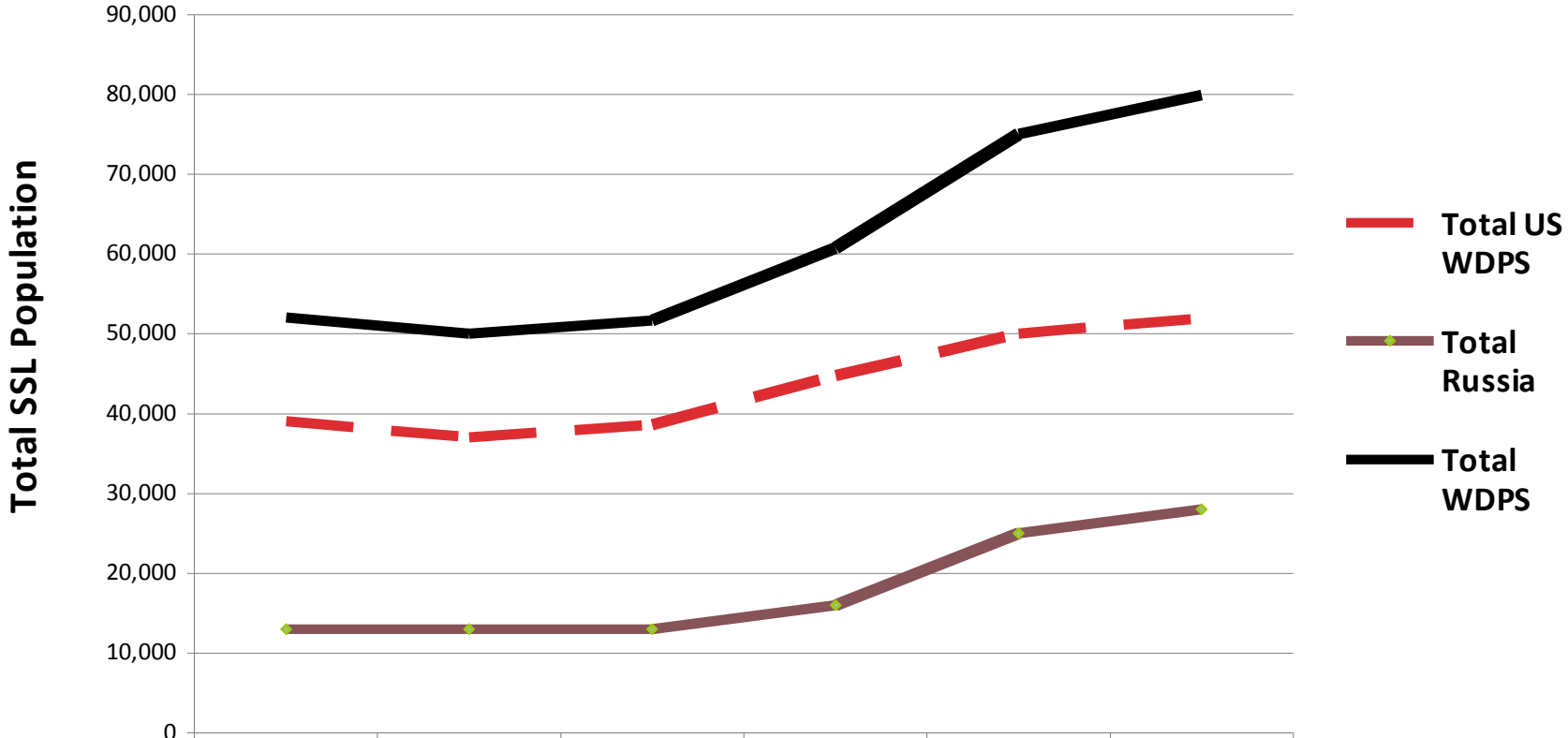
# Fishing Industry Panel Presentation for CIE Review of the 2010 Biological Opinion

August 1-2, 2012

## Figure 1: Total Population Estimate for WDPS SSLs, 1998-2011




| | 1998 | 2000 | 2002 | 2005 | 2009 | 2011 |
|---|---|---|---|---|---|---|
| Total US WDPS | 39,031 | 37,000 | 38,651 | 44,775 | 50,040 | 51,962 |
| Total Russia | 13,000 | 13,000 | 13,000 | 16,000 | 25,000 | 28,000 |
| Total WDPS | 52,031 | 50,000 | 51,651 | 60,775 | 75,040 | 79,962 |

## Figure 2: Total Population Estimate for the U.S. WDPS, 2002-2011

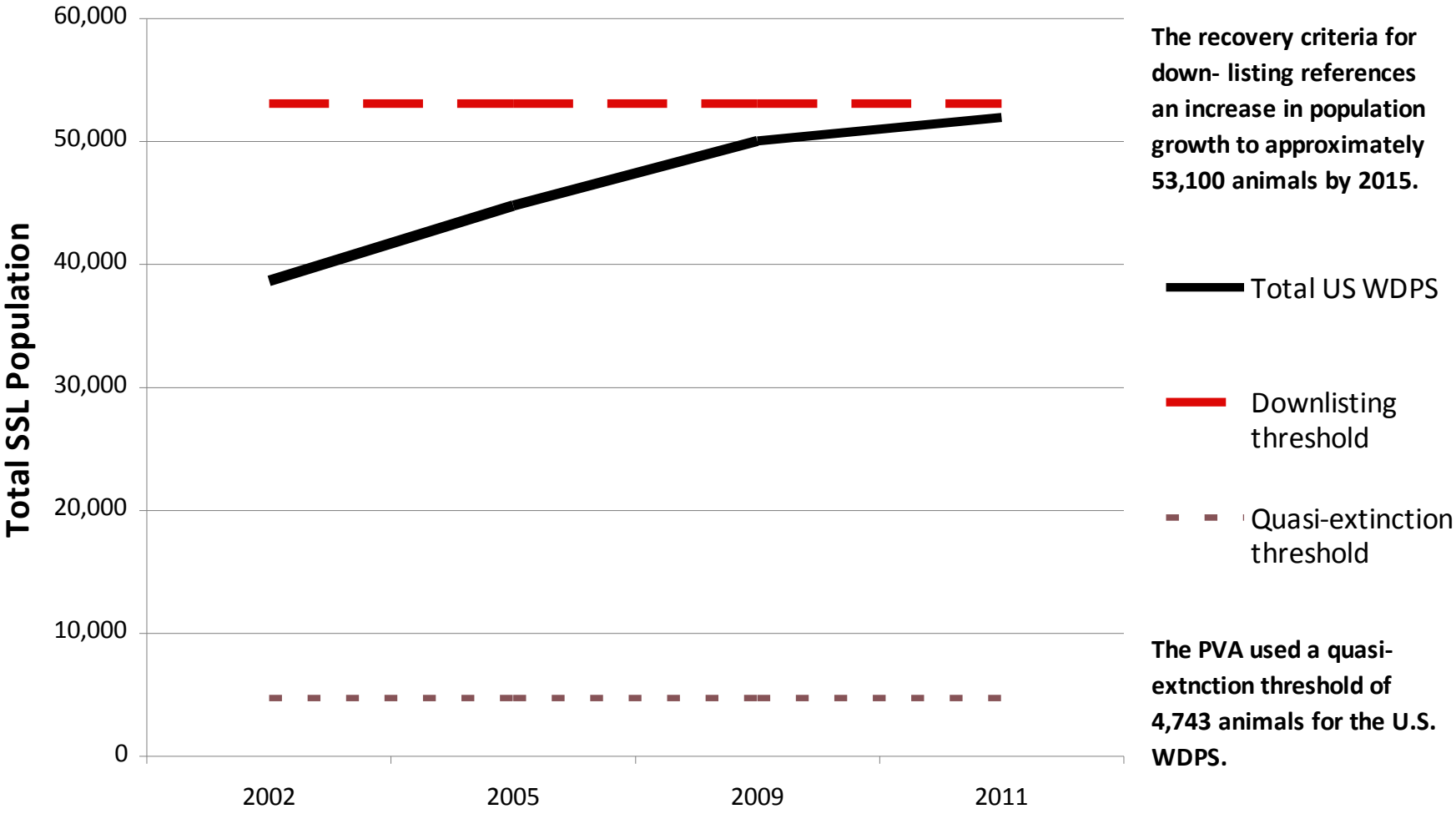
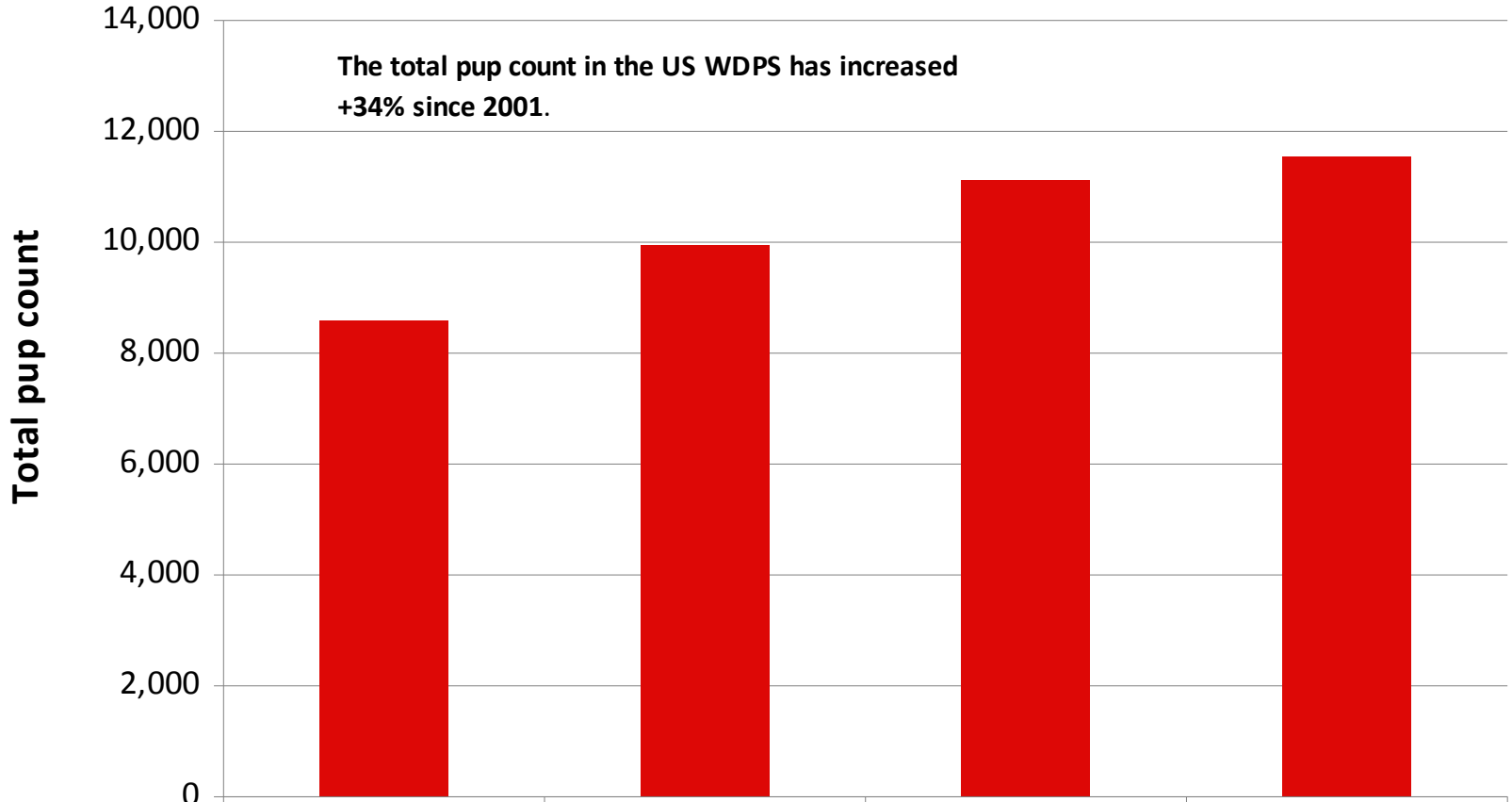


**Figure 3: Total Pup Count for the U.S. WDPS, 2001-2011**
(from the 2011 and 2001/02 pup survey reports)



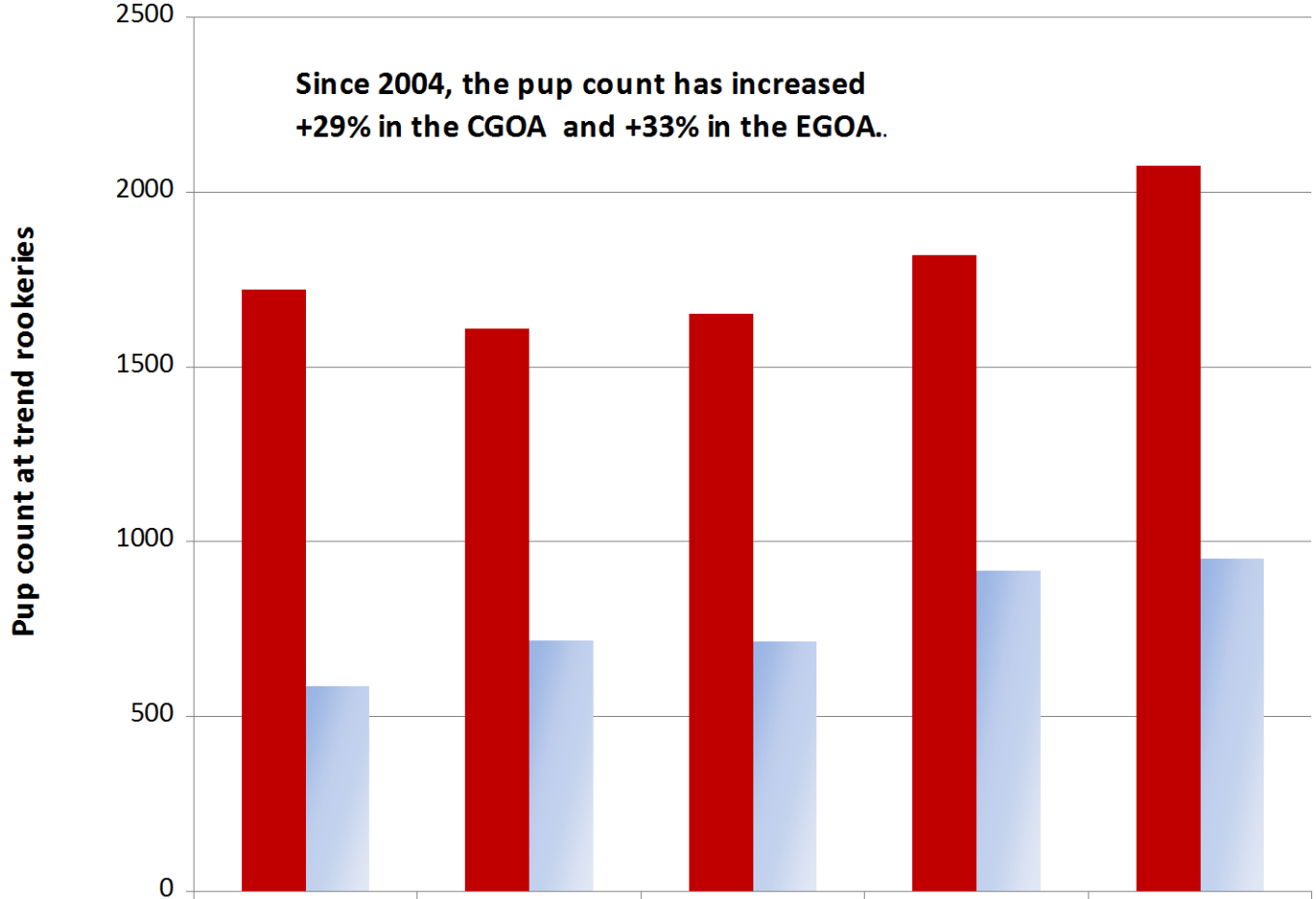

| | 2001/02 | 2005 | 2009 | 2011 |
|---|---|---|---|---|
| US WDPS Pup Count | 8,589 | 9,950 | 11,120 | 11,547 |

**Russian SSL Branding Studies, 2002-2008.**

(From Burkanov, Russian SSL Studies Update, presentation to SSLMC, January 2010)

| **Area** | **All marked immigrants (both sexes combined)** |
|---|---|
| Sea of Japan | 30.7% |
| Sakhalin | 69.3% |
| Antsiferov, Kuril Islands | 30% |
| Raykoke, Kuril Islands | 31.9% |
| Chirpoey Kuril Islands | 24.4% |
| Yamsky Islands, Sea of Okhotsk | 16.1% |
| Kozlova, Kamchatka | 36.6% |
| Medny, Commander Islands | **0%** |
| Mean | 28.3% (16.1% -36.6%), excluding Medny (0%) and Sakhalin (69.3%, re-colonizing rookery) |

**Figure 4: CGOA and EGOA Pup Counts, 2001-2011**
(from Table 2, 2011 pup survey report)




| | 2001/02 | 2003/04 | 2005 | 2009 | 2011 |
|---|---|---|---|---|---|
| CGOA Pup Count | 1721 | 1609 | 1651 | 1820 | 2075 |
| EGOA Pup Count | 586 | 716 | 715 | 918 | 953 |

**Figure 5: Comparison of 2008 Forage Ratios**
(from Tables 4 &6, Fadely et al, November, 2010)
(where 2008 = average of 2004, 2006, 2010 trawl surveys)

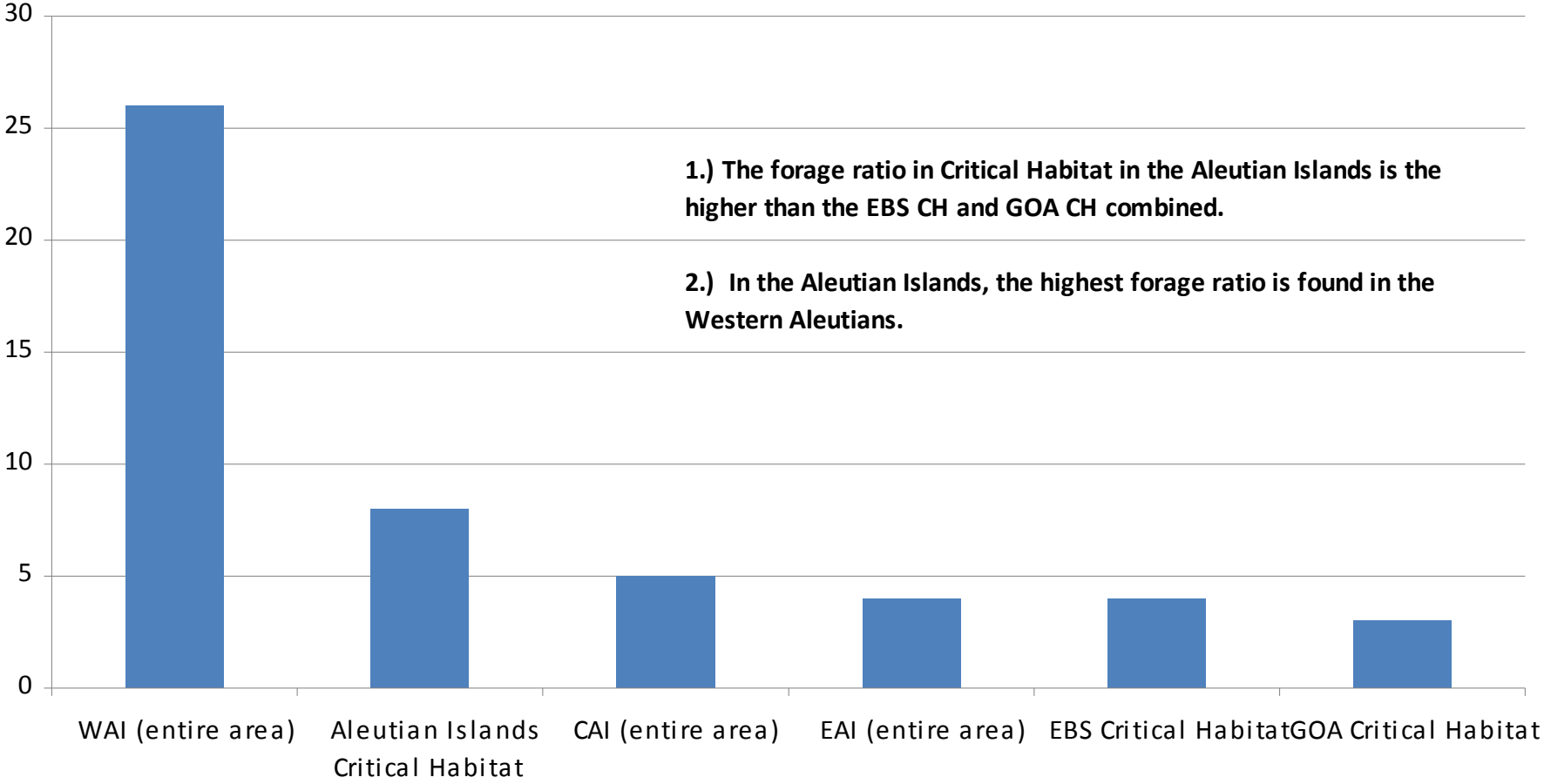


**Figure 6: Aleutian Islands pollock: Total Age 2+ biomass, 1999-2011**
(from 2011 AI pollock SAFE, Table)

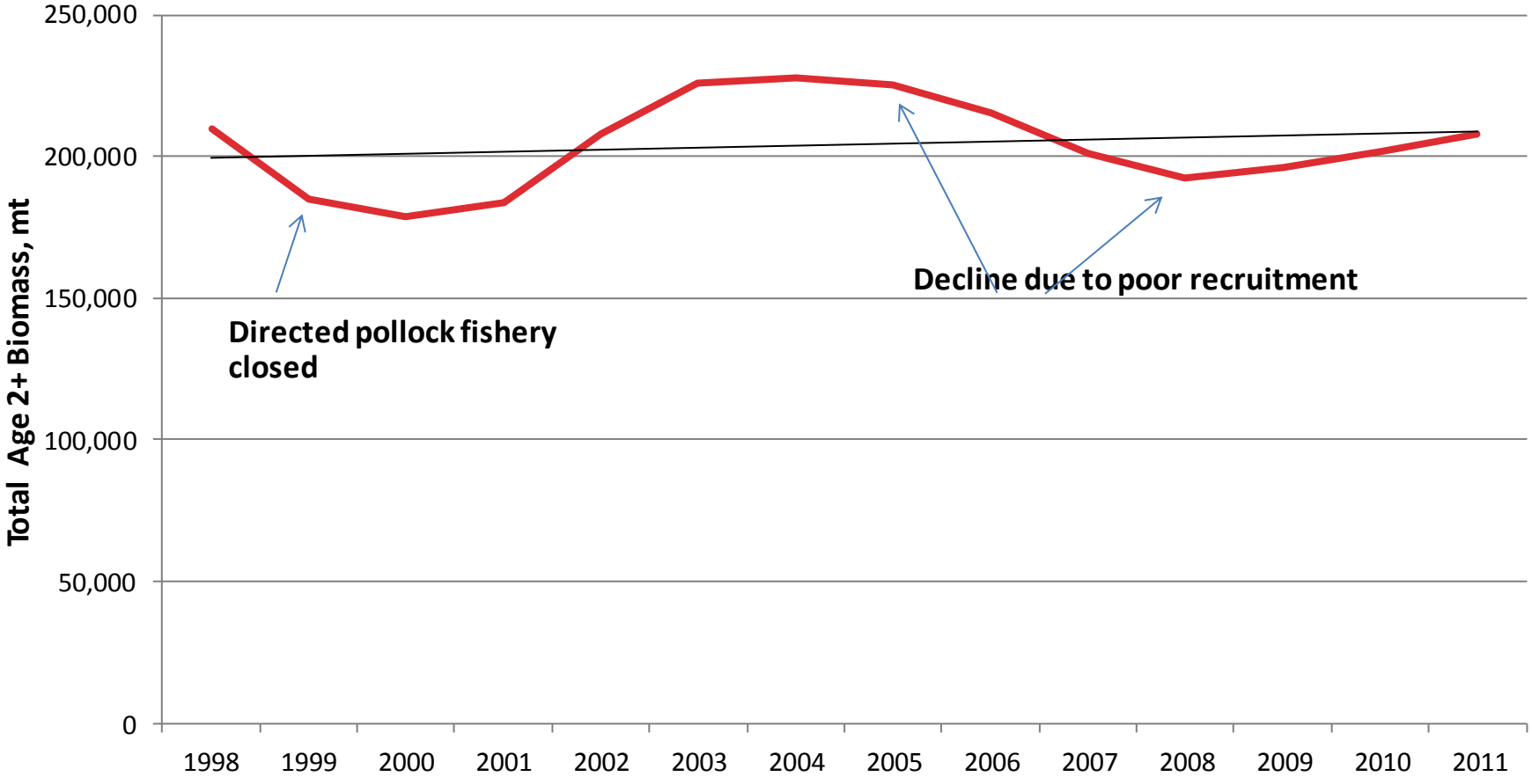
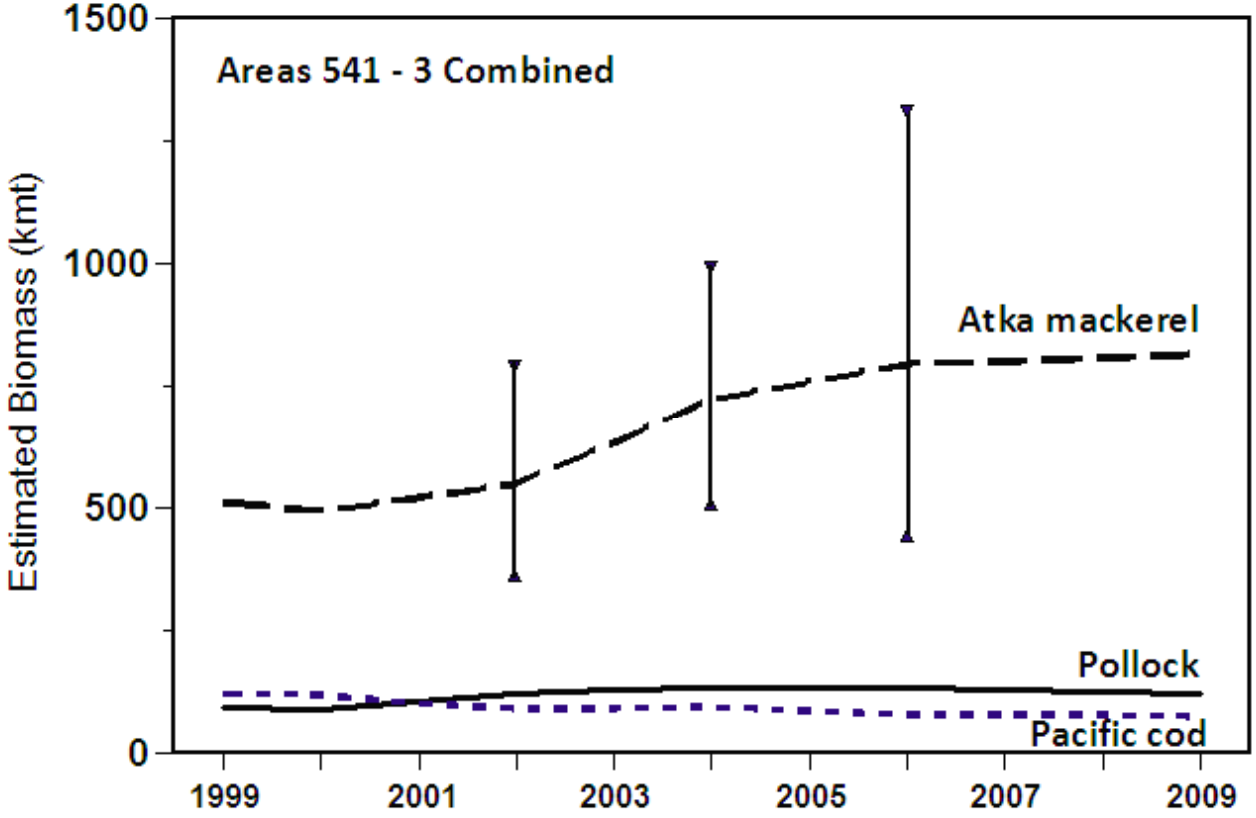


**Figure 7: Independent scientific review panel figure of AI biomass for AM, p-cod, and pollock.**



**Comparison of AI p-cod harvest rates resulting from unexpanded trawl survey biomass and expanded estimates of AI p-cod biomass (using catch from BIOP Table 5.2 in all cases). Years of actual AI survey are 2000, 2002, 2004, and 2006.**

| Year | BIOP - from trawl survey biomass (from Table 5.2) | AI Age 3+ biomass (16% of BSAI Age 3+ biomass) derived from 2010 BSAI P-cod SAFE Table 2.4 | AI p-cod Age 3+ biomass, from Footprint Analysis (Table 9) |
|---|---|---|---|
| | | | |
| 2000 | 34% | 19% | 16% |
| 2002 | 34% | 13% | 11% |
| 2004 | 31% | 11% | 11% |
| 2006 | 30% | 16% | 11% |
| | | | |
| **Average** | **32%** | **15%** | **12%** |

# Alaska Seafood Cooperative's (AKSC) comments to Center for Independent Review (CIE) Panel Review of SSL Bi-Op August 2, 2012

John Gauvin
Fisheries Science Projects Director
Alaska Seafood Cooperative

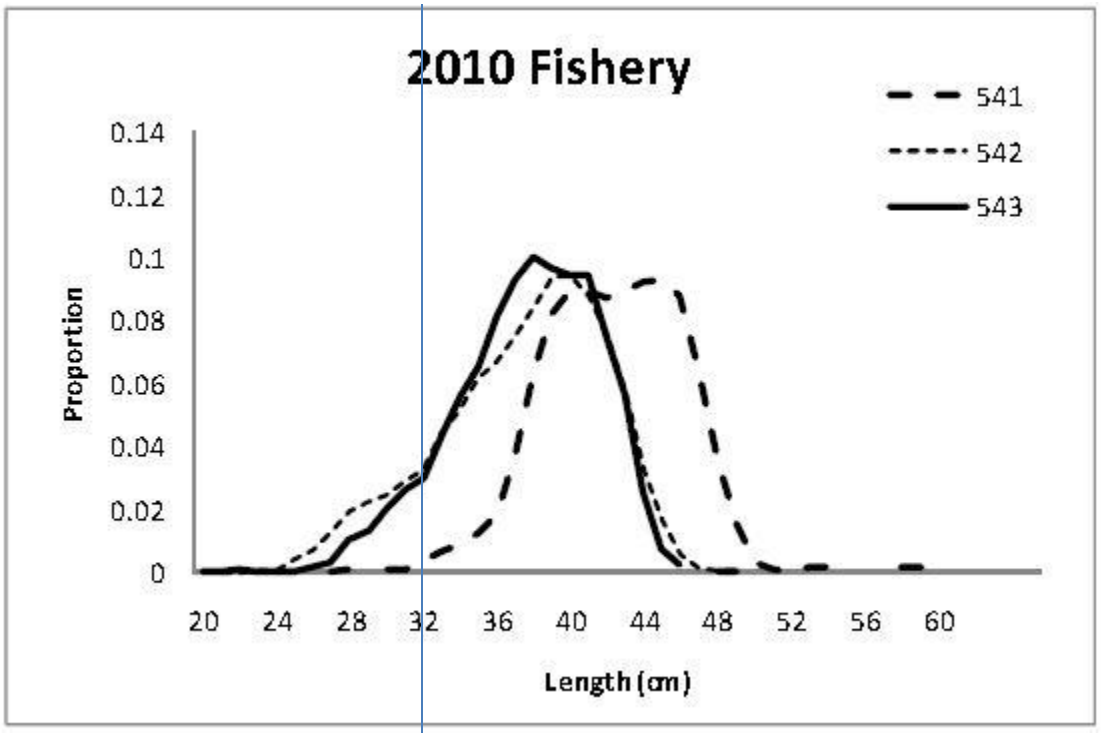
# Content of AKSC's testimony today

- Focus: My part will focus on Atka mackerel, other industry speakers will focus on Pacific cod and pollock
- Topics: I will cover: Use of available information to evaluate effects of fishing on SSL prey; use of information to characterize SSL dependence on feeding outside of CH in the AI; adaptive management perspectives

# Bi-op should have taken a hard look at how fisheries affect SSL prey and feeding using the best available data: Overlap/Exposure

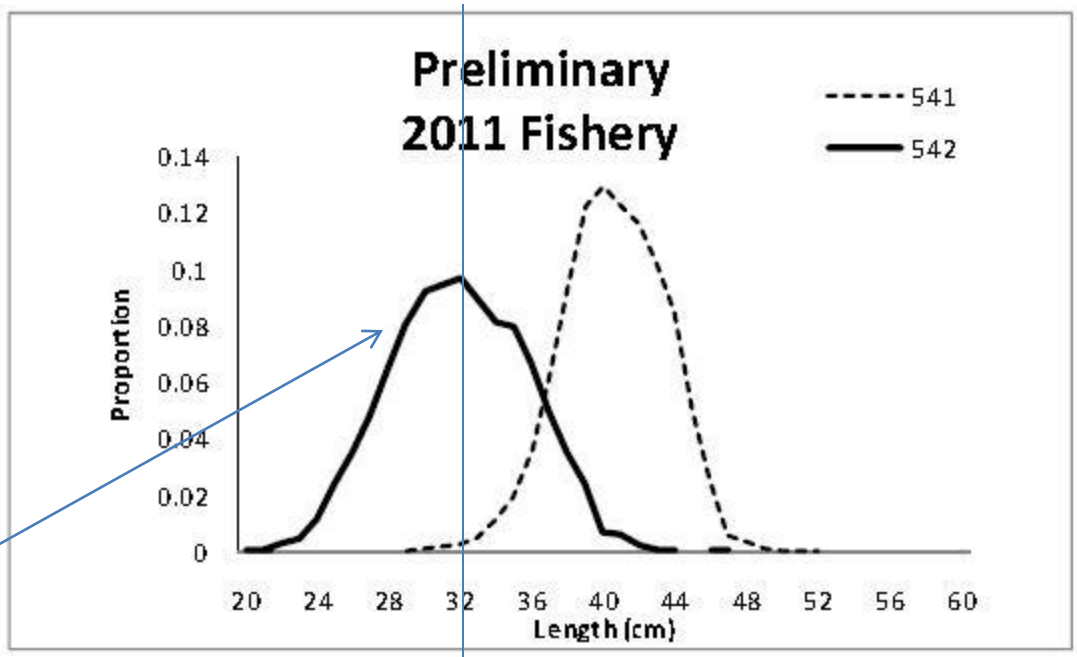
- Some attempt to look at effects of fishing on SSL in Draft (Aug) Bi-op but largely abandoned/ignored in final Bi-op conclusions and RPA decision process
- Diet: Atka mackerel is clearly an important prey item based on scat data and percentage biomass of AI overall (to a larger degree than cod and pollock); SSL eat mackerel no doubt but diet data shows mean size smaller than fishery size range prior to 2010 Bi-op (not examined in Bi-op)
- Overlap: Under pre-2010 RPAs, fishing was occurring mostly outside of 10 miles of SSL sites in CH and at least 40% of TAC had to be caught outside of CH; fishing depths generally greater than 100 meters; fishing was spread out temporally (platoons and later Co-ops)
- Competition: Effect of fishing is what is left in water. Best is to evaluate on local basis (harvest rates by sub-area and other information on local harvest rates). What info was used and what could have been used?

# A. Mackerel length data by fishing area from 2010 mackerel SAFE report




Average mackerel length from scat data is 32 cm (Zeppelin et al. 2003)

# A. Mackerel length data by fishing area from 2011 mackerel SAFE report




542 RPA effectively shifts all of mackerel fishery to Petrel Bank outside of CH

Average mackerel length from scat data is 32 cm (Zeppelin et al. 2003

# Harvest Rate Analysis in Draft Bi-op: NMFS' case that fisheries in WAI and CAI were affecting SSL in <u>August draft Bi-op</u> (Table 5.3)

**Table 5.3.** Summary table of Steller sea lion biology, status, and trends and 2008 Atka mackerel, Pacific Cod, and Pollock harvest overall and in Steller sea lion critical habitat by RCA.

| SSL Sub-Region | Fishery Management Area | RCA | Trend Sites (n)/Rookeries (n) | Non-Pup Counts at SSL Trend Sites 2008A[1] | SSL Trend Sites Avg Annual Growth Rate, 2000-2008 (%) | | Overall Difference in SSL Counts, 2000-2008A (%) | | Pups (2009): Non-Pups (2008)[5] | Primary Prey (% FO)[6] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Non-Pups[2] | Pups[3] | Non-Pups[3] | Pups[4] | | Summer | Winter |
| Western AI | 543 | 1 | 10/4 | 894 | -7 | -11 | -45 | -43 | 0.29 | | |
| Central AI | 542 | 2 | 12/4 | 772 | -4 | -4 | -11 | -7 | | | |
| | 542 | 3 | 12/4 | 1896 | -1 | -4 | | | | | |
| | 541 | 4 | 13/2 | 1351 | -4 | 2 | | | | | |
| | 541 | 5 | 12/2 | 1645 | 2 | 2 | | | | | |
| Eastern AI | 610 | 6 | 31/7 | 519 | 4 | 5 | 28 | 47 | | | |
| | 610 | 7 | 16/5 | 5[illegible]4 | 5 | 3 | 39 | 23 | | | |
| Western GOA | 620 | 8 | 11/3 | 14[illegible] | 0 | 1 | | | | | |
| Central GOA | 630 | 9 | 18/3 | 2814 | 0 | 1 | 1 | 6 | | | |
| Eastern GOA | 640 | 10 | 19/4 | 3675 | 4 | 4 | 58 | 57 | | | |

Source Tables:

| Fishery Management Area | RCA | Change in Amount of Harvest by CH Zone, 1999-2008 (top row) and 2008 Harvest Amount by Zone (bottom row)[7] | | | | | | | | | Forage Biomass 2008 (top row) and Total Harvest by RCA (bottom row)[8] | | | Fraction of Biomass Harvested by RCA | | | Fraction of 2008 Total Catch taken from CH (top) and Fraction of 2008 Forage Biomass taken from CH | | | Forage Availability Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Atka Mackerel | | | Pacific Cod | | | Pollock | | | Atka Mackerel | Pacific Cod | Pollock | Atka Mackerel | Pacific Cod | Pollock | Atka Mackerel | Pacific Cod | Pollock | |
| | | 3-10 | 10-20 | Foraging | 3-10 | 10-20 | Foraging | 3-10 | 10-20 | Foraging | | | | | | | | | | |
| 543 | 1 | 15<br>15 | -5,863<br>5,940 | | 2,495<br>2,917 | 4,285<br>5,793 | | 31<br>36 | -45<br>34 | | 62,154<br>16,509 | 39,939<br>[illegible] | [illegible]<br>114 | 0.27 | 0.23 | 0.01 | 0.15<br>0.10 | 0.95<br>0.22 | 0.61<br>0.00 | |
| 542 | 2 | 69<br>[illegible] | 4,486<br>[illegible] | | -867<br>[illegible] | -301<br>[illegible] | | -70<br>[illegible] | -59<br>[illegible] | | 91,05[illegible]<br>[illegible]317 | 21,519<br>2,870 | 4[illegible],038<br>123 | 0.20 | 0.13 | 0.00 | 0.48<br>0.09 | 0.86<br>0.12 | 0.27<br>0.00 | |
| 542 | 3 | | | | | | | | | | 81,236<br>4,560 | 23,068<br>1,441 | 1,074<br>168 | 0.06 | 0.06 | 0.01 | 1.00<br>0.06 | 1.00<br>0.06 | 0.96<br>0.01 | 11:1 |
| 541 | 4 | | | | | | | | | | 20,173<br>53 | 7,403<br>6,910 | [illegible],907<br>470 | 0.00 | 0.93 | 0.25 | 0.58<br>0.00 | 0.83<br>0.77 | 0.15<br>0.04 | |
| 541 | 5 | | | | | | | | | | 216,994<br>18,650 | 80,223<br>11,821 | 19[illegible],830<br>404 | 0.09 | 0.15 | 0.00 | 0.01<br>0.00 | 0.76<br>0.11 | 0.85<br>0.00 | |
| 610 | 6 | | | | | | | | | | [illegible]0,512<br>[illegible]173,693 | 74,149<br>447 | 934,201<br>140,492 | 4,43[illegible],756<br>99[illegible],601 | 0.01 | 0.15 | 0.22 | 0.01<br>0.01 | 0.07<br>0.01 | 0.25<br>0.06 | 446:1 |
| 610 | 7 | | | | | | | | | | | | 168,227<br>18,661 | 11[illegible],114<br>1[illegible],986 | | 0.11 | 0.12 | | 0.64<br>0.07 | 0.70<br>0.08 | |
| 620 | 8 | | | | | | | | | | -12,181<br>2,760 | | 53,508<br>11,481 | 21[illegible],585<br>1[illegible],225 | | 0.21 | 0.08 | | 0.75<br>0.16 | 0.59<br>0.05 | |
| 630 | 9 | | | | | | | | | | -56<br>7 | | 128,096<br>24,226 | 10[illegible],941<br>1[illegible],314 | | 0.19 | 0.15 | | 0.48<br>0.09 | 0.79<br>0.12 | 17:1 |
| 640 | 10 | | | | | | | | | | | | 12,556<br>2,109 | 4[illegible],961<br>166 | | 0.17 | 0.03 | | 0.76<br>0.06 | 0.60<br>0.02 | |

| SSL Sub-Region | Fishery Management Area | RCA | Fraction of Biomass Harvested by RCA | | |
|---|---|---|---|---|---|
| | | | Atka Mackerel | Pacific Cod | Pollock |
| Western AI | 543 | 1 | 0.27 | [illegible] | 0.01 |
| Central AI | 542 | 2 | 0.20 | 0.13 | 0.00 |
| | 542 | 3 | 0.06 | 0.06 | 0.01 |
| | 541 | 4 | 0.00 | 0.93 | 0.25 |
| | 541 | 5 | 0.09 | 0.15 | 0.00 |
| Eastern AI | 610 | 6 | 0.01 | 0.15 | 0.22 |
| | 610 | 7 | | 0.11 | 0.12 |
| Western GOA | 620 | 8 | | 0.21 | 0.08 |
| Central GOA | 630 | 9 | | 0.19 | 0.15 |
| Eastern GOA | 640 | 10 | | 0.17 | 0.03 |

In comments on draft Bi-op, SSC and public questioned RCA-specific biomass and snapshots of AI trawl survey to apportion biomass

# Harvest rates in Final Bi-op Table 5.8

Table 5.8. Summary table of Steller sea lion biology, status, and trends and 2008 Atka mackerel, Pacific Cod, and Pollock harvest overall and in Steller sea lion critical habitat by RCA; biomass and harvest rates by NMFS Management Area.

| SSL Sub-Region | Fishery Management Area | RCA | Trend Sites (n)/Rookeries (n)[1] | Non-Pup Counts at SSL Trend Sites 2008A[2] | SSL Trend Sites Avg Annual Growth Rate, 2000-2008 (%) | | Overall Difference in SSL Counts, 2000-2008A (%) | | Pups (2009): Adult Females (2008)[3] | Primary Prey (% FO)[4] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Non-Pups[5] | Pups[6] | Non-Pups[5] | Pups[6] | | Summer | Winter |
| Western GOA | 543 | 1 | 10/4 | 894 | -7 | -11 | -45 | -43 | 0.29 | Atka mackerel (44), Salmon (17), Cephlopods (15), Pollock (7), P. Cod (6) | Atka mackerel (53), P. Cod (26), Irish Lord (10), Cephlopods (14), Pollock (12), Inverfish (12) |
| Central GOA | 542 | 2 | 12/4 | 772 | -4 | -4 | -11 | -7 | 0.39 | | |
| | 542 | 3 | 12/4 | 1896 | -1 | -4 | | | | | |
| | 541 | 4 | 13/2 | 1351 | -3 | 2 | | | | | |
| | 541 | 5 | 12/2 | 1645 | 2 | 2 | | | | | |
| Eastern GOA | 610 | 6 | 31/7 | 6519 | 3 | 5 | 28 | 47 | 0.37 | Pollock (44), Salmon (34), Herring (19), Sand Lance (14), Atka mackerel (12), Rock Sole (10), P. Cod (10) | Pollock (53), Atka mackerel (20), P. Cod (19), Irish Lord (15), Sandlance (28), Salmon (25), Arrowtooth (21) |
| | 610 | 7 | 16/5 | 5274 | 5 | 3 | 39 | 23 | 0.38 | Sandlance (50), Salmon (17), Pollock (10), P. Cod (14), Atka mackerel (21), Arrowtooth (16) | Pollock (63), P. Cod (31), Salmon (17), Sandlance (17), Arrowtooth (7) |
| Western GOA | 620 | 8 | 11/3 | 1492 | 0 | 1 | | | | | |
| Central GOA | 630 | 9 | 18/3 | 2814 | 0 | 1 | 1 | 6 | 0.42 | Salmon (34), Pollock (44), Arrowtooth (45), Sandlance (14), Capelin (18), Herring (12) | Pollock (44), P. Cod (48), Sandlance (33), Arrowtooth (31), Salmon (29), Irish Lord (17) |
| Eastern GOA | 640 | 10 | 19/4 | 3675 | 5 | 4 | 58 | 57 | 0.38 | Salmon (84), Sand Lance (44), Herring (24), Capelin (14), Pollock (8), P. Cod (5), Arrowtooth (5) | Not available |

| Fishery Management Area | Fraction of 2008 Harvest Amount by Zone[7] | | | | | | | | | | | | Estimated Biomass 2008 (top row) and Total Harvest 2008 (bottom row)[8] | | | Fraction of 2008 Biomass Harvested by Fishery Management Area | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Atka Mackerel | | | | Pacific Cod | | | | Pollock | | | | Atka Mackerel | Pacific Cod | Pollock | Atka Mackerel | Pacific Cod | Pollock |
| | 0-3 | 3-10 | 10-20 | Foraging | 0-3 | 3-10 | 10-20 | Foraging | 0-3 | 3-10 | 10-20 | Foraging | | | | | | |
| 543 | 0.00 | 0.00 | 0.65 | | 0.00 | 0.32 | 0.63 | | 0.00 | 0.32 | 0.30 | | 243,692<br>16,642 | 17,202<br>7,418 | 748<br>114 | 0.07 | 0.43 | 0.01 |
| 542 | 0.00 | 0.01 | 0.47 | | 0.02 | 0.66 | 0.20 | | 0.00 | 0.02 | 0.25 | | 268,957<br>22,328 | 20,152<br>5,434 | 3,762<br>290 | 0.08 | 0.27 | 0.01 |
| 542 | 0.00 | 0.02 | 0.98 | | 0.00 | 0.76 | 0.24 | | 0.04 | 0.74 | 0.21 | | | | | | | |
| 541 | 0.00 | 0.96 | 0.02 | | 0.00 | 0.52 | 0.30 | | 0.00 | 0.05 | 0.10 | | 295,765<br>18,719 | 39,804<br>18,180 | 8,076<br>872 | 0.06 | 0.46 | 0.01 |
| 541 | 0.00 | 0.00 | 0.01 | | 0.00 | 0.03 | 0.72 | | 0.00 | 0.03 | 0.81 | | | | | | | |
| 610 | 0.00 | 0.11 | 0.79 | 0.01 | 0.00 | 0.02 | 0.06 | | 0.00 | 0.00 | 0.07 | 0.17 | 91,670<br>1,787 | 128,512<br>20,973 | 15,084<br>3,257 | 0.02 | 0.16 | 0.11 |
| 610 | 0.00 | 0.10 | 0.26 | | 0.00 | 0.26 | 0.38 | | 0.00 | 0.43 | 0.27 | | | | | | | |
| 620 | | | | | 0.00 | 0.00 | 0.05 | 0.70 | 0.00 | 0.00 | 0.40 | 0.16 | 2,847<br>323 | 214,601<br>37,532 | 22,771<br>3,607 | 0.11 | 0.17 | 0.15 |
| 630 | | | | | 0.00 | 0.12 | 0.36 | 0.00 | 0.01 | 0.00 | 0.72 | 0.00 | | | | | | |
| 640 | | | | | 0.12 | 0.27 | 0.49 | | 0.00 | 0.00 | 0.60 | | | | | | | |

Summary ta

| Fishery Management Area | Fraction of 2008 Biomass Harvested by Fishery Management Area | | |
|---|---|---|---|
| | Atka Mackerel | Pacific Cod | Pollock |
| 543 | 0.07 | 0.43 | 0.01 |
| 542<br>542 | 0.08 | 0.27 | 0.01 |
| 541<br>541 | 0.06 | 0.46 | 0.01 |
| 610<br>610 | 0.02 | 0.16 | 0.11 |
| 620<br>630<br>640 | 0.11 | 0.17 | 0.15 |

**But** this <u>big difference</u> in harvest rate as indicator of effects of fishing on SSL prey did not affect final Bi-op's conclusions for RPAs in WAI and CAI.

# Relevant new information: The 2010 Atka mackerel stock assessment was not available in time for final SSL 2010 Bi-op, which means:

- Bi-op included statements that Atka mackerel stock was at relatively low levels of abundance at the time of the 2010 Bi-op and this was related to steep decline of SSL in WAI and failure of SSL to increase in CAI
- Bi-op based this statement on using snapshot of 2006 trawl survey. Mackerel stock assessment uses weighted average of trawl survey abundance to subdivide ABC between AI sub-areas
- Harvest Rate tables in final Bi-op used an averaging for trawl survey apportionment between sub-areas but did not use 2010 mackerel stock assessment
- Biomass increase targets of RPAs based on biomass levels prior to the 2010 stock assessments

# Page 119 of Draft Bi-op (Chapter 3 Status of Species and Critical Habitat)

- "The decrease in biomass in the 2006 survey is largely a result of a decrease in biomass found in the western area (376,414 mt in 2004 down to 100,693 mt in 2006), despite a large increase in the eastern area. Relative to the 2004 survey, the 2006 biomass estimates are down 73% in the Western area, up 3% in the Central area, and up 44% in the eastern area." Page 119

# New Information: 2010 A. mackerel stock assessment as it relates to information used in 2010 Bi-op draft



The most recent Aleutian Islands biomass estimate from the 2010 Aleutian Islands bottom trawl survey is 844,571 t, up 16% relative to the 2006 survey estimate (no survey was conducted in 2008, Table 16.8). The breakdown of the Aleutian biomass estimates by area corresponds to the management sub-districts (541-Eastern, 542-Central, and 543-Western). The increase in biomass in the 2010 survey is largely a result of the increase in biomass found in the Western area (252,819 t in 2010 up from 100,693 t in 2006), despite a large decrease in the Central area. Relative to the 2006 survey, the 2010 biomass estimates are up 151% in the Western area, down 29% in the Central area, and up 13% in the Eastern area (Figure 16.5). The 95% confidence interval about the mean total 2010 Aleutian biomass estimate is **162,039-1,527,102 t**. The coefficient of variation (*CV*) of the 2010 mean Aleutian biomass is 40% (Table 16.8).

# On the prospect of localized depletion, in Chap 4. of the draft and final Bi-ops (Page 236) of Final Bi-op:

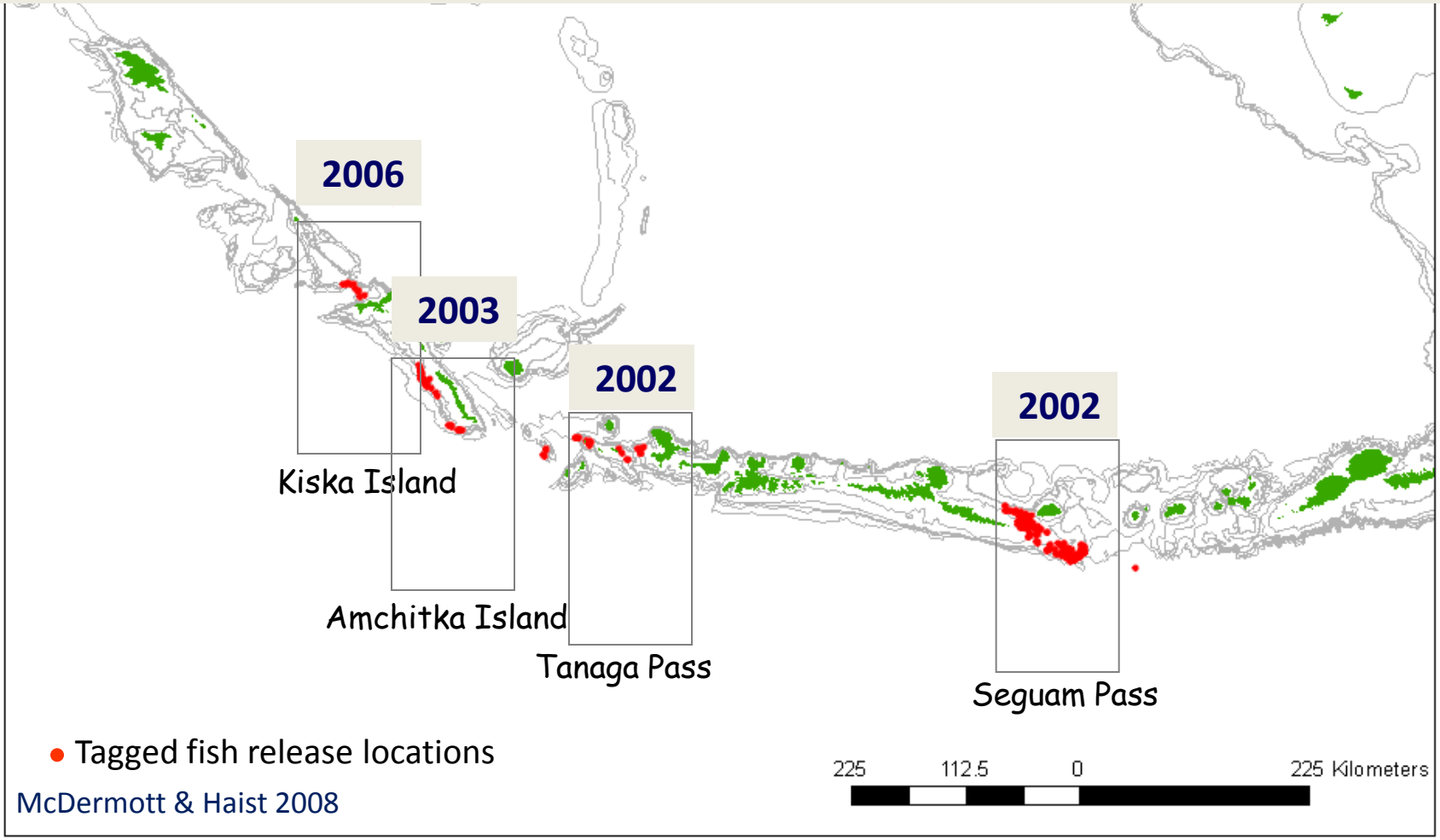
"To further examine the potential for localized depletion of Atka mackerel, exploitation rates (catch/biomass) were calculated for the Atka mackerel fishery during August through October in each of the Atka mackerel tagging areas. Catch data were derived from the Norpac database and represent all Atka mackerel catches by observed commercial catcher processors in each of the specific study areas. **The local exploitation rates estimated in this analysis were low for Seguam Pass, Tanaga Pass and Kiska Island (<5%) and little danger of localized depletion of prey is expected.** However, higher exploitation rates at Amchitka (50%) make this area susceptible to localized depletion during the time of the fishery in the area outside the trawl exclusion zone (NMFS 2006b; Ortiz and Logerwell 2010).

**BUT Bi-op used performance standard approach to RPAs in favor of using the FIT local biomass information, see below…….**

# Could the FIT mackerel tagging study information have been used to craft fishery management measures that avoid localized depletion?

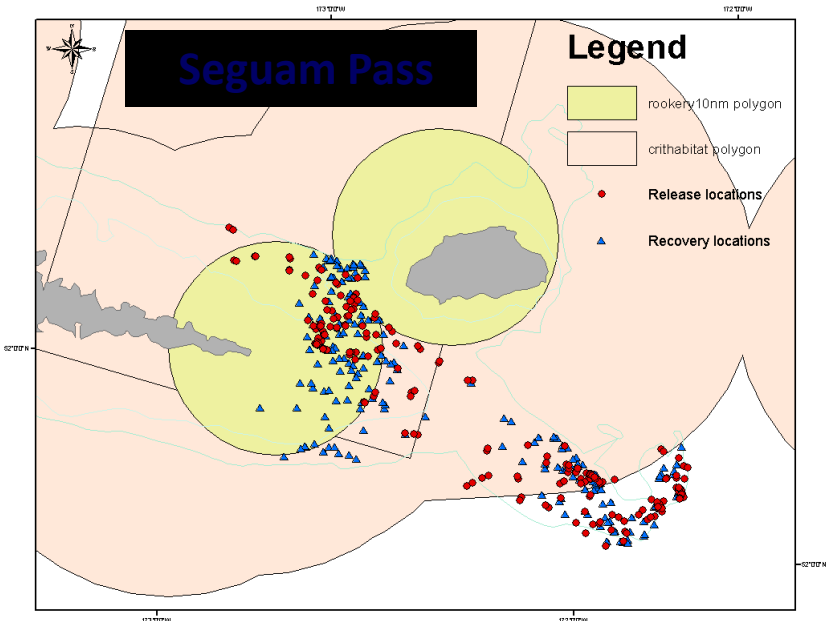
In August 2010, the NPFMC (the Council) proposed an RPA utilizing local biomass estimates for mackerel based on McDermott et al. This would have allowed mackerel fishing inside CH at Kiska and Tanaga (harvest would be <5%) but would have closed Amchitka. NPFMC proposed RPA was not accepted by NMFS ostensibly because it failed to meet the "performance standards" for increasing groundfish biomass for RPAs in the Bi-op. The RPA objective was to increase mackerel biomass to a target amount based on a single species model projection.

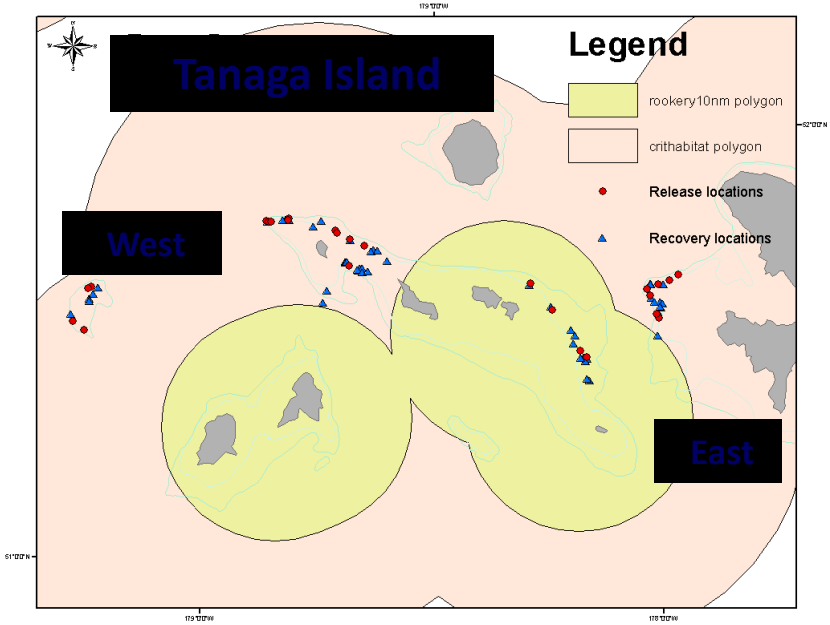
# FIT mackerel tagging study area (McDermott et al.)

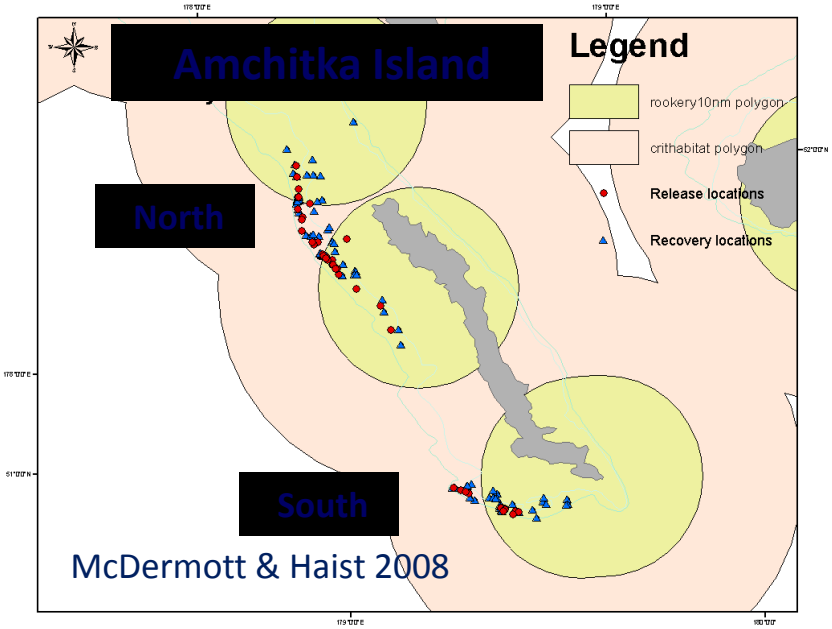



McDermott & Haist 2008

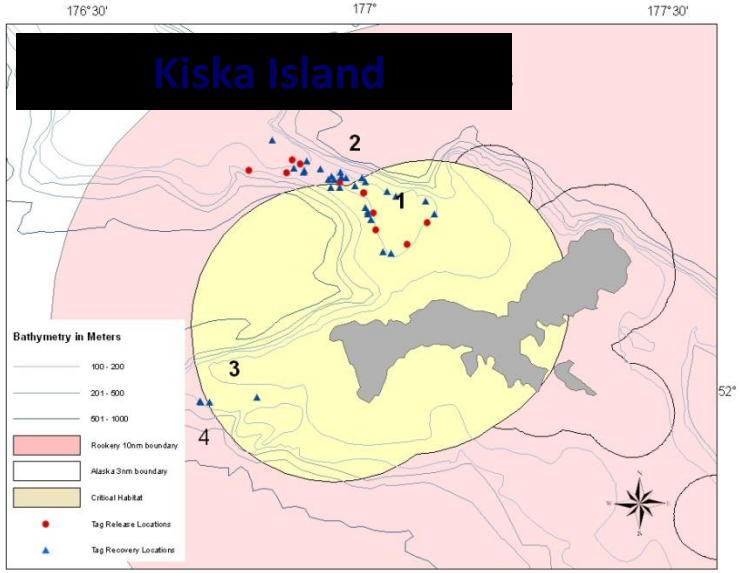
# Tag release and recovery locations



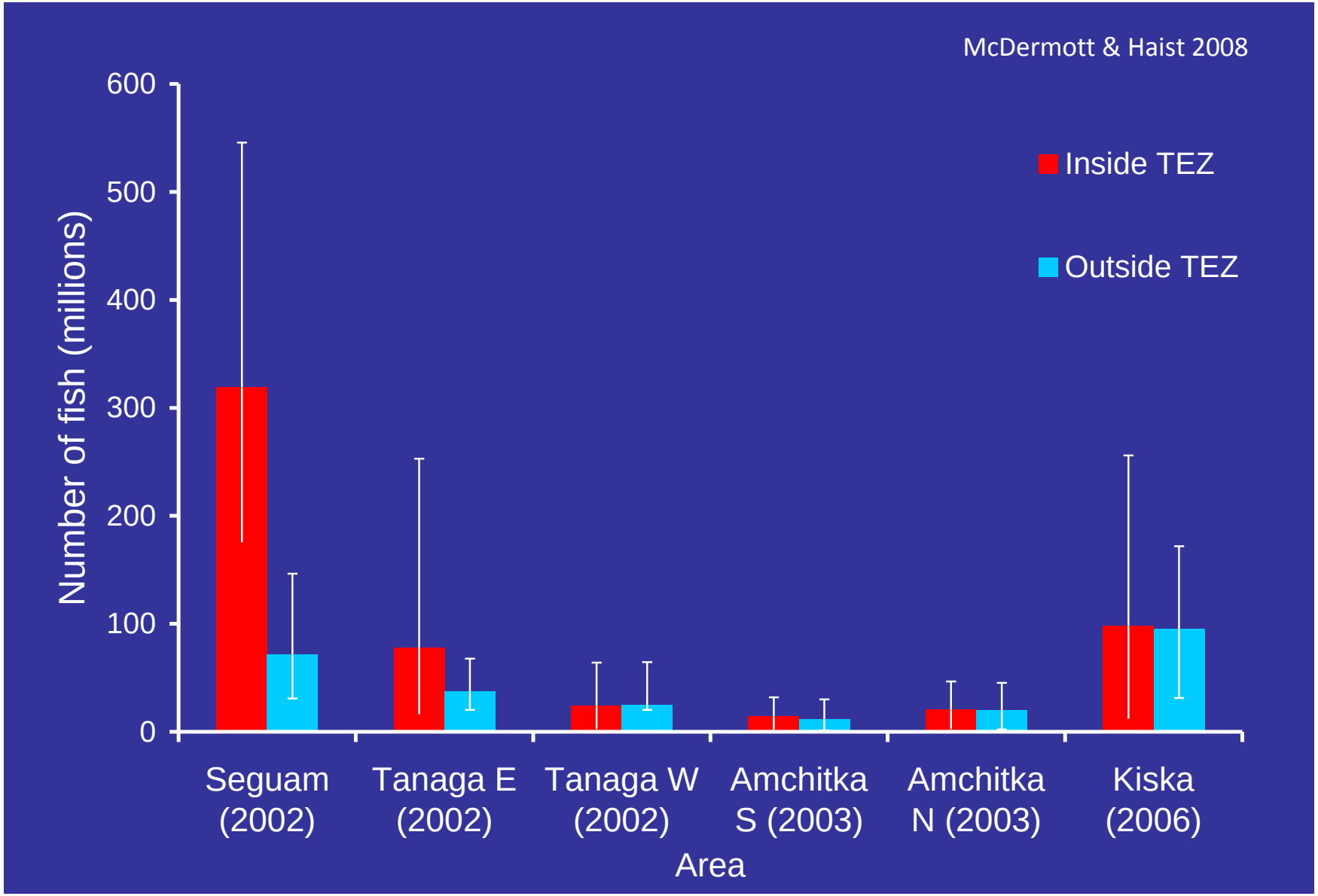



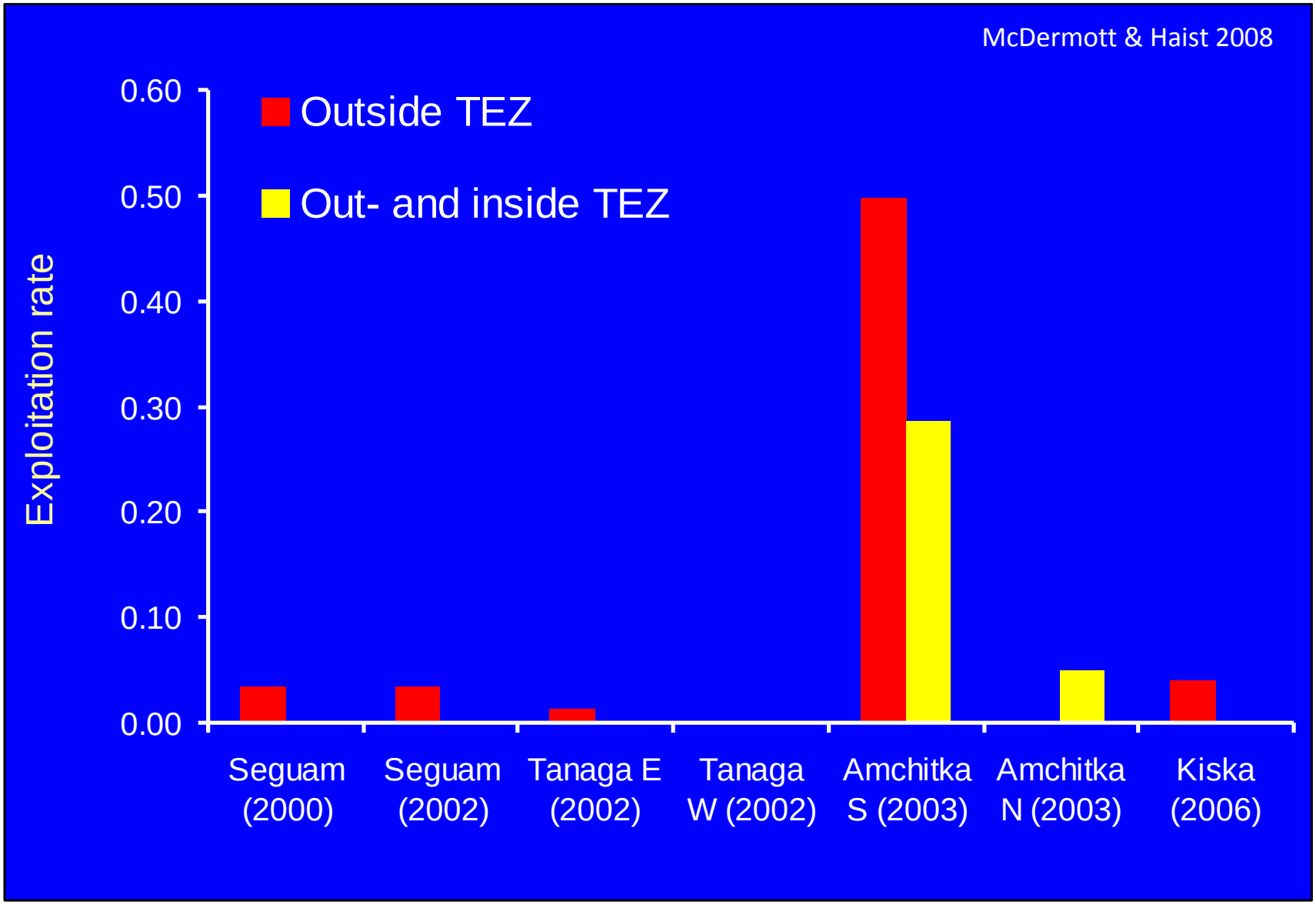

McDermott & Haist 2008



# Atka mackerel abundance estimates



# Exploitation rate

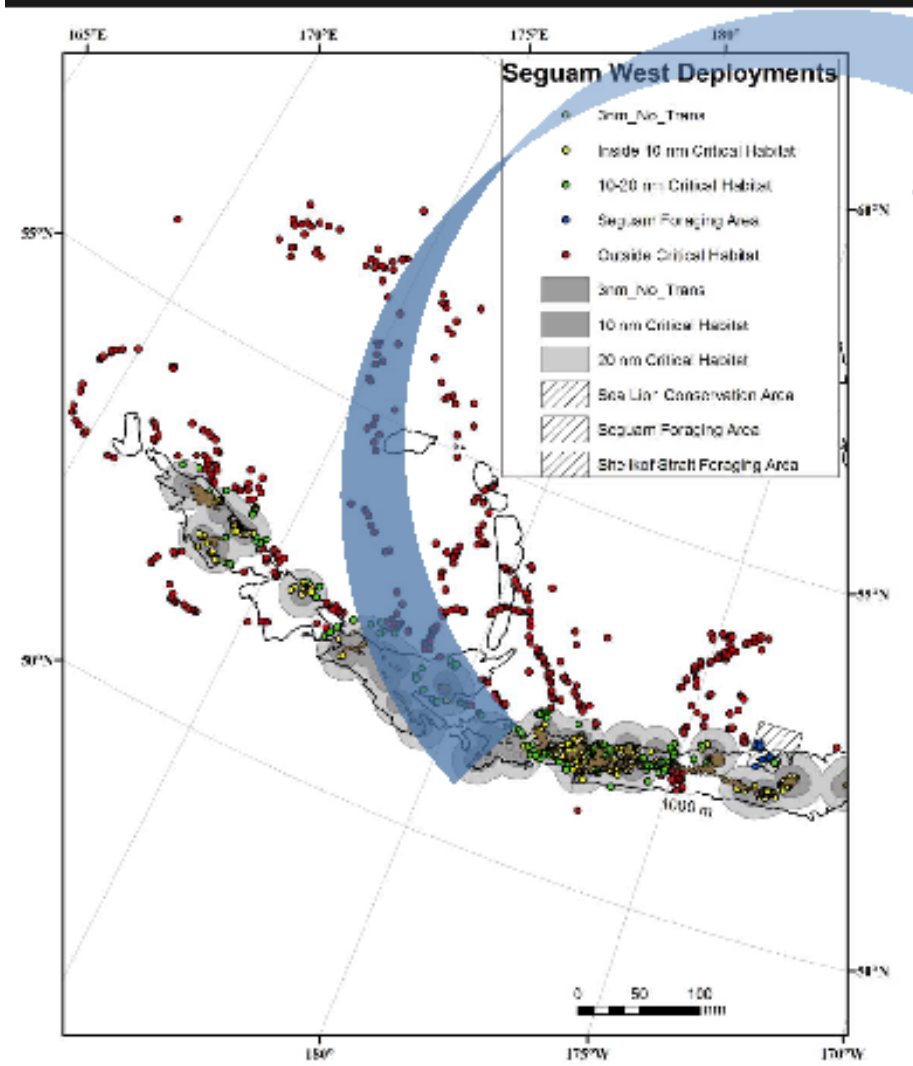


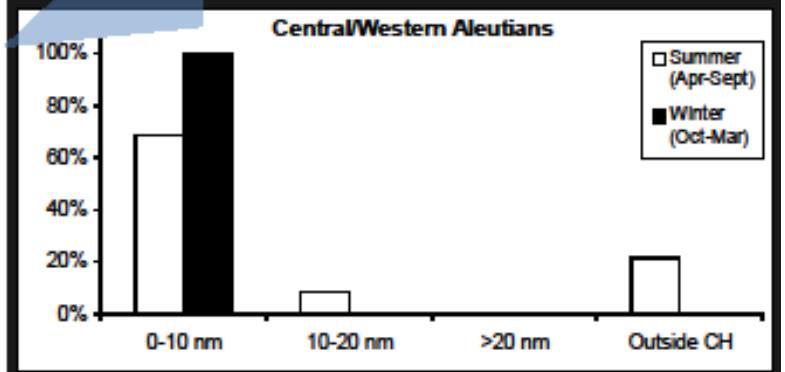
# Bi-op's claim that SSL in CAI and WAI have high relative dependence on areas outside of critical habitat (AFSC 2010b (Fadely)and Boor, 2010

"Past SSL telemetry data indicate SSLs in certain areas have tended to forage close to land, most within 20 nm. New spatial analyses indicate that SSLs indeed forage close to rookeries and haulouts, particularly in the 0 to 10 nm zone and also in the areas further offshore to 20 nm (Boor 2010, AFSC 2010b). In particular, **recent telemetry information indicates that in RCAs 1, 2 and 3 an unusually large proportion of telemetered animals forage outside 20 nm** (AFSC 2010b)" Biop page 343

# AFSC 2010 b (Fadley)

## Telemetry review: 2006 analysis example



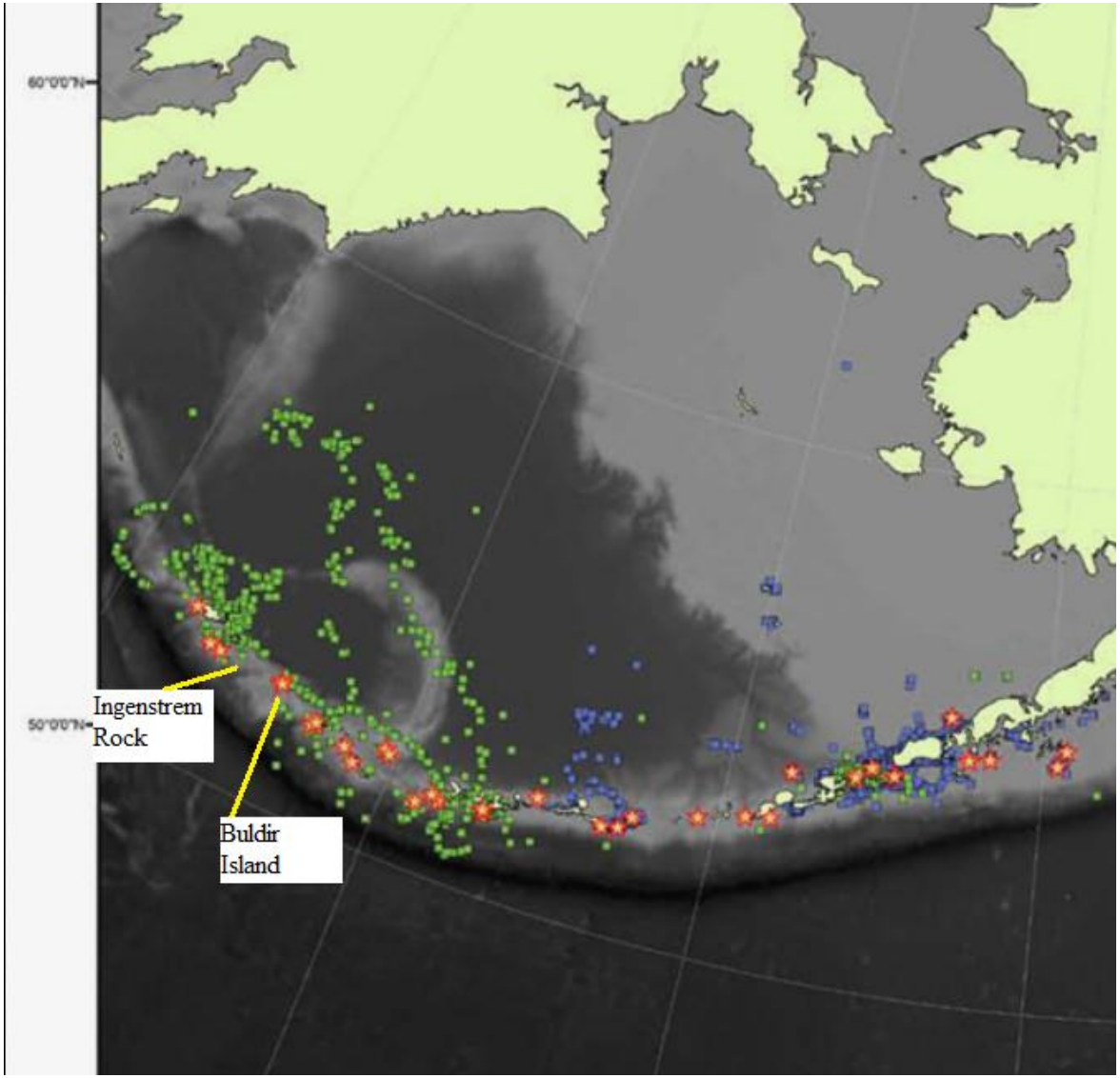

Depending on age, season, region:

0-10 nm 78.4-95.4% of locations

10-20 nm 3.5-8.9% of locations

Outside CH 1.0-11.9% of locations

# Telemetry locations in ADFG study pictured with bathymetry (Figure reproduced from Boor 2010)



# Figure 14 from Boor 2010

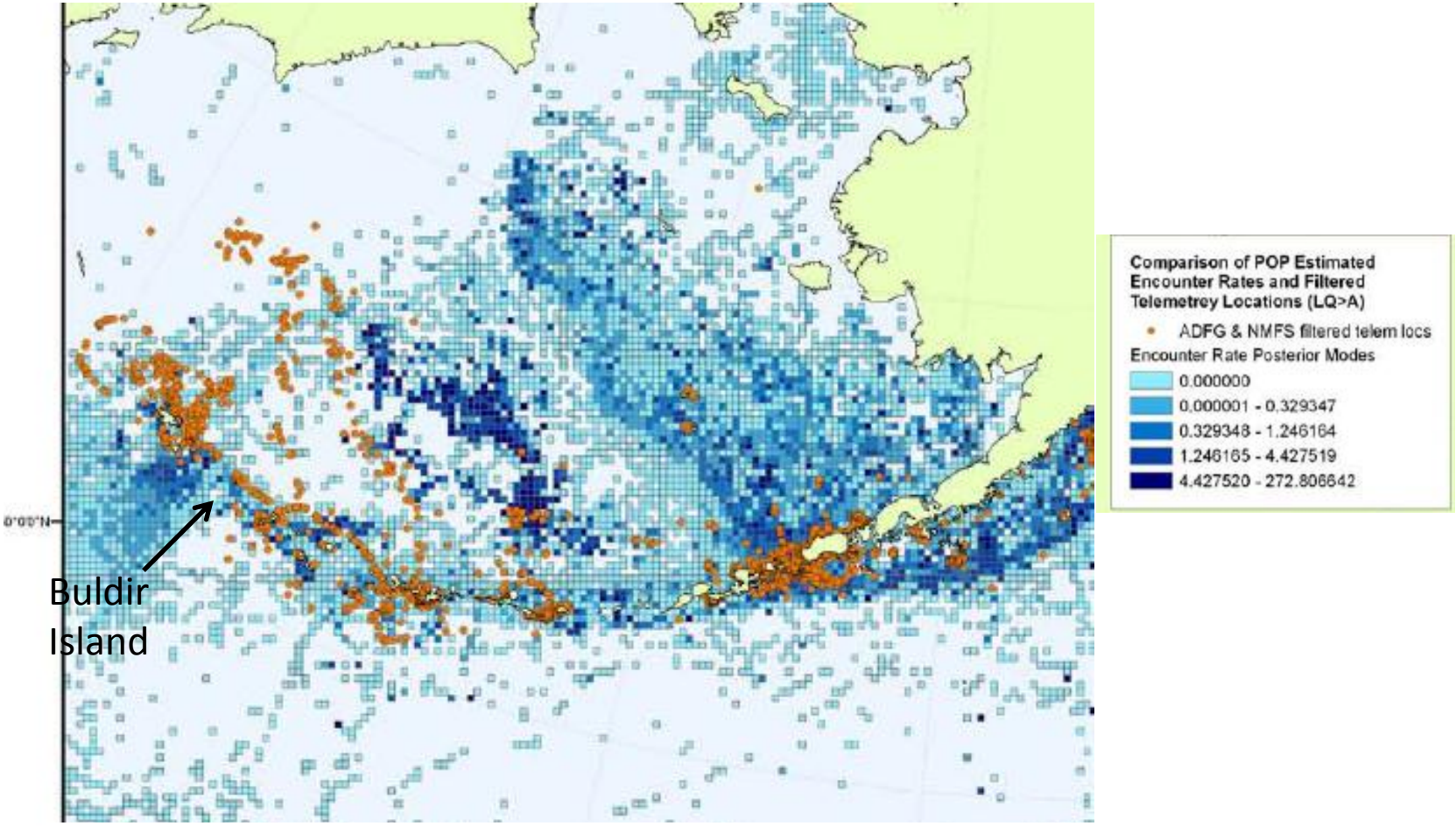
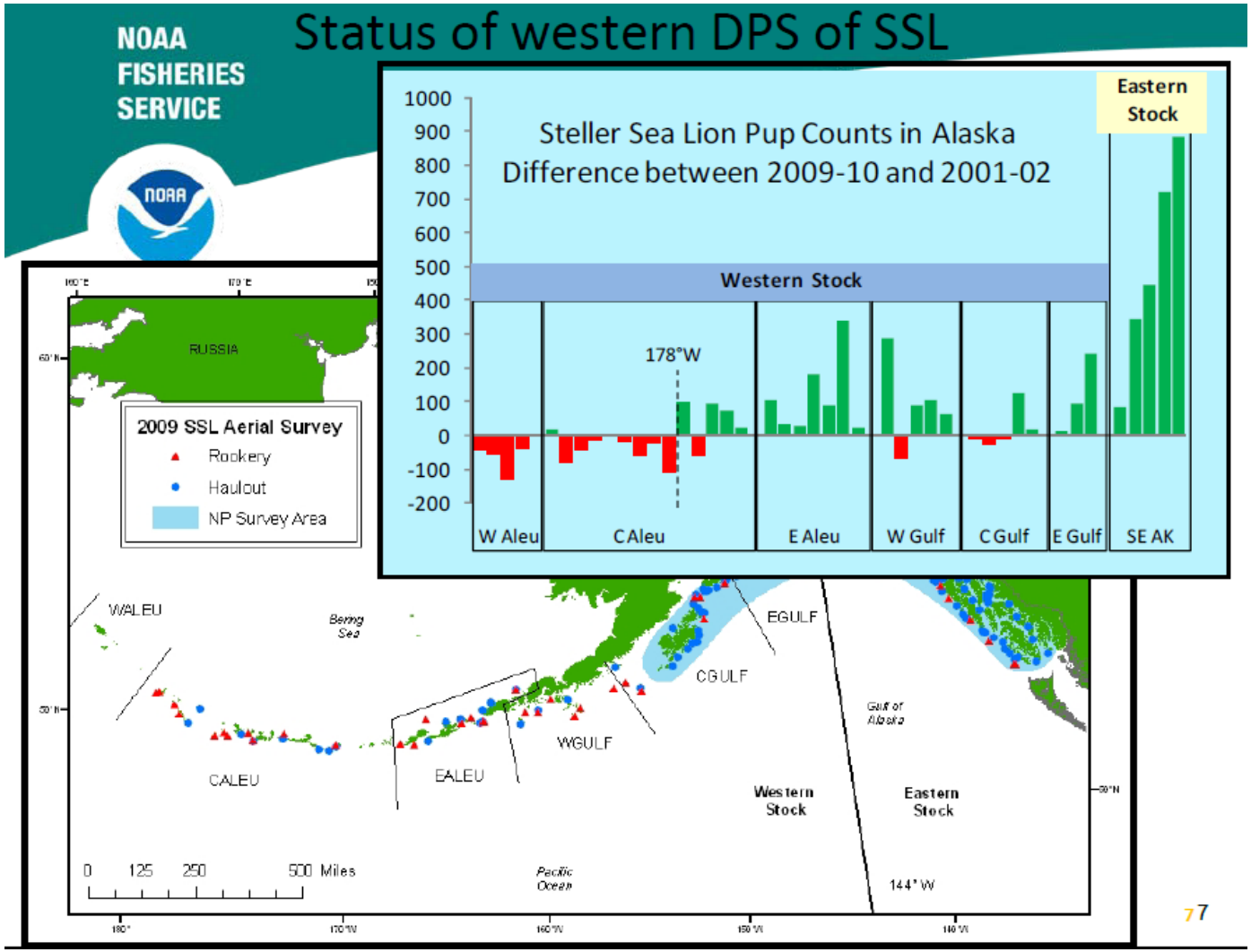



**Figure 14**. Comparing the patterns revealed by the filtered telemetry locations (LQ>A) and the POP estimated encounter rates. The encounter rates are reported as the posterior distribution modes.

# RPA in 543 closed inside and outside of Critical Habitat

- This was in part based on telemetry data from 3 juvenile SSL males in Fadley (AFSC 2010b) and Boor's 2010 paper
- SSL sightings and telemetry locations outside of CH do not "appear" align with fishing locations for groundfish (location data requested)
- Depths in these areas in thousands of meters and SSL feeding on pelagic fishes associated with upwelling?

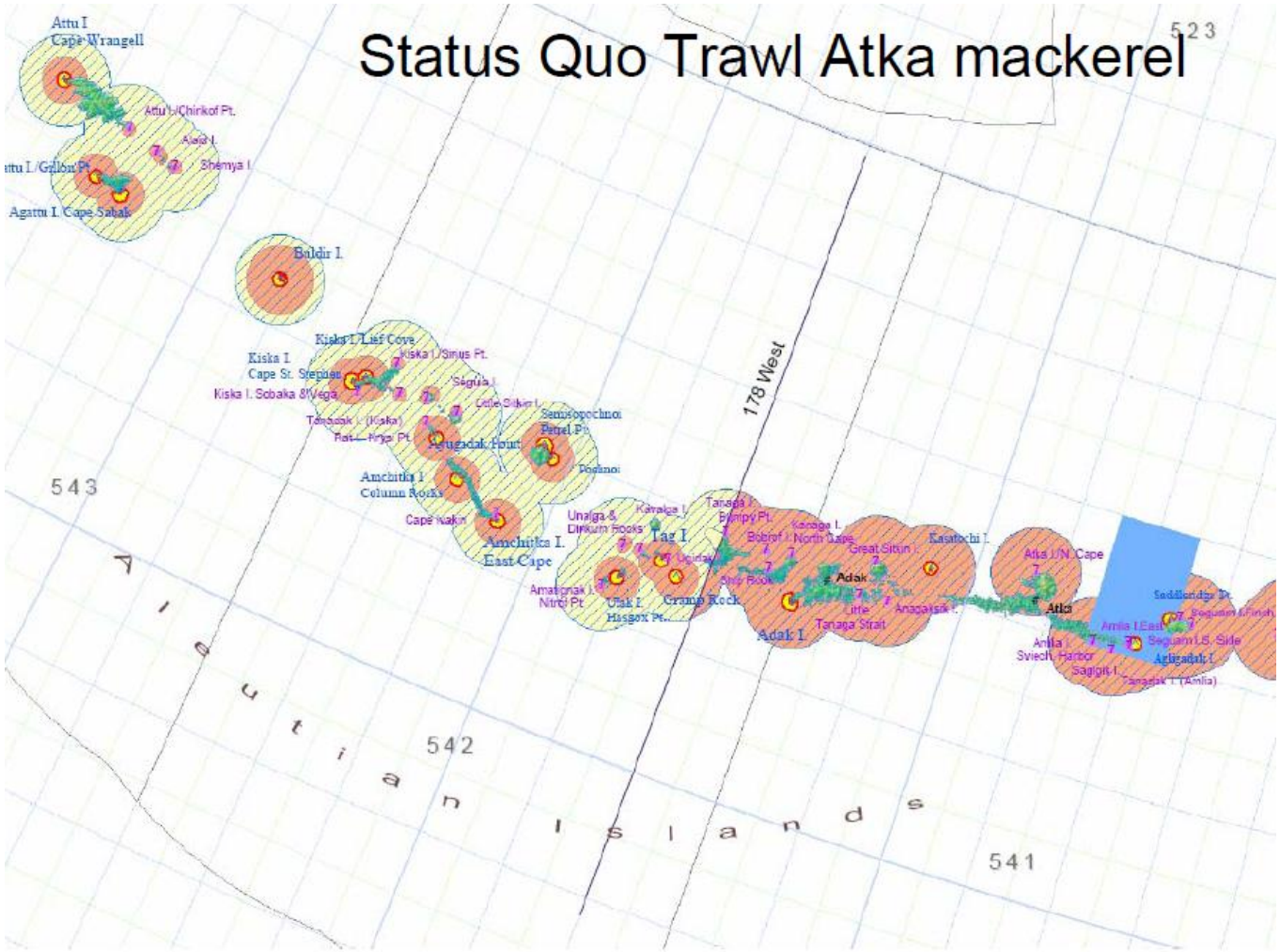
# Conclusions of Bi-op rely heavily on "correlative evidence" and "Adaptive Management" arguments based on measures from the 2001



# Example of final Bi-op's reliance on "correlative evidence" and quasi-Adaptive Management its final Bi-op page 293

"Regulations enacted in 2002 to mitigate Atka mackerel fishery impacts in the Aleutian Islands are illustrative of the potential effects of fisheries on critical habitat. Directed fishing for Atka mackerel is prohibited within Steller sea lion critical habitat in the Aleutian Islands management area east of 178° W. This includes all of RCAs 4 and 5, and with respect to fishery management areas, all of area 541 and part of area 542. By contrast, up to 60% of the TAC for Atka mackerel can be taken from Steller sea lion critical habitat areas west of 178°W in the Aleutian Islands; this includes all of RCAs 1-3, and part of area 542 and all of area 543. The boundary at 178°W does not coincide with any major biogeographic boundary in the Aleutian Islands, and is located at approximately Tanaga Pass which is about 60 miles east of Amchitka Pass in the Aleutian Islands. Steller sea lion populations in areas where directed fishing for Atka mackerel in critical habitat is prohibited (RCAs 4 and 5) have generally been stable or increasing slightly since 2000. However, populations in areas where fishing inside critical habitat is permitted (RCAs 1-3) have continued to decline. **This correlation is consistent with the hypothesis that Atka mackerel fishing within critical habitat areas west of 178°W may have contributed to the continued decline of Steller sea lion numbers in RCAs 1-3.** As noted later in this document, we believe this management history can be used in an adaptive management sense to better explore the efficacy of conservation measures implemented to promote the recovery of the western DPS of Steller sea lions."

# Not an adaptive management experiment: 1996-2002 (prior to 2002 Bi-op measures) very little mackerel fishing inside CH east of 178 W



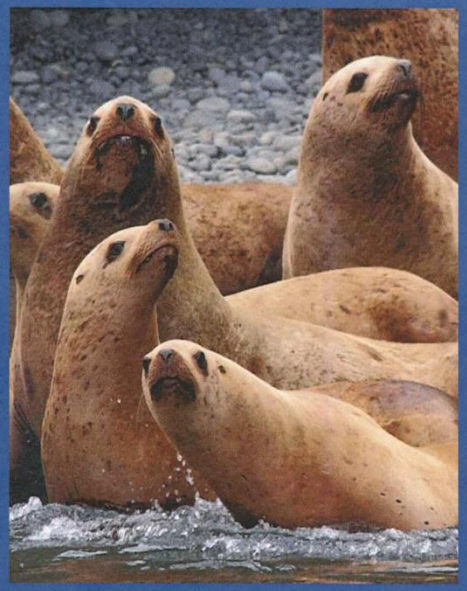
# 2001 RPAs are <u>not</u> a valid Adaptive Management experiment because…

- When 2001 RPA was implemented, SSL sub-area population declines were occurring at approximately same rate as current rates on both sides of 178 degrees west line
- Atka mackerel fishing was not occurring east of 178 line in 542 prior to 2001 (not a mackerel fishing area)
- So west of 178 W line mackerel fishing in CH continued (at somewhat lower level) but the curtailment of mackerel fishing east of 178 W line was only a “paper” regulation.

# New Information in the context of adaptive management (presented to SSLMC July 2012)

## Western Steller Sea Lions:

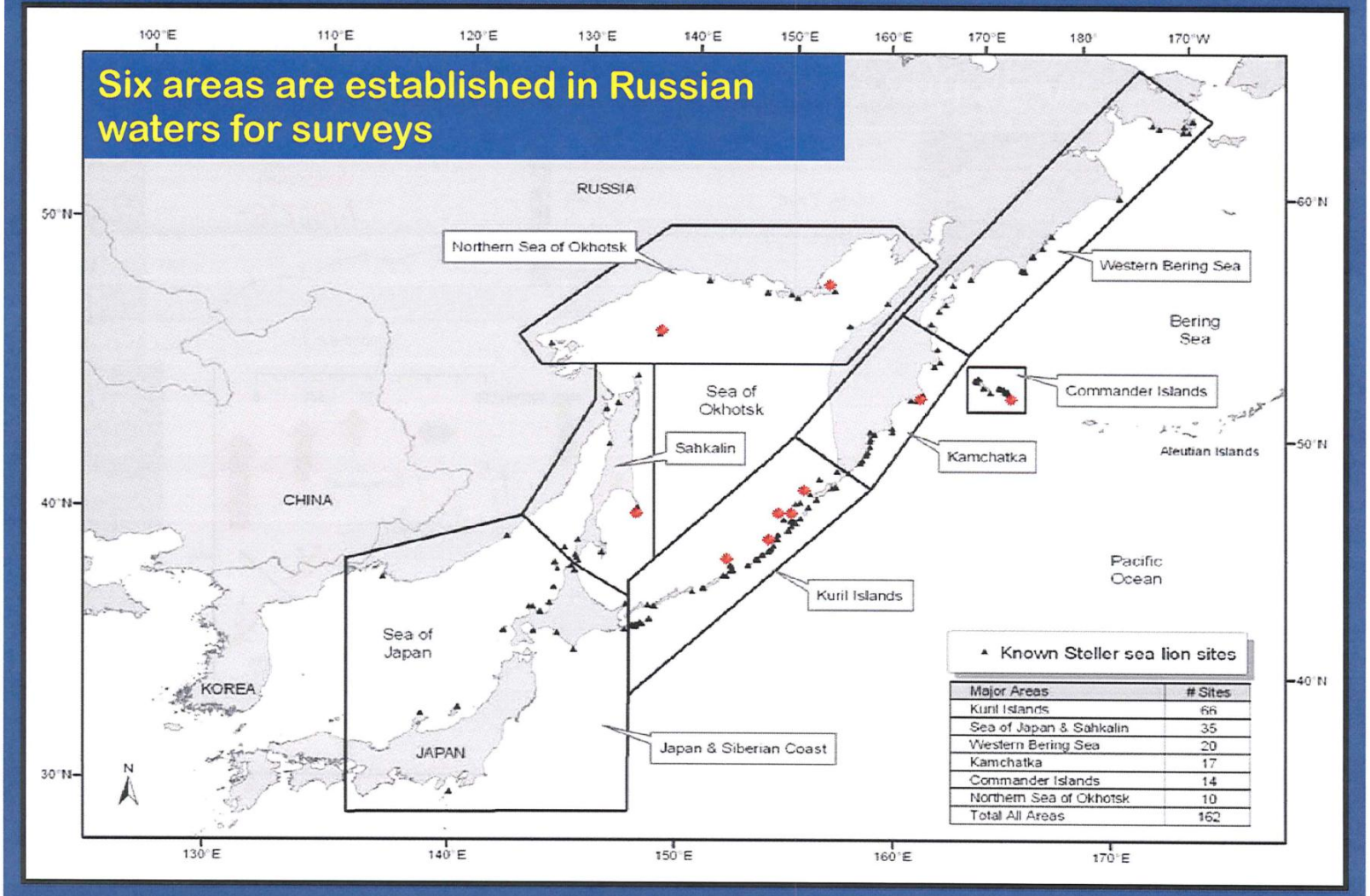
Population Trends, Vital Rates,
Composition and Movement



Alaska Ecosystem Program
NOAA Fisheries
National Marine Mammal Laboratory
Alaska Fisheries Science Center
Seattle, WA

# Commander Islands and 30 nm closure to all fishing in Commander Islands, an area that may be analogous to western Aleutians

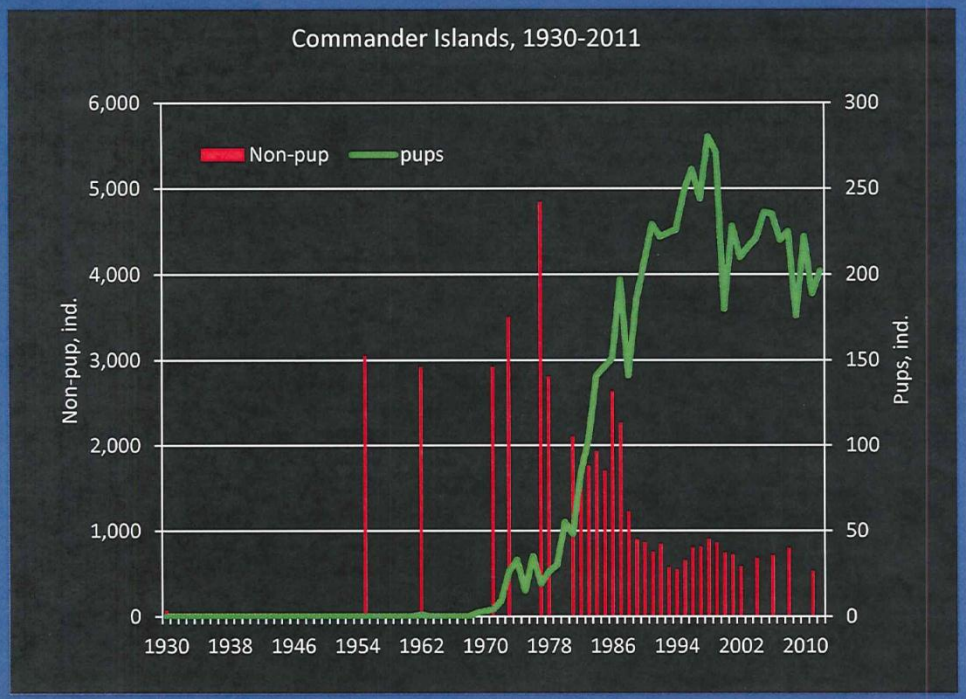
# SSL survey areas in Russian waters




| Major Areas | # Sites |
|---|---|
| Kuril Islands | 66 |
| Sea of Japan & Sahkalin | 35 |
| Western Bering Sea | 20 |
| Kamchatka | 17 |
| Commander Islands | 14 |
| Northern Sea of Okhotsk | 10 |
| Total All Areas | 162 |

# Why is 30 mile closure at Medny Island (enforced since 1980s according to V. Burkanov) likely to be a reasonably good indicator of prospects of WAI closures?

- Similar to AI in terms of narrow shelf, 30 miles closes all depths where groundfish would be fished
- Directly adjacent to western Aleutians
- Groundfish resources in Commander Islands dominated by Hexagramids, Sebastes, and Gadids




**Commander Island SSLs**

- Non-Pups increase 1930-1950s followed by decline through 80s
- Rookery reestablished late 70s
- Pups increase through 1990s
- 2000-2008 fluctuating at low level
  - 500-800 non-pups
  - 180-220 pups

**Medny I. rookery 2011:**

| | | |
|---|---|---|
| • pup born | 189 | -10% |
| • non-pup, max | 297 | -30% |
| • females, max | 205 | -20% |
| • Bulls total, max | 67 | -20% |
| • Bulls ter., max | 46 | -18% |

**No decline in number "M" branded animals resighted in 2009-2011**

**Clear negative trend in female birth rates** (preliminary estimates, analysis in progress)

**No significant changes in survival rates** (preliminary estimates, analysis in progress)

# Thoughts on potential for effective adaptive management experiment(s) for WDPS given ESA as written

- Commanders may be good location because of similarity of areas and possibility of more animal handling experiments, but fishing treatments possible?
- Large scale is inherently problematic, current large closure in WAI lacks a control (e.g. some fishing in CAI not a control for no fishing in WAI given SSL population trajectory is different between two areas, SSL movement between areas)
- Pollock closure in AI not been studied to see if pollock in SSL diet increased due to inability to account for small effects (pollock not large component of diet anyway)
- Small scale studies (like FIT fieldwork) with design that tracks SSL response locally may be best way to evaluate effects of fishing on SSL
- Mackerel tagging and pollock studies by FIT have been informative about scale of fishing effects on prey field. Buy-in needed from Protected Resources to use the information to manage fisheries (e.g. mackerel tagging studies)

Thanks for your attention,
Powerpoint available to CIE reviewers….

# Adak Community Development Corporation
## Comments to:
## CIE BiOp Review Panel

# 4 areas where the BiOp didn't use the best data, or failed to synthesize available information

- Productivity of the Aleutian Islands and Forage Ratios
- Overlap in Use of Habitat between Fisheries and Sea Lions
- Transient Killer Whale Predation
- Pollock

# Aleutian Island Forage Ratio

**What Was the Evidence for Low Eco-system Productivity?**

The draft BiOp repeatedly claimed the AI had lower productivity and a lower forage ratio than other areas

The final BiOp acknowledged that the forage ratios had been miscalculated.

The final BiOp (pg. 298) presented a new table showing higher global forage ratios in the Aleutians (leaving out a calculation for SE-AK).

| | Areas 543, 542, 541 | Eastern Bering Sea | Gulf of Alaska |
|---|---|---|---|
| Past (all area) | 19 | 322 | 26 |
| Current (all area) | 26 | 201 | 24 |
| Past (CH only) | 5 | 14 | 4 |
| Current (CH only) | 8 | 4 | 3 |

But the conclusion of Adverse Modification didn't change.

# Aleutian Island Productivity

Merriam-Webster defines productivity as "*the rate per unit area or per unit volume at which biomass consumable as food by other organisms is made by producers.*"

| Survey biomass est. | AI | EBS | Shumagin | Chirikof | Kodiak | Yakutat | WDPS GOA | SE-AK |
|---|---|---|---|---|---|---|---|---|
| P. cod | 56,931 | 463,374 | 114,207 | 30,701 | 79,705 | 1,664 | 226,277 | 7,033 |
| Pollock | 133,528 | 4,156,687 | 97,627 | 90,580 | 81,187 | 19,763 | 289,157 | 27,068 |
| Atka Mackerel/hake | 795,400 | 50,343 | 80,546 | 1,563 | 219 | - | 82,328 | - |
| Hake | - | - | - | - | - | *6,343* | 6,343 | *19,699* |
| Arrowtooth | 101,022 | 482,184 | 263,856 | 588,425 | 849,461 | 130,526 | 1,832,268 | 106,787 |
| Sculpin | 15,526 | 215,872 | - | - | - | - | - | - |
| | | | | | | | | |
| **biomass aggregate 3** | **985,859** | **4,670,404** | **292,380** | **122,844** | **161,111** | **27,770** | **604,105** | **53,800** |
| **biomass aggregate 5** | **1,102,407** | **5,368,460** | **556,236** | **711,269** | **1,010,572** | **158,296** | **2,436,373** | **160,587** |
| | | | | | | | 0 | |
| km2 of survey area | 56,931 | 463,374 | 65,228 | 68,053 | 101,489 | 57,197 | 291,967 | 28,038 |
| | | | | | | | | |
| **ton/km2 3 prey species** | **17.3** | **10.1** | **4.5** | **1.8** | **1.6** | **0.5** | **2.1** | **1.9** |
| **ton/km2 5 prey species** | **19.4** | **11.6** | **8.5** | **10.5** | **10.0** | **2.8** | **8.3** | **5.7** |

# Aleutian Island Productivity

The draft BiOp repeatedly asserted the AI had lower productivity

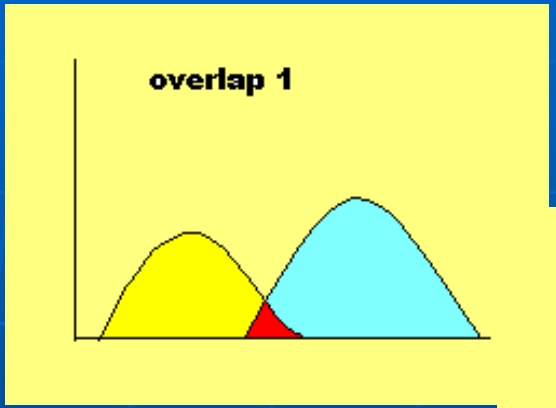
The final BiOp removed most assertions of lower productivity in response to our comments showing higher survey biomass per unit area of important prey species, and offered no evidence to the contrary.

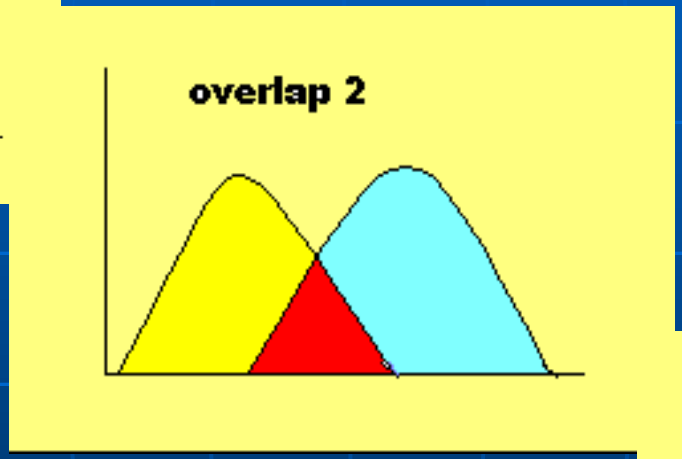
The preceding table could be updated using new information from the 2010 trawl survey biomasses, which would show a substantial increase in AI mackerel biomass.

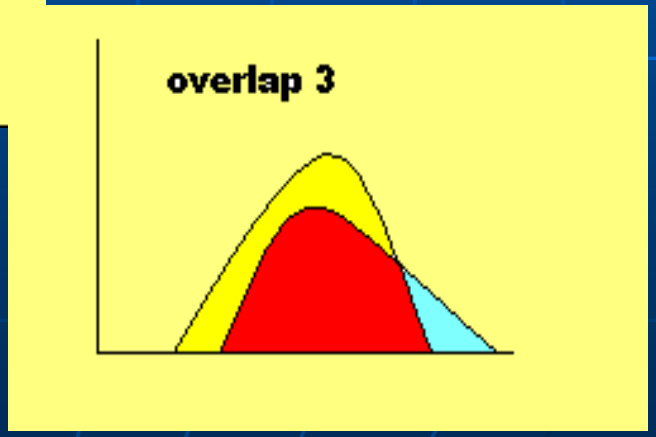
However, the final BiOp (pg. xxxiii) continued to assert: *"Differences in western Steller sea lion population response since 2000 is likely reflective of three main factors,* ***(a) overall ecosystem productivity (i.e., Aleutian Islands is less than GOA which is less than the EBS,)****…*

Again the conclusion of Adverse Modification didn't change.

# Competition and Overlap
# When is it Limiting?

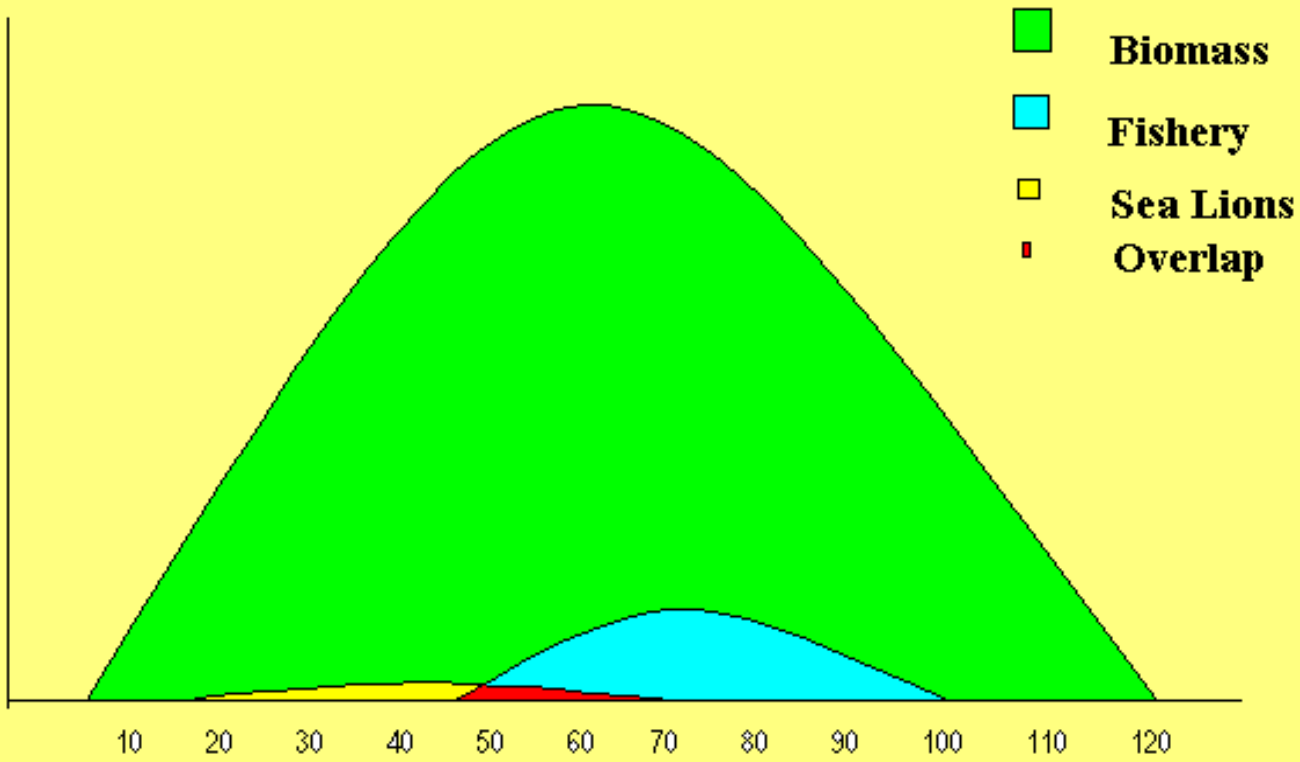



The potential for competitive overlap to limit one user is a function of degree to which the overlap is in the <u>tails</u> versus the <u>modes</u> of the distribution.

# Competition and Overlap
# When is it Limiting?

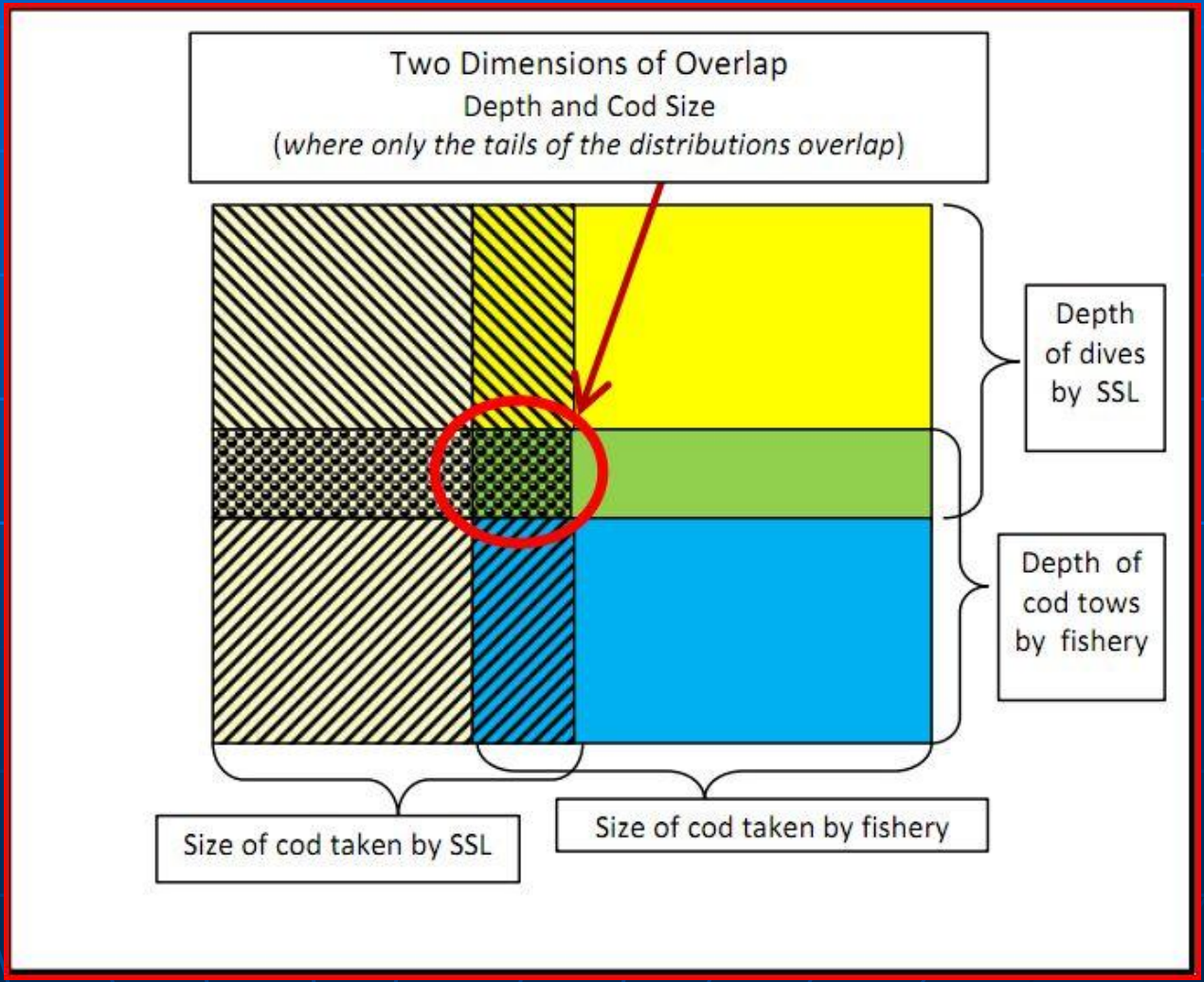



Do Sea Lions and the Cod Fishery Compete for the Same Resource in a Manner that Constrains Sea Lions?

# Considering the Significance of Multiple Dimensions of Overlap

The "Exposure Risk Analysis Schematic" (fig. 4-24 of the BiOp) treats overlap 1st as a simple Y/N question, and then attributes significance as function of the cumulative count of "Y's".

An alternative approach would look both at degree of overlap and the interaction of degree in multiple dimensions.

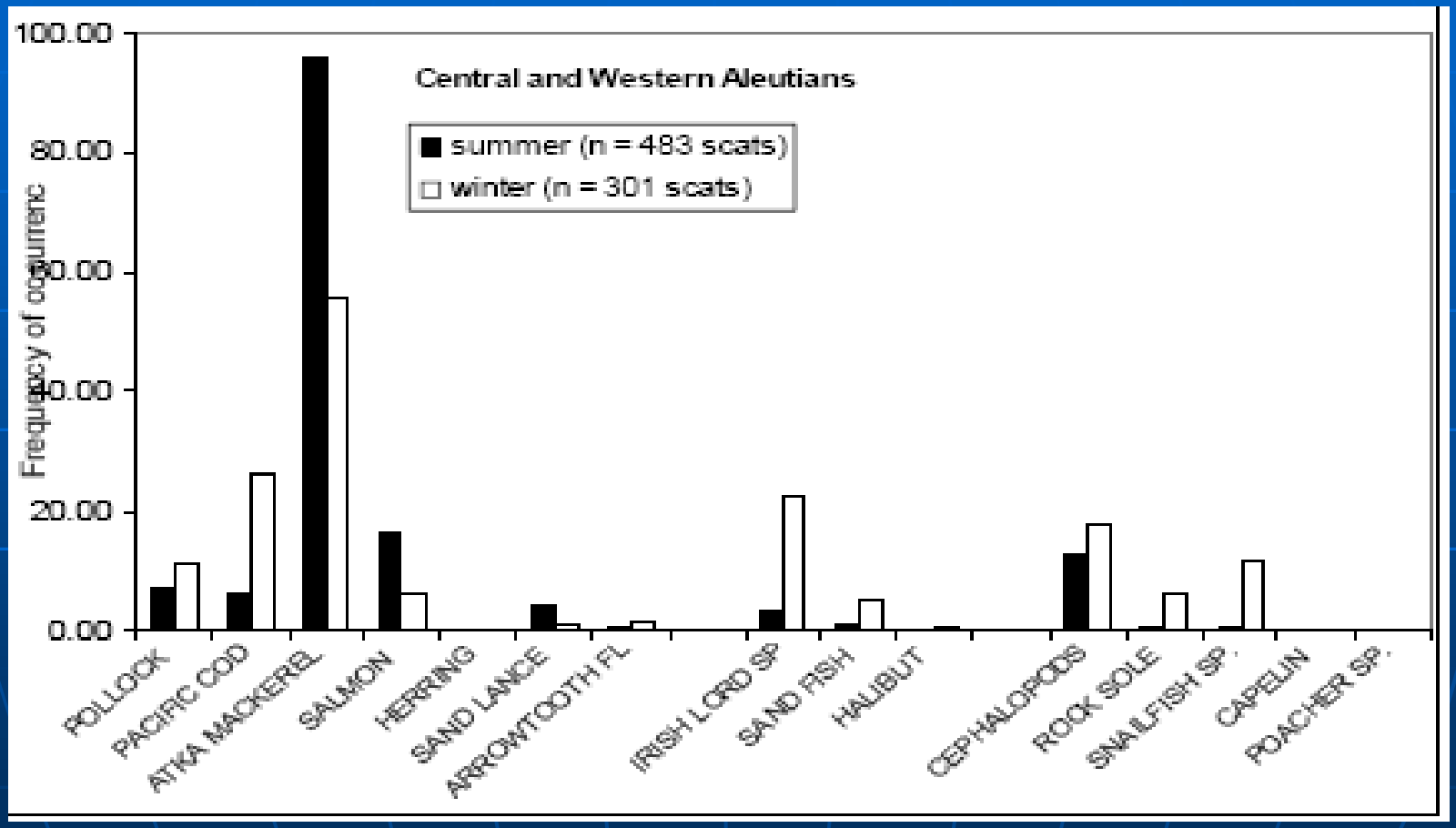


# What Are the Dimensions of Overlap Between Fisheries and Sea Lions?

- **Type of fish eaten/caught**
- **Size of fish eaten/caught**
- **Depth of fishing/foraging**
- **Area of fishing/foraging**
- **Season/time-of-day of fishing/foraging**

The draft and final BiOps treated Overlap as a binary question and failed to utilize the best available quantitative data in the analysis

# What Do Aleutian Island Sea Lions Eat?




This table, from the final BiOp, represents Frequency of Occurrence. To the extent that SSL make long trips off the shelf, it likely overstates cod and mackerel.

# What Does the Aleutian Island Preyfield Look Like?

| from Aydin 2007, Table C1 | tons/Km2 | | |
|---|---|---|---|
| Species | AI B | EBS B | GOA B |
| Atka mackerel_Juv | 0.53 | 0.00 | 0.06 |
| Atka mackerel | 11.65 | 0.11 | 0.45 |
| Myctophidae | 25.88 | 0.80 | 0.63 |
| Greenlings | 0.02 | 0.00 | 0.01 |
| Squids | 7.39 | 0.93 | 1.27 |
| Oth. pelagic smelt | 3.46 | 0.50 | 0.64 |
| Eulachon | 3.47 | 0.55 | 1.15 |
| Other sculpins | 6.27 | 1.16 | 0.82 |
| Oth. managed forage | 3.81 | 1.05 | 1.42 |
| Capelin | 3.58 | 1.24 | 7.02 |
| Bathylagidae | 0.45 | 0.16 | 0.07 |
| Octopi | 0.38 | 0.20 | 0.78 |
| Sandlance | 3.75 | 2.48 | 2.44 |
| P. Cod | 2.93 | 2.46 | 1.39 |
| W. Pollock_Juv | 2.89 | 2.78 | 0.67 |
| Salmon outgoing | 0.01 | 0.01 | 0.02 |
| Misc. fish shallow | 1.13 | 1.18 | 0.84 |
| Salmon returning | 0.14 | 0.16 | 0.86 |
| Arrowtooth | 0.53 | 0.94 | 5.77 |
| W. Pollock | 5.69 | 18.49 | 5.55 |
| Lg. Sculpins | 0.11 | 0.54 | 0.09 |
| Herring_Juv | 0.00 | 0.08 | 0.60 |
| P. Cod_Juv | 0.02 | 0.31 | 0.13 |
| Herring | 0.02 | 0.61 | 0.28 |
| Arrowtooth_Juv | 0.00 | 0.09 | 0.55 |
| **Sum** | **84.11** | **36.85** | **33.53** |

The data for this table is taken from "A Comparison of the Bering Sea, Gulf of Alaska, and Aleutian Islands Large Marine Ecosystems Through Food Web Modeling" (*Aydin, 2007*)

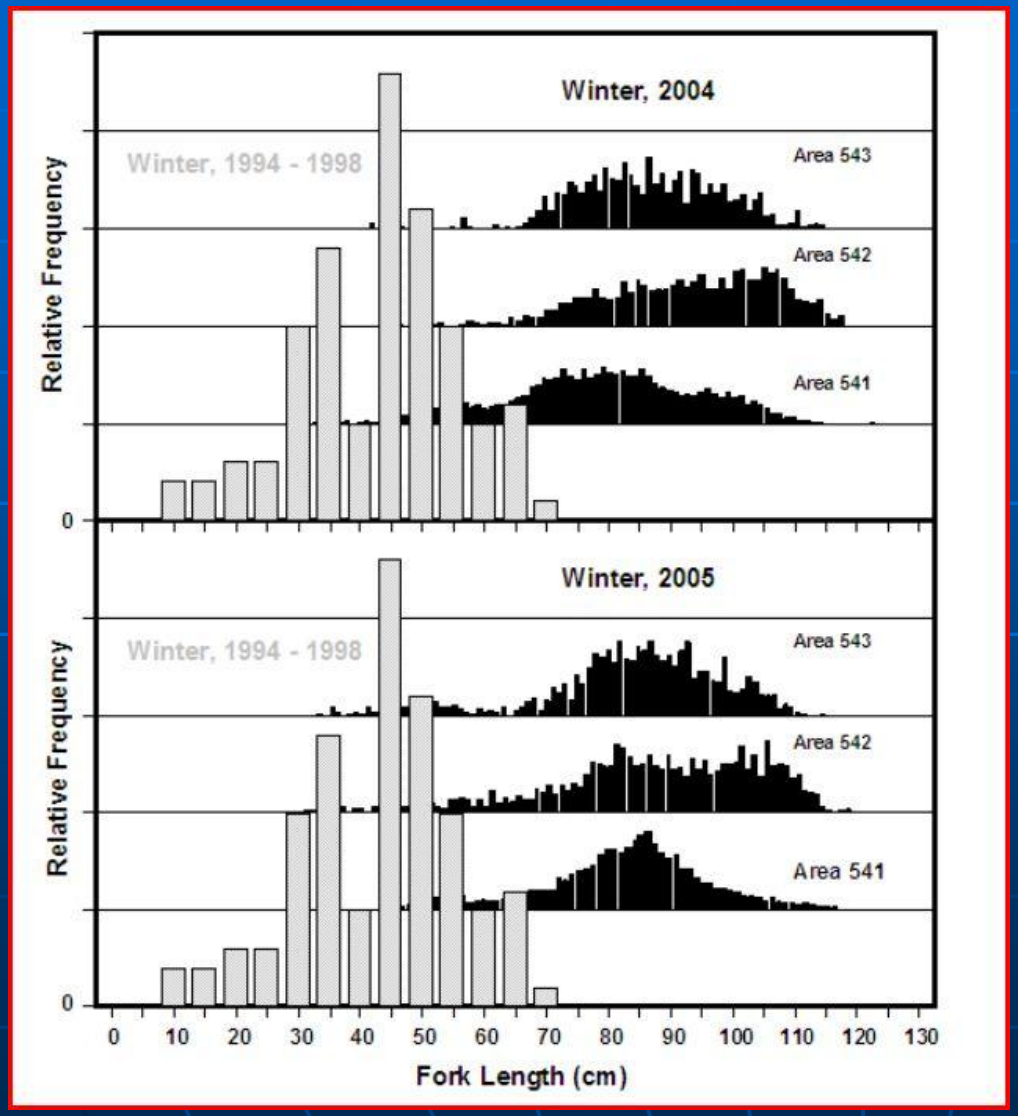
In this figure I have extracted from Aydin's table C-1, those species which appear in the sea lion scat data.

It's another way of looking at higher productivity of the Aleutian ecosystem relative to the GOA & EBS for SSL prey species.

It also suggests that cod comprises a small percentage of the prey field for sea lions in the Aleutians.

In Area 541 cod is the only species for which there is a commercial fishery in Critical Habitat.

# Overlap in Size of Cod Consumed

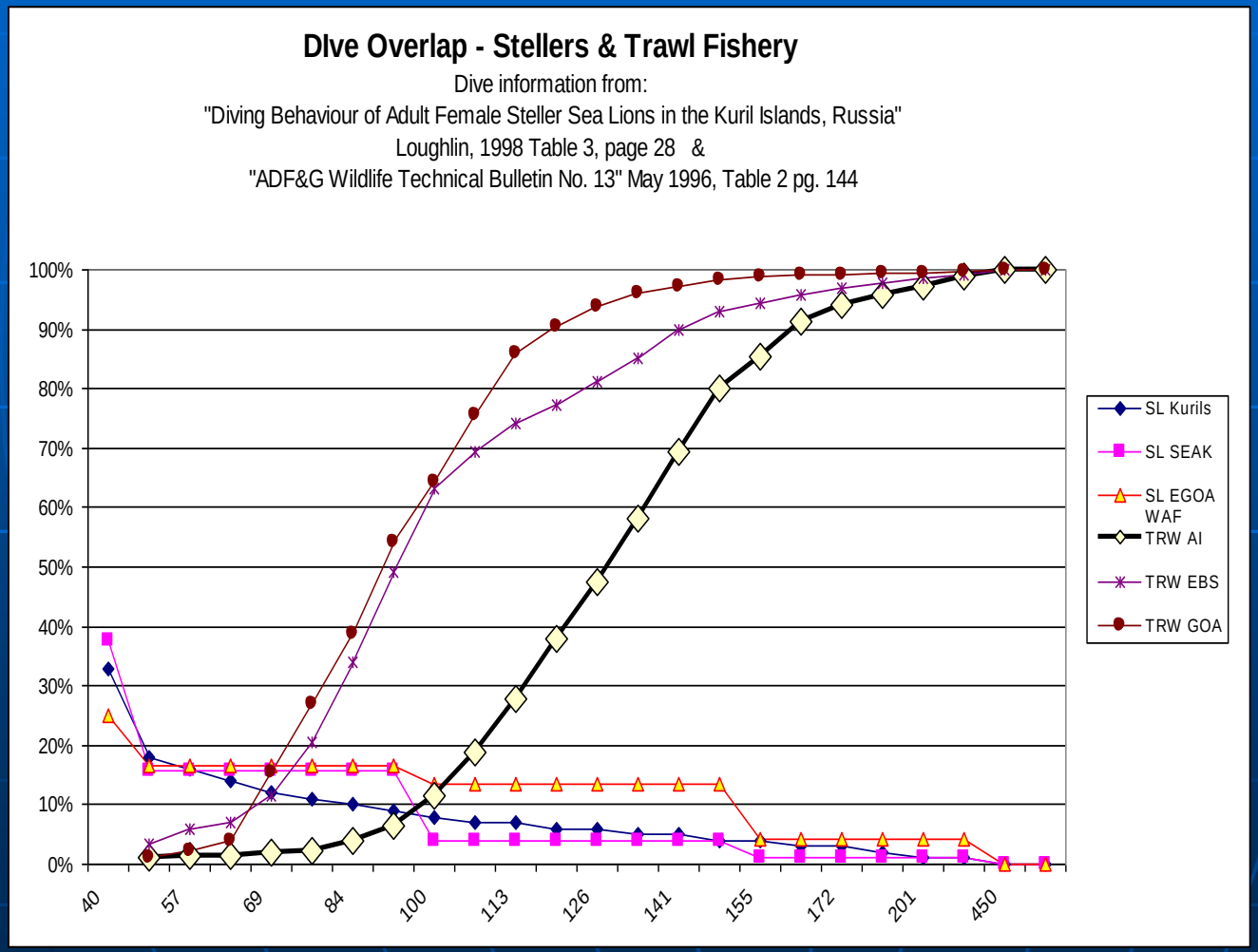



The final BiOp failed to provide <u>any</u> data on the size of cod consumed by either the fishery or sea lions in the Aleutians.

Observer data shows less than 10% of AI trawl cod by numbers are <60 cm.

Scat analysis (NMFS 2000) showed that less than 10% of cod consumed by SSL were >60 cm.

# Overlap in Depths Used by Cod Fishery and Adult Sea Lions

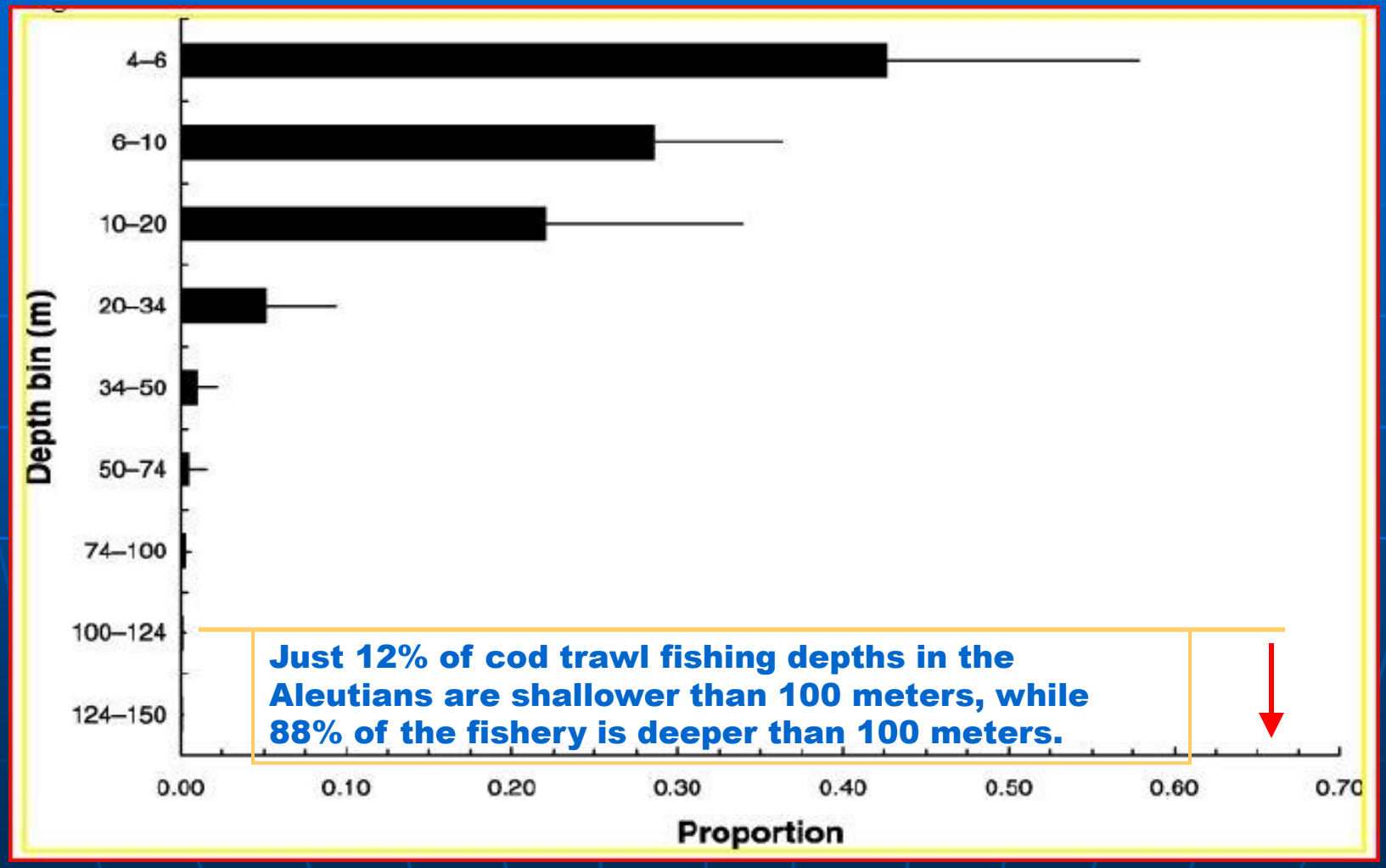



The final BiOp failed to provide <u>any</u> data on the distribution of AI fishing depths.

Observer data shows less than 15% of AI trawl cod hauls were <100 meters.

New SSL dive data ( *Lander, 2011*) still shows less than 15% of adult female dives >100 meters.

# Overlap in Juvenile Sea Lion Dive Depths




Juvenile SSL Dive Depths from *Fadely, 2005*

# Overlap with Juvenile Sea Lions Dive Depths and Locations

| Season | | Distance to shore (nm) | | | |
|---|---|---|---|---|---|
| | Seafloor depth (m) | <5 | 5 to 10 | >10 | Pooled |
| Nov-Jan (n=3) | <50 | 63.4 | 0.9 | 0 | 64.3 |
| | 50-100 | 32.3 | 1.7 | 0.9 | 34.9 |
| | 100-150 | 0.9 | 0 | 0 | 0.9 |
| | >150 | 0 | 0 | 0 | 0 |
| | Pooled | 96.6 | 2.6 | 0.9 | |
| | | | | | |
| Feb-Apr (n=26) | <50 | 68.7 | 0.7 | 0 | 69.5 |
| | 50-100 | 21.2 | 2.7 | 0.3 | 24.3 |
| | 100-150 | 4.8 | 1 | 0 | 5.8 |
| | >150 | 0.1 | 0.3 | 0 | 0.4 |
| | Pooled | 94.9 | 4.8 | 0.3 | |

**From Table 3.** ***Fadely (2005)*** *"*Percentages of locations (associated with diving to > 4m) stratified by distance to shore and seafloor depth in the Eastern and Central Aleutian Islands combined. Values are means (± 1 *SE*) of individually stratified proportions for 3 sea lions during November-January, 26 during February-April, and 9 during May-July*"*

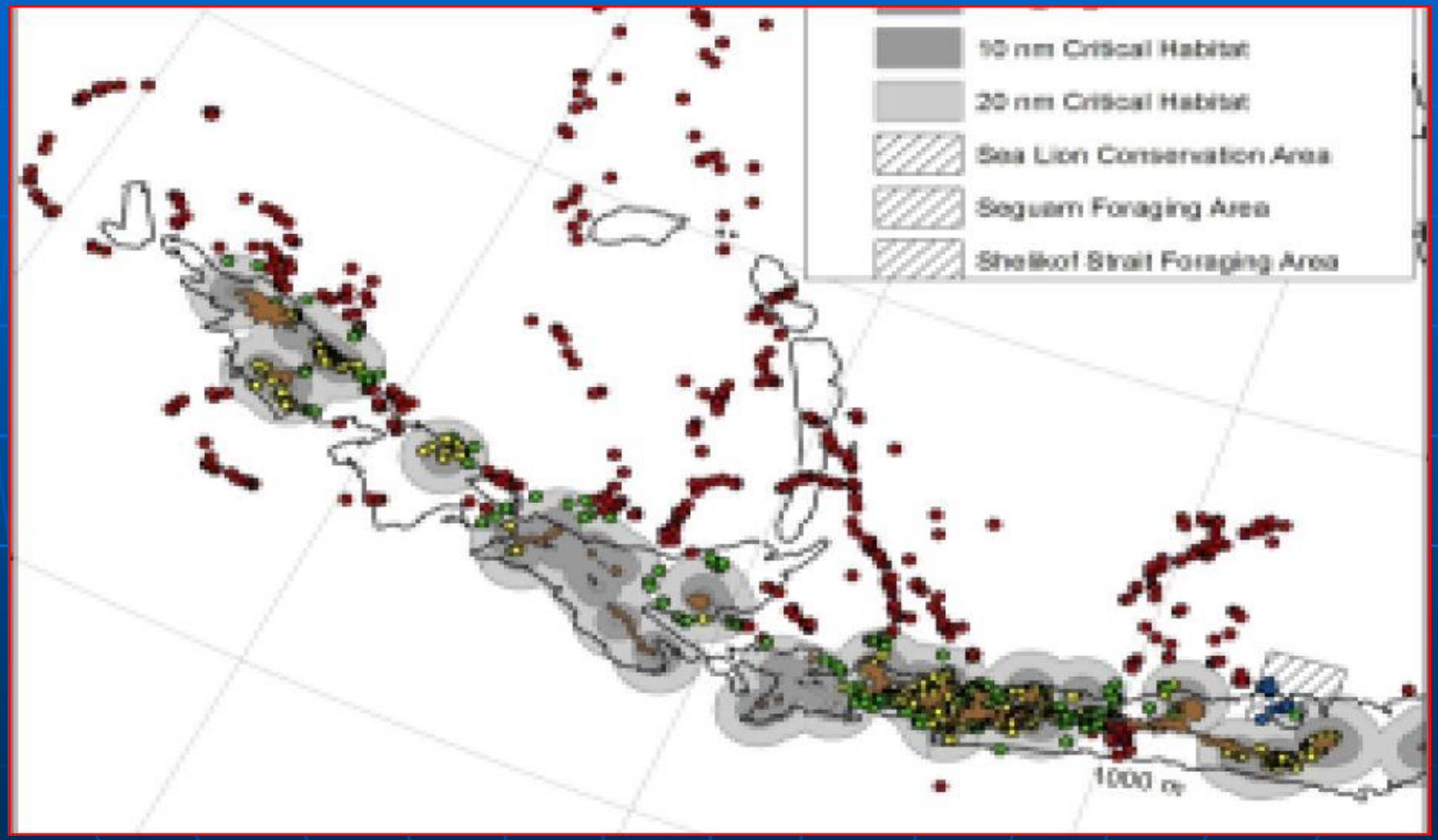
# Spatial Overlap
## Tracking a Sea Lion with Satellites

**Table 3.11** Proportion of 14,441 locations associated with diving to >4 m for 116 juvenile Steller sea lions based o distance to nearest listed haulout or rookery and stratified by region and season.

| | Prince William Sound | | Kodiak | | Eastern Aleutians | | Central/Western Aleutians | |
|---|---|---|---|---|---|---|---|---|
| Zone | Summer[1] | Winter[2] | Summer | Winter | Summer | Winter | Summer | Winter |
| Inside CH | | | | | | | | |
| 0-10 nm | 92.0% | 94.5% | 86.8% | 93.0% | 88.5% | 91.2% | 68.8% | 100.0% |
| 10-20 nm | 7.1% | 4.6% | 7.5% | 5.2% | 5.5% | 6.9% | 8.8% | 0.0% |
| >20 nm | 0.0% | 0.1% | 0.3% | 0.3% | 2.8% | 0.2% | 0.5% | 0.0% |
| Outside CH | 0.9% | 0.9% | 5.4% | 1.6% | 3.3% | 1.7% | 21.9% | 0.0% |

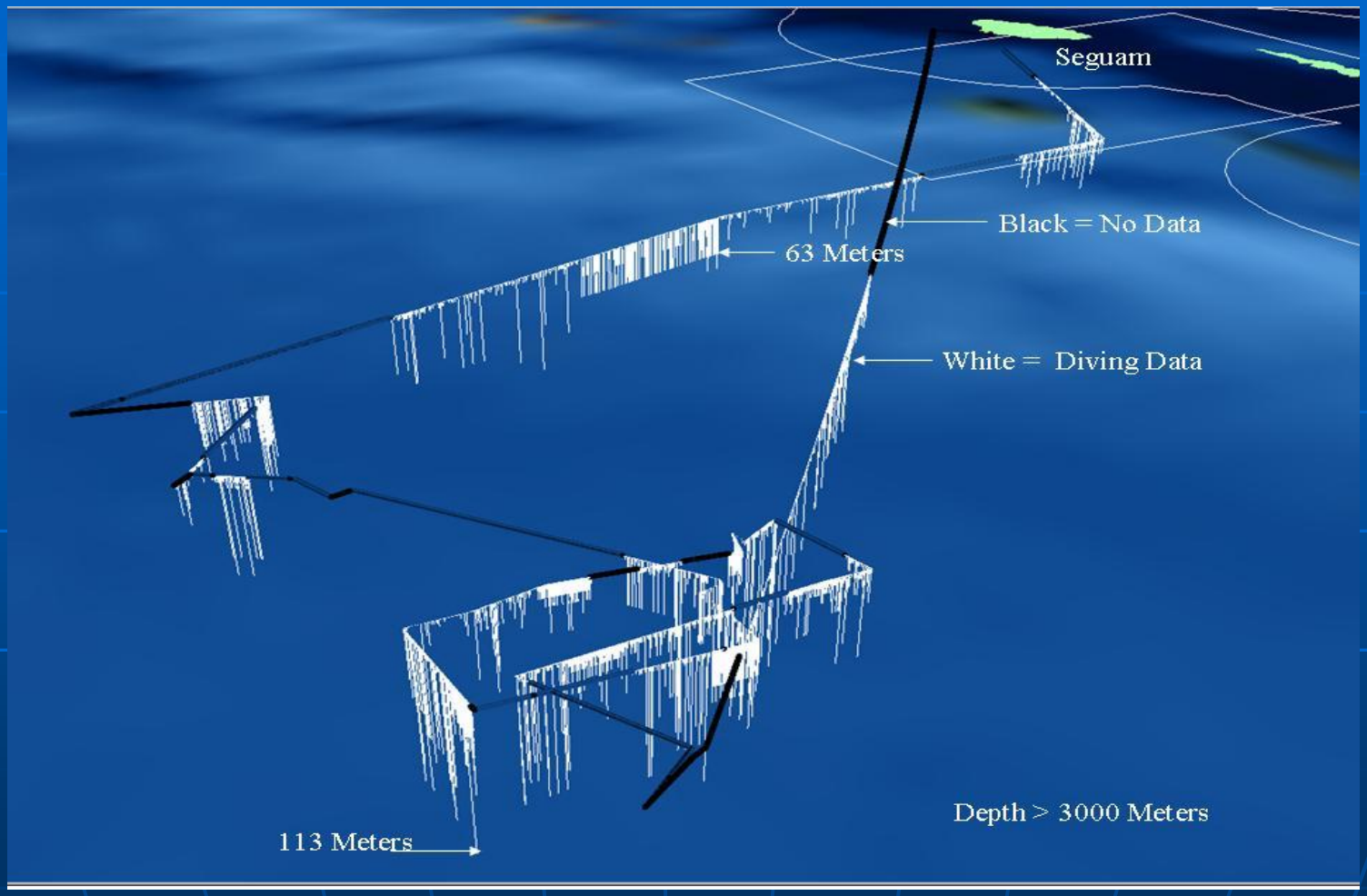
In the Aleutians in winter, 94.9% were inside 5 miles of land, and 89.9% of dives were shallower than 100 meters. *(Fadely, 2010)*

# Telemetry on 25 Tagged SSL in the Aleutians



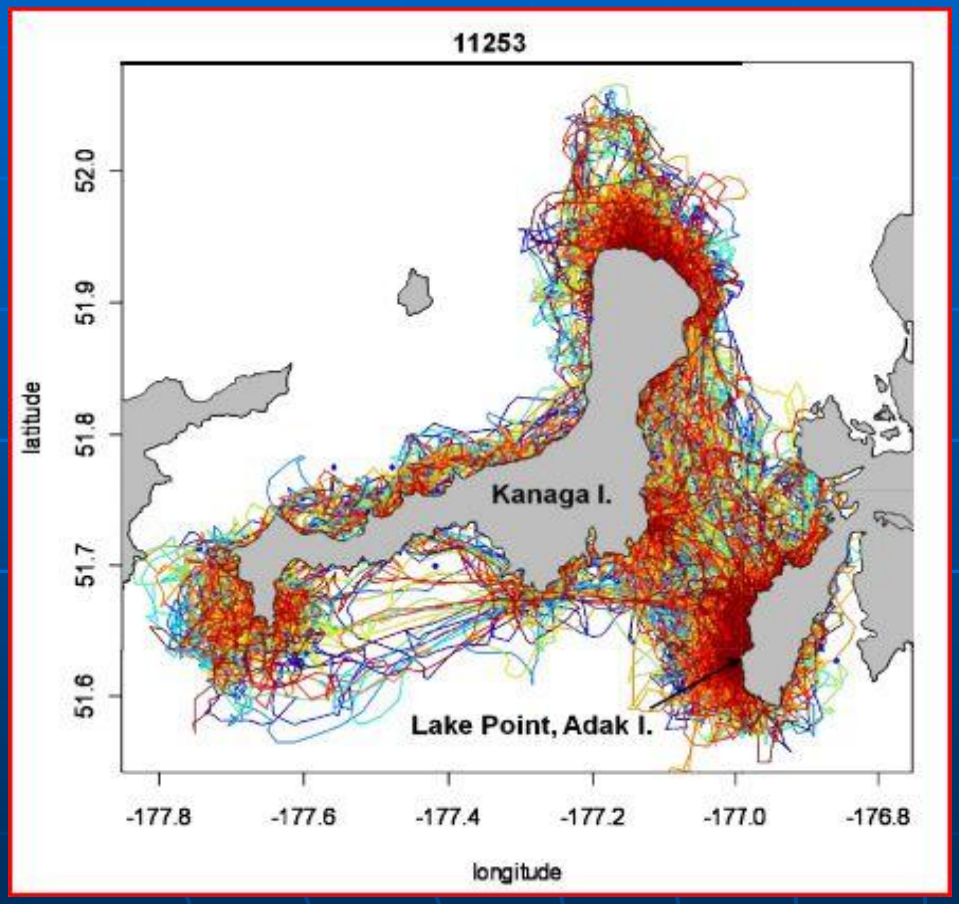

The red dots are just 3 young males in the summer wandering around out in the deep Aleutian basin. They are the exceptions. Further, they are beyond the continental shelf and beyond fishing grounds.

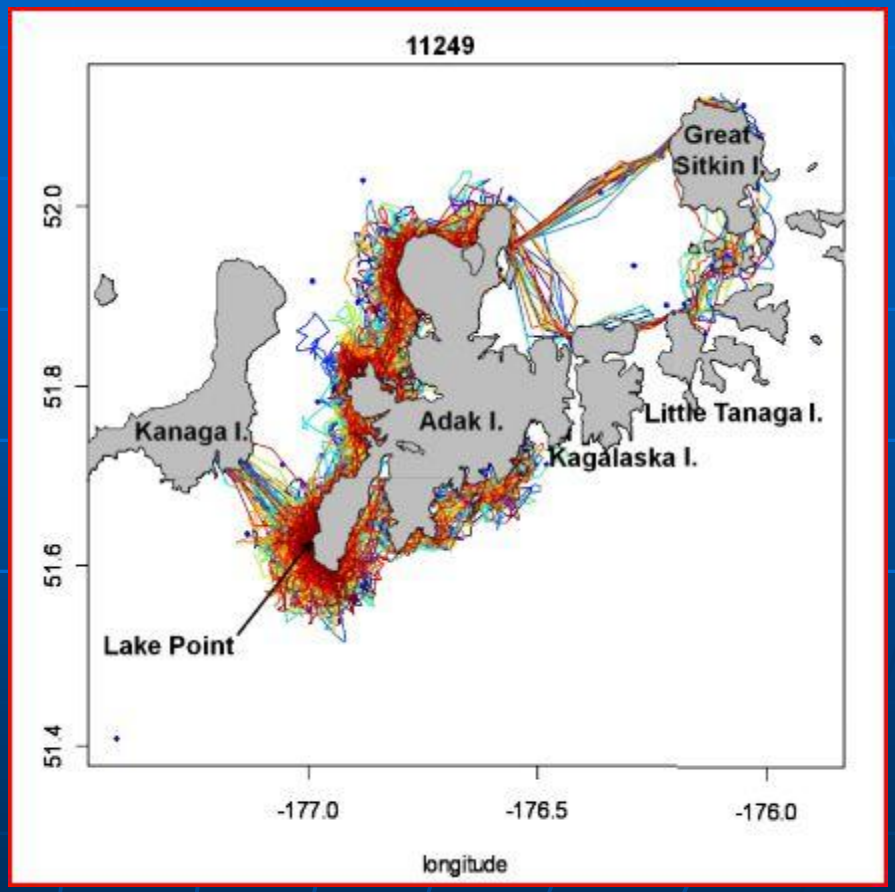
# Understanding 3D Use of Habitat




"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." *(Review of the November 2000 Biological Opinion – Bowen, et al, 2001)*

# A Closer Look at More Typical Juvenile Behaviour in Winter



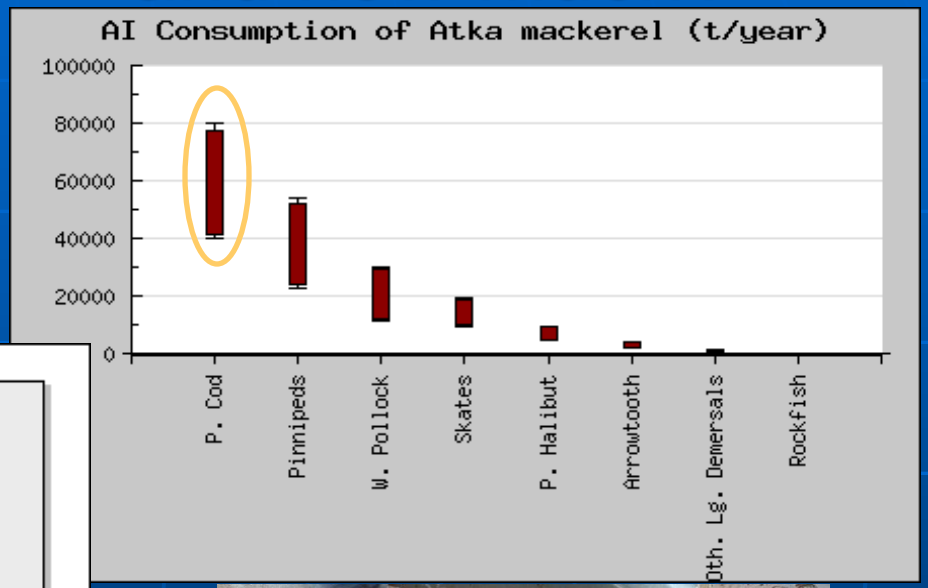



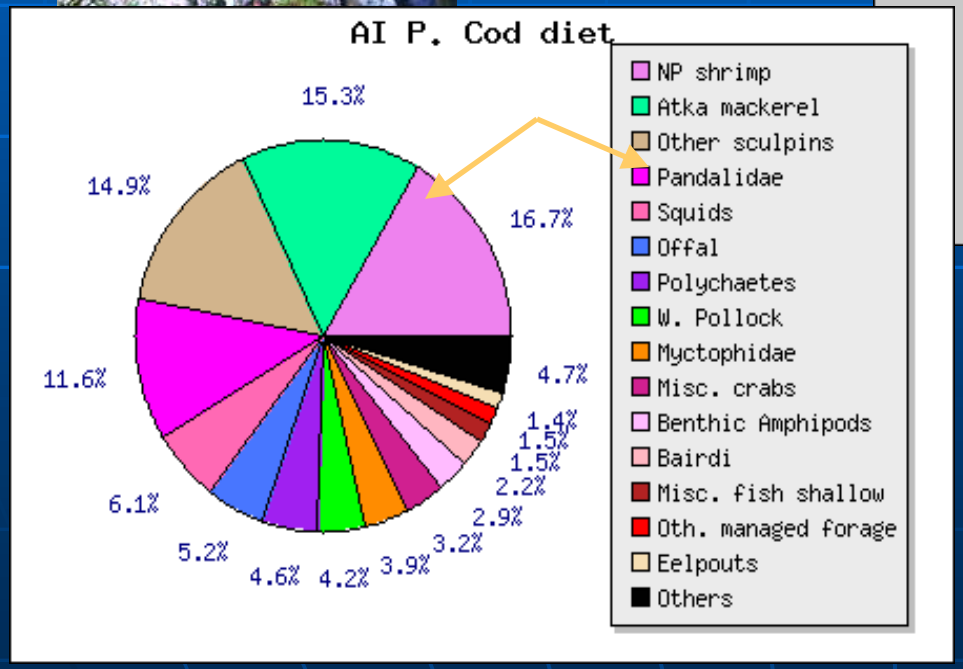

Figures from *Lander 2011*, displaying the data also analyzed in *Fadely 2010*, show more typical juvenile behaviour, especially during the winter trawl cod fishery season.

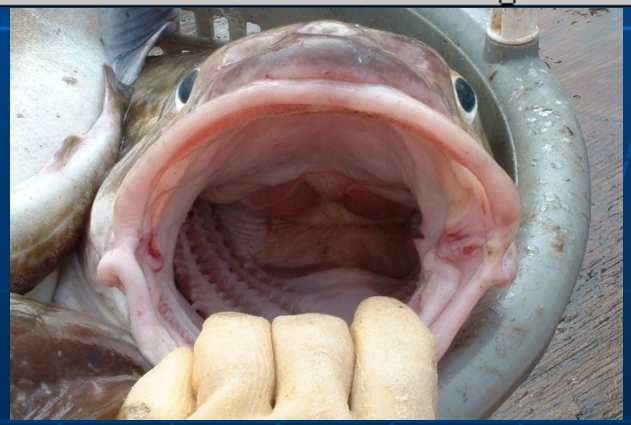
# So, how much overlap?

- **There is overlap in:**
  - Type of fish utilized
  - Size of fish utilized
  - Depth utilized
  - Area fished/foraged
  - Time/Season fished/foraged
- **When you try to look at quantifying the overlap, each dimension of overlap is limited to the tails of the distribution.**
- **Overlap is not "binary", neither should the RPAs be.**
- Is it **"reasonably likely"** that the pre-existing conservation restrictions protect sea lions from the impact of constraining competition with the cod fishery?

# Who Eats Atka Mackerel?
## and how much?



# Transient Killer Whales Eat Sea Lions

…but how many???

# Killer Whale Predation and Sea Otters

The BiOp doesn't incorporate the findings of research on another marine mammal in decline in the Aleutians:

"The cause of the overall decline is not known with certainty, but the weight of evidence points to increased predation, most likely by the killer whale (Orcinus orca), as the most likely cause." *Endangered Species Bulletin - Summer 2011 - Douglas Burn, US-FWS Alaska Sea Otter Program Leader*

"The only identified threat factor that is judged to have high importance to recovery is predation. The weight of evidence suggests that killer whale predation is the most likely cause of the sea otter's decline in the Western Aleutian Island management unit." *Recovery Strategy, pg. 5-1, US-FWS 2010, Sea Otter Draft Recovery*

# Killer Whale Predation
## *a tale of two species / two agencies*

USFWS Sea Otter Draft Recovery Plan threat analysis for WAI Management Unit (table 11) rates predation:

- geographic scope - entire unit
- likelihood - very likely
- level of confidence - high
- importance to recovery - high
- management potential - low

NMFS Sea Lion Recovery Plan threat assessment rates Killer Whale predation as:

- Potentially High

NMFS final BiOp rates Killer Whale Predation as:

- Possible

# Killer Whale Predation and SSL

**Is Predation a Major Factor Constraining Recovery in the Aleutians?**

- The BiOp says: "…in some areas (e.g., central Aleutians), effects of killer whale predation could be amplified. However, the data to evaluate this hypothesis are unavailable" (*BiOp – page xxiv*)

- The BiOp does say: 4 of 5 Sea Lion transmitters show "Sudden Death" - probably from Killer Whales - *(Updated results from Horning and Mellish now indicate 14 of 16 deaths were likely due to predation.)*

- The BiOp does say: A pod of just five individuals could account for the decline in sea otters and the continued suppression of sea lions in the Aleutians if they only ate sea lions or otters. (*Williams, et al*)

**What is the available data that could be used to evaluate the hypothesis?**

# Killer Whale Predation

**Depending on the numbers of transients, only a small portion of their diet need be sea lions to create a "predator pit" effect.**

- What the BiOp doesn't say:
  - "The minimum population estimate (NMIN) for the Gulf of Alaska, Aleutian Islands, and Bering Sea transient stock of killer whales is 552 animals based on the count of individuals using photo-identification." (*NOAA Technical Memorandum NMFS-AFSC-234 Alaska Marine Mammal Stock Assessments, 2011 –page 110*)
- The latest estimates of transients in the Central Aleutians:
  - A 2001-2003 line-transect estimate estimates 87 transient Killer whales from Samalga Pass to Delarofs in the central Aleutians (*Zerbini et al. 2007*)
  - A 2004-2010 Mark-recapture study estimates 90 transients from Samalga to Kiska (*Wade and Durban unpublished*)

# Killer Whale Predation

**The BiOp lists factors to discount Williams' conclusions:**

- KW's don't feed exclusively on SSL.
- Williams energetics don't account for resting.
- Not all KWs are in the AI.

**The BiOp <u>doesn't</u> synthesize what is known about those caveats.**

- Accepting the only 6% of KW diet is SSL...
- Accepting a 43% energetic resting discount…
- Assuming that only a fraction of the KWs are in the AI at one time…

**Just 10 KWs could consume the entire WAI annual SSL pup production.**

**Just 25 KWs could shift the CAI SSL population growth rate by 3%.**

*(See comment #6 in ACDC Comments on Final BiOp for details of the calculation.)*

# Lack of Review of Pollock RPAs

Pollock fishing has been closed in all of CH in the AI since 1999 – which amounts to a de-facto total closure.

- The BiOp contained no analysis of the benefit of the closure to the pollock stock.
- The BiOp contained no analysis of the benefit of the closure to sea lions
- The BiOp provided no rationale for maintaining the closure.
- Fishing depths for pollock are deeper than other RPA species in the Aleutians and deeper in the AI than in other areas.
- The FO of pollock in SSL scat is lower than other RPA species in the Aleutians and lower in the AI in other areas.
- The RPA for pollock in the Aleutians is more restrictive than pollock RPAs in any other area.

# Who Cares about Aleutian Pollock?

- The Aleut Corporation took title to the northern half of Adak Island in a land swap with the U.S. government.
- In 2004 Congress passed legislation allocating the directed pollock fishery in the Aleutian Islands to the Aleut Corporation
- The Aleut Corporation engaged in a multi-year cooperative research project with NMFS to evaluate management alternatives to the pollock RPA, which resulted in papers (*Barbeaux, et al)* that are not referenced in the BiOp.
- The Aleut Corporation repeatedly petition NMFS and the NPFMC for project level consultation on alternative pollock RPAs beginning in 2005.
- Consultation on alternative pollock RPAs was deferred to a programmatic BiOp, which failed to provide any analysis of pollock RPAs for the Aleutians.

# Did NMFS-PR Really Re-examine the Evidence?

**Section 7.4.4 (*integrating effects – peer/public review* ) of the final BiOp NMFS claims to have :**

- "considered the comments and reviews"
- "re-examined these issues and made changes in the document to better reflect current scientific consensus"
- re-examined the "conclusions reached."

**Despite some revisions to the body of the final BiOp, NMFS Protected Resources had prejudged the outcome of the BiOp and digest the significance of the revised "weight of evidence"**

# "Weight of Evidence" or a "Biologically Imaginable" Case?

Section 7.5.3 "Conclusions" remain unchanged from the draft BiOp. The BiOp states:

"From these data and observations, NMFS concludes:"

"…**that the relative intensity of groundfish fisheries as currently prosecuted within critical habitat is negatively associated** with Steller sea lion population response"

"…these adverse effects on the availability of important Steller sea lion prey within critical habitat **are exacerbated in areas of low ecosystem productivity** "

"Based on this analysis … **it is unlikely that designated critical habitat** within the western DPS of Steller sea lion **will remain functional (or retain the ability to become functional)** …"

# Is the Scale of the Response Supported by the Evidence?

**The BiOp case against fisheries in the Aleutians as they were being managed under the pre-2010 RPAs is not supported by strong evidence.**

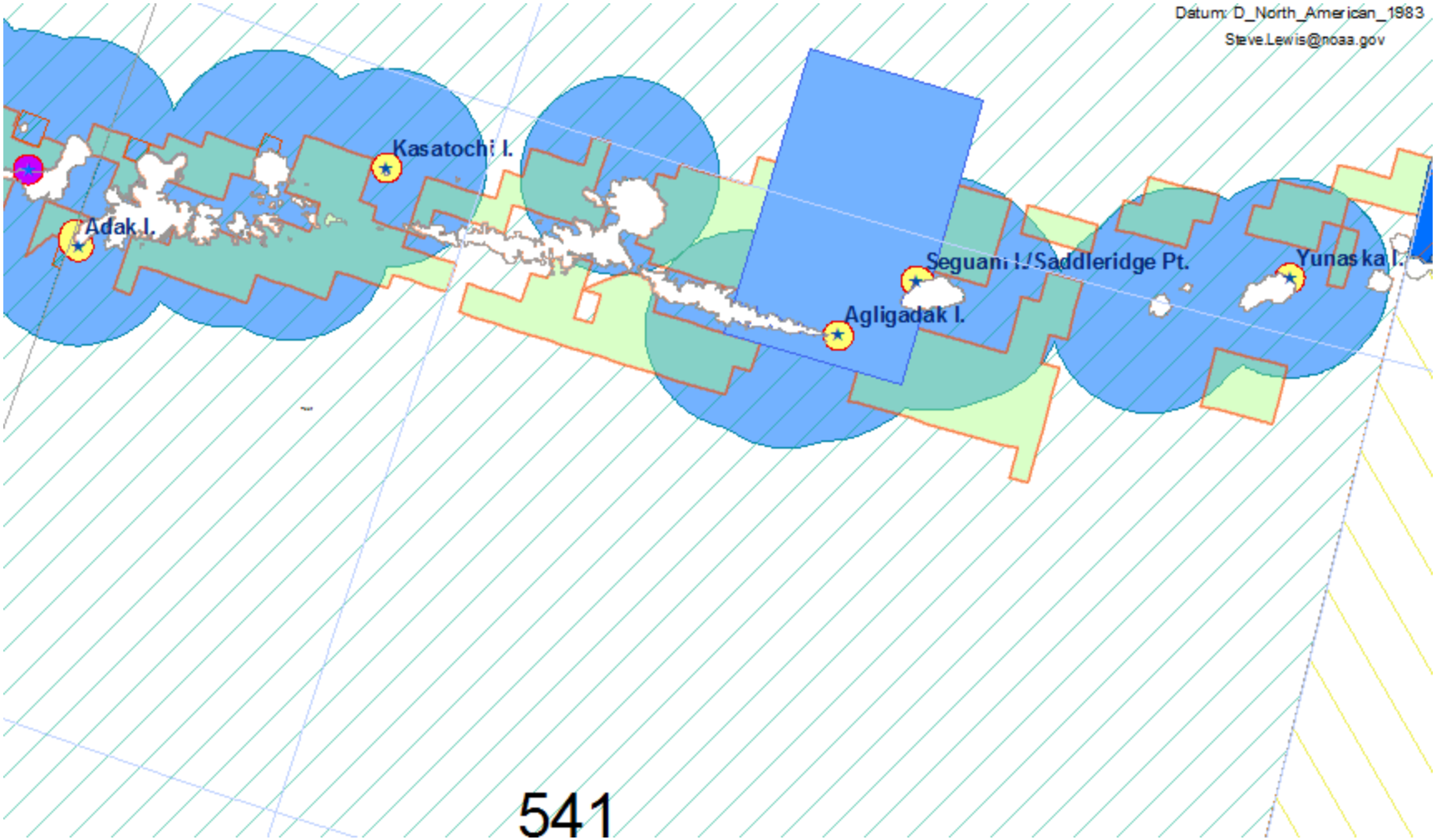
**The BiOp ignores some information and mis-uses other information that doesn't fit the BiOp's pre-conceptions.**

**Please consider our written comments in reviewing the BiOp and the appropriateness of the RPAs.**

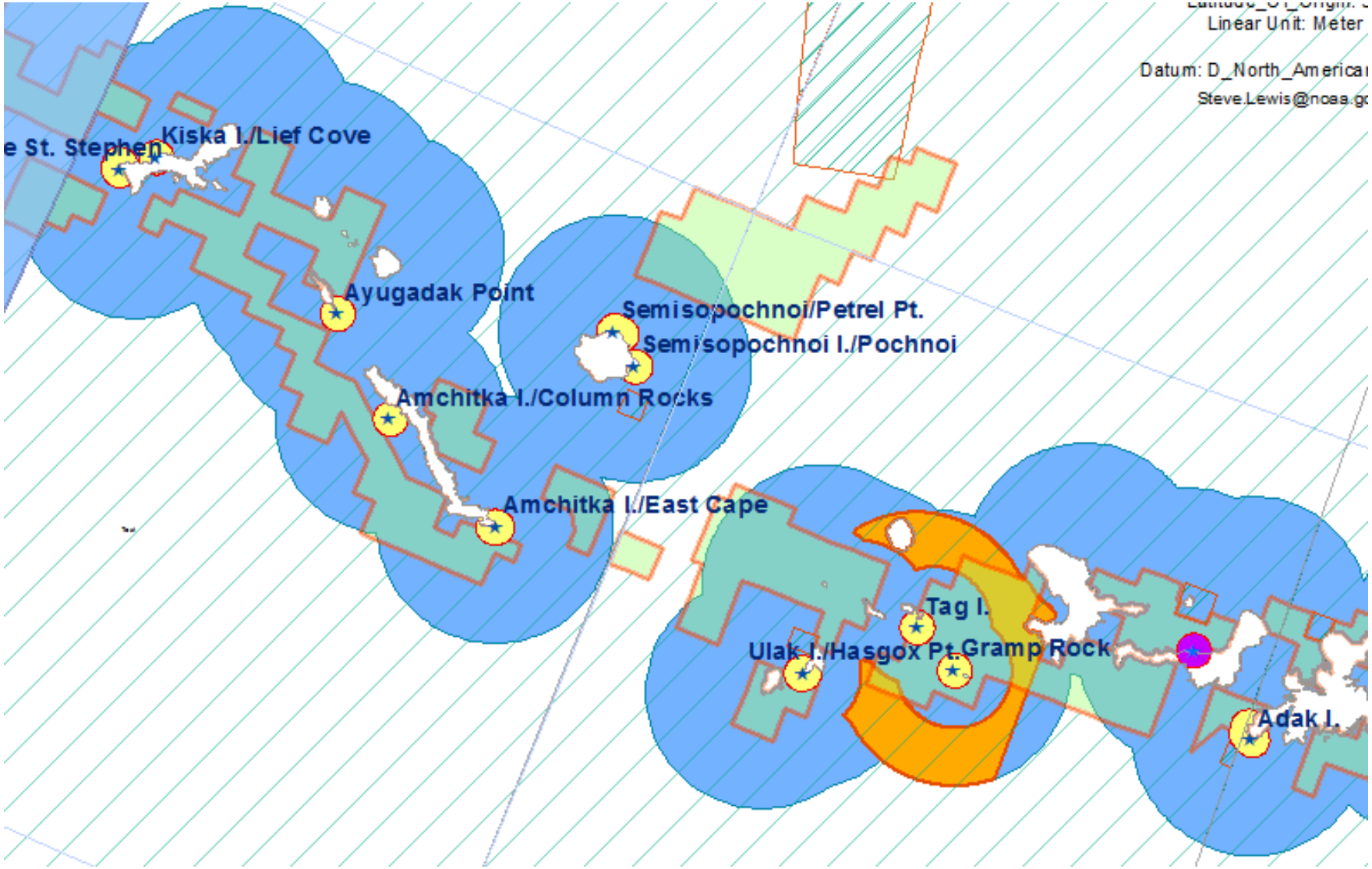
Thank you

Adak Community Development Corporation

# 541 Fishery Restrictions

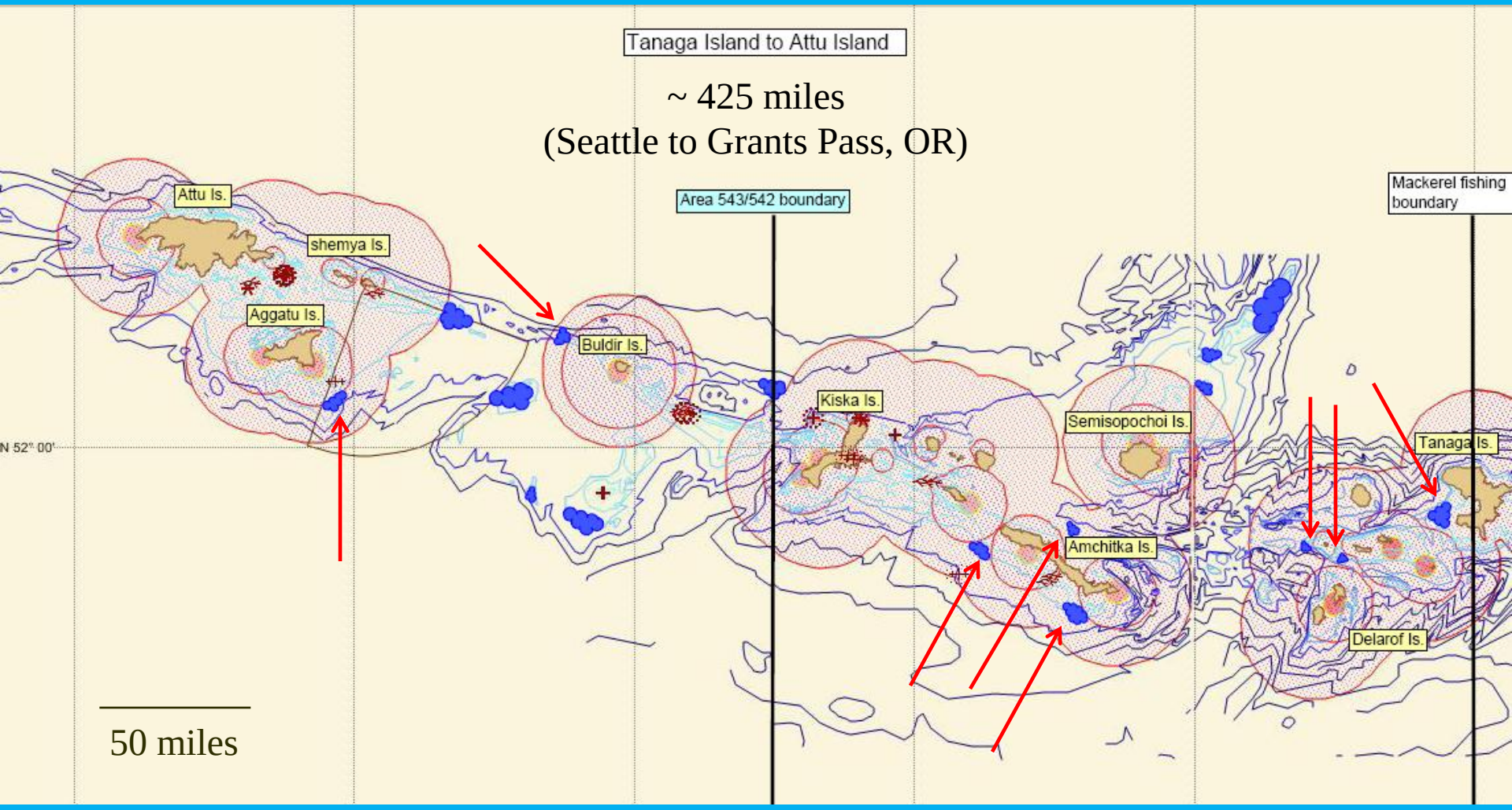


# 542 Fishery Restrictions



# 543 Fishery Restrictions

# Questions?


Tanaga Island to Attu Island
~ 425 miles
(Seattle to Grants Pass, OR)
Attu Is.
shemya Is.
Aggatu Is.
Buldir Is.
Area 543/542 boundary
Kiska Is.
Semisopochoi Is.
Amchitka Is.
Mackerel fishing boundary
Tanaga Is.
Delarof Is.
N 52° 00'
50 miles