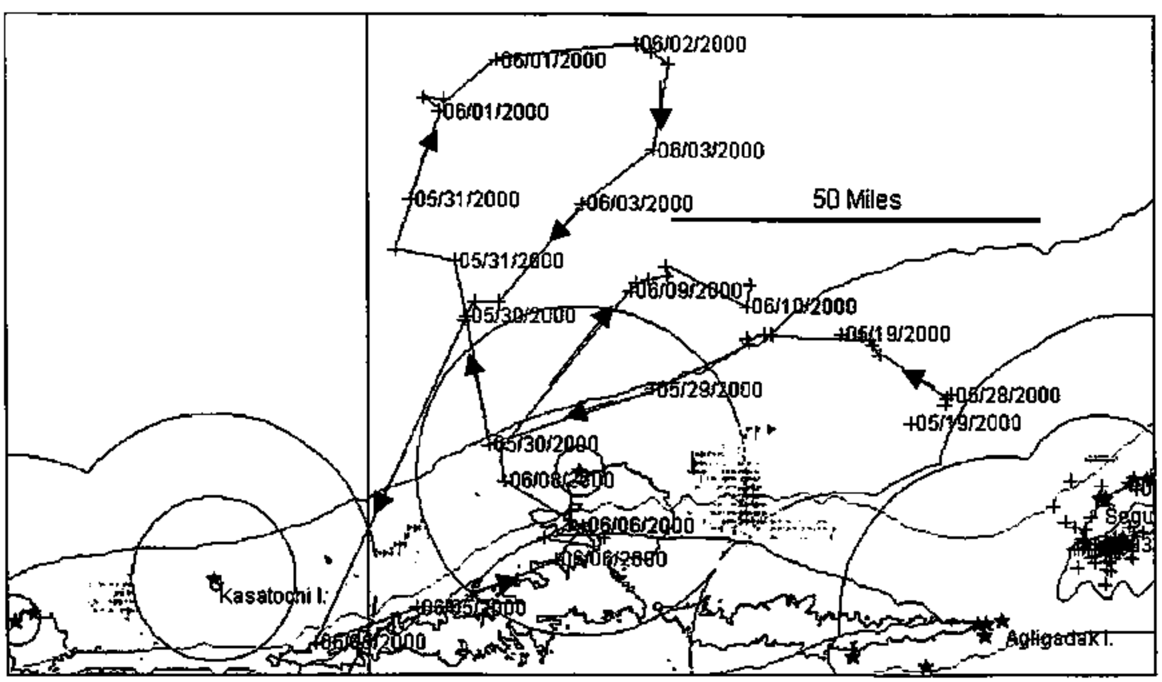


Fig. 21

This series of figures traces the movement of SSLID # 78, PTT #21094 (shown earlier in Fig. 6), a 9 month male tagged 3-2000. The 1st period is early to mid March.

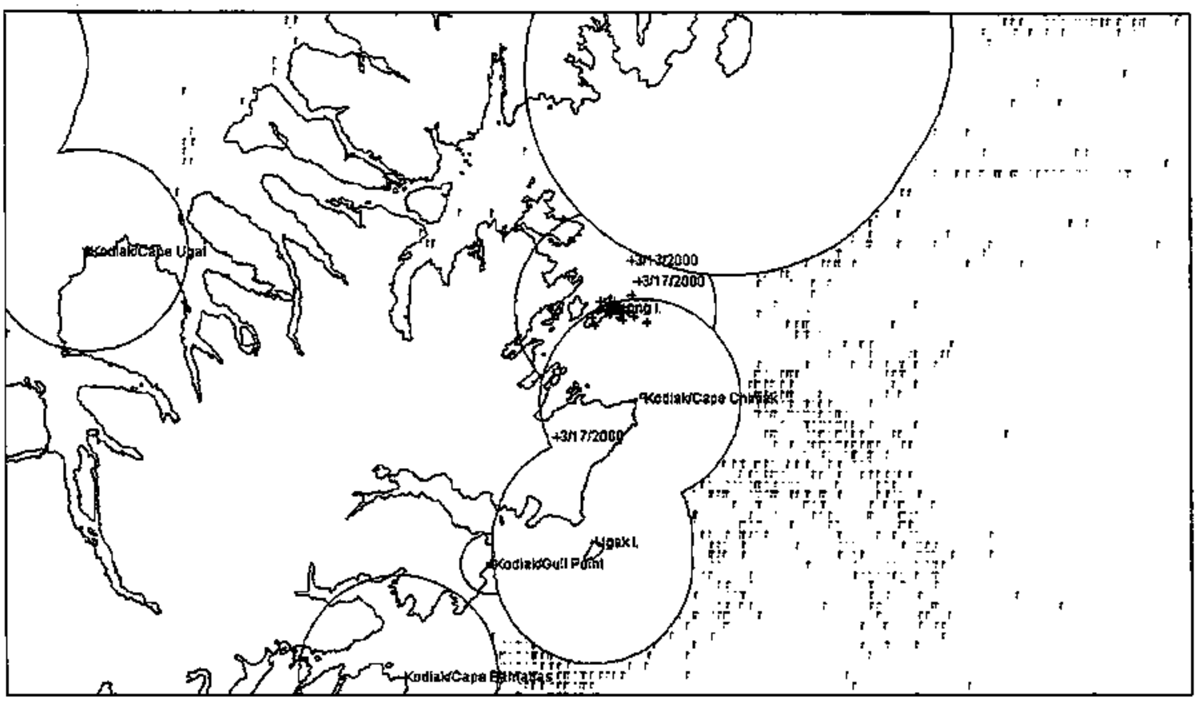


Fig. 22

The second period is mid March to early April.

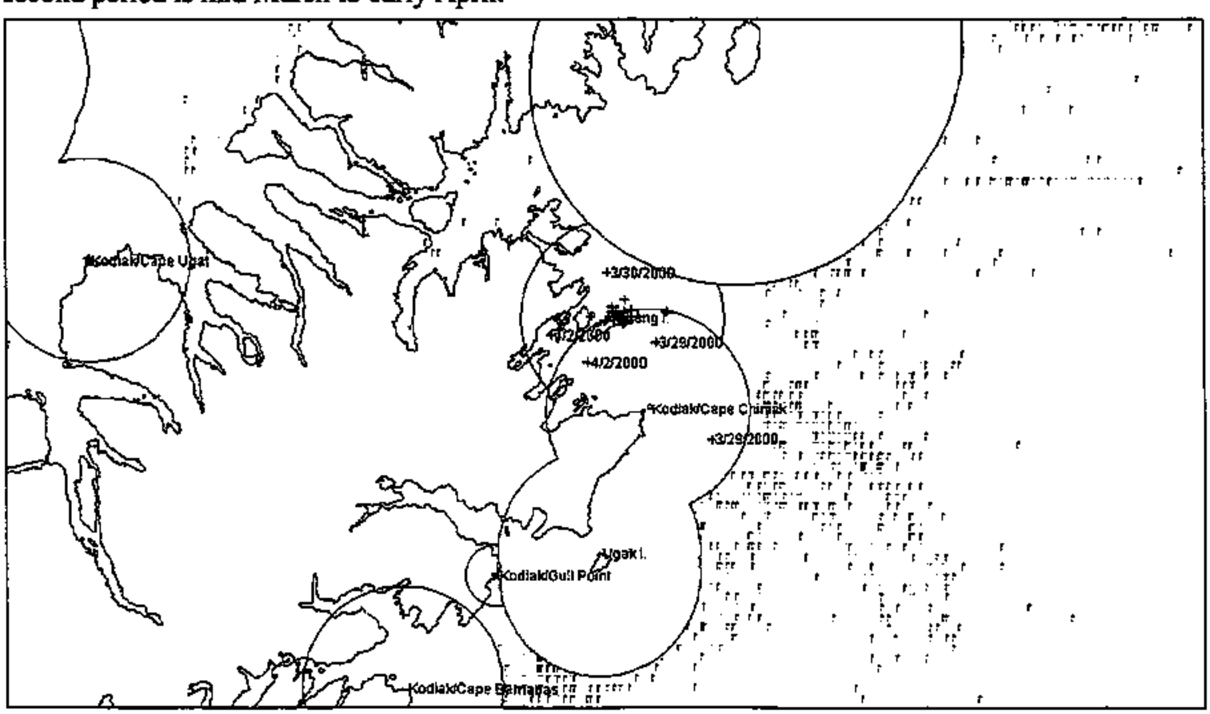


Fig. 23

The third period is early April to mid April.

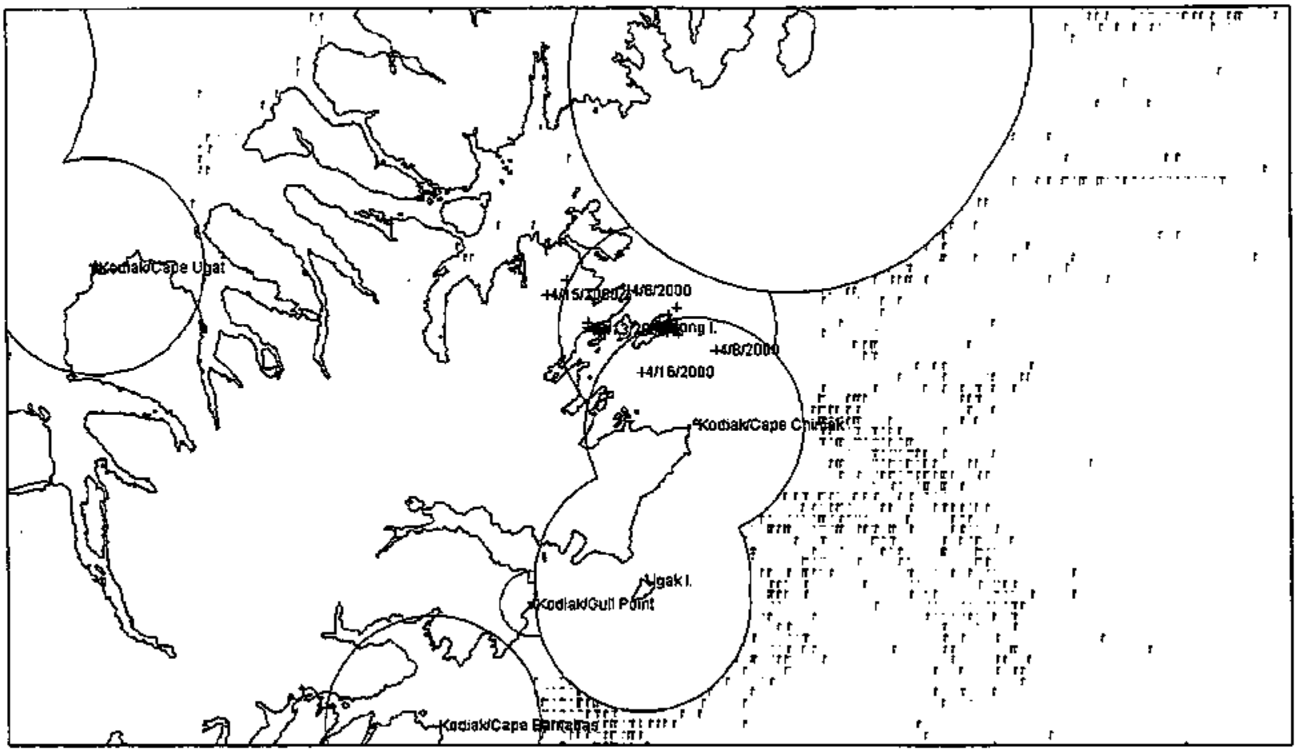


Fig. 24

The fourth period is mid April to late April.

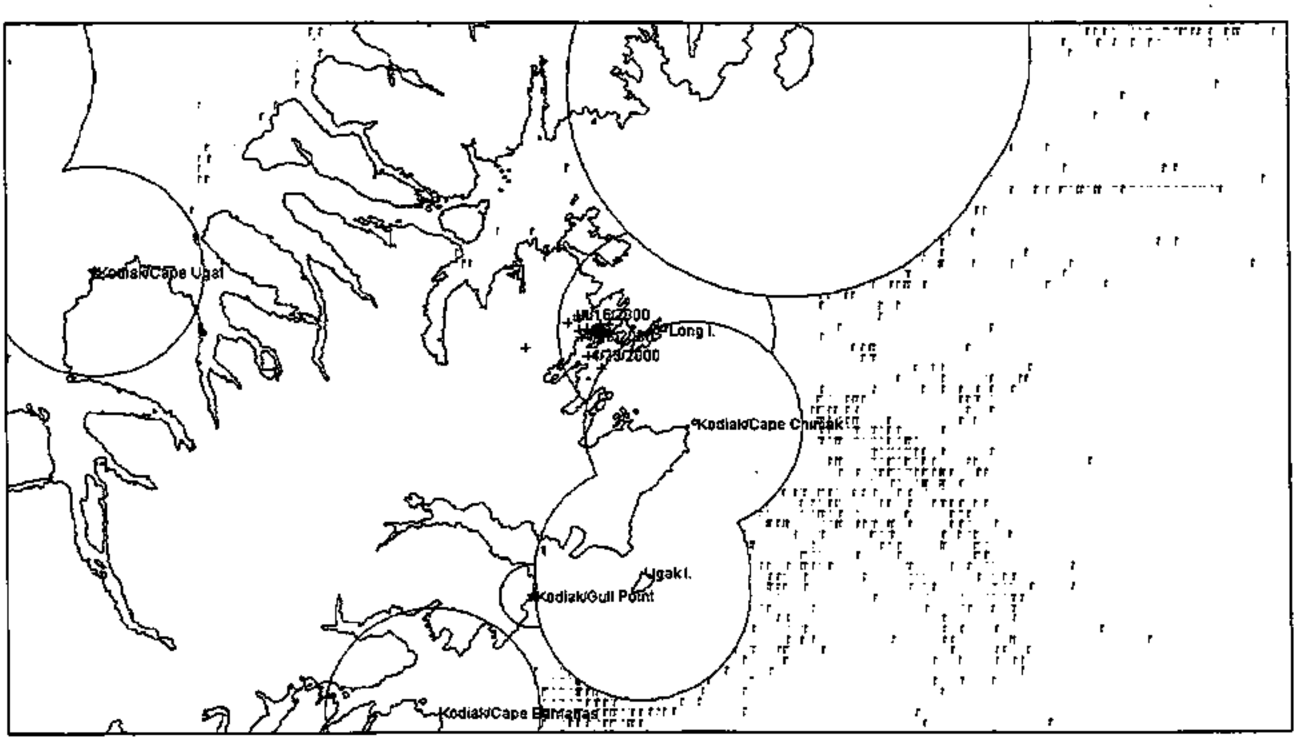


Fig. 25
The fifth period is late April to early May.

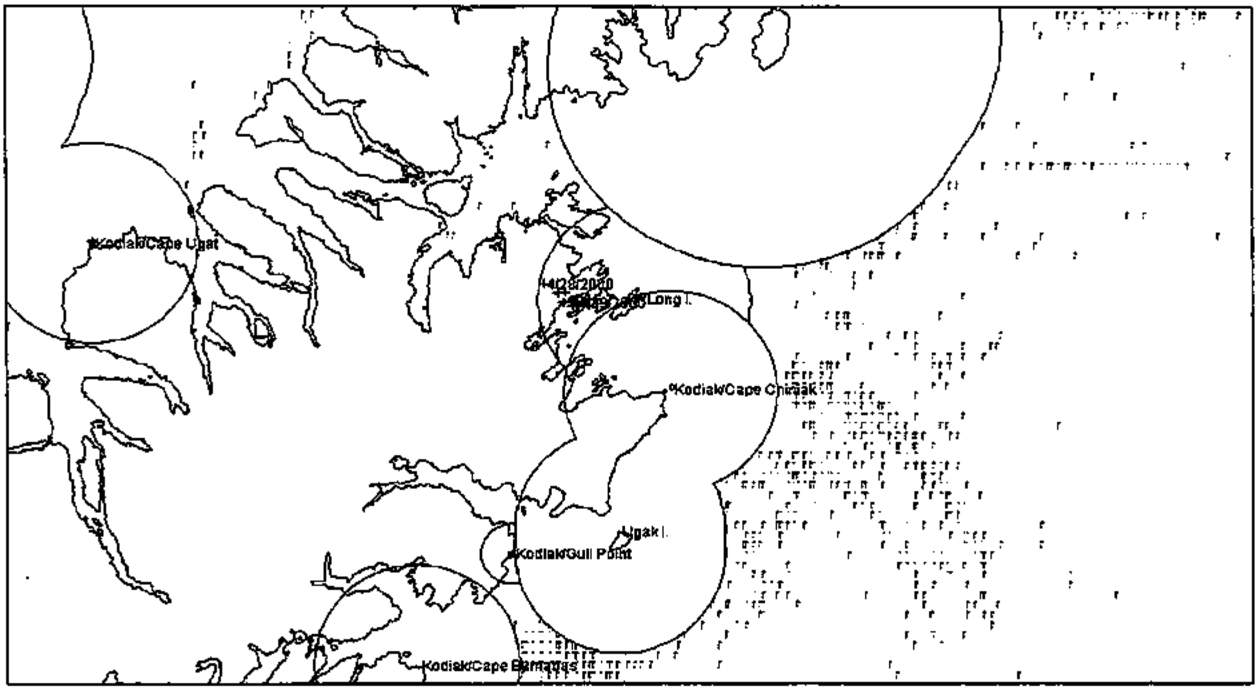


Fig. 26

The sixth period is the beginning of May. During this time trawl fisheries for Pollock and cod are closed (the fishing locations in this plot are for all seasons over 10 years.)

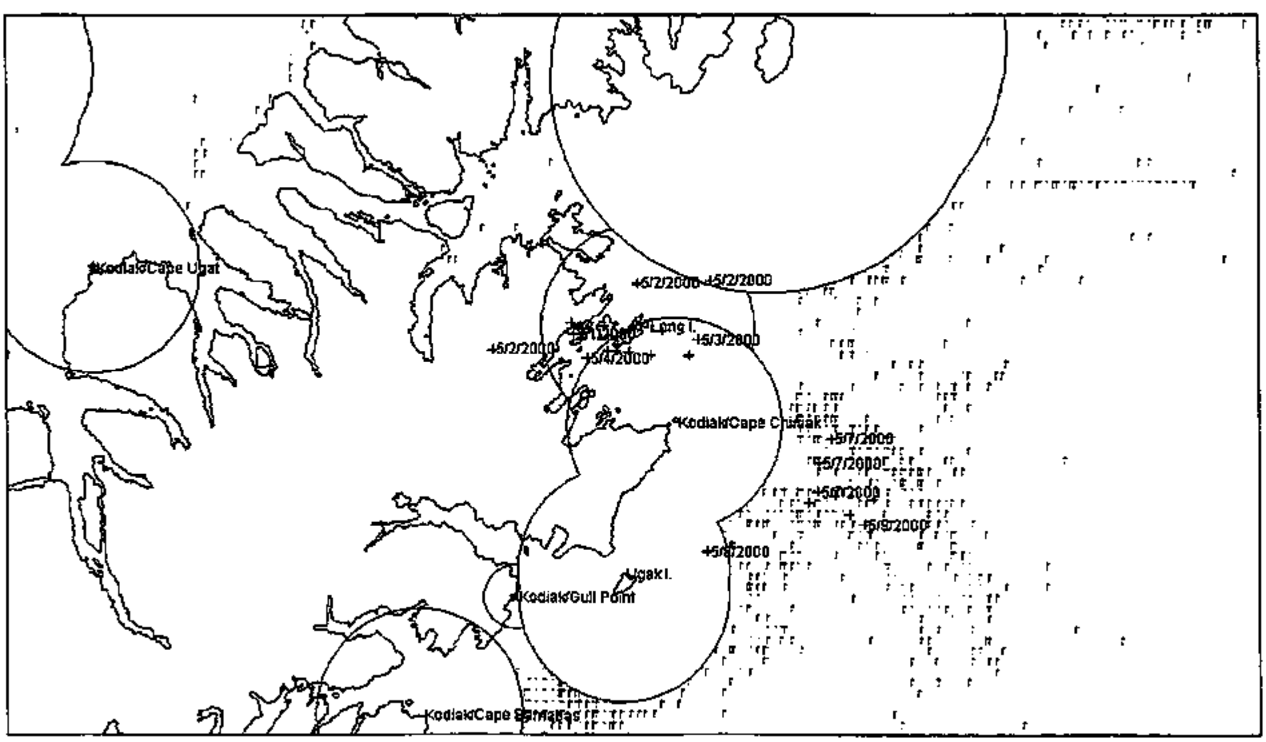


Fig. 27

The seventh period is from early to mid-May. Again, trawl fisheries for Pollock and cod are closed.

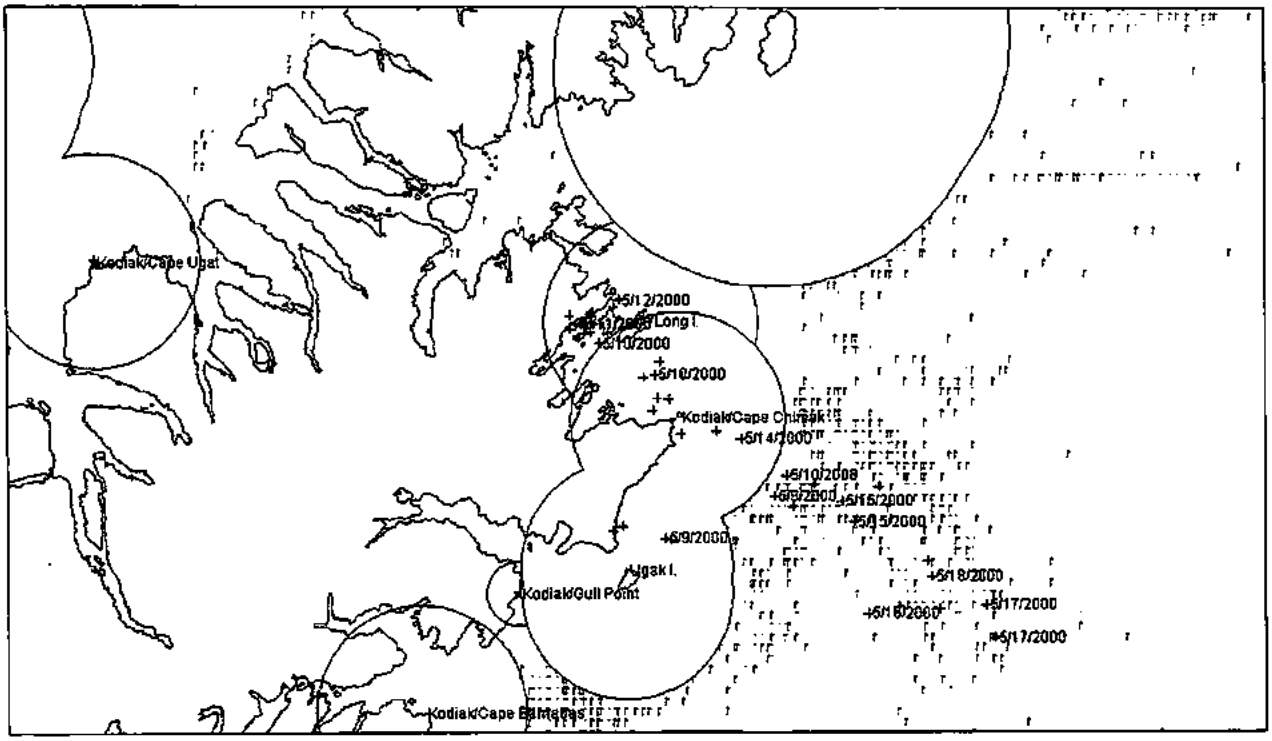


Fig. 28

This is the last leg of the telemetry data for SSLID 78, PTT 21094. There is no trawl fishing for mackerel, cod or Pollock in this area during this time period, inside or outside of 10 miles.

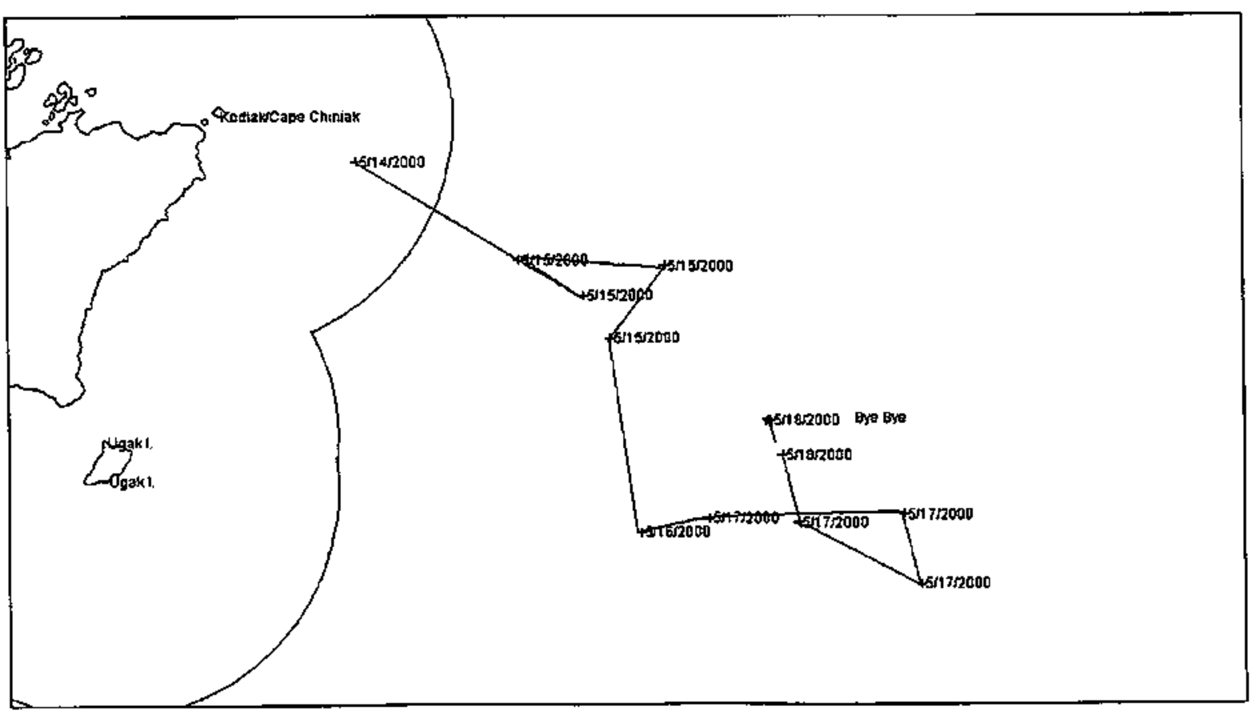
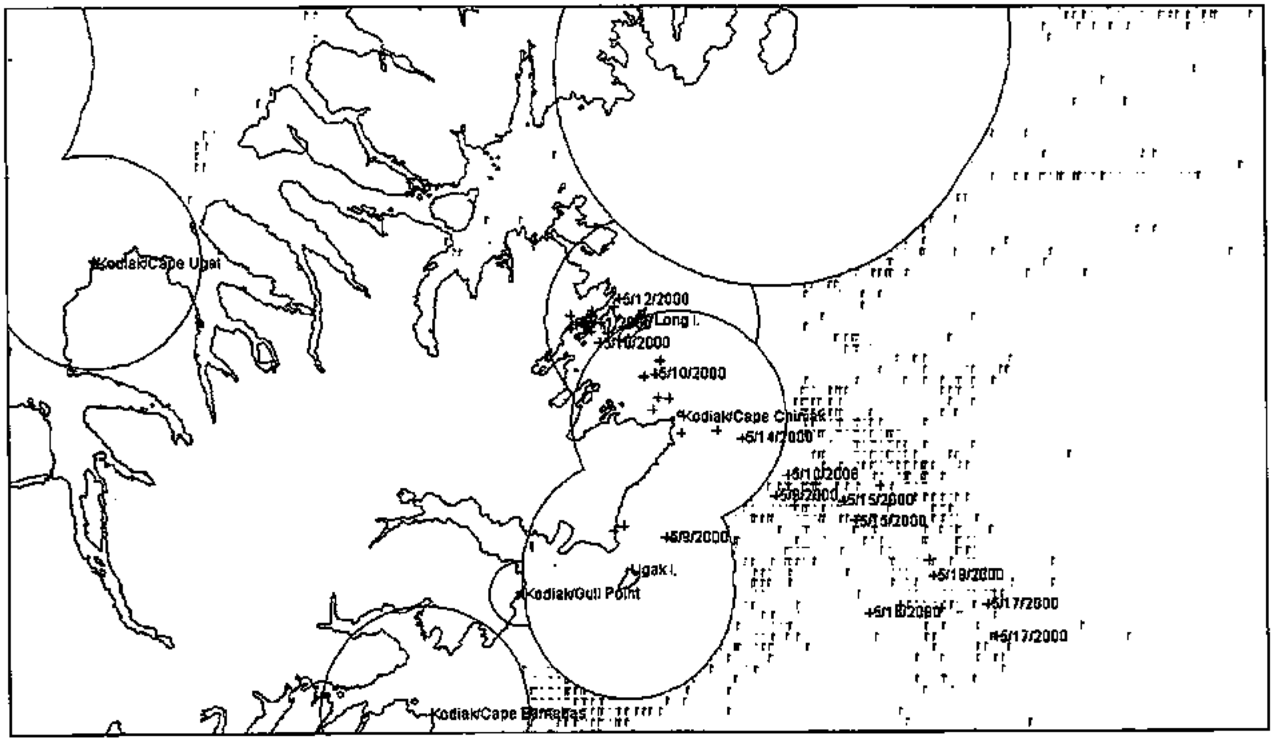


Fig. 27

The seventh period is from early to mid-May. Again, trawl fisheries for Pollock and cod are closed.



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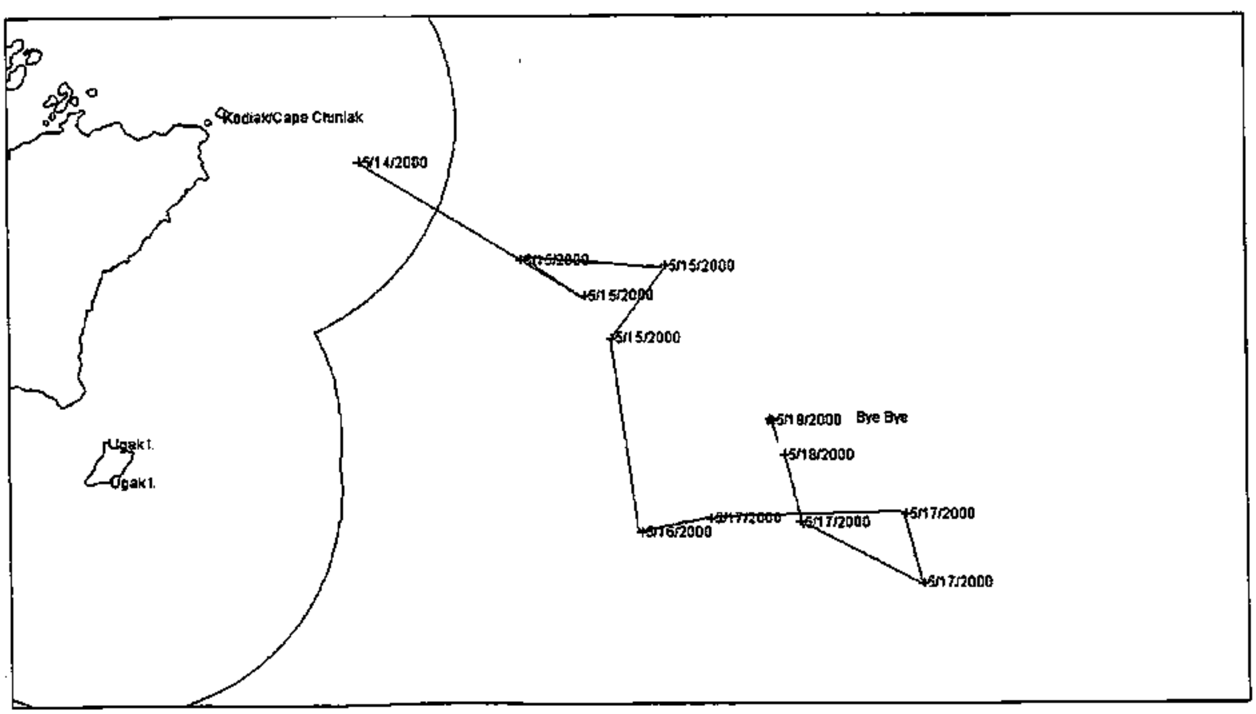

Review of the November 2000 Biological Opinion and Incidental Take Statement with Respect to the Western Stock of the Steller Seal Lion, with Comments on the Draft August 2001 Biological Opinion

By

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Final Report

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Executive Summary

The November 30, 2000 Biological Opinion (Nov2000BiOp) prepared by the National Marine Fisheries Service (NMFS) resulted in a finding of jeopardy to the Endangered western stock of Steller sea lions (SSL; *Eumetopias jubatus*) relative to fisheries for pollock, Atka mackerel, and Pacific cod under management jurisdiction of the North Pacific Fisheries Management Council (Council). The Nov2000BiOp set forth a set of management measures (termed reasonable and prudent alternatives or RPAs) intended to alleviate jeopardy if implemented in the 2001 fishing season. There is continuing scientific debate about the evidence regarding food competition between SSL and these commercial fisheries, and the role of other factors that might be limiting the recovery of SSL, and the implications of this evidence for the conclusions of the Nov2000BiOp.

The Council initially tasked this team to review the Nov2000BiOp with particular focus on the following three tasks:

1) determine the types of information that should be collected and analyses necessary to demonstrate an unequivocal adverse affect of commercial groundfish fisheries on SSL mortality,

2) recommend an appropriate experimental design to improve our understanding of the interactions between fisheries and SSL, and the efficacy of imposed management measures to promote recovery of the SSL population, and

3) review reports of stressed pinniped populations worldwide.

Subsequent to the team's interim report to the Council, NMFS released a new draft Biological Opinion in August 2001 (Aug2001BiOp) as Appendix A to a Supplemental Environmental Impact Statement. The team was asked to review both the new biological information on SSL and the analyses used in the development of the new RPAs. We refer to this as Task 4.

Task 1 - Review of the Nov2000BiOp

The overall conclusion of the Nov2000BiOp is that there is great uncertainty about the effects of the groundfish fisheries on SSL, but it is possible that these effects could be negative. However, the evidence presented in the Nov2000BiOp is almost entirely circumstantial. With respect to many of the key hypotheses (e.g., local depletion of prey by fishing, effects of local depletion on SSL) there are essentially no direct data bearing on the specific mechanisms for the effects of fishing on SSL. For the most part, the arguments in the Nov2000BiOp are constructed on the basis that such effects are possible, biologically imaginable, and are not contradicted by the available data.

There is no question that the number of SSL in the western stock has declined dramatically since the 1970s. However, there has been a marked decrease in the overall rate of decline and the rates of decline in different parts of the range over the past decade. These changes suggest that the factors that contributed most strongly to the more rapid declines in the several decades prior to the 1990s may not be the most significant factors operating today.

The hypothesis of the Nov2000BiOp that some aspect of food availability may be responsible for the declines in SSL is based largely on inferences drawn from a comparison of measurements from samples of SSL taken during the 1970s and another sample taken during the 1980s. These samples indicated, or in some cases simply suggested, a reduction in body growth rate, in late-term pregnancy rates, and in juvenile survival that were consistent with food limitation hypotheses. But these inferences are based on vital rates that applied more than 15 years ago, when the oceanographic regime, the fishery activities, and the rate of decline of the SSL population were quite different from now. There are good reasons for suspecting that these earlier vital rates are not representative of those currently being experienced by the population. The lack of recent estimates of vital rates is a serious obstacle to the evaluation of alternative explanations for the continuing decline of the western stock of SSL.

The distribution of SSL at sea is not well understood, but such knowledge is critical to understanding the potential effects of fisheries and environmental change on the foraging ecology of this species. NFMS and ADF&G have made good progress in fitting SSL with satellite transmitters and data loggers that provide information on the movements and diving behaviour of SSL at sea. However, despite the recognized importance of foraging distribution, there has been relatively little analysis of these new data. In our view, this represents a serious limitation of the analyses presented in the Nov2000BiOp (and, to a lesser extent, the Aug2001BiOp).

There has been considerable effort to increase the understanding of the diet of SSL through broad-scale collections of scats. Diet estimation in pinnipeds is fraught with difficulties, and SSL are no exception. While we applaud the research that has been done, the panel does not share the confidence expressed in the Nov2000BiOp that scats are a reliable tool for monitoring seasonal and temporal trends in SSL diets.

Task 2 - Design of Field Experiments

Experimental design to determine effectiveness of the Nov2000RPAs

During the time period of our review, the design of the experiment(s) to test the effect of fishing on SSL has been evolving and has therefore, from the standpoint of our review, constituted somewhat of a moving target. Apparently, the experimental design is constrained by the desire to ensure that jeopardy is alleviated for all management units. This presumably accounts for the somewhat surprising expectation that SSL populations in both the open and closed areas of the experiment would respond positively during the period of the experiment. In effect, the Nov2000RPA experimental design has two treatments and no control. We are quite pessimistic about the likelihood of obtaining convincing results using the proposed design. Given the high degree of uncertainty that the proposed RPAs really will alleviate jeopardy, we think it is worthwhile to contemplate an experiment that has a true control, at least locally. Given that the present size of the SSL stock is over 30,000 animals and that the present rate of decline is small, there should be considerable scope for experimentation without undue risk.

An important component of the design of any experiement is the choice of response variables (i.e., attributes of SSL) used to determine how experimental treatments affect SSL. We evaluted a suite of morphometric/energetic, behavioural, ecological, and demographic variables that have been or might be considered informative in the interpretation of experiments. Based on our analysis, it seems clear that quite similar changes in SSL response variables are predicted under the fishery-, climate-, and fish-predator-effects hypotheses. Our conclusion is that, without a distinct spatial pattern of treatment and control areas, it will not be possible to distinquish among the three food-driven hypotheses for the decline in SSL using only these response variables.

Finally, we note that good experiments can only be designed and undertaken if there are adequate quantitative observations from which to reasonably construct alternative models (i.e., explanations) and predictions. Given the current state of our observations with respect to SSL foraging behaviour and the effects of fishing on prey behaviour at fine to meso scales, it might be considered somewhat premature to undertake large-scale manipulative experiments, particularly given the difficulties associated with achieving convincing results. . On the other hand, the importance of learning whether fishing really is having an impact on SSL may outweigh the desire to make additional preliminary studies as a prelude to designing the best possible large-scale experiment.

Task 3 - Responses of Other Pinnipeds

Case studies for other pinniped species in which the effect of local prey depletion on demography has been investigated, or in which changes in demography have been attributed to local prey depletion, can be divided into three categories: fisheries-induced changes, environmentally-induced changes, and predator-induced changes.

The team was unaware of direct evidence that prey depletion by fisheries has affected the demography of any seal population, whereas there are a number of cases in which seal populations have continued to increase exponentially following the collapse of an important prey species. There is clear evidence of negative effects of environmental change on the demography of pinnipeds.

Two lessons emerge from our review. First, that changes in seal demography in response to a reduction in prey abundance are either so dramatic that they can be detected even without scientific study (e.g., Cape fur seals in Namibia, harp seals in Norway) or are relatively subtle, requiring time series of monitoring data (e.g., North Sea grey seals, Antarctic fur seals, southern elephant seals). Second, a reduction in first-year survival was involved in all the examples we have identified.

Task 4 - Review of August 2001 Draft Biological Opinion

The Aug2001BiOp concludes that managing the fisheries under RPA 4 would neither jeopardize the continued existence or recovery of the stock, nor would it lead to adverse modification of critical habitat. The conclusion with respect to jeopardy is based on new biological research on SSL presented in the Aug2001BiOp, which is used in an analysis of the effects of RPA 4 on the population trends of SSL over the next 8 years. The conclusion with respect to adverse modification is based on a forage ratio analysis.

New biological information

The Aug2001BiOp presents new information on the diets and distribution of SSL. However, only the new analyses of the distribution of SSL at sea are used directly in support of the RPA analysis. These new analyses indicated that most SSL locations at sea, derived from satellite telemetry, occur within 10 nm of land. However, this conclusion is quite sensitive to how the location data are analyzed. Different assumptions result in strikingly different conclusions about the way in which SSL use the ocean. As such, we have little confidence that this analysis provides a sound basis for drawing conclusions about the effect of the RPA on the dynamics of SSL.

Analysis in support of Aug2001RPA alleviation of jeopardy

Based on the analysis of the satellite telemetry data, the Aug2001BiOp assumed that the most important critical habitat is within 10nm of a rookery or haul out, because this is where SSL spend at least 75% of their time. A corollary of this is that 75% of the effects of a fishery on a haul out or rookery would be removed by closing the area within a 10-nm radius of that site to fishing. With a few further assumptions, the RPA Committee was able to simulate the potential effects of different area closures on trends in the number of SSL in 13 management areas over the next 8 years.

The RPA Committee clearly recognized that influential assumptions were involved in this population analysis. These include assuming that the effects of fisheries closures are related to local trends in SSL numbers rather than population wide ones, and assuming that only 50% (rather than the original 75%) of the effect of a fishery is removed by closing an area 10 nm around a haul out or rookery and that increased fishing outside 20 nm would have no effect. Trials of the RPA's performance using a computer model indicated that it was robust to the first of these assumptions, but not to the second. The potential effects of the third assumption were not tested. Given our concerns about the validity of the 75% value, and the possible importance of foraging beyond 20 nm, this raises considerable doubts about the reliability of the entire procedure.

Finally, simulations carried out by the team indicate that, under all the RPAs, local populations at the extreme western and eastern ends of the distribution of the western SSL stock are predicted to decline steadily over the next 20 years. The acceptability of such a situation, as a matter of policy, merits further discussion.

Avoiding adverse modification of critical habitat

To assess whether fishing might adversely modify critical habitat, the Aug2001BiOp presented calculations of the ratio of the estimated unfished biomass of pollock, Atka mackerel and Pacific cod in the Gulf of Alaska (GOA), Aleutian Islands, and Bering Sea system to the estimated food requirements of the historical population of 184,000 SSL in the western stock. They assumed that this was a minimum per capita requirement for a "healthy" stock of SSL. They then calculated the same ratio for the biomass of these three prey species in SSL critical habitat and the requirements of the current SSL population. All but one of these values was greater than that required for a "healthy" stock, and hence no adverse modification was predicted.

Clearly, this approach does not address the central issue: do the fisheries for these species cause **local** depletion of prey within SSL critical habitat? As a result, it cannot be used to evaluate whether or not specific management actions are more or less likely to result in adverse modification. These calculations (that there is more than enough biomass of these three prey species in critical habitat to sustain the current SSL population) are also inconsistent with NMFS' position that nutritional stress associated with local prey depletion is a likely cause of at least some portion of the recent decline in SSL numbers.

The team sees little merit in this approach to the assessment of adverse modification of critical habitat.

Research Priorities

One of the team's tasks was to recommend an appropriate experimental design to improve our understanding of the interactions between fisheries and SSL, and the efficacy of imposed management measures to promote recovery of the SSL population. This was, in part, because the original Nov2000BiOp RPA (Alternative 3) involved contrasting regulation of fisheries in adjacent management areas, with some areas being effectively closed to fishing while others were not. However, the preferred Aug2001BiOp RPA (Alternative 4) involves a wide range of area- and fishery-specific measures, which are predicted to have more subtle effects on local SSL population dynamics than Alternative 3. The panel feels that it is **unlikely** that simple monitoring of the response of these local populations under Alternative 4 will provide any insight into the interactions between SSL and fisheries.

However, even if Alternative 3 was to be implemented, we suspect that the responses of local populations would be difficult to interpret. Although we believe that large-scale experiments can reduce the long-term risks to the western stock of SSL, it is not practicable to design such experiments at present. We therefore recommend that research should focus initially on an integrated program of modelling and smaller scale manipulative experiments (see below).

Many elements of the recent and current research plans are unlikely to contribute either to the jeopardy finding of the Nov2000BiOp or to the no-jeopardy finding that the Aug2001BiOp attaches to the preferred RPA. Much of the deficiency has to do with a focus on physiological or behavioural indices, which cannot be converted to demographic consequences. Some of the inherent ambiguities in interpreting these indices are set forth in our discussion of response variables. The bottom line is that for results to be useful in the jeopardy decision, the effects of any posited mechanisms need, ultimately, to be quantified in units of population change (i.e., mortality or reproduction).

The SSL program has undergone a rapid shift in circumstances from modest budget to very large budget (although the longevity of this increased level of funding is uncertain). Nevertheless, this means that some research activities that previously were perceived as important, but budget-limited, could be expanded considerably. We strongly urge that in the next round of funding the highest priority is given to proposals which will have a direct bearing on the jeopardy finding and the effectiveness of the RPAs.

We believe priority should be given to the assessment of population trends and vital rates, and on better understanding the mechanisms underlying the current decline in the western SSL population. The high priority research items (not in order of priority) are:

- monitoring trends in population size and distribution

The Aug2001BiOp indicates that cessation of the decline in SSL numbers is the criterion that will be used to evaluate the success or failure of the implemented RPA. Therefore, ongoing monitoring of pup and non-pup numbers on rookeries and haulouts throughout the year and the geographic range of the stock is crucial to determining population status.

- estimation of vital rates

It is generally believed that the SSL population decline is an expression of reduced per capita recruitment owing, proximately, to reduced post-weaning juvenile survival. But the demographic parameter estimates upon which this judgement is based are derived from data from a period when the population decline was considerably steeper than at present. There is a strong suspicion that the causes of the decline were different than they are now. Therefore, new measurements are needed to estimate current vital rates.

- spatial and temporal scales of foraging

An understanding of the spatial and temporal distribution of SSL at sea and the factors that affect this distribution will be needed to identify ecologically important habitats, and to assess the response of SSL to environmental change and human activities, including fishing, that affect the distribution, abundance and quality of available prey.

- diet

We recognize that estimating the diet of SSL is difficult. Nevertheless, the importance of these data warrant the effort. NMFS is to be commended on the substantial effort that has gone into the collection of scat samples throughout the western stock. However, the reliance on frequency of occurrence as the measure of the relative importance of prey species is fraught with problems, and more informative and reliable measures should be sought. Thus, we would also recommend that other techniques, which are not dependent on the recovery of prey hard parts (e.g., fatty acid signature analysis), be seriously investigated. In the longer-term, such methods are likely to provide a more reliable basis for testing hypothesis about the factors underlying temporal and spatial variation in the diet of SSL.

- modelling

We expect prey availability, predators, and disease to affect the dynamics of SSL. Further, we expect that the effects of these factors to vary in time and space. Thus, it seems to the team that it will be useful to develop a modelling framework that can be used to integrate information on the foraging and reproductive energetics of SSL within a spatially explicit demographic model. Within this framework it should be possible to identify the types of perturbations that are likely to pose a problem for SSL and the resulting demographic consequences.

- retrospective data analysis

The historical data on counts of SSL at rookeries and haulouts is of high spatial resolution and provides an opportunity, independent of any manipulation experiment, to examine the relationship between SSL demography and possible influencing factors, such as fisheries. Nonparametric regression models could be used to investigate the relationship between the rate of change of SSL numbers at these sites and contemporary high resolution, spatially-explicit data on catch and effort for pollock and Atka mackerel close to the rookery over that time period.

- local depletion of prey and its consequences for SSL

The conclusion that fisheries for pollock, Atka mackerel and Pacific cod jeopardize the survival and recovery of the western stock of SSL is based on the hypothesis of localised depletion of prey within critical habitat. However, there is no direct evidence to support or refute this hypothesis. An integrated research program to address this issue is urgently required.

Introduction

The November 30, 2000 Biological Opinion (Nov2000BiOp) prepared by the National Marine Fisheries Service (NMFS) pursuant to the Endangered Species Act, resulted in a finding of jeopardy to the Endangered western stock of Steller sea lions (SSL; *Eumetopias jubatus*) relative to three fisheries under management jurisdiction of the North Pacific Fisheries Management Council (Council). The Nov2000BiOp sets forth a set of management measures (termed reasonable and prudent alternatives or RPAs) intended to alleviate jeopardy if implemented in the 2001 fishing season. Those measures are being implemented by NMFS under emergency rulemaking authority. The RPAs carry considerable economic and social costs for the pollock (*Theragra chalcogramma*), Atka mackerel (*Pleurogrammus monpterygius*), and Pacific cod (*Gadus macrocephalus*) fisheries. There is scientific debate regarding the conclusions of the Nov2000BiOp, and its associated RPAs, owing to the nature of the evidence regarding food competition between SSL and these commercial fisheries, and other factors that might be limiting the recovery of SSL.

Statement of Task

The Council initially tasked this team to review the Nov2000BiOp and provide their overall assessment of that document and its underlying science, assumptions, and hypotheses. More specifically, the team was to focus on the following three tasks:

1) Determine the types of information that should be collected and the analyses necessary to demonstrate an unequivocal adverse affect of commercial groundfish fisheries on SSL mortality. Characterize the current availability of such information, the critical gaps and the impact of data limitations on the determination of fishery/SSL competitive interactions.

2) Recommend an appropriate experimental design to improve our understanding of the interactions between fisheries and Steller sea lions, and the efficacy of imposed management measures to promote recovery of the SSL population.

3) Review reports of stressed pinniped populations worldwide and compare and contrast characteristics of those populations with conditions observed for SSL.

In July 2001, the team also was asked to review the August 2001 Draft Biological Opinion (Aug2001BiOp) with particular attention to the new RPAs (Aug2001RPA) it proposed to remove jeopardy. In that Opinion, NMFS concluded, "given the new biological information on Steller sea lions, that there were other possible ways to avoid jeopardy and adverse modification of critical habitat". This new Biological Opinion concluded there would be no jeopardy to the western SSL stock resulting from prosecution of the covered fisheries if the new RPAs were implemented.

There was little time for the team to review the Aug2001BiOp if it was to meet its September deadline. Therefore we have commented on only three critical topics: 1) the significance of the new biological information, 2) the population dynamics analysis which purports to provide a framework for comparing the effects of different RPAs, and 3) the use of the forage ratio method to assess the likelihood of modification of critical habitat. We refer to this final component as our Task 4.

We begin with an overall evaluation of the arguments put forward in the Nov2000BiOp concerning the likelihood that the commercial fisheries for pollock, Atka mackerel, and Pacific cod, if pursued as then proposed without implementation of RPAs, would adversely affect the western stock of SSL. Within this framework, we assess current understanding of the population dynamics and foraging ecology of SSL, and the evidence that fishing results in reduced foraging efficiency of SSL through its effects on local prey abundance and levels of prey aggregation. We briefly also consider alternative hypotheses that have been proposed for the decline in SSL numbers. We then discuss the kinds of data that ought to be collected, and the types of analyses that could be done, to provide insight into the factors affecting trends in SSL abundance.

Comparative studies are often useful in providing insight when data on a population of interest are not available. Therefore, we examine other situations where changes in the abundance of pinniped species have been attributed to local depletion of their prey. We review the evidence that has been used to infer this relationship and the way in which the pinniped population responded to changes in prey abundance. We extend this comparative review to include a range of case studies where pinnipeds have faced potential competition from commercial fisheries or have been negatively affected by other factors, such as large-scale environmental variability. We discuss the kinds of studies, monitoring, and management experiments that might be conducted to test hypotheses regarding the impacts of fisheries on SSL. Finally, we conclude with our limited analysis of the Aug2001BiOp, within the context explained above.

Task 1 - Review of the Nov2000BiOp

We have not provided a detailed (i.e., point by point) evaluation of the arguments put forth in the Nov2000BiOp. There are a number of statements in the Nov2000BiOp that we feel are not well supported by evidence. However, for the most part, correcting these matters of fact or interpretation of the evidence will not alter the overall conclusion of that document: there is great uncertainty about the effects of the groundfish fisheries on SSL, but it is possible that these effects could be negative. The evidence presented in the Nov2000BiOp is almost entirely circumstantial. With respect to many of the key hypotheses, there are essentially no direct data bearing on specific mechanisms of the effects of fishing on SSL. For the most part, the arguments in the Nov2000BiOp are constructed on the basis that such effects are possible, biologically imaginable, and are not contradicted by the available data. The weight that this argument of "plausibility" has carried in the decision process is a matter of legal and juridical interpretation of the Endangered Species Act.

Biology of Steller sea lions

a) Population dynamics

There is no question that the number of SSL in the western stock has declined dramatically since the 1970s. The broad geographic extent of the decline and its duration over several decades are clearly causes for concern. However, there has been a marked decrease in the overall rate of decline and in the rates of decline in different parts of the SSL range over the past decade. These changes, in conjunction with the changes in direct mortality, suggests that the factors that contributed most strongly to the more rapid declines in the several decades prior to the 1990s may not be the most significant factors operating today. In fact, it is believed that directed take and incidental entanglement in active fishing gear played a large role in the earlier period, and both these factors are thought to be very minor now. Although the Nov2000BiOp acknowledges the likely change in the nature of the causal factors, it does not develop this idea to help evaluate alternative hypotheses. We believe that more information could be extracted from the counts of SSL by developing spatially explicit models using both the pup and non-pup data at the level of individual rookeries or haulouts. Such models could help us understand how demography has changed in different areas over the course of the decline. This information could be used to evaluate, for example, hypotheses concerning which components of the population have recently been affected.

The current view that some aspect of food availability or quality may be responsible for the declines in SSL has gained popularity based largely on inferences drawn from a comparison of measurements from samples of SSL taken during the 1970s and another sample taken during the 1980s. These samples indicated, or in some cases simply suggested, a reduction in body growth rate, in late-term pregnancy rates, and in juvenile survival that were consistent with food limitation hypotheses. But these inferences are based on vital rates that applied more than 15 years ago (see York 1994), when the oceanographic regime, the fishery activities, and the rate of decline of the SSL population were quite different from now. There are good reasons for suspecting that these earlier vital rates are not representative of those currently being experienced by the population. The lack of current estimates of pregnancy rates and survival rates for the various segments of the population compromise the current population projections. The absence of recent data on vital rates also constitute a missed opportunity, since such data could be used to test alternative hypotheses about the factors responsible for the current trends in numbers. This sort of modeling would, of course, be much more revealing if it accounted explicitly for movement among rookeries and haulouts. Such data are largely lacking, but should accumulate rapidly over the next decade.

b) Foraging ecology

Apart from travelling from one haulout or rookery to another, it can be reasonably assumed that SSL go to sea primarily to forage. Currently, the distribution of SSL at sea is not well understood, but such knowledge is critical to understanding the potential effects of fisheries and environmental change on the foraging ecology of this species. Understanding the 3-dimensional use of the sea by SSL is also fundamental in identifying important habitats and in designing experiments and other studies to test hypotheses about the effects of local prey depletion by fisheries on SSL numbers.

The data summaries from the satellite tagged animals given in the Nov2000BiOp do not permit critical evaluation of how the analyses were done, and thus the conclusions drawn from the analyses cannot be properly assessed. The last published analysis of ranging behavior (Merrick and Loughlin 1997) was based on data collected during the period 1990-1993 (also see New Biological Information, Task 4 below).

The Nov2000BiOp repeatedly confuses the concepts of foraging and diet. Although clearly related, they are not the same and careless use of these terms can be misleading. Foraging refers to behaviors used in searching for, selecting, capturing and handling prey, and the ecological and prey characteristics that influence the decision to include a prey item in the diet. Diet is simply what was eaten. An example of the misuse of these terms is found in Table 4.2 where we are directed to foraging studies of SSL, but are presented with summaries of what was found in SSL stomach contents, i.e., diet. Although the confusion of these concepts may not seem important, it can be. Studies of what was found in the stomachs or scats of SSL (i.e., diet) are clearly important, but they provide little indication of where SSL forage, how often they dive, how deeply they dive, what fraction of the time they spend foraging, or how the composition in the diet relates to the spectrum of available prey items where and when the feeding took place. Each of these aspects of an animal's behavior could be used to shed light on how SSL might be affected by fishing, and by environmental change affecting prey availability.

There has been considerable effort to increase the understanding of the diet of SSL through broad-scale collections of scats. Diet estimation in pinnipeds is fraught with difficulties, and SSL are no exception. Nevertheless, the Nov2000BiOp concludes that scats are a "reliable tool for monitoring seasonal and temporal trends in predator diets and eliminates the need to euthanize the animal." While the second point is true, the first is almost certainly not, in most situations. One of the many known problems with the use of scats is that one has little idea of the age or sex of the animals whose scats were collected. Thus, there is usually no way of knowing how representative the sample is with respect to different age and sex classes. The potential sources of bias in estimating species composition of the diet from scats are reasonably well understood in principle, although how they affect estimates of the diet of individual species is less well understood. NMFS and ADF&G scientists have used, in the past, the split-sample frequency of occurrence of different prey species (Olesiuk et al. 1990) in individual scats to characterize SSL diet, rather than other more sophisticated methods of diet reconstruction (e.g., Frost and Lowry 1980; Hall et al. 2000). This is understandable, since feeding studies of SSL have indicated that a high proportion of otoliths, which would normally be measured in order to reconstruct diet, are completely digested during their passage through the gut. However, it should be recognized that frequency of occurrence tends to over-emphasize the importance of rare prey species and is relatively insensitive to changes in the proportion of the most important prey species in the diet (Olesiuk et al. 1990). In addition, the statistical properties of split-sample frequency of occurrence estimates are not well understood, which makes it difficult to detect significant changes in diet.

Another source of bias in the use of scats relates to the duration of foraging trips. VHF and SDR data indicate that female trips are relatively short during the summer, but can differ widely from 7.5 h to 39.1 h among rookeries (Springer et al. 1999, p. 27). Scat samples collected from females (or other age and sex classes) undertaking short foraging trips likely represent the diet of these animals in so far as such data can, but SSL undertaking trips longer than 24 h likely defecate at sea and thus scats collected at land sites may be biased towards the diet from the return trip in the immediate vicinity of haulouts. Winter foraging behavior could exacerbate this bias. Merrick and Loughlin's (1997) analysis of data from 1990-93 indicates that average trip duration of 5 adult females in winter was on the order of 8.5 d. If these data are representative, then scats collected at rookeries and haulouts are unlikely to be representative of winter diet. These points further underscore the importance of understanding the spatial and temporal characteristics of SSL foraging behavior.

The Nov2000BiOp attempts an integration and synthesis of the current understanding of SSL foraging in section 4.8.6.6. This synthesis is summarized in seven points. Our comments on these points are as follows:

Point 1 - "Steller sea lions are land-based predators but their attachment to land and foraging patterns/distribution may vary ...;"

This is a reasonable statement, evidence for which comes not only from studies of SSL, but from many other pinniped species.

Point 2 - "foraging sites relatively close to rookeries may be particularly important during the reproductive season when lactating females are limited by the nutritional requirements of their pups; "

Foraging sites close to rookeries are clearly important for lactating females, but all evidence to date suggests that during the first two months of lactation female SSL are not experiencing food shortages. The extent to which female foraging may be limited by the nutritional requirements of their pups during mid to late lactation is not known, but certainly pup fasting ability will place an upper limit on the duration of female foraging trips.

Point 3 - "Steller sea lions appear to be relatively shallow divers but are capable of (and apparently do) exploit deeper waters (e.g., beyond the shelf break);"

This point clearly depends on what is considered "shallow". Shallow diving appears to mean < 200 m. By itself this statement is not terribly useful. Data on SSL dive depth would be more useful if they were linked to bathymetry such that one could then estimate the fraction of benthic habitat available to different age and sex-classes.

Point 4 - "at present, pollock, Atka mackerel appear to be their most common or dominant prey, but Steller sea lions consume a variety of demersal, semi-demersal, and pelagic prey;"

That pollock and Atka mackerel are common in the diet of SSL seems well supported by available information, subject to the caveats about the quality of frequency-of-occurrence data from scats (e.g., biases arising from differential or complete digestion of prey remains, and foraging range effects on prey remains) and the fact that variation of diet among age and sex classes is poorly known,

Point 5 - "the availability of prey to an individual sea lion is determined by a range of factors ...;"

This is a rather general statement that could be made about any pinniped species and therefore is not particularly useful with respect to SSL foraging,

Point 6 - "diet diversity may also be an important determinant of foraging success and growth of Steller sea lion populations; and"

Diversity may indeed be important. However, this point is based on an observed correlation between diet diversity and rate of decline in different parts of the SSL range (Merrick et al. 1997; also see Task 4). As noted in the Nov2000BiOp, observed differences in diet diversity may simply reflect regional differences in prey availability that may have no direct effect on SSL demography. Thus, a more specific formulation and test of this hypothesis is needed before much significance can be attached to the observation.

Point 7 - "the broad distribution of sea lions sighted in the POP database indicates that sea lions forage at sites distant from rookeries and haulouts; the availability of prey at these sites may be critical ...".

It is quite likely that more distant (i.e., beyond 20 nm) foraging is important. The lack of analysis of SSL movements from existing satellite data, and the paucity of such data in winter, represent significant gaps in knowledge. As a result, the arguments about food availability advanced in the Nov2000BiOp are largely speculation.

c) Physiology

Captive studies - "The Steller sea lion captive research program at the University of British Columbia uses a bioenergetic paradigm to empirically test hypotheses related to the population decline." This is an overstatement. However, it is true that this captive program has contributed to our understanding of the energetic requirements of SSL.

These data will be useful both in designing studies to test hypotheses and in interpreting the results of such studies.

Free-ranging studies - Essentially these studies have failed to yield any insights into the causes of the decline in SSL numbers, a point acknowledged in the Nov2000BiOp. Studies of free-ranging SSL have focused on the first 30-60 d of lactation, when females and pups can readily be sampled. Studies during mid-late lactation, when the energetic demands of lactation are greater, or during the winter, when energetic demands for themoregulation may be more severe, might have shed more light on the causes of the decline. However, such studies would have been more difficult to undertake because of reduced access to lactating females once they leave the rookeries in mid summer.

Effects of fisheries on Steller sea lions

The Nov2000BiOp argument for the effects of fisheries on SSL demography is summarized below:

1. **Fish abundance is finite. Fishery removals are substantial and spatially concentrated.** The argument is that fishing can reduce, on a local scale and for short time periods, targeted fish biomass and thereby make it more difficult for SSL to forage.

2. **The likelihood of depletion is higher for patchily distributed fish (e.g., pollock and Atka mackerel).** This is because fishing may reduce both the number of fish aggregations within an area, making aggregations more difficult for SSL to locate, and the density of fish within an aggregation, making them less profitable to foraging SSL. The effect of this hypothesized depletion on SSL will depend on the species' foraging strategy. Although SSL are probably adapted to foraging on the unfished schools of pollock and Atka mackerel, we would point out that it is also conceivable that SSL may be able to exploit fragmented fish schools more effectively.

3. **SSL foraging efficiency may have been compromised by fisheries conducted near SSL rookeries and haulouts.** The proportion of effort by the commercial pollock fishery within known SSL foraging areas has increased substantially since the 1970's. Nevertheless, the effect of this trend on the number and density of pollock schools is unknown. Also the ability of SSL to change their diet, which might be expected to occur with depletion of pollock, might be hampered by competition with other fisheries that also locally deplete their target species.

4. **These effects are more significant the longer they last (i.e., they are cumulative) and are most significant during the winter for juvenile and adult female SSL.** There are three reasons for this:
   i. during winter SSL females face both the energetic demand of providing milk to their growing pup and of providing for the developing fetus,

ii. winter is a time of harsh environmental conditions likely increasing daily energy requirements, particularly for small animals with thin blubber,

iii. pups weaned during the winter may be challenged energetically because pups have greater metabolic and growth requirements per unit body mass and more limited foraging skills than older SSL.

Despite the acknowledged importance of winter conditions, spring foraging conditions also are likely important to adult females because poor foraging conditions could reduce birth rate, and pup birth mass and subsequent survival.

1. **SSL do not have large fat reserves compared with other pinnipeds and require continuous access to food.** Thus, they are susceptible to local depletion of prey by fisheries and have shown the effect of food limitation through reduced growth and condition as well as declining numbers.

2. **There may be interference competition between SSL and fisheries as well as resource competition.** It is speculated that the presence of fishing vessels and gear can cause disruption of feeding and abandonment of fishing areas used by SSL.

3. **Indirect effects of fishing may reduce carrying capacity and affect the critical habitat of SSL.** In this context, critical habitat is defined as the geographic extent of environment needed for the recovery and conservation of a species, and carrying capacity is the maximum number of individuals that could be supported by available resources.

Next, we briefly review the evidence of the effects of fishing on SSL presented in the Nov2000BiOp.

a) Depletion of pollock and Atka mackerel

The depletion of pollock has been documented from three areas: Bogoslof Island (AI), the donut hole, and Shelikof Strait (Fritz et al. 1995). In Shelikof Strait, for example, the fishery in 1970's developed to 300,000 tonnes/yr. By 1993, the estimated size of the Gulf of Alaska (GOA) pollock stock was reduced from 3 million tonnes to 1 million tonnes. NRC (1997) noted that SSL counts on nearby rookeries declined dramatically during the same period and individuals showed signs of reduced growth (Calkins and Goodwin 1988, Lowry et al. 1989). Uncertainties in these studies include the fact that prey density was rarely known in areas used by foraging SSL. This is because harvest rate is not necessarily a good indicator of prey availability. Using survey biomass estimates for a large region as an index of availability to SSL assumes a uniform distribution of prey in the area (an unlikely assumption). In addition, the correlation between fish distribution and catch distribution is often poor (Fritz 1993).

The depletion of Atka mackerel has been shown to occur through sharp declines in CPUE during repeated experimental trawling over relatively short periods (3 d to 17 wk; L. Fritz unpublished). Fritz estimated that harvest rates ranged between 55% and 91%, suggesting that there was substantial local depletion of the exploitable biomass. However, Atka mackerel do not have a swim bladder and therefore are not easily targeted by acoustics. Thus, there was no easy way to ascertain whether the number of shoals, size of shoals or density of shoals were reduced. Therefore, it is difficult to assess how such reductions in CPUE might affect SSL foraging success. Furthermore, it is unclear whether the shoals disrupted by fishing reaggregate and how fast they might do so, or whether they remain more dispersed. Finally, it is unclear whether disaggregation, if it occurred, would benefit or hinder SSL foraging success.

b) Potential competition between fisheries and SSL

There are two lines of evidence here, 1) competition for prey of similar size and 2) competition for prey at similar depths. There is likely overlap in the size of fish taken in the pollock fishery and that consumed by adult SSL, but evidence for such an overlap in prey size for juvenile SSL is weak. Recent data on SSL diet, so far, have provided little information on the size of prey eaten. There also may be overlap in the depths used by foraging SSL and that trawled by fisheries. Some fish prey exhibit diel vertical migration such that competition by depth between SSL and fisheries could occur at some times of the day, but not others. However, we still have a rather poor understanding of the foraging depths used by SSL of various age and sex classes at different times of the year. It is also important to emphasize that overlap in prey size or depth distribution does not provide sufficient evidence to conclude that there is competition between SSL and fisheries.

c) Competition during winter

Again, there are two lines of evidence bearing on this possibility. First, captive SSL increase their level of food intake in fall and early winter (Kastelein et al. 1990). Second, although spawning aggregations of fish in late winter may provide a higher energy and more reliable food source for SSL, the fishery, by trawling these aggregations, may reduce their availability. Neither of these arguments directly addresses whether or not competition occurs, only that it is possible.

d) Interference competition

The POP observation and observer program databases are equivocal on this issue. There are few observations of SSL from fishing ships in comparison to the amount of fishing activity. This could be because SSL are disturbed and avoid the vessels or because they are tolerant of fishing operations and just rarely sighted. However, the by-catch of SSL in the 1970's and 1980's implies that some SSL were tolerant of fishing activity in that era.

e) Nutrient limitation in SSL

There are several lines of evidence that point to the effects of food limitation on the western stock of SSL. York's (1994) analysis of the age structures of SSL collected in 1975-1978 and 1985-1986 by Calkins and Goodwin (1988) showed or suggested:

- smaller animals in 1985,
- later maturity in 1985,
- lower birth rate in 1985,
- females with pups were older in 1985, and
- SSL pups in 1985 were reported with signs of anemia. However, reported values were within the normal range for pups 2-3 weeks of age (NRC 1997).

In addition, juvenile survival apparently declined in eastern AI (Ugamak Island, Merrick et al. 1987) and in the GOA (Marmot Island, Chumbley et al. 1999). Pitcher et al. (1998) found an increased proportion of abortions and poorer condition in pregnant females collected during late gestation in 1985-86 compared with those collected in 1975-78 on rookeries, haulouts and coastal waters of the GOA. Successful gestation was directly proportion to condition (mass index).

On the other hand, more recent studies that have compared SSL at rookeries in declining (western) and stable or increasing (eastern) populations have found little evidence of food stress:

- Rea et al. (1998) sampled 238 free-ranging pups < 1 month old during June and July 1990-1996 in the GOA, AI, and Southeast Alaska. They found no indication of nutritional stress in the declining populations,
- Castellini (unpublished data, Williams et al. 1999) measured girth, length, and blood chemistry parameters of lactating female SSL between 1993 and 1997 from both increasing and declining populations. The results showed that individuals in the western population were rounder, longer and heavier compared with those from the eastern population, and
- energy intake of 40 pups at 5 rookeries in declining and stable populations sampled between 1993 and 1997 did not differ significantly (unpublished data, Williams et al. 1999).

Finally, the Nov2000BiOp states that "The question of whether competition exists between the Steller sea lion and BSAL and GOA groundfish fisheries is a question of sea lion foraging success." This is a necessary but not sufficient basis upon which to draw conclusions. Poor foraging success may also be the result of environmental change. Without additional information, it is not possible to determine whether fishing, the environment, or a combination of the two is the causal factor. Furthermore, as the evidence above clearly reveals, support for the Nov2000BiOp argument is indirect.

The Nov2000BiOp concludes that the groundfish fishery, as previously conducted, poses jeopardy for the western stock of SSL. The basis of that decision rests on two unquestioned facts, one argument of plausibility of causation, and one argument of absence of conclusive evidence that alternative causes are wholly responsible. The two unquestioned facts are that the SSL stock has continued its decline (though at a slower rate) over the past decade, and that a massive groundfish fishery is being conducted more or less coincident in space and time with activities of the SSL. The argument of plausibility of causation is that there are imaginable, but unconfirmed, mechanisms whereby the fishery could cause the decline in SSL numbers. Alternative hypotheses for the cause of the decline are also plausible, but there is insufficient evidence for a strong inference that, singly or in combination, these mechanisms on their own could reasonably account for the decline. In fact, there is strong evidence of major changes in the marine community in the GOA coincident with, or subsequent to, the oceanographic regime shift in the 1970s. Superficially, some of these changes are of a magnitude as great or greater than the effect of the fishery on its target stocks. Realistically, then, the question for a jeopardy evaluation should be whether the effect of the fishery, *in concert with the effect of environmental change*, is adversely affecting SSL numbers. The available data are not adequate for such an evaluation.

Task 2 - Design of Field Experiments

In the Nov2000BiOp, NMFS proposed to establish a "well-designed monitoring program that would be used to ascertain the extent to which the implemented measures [to] promote the recovery of sea lions."

Experimental design to determine effectiveness of the Nov2000RPAs

During the time period of our review, the design of the experiment(s) to test the effect of fishing on SSL has been evolving and has therefore, from the standpoint of our review, constituted somewhat of a moving target. Apparently, the design is constrained by a number of considerations, which are not conducive to obtaining clear results. Among the apparent constraints is the desire to ensure that the design "alleviate jeopardy", as judged by the Nov2000BiOp for all management units. This presumably accounts for the somewhat surprising expectation, expressed at the top of page 295 (Nov2000BiOp) that SSL populations in both the open and closed areas will respond positively during the period of the experiment. Certainly if fishing is a significant factor affecting SSL numbers then we would expect a non-zero, positive response in the areas closed to fishing. However, the planned experiment was designed so that conditions for SSL in the areas open to fishing are also predicted to improve. In effect, the Nov2000RPA experimental design has two treatments and no control. Given the high degree of uncertainty that the proposed RPAs really will alleviate jeopardy, we think it is worthwhile to contemplate an experiment that has a true control, at least locally. Given that the present size of the SSL stock is over 30,000 animals and that the present rate of decline is small, there should be considerable scope for experimentation without undue risk.

The Nov2000BiOp also states that both the RPA experiment and other studies will be used to assess the efficacy of management measures, but there is no indication of the types of studies anticipated. Certainly telemetry studies will be needed to determine to what extent the closed areas are actually used by foraging SSL. For example, if only 50% of animals use the treatment area intensively, the population response will only be about half that expected and one might incorrectly conclude that fishing was not a significant factor.

Design principles for ecological field experiments

Although the specific designs of the proposed field experiments have yet to be determined, there are certain principles that should apply rather generally to any such experiment. We briefly discuss some of these below to help focus the discussion about the merits of field experiments.

All experiments are based on the following logical model:

Observations → Models → Hypotheses (Predictions) → Alternative or Null hypotheses → Experiments → Interpretation of results.

This framework (Underwood 1997) emphasizes that good experiments can only be designed and undertaken if there are adequate quantitative observations from which to reasonably construct alternative models (i.e., explanations) and predictions. Given the current state of our observations with respect to SSL foraging behaviour and the effects of fishing on prey behaviour at fine to meso scales, it might be considered somewhat premature to undertake large-scale manipulative experiments, particularly given the difficulties associated with achieving convincing results (Raffaelli and Moller 2000). On the other hand, the importance of finding out whether fishing really is having an impact on SSL may outweigh the desire to make additional preliminary studies as a prelude to desiging the best possible large-scale experiment.

Nevertheless, it cannot be overemphasized how difficult it will be to conduct large-scale field experiments to test hypotheses about the effects of fishing on SSL. To our knowledge, experiments in the open ocean at this spatial scale have not been previously attempted. But, on the positive side, if the enormous fishing power of the groundfish fisheries really were at the disposal of the experiment (unconstrained by the pressures that molded the Nov2000RPA), this too would be unprecedented.

Some of the issues that need to be resolved include:

1) number of replicates of the treatment and the control,
2) size of the experimental unit (individual rookeries, clusters of rookeries),
3) demographic response variable(s) to measure (pups, non-pups, both, others) and what level of change should we expect to be able to detect,
4) duration of the experiment (there will be lags in the response variable),

5) how is the treatment to be measured (fishing days, biomass removed, number of tows, others?),
6) other response variables to measure (diet, foraging trip duration, birth mass, pup growth rate, others), and
7) what are the alternative hypotheses (e.g., climate effects, predation) and how will they be evaluated (i.e., does the experiment make unique predictions about the effects of fishing?).

Response variables

The choice of response variables will play an important role in the design, implementation, analysis and interpretation of field experiements. Researchers conducting field studies on SSL previously have used a number of response variables and both the first "Is It Food Workshop" (Alaska Sea Grant 1993) and the NRC review of the Bering Sea ecosystem (NRC 1997) attempted to predict the likely response of a number of variables under the range of hypotheses that have been advanced to account for the decline of SSL.

In Table 1, we list a number of morphometric/energetic, behavioural, ecological, and demographic variables that have been or might be considered informative in the interpretation of both experimental and observational data. We do this because these variables, used either singly or in combinations, will be measured, and it is important to understand how each variable might be interpreted with respect to discriminating among competing hypotheses. For some response variables, the direction of change under specific hypotheses is debatable. For other response variables, it is not clear to us how, or even if, the variable would change under some of the hypotheses. Changes in the response variables in Table 1 are often equivocal because they may respond in different ways, under the same hypothesis, depending on whether the effects are size selective, local or operate at a larger scale, and result in reduced performance rather than mortality. Also, the magnitude of the change may vary depending on the intensity of the effect. Thus, using the response variables as evidence for a particular hypothesis can be misleading unless additional information is available concerning the underlying mechanisms. Nevertheless, simultaneous changes in several response variables may allow us to build up a balance of evidence to distinguish among the hypotheses even though no one change is conclusive in itself. Finally, the entries in Table 1 are what we consider to be the most likely responses, based on current information. They are not predictions of what will happen.

Most response variables can be measured using both longitudinal and cross-sectional sampling. The first method repeatedly samples marked (i.e., identified) individuals over time, whereas the second takes a 'random sample' of the population at each sampling period. The method used to measure the response variable is important because the two methods can yield different results when used in the same study (Lunn et al. 1994). This has been shown clearly in the case of pup growth rate and weaning mass. The longitudinal method is preferable, provided that a representative sample is initially selected (and controls are maintained), because it is less affected by selective mortality which can significantly bias estimates obtained through cross-sectional sampling. Although longitudinal methods are often preferred, they are operationally more difficult to use under many field conditions, because of the need to keep track of individual animals over a long period of time.

a) Morphometric/energetic response variables

Birth mass - This is often used as a response variable because, in principle, it should reflect conditions experienced by the female during gestation. Females on a high plane of nutrition should give birth to larger offspring than those that are undernurished. However, birth mass can be difficult to interpret in practice because it can also be influenced by maternal phenotypic traits such as age, body size and birth date (e.g., Ellis et al. 2000). The use of such covariates will considerably strengthen conclusions based on birth mass.

Under the fishery effects, climate effects, and fish predator effects hypotheses, we would expect females in poor condition to give birth to smaller pups. No change in birth mass might be observed if females in the poorest condition simply do not give birth. However, the response of females to reduced food will likely be non-linear, as females will have some ability to modify their behaviour to buffer the fetus from the effects of reduced maternal food intake. Under the killer whale and shark predation hypothesis, we can imagine situations where birth mass might decline, increase, or not change. If the effects of incidental take and subsistence harvest hypotheses are selective on females of a certain body size then birth mass could increase or decrease. However, we do not expect size- or age-dependent selection on adult females. Furthermore, levels of harvest are not likely to be large enough to cause any detectable change in mean birth mass, except perhaps at a very local level. If pollution and disease lead to morbidity, then we might expect the same response in birth mass under these hypotheses as under the three food limitation hypotheses (fishery, climate and fish predator effects). If disease and pollution result in mortality of females, then we would expect to see no change in birth mass. Finally, under the entanglement hypothesis, any change in birth mass will depend on whether the entanglement is size selective and whether it leads to death. If females are entangled but not killed, birth mass might be lower because of the increased energy expenditure of females. If entanglement results in mortality the remaining animals could benefit from reduced competition resulting in increased birth mass. However, we do not expect entagnglement mortality to be size selective, and unless the proportion of females entangled at a rookery is large, we do not expect the effect to be large enough to effect average birth mass.

Pup growth rate - Like birth mass, pup growth rate (typically measured as gain in mass) is a useful response variable because it depends to a considerable degree on female condition which in turn depends on foraging success. This is particularly true in the case of otariid females, like SSL, in which most of the energy used to support milk production comes from food aquired during brief foraging trips to sea. As such, pup growth rate is likely more responsive to variation in prey abundance than birth mass. Nevertheless, pup growth rate also may be affected by maternal age, body size, and birth date. Accounting for these covariates will be important in the use of this variable. As with birth mass, it is important to be aware of the potential for bias in cross-sectional estimates of pup growth rate. Where possible, longitudinal estimates are preferred.

Under the fishery, climate and fish predator effects hypotheses, females that are not able to satisfy the energetic requirements of their offspring should have slower-growing pups. Given the limited foraging range of lactating females, at least during early lactation in summer, such effects will generally be a reflection of local depletion of prey rather than reduced prey abundance at larger scales. Under the predation hypotheses we would expect no change in pup growth rate, unless predation was size selective on pre-weaned pups. However, these effects are likely to be difficult to detect on a rookery scale. For the remaining hypotheses, we would expect pup growth rate to respond in a similar way as birth mass.

Weaning mass - This is determined by birth mass plus the mass gained during lactation. As such it represents the energy investment of a female in her offspring. Evidence from a growing number of pinniped species indicates that larger offspring at weaning have a greater probability of surviving (e.g., Baker and Fowler 1992; Hall et al. 2001). Thus as a response variable, weaning mass provides a link between physiological/energetic and demographic processes affecting populations. However, like birth mass and growth rate, weaning mass can be strongly influenced by maternal traits (e.g., Pomeroy et al. 1999; Bowen et al. 2001) and thus accounting for covariates is critical to its use. We note that it is difficult to determine when weaning has occurred in SSL and thus, using weaning mass as a response variable in this species will be problematic.

Nevertheless, given that weaning mass provides a measure of a female's total energy investment in her offspring, it is expected that weaning mass would respond in a similar way to both birth mass and growth rate under each of the hypotheses in Table 1.

Body condition - There are a number of indices of body condition, but all are attempts to characterize the physical state of an individual relative to some norm. Animals judged to be in good condition are expected to reproduce and survive better than those that are in poor condition. As a measure of the physical state of an individual, condition can be affected by a number of factors including food intake, diet, disease, and pollution.

Thus, it is expected that under the fishery, climate and fish predator effects hypotheses, sea lions would have reduced body condition. Although in severe conditions males and females of all age classes ought to be affected, in less severe conditions some groups, such as newly weaned pups, and perhaps adult males, might suffer more than other members of the population. One difficulty in using body condition as a response variable is that under severe environmental conditions, animals in the worst condition may be more or less available to be sampled depending on the behavioural reaction of the animal to nutritional stress. That is, animals spending more time at sea searching for food may be less detectable by a monitoring system based on haulout and rookery sites, whereas animals that are so debilitated that they cannot forage may be more detectable. Failure to account for such differences could lead to biased estimates. We would expect no change in body condition under the predation, incidental take, subsistent harvest, and entanglement hypotheses and no change or perhaps reduced condition would be expected under the disease and pollution hypotheses.

Milk output - For most of lactation, milk is the only form of nutrient intake for young SSL. As offspring growth and survival are dependent on the adequate production and transfer of milk, the measurement of milk output should provide a sensitive measure of female foraging success, which in turn ought to reflect food availability. Nevertheless, milk production suffers as a response variable because it is rather difficult to measure in large number of animals. Milk output is particularly difficult to measure in SSL beyond the first several months of lactation. However, this is the period when lactation may be most compromised by poor female foraging success.

Under the fishery, climate, and fish predator effects hypotheses, females experiencing nutritional stress should have reduced milk output. We would expect no change in milk output under the predation, incidental take, subsistent harvest, and entanglement hypotheses. However, depending on the type of disease or pollution affecting a female, milk output could be unaffected or could be reduced.

b) Behavioural response variables

Lactating female foraging trip duration - SSL and other otariid females alternate periods of suckling their young on land with foraging trips to sea. Except for the first few days of a long lactation period, when females use body stores to produce milk, females rely on successful foraging to ensure adequate milk production. The duration of these foraging trips is a reflection of both prey abundance and the distance between the foraging location and the rookery. Females undertake longer trips either because they have to travel a greater distance to forage or because they require more time to acquire the food needed to support both their own metabolic requirements and those of their offspring.

Thus under the fishery, climate, and fish predator effects hypotheses, an increased distance to prey, reduced prey abundance, or more dispersed prey should require more foraging time and thus foraging trips of increased duration. The fasting ability of pups may place an upper limit on the duration of female foraging trips. Beyond this limit there may be no change in foraging trip duration. In addition, comparisons of trip duration among females at different rookeries may not be informative because of differences in the characteristics of available prey near these rookeries. Foraging trip duration may also vary over the course of the lactation period and with female age and body size. Thus, these covariates will need to be considered when using trip duration as a response variable. Generally, we would expect no change in trip duration under the predation hypothesis unless females spend less time foraging in an attempt to reduce the risk of predation. Similarly, we would expect no change under the predation, incidental take, subsistent harvest, and entanglement hypotheses, although entangled females might have longer trips due to increased energetic cost of transport. We are unsure how disease would affect female foraging trip duration.

Foraging effort - Although trip duration is relatively easy to measure, it is only one aspect of foraging behaviour. More direct measures of the diving effort spent by females during a foraging trip, such as the number of dives, the time spent diving or the vertical distance travelled during diving also may be informative.

Under the fishery, climate, and fish predator effects hypotheses, reduced prey abundance or less concentrated patches of prey would result in more time searching, whereas an increased distance to prey could result in more foraging effort to pay for increased travel costs. In both cases, we might expect foraging effort to increase. However, if females choose to reduce the allocation of energy to their young in the face of reduced availability of prey, foraging effort may show no change. We expect foraging effort to respond in the same way as trip duration under the other hypotheses.

Pup/juvenile ranging behaviour - Young pinnipeds must search their environment in order to find food. Both the distribution and abundance of food may affect the way animals search and this will be reflected in ranging behaviour (i.e., the spatial extent of movements).

Under the fishery effects hypothesis, a local reduction in the availability of prey should result in an increase in the time spent searching and this could result in an increase in ranging behaviour. Under the climate and fish predator effects hypotheses, ranging behaviour could increase or decrease depending on whether the effect on prey is local or at a larger scale. We would expect no change under the incidental take, subsistent harvest, and entanglement hypotheses. We would also expect no change under the predation hypothesis, unless juveniles reduced foraging to avoid predation risks. Under the disease hypothesis, ranging behaviour might be reduced because of impairment, but the observed response will depend on nature of the disease.

c) Ecological response variables

Diet Composition - The prey species eaten by a pinniped will depend on a number of factors. These could including the age, sex, and reproductive status of the predator and the characteristics of the prey, such as the relative abundance and distribution of each prey species, their anti-predator behaviours, and their profitability (i.e., the net energy return per unit prey handling time). We are just beginning to understand how these factors may affect diet choice in pinnipeds. There are several difficulties in using diet composition as a response variable. First, many factors can affect diet composition, so changes are always expected, but they are likely to be difficult to interpret without careful consideration of covariates. Second, without an understanding of the spatial scale used during foraging, it is difficult to distinguish between local and more widespread factors affecting diet choice. Third, changes in diet are difficult to interpret without information about the suite of prey species available to the foraging animals.

Nevertheless, there is considerable evidence that changes in the distribution and abundance of prey are associated with changes in diets of pinnipeds. Therefore under the fishery, climate, and fish predator effects hypotheses, we would expect diet to change, although predicting how it should change will be difficult given our current understanding of diet choice. Under the remaining hypotheses we would not expect the diet to change above what might be considered background variation. It is conceivable that strong predation pressure or chronic disease could alter feeding behaviour and thus diet, but this would be difficult to investigate.

Diet Diversity - Pinnipeds typically consume a wide variety of prey species, but often relatively few species contribute most of the energy in the diet. Diversity indices provide an informative way to represent both the number of species eaten and their relative contribution to the diet.

Under the fishery effects hypothesis, the abundance of dominant prey species in a particular region might be reduced by fishing, thereby resulting in an increase in the evenness of the prey field included in the diet and hence a increase in diversity. Under the climate and fish predator effects hypotheses, the direction of a change in diversity will depend upon which prey species are affected by the environmental change and on the diets of the competitors. As in the case of diet composition, we would not expect diversity to change above some background variation under the predation, incidental take, subsistent harvest, and entanglement hypotheses and we are unable to predict the likely response under the disease and pollution hypotheses.

d) Demographic response variables

Percentage of 1-year old and older young nursing - The duration of the lactation period is imprecisely known in SSL, but there is increasing evidence that most pups are weaned just prior to the birth of a female's subsequent offspring (i.e., after about 11 months). However, some SSL females nurse offspring beyond this period, in some cases for as long as several years. Although the duration of lactation may be difficult to estimate, the percentage of yearlings and older juveniles that are nursing might reflect the ability of females to deliver food to their young. Nutritionally stressed females may increase the duration of lactation to compensate for a lower rate of energy delivery to offspring.

Thus under the fishery, climate, and fish predator effects hypotheses, we might expect an increase in the lactation period and hence to see a greater percentage of older offspring nursing. However, the response of females to reduced food may depend on the severity of the shortage and under extreme shortage females may wean offspring earlier because their own survival is threatened, in which case the percentage of older offspring nursing might go down. Conversely, a female in good condition, and for some reason not pregnant, might extend lactation without substantial energetic cost. Under the predation, incidental take, subsistent harvest, and entanglement hypotheses, we would expect to observe no change in this variable, unless predation was selective for lactating females or older nursing pups, in which case the percentage of older offspring nursing might be reduced. The response of this percentage under the pollution hypothesis will depend on the effect of the pollutant on females and pups, which is difficult to predict.

Birth rate - Female seals that are nutritionally stressed may abort their foetus rather than invest heavily in lactation, since this might effect their subsequent fecundity and survival. Thus, we would expect a reduced birth rate under the fishery, climate, and fish predator effects hypotheses, but no change under predation, incidental take, subsistent harvest, and entanglement – unless mortality associated with these hypotheses is so large that it results in increased food availability for the survivors. Some diseases, such as the morbilliviruses, can cause spontaneous abortions, and some pollutants, such as organochlorines, can cause infertility or even sterility. We might therefore, in some circumstances, expect a reduction in birth rate under disease and pollution hypotheses.

Age at first birth - Pinnipeds need to be a minimum size before they can breed because they use their body reserves to provide the energy required for at least part of lactation. We would expect female growth rates to be reduced under the fishery, climate, and fish predator effects hypotheses, and possibly under disease and pollution hypotheses. As a result, the average age at which females give birth to their first pup is expected to increase. No change is expected under predation, incidental take, subsistent harvest, and entanglement. It should be recognized that a reliable estimate of age at first birth can only be obtained through destructive sampling or by individually marking a large sample of female pups and subsequent close monitoring of rookeries.

Juvenile survival - As noted under pup growth rate, reduced weaning mass has been shown to affect post-weaning survival in a number of pinniped species. In addition, reduced availability of easily accessible prey may affect the survival of all juvenile animals, regardless of their condition. However, juvenile animals are also likely to be more vulnerable to predation, incidental take, entanglement and subsistence harvest. They are also more susceptible to disease and may acquire exceptionally large pollutant burdens during lactation. As a result, a reduction in juvenile survival is predicted under all hypotheses.

Adult survival - All of the mortality related hypotheses (predation, incidental take, subsistent harvest, entanglement, disease, and pollution) ultimately predict a reduction in adult survival. However, the first response of adult animals to a reduction in food availability (i.e., fishery, climate, and fish predator effects) is probably to reduce investment in reproduction, either through a decreased birth rate or changes in the duration of lactation. The immediate consequence of the latter is likely to be a reduction in juvenile survival (see above). As a result, changes in these demographic and energetic variables are predicted to occur before any reduction in adult survival. However, if food availability is reduced sufficiently during the course of lactation, some individuals may chose to continue lactating and this could prejudice their future survival.

e) Summary

Although some of the predicted effects in Table 1 are necessarily uncertain at this time, it seems clear that quite similar changes are predicted under the fishery, climate, and fish predator effects hypotheses. Our conclusion is that, without a distinct spatial pattern of treatment and control areas, it will not be possible to distinquish among the three food-driven hypotheses for the decline in SSL based only on the global signature in these response variables. Additional information will be needed, and this might be provided by spatial variation in food availability. This should be investigated further, especially insofar as the design of regulations has the potential to impose a spatial signal in the intensity of fishing. The same arguments apply to the mortality-related hypotheses (predation, incidental take, subsistent harvest, and entanglement), which also have almost identical predicted effects on the response variables

Smaller Scale Experiments

We are pessimistic about the prospects for resolving the critical uncertainties about the SSL decline from simply monitoring the response variables described above following the implementation of the RPAs. For this reason, we believe that a series of smaller scale experiments specifically designed to answer questions about the hypothesized mechanisms of the interaction between the fisheries and the SSL is required.

These will entail detailed measurements of the effects of fishing activities on the prey field and on the behavior of individual SSL fitted with satellite and/or GPS tags and perhaps other data loggers (e.g., Andrews 2001). These experiments should focus on the seasons and locations thought to represent the greatest nutritional stress for juveniles and adult females. Similarly, the sample of instrumented animals should include the age classes thought to be most severely affected. Although these experiments are smaller in scale than treating the RPAs as one grand experiment, they are still very substantial undertakings that will require a massive commitment of resources. It is our scientific judgement that this investment would be warranted.

An example of the kind of experiment we think would be informative is the acoustic research being conducted near Kodiak Island by the MACE group during August 2000 and 2001 (Chris Wilson, NMFS, AFSC, Seattle, WA, personal communication). In that experiment, two gully areas were chosen, and repeated acoustic transects were sampled in both areas, before, during, and after fishing was open in one of the areas. Analysis of these data could shed light on the impact of fishing on the number, size, and density of prey aggregations. If fishing effects on prey were found, it would be informative to expand the research to include coincident studies of the foraging behaviour of SSL in the fished and unfished areas. This expanded experiment should be conducted during both winter and spring when the energy demand of lactating female SSL and juveniles is high and the hypothesized effects of localized depletion would be most likely detected.

Task 3 - Responses of Other Pinnipeds

Comparisons with other species in the action area

In assessing the causes of continuing declines of the western stock of SSL, the Nov2000BiOp has made little use of data from other SSL populations, or from other pinniped species in the action area. Indeed, the Nov2000BiOp pays little attention to the continuing and consistent increase in numbers of SSL in Southeast Alaska (i.e., the eastern stock) or to changes in SSL numbers in the Russian territories. Many SSL foraging areas are also used by Northern fur seals (*Callorhinus ursinus*) at certain times of the year, and by harbour seals (*Phoca vitulina*) throughout the year. We believe that comparative data from other SSL stocks and other species could be used to help distinguish among alternative hypotheses, as we discuss below.

The Nov2000BiOp notes on page 102 that the SSL population in the Russian territories had also declined to about one-third of historic levels by the late 1980s. Counts conducted in 1989, 1994, and 1999 indicated differing trends in different areas, but some measures of pup production overall have increased at about 2.7% annually during the 1990s. The sum of counts has increased, "but counts at repeated sites have declined indicating the trends in Russian territories cannot yet be described with confidence." We are a little mystified by the final remark, but the important point is that demography in the Russian population apparently changed in the 1990s after a period of dramatic decline. This is more consistent with a large-scale environmental effect than with the effects of fishing, unless patterns of fishing within the Russian territories have changed or fishing effort was considerably reduced in the 1990s.

The dramatic decline in harbour seal numbers at Tugidak Island in the central GOA also seems to have halted during the 1990s and there is evidence of an increase in this population through 1999 (ADF&G personal comm.). There are population estimates of harbour seals elsewhere in the action area that could also be examined.

Fur seals use the action area only seasonally. Nevertheless, the number of pups born at St. Paul and St. George Islands has been rather more stable over the past decade, in contrast to earlier declines.

The point here is that by looking more broadly and considering the population trends, diet and foraging distribution of similar species in the action area, it may be possible to distinguish among competing hypotheses about the causes of decline in SSL.

Lessons from other seal populations

In this section we review some case studies for other pinniped species in which the effect of local prey depletion on demography has been investigated, or changes in demography have been attributed to local prey depletion. For convenience, we divide the causes of prey depletion into three categories: fisheries-induced changes, environmentally-induced changes, and predator-induced changes.

a) Fisheries-induced prey depletion

There is, as far as we know, no direct evidence that prey depletion by fisheries has affected the demography of any seal population, whereas there are a number of cases in which seal populations have continued to increase exponentially following the collapse of an important prey species (e.g., grey seals, *Halichoerus grypus*, and Atlantic cod, *Gadus morhua*, in the Northwest Atlantic; Mohn and Bowen 1996).

The only detailed study known to the team of the effect of local depletion concerns the North Sea "industrial" fishery for small pelagic species, which are used as animal feed or to produce fish meal and oil. This includes a fishery for sand lance (mainly the lesser sand lance, *Ammodytes marinus*). Sand lance catches rose sharply from 1960 onwards and have varied between 540,000 and 970,000 tonnes since 1984 (Pedersen et al. 1999); they now account for nearly 50% by weight of all fish landings from the North Sea. Sand lance are an important prey species for many predatory fish, seabirds, and marine mammals. The sheer scale of this fishery has led to concerns about its impact on the entire North Sea ecosystem (e.g., Aikman 1997). In particular, there is substantial spatial overlap between the fishery and foraging by seals and breeding seabirds on a series of major sandbanks off the Firth of Forth in Scotland. Sand lance fishing began in this area in 1990 and catches rose rapidly to more than 100,000 tonnes in 1993. They then fluctuated around 40,000 tonnes until the area was voluntarily closed to sand lance fishing in 1999. In most years, over 90% of the catch was taken in June, and most of that within a 10-day period. The effects of this local depletion on foraging and breeding performance of three seabird species (kittiwake *Rissa tridactyla*, shag *Phalacrocorax aristotelis*, and common murre *Uria aalge*) and grey seals was investigated during 1997 and 1998 (Harwood 2000).

The total biomass of sand lance in 1998 was 15% less than in 1997, and there was a marked change in the age distribution of sand lance between the two years. Acoustic surveys indicated that the biomass of 0-group sand lance in June 1998 was less than half that in 1997 and individual fish were smaller. Total removals were similar in both years (69,000 tonnes in 1997 and 65,000 tonnes in 1998). Fish were the most important natural predator in both years. The fishery was responsible for 68% of all removals in 1998, compared to 34% in 1997.

Sand lance (mainly 1-year-old and 3-year-old fish) made up nearly 50% of the diet of grey seals in 1997, but only around 10% in 1998 (and in that year they were mostly 2-year-old fish). More cod and whiting were consumed in 1998. The proportion of sand lance in the diet of murres declined by 70% in 1998, with the alternative prey being clupeids. The diet of shags and kittiwakes showed much less change and was dominated by sand lance in both years. Both murres and shags spent more time diving and proportionally less time at the surface in 1998. In contrast, the surface feeding kittiwakes did not, or could not, change their foraging behaviour. Kittiwakes suffered an almost complete breeding failure in 1998, whereas the productivity of guillemots and shags was only slightly reduced.

The proportion of female grey seals not breeding at the nearest rookery, and the number of breeding failures amongst marked animals at that colony, was negatively correlated with sand lance CPUE in the southern North Sea over the period 1990 to 1997. Female body condition was positively correlated with CPUE for the North Sea and the local stock area. None of these relationships had a measurable effect on the total number of pups born at the colony, which increased steadily over the study period.

The conclusion from this study is that the impact of local depletion by fisheries depends intimately on the foraging strategy of the predators that may be affected. Grey seals, murres and shags were able to make behavioural changes to compensate for the rapid reduction in the biomass of 1+ sand lance by the commercial fishery in June 1999, whereas surface-feeding kittiwakes were not. As a result, the observed response of most predators was relatively subtle and had no immediate effect on their demography.

Similarly, the relationships between grey seal breeding parameters (female condition, missed pregnancies, failed breeding) and sand lance abundance (as measured by CPUE) were also rather subtle and were only detectable because longitudinal data were available from a sub-population of permanently marked females at the relevant rookery. It should be noted that the year-to-year variations in sand lance abundance appear to be primarily a result of fluctuations in recruitment and not of the action of the fishery itself.

b) Environmentally-induced depletion of prey

The effects of ENSO (El Niño Southern Oscillation) events on the demography of a range of fur seal, sea lion and seal populations along the western seaboard of South and North America are well known (Trillmich and Ono 1991). However, there have been similar events in other parts of the world. For example, the intrusion of warm, low-oxygen content water into the northern Benguela system off the Atlantic coast of Namibia in late 1993 and early 1994 resulted in the virtual disappearance of many pelagic and epipelagic fish species from the continental shelf. This had a dramatic effect on Cape fur seals (*Arctocephalus pusillus pusillus*) at Namibian colonies during the 1993/94 breeding season, summarized in Anon (1998). The initial effect was seen in a reduced growth rate of pups at Cape Cross (the northernmost colony of the Cape fur seal). This was followed by a mass mortality of pups at Cape Cross in the austral summer of 1993/94, and colonies further south were affected after a short delay. From February/March 1994 onwards, all colonies north of Lüderitz (in southern Namibia) experienced the highest levels of pup mortality ever observed, due to abandonment and starvation. By the end of May approximately 120,000 pups, out of a normal production of around 300,000, had died. Beginning in June, and worsening through July, surviving females aborted their pups. It is estimated that 40,000 foetuses were aborted at Cape Cross alone. At the same time large numbers of emaciated adults of both sexes washed up along much of the Namibian coast. Pup production in 1994/95 was 50-70% lower than in 1992/93 and 1993/94. Mass of pups at birth and early pup survival in 1994/95 was the lowest ever recorded.

Capelin (*Mallotus villosus*) are normally the most important prey species for the harp seal (*Phoca groenlandica*) population which breeds in the White Sea and feeds in the Barents Sea, making up more than 90% of the diet in some years. The Barents Sea capelin stock collapsed in 1985/87 and remained at very low levels until 1990. At about the same time, large numbers of harp seals began appearing off the northwest coast as Norway, and by 1987, they were reported as far south as the southern North Sea. Very large numbers of harp seals (up to 60,000 in 1987) were taken as bycatch in gillnets along the coast of Finnmark, Troms and Nordland during this period. These "invading" harp seals, particularly in the subadults, were reported to be thin and in very poor condition (Wiig 1988 in Haug & Nilssen 1995). These events must have resulted in large scale mortality of young animals because the 1986-1988 year classes are virtually absent from the age structure of Norwegian samples of moulting harp seals taken since 1990 (Kjellqwist et al. 1995). Despite these dramatic changes, Haug and Nilssen (1995) are cautious about attributing the 1980s invasions of harp seals to local depletion of capelin in the Barents Sea, partly because the capelin stock collapsed again in 1992/93 but there was only a relatively small influx of harp seals into Norwegian waters at that time.

Antarctic fur seals (*Arctocephalus gazella*) breeding on the islands around South Georgia feed almost entirely on krill (*Euphasia supurba*). Breeding performance of fur seals and a number of seabird species, which also prey on krill, has been monitored annually on one of these islands (Bird Island) since 1980. Performance of all krill predators increased up to the late 1980s, but has declined steadily since then. Reid and Croxall (2001) interpret these changes as a response to decreasing availability of krill, possibly as a consequence of ocean warming and reduced sea-ice extent. The main responses by fur seals have been a decrease in the mean birth weight of pups and an increase in foraging trip duration (Boyd et al. 1994) during a year of particularly low krill abundance.

c) Predator-induced depletion of prey

The numbers of southern elephant seals (*Mirounga leonina*) breeding on Macquarie Island in the southern Indian Ocean have been declining steadily since the early 1970s. Hindell (1991) demonstrated that this was, at least in part, due to a dramatic decline in first-year survival from around 45% in the 1950s to less than 2% in the 1960s. He concluded that the population had temporarily exceeded the carrying capacity of the local environment and was demonstrating signs of delayed density-dependence. However, although first-year survival has now recovered to levels similar to, if not higher than, those observed in the 1950s, the population at Macquarie has continued to decline (McMahon et al. 1999) indicating that some demographic rate besides first year survival is also involved.

On the basis of changes in the size distribution krill caught off South Georgia during the 1990s, and estimates of local krill mortality that were 50% higher than those recorded elsewhere in the species' range, Reid and Croxall (2001) concluded that Antarctic fur seals and seabirds from South Georgia were now "operating close to the limit of krill availability". As a consequence, there has been an "increase in the frequency of years where the amount of krill is insufficient to support predator demand", and abundance of all krill predators on Bird Island has declined since 1990.

d) Lessons for SSL management

Two major lessons emerge from this brief review: 1) changes in seal demography in response to a reduction in prey abundance are either so dramatic that they can be detected even without scientific study (Cape fur seals in Namibia, harp seals in Norway) or relatively subtle, requiring time series of monitoring data (North Sea grey seals, Antarctic fur seals, southern elephant seals) and 2) a reduction in first-year survival was involved in all the examples listed above. A reduction in pup birth mass or growth rate or an increase in female foraging trip duration was also observed in some cases. The second point supports NMFS' contention that a reduction in juvenile survival is probably involved in the continuing decline of the western population of SSL. However, it should be recognized that a decline in SSL juvenile survival has not been adequately documented, it has only been inferred from York's (1994) analysis of age-structure data and on observations of low survival from a small sample of marked animals. The data upon which both inferences are based are now quite dated. The inference problem for the SSL is unusually complicated because the population decline has been underway for decades, but the mix of potential causal factors has been changing during this time. As a consequence, it is not clear what time period provides the appropriate "baseline" against which demographic data from the most recent decade should be compared.

Task 4 - Review of August 2001 Draft Biological Opinion

The Aug2001BiOp differs substantially from the Nov2000BiOp both in style and content. Stylistically, the Aug2001BiOp is a more coherent and closely reasoned document that provides a balanced treatment of rival hypotheses and clearly identifies the assumptions that have been made at every stage. In terms of content, it contains new information on SSL at-sea distribution and behavior, and on diet. These data are used to support the case made in the Nov2000BiOp that fisheries for pollock, Atka mackerel and Pacific cod could jeopardize the continued existence of the western stock of SSL as a result of local depletion of these prey species in SSL critical habitat. The Aug2001BiOp accepts as given the conclusions of the Nov2000BiOp of jeopardy through local depletion of prey, and that this jeopardy can be avoided by implementing the RPA proposed in that BiOp, referred to as the "Restricted and Closed Area Approach", or Alternative 3. The main purpose of the Aug2001BiOp is to evaluate the performance of alternative RPAs developed by the Council's RPA Committee, in particular Alternative 4: the "Area and Fishery Specific Approach", that have lower economic and social costs than Alternative 3. To do this, the RPA Committee developed a new approach for comparing the effects of different RPAs on the dynamics of the western stock of SSL. In addition, the Aug2001BiOp includes a discussion of whether these RPAs might lead to adverse modification of SSL critical habitat. The Aug2001BiOp concludes that managing the fisheries under Alternative 4 would neither jeopardize the continued existence or recovery of the stock, nor would it lead to adverse modification of critical habitat.

In this section, we first critically examine the new data on at-sea distribution and diet, and evaluate their relevance to the different RPAs. We then consider the methods developed in the Aug2001BiOp to evaluate the effects of the alternative RPAs on jeopardy and adverse modification. Finally, we recommend additional research that we believe should be given the highest priority to determine the efficacy of management measures and to improve current understanding of the interactions between fisheries and SSL.

New information from biological research on SSL

a) At-sea distribution of SSL

One of the two main reasons given for the re-initiation of consultation resulting in the Aug2001BiOp was a new analysis of the distribution of SSL that "revealed a possible greater dependence on near shore waters than previously understood". The new analyses concern the at-sea distribution of SSL based on locations derived from satellite-linked time-depth recorders (SDRs); they are reviewed in Small (2001). The analyses were conducted at the request of the RPA Committee, and "do not represent the analytical approaches NMML and ADF&G scientists are pursuing with the SSL telemetry data" (Small, pers. comm.). Results are summarised in Table 5.1 of the Aug2001BiOp. This table is based on data collected from NMML's deployments of SDRs on SSL pups and adult females at rookeries in the Aleutian Islands and GOA. It indicates that between 74% and 99% of all locations obtained from these deployments were within 10 nm of shore.

While the Aug2001BiOp acknowledges that the current analysis suffers from a number of problems, conclusions about the distribution of foraging are nonetheless an important component of the Aug2001RPA analysis to remove jeopardy. Thus, it is essential to determine how robust the conclusions about the spatial distribution of foraging by SSL are to limitations in existing data and to the methods of analysis.

Both NMFS and ADF&G must be commended for their efforts to fit large numbers of SSL with these tags, which provide information on the distribution of animals at sea. The panel recognizes that this has been a costly and logistically difficult undertaking, and the importance of the resulting data clearly warrants this effort. Having said this, there are limitations (clearly acknowledged by both agencies) to the current data, which suggest that conclusions drawn from these data may not be reliable. These limitations are noted in the Aug2001BiOp (p110) and discussed at length in Small (2001). They are:

1. The location can only be determined if an animal fitted with an SRD is at the surface when a satellite passes overhead and if the satellite receives multiple transmissions within the 10-min interval. SSL spend more time at the surface in inshore waters than when they are offshore, because this is where they rest, sleep and interact socially. As a result, the raw location data gives a biased measure of the amount of time spent inshore.
2. At-sea locations do not necessarily indicate where an animal is foraging.
3. The large majority of pups, and perhaps most juveniles, in the sample were probably still nursing, and thus not foraging independently.
4. SRDs have not been deployed on subadults or females without pups.

The first problem is exacerbated by the fact that SSL return to a particular rookery or haulout after each foraging trip. Thus many of the locations in inshore waters relate to animals that are in transit to and from these sites, rather than foraging. Support for this comes from Andrew's studies of adult female SSL fitted with stomach temperature data loggers (Andrews 2001), which can be used to determine when an animal has ingested a prey item. He found that, although animals began making relatively deep (>10m) dives soon after they departed from their rookeries, the first prey was not ingested until 1-5 hours after departure. There are insufficient location data to determine exactly where successful foraging first took place, but if these animals were swimming directly away from the rookery they would have been 3-25 nm offshore (Small 2001). To examine the possible effects of these biases, 90% of the locations recorded within 2 nm of shore were removed from the database (i.e., it was arbitrarily assumed that the probability of obtaining a location from an animal that was close inshore was nine times greater than when it was further offshore). The resulting estimates are summarised in Table 5.1b of the Aug2001BiOp. They are strikingly different from those based on the raw data. Only about 40% of the remaining female locations in winter and pup/juvenile locations in summer were within 10 nm of shore. This suggests that about 50% of the locations of pups and juveniles in summer, and about 20% and 50% of adult females in summer and winter, respectively, were beyond 20 nm (i.e., beyond critical habitat). A less arbitrary way of taking account of the known bias would be to calculate the average location of each animal on each day that location information was received, and to use these summary data in the calculations. It should also be recognized that the appropriate sampling unit in these studies is the individual. Pooling the location data, as was done in the calculations for Table 5.1, results in an overrepresentation of individuals that retained their transmitters for long periods. In addition, the information in Table 5.1 is derived only from the 72 animals of the western stock (23 pups/juveniles and 49 adult females) handled by NMML. There are equivalent data from a further 17 pups handled by ADF&G.

Although lactating females and dependent pups are important components of the population, and thus were rightly the focus of such studies, it has been difficult to obtain records longer than a few months from individual animals. This means, in the case of lactating females, that our understanding of their foraging distribution is limited mainly to the early part of lactation (i.e., summer) and may not be representative of foraging during later lactation (i.e., fall and winter) when females are likely faced with higher milk energy output costs. All of the available evidence suggests that neither female SSL nor their pups are nutritionally stressed during the early phases of lactation. In the case of pups and dependent juveniles, their distribution may reflect largely that of their mothers rather than that of independently foraging young SSL. Analysis of the dive patterns of these animals and the duration of their trips from rookeries and haul outs (Loughlin et al. 2001) suggests that they do not move independently of their mothers until they are 11-12 months of age (i.e., from June of their second year). Thus, the spatial distribution of foraging adult SSL during winter, and of independent sub-adult animals throughout the year, remains largely unknown. Nevertheless, the few winter foraging records that are available suggest that larger areas and more distant sites may be regularly used by foraging SSL.

All of these considerations indicate to us that the conclusion by the RPA committee (repeated on p112 of the Aug2001BiOp) that "areas within 10 nm from shore were about 3 times as important as those areas beyond 10 nm ... and ... the areas beyond 10 nm were [a] less important factor in the current decline of the species, and would therefore be less likely to be adversely affected by competition with fisheries" is extremely sensitive to the assumptions made in analyzing the data. As such, we have little confidence that this analysis provides a sound basis for drawing conclusions about the effect of the RPAs on the dynamics of SSL.

a) Diets of SSL

The other new information that has become available since the Nov2000BiOp is an analysis of the hard parts of prey retrieved from nearly 4,000 SSL scats collected between 1990 and 1998 (Sinclair and Zeppelin submitted). The authors used Principal Components Analysis and cluster analysis to identify three major diet groups: one dominated by Atka mackerel and cephalopods; one by pollock, salmon and arrowtooth flounder; and a third which was intermediate between the other two, but which also included significant quantities of sand lance, herring and Pacific cod. Most of the scats from the Central Aleutian Islands fell into the first cluster, most from the Eastern and Central GOA fell into the second cluster, scats from the Eastern Aleutian Islands fell into the third cluster, and scats from the Western GOA fell into a number of different clusters.

These broad regional groupings of rookeries and haulouts are similar to those identified by York et al. (1996) in their analysis of trends in SSL numbers. Following on the work of Merrick et al. (1997), Sinclair and Zeppelin (submitted) use this similarity, and other arguments, to suggest that low prey diversity may be a factor in the continued decline of SSLs since 1990. We have several problems with this conclusion. First, the analysis is based on simple frequency of occurrence of species remains in scats, rather than the more sensitive split-sample frequency of occurrence (see above), thus the presence of one otolith of a small fish such as a sand lance in a scat receives the same score as the presence of many bones from large pollock. Second, the differences in diet diversity are small (1.5 vs 2.1 in summer, and 1.9 vs 2.1 in winter). And third, York et al. (1996) had difficulty finding periods of time for trends that resulted in neighbouring rookeries being in the same cluster. When they used distance from Outer Island and the rates of decline for the time periods 1959-1975, 1976-1985, 1985-1989 and 1989-1994, they obtained non-contiguous clusters (i.e. regions far apart were more similar to each other than regions close together). Only by choosing the time periods 1959-1975, 1976-1985, 1985-1994, 1976-1994 and 1985-1994 did they get 'reasonable' clusters. They could not get contiguous clusters if they used the 1989-94 time series (the nearest comparison to the time period covered by Sinclair and Zeppelin's data). This is clearly allowing a pre-judgement of what is "reasonable" to drive the analysis. We are not persuaded that the expectation of "reasonable" clustering is justified. For this reason, we have little confidence in the identity of their regions.

Sinclair and Zeppelin also conclude that SSL "target prey when they are densely schooled in spawning or migratory aggregations nearshore". However, the team believes that their data do not justify such a strong conclusion. All they have shown is that when SSL are feeding inshore their diet tends to reflect the known abundance of prey species in that area. This is because, as noted above, scat analysis provides information only on the prey species that an animal has eaten in the period immediately before it hauled out. They provide no information on how the animals obtained those prey (e.g., whether they are dependent on large local aggregations or target solitary individuals), or on whether prey captured inshore are more or less important than those captured offshore.

Analysis in support of Aug2001RPAs alleviation of jeopardy

The new draft Aug2001BiOp takes great pains to emphasize that the arguments presented there to justify the adequacy of the new RPA are "qualitative." On the face of it, we found this puzzling, because the RPA measures are characterized by quantities defining the conduct of fisheries and the hoped for response of the SSL population growth rate is also defined in terms of quantities. After discussion with NMFS' staff it became clear that this terminology was adopted because the procedure developed by the RPA Committee, in their view, is intended to compare the relative, not the absolute, performance of the alternative RPAs. Nevertheless, the judgment that an RPA is adequate to remove jeopardy is inherently an absolute standard of performance.

The basis of the quantitative component of the analysis done by the RPA Committee is described in detail in DeMaster (2001), it follows logically from the development of the RPA in the Nov2000BiOp. It is assumed that the only effect of the fisheries on SSL population dynamics is through localised depletion in SSL critical habitat. Further, it is assumed that this localised depletion reduces the potential rate of increase of a local SSL population by 4% (the average rate of decline of the western stock since 1991). Initially, we also found this to be confusing and contradictory, especially when considered in the context of the Marine Mammal Protection Act (MMPA). It implies that, in the absence of any effects of fishing, SSL numbers would, at best, be approximately constant and may continue to decline. Indeed, this is accepted in the Nov2001BiOp (see p139). If this is really the case, the western stock is well above its Maximum Net Productivity Level (as defined in the MMPA), and is in no need of protection! However, the RPAs are being developed under the Endangered Species Act, not the MMPA, and we recognise that this is the context in which they should be evaluated.

The Aug2001BiOp assumes, on the basis of the analysis of the SDR telemetry data, that the most important critical habitat is within 10nm of a rookery or haul out, because this is where SSL spend at least 75% of their time. A corollary of this is that 75% of the effects of a fishery on a haul out or rookery can be removed by closing the area within a 10-nm radius of that site to fishing. With a few further assumptions, it was then possible for the RPA Committee to calculate the predicted effects of different area closures on the dynamics of SSL in 13 different management areas over the next 8 years. An RPA which was predicted to result in a total population as large as, or larger than, that predicted under Alternative 3 (the RPA from the Nov2000BiOp) was considered to result in no jeopardy to the western stock. In fact, the situation was a little more complicated than this.

Earlier simulations based on Alternative 3 assumed that restrictions on fishing activity in management areas that were still open to fishing would have no effect on SSL population dynamics (DeMaster 2001). The Aug2001BiOp presents an additional scenario where these restrictions increase the rate of increase of the local population by 2% per annum. Not surprisingly, this results in a population trajectory with a higher final population size than either the original Alternative 3 or Alternative 4. The criterion for no jeopardy now seems to be that the predicted population trajectory should lie between that for the original Alternative 3 and that for Alternative 3 with a 2% benefit in restricted areas.

The RPA Committee clearly recognizes that influential assumptions are involved in this procedure, and has carried out some analyses to test its robustness (see pp 135-6 of the Aug2001BiOp). These include assuming that the effects of fisheries closures are related to local trends in SSL numbers rather than population wide ones, and assuming that only 50% (rather than 75%) of the effect of a fishery is removed by closing an area 10 nm around a haul out or rookery and that increased fishing outside 20 nm would have no effect. Trials of the RPA's performance using a computer model indicated that it was robust to the first of these assumptions, but not to the second. The potential effects of the third assumption were not tested. Given our concerns about the validity of the 75% value (see **At-sea distribution**), compounded by the uncertainty of effects of increased fishing outside 20 nm, this raises considerable doubts in our minds about the reliability of the entire procedure.

This procedure could have been applied to the other RPAs initially considered by the RPA Committee, but this was not done. It is particularly interesting to apply it to Alternative 1 ("No change" from the pre-2000 fisheries management practices), because this is a trajectory that, according to the Nov2000BiOp, involves jeopardy. We carried out the necessary simulation and found that under this Alternative the population is predicted to decline by around 2% per year over the next 8 years, compared with an annual decline of 0.77% under the original Alternative 3 and 0.41% under Alternative 4 (see Table 5.6 of the Aug2001BiOp). The 4% decline observed from 1991 to 2000 does not continue indefinitely because the dynamics of the total population becomes dominated by those local populations that have been increasing since 1991.

Clearly the distinction between jeopardy and no jeopardy is a rather fine one. The definition of jeopardy adopted by NMFS ("..action that reasonably would be expected ... to reduce ... the likelihood of both the survival and recovery ...") is suitably precautionary, but this seems to set an almost impossibly high standard for the avoidance of jeopardy for a species such as the SSL, about whose dynamics there are so many uncertainties. In this case, the conclusion that jeopardy is removed by RPA Alternatives 3 and 4 rests entirely on a particular model of the way in which the fisheries may have affected SSL population dynamics. If this model does not accurately represent the actual mechanism (for example, if the major effects of the fishery occur in areas more than 10 nm from haulouts or rookeries) the proposed RPAs could actually contribute to jeopardy rather than remove it.

Neither DeMaster (2001) nor the Aug2001BiOp provide any information on predicted population trajectories within individual management areas. Simulations carried out by the team indicate that, under all the RPAs, local populations at the extreme western and eastern ends of the distribution of the western stock (i.e., in the western Aleutian Islands and in the eastern GOA) are predicted to decline steadily over the next 20 years. The acceptability of such a situation, as a matter of policy, merits further discussion.

However, we would note that all of these predictions must be interpreted with great caution. The 13 management areas do not reflect any natural biological divisions of the western stock of SSL, rather they appear to have been chosen for administrative convenience, and there is no *a priori* reason to assume that observed trends will continue. Indeed, recent evidence on resighting of branded animals (Raum-Suryan et al. in press) suggests that there may be considerable redistribution of animals on scales similar to or greater than those of the 13 management areas.

Avoiding adverse modification of critical habitat

Angliss and DeMaster (2001) have proposed an approach to evaluating whether or not adverse modification of critical habitat for SSL may have occurred, and this approach is used in the Aug2001BiOp. They calculated the ratio of the estimated unfished biomass of pollock, Atka mackerel and Pacific cod in the GOA, Aleutian Islands, and Bering Sea system to the estimated food requirements of the historical population of 184,000 SSL in the western stock. They assume that this is a minimum per capita requirement for a "healthy" stock. They then calculate the same ratio for the biomass of these three prey species in SSL critical habitat and the requirements of the current SSL population. Values are calculated for the entire region and separately for the GOA, Aleutian Islands and Bering Sea, on an annual and monthly basis. All but one of these values is greater than that required for a "healthy" stock, and hence they conclude that there has been no adverse modification.

However, the authors clearly recognise that this approach does not address the central issue: do the fisheries for these species cause **local** depletion of prey within SSL critical habitat? As a result, it cannot be used to evaluate whether or not specific management actions are more or less likely to result in adverse modification. They also recognise that the implication of these calculations (that there is more than enough biomass of these three prey species in critical habitat to sustain the current SSL population) is inconsistent with NMFS' position that nutritional stress associated with local prey depletion is a likely cause of at least some portion of the recent decline in SSL numbers.

Research priorities

One of the team's tasks was to recommend an appropriate experimental design to improve our understanding of the interactions between fisheries and SSL, and the efficacy of imposed management measures to promote recovery of the SSL population. This was, in part, because the original Nov2000BiOp RPA (Alternative 3) involved contrasting regulation of fisheries in adjacent management areas, with some areas being effectively closed to fishing while others were not. However, the preferred Aug2001BiOp RPA (Alternative 4) involves a wide range of area- and fishery-specific measures, which are predicted to have more subtle effects on local SSL population dynamics than Alternative 3. The panel feels that it is **unlikely** that simple monitoring of the response of these local populations under Alternative 4 will provide any insight into the interactions between SSL and fisheries.

However, even if Alternative 3 was to be implemented we suspect that the responses of local populations would be difficult to interpret. Although we believe that large-scale experiments can reduce the long-term risks to the western stock of SSL, it is not practicable to design such experiments at present. We therefore recommend that research should focus initially on an integrated program of modelling and smaller scale manipulative experiments (see below).

We suggest it would be worthwhile for NMFS to devote some effort to developing policy guidance that allows for the option of responsible and effective experimentation as part of the program for removing jeopardy. This is particularly necessary in this situation, where it simply is not possible to identify reasonable management alternatives that have a high certainty of ensuring survival and recovery of the population without future adjustment. We note that jeopardy has both a short-term and a long-term component. By focussing on the short term, during which there is very little true jeopardy, NMFS have ruled out many of their options for reducing jeopardy over a biologically relevant time scale. We believe that larger scale manipulative experiments should be considered in future RPAs once the results of the smaller scale experiments/modelling work become available.

Many elements of the recent and current research plans are unlikely to contribute either to the jeopardy finding of the Nov2000BiOp or the no-jeopardy finding that the Aug2001BiOp attaches to the preferred RPA, or to provide insights into causes underlying the continued decline of SSL. Much of the deficiency has to do with focus on physiological or behavioural indices, which cannot be converted to demographic consequences. Some of the inherent ambiguities in interpreting these indices are set forth in Table 1 and our discussion of response variables. The bottom line is that for results to be useful in the jeopardy decision, the effects of any posited mechanisms need, ultimately, to be quantified in units of population change (i.e., mortality or reproduction).

The SSL program has undergone a rapid shift in circumstances from modest budget to very large budget (although the longevity of this increased level of funding is uncertain). Nevertheless, this means that some research activities that previously were perceived as important, but budget-limited, could be expanded considerably. We strongly urge that in the next round of funding the highest priority be given to proposals which will have a direct bearing on the jeopardy finding and the effectiveness of the RPAs.

We believe priority should be given to the assessment of population trends and vital rates, and on better understanding the mechanisms underlying the current decline in the western SSL population. The high priority research items (not in order of priority) are:

- monitoring trends in population size and distribution

The Aug2001BiOp indicates that cessation of the decline in SSL numbers is the criterion that will be used to evaluate the success or failure of the implemented RPA. Therefore, ongoing monitoring of pup and non-pup numbers on rookeries and haulouts throughout the year and the geographic range of the stock is crucial to determining population status. The precision of the monitoring of population counts will affect the resolution with which changes in population size and trajectory can be detected, and the time required to detect those changes. The most obvious ways to increase precision are to increase the frequency of visits to the many sites, to ensure systematic coverage during all seasons, and to improve the quality and analysis of aerial photographs. Enhanced quality and coverage of aerial photographs also could provide additional demographic information, such as age-class structure (e.g., juvenile:adult ratios; Holmes and York submitted).

- estimation of vital rates

It is generally believed that the SSL population decline is an expression of reduced per capita recruitment owing, proximately, to reduced post-weaning juvenile survival. But the demographic parameter estimates upon which this judgement is based are derived from data from a period prior to the decade of the 1990s, which was a time when the population decline was considerably steeper than at present, and there is strong suspicion that the causes of the decline were different than they are now. Thus, we recommend the re-establishment of a long-term program to permanently and individually mark (e.g., brand) large numbers of SSL at a number of sites. We emphasise that a fundamental component of this research is the establishment of systematic sighting surveys over a number of years. In undertaking this program, it is also critically important to decide which vital rates are to estimated and with what precision, as answers to these questions will determine both the number and location of marking sites, the number of individuals that will need to be marked and the sighting effort required.

- spatial and temporal scales of foraging

An understanding of the spatial and temporal distribution of SSL at sea and the factors that affect this distribution will be needed to identify ecologically important habitats, and to assess the response of SSL to environmental change and human activities, including fishing, that affect the distribution, abundance and quality of available prey. Both NMFS and ADF&G have devoted considerable effort to fitting SSL with SDRs to study their at-sea distribution. We strongly support this research and recommend that it be continued with a focus on filling the gaps (e.g., winter distribution) identified by both by NMFS and ADF&G. We appreciate that the analysis of these data poses a number of analytical challenges, but we cannot over-emphasis the importance of rapid progress. The methods used to analyze these location data must account for the biases noted above to provide a more reliable estimate of the at-sea distribution of SSL. Analytical procedures that take account of the way in which central place foraging determines the accessibility of different areas of the ocean to SSL from each land site (e.g., those developed by Matthiopoulos submitted) would provide a more reliable identification of the most important foraging areas for this species. Such analyses, coupled with further studies on the distribution of foraging success (e.g., stomach temperature telemetry), should provide the basis for reasonable inferences about the foraging behaviour of SSL.

- diet

We recognize that estimating the diet of SSL is difficult. Nevertheless, the importance of these data warrant the effort. NMFS is to be commended on the substantial effort that has gone into the collection of scat samples throughout the western stock. However, the reliance on frequency of occurrence as the measure of the relative importance of prey species is fraught with problems, and more informative and reliable measures should be sought. Although the number of otoliths recovered from SSL scats is too few to provide the basis for more quantitative representation of the diet, other prey structures can be used to identify prey species and size. We are aware that there is ongoing SSL research in this regard and encourage its development. However, we caution that it is doubtful that the recovery of prey structures from SSL scats will provide a reliable means of diet estimation in this species. Thus, we would also recommend that other techniques, which are not dependent on the recovery of prey hard parts (e.g., fatty acid signature analysis; e.g., Iverson et al. 1997; Iverson et al. in prep.), be seriously investigated. In the longer-term, such methods are likely to provide a more reliable basis for testing hypothesis about the factors underlying temporal and spatial variation in the diet of SSL. Finally, given the large number of sites, seasons and age/sex classes that could be sampled, careful thought should be given to restrict the number of questions to those that are most likely to be informative with respect to food-related hypotheses and then to design an appropriate sampling scheme.

- modelling

We expect prey availability, predators, and disease to affect the dynamics of SSL. Further, we expect the effects of these factors to vary in time and space. Thus, it seems to the team that it will be useful to develop a modelling framework that can be used to integrate information on the foraging and reproductive energetics of SSL within a spatially explicit demographic model. That is, we need an analytical tool that can be used to assess the behavioural, energetic, and demographic consequences, for example, of changes in prey availability at different temporal and spatial scales. Differences in body size and energy expenditure among age and sex classes mean that individuals in the population will differ in their ability to tolerate reductions in prey availability. Thus, it should be possible to identify the types of perturbations that are likely to pose a problem for SSL and the resulting demographic consequences

- retrospective data analysis

The historical data on counts of SSL at rookeries and haulouts is of high spatial resolution and provides an opportunity, independent of any manipulation experiment, to examine the relationship between SSL demography and possible influencing factors, such as fisheries. Nonparametric regression models could be used to investigate the relationship between the rate of change of SSL numbers at these sites and contemporary high resolution, spatially-explicit data on catch and effort for pollock and Atka mackerel close to the rookery over that time period. Other potential factors, such as catch of other species (e.g., herring), geographic location of the rookery, and maximum historical SSL population at that site could also be used as covariates. This type of analysis can be done on groups of sites over any time period for which high resolution fisheries data are available. The advantages of this approach over analysis of larger areas are that the sample size is increased and there is more flexibility in the choice of spatial resolution and thus a greater chance of identifying signals in the data provided they were measured with high enough precision at this restricted spatial scale. However, this could be a problem at smaller spatial scales because the coefficient of variation for SSL counts tends to increase for smaller counts.

- local depletion of prey and its consequences for SSL

The conclusion that fisheries for pollock, Atka mackerel and Pacific cod jeopardize the survival and recovery of the western stock of SSL is based on the hypothesis of localised depletion of prey within critical habitat. However, there is no direct evidence to support or refute this hypothesis. An integrated research program to address this issue is urgently required. It should combine modelling of the foraging behaviour of lactating and juvenile SSL with studies of the fine-scale movements and foraging behaviour of individuals. An individual-based modelling framework will allow simulation of the behaviors of tagged individuals as well as including behavioral variability within and between individuals. The work already conducted by Andrews (2001) indicates that such studies are feasible, although the development of suitable GPS receivers would considerably enhance the resolution of data on SSL movements in relation to covariates (e.g., fishing activities, oceanographic features, prey). This research should be integrated with investigations of the impact of trawl fisheries on school size, school distribution and the density of fish within schools. The pilot study conducted near Kodiak Island (A. Hollowed and C. Wilson, NMFS, AFSC, pers. comm.) provides a useful example of how such research could be pursued. A longer-term goal of this research would be to link foraging success of young SSL to subsequent survival.

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Table 1. Likely direction of change in response variables under various hypotheses that have been proposed to explain the decline of the western stock of SSL.

Response variable	Hypothesis								
	FE	CE	FPE	PRED	IT	SH	D	PO	EN
Birth mass	R	R	R	U	NC	NC	R	R	NC
Pup growth rate	R	R	R	NC	NC	NC	NC/R	NC/R	NC
Weaning mass	R	R	R	NC	NC	NC	NC/R	NC/R	NC
Body condition	R	R	R	NC	NC	NC	NC/R	NC/R	NC
Lactating female foraging trip duration	I	I	I	NC/R	NC	NC	U	NC	NC
Foraging effort	I	I	I	NC/R	NC	NC	U	NC	NC
Milk output	R	R	R	NC	NC	NC	NC/R	NC/R	NC
Percentage of 1-year old and older young nursing	I	I	I	NC/R	NC	NC	U	U	NC
Pup/juvenile ranging behaviour	I	U	U	NC	NC	NC	R/U	NC	NC
Diet composition (scats)	C	C	C	NC	NC	NC	U	NC	NC
Diet diversity	I	U	U	NC	NC	NC	U	U	NC
Birth rate	R	R	R	NC	NC	NC	NC/R	NC/R	NC
Age at first birth	I	I	I	NC	NC	NC	NC/I	NC/I	NC
Juvenile survival	R	R	R	R	R	R	R	R	R
Adult survival	R/NC	R/NC	R/NC	R	R	R	R	R	R

FE - Fishery Effects on Food
CE- Climate/Regime Shift Effects on Food
FPE - Fish Predator Effects (competition)
PRED- Killer whale and shark predation
IT - Incidental Take
SH - Subsistence Harvest
D - Disease
PO - Pollution
EN - Entanglement in Fishing Gear
R = reduced, I = increased, NC = no change, C = change, U = uncertain

Bob ALVERSON
FVOA
C-2
SSL

Draft AP motion C-2

The AP believes that the recommendations of the RPA committee provide the best basis for addressing the twin mandates of the ESA and MSFCMA. As outlined in the staff presentation on "Alt. 4 Measures" Development, Issues, and Rationale," these recommendations are a precautionary response to concerns about SSL that make use of the best available scientific and commercial data, particularly in the new analysis of scat, telemetry and count data. These recommendations minimized potential interaction of fisheries near rookeries and haulouts based on the telemetry data and provide additional protection in areas declining at higher rates. The recommendations incorporate a global control rule, spatial and temporal dispersion, and an experimental design. We believe that Alt. 4 is equal to or better than Alt. 3 measures in avoiding jeopardy and adverse modification ESA mandates, while Alt. 4 is clearly superior in meeting MSFCMA mandates dealing with safety, bycatch, impacts to fishing communities, harvesters and processors, and the attainment of optimum yield.

Therefore the AP recommends that the Council adopt Alt. 4 as described in the action memo "Revised Description of Alternative 4, based on September 2001 Council action" (pages 2-26 through page 2-36) and attached table 2.3-1 with the following clarifications:

P.cod rollovers in the BSAI

Unharvested cod can be rolled over from one season to the next, consistent with bycatch considerations objectives of optimizing catch by gear groups and sectors.

P.cod trawl fishery closures during the Atka mackerel CH fishery

P. cod trawling should be closed from 0-20 of rookeries and haulouts in the AI west of 178 west longitude during the Atka mackerel CH fishery.

P. cod fishery in the GOA B season accounting

The start date for the GOA cod B season would be 6/10, but directed fishing would be prohibited for all gear until 9/1.

AI CDQ mackerel seasons

CDQ mackerel fishing should be governed by a single season as per 2001 provisions

Additionally, the AP recommends the following package of exemptions from area closures other modifications to Alternative 4 be analyzed in a trailing amendment for potential implementation at a later date.

1 - Area 8 – The "Constitution" exemption *(Staff sez: in the package and better than draft biop alt 4, but worse than post RPA committee bump analysis)*

2 – Area 4 – The "Chignik" exemption *(RPA committee sez: trailing amendment)*

3 - Area 9 – The "Dutch Harbor longline and jig" exemption *(RPA committee sez OK: fishing for P. cod by fixed gear vessels <60' would be allowed in area 9 outside 10 miles from rookeries and haulouts, capped at 250 tons)*

4 - The stand down provisions between A/B and C/D for pollock in the GOA *(RPA committee sez: trailing amendment)*

5 - All Areas – "Clem's" universal 60' exemption. *(RPA committee sez: No. 15.6% of TAC in GOA, thus triggers reconsultation.)*

TABLE 1.—YEAR 2000 GEAR SHARES AND SEASONAL APPORTIONMENTS OF THE BSAI PACIFIC COD HOOK-AND-LINE AND POT GEAR ALLOCATION

Gear Sector	Percent	Share (mt)	Harvest (mt) as of 7/13/2000	Adjusted Share (mt)[1]	Seasonal apportionment[2]	
					Date	Amount (mt)
Hook-and-Line Catcher-Processors	80	72,438	40,433	70,558	Jan 1-Apr 30 ..... May 1-Aug 31 ... Sept 1-Dec 31 ..	50,237 --- 20,321
Hook-and-Line Catcher-Vessels	0.3	272	318	--	Jan 1-Dec 31	272
Pot Gear Vessels	18.3	16,570	18,442	--	Jan 1-Dec 31	16,570
Catcher Vessels under 60 feet LOA using Hook-and-line or Pot Gear	1.4	1,268	....	1,230	Jan 1-Dec 31	1,230
Sub-total	100	90,548	....	....	....	90,548
Incidental Catch Allowance	....	500	....	....	....	500
Total hook-and-line and pot gear allocation of Pacific cod TAC	....	91,048	....	....	....	91,048

[1] Shares are adjusted proportionately to account for overages by the hook-and-line catcher vessel and pot gear sectors.
[2] Any unused portion of the first seasonal Pacific cod allowance specified for catcher/processors using hook-and-line fishery will be reapportioned to the third seasonal allowance.

Response to Comments

NMFS received a total of 14 letters of comment, all of which are summarized and responded to in this section. Of the total, the 11 letters that support the amendment and make essentially the same comment are summarized under comment 1. Of the three letters opposing the amendment, the two signed by a single author, make the same objections to the amendment and are summarized under comment 2; the third letter is summarized under comment 3.

Comment 1. Amendment 64 is necessary to the stability and overall rationalization of the fixed gear Pacific cod fishery in the BSAI, especially with the likely increase of fishing effort by vessels formerly targeting crab. All comment writers encourage prompt implementation of the amendment, and six letters explicitly entreat NMFS to implement the amendment by September 1.

Response. NMFS agrees and is expediting implementation of the amendment.

Comment 2. Amendment 64 and its implementing rule are opposed for the following four reasons: (1) The Initial Regulatory Flexibility Analysis (IRFA) for Amendment 64 does not satisfy the requirements of the Regulatory Flexibility Act (RFA) because the IRFA estimates the number of small entities impacted by this action, rather than specifying their exact number. (2) Because the exact number of affected small entities is unknown, NMFS could not adequately consider measures that would minimize any impacts on small entities. (3) For purposes of the RFA, pot vessels constitute the "universe of small entities" potentially impacted by this action and should, therefore, be the sole focus of any measures to mitigate this action's impact on small entities. (4) Amendment 64 does not adhere to the conservation and community goals of the Magnson-Stevens Act, as required by national standard 4 (allocations shall be fair and equitable), national standard 5 (conservation and management measures shall consider efficiency, but not have economic allocation as their sole purpose), and national standard 8 (conservation and management measures shall provide for the sustained participation of fishing communities and minimize adverse impacts on such communities).

Response. Section 603(b)(3) of the RFA requires that an IRFA contain "a description of and, where feasible, an estimate of the number of small entities" to which an action will apply. The IRFA and supplemental IRFA for Amendment 64 contain such a description and a reasonable estimate of the number of affected small entities, as defined by the RFA (see **Classification** for a summary of the IRFA and the estimated numbers of affected small entities).

For purposes of the RFA, a small entity is defined as a business that is independently owned and operated, is not dominant in its field of operation, and has combined annual receipts not in excess of $3 million. The IRFA identifies such entities in the BSAI fixed gear Pacific cod fishery, many of which are not pot vessels. Construing pot vessels alone as the entire "universe" of affected small entities would fail to satisfy the agency's requirements under the RFA. Those requirements are met by considering all small entities as the "universe of small entities" potentially impacted by the action.

The EA/RIR/IRFA for Amendment 64 presented alternatives with different percentage allocations, each of which represented tradeoffs in terms of impacts. Some small entities may be negatively impacted, and others positively impacted. Amendment 64, the Council's preferred alternative, represents the Council's deliberate intent to minimize impacts on small entities by allocating more cod to catcher vessels delivering to shore-based processors than they have historically harvested. That allocation will tend to benefit small entities. Conversely, the freezer longline fleet, with the highest percentage of large entities, will receive a smaller allocation to balance the increase given to small entities.

Amendment 64 is consistent with all the national standards, including 4, 5, and 8 under the Magnson-Stevens Act. National standard 4 requires that conservation and management measures not discriminate between residents of different states and that allocations be fair and equitable, be reasonably calculated to promote conservation, and implemented in such a manner that no entity receive an excessive share of fishing privileges. The allocations in Amendment 64 are made based on gear sectors and do not result in the acquisition of any particular share of the privilege by any individual entity.

These allocations reflect historical gear shares of the Pacific cod annually harvested by vessels using hook-and-line or pot gear. As such, NMFS believes that these allocations reflect historical participation in the fishery, promote stability within the Pacific cod fishery,

Prince William Sound Utilization Committee

SSL

Participating Members:
Community Organizations
Local Processors
Fishermen's Organizations
PWSAC

August 31, 2001

David Benton, Chairman
North Pacific Fisheries Management Council
605 West 4th Avenue, Suite 306
Anchorage, AK 99501-2252

Dear Chairman Benton and Members,

We fully support the ASSIRT's request for re-evaluation of the Western stock population of Steller sea lions. Further, the Prince William Sound Utilization Committee requests that the NPFMC support independent analysis of the NMFS data on Stellers in the Area E fishery region. We request that the Steller population in the Area E fishing region be considered specifically and separately , and not lumped with any other area of the State in this analysis.

The NMFW raw data indicates to us that the Steller population in Area E is not declining at the highest rate in the State, as the Dec. 2000 Biological Opinion asserts. In fact, the data – as we are able to interpret it – suggests that the Steller population in the area has stabilized, or is down only slightly.

If further analysis shows that the Area E population is indeed stable, we will respectfully request that the eastern boundary of the restricted area be redrawn from Cape Suckling to Cape Puget. The existing line location was arbitrary when it was drawn some years ago. We question whether or not its placement was scientifically justified. If not, we will request resolution and replacement.

The Prince William Sound Utilization Committee is a community-based group made up of stakeholders in our fisheries, including fishermen's organizations, Prince William Sound Aquaculture Corporation, the City of Cordova, area processors, and other community organizations. We work together to make constructive changes on issues that affect us all. The impacts of current actions regarding Steller sea lions certainly produce negative consequences for us, and we seek scientific justification for such actions.

We appreciate your consideration and support.

Sincerely,

Sue Aspelund
for

PWS Utilization Committee
P.O. Box 1110
Cordova, AK 99574

LATE COMMENT

RECEIVED
SEP 26 2001
N.P.F.M.C

North Pacific Fishery Management Council
605 W. 4th Ave, Suite 306
Anchorage AK 99501-2252

To:Councilmembers, AP Members, and Scientific and Statistical Committee members

The P-Cod fishery here in Chignik has had very little impact on Steller Sea Lions in our minds. We see them here and there around rookeries but never around our gear, pot and jig. During the Federal season cod are deeper, even in early spring, it is not until May, June or July the actually move onshore. There is no need to go close to sea lion areas. Fisherman respect the sea lion issues and we all want them to rebound. A prime example is our Eastward district from Foggy Cape to Kilokak Rocks has been virtually shut down. We haven't harvested pink and chum salmon, crab, or herring in years in this area. The sea lions are still declining in areas where there are no commercial fisherman interactions. Biological evidence confirms commercial fishing is not the problem. In order to close down fisheries it would seem to warrant sound biological evidence proving interaction.

During the Federal pot fishery maybe two boats fish the Mitrofania area with no interactions whatsoever between fisherman and sea lion. Pot and Jig fisheries are very clean fisheries with no bycatch.

Sincerely, John Jones
P-Cod Fisherman

October 1, 2001

COUNCIL TESTIMONY ON PRECAUTIONARY APPROACH AND LEGAL STANDARDS

Terry Leitzell

A. **Introduction.** The Council has heard testimony on several occasions urging a precautionary approach in protecting Steller sea lions. Frequently, the Council is told that it and the agency must always "give the benefit of the doubt" to the sea lions in deciding on management measures. NMFS has used a very conservative approach in BiOp 4 and has certainly met the requirements of the Endangered Species Act.

B. BiOps and Sec. 7 Consultation.

- **First Step in Consultation Process.** ESA requires action agency (usually Corps of Engineers or some other project-oriented agency) to be cautious and to request Section 7 consultations with NMFS or FWS whenever the action agency believes that a planned action "may affect" a listed species. Congress wanted the two expert agencies (NMFS and FWS) involved early and often, thus establishing a low threshold for requiring consultation.
- **Best Available Evidence**. But, once that consultation has begun, NMFS must use the best available scientific evidence available and must exercise its judgment to decide on jeopardy and adverse modification. The NMFS/FWS Section 7 Consultation Handbook (1998 guide to doing consultations and BiOps) never mentions the "precautionary approach" and never mentions giving "benefit of the doubt" to the species in the hundreds of pages of guidance.
- **NMFS is not required to "prove a negative".** The ESA was amended in 1979 from a requirement "to ensure no jeopardy" to the current language of "not likely" to jeopardize. P.L. 96-159 Sec. 4(1).
- **NMFS may not speculate**. In 1997, the Supreme Court held that the requirement to use the "best scientific and commercial data available" means that the agency may not speculate or surmise, in part to prevent uneconomic jeopardy decisions. Bennett v. Spear, 117 S. Ct. 1154 (1997).

C. Steller Sea Lions.

- Is there nutritional stress? BiOp 4 concludes that there is no evidence in the 1990s of nutritional stress; in fact, the western population females and juveniles and pups appear more healthy than in the non-endangered eastern stock. The Blue Ribbon Panel agrees (p. 18).
- Is there competition with the fisheries? In the "Is It Food II Workshop", 20 of the 24 scientists said they did not believe that fishery competition was occurring. The Blue Ribbon Panel agrees, stating that the evidence is "almost entirely circumstantial" and that there is "essentially no direct data" on fisheries effects (p. 10).

CONCLUSION: NMFS has been extraordinarily cautious and conservative in the proposed decisions of no jeopardy and no adverse modification in Draft BiOp 4. The substantiation of the key hypotheses of nutritional stress and fisheries competition has decreased in credibility over the last nine months, with the weight of opinion appearing to fall against those hypotheses.

CITY OF CHIGNIK

General Delivery • Chignik, Alaska 99564 • (907) 749-2280

Mr. Chairman and Honorable Council Members

My name is Jim Brewer and I am the Mayor of the City of Chignik, Alaska. As a representative of the community for the City of Chignik, I respectfully ask you to consider the following statement on behalf of the community as you consider the proposal to close the federal waters of Area 4 to codfish, Pollack, and atka mackeral.

We believe you should know the adverse effects such a change of the current fisheries would have on the revenues to the city, income to the residents, and the well being of our communities.

The five villages of the Chignik sub-region and the Lake & Peninsula Borough have been working actively to bring much-needed infrastructure to the communities in order to assist our fisheries and marketers. They include a new small boat harbor fully funded at $12.6 million (construction starts in spring of 2002, a city dock complex (funding request of $4 million for phase I and $4 million for phase II), a fully compliant Bulk fuel Storage Tank Farm and Transfer complex (fully funded at $2million plus) to start in April of 2002. In addition to these fisheries supportive projects, the city has a long list of other fully funded and proposed improvements to roads, airports and utility upgrades.

The sole source of tax revenues to support us is our fisheries. Due to the repeated disaster years for our salmon industry, most recently, 2001 as declared by local and state governments, revenues have dropped considerably. The loss of these much needed bottom fisheries revenue is too grim to contemplate.

Recently, congress appropriated $30 million to help industry and local governments deal with the loss of revenues due to the environmental restrictions on behalf of the Steller Sea Lion and although Chignik had previously participated in the federal fisheries, i.e. processing large amounts of bottom fish in Chignik Bay by Aleutian Dragon Fisheries and Chignik Pride plants but because of marketer reluctance during the inclusion dates, the amount of monies being discussed by SWAMC and their arbitrators of $100,000 for the entire Lake and Peninsula to be split up among its member communities, of which the City of Chignik is a part, does not represent a meaningful resource for our sub-region i.e. Ivanoff Bay, Perryville, Chignik Lake, Chignik Lagoon, and Chignik Bay.

To recap our position, the infrastructure mentioned above is necessary for stable markets, safe fisheries, and a healthy community. The bottom fisheries of our area are an integral part of our tax revenue, personal incomes, and reinvestment in our communities. The local vision of low impact, low or no by catch, and sustainable fisheries are in your hands.

Respectfully Yours;

James Brewer
Mayor, City of Chignik

Testimony of Alfredo Aboueid
Stellar Sea Lion RPAs
October 5, 2001

Mr. Chairman and Council members, my name is Alfredo Aboueid. I represent the Chignik Marketing Association and Chignik fishermen. I've fished in Alaska for over 27 years. Our Chignik fleet consists of 38-58 foot pot and jig vessels. We have no trawlers at all.

I ask the Council to review the strict measures taken in Alternative 4, which closes more than half of the Chignik area to fishing for Pacific cod. Option 1 would leave a limited fishing zone, but the area is relatively un-fishable in the winter by itself for our fleet.

In Alternative 4, Kak Island is upgraded to full rookery protection, yet it's only a haul-out with few Stellar sea lions. We'd like to ask the Council to reduce that 20-mile no fishing zone to 3 miles. That way, the Chignik small boat fleet has a little bit of protected area to fish in harsh weather around Castle Cape.

Alternative 4 changed the no-fishing zone for pollock around Metrofinia and Split Island from 20 down to 3 miles. We'd like to ask the Council to put it back. These areas have many more Stellar sea lions than Kak and Sutwik. One trawler takes as much cod in one day as our pot and jig fleets combined.

For the last 3-4 years, the Chignik fleet has annually harvested less that 4-5 million pounds in Federal and State waters combined. We don't think this little amount has any impact on Stellar sea lions.

Mr. Chairman, Council members, why is it necessary to close Area 4? Pot and jig fisheries are the cleanest and slowest. The BIOP and SEIS analyses show that the Chignik type and scale of fishery has the least potential for negative impacts. It's a "low and slow" fishery. Why keep other areas open that may be having more impact on sea lions than the Chignik fishery and close Chignik down?

The economy in Chignik is in tough shape, especially due to poor salmon markets. Limiting harvest of cod for the pot and jig fleet is going to have a large, negative impact on the community. The fact that other communities on the Alaska Peninsula are having a hard time is no reason to shut our lower risk fishery down. Please Mr. Chairman and Council members, take a close look at this matter.

Thanks for your consideration.

Review of the November 2000 Biological Opinion on the Western Stock of the Steller Seal Lion, with Comments on the Draft August 2001 Biological Opinion

by

W. Don Bowen

John Harwood

Dan Goodman

Gordon Swartzman

Nov2000BiOp

- Task 1 - overall review of BiOp
- Task 2 - experimental design to improve understanding of interactions between SSL and fisheries
- Task 3 - comparisons with other pinniped species
- Task 4 - targetted review of Aug2001BiOp
- Research Priorities

Nov2000BiOp - Task 1

- overall conclusion of the Nov2000BiOp is that there is great uncertainty about the effects of the groundfish fisheries on SSL, but it is possible that these effects could be negative
- evidence presented in the Nov2000BiOp is almost entirely circumstantial
- there are essentially no direct data bearing on the specific mechanisms for the effects of fishing on SSL

Nov2000BiOp - Task 1

- no question that the number of SSL in the western stock has declined dramatically since the 1970s
- marked decrease in the overall rate of decline and the rates of decline in different parts of the range over the past decade
- factors that contributed most strongly to the more rapid declines in the several decades prior to the 1990s may not be the most significant factors operating today

Nov2000BiOp - Task 1

- hypothesis that of food availability may be responsible for the declines in SSL is based largely on inferences from a comparison of samples of SSL taken during the 1970s and another sample taken during the 1980s
- these inferences are based on vital rates that applied more than 15 years ago, when the oceanographic regime, the fishery activities, and the rate of decline of the SSL population were quite different from now

Nov2000BiOp - Task 1

- good reasons for suspecting that these earlier vital rates are not representative of those currently being experienced by the population
- lack of recent estimates of vital rates is a serious obstacle to the evaluation of alternative explanations for the continuing decline of the western stock of SSL

Nov2000BiOp - Task 1

- distribution of SSL at sea is not well understood
- such knowledge is critical to understanding the potential effects of fisheries and environmental change on the foraging ecology of this species
- NFMS and ADF&G have made good progress in fitting SSL with satellite transmitters that provide information on the movements and diving behaviour of SSL at sea
- there has been relatively little analysis of these new data

Nov2000BiOp - Task 2

- the Nov2000RPA experimental design had two treatments and no control
- pessimistic about the likelihood of obtaining convincing results using the proposed design
- given current knowledge about SSL foraging behaviour and the effects of fishing on prey behaviour at fine to meso scales, we feel it is premature to undertake large-scale manipulative experiments

Nov2000BiOp - Task 2

- morphometric/energetic, behavioural, ecological, and demographic variables that could be informative in the interpretation of experiments
- similar changes in SSL response variables are predicted under the fishery-, climate-, and fish-predator-effects hypotheses
- without a distinct spatial pattern of treatment and control areas, not possible to distinquish among the three food-driven hypotheses for the decline in SSL using only these response variables

	Hypothesis								
Response variable	FE	CE	FPE	PRED	IT	SH	D	PO	EN
Birth mass	R	R	R	U	NC	NC	R	R	NC
Pup growth rate	R	R	R	NC	NC	NC	NC/R	NC/R	NC
Weaning mass	R	R	R	NC	NC	NC	NC/R	NC/R	NC
Body condition	R	R	R	NC	NC	NC	NC/R	NC/R	NC
Lactating female foraging trip duration	I	I	I	NC/R	NC	NC	U	NC	NC
Foraging effort	I	I	I	NC/R	NC	NC	U	NC	NC
Milk output	R	R	R	NC	NC	NC	NC/R	NC/R	NC
Percentage of 1-year old and older young nursing	I	I	I	NC/R	NC	NC	U	U	NC
Pup/juvenile ranging behaviour	I	U	U	NC	NC	NC	R/U	NC	NC
Diet composition (scats)	C	C	C	NC	NC	NC	U	NC	NC
Diet diversity	I	U	U	NC	NC	NC	U	U	NC
Birth rate	R	R	R	NC	NC	NC	NC/R	NC/R	NC
Age at first birth	I	I	I	NC	NC	NC	NC/I	NC/I	NC
Juvenile survival	R	R	R	R	R	R	R	R	R
Adult survival	R/NC	R/NC	R/NC	R	R	R	R	R	R

FE - Fishery Effects on Food | CE- Climate/Regime Shift Effects on Food
FPE - Fish Predator Effects (competition) | PRED- Killer whale and shark predation
IT - Incidental Take | SH - Subsistence Harvest
D - Disease | PO - Pollution
EN - Entanglement in Fishing Gear
R = reduced, I = increased, NC = no change, C = change, U = uncertain

Nov2000BiOp - Task 3

- unaware of direct evidence that prey depletion by fisheries has affected the demography of any seal population
- number of cases in which seal populations have continued to increase following the collapse of an important prey species
- evidence of negative effects of environmental change on the demography of pinnipeds

Nov2000BiOp - Task 3

- Two lessons -
- that changes in seal demography in response to a reduction in prey abundance are either so dramatic that they can be detected even without scientific study or are relatively subtle, requiring time series of monitoring data
- a reduction in first-year survival was involved in all the examples

Aug2001BiOp - Task 4

- concluded that managing the fisheries under RPA 4 would neither jeopardize the continued existence or recovery of the stock, nor would it lead to adverse modification of critical habitat
- conclusion with respect to jeopardy is based on new biological research on SSL, which is used in an analysis of the effects of RPA 4 on the population trends of SSL
- conclusion with respect to adverse modification is based on a forage ratio analysis

Aug2001BiOp - Task 4

- *New biological information*
- new analyses indicated that most SSL locations at sea, derived from satellite telemetry, occur within 10 nm of land
- conclusion quite sensitive to how the location data are analyzed
- different assumptions result in strikingly different conclusions
- we have little confidence in this analysis as the basis for drawing conclusions about the effect of the RPA on the dynamics of SSL.

Aug2001BiOp - Task 4

- *Analysis in support of Aug2001RPA alleviation of jeopardy*
- assumed that the most important critical habitat is within 10nm of a rookery or haul out, because this is where SSL spend at least 75% of their time
- corollary of this is that 75% of the effects of a fishery on a haul out or rookery would be removed by closing the area within a 10-nm radius of that site to fishing

Aug2001BiOp - Task 4

- *Analysis in support of Aug2001RPA alleviation of jeopardy*
- RPA Committee clearly recognized that influential assumptions were involved in this population analysis
- so they assumed that the effects of fisheries closures are related to local trends in SSL numbers rather than population wide ones
- and assuming that only 50% (rather than the original 75%) of the effect of a fishery is removed by closing an area 10 nm around a haul out

Aug2001BiOp - Task 4

- *Analysis in support of Aug2001RPA alleviation of jeopardy*
- the RPA's performance using a computer model indicated that it was robust to the first of these assumptions, but not to the second
- increased fishing outside 20 nm would have no effect, but the effects of this assumption were not tested
- our concerns about the validity of the 75% value, and the possible importance of foraging beyond 20 nm; considerable doubts about the reliability of the entire procedure

Aug2001BiOp - Task 4

- *Analysis in support of Aug2001RPA alleviation of jeopardy*
- simulations carried out by the team indicate that, under all the RPAs, local populations at the extreme western and eastern ends of the distribution of the western SSL stock are predicted to decline steadily over the next 20 years

Aug2001BiOp - Task 4

- *Avoiding adverse modification of critical habitat*
- ratio of the estimated unfished biomass of pollock, Atka mackerel and Pacific cod in the Gulf of Alaska, Aleutian Islands, and Bering Sea system to the estimated food requirements of the historical population of 184,000 SSL in the western stock
- assumed that this was a minimum per capita requirement for a "healthy" stock of SSL

Aug2001BiOp - Task 4

- *Avoiding adverse modification of critical habitat*
- then calculated the same ratio for the biomass of these three prey species in SSL critical habitat and the requirements of the current SSL population
- all but one of these values was greater than that required for a "healthy" stock, and hence no adverse modification was predicted

Aug2001BiOp - Task 4

- *Avoiding adverse modification of critical habitat*
- does not address the central issue: do the fisheries for these species cause **local** depletion of prey within SSL critical habitat?
- cannot be used to evaluate whether or not specific management actions are more or less likely to result in adverse modification
- conclusion (more than enough biomass in critical habitat for current SSL population) inconsistent with NMFS' position of nutritional stress as a likely cause of recent decline in SSL

Research Priorities

- one of the team's tasks was to recommend an appropriate experimental design to improve our understanding of the interactions between fisheries and SSL, and the efficacy of imposed management measures to promote recovery of the SSL population
- preferred RPA (Alternative 4) involves a wide range of area- and fishery-specific measures, which are predicted to have more subtle effects on local SSL population dynamics than Alternative 3

Research Priorities

- team feels that it is **unlikely** that simple monitoring of the response of these local populations under Alternative 4 will provide any insight into the interactions between SSL and fisheries
- we therefore recommend that research should focus initially on an integrated program of modelling and smaller scale manipulative experiments

Research Priorities

- high priority research items (not in order of priority) are:
- monitoring trends in population size and distribution
- estimation of vital rates
- spatial and temporal scales of foraging
- diet
- modelling - integration of energetics and demography
- retrospective data analysis
- local depletion of prey and effects on SSL

GREENPEACE
AMERICAN OCEANS CAMPAIGN
SIERRA CLUB

October 4, 2001

David Benton, Chairman
North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, AK 99501-2252

RE: 2002 Steller Sea Lion Biological Opinion RPA Proposal

Mr. Chairman:

On behalf of Greenpeace, American Oceans Campaign, and Sierra Club, we offer the following comments on the 2002 Steller sea lion Reasonable and Prudent Alternative (RPA), which is required under the Endangered Species Act (ESA) to avoid jeopardizing the survival and recovery of sea lions and adversely modifying critical habitat, the most important feature of which is the prey base.

We were disappointed to learn that we were criticized for not testifying during the September meeting in Sitka. As the Chairman knows, we have participated in the North Pacific Fishery Management Council (Council) public process for many years and have appealed for protection of sea lion habitat and food supply for many years. Again and again we have gone before the Council and proposed solutions, only to be rebuffed or ignored. After years of denial and delay from the Council, we challenged the National Marine Fisheries Service (NMFS) in court in 1998 for failing to comply with its obligations under the Endangered Species Act to protect to sea lion habitat and the prey base that is its most important feature. Without an adequate food supply, the habitat essential to the survival and recovery of Steller sea lions in western Alaska will not support viable populations of sea lions. The impact of the big factory fisheries on that habitat is the one thing over which this management system has any control, a point underscored by the Council-commissioned Peer Review Panel report on the earlier December 1998 Biological Opinion.[1] Reducing the impact of the fisheries on critical habitat from the record levels of the 1990s should be priority number one.

Yet even after NMFS issued successive Biological Opinions in 1998 and 2000 concluding that the fisheries jeopardize the survival and recovery of Steller sea lions and adversely modify their critical habitat, the North Pacific Council has resisted compliance with the law. In the Council's public meetings, Council members and their allies in the groundfish industry have spared no effort to denounce, discredit, and destroy the Biological Opinions rather than to seek a solution that avoids

[1] Steller Sea Lion Peer Review Panel Report, April 26-28, 1999: "*The panel emphasizes that although understanding the relative influence of these [environmental] and other factors compared to the effects of human activities on Steller sea lion numbers would be desirable, it is only human activities that we can modify to promote the recovery of this stock.*"

jeopardy and adverse modification of critical habitat. During last December's Council meeting, members of the Advisory Panel placed puppets in the front of the room depicting the environmental groups in the sea lion lawsuit as vultures feeding on hapless fishermen in survival suits. Such behavior is completely inappropriate for public officials who are appointed to serve as stewards of public resources.

When it comes to Steller sea lions, there is something very fishy indeed about the North Pacific Council "public" process. Never has this been clearer to us than in the debate over Steller sea lion conservation, which has exposed the partisan industry bias of the entire Council process. Council members are appointed to serve as public officials and stewards of public resources in the oceans, but they represent the fishing industry and they vote to protect their own vested interests in the fisheries they manage. It is noteworthy that the Fishery Management Councils are the only federal advisory committees that are exempted from the conflict of interest provisions in federal law.

Given the history of this process and the open hostility of Council members to our presence, it is absurd that we were criticized for failing to participate in the Council meeting in Sitka. We remind the Council that we were not invited to participate on the Council's RPA Committee, which designed the Council's preferred Alternative 4 RPA. Meanwhile all the industry interests were represented, regardless of their status in the lawsuit and despite their clear conflicts of interest. Nevertheless we did attempt to participate in a constructive manner, with no help or encouragement from the Council. Working with the token environmental groups represented on the committee, we did endorse an alternative (Alternative 2) that provides full protection of sea lion critical habitat from trawling and reduces fishery catches to leave more prey in the water for sea lions and other consumers in the ecosystem. It was the only alternative analyzed by NMFS that resulted in a projected positive growth rate for Steller sea lions.

But the RPA Committee failed to consider any aspect of Alternative 2 for inclusion in the final committee RPA package that the Council is now set to approve. The process of negotiating the Council's proposed sea lion mitigation package (RPA) with industry interests on the committee was a charade of public process and ESA compliance, the result a foregone conclusion. The deck was stacked from the beginning. To no one's surprise, the Council's RPA Committee produced an RPA that serves industry interests. Worse than that, it proposes to turn back the clock to a time before there were any RPAs at all.

THE COUNCIL'S DOUBLE STANDARD IN THE TREATMENT OF SCIENCE AND UNCERTAINTY MUST END

Although industry representatives on and off the Council have attacked the science behind the jeopardy findings in the 1998 and 2000 Biological Opinions, science is not the real issue for them. It is clear to us that the major sectors of the North Pacific groundfish industry will only accept scientific conclusions that exonerate them of any responsibility for the sea lion decline and other changes in the ecosystems they exploit.

This process has not been about science. It definitely has not been about saving sea lions. It has been about producing a conclusion that is acceptable to the groundfish industry so that business as usual may continue in the short term, even if business as usual undermines the long-term health and sustainability of the ecosystems, and thus the fisheries themselves. During last December's Council debate on the November 2000 FMP-level Biological Opinion, one Council member derided the "criminally negligent science" in the Biological Opinion, to which the NMFS Regional Administrator replied: "Is the Council saying that this criminally negligent science which concluded that the fisheries jeopardize sea lions is *not* criminally negligent in finding that the fisheries don't jeopardize the other 20 listed species assessed in the BiOp?"

We all know the answer to that rhetorical question. If the November 2000 FMP BiOp had concluded that the fisheries do not jeopardize sea lions or adversely modify their critical habitat, the Council and its scientific advisors would not have shown the slightest interest in an outside scientific peer review to assess the validity of the conclusions. There never was any groundfish industry hue and cry as long as successive NMFS Section 7 consultations resulted in findings of no jeopardy in the past. As long as the perceived interests of the fishing industry were not affected and the agency issued findings of no significant impact, no one cared what marine mammal scientists said about sea lions or whether their conclusions were scientifically sound or politically motivated. As long as the conclusions and proposed solutions suit the interests of the industry participants, no one is concerned to seek a second opinion.

When the verdict was not to the industry's liking in the most recent BiOps, the North Pacific Council immediately began beating the drum for outside scientific peer review. It is transparent to us that the Council's sudden keen interest in the quality of the science in recent Steller sea lion Biological Opinions flows from the conclusions of the BiOps rather than a disinterested passion for good science. It is transparent that the Council's demand for peer review of each jeopardy opinion is motivated by the hope that some outside group of scientific reviewers might reject the premises that underlie the jeopardy and adverse modification findings, not by a desire for greater understanding. By contrast, we note that there has been no hue and cry from the Council members to peer review this new Draft RPA BiOp, whose mitigation measures were negotiated by industry representatives on the RPA Committee.

Presently, however, science cannot provide conclusive evidence to answer the questions posed by the Steller sea lion controversy. Science can neither disprove the hypothesis that factory fishing is a major factor in the crash of Steller sea lions and other observed changes in the North Pacific that have occurred since the factory fisheries first arrived off the coasts of Alaska, nor disprove the countervailing theory that fishing is insignificant compared to naturally occurring oceanographic conditions that reputedly drive ecosystem change. In any case, fishing pressures will amplify any natural forcing mechanisms and the combination of factors could easily push sea lions over the brink of extinction in the foreseeable future. The North Pacific Fishery Management Council cannot control the weather, but it can control the operation of the fisheries to minimize impacts on sea lion habitat and food supplies.

The modern factory fisheries are a recent phenomenon in western Alaska. The scale of these fisheries has no precedent in the North Pacific. Groundfish catches from the Bering Sea soared from 12,500 tons in the early 1950s to over 2.2 million tons in the early 1970s.[2] During the 1990s, North Pacific groundfish catches ranged from 1.8 to 2.4 million metric tons and averaged more than 2 million tons (about 4.4 billion pounds) from the Bering Sea, Aleutian Islands, and Gulf of Alaska combined.[3] Since the arrival of the distant water factory trawlers of Japan and the Soviet Union in the late 1950s and 1960s, approximately 67 million metric tons – nearly 150 billion pounds – of pollock, yellowfin sole,

[2] Lowry, L. F., D. G. Calkins, G. L. Swartzman, and S. Hill. 1982. Feeding habits, food requirements and status of Bering Sea marine mammals. Document submitted to North Pacific Fisheries Management Council, Nov. 1, 1982, p. 148.
[3] NMFS 2001. Draft PSEIS Vol. VII, p. 1-13, Table 1.1-2.

rockfish, Pacific cod, Atka mackerel, Greenland turbot, rock sole, other flatfish, squid and "other species" (not including halibut, salmon, herring, crab and shrimp) have been reported as catches from the eastern Bering Sea, west-central Gulf of Alaska, and Aleutian Islands ecosystems.[4]

By any stretch of the imagination biomass removals and associated impacts to the environment of this magnitude should be considered significant. Scientific "proof" of the role of fisheries in the sea lion decline is not possible in the foreseeable future, but the expansion of the modern groundfish trawl fisheries into areas of greatest sea lion abundance historically and the subsequent crash of sea lions is a parallel too compelling to ignore. When the catches are concentrated in sea lion foraging habitat, their associated impacts are amplified and could have devastating effects on prey availability for sea lions. And since the fishing strategy is intended to reduce spawning biomasses of exploited stocks by 60% over time, the overall prey availability to competing top predators such as the Steller sea lion is vastly reduced. Scientific certainty is not attainable any time soon, but scientific uncertainty should not obscure the salient facts of this case:

- In the past 30 years, the western Steller sea lion population has declined 80-90% across its range in the Bering Sea, Aleutian Islands, and Gulf of Alaska.

- Food stress is indicated in previous research and a shortage of food is considered a leading hypothesis to explain the ongoing decline; other proposed causes are not supported by the available data.

- Pollock, Atka mackerel, and Pacific cod are consistently shown to be major prey species in the diets of Steller sea lions in western Alaska.

- Major groundfish fisheries for pollock, Atka mackerel, Pacific cod, and other sea lion prey species (e.g., flounders, rockfishes) have developed and expanded enormously in areas that historically supported the largest Steller sea lion populations in the world, and the fisheries are presently concentrated in critical foraging habitats.

- The North Pacific Council's default fishing strategy is intended to reduce spawning biomasses of exploited stocks by 60% over time, in effect vastly reducing the overall prey availability to competing top predators such as the Steller sea lion.

Other factors may have contributed to the sea lion population decline, including oceanographic "regime shifts," but NMFS has acknowledged that the coincident development of the large-scale fisheries in modern times is *precisely* what distinguishes the present conditions from previous eras of natural change in the North Pacific:

> *"Sea lions have lived through many regime shifts in the few million years they have existed. What may be different about this most recent shift is the coincident development of extensive fisheries targeting the same prey that sea lions depend on during warm regimes. Fisheries in the Bering Sea and GOA expanded enormously in the 1960s and 1970s. The existence of a strong environmental influence on sea lion trends does not rule out the possibility of significant fisheries-related effect. The cause of the sea lion decline need not be a single factor. To the*

[4] See also NMFS 2001, Draft PSEIS 2.7, Tables 1,2,3 for catch statistics through 1999.

contrary, strong environmental influences on the BSAI and GOA ecosystems could increase the sensitivity of sea lions to fisheries or changes in those ecosystems resulting from fisheries."[5]

Clearly Steller sea lions are well adapted to natural variability in the climate and ocean conditions of the North Pacific over the past three million years or so of their existence as a species, otherwise they would not have survived into the present era. What Steller sea lions have *not* adapted to over the past three million years are the impacts on prey availability and habitat wrought by the contagious spread of modern industrial groundfish fisheries, which are superimposed over natural fluctuations and disturbance regimes.

In cases of scientific uncertainty such as this, **the ESA requires NMFS to shift the burden of proof to give the endangered species the benefit of the doubt**. Given the concentration of these fisheries in critical habitat areas that only 30 years ago supported 80-90% more Steller sea lions than today, the endangered species should not have to "prove" that the fisheries are jeopardizing its survival and recovery before their impacts are reduced.[6] There is every reason for shifting the burden of proof onto NMFS and the North Pacific Council to demonstrate that these fisheries are *not* jeopardizing the survival and recovery of sea lions or adversely modifying their critical habitat, the most important feature of which is the food supply.

Simply put, NMFS cannot pass the red face test under the ESA by allowing these fisheries to remain concentrated in critical habitat, targeting staples in the sea lion diet. The proposed Alternative 4 RPA defies common sense and the precautionary approach, which states that the absence of definite scientific information should not be an excuse for inaction to address suspected harmful activities; rather, the burden of proof should be on the user of a resource to show that the intended use will not have a detrimental effect (WWF-IUCN 2001).[7]

THE COUNCIL'S PROPOSED ALTERNATIVE 4 RPA IS ATTEMPTING TO TURN BACK THE CLOCK TO A TIME BEFORE THERE WERE RPAs

We do not believe that the framework RPA outlined in the Draft RPA BiOp or the final proposal before you now meets NMFS's obligations under the ESA. Major shortcomings in the proposed RPA measures are outlined below and more detailed specific comments have been sent to NMFS. Broadly speaking, the proposed Alternative 4 RPA fails to address jeopardy and adverse modification of critical habitat at *any* of the temporal-spatial scales of competitive interaction identified in the November 30, 2000 FMP-level Biological Opinion[8]:

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[5] NMFS, December 22, 1998 Biological Opinion on 1999 TAC Specifications for Groundfish Fisheries in the BSAI and GOA, p. 88.

[6] NMFS Revised Final Reasonable and Prudent Alternatives for the Pollock Fisheries in the BSAI and GOA with supporting documentation. October 1999, p. 20.

[7] World Wide Fund for Nature (WWF) and the World Conservation Union (IUCN). The status of natural resources on the high-seas, prepared by the Southhampton Oceanography Centre & Dr. A. Charlotte de Fontaubert. May 2001, p. 74.

[8] FMP BiOp, p. 289: "*This competitive interaction, occurring at the global, regional, and local scales has been shown to jeopardize the continued existence of Steller sea lions by interfering with their foraging opportunities for the three major prey species resulting in reduced reproduction and survival.*"

- The proposed Alternative 4 RPA fails to address cumulative impacts of the fishing exploitation strategy ($F_{40\%}$ proxy for F_{MSY}) at the global scale of competitive interaction, as required in the November 2000 FMP BiOp.

- The proposed Alternative 4 RPA fails to provide any reasonable assurance that groundfish catch levels and spatial/temporal distribution at the regional and local scales of competitive interaction will avoid continued jeopardy to the species or adverse modification of nearshore and pelagic foraging habitat.

The FMP BiOp (p. 259) clearly identifies four primary effects categories that must be addressed,[9] and NMFS says that the RPA must avoid jeopardy and adverse modification "*at all three scales where the competitive interactions occur*" (FMP BiOp, p. 290). Thus, the goal of any acceptable RPA alternative should be to design a fishery based on levels of fishing highly likely to avoid competition with Steller sea lions at the three scales of competitive interaction identified by NMFS in the FMP BiOp. In short, an RPA that can be expected to produce a positive growth rate for the endangered population.

An adequate RPA package must include the following elements:

- At the global scale, reduce groundfish catch levels. The RPA should employ more conservative exploitation strategies for important forage fishes such as pollock, Atka mackerel, and Pacific cod in order to maintain the forage base for predators at high levels of abundance relative to the unfished condition. Currently the fishing strategy is intended to reduce spawning biomasses of exploited stocks by 60% over time, thereby vastly reducing the overall prey availability to competing top predators such as the Steller sea lion.

- At the regional scale, disperse groundfish fisheries in time (at least 4 seasons) and space (adequately distributed by management areas, based on biomass distribution if available) both inside and outside critical habitat.

- At the local scale within critical habitat, exclude all trawling in order to *eliminate* the possibility of direct food competition and disturbance of the prey field from the fishing gear that accounts for 80-90% of the total groundfish catches and 90% of the total discarded bycatch in the fisheries every year.

The basis for these RPA elements can be found in the Steller sea lion Biological Opinions prepared by NMFS in 1998 and 2000, as analyzed in the Draft RPA SEIS Alternative 2 (NMFS 2001), and in previous NMFS Section 7 consultations. The case for prohibiting all trawling in critical habitat is necessarily circumstantial, based on the weight of the available information. Science cannot readily quantify the impacts of large-scale trawl fishing on prey availability and foraging success of sea lions, much less the associated disturbance effects. In the EA/RIR for Amendments 25 and 20 to the FMPs of

[9] The four primary categories of fishery effects are the effect of global biomass levels, effects of disturbance, and effects of temporal and spatial concentration of fishing.

the GOA and BS/AI,[10] NMFS provided four major reasons for recommending special management measures to prohibit trawling around rookeries in western Alaska:

1. trawlers account for the majority of the catch of species of concern in critical habitat;
2. trawlers have higher bycatch of non-target prey species including juvenile pollock, squid, octopus, salmon, herring, capelin, eulachon, and sand lance, as well as flatfish and shellfish, any number of which may serve as important seasonal or secondary items in the sea lion diet, depending on availability;
3. trawlers are the primary source of lethal incidental entanglements in nets; and
4. trawlers are responsible for benthic habitat disturbances and changes in species composition.

However, we also envision that some fishing with lower-impact fixed gears (pot, jig, hook-and-line) can occur within critical habitat with minimal disruption to sea lions or the prey field, as now occurs in Southeast Alaska waters, provided that limits on total catch and measures to spread the fishery in space and time avoid large-scale removals over short periods in concentrated locations (i.e., pulse fishing). Thus we have advocated and endorsed the fixed-gear Pacific cod provisions in the RPA SEIS Alternative 2, which would enable fixed-gear vessels (except factory longliners) to operate within 3-20 nm of critical habitat zones around rookeries and haulouts:

- For the fixed-gear cod fishery, employ vessel size and gear limits, daily (or weekly) catch limits, and at least four seasonal allocations of the quota within critical habitat in order to disperse the effort of longline, pot and jig fishermen in a way that is highly likely to avoid harming Steller sea lions or adversely modifying their critical habitat, the most important feature of which is prey.

We believe such a package of RPA measures – the main features of which were analyzed in the RPA SEIS as Alternative 2 – will be highly likely to avoid jeopardy and adverse modification of critical habitat, providing major reductions of catch of sea lion prey in critical habitat while allowing a robust and low-impact fixed gear cod fishery within critical habitat. The proposed year-round trawl exclusion in all critical habitat (106,410 nm^2) would also provide substantial benefits to Essential Fish Habitats (EFH) and HAPC species of concern, as noted by NMFS in the accompanying RPA SEIS.[11] NMFS says that the Alternative 2 "zonal" approach to fixed-gear cod fishing regulations within critical habitat is quite protective of EFH and HAPC species.[12]

THE PLIGHT OF THE STELLER SEA LION UNDERSCORES THE NEED FOR A BROADER MANAGEMENT FOCUS ON THE PROTECTION OF EXPLOITED ECOSYSTEMS IN THE NORTH PACIFIC

We believe that nothing less than the future of Bering Sea, Aleutian Islands, and Gulf of Alaska ecosystems is at stake in this case. The Bering Sea alone is home to at least 450 species of fish,

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[10] NMFS 1991. EA/RIR for Amendments 25 and 20 to the FMPs of the GOA and BS/AI prohibiting groundfish trawling in the vicinity of sea lion rookeries.

[11] RPA SEIS, p. 4-242: "*This alternative is the most protective alternative under consideration in terms of reducing competition for prey with Steller sea lions, and is also the most protective for EFH.*"

[12] RPA SEIS, p. 4-242: "*is quite protective of EFH and particularly of HAPC species and of nearshore HAPC areas. As described in Sec. 3.8.1, nearshore habitat provides spawning habitat for numerous fish species, including Atka mackerel, and the effect of this approach is that these nearshore areas are closed to all but the least invasive gear types.*"

crustaceans and mollusks, 50 species of breeding seabirds, and 25 species of marine mammals.[13] Hundreds of species are affected to varying degrees in the process of capturing and processing the "target" fish species. Benthic invertebrates and living substrates, skates and sharks, sculpins and squid, seabirds, seals, sea lions and cetaceans are all affected by the repeated towing of trawl nets, the setting of hundreds of miles of hooks and lines, the dropping of trap cages by the thousands. The impacts of the fisheries reach across the full extent of the Aleutian Islands archipelago, across an area of the eastern Bering Sea bigger than California, and around the Gulf of Alaska from Davidson Bank to Dixon Entrance.

As top predators in the food web, Steller sea lions are canaries in the coal mine. Their steady demise is a warning to us that profound changes have occurred in North Pacific ecosystems in the past 30-odd years and continue today. The crash of Steller sea lions has been accompanied by large declines in fur seals, harbor seals, and some of the largest breeding colonies of fish-eating seabirds in the Pacific, all of which rely on commercially exploited forage fishes such as pollock, Atka mackerel, and Pacific cod among others. Their declines at the top of the food web imply a huge drop in carrying capacity of the ecosystem, yet there is no evidence from the fisheries that such a natural decline in the productivity of the seas off Alaska has occurred. To the contrary, large-scale factory fisheries have flourished throughout the period of the declines in wildlife, targeting prime wildlife prey in areas where wildlife populations have been most abundant historically. In addition, regional stocks of pollock have declined dramatically in the wake of heavy fishing, and bottom-dwelling invertebrates such as red and blue king crab and Tanner and snow crab have suffered major declines as well. Now sea otter populations are crashing in the Aleutian Islands. Taken together, the trends suggest that fisheries are not only implicated but have exceeded the limits of sustainability in the exploited ecosystems of the North Pacific.

As noted by many others, the ESA has frequently prompted long-overdue reforms of federal resource management and has improved ecosystem-level planning and conservation.[14] The purposes of the Endangered Species Act set forth in Section 2(b) emphasize the importance of conserving the ecosystems on which endangered species rely for food, water, shelter, migration, and other features essential for survival and reproduction. The National Research Council (1995) concluded that the single-species focus of listings and recovery plans under the ESA does not lessen the importance of protecting ecosystems, and often entails protection of ecosystem components to protect critical habitats (e.g., old growth forests for northern spotted owls). Even without protections for ecosystems, ESA-listed species draw attention to ecosystems on which their survival and recovery depends.[15]

In the North Pacific region off Alaska, the ESA listing of Steller sea lions and subsequent actions to restrict fishing in some areas of designated critical habitat have served to focus attention on the ecosystems of the Gulf of Alaska, Aleutian Islands, and eastern Bering Sea as never before. Although sustainability is the watchword of the reauthorized Magnuson-Stevens Fishery Conservation and Management Act (*aka* the "Sustainable Fisheries Act" of 1996), there is no explicit requirement or policy framework in the fishery allocation process for considering the ecological consequences of fishing on

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[13] Schumacher et al. (in press). Climate Change in the Southeastern Bering Sea and Some Consequences for Biota.

[14] Mark Salvo. Declining Sage Grouse in the American West: Can the Threat of Listing in this Species Help Transform the Bureau of Land Management? Endangered Species Update, Vol. 18, No. 3 (2001), pp. 69-74.

[15] National Research Council. Science and the Endangered Species Act. National Academy Press, Washington, D.C., 1995, p. 199: "*Even where the ESA has led to incomplete or even no protection of an ecosystem, it has focused attention on the nature and biological significance of many ecosystems.*"

food webs, habitats, biodiversity or ecosystem stability, and no procedure for making adjustments to the "acceptable biological catch" (ABC) to account for predator-prey relationships or habitat impacts. Each allowable catch level is, as stated, single-species for that species, treated in isolation from its relation to the ecosystem.

The absence of an explicit ecosystem-based policy framework in the nation's flagship fishery law has brought it into headlong conflict with the nation's flagship environmental law. The present concentration of the largest fisheries in the United States in areas designated as Steller sea lion critical foraging habitat tests the ability of this management system to honor its stewardship responsibilities under the Endangered Species Act. NMFS has twice concluded (in 1998 and 2000) that major groundfish fisheries jeopardize the survival of Steller sea lions and adversely modify their critical habitat, requiring mitigation measures to avoid jeopardy to the species and adverse modification of critical habitat. The Council's proposed Alternative 4 RPA fails to meet those standards or to address the unresolved conflict between the single-species exploitation policies in the North Pacific and goals for ecosystem-based management.

We urge NMFS and the Council to recognize that the myopic focus on commercial fishery production from marine ecosystems must be widened to include other public goals for ecosystem integrity, biodiversity conservation, and habitat protection in the North Pacific, as reflected in the ESA and other environmental laws. Conventional fishery management goals that focus narrowly on maximizing yields of fish to the fisheries in effect treat the oceans as a strip mine. Such policies have perpetuated a destructive cycle of boom and bust fisheries, impoverishing marine ecosystems, putting fishermen out of work and violating the public trust. Making the health and integrity of ocean ecosystems the top priority of resource managers is not only required by all our national environmental laws, we believe it is the only hope for achieving the elusive goal of sustainable fisheries.

Sincerely,

John Passacantando

John Passacantando
Executive Director,
Greenpeace

Phil Kline

Phil Kline
American Oceans Campaign

Jack Hession

Jack Hession
Sierra Club

Nikolski Fisherman's Assoc.
Box 788
Nikolski,Alaska 99638

Oct.02 01

National Pacific Fisheries &
Marine Commission

Dear NPFMC;

We of the Nikolski Fisherman's Assoc. are very concerned about losing the sea lion exemption for boats under 60 feet.

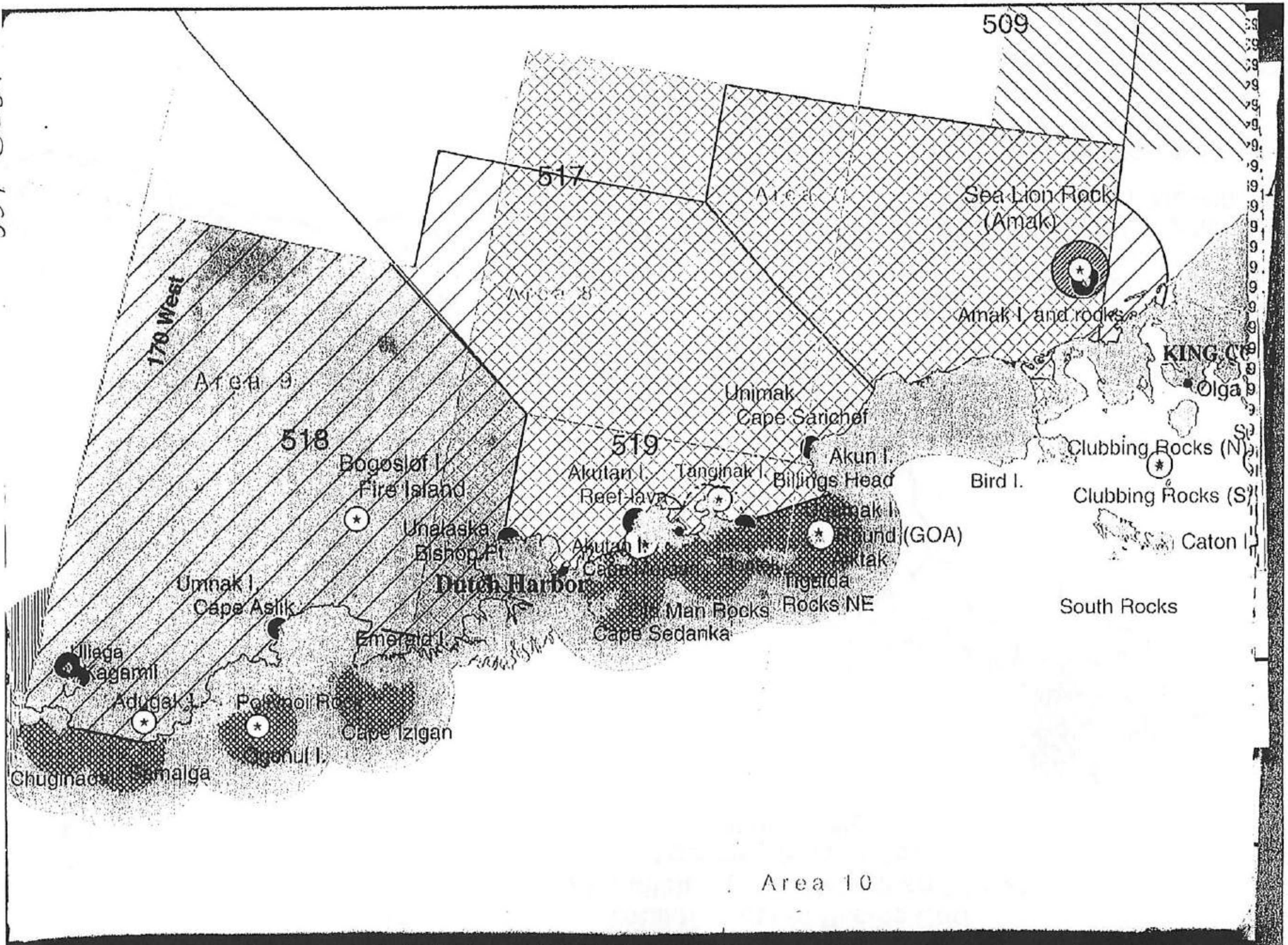
while we don't fish commercially out of our village nowdays,for many yearspeople fished from dories or on the Umnak Native and salted the cod for shipment down south. We may someday want to do this again here or near Inanudak or Chernofski.

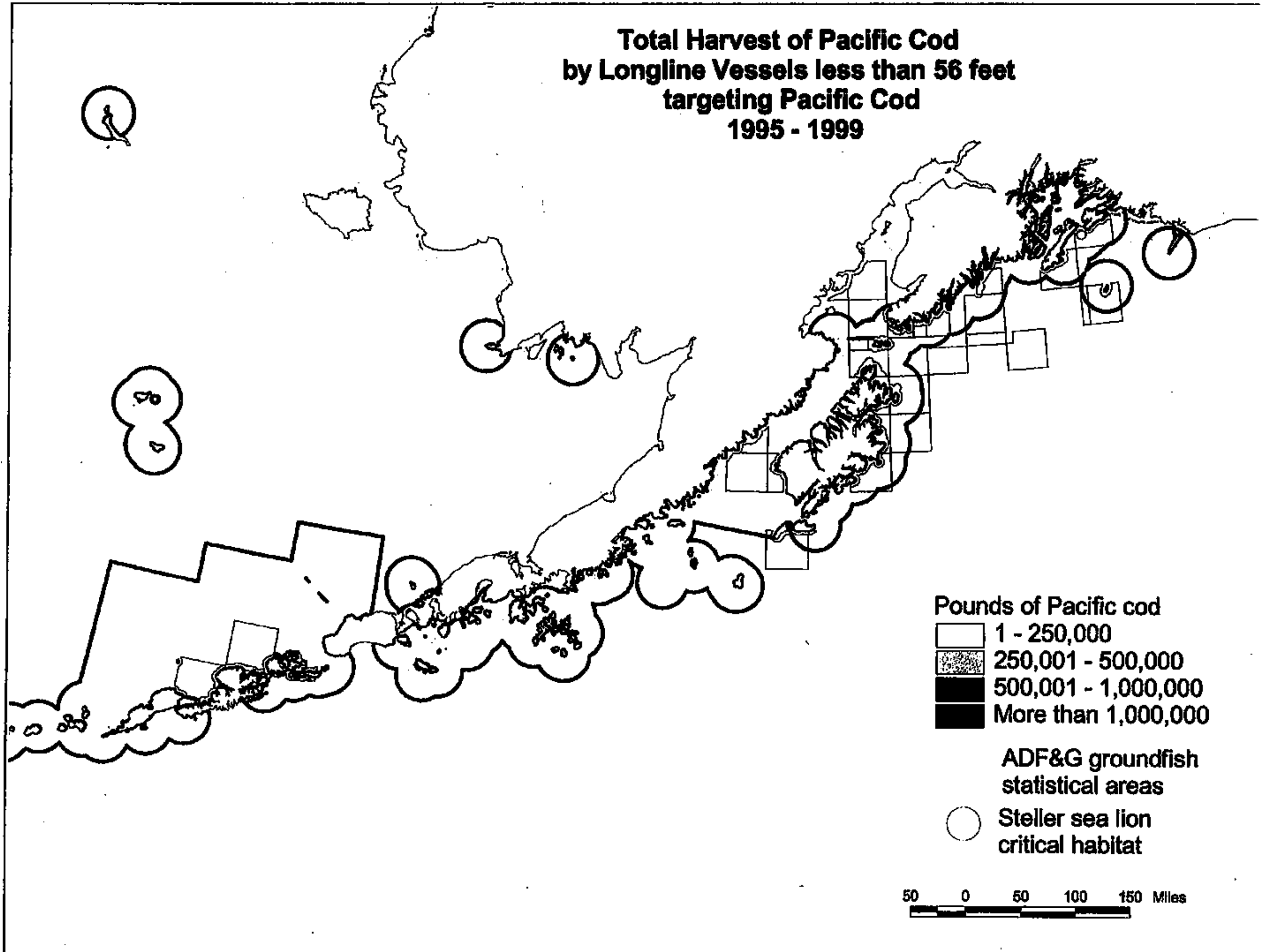
Small boats fishing with hooks or pots don't hurt the sea lions. People a thousand miles away deciding to cut us out so that the big guys can keep fishing somewhere else isn't right and doesn't help the sea lions one bit. Consider size limits or trip limits if you have but leave us little fishing fleet alone

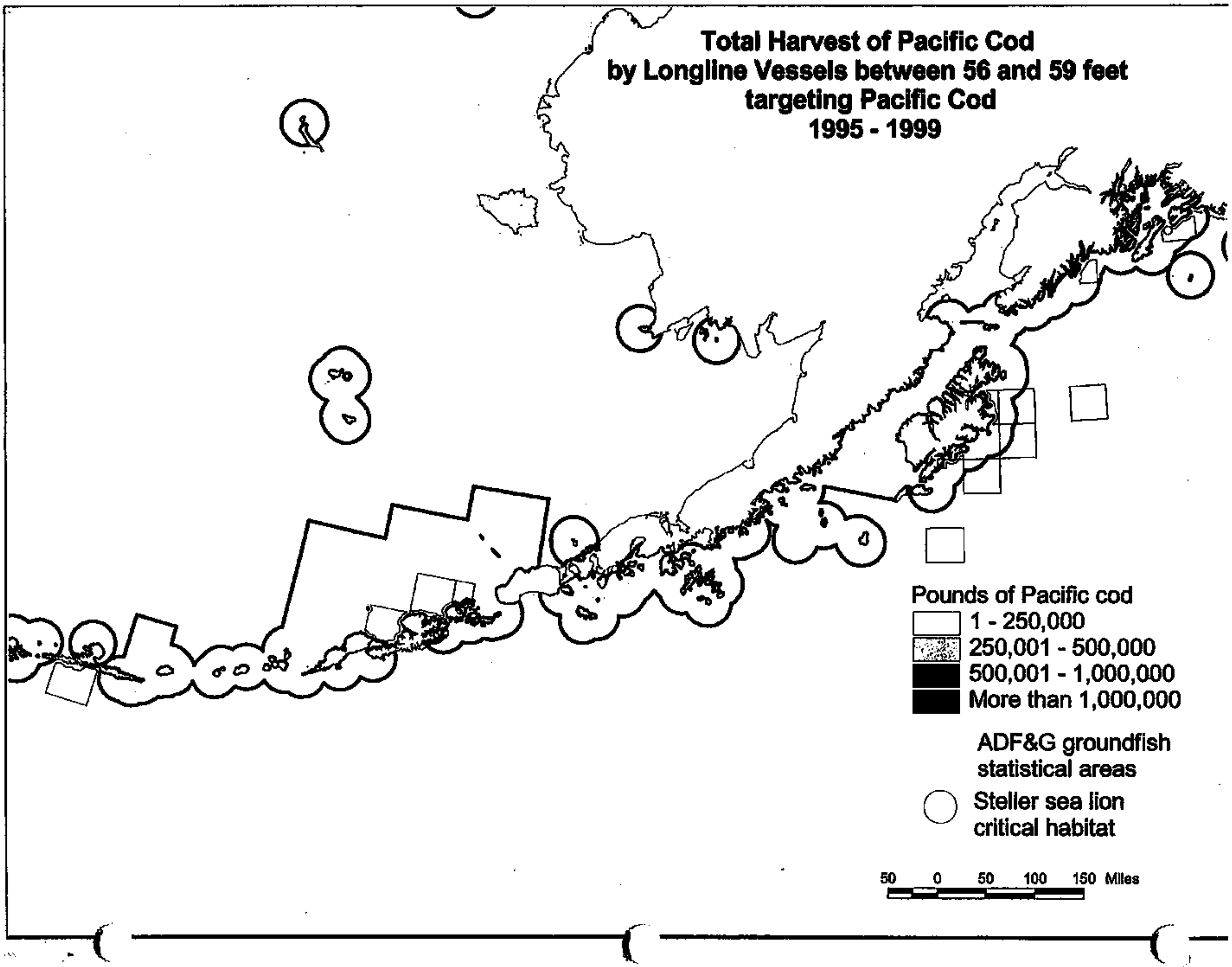
Nick

Thank you,
Nick Dushkin Pres.

DUSTIN DICKERSON
C-2 SS
OCT 2001




Total Harvest of Pacific Cod
by Longline Vessels less than 56 feet
targeting Pacific Cod
1995 - 1999
Pounds of Pacific cod
1 - 250,000
250,001 - 500,000
500,001 - 1,000,000
More than 1,000,000
ADF&G groundfish statistical areas
Steller sea lion critical habitat
50 0 50 100 150 Miles


Total Harvest of Pacific Cod
by Longline Vessels between 56 and 59 feet
targeting Pacific Cod
1995 - 1999
Pounds of Pacific cod
1 - 250,000
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More than 1,000,000
ADF&G groundfish
statistical areas
Steller sea lion
critical habitat
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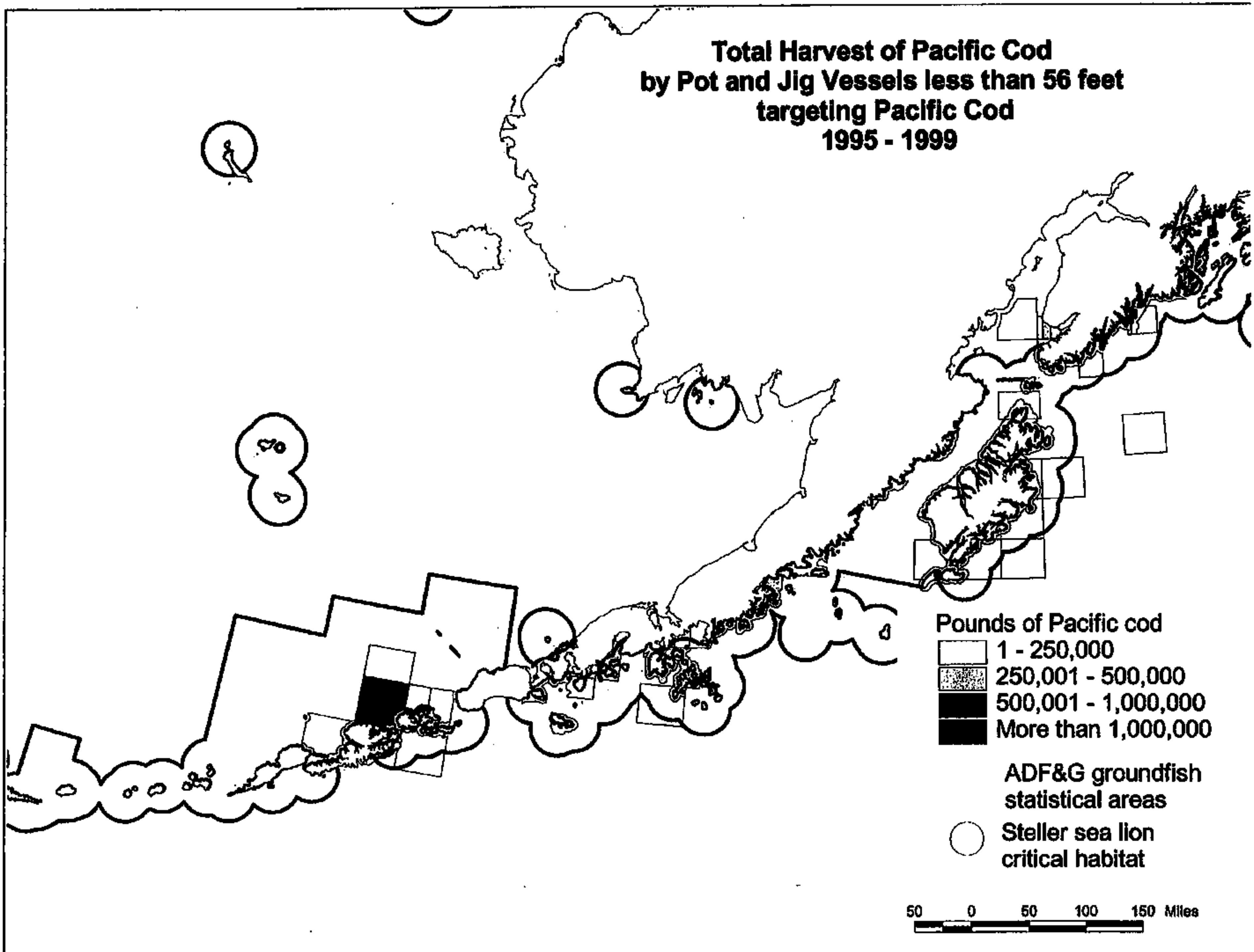
Total Harvest of Pacific Cod
by Pot and Jig Vessels less than 56 feet
targeting Pacific Cod
1995 - 1999
Pounds of Pacific cod
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statistical areas
Steller sea lion
critical habitat
50 0 50 100 150 Miles

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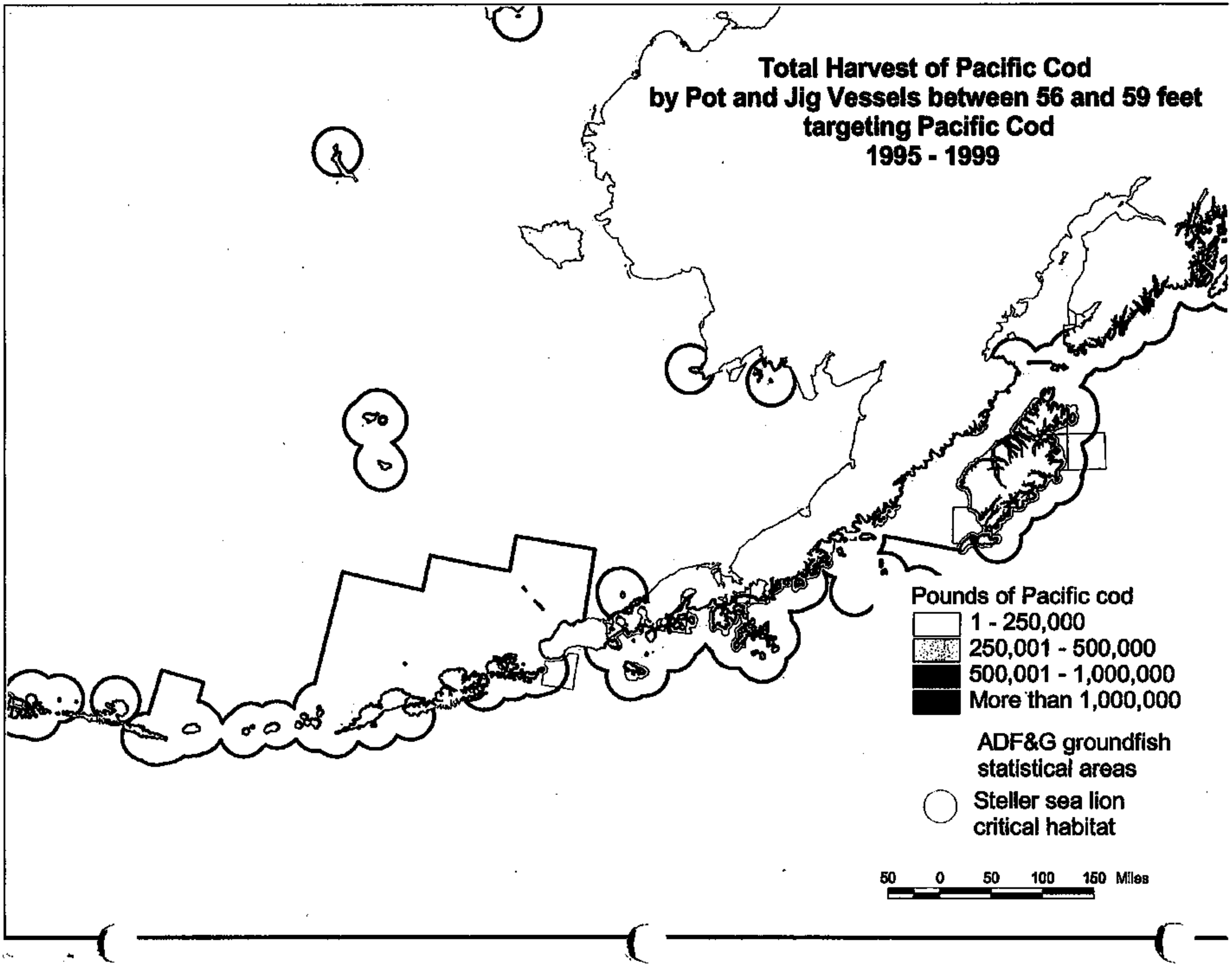
Total Harvest of Pacific Cod
by Pot and Jig Vessels between 56 and 59 feet
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Steller sea lion
critical habitat
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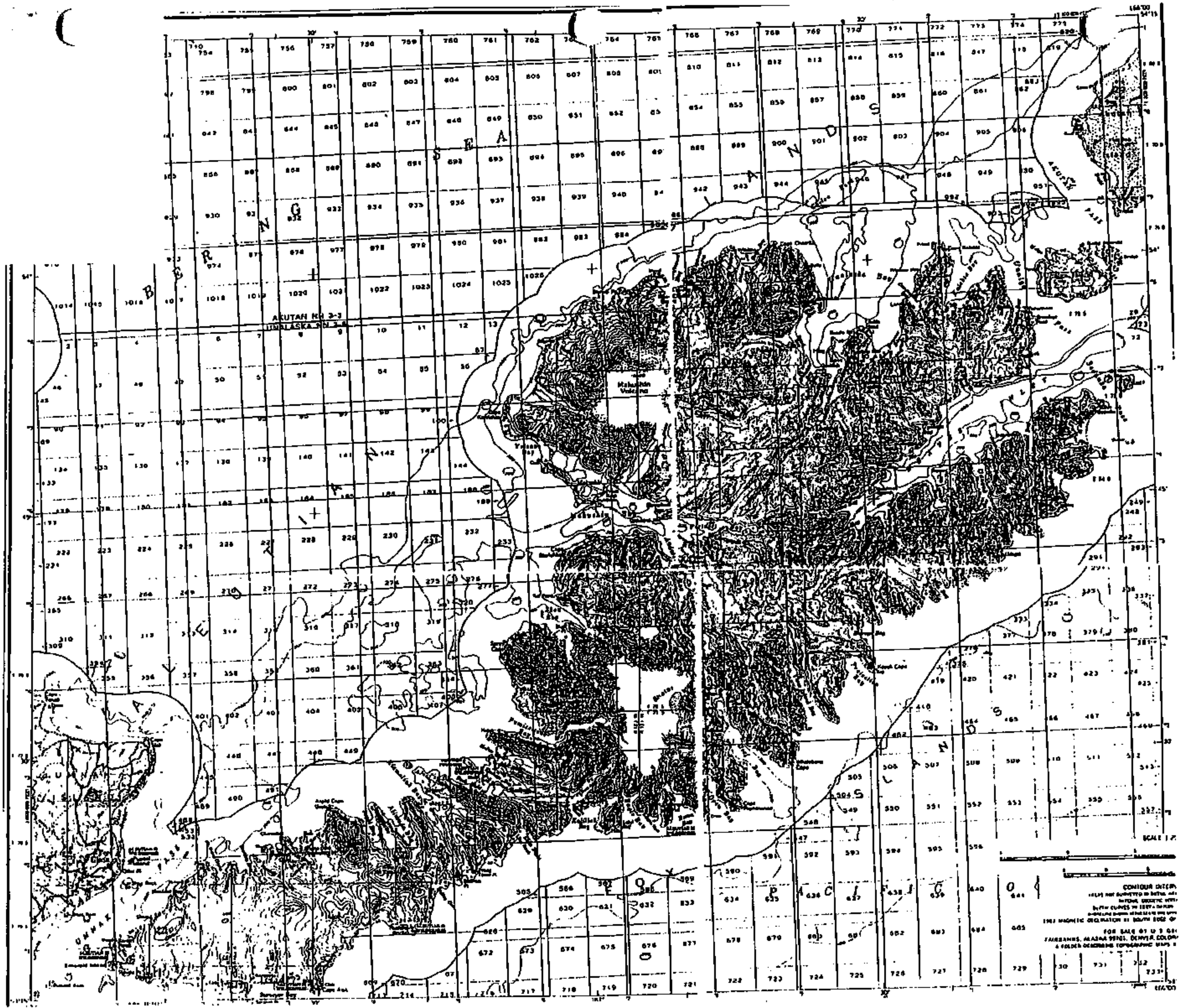
AKUTAN NN 3-3
UNALASKA NN 3-6
Makushin Volcano

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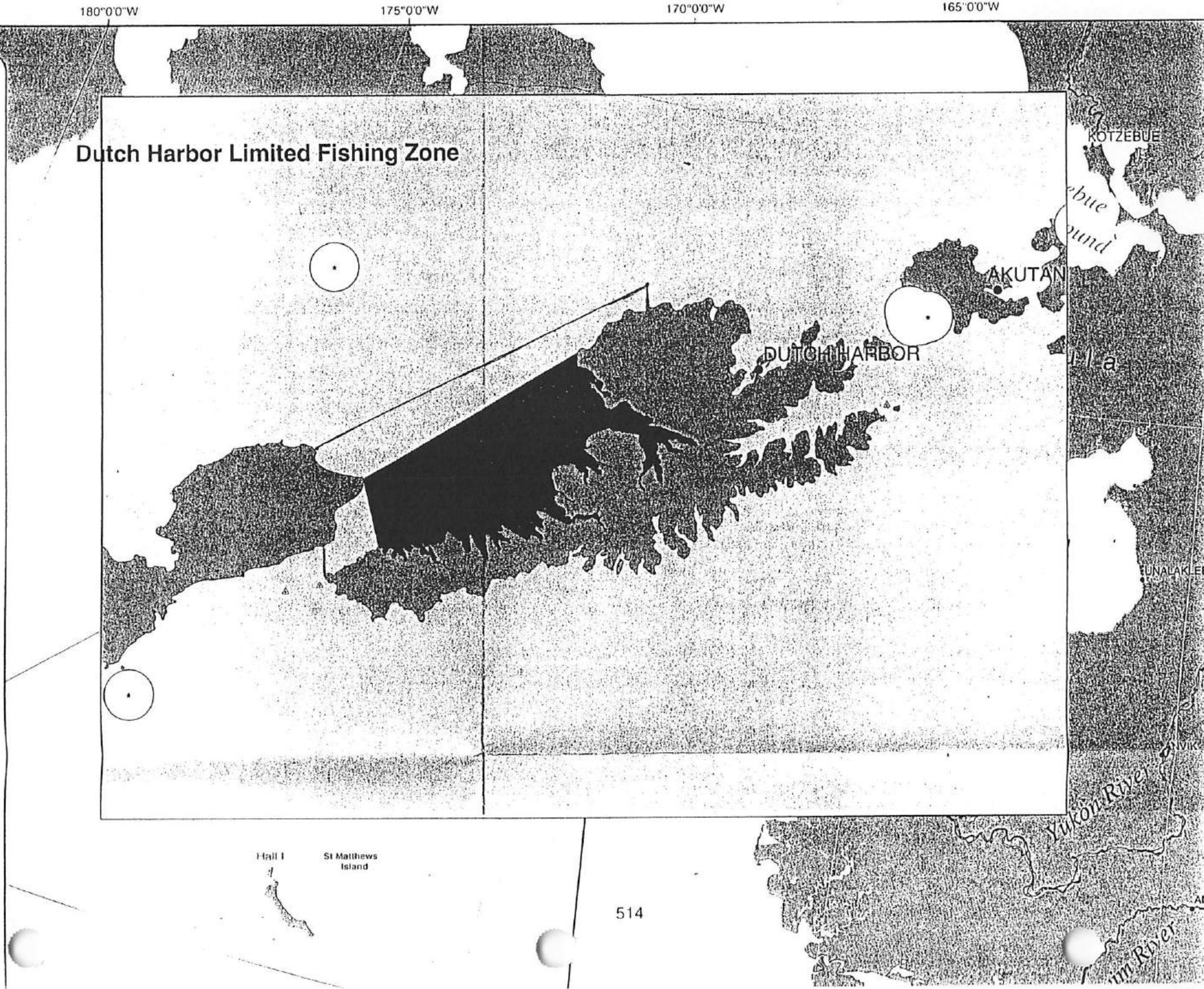
10-Dec 31


180°0'0"W
175°0'0"W
170°0'0"W
165°0'0"W
Dutch Harbor Limited Fishing Zone
KOTZEBUE
AKUTAN
DUTCH HARBOR
UNALAKLEET
Hall I
St Matthews Island
Yukon River

Tamra Faris

Introduction, alternatives, overview

Steller Sea Lion Protection Measures
Draft Supplemental
Environmental Impact Statement

Overview - Volume 1

- Reviewer Letter
- Chapter 1- Purpose and Need
- Chapter 2- Alternatives Including the Proposed Action
- Chapter 3- Affected Environment
- Chapter 4- Environmental Consequences
- Chapter 5- List of Preparers
- Chapter 6- List of Agencies, Orgs, and Persons
- Chapter 7- Literature Cited

Steller Sea Lion Protection Measures
Draft Supplemental
Environmental Impact Statement

Volume II Contents

Appendix A
Appendix B
Appendix C
Appendix D
Appendix E
Appendix F

Overview - Volume 2

- Appendix A Draft Section 7 Biological Opinion
- Appendix B Scoping Process
- Appendix C Regulatory Impact Review
- Appendix D Market Analysis
- Appendix E Harvest Data and Maps
- Appendix F Social Impact Assessment

Purpose of SSL Protection Measures

1 modify BSAI and GOA pollock, Pacific cod and Atka mackerel fisheries such that the reconfigured fisheries do not jeopardize the continued existence of SSL or adversely modify their critical habitat.

2 Modify the fisheries such that the reconfiguration minimizes the economic and social costs that will be imposed on the commercial fishing industry and associated coastal communities.

Effects of the Action (Alternatives)

- Direct and indirect effects addressed for:
  - marine mammals
  - target fish species
  - non-specified species
  - forage species
  - prohibited species
  - ESA listed Pacific salmon
  - seabirds
  - marine habitat
  - ecosystem
  - State of Alaska managed fisheries
  - management and enforcement
  - social and economic issues
- Cumulative effects for same 12 topics

Reference Points - Resource Issues

Typical Analytical Approach for Each Topic

[illegible]

NEPA - Significance Determinations

S+	Significant beneficial effect in relation to the reference point: this determination is based on ample information and data.
CS+	Conditionally significant beneficial effect in relation to the reference point: determination is lacking in quantitative data and information, however, judgement is the action will cause an improvement in the reference point condition.
I	Insignificant effect in relation to the reference point; determination is based upon information and data, along with the judgement that the effects are small and within the "normal variability" surrounding the reference point condition.
CS-	Conditionally significant adverse effect in relation to the reference point: based on insufficient data and information, however, judgement is the action will cause decline in the reference point condition.
S-	Significant adverse effect in relation to the reference point and based on ample information and data.
U	Unknown effect in relation to the reference point

David Witherell

Alternatives Analyzed

Alternatives Examined - Chapter 2

- Alternative 1: No action.
- Alternative 2: Low and Slow Approach.
- Alternative 3: Restricted and Closed Area Approach.
- Alternative 4: Area and Fishery Specific Approach.
  - Option 1: Chignik area <60' fixed gear exemption.
  - Option 2: Unalaska area <60' fixed gear exemption.
  - Option 3: Gear specific zones for GOA Pacific cod fisheries.
- Alternative 5: Critical Habitat Catch Limit Approach.

Alternative 1 - No Action
section 2.3.1 (p. 2-8); map 2.3.1

- All emergency rules to protect sea lions would expire.
- Measures still in place would include:
  - 3 nm no transit zones around rookeries.
  - 10-20 nm trawl closures around rookeries.
  - Atka mackerel fishery: 2 seasons, CH catch limits, and VMS requirements.
- This alternative is presumed to violate ESA.

Alternative 2 - Low and Slow Approach
section 2.3.2 (p. 2-12); map 2.3.2

- Originally proposed by Leape and Cline (based on PSEIS), major measures would include:
  - Reduced TACs, set as a % of ABC.
  - Four seasons, with equal TAC apportionment.
  - No trawling (for any species) in SSL critical habitat.
  - Foraging area cod catch limits.
  - Seasonal exclusive area registration.
  - Maximum daily catch limits.
  - VMS coverage on fixed gear cod.
  - Zonal approach for cod fisheries around rookeries and haulouts.
  - No pollock fishing in the Aleutian Islands.

Alternative 3 - Restricted and Closed Area Approach
section 2.3.3 (p. 2-20); map 2.3.3

- Originally the BiOp3 RPA, major measures include:
  - 3 nm no transit zones around rookeries
  - 3 nm no groundfish fishing zones around haulouts.
  - No cod, pollock, or mackerel fishing 11/1-1/20 inside CH.
  - Large closure areas for cod, pollock, and mackerel fishing.
  - Two seasons outside of CH. Four seasons inside CH, with catch limits established inside CH based on the biomass available within the areas designated as open to fishing.
  - BSAI Pacific Cod TAC split into BS and AI components.
  - Global Control Rule. Stops fishing when biomass <20% of unfished biomass, and reduces fishing when biomass<40%.

Alternative 4 - Area and Fishery Specific Approach section 2.3.4 (p. 2-25); maps 2.3.4-2.3.6

- Originally proposed by RPA Committee, major measures include:
  - 3 nm no transit zones around rookeries.
  - 20 nm no groundfish zones around northern BS haulouts.
  - All pollock, cod, and mackerel fishing prohibited in Seguam foraging area, Area 9 (Bogoslof), and Area 4 (Chignik).
  - Fishery specific seasons, TAC apportionments, and area closures within each of the regions (BS, AI, GOA).
  - Modified Global Control Rule. Stops fishing when biomass <20% of unfished biomass, and reduces fishing when biomass<40%.
- Identified by NMFS as the preferred alternative.

Atka mackerel and pollock

Pacific cod fixed gears

Pacific cod trawl

Options for Alternative 4
sections 2.3.4, 4.14 (p. 2-30, 4-550); map 2.3.7

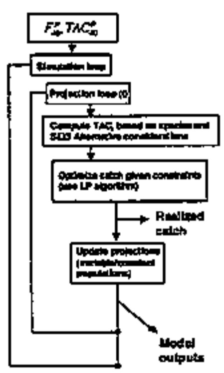
- Option 1. Establish a limited fishing zone in the Chignik area (area 4) for fixed gear out to ten (10) miles from Castle Cape to Foggy Cape for vessels under 60 ft.
- Option 2. Establish a limited fishing zone in the Dutch Harbor area (area 9) for fixed gear out to ten (10) miles from Cape Cheerful to Umnak Pass for vessels under 60 ft.
- Option 3. Establish a zonal approach for GOA Pacific cod. Buffers zones (0-3 nm, 3-12 nm, 12-20 nm, and +20 nm) would be established as measured from land. Fixed gear would be allowed in bands < 20 nm, with band specific gear and vessel size limits. Trawl gear would be prohibited < 20 nm.

Alternative 5 - Critical Habitat Catch Limit Approach
section 2.3.5 (p. 2-34); map 2.3.8

- Developed from 2000 RPA measures for pollock and mackerel, (cod fisheries added), major measures would include:
  - 3 nm no transit zones around rookeries.
  - 10-20 nm trawl closures around rookeries.
  - 10-20 nm closures around haulouts to pollock fishing.
  - Catch distributed over seasons: 4 for pollock, 2 for mackerel, 2 for cod.
  - Catch limits established in critical habitat based on biomass estimates.
  - No pollock fishing in the Aleutian Islands.

Target Species / Global Control Rule

Anne Hollowed



Stock Projections

- For the stocks with age-structure information
  - Parameters and other inputs from the most recent SAFE report or from assessment scientists.
  - Begin year = 2000
  - Recruitment

    Random based on estimates since 1978

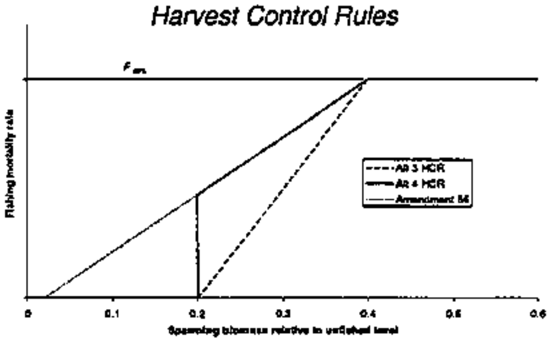
    no serial correlation assumed
  - F_{ABC} as defined from the alternative.
- For stock where age-structure information is not available
  - ABC's are set as from Amendment 56

    E.g., recent estimates of ABC as the upper limit on total catch.

Management Model

- Consider interactions between a large number of species, areas, and gear types.
- Maximizes catch subject to a number of constraints
- Uses bycatch data from array of species likely to be captured by different gear types
- Goal to assess cumulative effect of individual fisheries on the allowable catch of each species (or species group).

Harvest Control Rules



Key Data Sources

- Bycatch information:
  - Observers
  - ADFG fish-ticket data
  - Processor reports
- Abundance-at-age in 2000 and recruitment level and variability
  - Stock assessments

Key Assumptions

- Within a single fishery, predicted bycatch is wholly determined by the bycatch data.
- The bycatch array is fixed over time
  - even if relative stock abundances change
- Current stock abundance levels are taken as known exactly

Constraints

- Acceptable biological catch (ABC) (TAC constraints)
  - As determined by control rules (e.g., Am. 56)
- Market constraints
  - Defined as limits to potential expansion (and contraction) of certain fisheries
- Gear type constraints
  - Gear allocations (e.g., for Pacific cod, sablefish)
- Prohibited species
  - Halibut most common

David Witherell

Overview of how SSC and AP concerns were addressed

Tamra Faris

Explain the revisions underway with the marine mammal analysis

Marine Mammal Evaluations - types of effects (questions)

[redacted]

Marine Mammal analysis comprised of three tiers

[redacted]

Criteria for Significance - Pinnipeds, Sea Otter

Effects	Score: S-	CS-	I	CS+	S+	U
Incidental take/ entanglement in marine debris	Take rate increases by >50%	Take rate increases by 25-50%	Level of take below that which would have an effect on population trajectories	NA	NA	Insufficient information available on take rates
Harvest of prey species	TAC removals of one or more key prey species increased by more than 5%	TAC removals of one or more key prey species increased or reduced from 1998 levels by less than 5%	TAC removals of one or more key prey species reduced by 5-20%	TAC removals of one or more key prey species reduced from 1998 levels by more than 20%	TAC removals of all key prey species (pollock, Pacific cod, Atka mackerel) reduced by more than 20%	Insufficient information available on key prey species
Spatial/ temporal concentration of fishery	Much more temporal and spatial concentration in all key areas	Similar temporal and spatial fishery distribution in some, but not all key areas	Marginally less temporal and spatial concentration than 1998 fisheries	Much less temporal and spatial concentration in some, but not all key areas	Much less temporal and spatial concentration in all key areas	Insufficient information as to what constitutes a key area
Disturbance	Much more disturbance (all closed areas reopened)	Marginally more disturbance (some closed areas reopened)	Similar level of disturbance as that which was occurring in 1998	NA	NA	Insufficient information as to what constitutes disturbance

Criteria for Significance - Pinnipeds, Sea Otter

[illegible]

REVISED--Criteria for Significance - Pinnipeds, Sea Otter

[illegible]

Revised Table 4.1-5 Summary of effects on Steller sea lion

Steller Sea Lion	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Incidental take/entanglement in marine debris	I	I	I	I	I
Harvest of prey species	I	I	I	I	I
Spatial/temporal concentration of fishery	CS-	CS-	CS-	I	I
Disturbance	I	I	I	I	I

S = Significant, CS = Conditionally Significant, I = Insignificant, U = Unknown, + positive, - negative

Management and Enforcement

Galen Tromble

Implementation Schedule

- In order to provide vessels sufficient time to purchase and install VMS units the effective date for VMS requirements will be in mid-2002

Reliability

- NMFS' experience with the VMS system in Alaska since January, 2000 is that the system is highly reliable.
- At the current time, 81 vessels are operating VMS units
- Some hardware failures have occurred – most related to fluctuations in vessel power – particularly after lay-up. Many of these are preventable by turning VMS unit power on only after vessel power is stable.

Consequences of VMS failure

- The regulation will require that vessels operate a VMS system. The performance standard for operation is that VMS data are received by NMFS
- If the vessel operator becomes aware that the VMS system is not working, the operator must contact NMFS Office of Law Enforcement for instructions.
- There are a variety of reasons that NMFS might not receive VMS data, ranging from failure of the hardware unit to a problem with the message-processing system
- If NMFS determines that VMS data for a vessel are not being received, NMFS will contact the vessel operator (if possible) or owner and initiate a trouble-shooting process to determine the cause of the problem and to determine appropriate action to restore VMS operation.

Fisheries and Sectors subject to VMS

- Vessels permitted to fish only with jig gear are not subject to VMS requirements.
- All vessels with federal permits for the pollock, Pacific cod and Atka mackerel fisheries in the Central and Western GOA and the BSAI with trawl, hook-and-line or pot gear will be required to operate NMFS-approved VMS units during the time when the directed fisheries for these species are open. The requirement to operate VMS during these periods applies even if the vessel is not directed fishing for one of the three species.
- NMFS and ADFG have discussed requirements for operation of VMS in parallel State fisheries.
- NMFS will accept VMS data as meeting the requirement for processor vessels to check in and out of federal reporting areas, so NMFS expects that some processor vessels will choose to operate the VMS at all times as it is more convenient than preparing and submitting checkin/checkout reports.

Examples

- Example A. A vessel permitted to directed fish for all three species in the GOA and the BSAI would have to operate the VMS unit whenever a directed fishery for any of the three species was open. If the vessel operator chose to fish for rock sole while the Pacific cod fishery was open, the vessel would still be required to operate the VMS.
- Example B. A vessel permitted to directed fish for only Pacific cod in the GOA would have to operate the VMS unit only when GOA Pacific cod directed fisheries were open.

Cumulative Impacts

John Isaacs

Cumulative Impacts
Requirements of NEPA

- An environmental assessment must consider cumulative effects when determining whether an action significantly affects environmental quality
- If it is reasonable to anticipate cumulatively significant impacts, an environmental impact statement must be prepared

CEQ definition (40 CFR 1508.25)

Cumulative Impacts
Requirements of NEPA

"...the most devastating environmental effects may result not from the direct effects of a particular action but from the combination of individually minor effects of multiple actions over time."

Considering Cumulative Effects under NEPA
CEQ 1997

Cumulative Impacts
Requirements of NEPA

Cumulative impacts are defined as:

"... the impact on the environment that results from the incremental or synergistic impact of the action when added to other past, present, and reasonably foreseeable future actions."

CEQ definition (40 CFR 1508.7)

Cumulative Impacts
Requirements of NEPA

- ◆Consider the aggregate of past, present and reasonably foreseeable future actions, regardless of which agency or persons undertakes such actions
- ◆Consider the total effect, including both direct and indirect effects on a given resource, ecosystem and human community, of all actions taken

Cumulative Impacts
Suggested CEQ Guidelines

1) Identify the significant issues
2) Establish the geographic and temporal scopes of analysis
3) Identify other potential actions with incremental or synergistic effects
4) Characterize the affected resources

Cumulative Impacts
Suggested CEQ Guidelines

5) Characterize the stresses affecting these resources
6) Define baseline conditions
7) Identify important cause-and-effect relationships
8) Determine the magnitude and significance of the cumulative effects

Cumulative Impacts
Suggested CEQ Guidelines

- The project proponent should avoid, minimize, or mitigate adverse significant effects of a proposed action by modifying or adding alternatives
- Mitigation and enhancement strategies should focus on cause and effect pathways

Cumulative Impacts
Methodology - Terminology

- incremental or synergistic impact of the action...
  - *Start with the categories of direct and indirect effects of the proposed action and alternatives*
  - *Look for external factors where there are potential additive/incremental and synergistic/interactive effects*
- ...when added to other past, present, and reasonably foreseeable future actions
  - *Past actions may have a lingering effect*
  - *Future actions must be reasonably foreseeable*

Cumulative Impacts
Methodology - Analytical Steps

1) DIRECT AND INDIRECT EFFECTS
Start with the potential direct and indirect effects of each the five alternatives

2) EXTERNAL FACTORS
Identify external past, present, and reasonably foreseeable external factors that could have additive or synergistic effects such as other fisheries, other human activities, and natural phenomena and trends

Cumulative Impacts
Methodology - Analytical Steps

3) SCREENING TABLES
Use a tabular structure to screen whether external factors have incremental or synergistic effects with identified direct and indirect effects of the alternatives

4) EVALUATE SIGNIFICANCE OF POTENTIAL EFFECTS
Evaluate the significance of the potential cumulative effects using criteria appropriate to the resource category in question

Cumulative Impacts

Methodology – External Factors

◆ *Biological Environment*

- Other Fisheries (state, federal, and foreign)
- Climate Effects (short and long -term climate and regime shifts)
- Life Cycle Effects
- Trophic Interactions
- Pollution
- Commercial and Subsistence Harvests (where appropriate)

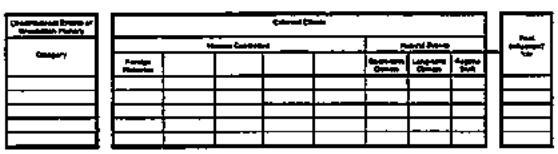
◆ *Social Environment*

- Other Fisheries (state, federal, and foreign)
- Other Economic Development Activities (effects on employment and services)
- Other Revenue Payments and Sources

Cumulative Impacts

Methodology – Analytical Tables

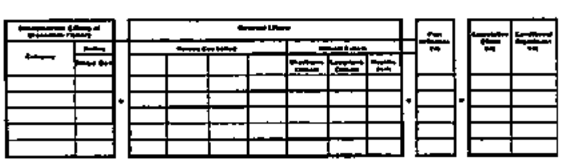
Cumulative effects – past influence



Cumulative Impacts

Methodology – Analytical Tables

Cumulative effects – all alternatives



Cumulative Impacts
Section 4.13

	Section	Page
◆ Marine Mammals	4.13.2	4-373
◆ Target Fish Species	4.13.3	4-420
◆ Non-specified Fish	4.13.4	4-452
◆ Forage Fish	4.13.5	4-453
◆ Prohibited Species (by species)	4.13.6	4-453
◆ ESA Listed Pacific Salmon	4.13.7	4-476
◆ Seabirds	4.13.8	4-477
◆ Benthic Habitat	4.13.9	4-487
◆ Ecosystem	4.13.10	4-497
◆ State Managed Fisheries	4.13.11	4-512
◆ Management and Enforcement	4.13.12	4-512
◆ Socioeconomic Cumulative Effects	4.13.13	4-512

Cumulative Impacts
Potential Outcomes

- ◆ Insignificant direct and indirect impacts, insignificant cumulative impacts
- ◆ Significant direct and indirect impacts, insignificant cumulative impacts
- ◆ Insignificant direct and indirect impacts, significant cumulative impacts
- ◆ Significant direct and indirect impacts, significant cumulative impacts
- ◆ There may or may not be a cause and effect relationship between the two

Cumulative Impacts
Potential Outcomes

- ◆ **Conditional significance** –
  - ➢ Where quantitative data is insufficient and conclusions of significant are based on assumptions or "conditions"
- ◆ **Unknown** –NEPA requires the following:
  - State what information is incomplete and unreliable
  - State the relevance of missing information in evaluating the potential significance of effects
  - Identify steps and studies necessary to obtain the missing information

Cumulative Impacts

Substantive Findings – <u>Marine Mammals</u>

Steller Sea Lions — ***Significant Direct/Indirect Cumulative Impacts***

Direct/Indirect Category	Past Effect	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Incidental Take	Y	I I	I I	I I	I I	I I
Prey Availability	Y	CS- Y-	CS+ Y-	I Y-	I Y-	CS- Y-
Spatial/ Temporal	Y	CS- Y-	CS+ I	I Y-	I Y-	CS- Y-
Disturbance	Y	I I	I I	I I	I I	I I

Cumulative Impacts

Substantive Findings – <u>Marine Mammals</u>

Northern Fur Seals — ***Significant Direct/Indirect Cumulative Impacts***

Direct/Indirect Category	Past Effect	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Incidental Take	Y	I I	I I	I I	I I	I I
Prey Availability	Y	CS- Y-	CS- Y-	CS- Y-	CS- Y-	CS- Y-
Spatial/ Temporal	Y	CS- Y-	CS- I	CS- Y-	CS- Y-	CS- Y-
Disturbance	Y	CS- I	CS- I	CS- I	CS- I	CS- I

Cumulative Impacts

Substantive Findings – <u>Target Fish</u>

Atka Mackerel GOA — ***Significant Direct/Indirect Cumulative Impacts***

Direct/Indirect Category	Past Effect	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Fishing Mortality	Y	U U	U U	U U	U U	U U
Spatial/ Temporal	Y	U U	U U	U U	U U	U U
Habitat Suitability	Y	U U	U U	U U	U U	U U
Prey Availability	Y	U U	U U	U U	U U	U U

Cumulative Impacts

Substantive Findings –Prohibited Species

- **Other King Crab**
  - Alternative 2, CS- for direct, indirect, and cumulative bycatch; all alts unknown for competition for prey
- **Tanner Crab**
  - Alternative 2, 3, & 4 CS+ for direct, indirect, and cumulative bycatch; all alts unknown for competition for prey
- **Herring**
  - Unknown for competition for prey
- **Chinook Salmon**
  - Unknown spatial/temporal and competition for prey
  - Bycatch: CS- for Alternative 3; CS+ for other alternative
- **Seabirds**
  - Short-tailed Albatross: Alternative 1 CS- for take

Cumulative Impacts

Substantive Findings – Habitat

Marine Benthic Habitat — ***Significant Direct/Indirect Cumulative Impacts***

Direct/Indirect Category	Past Effect	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
HAPC damage mobile gear	Y	CS- Y-	S+ Y+	CS+ I	CS+/- U	CS- Y-
HAPC damage fixed gear	Y	CS- Y-	CS+ I	I I	CS+/- U	CS- Y-
Substrate mod. mobile gear	Y	CS- Y-	CS+ I	CS+ I	CS+/- U	CS- Y-
Substrate mod. fixed gear	N	I I	I I	I I	I I	I I
Changes to species mix	Y	CS- Y-	CS+ I	CS+ I	CS+/- U	CS- Y-

Cumulative Impacts

Substantive Findings – Ecosystem

Biological Diversity — ***Significant Direct/Indirect Cumulative Impacts***

Direct/Indirect Category	Past Effect	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Species Diversity	Y	CS- Y+/-	CS+ Y+/-	CS+ Y+/-	CS+ Y+/-	CS+ Y+/-
Functional Diversity	Y	I Y-	I I	I I	I I	I I
Genetic Diversity	Y	I I	CS+ I	CS+ I	CS+ I	CS+ I

Cumulative Impacts
Substantive Findings – Ecosystem

Predator/Prey Relationship — ***Significant Direct/Indirect Cumulative Impacts***

Direct/Indirect Category	Past Effect	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Pelagic Forage Availability	Y	S+ Y+/-	S+ Y+/-	S+ Y+/-	S+ Y+/-	S+ Y+/-
Spatial/ temporal Concentration	Y	CS- Y-	CS+ I	CS+ I	CS+ I	CS+ I
Removal of Top Predators	Y	I I	I I	I I	I I	I I
Intro of Non-Native Species	Y	CS- Y+/-	I I	I I	I I	I I

Cumulative Impacts
Substantive Findings – Socioeconomic

Fishing Industry Sectors — ***Significant Direct/Indirect Cumulative Impacts***

Direct/Indirect Category	Past Effect	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Existence Benefits	Y	CS- Y-	CS+ I	CS+ I	CS+ I	CS+ I
Non-market Subsistence	Y	CS- U	CS+ I	CS+ I	CS+ I	CS+ I
Non-consumptive Eco-tourism	Y	CS- Y-	CS+ I	CS+ I	CS+ I	CS+ I
Harvests & Fish Prices	Y	CS+ I	S- Y-	S- Y-	I I	CS- I
Operating Costs	Y	CS+ I	S- Y-	S- Y-	S- Y-	CS- Y-
Groundfish Product Value	Y	CS+ I	CS- Y-	CS- Y-	CS- Y-	CS- Y-

Cumulative Impacts
Substantive Findings – Socioeconomic

Fishing Industry Sectors — ***Significant Direct/Indirect Cumulative Impacts***

Direct/Indirect Category	Past Effect	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Safety Impacts	Y	CS- I	CS- Y-	CS- Y-	CS- Y-	CS- Y-
Impacts on Related Fisheries	Y	U U	U U	U U	U U	U U
Costs to Consumers	Y	CS+ Y+	CS- Y-	CS- Y-	I I	I I
Management and Enforcement Costs	Y	I I	S- Y-	S- Y-	S- I	S- I
Excess Capacity	Y	CS- Y-	S- Y-	S- Y-	I Y-	CS- Y-
Prohibited Species Bycatch and Discards	Y	I U	U U	U U	U U	U U

Cumulative Impacts
Substantive Findings – <u>Socioeconomic</u>

Regions and Communities | ***Significant Direct/Indirect Cumulative Impacts***

Direct/Indirect Category	Past Effect	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Total Regionally - owned CV Harvest $	Y	S+ Y-	S- Y-	S- Y-	I Y-	CS- Y-
Total Ex-Vessel Value to Shore Based Processors in Region	Y	S+ Y-	S+ Y-	S- Y-	I Y-	CS- Y-
Total Shore-Based Processing Volume in Region	Y	S+ Y-	S- Y-	S- Y-	I Y-	CS- Y-
Total & Processing Payments to Labor to Accruing to Region	Y	S+ Y-	S- Y-	S- Y-	I Y-	CS- Y-
Total & Processing Payments to Labor to Accruing to Region	Y	S+ Y-	S- Y-	S- Y-	I Y-	CS- Y-

Cumulative Impacts
Preferred Alternative

- Marine Mammals
  - significant adverse cumulative effects in *prey availability* and spatial/temporal due to external factors (similar to 1, 3, & 5)
- Habitat
  - cumulative effects generally unknown due to complicated pattern of open and closed areas
- Ecosystem
  - generally insignificant and comparable to other alternatives
- Socioeconomics
  - significant adverse cumulative effects due to trends in other fisheries; better on harvest sectors, communities and regions
  - some regions and sectors will suffer more harm than others

Cumulative Impacts
Conclusions

- The role of cumulative effects analysis is to indicate when direct/indirect actions, in conjunction with external factors, cross a threshold of significance
- Controlling cumulatively significant effects may not be within the control of fisheries management
- Reassess cumulative effects after implementation of specific management measures and redistribution of effort
- Monitor trends and issues that are potentially cumulative in nature

Economics Impacts

Lew Queirolo and Ben Muse

Under revision:

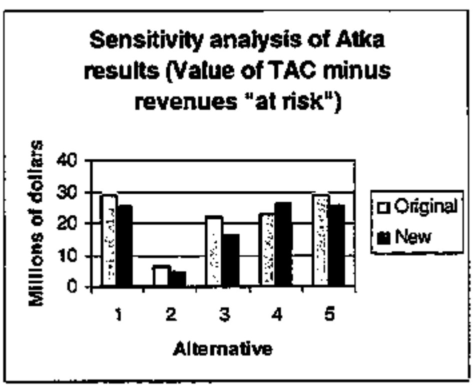
- Sensitivity Analysis of Atka mackerel results
- Elaboration of management and enforcement expenses borne by industry
- Safety discussion extended to address 99' exemption in the SCA

Under revision:

- CDQ related issues (employment, impacts on CDQ owned and operated vessels, plants, etc.)
- Trip limits, exclusive registration issue in the GOA Pacific cod fishery
- Platooning in the Aleutian Islands Atka mackerel fishery

Atka mackerel sensitivity analysis

- Original "surface area"
  - State stat areas
  - Divided in CH and non-CH closed areas
  - Harvest from stat area assigned to CH areas in proportion to CH surface area
- New allocation procedure based on observer reports



Private sector management and enforcement costs

- The RIR is being revised to incorporate a discussion of management and enforcement costs borne by the private sector.

Specific estimates

- VMS
  - Investment: $1.0 million
  - Annually: $0.2 million
  - 5 year present value: $1.9 million
- Daily observer costs
  - Alt 2: $0.2 million/year; 5 year PV - $1.0 million
  - Alt 4: $0.15 to $0.3 million/year
  - Alt 4: 5 year PV - $0.7 to $1.4 million

Observer estimates

- Underestimate of true costs
- Doesn't include logistic and transportation expenses for observers which we can't estimate
- Observer costs for small vessels contemplated here are likely to be higher than for the larger vessels covered in the past

CDQ Fisheries

Obren Davis

Socio Impact Assessment
Environmental Justice Analysis

Michael Downs

Three new or replacement
Social Impact Assessment sections:

- (1) Section 3.2.12 - Existing Social Conditions
  - 3.12.2.9 CDQ Region Existing Conditions
  - 3.12.2.10 Environmental Justice Existing Conditions

Three new or replacement
Social Impact Assessment sections (cont.):

- (2) Section 4.2.12 - Social Impact Assessment
  - 4.12.2.2.7 CDQ Region Effects
  - 4.12.2.3 Environmental Justice Effects

Three new or replacement Social Impact Assessment sections (cont.):

- (3) Appendix F - Social Impact Assessment Appendices
  - Appendix F3: Effects of the Proposed Alternatives on Subsistence (revised)
  - Appendix F4: CDQ Region and Program Existing Conditions (new)

Expanded/Added Social Impact Assessment Analytic Areas

- CDQ Region Impacts
- Environmental Justice Impacts
- Subsistence Impacts

CDQ Region Impacts

- Existing conditions cross reference in Section 3.12.2.9
- New existing conditions section in Appendix F(4)

CDQ Appendix F(4) sections:

- CDQ allocations by species and group
  - Volume and value of CDQ allocations by species
  - Wholesale value by target fishery and month
- CDQ communities, population, group membership, group profiles

CDQ Appendix F(4) sections (cont.):

- Economic impacts of the CDQ program
  - Revenue generation
  - Asset accumulation
    - investments
    - vessel acquisitions
    - processing plant acquisitions
    - volume and value of groundfish processed by catcher-processor vessels and shoreplants with CDQ equity interest
    - volume and value of groundfish harvested by catcher vessels with CDQ equity interest

CDQ Appendix F(4) sections (cont.):

- Employment and income
- Training and education
- Indirect employment and income effects

CDQ Region Effects (Section 4.12.2.2.7):

- Quantification of impacts:
  - Output tables with 21 socioeconomic variables by species produced for Alternative 1, Alternative 2, and Alternative 4 high and low cases, consistent with approach used for other regions
  - Important caveat: entities with minority ownership produce same tabular results as majority or full ownership
  - Therefore: (1) CDQ region results are overstated rather than understated; and (2) results are not additive with other regions

CDQ Region Effects (Section 4.12.2.2.7, cont.):

- Quantification of impacts (cont.):
  - Additional tables produced with unique CDQ region variables by species by alternative (high and low cases):

    CDQ allocation (MT)

    CDQ allocation ex-vessel revenue ($)

    CDQ allocation wholesale revenue ($)

    CDQ royalties ($)

    CDQ royalties ($/MT)

CDQ Region Effects (Section 4.12.2.2.7, cont.):

- Alternative 2 impacts:
  - CV harvests decline 28 to 51 percent
  - Total processing payments to labor (all sectors) decline 20 percent to 32 percent
  - Employment declines mirror payments to labor declines
  - Allocations decline 23 to 43 percent
  - Ex-vessel revenue and wholesale revenue decline 19-41 and 21-42 percent, respectively
  - Overall CDQ royalties decline 21-42 percent

CDQ Region Effects (Section 4.12.2.2.7, cont.):

- Alternative 4 impacts:
  - CV harvests decline 0 to 4 percent
  - Total processing payments to labor (all sectors) decline 0 percent to 3 percent
  - Employment declines mirror payments to labor declines
  - Allocations would change by an increase of 1 percent to a decline of 6 percent.
  - Ex-vessel revenue and wholesale revenue change between decreasing 0-9 percent and decreasing -1 to 7 percent, respectively
  - Overall CDQ royalties decline 0-7 percent

Environmental Justice Impacts

- New existing conditions discussion Section 3.12.2.10
- New impacts discussion Section 4.12.2.3

Environmental Justice Existing Conditions (Section 3.12.2.10):

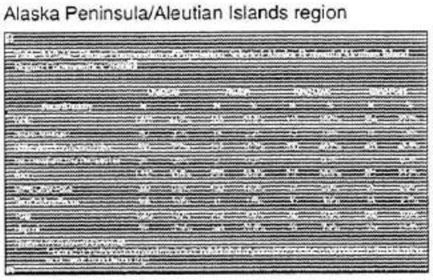
- Definition and regulatory context
  - requires federal agencies to address environmental justice concerns by identifying "disproportionately high and adverse human health and environmental effects...on minority populations and low-income populations."
  - Executive Order 12898 (59 FR 7629 [1994])
  - (New intro to Section 3.12.1 specifically identifies social and economic assessment requirements under NEPA (40 CFR § 1508.8) and the MSA/National Standard 8 (Sec. 301(a)(8)) as well as EO 12898)

Environmental Justice Existing Conditions (cont.):

- Community variations
  - Wide geographic range of communities
  - Wide social and economic structure range of communities
  - Wide range of nature and intensity of ties to the groundfish fishery
  - Focus on Alaska Peninsula/Aleutian Islands, Kodiak, and Washington Inland Waters regions.

Environmental Justice Existing Conditions (cont.):

- Alaska Peninsula/Aleutian Islands region



Environmental Justice Existing Conditions, Alaska Peninsula/Aleutian Islands region (cont.)

- Wide demographic variation, Alaska Native/non-Native ratio, etc.
- All have less than 50 percent non-minority population
- Range of income, but low percent unemployed and percent poverty
- Very different populations in group quarters and non-group quarters

Environmental Justice Existing Conditions, Alaska Peninsula/Aleutian Islands region (cont.)

- Group quarters versus non-group quarters example
  - Akutan one end of the continuum
  - Note 1990 not 2000 data

[illegible]

[illegible]	Total Population		Group Quarters Population		Non-Group Quarters Population	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Environmental Justice Existing Conditions, Alaska Peninsula/Aleutian Islands region (cont.)

- Industry provided data, 2000, four major plants
  - 79 percent of workforce comprised of minority individuals
  - Range from about three-quarters to over 90 percent minority at individual plants
  - Detail of data varied, Asian and Hispanic ancestry largest groups represented

Environmental Justice Existing Conditions (cont.):

- Kodiak Region - City of Kodiak population

[illegible] Kodiak City, 2000

Race/Ethnicity	2000 n	%
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

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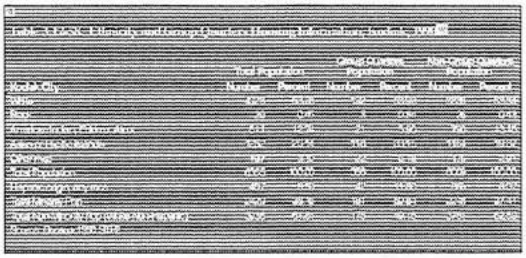
Environmental Justice Existing Conditions, Kodiak region (cont.):

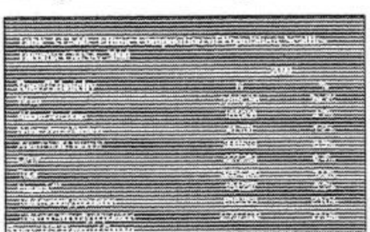


Environmental Justice Existing Conditions, Kodiak region (cont.):

- Industry provided 2000 data
  - Cannot release figures due to confidentiality restrictions
  - At least some plants have minority workforce proportions in the range seen in the Alaska Peninsula/Aleutian Islands region

Environmental Justice Existing Conditions (cont.)

- Washington Inland Waters region



Environmental Justice Existing Conditions, Washington Inland Waters region (cont.)

- Group quarters housing data not relevant to this analysis
- Industry provided data forthcoming

Environmental Justice Existing Conditions (cont.)

- CDQ region
  - Discussed in previous section
  - EJ issue due to demographics and economics
  - Communities are 86.8 percent Alaska Native
  - Limited economic development and lack of employment/income was reason for formation of the CDQ program

Environmental Justice Effects (Section 4.12.2.3)

- Community level environmental justice impacts
- Catcher vessel fleet related environmental justice impacts
- Catcher-processor fleet related environmental justice impacts
- Shore processor related environmental justice impacts
- CDQ related environmental justice impacts
- Subsistence related environmental justice impacts

Environmental Justice Effects (cont.)

- Community level environmental justice impacts (general local economy, tax revenues, etc.)
  - Alaska Peninsula/Aleutian Islands region - Alternative 2 impacts
    - King Cove and Sand Point community level impacts would be environmental justice impacts due to Alaska Native plurality
    - Unalaska and Akutan different structure, less clearly community specific environmental justice impacts per se.
    - Aleutians East Borough communities that are predominately Alaska Native will realize impacts through loss of borough revenues.

Environmental Justice Effects, community level environmental justice impacts (cont.)

- Kodiak region - City of Kodiak largely non-Native, therefore not environmental justice issue at the community level.
- Alaska Southcentral and Southeast regions, and the Washington and Oregon regions are not expected to experience high and adverse impacts at the community level.

Environmental Justice Effects (cont.)

- Catcher vessel fleet related environmental justice impacts
  - Environmental justice impacts likely for catcher vessel fleet for King Cove and Sand Point under Alternative 2, available data not clear for Unalaska/Dutch Harbor.
  - Not likely for other regions under Alternative 2
  - Not likely for any region or community for Alternative 4.

Environmental Justice Effects (cont.)

- Catcher-processor vessel fleet related environmental justice impacts
  - Analysis remains to be completed, pending receipt of industry data

Environmental Justice Effects (cont.)

- Shore processor related environmental justice Impacts
  - High and adverse impacts will disproportionately accrue to minority labor force in major shoreplant communities in APAI region under Alternative 2.
  - Estimated 1,200-2,200 jobs lost in this sector in this region for Alternative 2 are overwhelmingly held by minority individuals.
  - Impacts accentuated by relative disadvantage in obtaining work outside the seafood industry (e.g., language and alternative job skills).
  - Situation is similar, but on a smaller scale, for Kodiak region.
  - Similar impacts not anticipated for Alternative 4.
  - No EJ impacts to this sector anticipated for other regions for either Alternative 2 or Alternative 4.

Environmental Justice Effects (cont.)

- CDQ related environmental justice impacts
  - CDQ impacts under Alternative 2, as described in Section 4.12.2.2.7, will result in disproportionate high and adverse impacts to the predominately Alaska Native CDQ region communities.
  - Impacts deriving from Alternative 4 are not likely to be high and adverse or disproportionately felt in the CDQ region.

Environmental Justice Effects (cont.)

- Subsistence related environmental justice impacts
  - Environmental justice issue because of disproportionate involvement of Alaska Native population.
  - Direct effects unlikely.
  - Indirect effects due to lost opportunities for joint commercial and subsistence production are possible, and would most likely occur in King Cove, Sand Point, and Kodiak.
  - Given population composition, these are environmental justice impacts for King Cove and Sand Point.
  - Environmental justice impacts related subsistence joint production issues are unlikely for other regions under Alternative 2, or for communities in any region under Alternative 4.
  - Indirect effects on subsistence resulting from a loss of income that would otherwise be directed toward subsistence pursuits cannot be quantified with available data, but may occur in any Alaska region.

Effects of the proposed alternatives on subsistence use of resources (Appendix F(3))

- Potential effects on groundfish subsistence use (expanded)
- Potential effects on subsistence use of Steller sea lions (expanded)
- Indirect effects on other subsistence activities (new)

Effects of the proposed alternatives on subsistence use of resources (cont.)

- Direct negative impacts on groundfish and Steller sea lion subsistence are unlikely
- Assessment of indirect effects is less straightforward. These effects include:
  - Impacts to other subsistence pursuits as a result of loss of income from the commercial groundfish fishery.
  - Impacts to other subsistence pursuits as a result of the loss of opportunity to use commercial fishing gear and vessels for subsistence pursuits.

Effects of the proposed alternatives on subsistence use of resources – indirect effects (cont.)

- Loss of income resulting in funds not being available for subsistence pursuits is a very complex issue.
  - Loss of income can impact communities ranging across Alaska and the Pacific Northwest.
  - Income may or may not be used for subsistence expenses.
  - Income specifically contributed by groundfish pursuits may be a larger or smaller proportion funds used for subsistence by individuals or families.

Effects of the proposed alternatives on subsistence use of resources – indirect effects (cont.)

- The relationship between loss of income to specific subsistence outcomes is not entirely straightforward.
  - Income is required for contemporary subsistence pursuits. However, factors that influence participation in subsistence activities are many and complex.
  - An increase of income may decrease subsistence activity or an increase in subsistence activity; a decrease in income may decrease subsistence involvement or increase subsistence involvement.

Effects of the proposed alternatives on subsistence use of resources – indirect effects (cont.)

- Income associated with the groundfish fishery can derive from direct participation, investment, and/or control of quota.
- CDQ communities represent a special case as communities where subsistence is heavily practiced and that benefit from the fishery primarily through investment and control of quota.
- Different CDQ groups have chosen different organizational structures and strategies. As a result, there are effectively different levels of income to individuals and families in different CDQ communities.
- CDQ programs focused on employment and training may, in turn, indirectly influence individual subsistence spending and participation decisions.

Effects of the proposed alternatives on subsistence use of resources – indirect effects (cont.)

- Loss of opportunity for joint production applies to groundfish communities with direct participation in the fishery.
  - Not all vessels are used for subsistence in addition to commercial fishing.
  - Depending on the community, a greater or lesser proportion of fleet engaged in the local commercial groundfish fishery is a non-resident fleet.
  - Joint production can occur in at least two fundamentally different ways.
    - Subsistence fish can be retained during what are otherwise commercial trips
    - Separate trips may be taken that focus on subsistence.

Effects of the proposed alternatives on subsistence use of resources – indirect effects (cont.)

- Trip specifically dedicated to subsistence are generally uneconomic for larger vessels.
- Smaller vessels are most likely to be involved in joint production.
- Smaller vessel classes are less likely to be narrowly specialized than the larger vessels.
- Nearly all of the smaller class vessels are also involved in some or all of the salmon, halibut, sablefish, and herring fisheries.
- Joint production opportunities would presumably still exist during pursuit of other fisheries.
- The time of the year that the vessel would be available for joint production may decrease if the reduction of the commercial groundfish fishery were of a sufficient magnitude.

Effects of the proposed alternatives on subsistence use of resources – indirect effects (cont.)

- In practical terms, joint production opportunities vary by gear type as well as vessel size.
- Commercial vessel owners resident in communities tend to own skiffs for subsistence pursuits, so if the larger commercial vessel is not available, it will not mean the discontinuation of subsistence efforts.
- CDQ owned vessels that participate in the commercial groundfish fishery largely do not participate in subsistence activities.

Effects of the proposed alternatives on subsistence use of resources – indirect effects (cont.)

- Community level joint production impacts
  - In the case of Unalaska, none of the large commercial vessels that deliver groundfish to the local processing plants are owned or crewed by residents of the community.
  - A community small boat fleet does jig for cod, although the most recent data available suggest that none or very few of small boat owners derive their income exclusively from commercial fishing.
  - The fact that commercial fishing for small boat owners is generally one part of a (variable) multiple income source strategy of piecing together a living suggests that even if there were a partial reduction opportunity to fish, there would still be incentives to continue to fish. If at least some fishing took place, the opportunity would continue to exist for joint commercial/subsistence production.

Effects of the proposed alternatives on subsistence use of resources – indirect effects - community level joint production impacts (cont.)

- In Akutan, the fleet that delivers at the local processing facility is a non-residential fleet.
- Akutan's small boat fleet is comprised nearly exclusively of open-skiff type of vessels that generally do not deliver groundfish to the plant, so there would be no joint production impacts.

Effects of the proposed alternatives on subsistence use of resources – indirect effects - community level joint production impacts (cont.)

- In the case of Sand Point and King Cove, there is a residential fleet that does deliver groundfish in significant volume to the plants.
- Joint production related impacts are likely for at least a portion of the local fleet.

Effects of the proposed alternatives on subsistence use of resources – indirect effects - community level joint production impacts (cont.)

- For Kodiak, similar to Sand Point and King Cove, there is a residential fleet that delivers significant amounts of groundfish to the local processing plants.
- Whatever indirect subsistence impacts that do occur in this region as a result of the alternatives are likely to be concentrated in the City of Kodiak itself.

Effects of the proposed alternatives on subsistence use of resources – indirect effects - community level joint production impacts (cont.)

- In summary, the indirect impact of the alternatives on subsistence is difficult to assess.
- Impacts are likely to be concentrated among small vessel owners in a relatively small number of communities
- Indirect impacts through loss of income may have impacts on subsistence pursuits in a wider range of communities, including the CDQ communities.

Summary of SEIS Remaining Issues and Schedule

Tamra Faris

Preferred Alternative

[redacted]

Remaining Needs for the EIS

[redacted]

Time Schedule

[redacted]

- ◆ October 15-November 9 - Review comments, respond to comments, and prepare Final SEIS
- ◆ November 30 - Notice of Availability of Final SEIS

[redacted]

Record of Decision

a State what the decision was

b Identify all alternatives considered

➢ specify the environmentally preferable alternative

c State whether all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why not.

Environmentally Preferable

[illegible]

Summary of Steller Sea Lion Protection SEIS Alternative 4 Measures: Development, Issues, and Rationale

Prepared by
Dave Witherell, Staff

Background

- Alternative 4 (The Area and Fishery Specific Approach) was originally proposed by RPA Committee in June 2001.
- The Committee's procedure in developing this alternative was to first review existing and new scientific data on Steller sea lions (telemetry, scat studies, survey counts) to determine sea lion needs and the types of actions needed to avoid jeopardy and adverse modification. The second step was to build a fishery management program around the sea lion needs. Fishery observer information and survey data were used to help design a management program that met MSA mandates and national standard guidelines.

Sea Lion Needs

- Satellite telemetry data indicated that Steller sea lions were located close to shore (most within 3 nm, > 85% within10 nm), especially in the vicinity of rookeries and haulouts.
  - Committee response: minimize potential interaction of fisheries near rookeries and haulouts. For example, trawling is prohibited for pollock, cod, and mackerel within 10 nm of all rookeries and most haulouts.
- Survey Count data indicated that some rookeries were declining at rates > 10% per year
  - Committee response: provide additional protection to these areas (e.g., bigger closures around Agligadak and Buldir).

Sea Lion Needs (continued)

- Scientific consensus is that prey needs to be readily available to sea lions.
  - Committee response: spatially and temporally distribute the fishery to the extent practicable. Incorporate a global control rule to further reduce fishing pressure at low stock sizes.
- An experimental design should be incorporated to allow for monitoring of the efficacy of the measures implemented.
  - Committee response: close all of area 4 (Chignik), area 9 (Bogoslof), and the Seguam foraging area to fishing for pollock, mackerel, and cod. The 5 northern Bering Sea haulout closures would also be closed to these fisheries.

Fishery Measures

- Once sea lion needs were assessed, a management program was developed within the MSFCMA national standards, with particular attention paid to minimizing social (standard 8) and economic impacts (standards 1 and 5), minimizing bycatch (standard 9), and promoting safety at sea (standard 10). In addition, the conservation and management measures were developed based on the best available scientific information (standard 2).
- The following slides review the major measures proposed by Alternative 4 for each fishery, along with rationale for these measures.

Atka Mackerel Fishery

- East of 178W: the fishery can catch the TAC outside of critical habitat (CH), so all of CH was closed for maximum protection.
- West of 178W: Rookeries closed 0-10 nm. Haulouts were closed only to 3 nm, because many of the limited number of fishing spots occur in the 3-10 nm rings.
- Spatial-temporal dispersion attained through 2 seasons (50%), with 70%/30% apportionment inside and outside CH. Catch further spread out over time through platooning of the fleet in areas 542 and 543; should reduce daily catch by ~50%.
- Platooning based on random vessel selection with no switching once assigned. Rationale is that non-random or switching would be allocative in that it would provide additional advantages to companies with multi-vessels or partner companies.

AI Cod and Pollock Fishery

- All CH closed to pollock to prevent all potential interaction.
- Temporal dispersion of cod attained through 2 seasons.
- Fixed gear cod fisheries would be allowed in most CH area west of 173. Rationale is that this fleet has a low catch and is widely dispersed in the AI area. These fleets would be prohibited in CH east of 173 to help reduce cod catch in the areas where trawling would be allowed.
- Trawl cod fisheries allowed in most CH east of 178. Rationale is that the catcher vessels need access to these areas close to ports of Dutch Harbor and Adak. Trawl cod fisheries prohibited 0-10 (20?) nm from rookeries and haulouts west of 178 to provide full SSL protection.

Comparison of the Alternatives

[illegible]

Bering Sea Cod and Pollock Fishery

- Temporal dispersion of pollock and cod attained through 2 seasons (3 seasons for trawl cod).
- Pollock catch within the SCA limited to 28% of the annual TAC before April 1 to reduce potential competition during the A season, when spawning fish tend to be more aggregated. The Leitzell line 0-10 nm closure in the A season would eliminate all potential for pollock competition in the nearshore areas important for SSL foraging.
- Cod trawl fisheries prohibited within 10 nm of rookeries and haulouts in this area (except haulouts around Pribilofs; rationale: no SSLs surveyed here since ~1960). Fixed gear prohibited 0-7 at Amak rookery and 0-3 nm of haulouts (0-10 for c/p longliners at Reef-Lava and Bishop Pt haulouts).

Gulf of Alaska Cod Fishery

- Temporal dispersion attained through 2 seasons.
- Cod trawl fishery would be prohibited 0-20 nm of rookeries and haulouts in areas 1, 4, 5 (with exceptions), 10, and 11 to provide for maximum protection. Cod trawl fishery would be prohibited within 10 nm of rookeries and haulouts in areas 2 (rookeries closed to 15 and 20 nm) 3 (with exceptions), and 6 (with exceptions). Exceptions provide some opportunities for local fleets.
- Cod fixed gear fisheries prohibited 0-3 nm of all rookeries. Closures 0-10 nm set for rookeries in area 2, and in areas 10&11, 0-20 nm for pot gear and 0-10 nm for longline gear.

Gulf of Alaska Pollock Fishery

- Temporal dispersion attained through 4 seasons with 25% of the TAC apportioned to each.
- Pollock trawl fishery closure areas are the same as for cod trawl fishery. The rationale for these closures is that it minimizes potential competition with sea lions in the important nearshore areas around rookeries and haulouts.

Global Control Rule