

# **Fishing Industry Perspective of the 2010 Biological Opinion and New Available Information**

**CIE Panel Review, August 1-2, 2012, Seattle, Washington**

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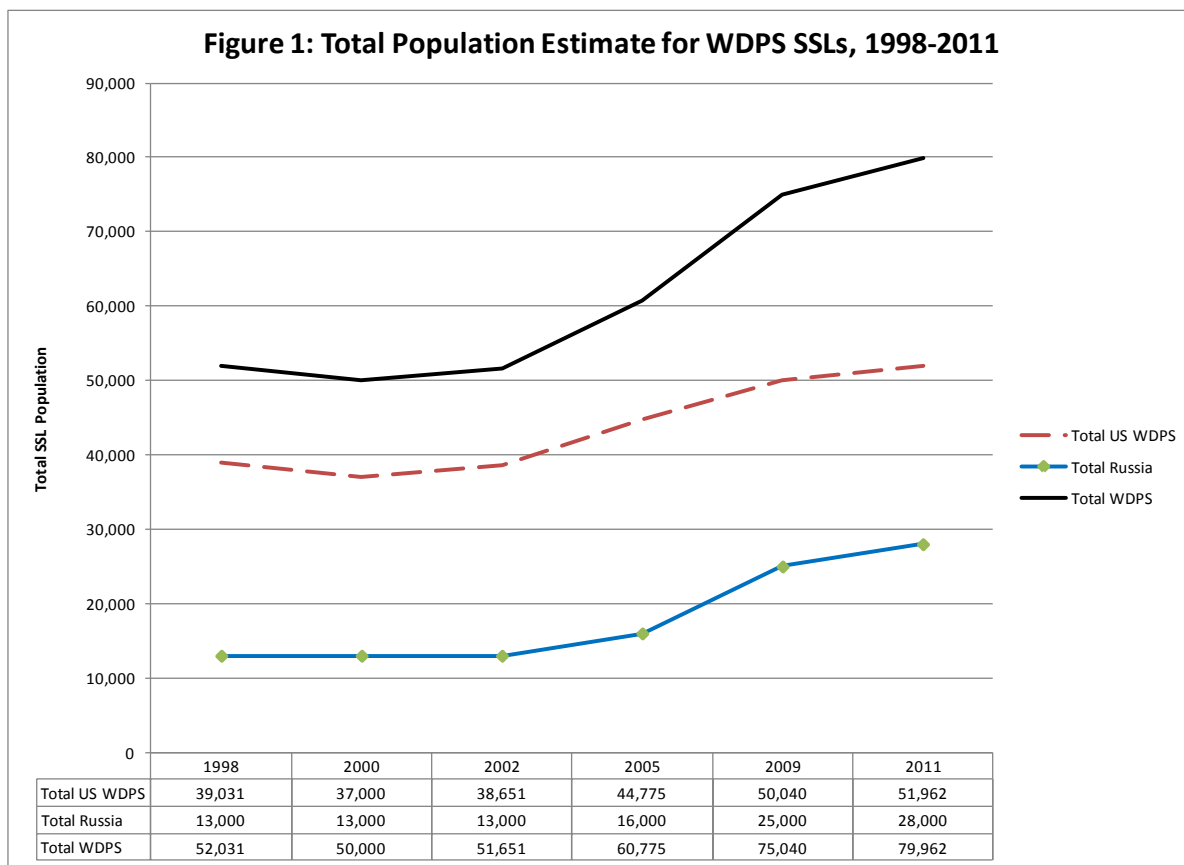
**Petersburg, Alaska.**

Member of the NPFMC Steller Sea Lion Mitigation Committee; member of the North Pacific Research Board; at-large board member of United Fishermen of Alaska; past North Pacific Fisheries Management Council member; and past participant in the NPFMC SSL RPA committee process in 2001.

## 1.) Total population for the WDPS:

The BIOP concluded that the proposed action is likely to jeopardize the continued existence of the entire population of the western DPS. However, the BIOP provided very little information on the status of the entire western DPS population. The BIOP included one lone point estimate for the total population of the WDPS in 2008, (p. 80). The BIOP did not provide a description of the status quo or trend for the total WDPS population. In 2011, a pup survey was completed with a total count of 11,547 pups in the U.S. WDPS.<sup>1</sup> The best estimate of the total WDPS population in 2011 would be **77,000 – 80,000** (with 52,000 in the US WDPS and 25,000-28,000 in Russia<sup>2</sup>). From 2000 to 2011, the total population estimate for the WDPS has increased **+54% to 60%**.<sup>3</sup>

**New information:** 2011 SSL pup survey; 2011 Russian population estimate.



<sup>1</sup> 2011 Steller sea lion survey report, December 5, 2011, p. 5.

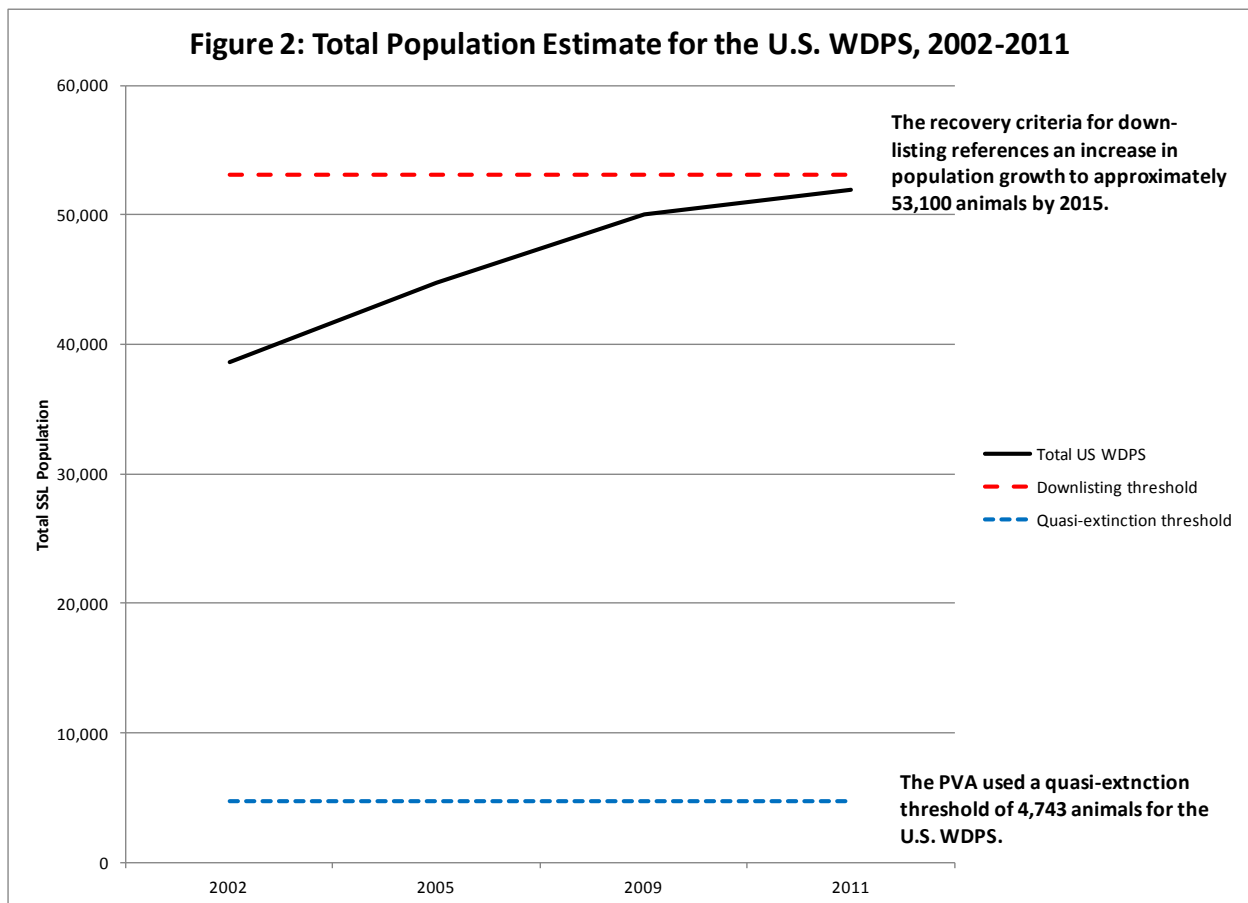
<sup>2</sup> “SSL demographic studies in Russian waters”, Burkanov, 2012 AMSS poster. 2011 estimate of 25-28,000 SSLs.

<sup>3</sup> The Recovery Plan (p. 1-13) states the entire WDPS population was below 50,000 animals in 2000. For 1998, the Recovery Plan (p. I-10) has a US WDPS population of 39,031 (using a pup multiplier) plus a Russian estimate of 13,000 (p. I-11). For 2005, the Recovery Plan estimates a US WDPS population of 45,000 and 16,000 in Russia (p. I-8). In January 2010, after the 2009 pup survey, NMFS reported to the NPFMC that the 2009 US WDPS population was 50,000 (using a pup multiplier of 4.5) and combined with the 2008 estimate for the Russian population of 25,000 results in a WDPS population of 75,000 for 2009. Pup survey counts in 2011 increased the total US WDPS population estimate to 52,000 plus the Russian population (estimate of 25,000 -28,000) - results in a WDPS population estimate of 77,000 -80,000 in 2011.

## 2.) Total population estimate for the U.S. WDPS:

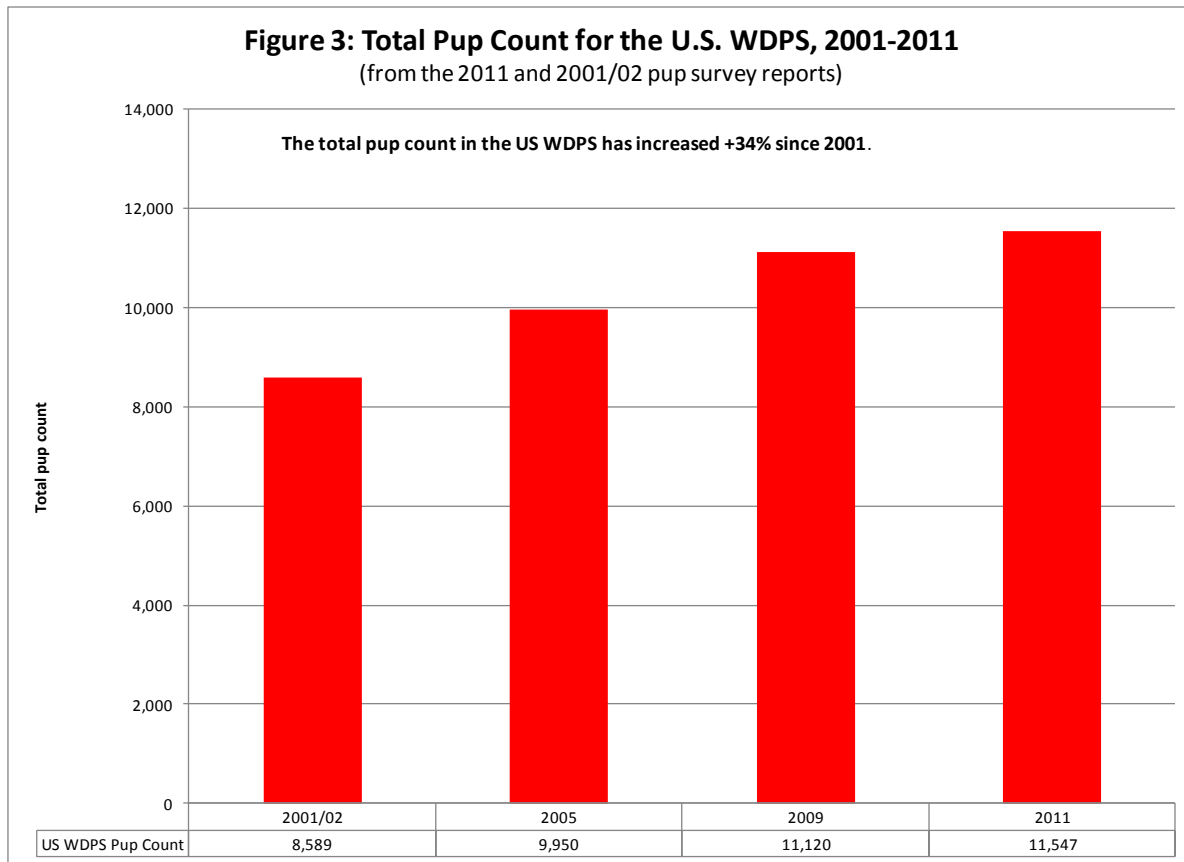
One of the major recovery criteria in the Recovery Plan is the growth of the total US WDPS population. From the BIOP, it is not possible to determine the status and trend of the total population as the BIOP did not provide any estimates for the total population of the U.S. WDPS. However, as NMFS has done previously in the Recovery Plan and in NPFMC reports, the total population for the US WDPS can be estimated from total pup counts. The 2011 pup survey results in a total population estimate for the U.S. WDPS of 52,000 (using a pup multiplier of 4.5). The 2011 population estimate is **98%** of the recovery plan population downlisting threshold of 53,100 by 2015.<sup>4</sup> The total pup counts in the U.S. WDPS in 2011 have increased **+4%** (from 2009; **+16%** (2005); and **+34%** (2002)).<sup>5</sup>

**New information:** 2011 SSL pup survey.



<sup>4</sup> The 2011 total pup count for the US WDPS is 11,547 pups. A 4.5 pup multiplier yields a total population estimate of 52,000 (or 98% of the downlisting criteria of 53,100 by 2015, Recovery Plan, p. V-17). The Recovery Plan uses a pup multiplier to estimate the US WDPS (p. I-10) as does the PVA analysis (Recovery Plan appendix).

<sup>5</sup> The 2011 SSL survey report includes total pup counts for 2011, 2009 (11,120), and 2005 (9950) in Table 1, p. 9. The 2001/2002 SSL survey reports a total pup count of 8589 (p. iv).



### 3.) 2011 Non-Pup Survey for the U.S. WDPS:

Both pups and non-pups populations increased in the 2011 U.S. WDPS survey. In the 2011 non-pup survey, 135 of 179 (75.4%) sites were successfully surveyed, though NMFS states that a non-pup trend cannot be obtained.<sup>6</sup> However, it is clear that the non-pup population is increasing as the non-pup count for 2011 (with only 75.4% of sites surveyed) exceeds the non-pup count in 2008 (with 100% of sites surveyed).<sup>7</sup> In other words, there are more non-pups counted in 2011 than in 2008 – with 25% less sites surveyed in 2011.

In the 2007 non-pup survey, 77% of the sites were successfully surveyed and NMFS was able to conclude “*that the overall trend for the WDPS (through 2007) is either stable or declining slightly*”. NMFS made this determination by comparing only the sites that were surveyed in both 2004 (complete survey) and 2007.<sup>8</sup> This type of comparison has not yet been done for 2011 and 2008 (complete survey). A preliminary comparison of the sites that were sampled in both 2011 and 2008 indicates that the U.S. WDPS non-pup population may have increased as much as +16% (if the groupings of haulouts are consistent across both years in Table 3 of the 2011 survey report.)

<sup>6</sup> “Results of SSL surveys in Alaska, 2011”, p. 2.

<sup>7</sup> Ibid., Table 3.

<sup>8</sup> “Survey of Adult and Juvenile SSLs, 2007”, p. 3

#### 4.) Jeopardy:

The BIOP makes a jeopardy determination for the entire WDPS based on the significant decline in one sub-area. While a significantly declining sub-population is cause for concern, the determination that the decline in one area jeopardizes the recovery of the entire population appears to be in part based more on belief than science.<sup>9/10/11</sup>

The BIOP does provide considerable information on demographics of SSL sub-populations; RCAs; and trend sites within the US WDPS (but non-pup trend site counts have numerous caveats in the methodology<sup>12</sup>). While it may be important to know the status and trend of sub-populations, it is just as important to know the status and trend of the total population. Given the lack of quantitative information provided in the BIOP regarding SSL movement between the sub-populations, it only reinforces the need for a more accurate description of the baseline, trend, and status of the total WDPS population.

The focus of the BIOP on sub-populations seems inconsistent with the PVA model utilized by the Recovery Team which “*was based upon a single population and did not consider sub-populations/meta-populations dynamics which could be an important influence on persistence.*”<sup>13</sup> Models that used independent sub-populations resulted “*in a prognosis for the species that is considerably more optimistic.*”<sup>14</sup> In selecting the more pessimistic single population PVA model, the BIOP notes that “*the Recovery Plan was charged with addressing the recovery of the entire species [WDPS].*”<sup>15</sup> But conversely, the BIOP provides almost no information on the entire population of the WDPS but provides considerable information on sub-populations.

Boyd (2010) investigated future population projections for the WDPS, EDPS, and the combined SSL meta-population based on historical trends. Boyd found that none of the scenarios investigated – including the projections for the WDPS - showed that the population was endangered (particularly when using the full range of historical data). The probability of not meeting the conservation objective (<1% chance in 100 years) was very low.<sup>16</sup>

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<sup>9</sup> Final BIOP, p. xxii, “*The Recovery Team **believed**, and NMFS concurred, it was important to consider sub-population vital rates and demographic characteristics when considering the status of recovery of the WDPS.*”

<sup>10</sup> Final BIOP, p. 331, “*The Recovery Team **believed** that it was important to consider sub-population declines in recovery and therefore established specific sub-regions in the geographical range of the western DPS.*”

<sup>11</sup> Ibid. “*Recovery Team strongly **believed** that all parts of the range must remain occupied to ensure recovery.*”

<sup>12</sup> WDPS non-pup survey counts have been adjusted downward for: 1.) -3.64% since 2004 for more accurate camera angle, and, 2.) -8% in the EGOA in 2008 for movement from the EDPS to the WDPS, 3.) Non-pups in the water are excluded from the count (unless thought to be disturbed by the survey aircraft, 4.) No estimation for SSLs at sea during survey, and 5.) Counts at consistently occupied sites during the survey period such as Round Island etc. are not included. The mean number of SSLs on Round I during May-August, 2011 was 203 with a peak count of 403.

<sup>13</sup> Recovery Plan, p V-14.

<sup>14</sup> Final BIOP, p. 95.

<sup>15</sup> Ibid.

<sup>16</sup> “*The viability of SSL populations*”, I.L. Boyd, 2010, p. 1 and p. 10-11. And “*Assessing the effectiveness of conservation measures: Resolving the “wicked” problem of the SSL.*”, I.L. Boyd (2010). p. 6-7.

The draft and final BIOP gave little consideration to Boyd’s analysis and findings<sup>17</sup> and NMFS dismissed the results of Boyd (2010) on the mischaracterization that the results only addressed the SSL metapopulation – and not the WDPS.<sup>18</sup> While Boyd did examine the metapopulation, he also examined viability scenarios for the WDPS and EDPS separately - with the most emphasis on the WDPS. None of the scenarios in Boyd’s analysis showed that either DPS was endangered (see attached Appendix II for the summary of Boyd 2010).

The Independent Scientific Review Panel also disagreed with the jeopardy finding of the BIOP<sup>19</sup> and stated that the conclusions in the BIOP regarding the finding of jeopardy and its posited cause (nutritional stress from food competition with fisheries) do not follow logically from scientific, economic, and social information presented in the BIOP and attendant documents.

**5.) Movement:**

**New information:** SSLMC presentation; St. Lawrence Island observations; Russian studies.

The BIOP contains little quantitative information on SSL movement between areas and sub-populations though information was available. On movement and natal fidelity in the WDPS, Raum-Suryan 2002 found that 33% of the branded females (1987-88) were observed with newly born pups at sites other than their natal rookeries.<sup>20</sup> On movement in Russia, Burkanov found that on average 28.3% (range of 16.1% to 36.6%<sup>21</sup>) of branded animals re-sighted on a rookery were immigrants, with the proportion of immigrants among breeding females being 2-3 times higher than that among males SSLs (2002-2008, with a sample size of n= 5,342).<sup>22</sup>

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

Of interest is the complete lack (0%) of branded immigrants sighted in the Commander Islands (Medny rookery), for all categories and sexes: total, mature, juvenile, and breeding animals. (See <http://www.fakr.noaa.gov/npfmc/conservation-issues/ssl-archives.html> Russian studies link)

<sup>17</sup> Final BIOP, p. 264, on past stressors and projected risk of extinction, “others argue that changes have been and will be far less dramatic (Boyd 2010).”

<sup>18</sup> Final BIOP, p. 334, “However, concerning the results of Boyd (2010), NMFS cannot rely on this finding because Steller sea lions are recognized as two distinct populations under the ESA.”

<sup>19</sup> Independent Scientific Review, p. xii-xiv and p. 95.

<sup>20</sup> Dispersal, Rookery Fidelity and Metapopulation Structure of SSLs, Raum-Suryan et al 2002.

<sup>21</sup> Average excludes Commander Islands (0%) and Sakhalin (69.3%) – rookery being re-colonized

<sup>22</sup> Burkanov, “Russian SSL Studies Update”, 42 page powerpoint presentation to SSLMC, January 2010.

Of all the rookeries in Russia, Medny (in the Commander Islands) by far has the widest dispersal of branded animals to other rookeries in Russia and the U.S. (n = 1,162 with sightings in the CGOA, Round Island, and the Aleutians). The Commander Islands have 30 mile fishing closures that have been in place since 1958 with effective enforcement since the 1980s.<sup>23</sup> It would seem reasonable to investigate why branded animals are not immigrating to or remaining at Medny (lack of high quality forage, increased predation, or other reasons). It would also be useful to determine if the WAI is experiencing the same low level of immigration relative to other areas.

Since 1990, 7000 pups in Russia and 2000 pups were branded in Alaska but no quantitative analysis of brand/re-sight information is provided in the BIOP. Without baseline knowledge of SSL movement between sub-areas of the WDPS, the evaluation of population status and trends of the sub-areas is an incomplete picture and makes mandatory requirements for growth in sub-areas difficult to interpret and problematic.

A small amount of new information is available on brand/re-sight movement between the Russia and the U.S. population from observations in 2011.<sup>24</sup> However, the sample size is small (N= 54 compared to N = 5342 in the Russian study). Nineteen animals branded in Russia were sighted in the U.S. WDPS – 2 in the winter and 17 in the summer (with 11 of 17 from Medny). Dispersal again was as far as the CGOA, the Pribilofs, and Round Island. Eleven animals branded in the U.S. WDPS were sighted in Russia – 6 in winter and 5 in summer with dispersal to Medny and Kamchatka. The sources of the U.S. brands were from Agattu, Ugamak, and the CGOA. Animals branded in the EDPS (including California and Oregon) were also re-sighted in the Aleutians. In November 2010, 262 SSLs were counted at St. Lawrence Island in the northern Bering Sea, with branded animals from eleven rookeries including SSLs from Forrester Island (SEAK) and Medny.<sup>25</sup> On Round Island (Bering Sea) in 2011 (May to August), there was a peak count of 403 animals with branded animals from Ugamak, CGOA, Medny, and from Graves Rock (EDPS). The average number of SSLs counted on Round Island is increasing, 1999-2011 (Appendix I).

The movement of SSLs appears to be more extensive than previously thought and natal fidelity appears to be less than previously theorized (even among females). The Recovery Plan noted “*of the two most recently established rookeries in the EDPS, the majority of pups born there are from WDPS females. At Graves Rock, about 70% of the pups born were from WDPS females, and about 45% of the pups born at White Sisters were from WDPS females.*”<sup>26</sup> The SSL Recovery Plan then theorized that this migration is an “*infrequent event*” and SSLs “*are only crossing (in detectable numbers) from west to east*”.<sup>27</sup> This assumption proved to be incorrect as the 2008 SSL non-pup survey found large movement between the two populations from east to west. In 2008, the population count in the eastern GOA portion of the WDPS increased +35% from the 2004 count.<sup>28</sup> NMFS then attributed this increase in the WDPS due to east to west movement from the EDPS<sup>29</sup> and subsequently lowered the EGOA (WDPS) non-pup count by -18%.

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<sup>23</sup> SSLMC presentation, July 2012. In 1993, the Commander Islands Nature Preserve was also established.

<sup>24</sup> Ibid.

<sup>25</sup> “Spanning the North Pacific: SSLs at St. Lawrence, Nov/Dec 2011”, Sheffield, poster at 2012 AMSS.

<sup>26</sup> SSL Recovery Plan, March 2008, p. 1-5, 1-6

<sup>27</sup> SSL Recovery Plan, March 2008, p. 1-6

<sup>28</sup> Fritz et al, Nov 2008, Survey of Adult and Juvenile SSL, June-July 2008, Table 5

<sup>29</sup> Fritz et al, Nov 2008, Survey of Adult and Juvenile SSL, June-July 2008, p. 1 and p. 8. Fritz et al Feb 2009, Survey of Adult and Juvenile SSL, June-July 2008, p. 2, pp. 6-8. , NMFS news release 11/19/2008.

## 6.) Holmes 2007 and the “weight of evidence”: 2011 pup survey in the CGOA and EGOA

**New information:** 2011 SSL survey; Horning and Mellish 2012; Scientific Review Panel.

**Scientific Review Panel** “Direct evidence of sea lions being in nutritional stress is lacking in the BiOp. We compared the signs of fishery-driven nutritional stress listed in Figure 4.26 of the BiOp with data provided in Table 3.17 of the BiOp. Of the eight general conditions consistent with fishery-driven nutritional stress in sea lions, no recent information (after 2000) was available on four. Nutritional stress was not indicated for three conditions (sea lions were not emaciated, body size was not reduced, and survival was not reduced). Information on the final general condition (reduced reproduction) was contradictory.”<sup>30</sup>

Of the indicators assessed for nutritional stress in the WDPS, thirteen were negative and one was positive (reduced birth rate). The evidence for reduced WDPS birth rate in BIOP Table 3.17 is based on comparing 2000-2004 rates to the previous decade. No explanation is provided in the BIOP for the use of 2000-04 to represent the entire decade in a 2010 document but the 2004 date corresponds with the end of the modeling period (1976-2004) in Holmes 2007.

The final BIOP puts considerable weight on CGOA modeling work with 62 references to Holmes 2007 or Holmes and York 2003 (in order to support over 100 references to “nutritional stress”). Holmes 2007 estimated that natality rates in the central GOA were 36% lower in the period 1998-2004 than in the mid-1970s.<sup>31</sup> Holmes postulated that declining birth rates in the CGOA might also be a problem for the WDPS across the GOA and the Aleutians.

Maniscalco *et al.* (2010) estimated that the birth rate at Chiswell Island (EGOA) was 69% from 2003-2009 - based on direct observations rather than modeling. AFSC proceeded with three critiques of Maniscalco and suggested that the actual birth rate was lower and in the range of 52%, 54% and 62% (AFSC, Holmes, Johnson 2009). All of these revised estimates of natality are higher than the 43% from Holmes 2007, and suggest the possibility that birth rates either improved in the Gulf of Alaska or may have remained at the 1980s level.<sup>32</sup> Horning (2012) has concluded that “we find no support for the hypotheses advanced by Holmes *et al* 2007 of recovered juvenile survival and depressed natality – right now, for this region.”<sup>33</sup>

The observations (and subsequent re-analysis) of Maniscalco *et al.* (2010), Horning 2012, and the 2011 pup survey do not support the BIOP’s contention that birth rates are continuing to fall in the CGOA (and by extension in the entire WDPS). The total pup counts in the U.S. WDPS in 2011 have increased +4% since 2009; +16% since 2005; and +34% since 2002, [Figure 3].<sup>34</sup> In the CGOA, total pup counts increased +16% from 2009 to 2011.<sup>35</sup> Pup counts at trend rookeries in the CGOA have increased +29% and +33% in the EGOA since 2004.<sup>36</sup>

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<sup>30</sup> Ibid.

<sup>31</sup> “Age Structure Modeling Reveals Long Term Declines in the Natality of Western SSLs”; Holmes et al, 2007, p. 1

<sup>32</sup> Independent Scientific Review Panel, October 8, 2011, p. 48.

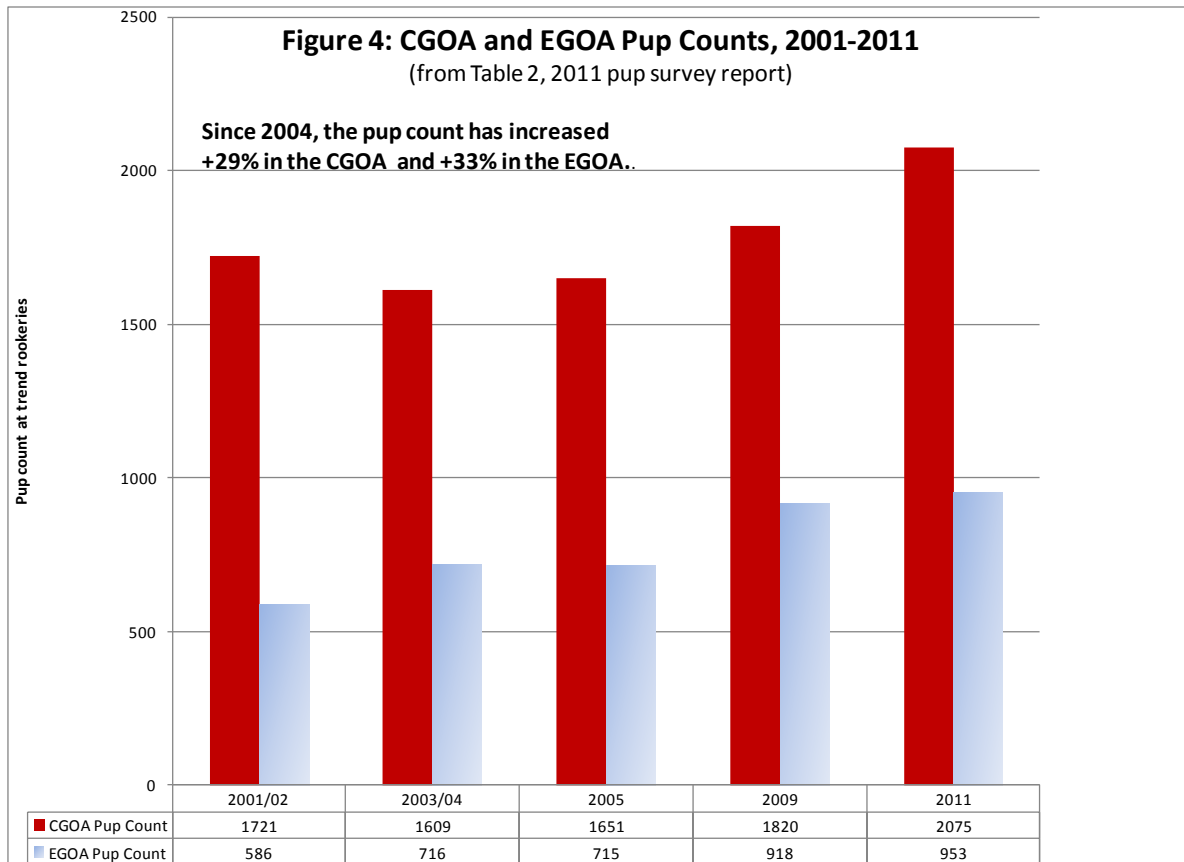
<sup>33</sup> “Predation on an Upper Trophic Marine Predator, the SSL”, Horning and Mellish 2012, presentation to SSLMC.

<sup>34</sup> The 2011 SSL survey report includes total pup counts for 2011, 2009 (11,120), and 2005 (9950) in Table 1, p. 9. The 2001/2002 SSL survey reports a total pup count of 8589 (p. iv).

<sup>35</sup> 2011 SSL survey report, December 5, 2011, Table 1

<sup>36</sup> Ibid., Table 2.





The CGOA has an increasing pup count (+16%, 2009-2011) and a preliminarily increasing non-pup count (2008-2011)<sup>37</sup>. The CGOA also has significant groundfish catches (pollock) with high percentages of catch inside Critical Habitat (+90%) during both the periods of modeled declining birth rates (1998-2004) and during the period of increasing pup counts (2004 -2008).<sup>38</sup> The relationship between fishing in CH and SSL demographics appears to be unrelated.

**Pup to non-pup ratios:** The BIOP (p. xxvii) states “*Pup to non-pup ratios are an indicator of reproductive rates (or natality) in sea lion populations.*” The BIOP then notes that the ratio of pups (2009) to adult females (2008) is lowest in the WAI. However, the WDPS area with the highest ratio is CGOA, which is then followed closely by the CAI.<sup>39</sup> The BIOP also notes the confounding effect of SSL movement on pup to non-pup ratios but provides no intra-movement information for the U.S. WDPS to estimate the degree of “confounding”.<sup>40</sup> The Independent Science Review Panel discussed the limitations on the use of pup to non-pup ratios<sup>41</sup> as well as the numerous factors that can affect the ratios – including length of foraging trips (which are longer in the EDPS than the WDPS). The use of pup to non-pup ratios as a proxy for natality requires more explicit discussion of the limitations on comparing the ratios in different areas.

<sup>37</sup> 2011 SSL survey report, Tables 1 and 3

<sup>38</sup> Final BIOP, Appendix IV, Tables IV-9 and IV-9.

<sup>39</sup> Final BIOP, Table 5.8

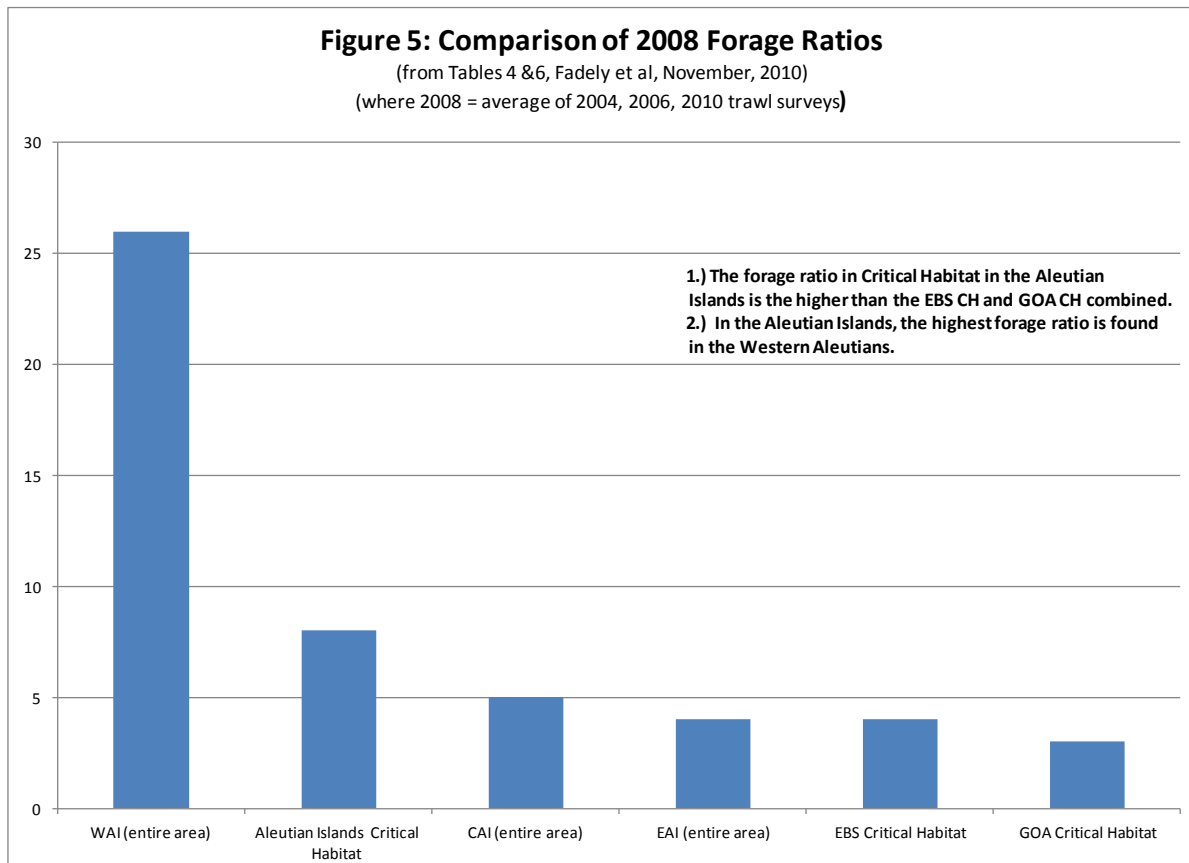
<sup>40</sup> Final BIOP, p. xxix

<sup>41</sup> Independent Scientific Review Panel, p. 47

## 7.) Forage ratios and the 2010 trawl groundfish surveys:

The draft and final BIOP conclude that the proposed action is likely to adversely modify the designated critical habitat for the WDPS of SSLs. The draft 2010 BIOP states that the SSL population trend is reflective of the low productivity of the Aleutian Islands ecosystem<sup>42</sup> and low forage availability inside Critical Habitat (CH). However, the revised AI forage ratio estimates in the final BIOP and the 2010 AI trawl survey biomass estimates do not support those statements. Despite the new information, the conclusions and RPAs in the final BIOP were largely unchanged from the draft BIOP.

**New information:** 2011 Aleutian Islands trawl survey; Scientific Review Panel



The revised forage ratios in the final BIOP show that in 2008, the forage ratio in Critical Habitat in the Aleutian Islands is the highest of all areas<sup>43</sup> and increased **+39%** since 2000.<sup>44</sup> The forage biomass available in the Aleutian Islands (inside and outside CH) in 2008 has also increased **+39%** since 2000.<sup>45</sup> The forage composition in Fadely et al 2010 is 65% Atka mackerel and 15% gadids (pollock and p-cod combined).<sup>46</sup>

<sup>42</sup> Draft BIOP, p. xxxii

<sup>43</sup> Fadely et al 2010 “Updated Forage Ratio Estimates for 2000 and 2008”, Table 4, p. 6 (where 2000 = the average of 1997, 2000 and 2002, and where 2008 = the average of 2004, 2006, 2010).

<sup>44</sup> Ibid., Table 4, p. 6

<sup>45</sup> Ibid., Table 1, p. 3

<sup>46</sup> Fadely et al 2010, p. 1

**RPA Performance Standards:** The performance standards for the RPAs include “*Conserve overall forage biomass in for SSLs by limiting fishery removals in areas with low forage biomass availability*”.<sup>47</sup> The RPAs in the final BIOP are inconsistent with the performance standards as the WAI has highest forage ratio of all areas – and the most restrictive management measures.

**Independent Scientific Review Panel:** “*Forage ratios of groundfish to sea lions were higher in the western and central Aleutians than in regions where sea lions are recovering, thereby indicating a quantity of groundfish area-wide sufficient for sea lions to avoid nutritional stress. Sea lions in the eastern Bering Sea and the Gulf of Alaska (GOA) show no signs of nutritional stress despite having forage ratios within critical habitat that are lower than in the western and central Aleutian Islands.*”<sup>48</sup>

**Atka mackerel:** The final BIOP did not incorporate the 2010 groundfish trawl survey results in the calculations for projected biomass or harvest rates. In 2010, the Aleutian Islands trawl survey biomass estimate for Atka mackerel increased **+16%** from the last survey conducted in 2006.

In the Western Aleutian Islands (543), the 2010 trawl survey biomass estimate for Atka mackerel increased **+151%** to 252,819 mt – with no new fishing restrictions imposed.<sup>49</sup> Under the RPA in 543 (with no directed fishing for Atka mackerel), NMFS expected the Atka mackerel biomass in the WAI (543) to increase **+43%** by 2020 (relative to 2009).<sup>50</sup> However, the 2009 baseline biomass in the BIOP single species model projections (Ianelli 2010) is not based on an actual trawl survey biomass point estimate for 2009 but the average of the 2002, 2004, and 2006 survey values. On average in trawl surveys (2002-06) in 543, Atka mackerel represented 34% of all groundfish biomass in 543 and 41% of all groundfish in 542.

**Pacific cod:** P-cod represents 3% of the groundfish biomass in both 543 and 542. In the AI trawl survey in 2010, the trawl survey biomass of p-cod declined **-26%**<sup>51</sup> from the previous survey in 2006. However, the overall BSAI p-cod biomass has been steadily increasing with most of the increase in the EBS. BSAI Age 3+ p-cod biomass increased **+36%** from 2010 to 2011.<sup>52</sup> EBS age 0+ p-cod biomass increased **+104%** from 2009 to 2010<sup>53</sup> and increased an additional **+5%** from 2010 to 2011.<sup>54</sup>

**Pollock:** Pollock represents 1% of the groundfish biomass in 543 and 6% of 542 (with a declining proportion in 2004 at 2%, and 2006 at 3%).<sup>55</sup> No directed pollock fishing has occurred in the Aleutian Islands since 1999, yet the pollock biomass has not steadily increased but instead AI pollock has remained relatively stable (1999-2011) with variability due to changes in recruitment, [Figure 6].<sup>56</sup>

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<sup>47</sup> Draft BIOP, p. 356 and final BIOP, p. 358.

<sup>48</sup> Ibid.

<sup>49</sup> BSAI Atka Mackerel SAFE, 2011, Table 17.6

<sup>50</sup> Ianelli 2010, AI Trawl Survey Biomass Summary, October 13, 2010, p. 3

<sup>51</sup> 2010 BSAI Pacific cod SAFE, p. 253.

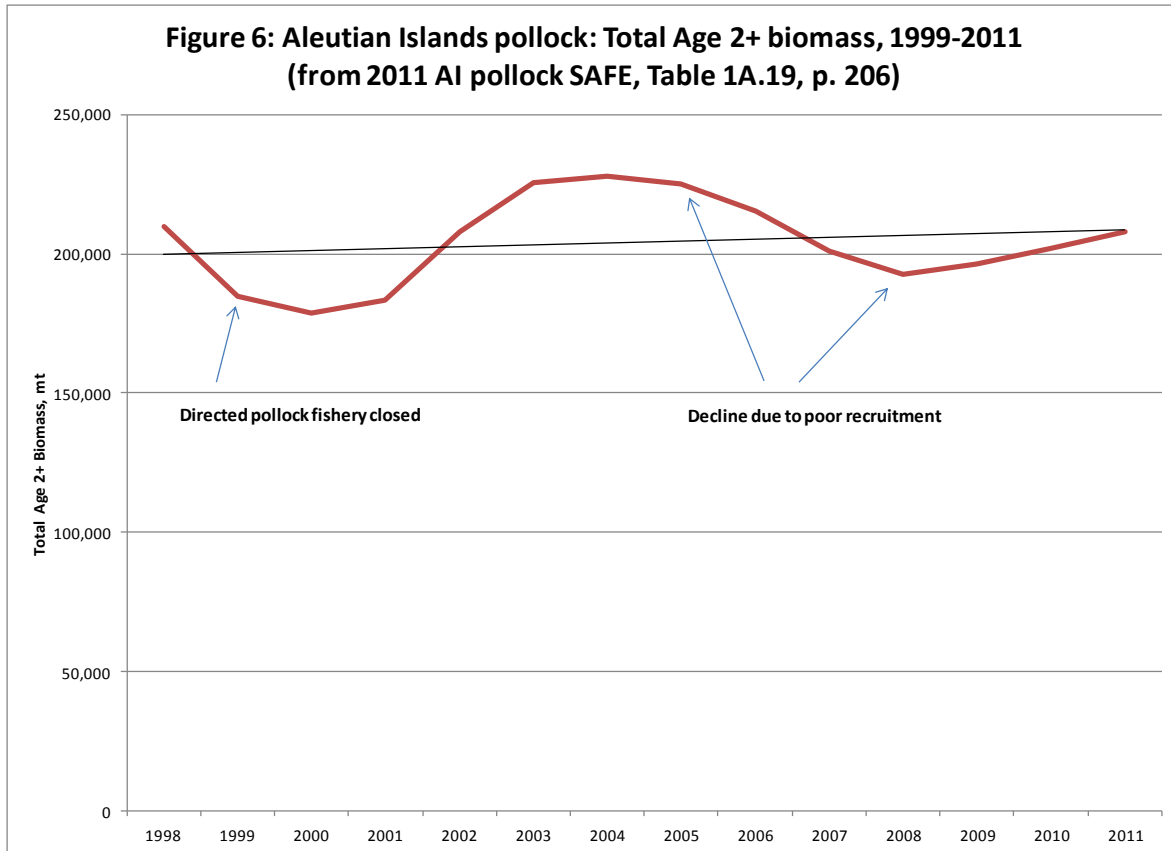
<sup>52</sup> Ibid. p. 245

<sup>53</sup> Ibid., Table 2.12b, p. 307.

<sup>54</sup> 2011 BSAI Pacific cod SAFE, Table 2.10b, p. 58

<sup>55</sup> Ianelli 2010, AI Trawl Survey Biomass Summary, October 13, 2010, Tables 1 and 5.

<sup>56</sup> 2011 Aleutian Islands pollock SAFE, Table 1A.19, p. 206



Since the Aleutian Islands directed pollock fishery closed after 1998<sup>57</sup>, the overall trend for total biomass (Age 2+) has only slightly increased from 1998 to 2011.

The 2011 AI pollock SAFE states that, “The total biomass trend appears to have increased from 1999 to 2005 after cessation of directed fishing in the area, and then a decline between 2005 to 2011 with the lack of good recruitment after the 2000 year class. The stock declined slightly between 2005 and 2008 due to poor recruitments. The most recent increase in abundance from 2008 through 2011 is due to the increase in the AIBT survey abundance index in 2010.”<sup>58</sup>

The overall trend in Aleutian Islands pollock biomass since the closure of the directed fishery appears to have more to do with natural variability in recruitment than with fishing. The variable biomass trend for AI pollock following a fishery closure is in direct contrast with the expected biomass projections resulting from the RPA fishing closures in the Western Aleutian Islands for Atka mackerel and p-cod. The single species model (Ianelli 2010) projected annual biomass growth from year to year for every year from 2009 to 2020.

The single species model projections also fail to incorporate any predator-prey relationships between p-cod, Atka mackerel and pollock.

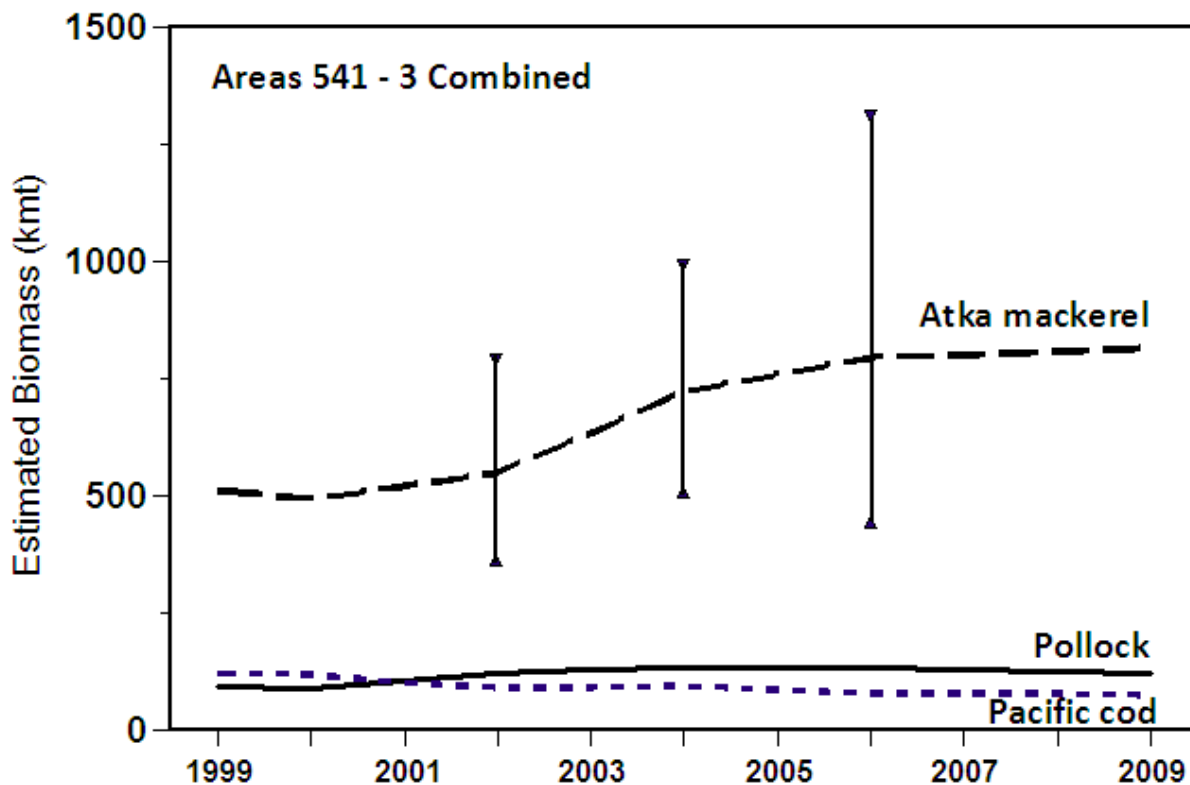
<sup>57</sup> 2011 Aleutian Island pollock SAFE, p. 172

<sup>58</sup> Ibid, p. 181.

**8.) Harvest rates:** The biomass of Atka mackerel in the Aleutian Islands is large but the harvest rates have been very low (8%) and declining since 2001. The biomass of p-cod and pollock comprise a very small portion of the groundfish biomass in the Aleutians [Figure 6]. The directed pollock fishery has been closed since 1999 and harvest rates are very low (1%) with incidental catch only. The BIOP overstates the harvest rates on Aleutian Islands p-cod by using trawl survey biomass to represent total AI p-cod biomass (where Age 3+ biomass estimate is on average 2X to 2.5 X times larger than trawl survey biomass). BIOP Table 5.2 use of trawl survey biomass (instead of total p-cod biomass) effectively doubles the harvest rate for p-cod.

**Scientific Review Panel:** “The available data and analyses indicate that current harvest rates of Atka mackerel have been too low, and the population of Pacific cod has been too small for the fishery on either species to cause nutritional stress in sea lions. Modeling efforts by NMFS reported in the BiOp support this observation, especially the lack of an effect of the Pacific cod fishery on sea lion biomass.”<sup>59</sup>

**New information (and information not considered in the BIOP but was available):** Scientific Review Panel; 2010 AI trawl surveys; Ormseth 2008; SSL fishery and oceanographic analysis “footprint analysis”



**Figure 7:** (From Independent Scientific Review, p. 37, Figure 4.6.—Estimated biomass of Atka mackerel, Pacific cod, and pollock in Areas 541 – 543 combined with 95% confidence intervals from surveys for Atka mackerel. Data taken from [BIOP, Table 5.2] and Lowe *et al.* (2010).

<sup>59</sup> Independent Scientific Review of the Biological Opinion, Bernard et al, October 8, 2011, p. xiii.

**Atka mackerel:** While Atka mackerel is a significant portion of groundfish biomass in the Aleutian Islands (34-41% in 543 and 542), the stock has been managed conservatively and harvest rates are quite low (and declining since 2001).<sup>60</sup> The average overall harvest rate for Atka mackerel in the combined Aleutian Islands is 8% (1999-2009 average, range = 7% in 2009 to 12% in 2001).<sup>61</sup> The lowest harvest rates are found in Area 543 (as low as 4% in 2007).<sup>62</sup>

**Pacific cod:** In the rationale for the RPA, the BIOP makes repeated references to high harvest rates in the p-cod fisheries in Areas 543, 542, and 541. The BIOP arrives at these rates by placing catch over AI trawl survey biomass.

However, AI trawl survey biomass does not represent total biomass for p-cod. Trawl survey biomass is approximately one half of the estimate for Age 3+ biomass for Aleutian p-cod. The use of trawl survey biomass (BIOP Table 5.2) effectively doubles the harvest rate on p-cod. Estimates of Age 3+ biomass for Aleutian p-cod were available (and used in the Footprint Analysis and other NMFS documents). The BIOP used biomass values and harvest rates for Aleutian p-cod that are inconsistent with all other references.

For comparison, for EBS p-cod, the modeled biomass estimate (Age 0+) is on average **2.63 times larger** than the EBS trawl survey biomass estimate (2000-2009 average, range = 1.92 to 2.93).<sup>63</sup> There is currently no model for AI p-cod. However, the BSAI p-cod 2010 SAFE includes an estimate for BSAI Age 3+ biomass for 1988 to 2010<sup>64</sup> which can be apportioned into EBS and AI (84% EBS and 16% AI).

The Footprint Analysis<sup>65</sup> (p. 6) used this very method to estimate p-cod biomass in the Aleutians: *“Pacific cod biomass in the entire Bering Sea-Aleutian Islands (BSAI) region was assessed by Thompson et al. (2008b), who estimated that 16% of BSAI cod biomass resides in the Aleutian Islands management area (sea lion regions 1-5; Table 9). Annual BSAI cod biomass estimates for the years 1991-2008 were multiplied by 0.16 to estimate AI cod biomass.”*

Table 9 (p. 35) in the “Footprint Analysis” provides p-cod biomass estimates for the Aleutians (543, 542, 541) that are on average **2.49 X** times larger (1999-2008) than the biomass estimates found in BIOP Table 5.2 for the same time period.

Ormseth (2008)<sup>66</sup> also apportioned Age 3+ p-cod biomass to the AI using the same 84/16 apportionment method. Ormseth estimated an exploitation rate of 22% for AI p-cod in 2007 and a 2007 AI cod biomass of 153,600 mt (or 1.95 X larger than the BIOP 2007 cod biomass in Table 5.2). Using BIOP Table 5.2 results in a harvest rate for AI p-cod of 43% for 2007 – or double the estimate by Ormseth (22%). Ormseth 2008 was not cited or included in the BIOP.

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<sup>60</sup> Final BIOP, Table 5.3.

<sup>61</sup> Independent Scientific Review Panel, Table 4.3, p. 36

<sup>62</sup> Final BIOP, Table 5.3.

<sup>63</sup> 2010 BSAI Pacific cod SAFE, Tables 2.12b and 2.25a

<sup>64</sup> Ibid. Table 2.4, p. 84.

<sup>65</sup> SSL fishery and oceanographic analysis BIOP 2010, February 11, 2010, p. 6. “Footprint Analysis”.

<sup>66</sup> Ormseth et al 2008, Summary of biological information regarding differences between Pacific cod in the EBS and AI, September 2008, p. 9.

**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%
<b>Average</b>	<b>32%</b>	<b>15%</b>	<b>12%</b>

Since the total biomass of p-cod in the Aleutians is underestimated in the BIOP by more than 50%, the inferences from the fishery effect of prey removals are greatly overstated in the BIOP for the total AI region, by management area, and in CH.

**9.) Multi-species model:** Results from multi-species modeling described in the final BIOP generally show that restricting fisheries does not appreciably increase sea lion biomass in the AI. While NMFS has been encouraging the regional fishery management councils to use an ecosystem based approach to fisheries management, the final BIOP chose to dismiss the results of the food web modeling and rely on a single species model that did not account for predator-prey relationships.

The draft BIOP included single species modeling for AI management areas (Ianelli, July 2010) that projected the potential increase in Atka mackerel and p-cod biomass from restrictions on fishing. The only management scenarios run for Area 543 for p-cod are “no fishing” and “status quo.”

The final BIOP included multispecies modeling in the AI (Aydin 2010) that estimated the Atka mackerel/p-cod interactions in the AI and potential effects from restrictions on fishing.

Aydin 2010 notes the presence of large p-cod in the Aleutians that predate on Atka mackerel. *“Larger p-cod (fork lengths between 80-100 cm) tend to be numerous in the western Aleutian Islands (542-543) while smaller cod are more numerous in the east (541).....with larger cod in 543 consuming the most Atka mackerel by weight of any portion of the cod population.”*<sup>67</sup>

Given the effect of large cod feeding on Atka mackerel, Aydin 2010 concluded it is reasonable to expect that a spatially-explicit model would show that an increase in p-cod would cause a decrease in Atka mackerel. *“Decreasing fishing on Pacific cod would have little or no, or even potentially deleterious impacts on increasing prey supply to SSLs.”*<sup>68</sup>

<sup>67</sup> Aydin 2010, p. 9.

<sup>68</sup> Ibid, p.10.

Results from food web modeling show a small expected increase of 6% in SSL biomass and a decrease of -20% in pollock biomass from restrictions on the Atka mackerel fishery.<sup>69</sup> NMFS chose not to use the results of multi-species food web model (ecosystem management approach) by citing the number of model assumptions and uncertainty. The BIOP cites Van Kirk 2010 incorrectly for its rationale in selecting the simplest model. Van Kirk 2010 notes the sensitivity of model outputs to parameter bounds and assumptions but advocated simplifying the modeling assumptions not just selecting the simplest model.<sup>70</sup>

The Independent Science Review Panel noted: *“It is true that food-web models will have more parameters than single-species models and are more complex. However, using single-species models in this instance ignores the strongest scientific information available—the knowledge that the dynamics of these species are linked. Using single-species models as was done in evaluating the effectiveness of RPAs ignores best science in favor of methods that have a guaranteed outcome. The advice in Van Kirk et al. (2010) is to pick the simplest model that meets objectives, not just pick the simplest model.”*<sup>71</sup>

## 10.) Scat and FO:

**New information:** “Diet of the WDPS from 1999-2009”.

The BIOP puts a large emphasis on “frequency of occurrence” (FO) in scat for determining “fisheries of concern” (Figure 4.24). “Fisheries of concern” are described as those fisheries with greater than 10% FO – but the BIOP provides no rationale for selection of that threshold. While it is reasonable to conclude that Atka mackerel is an important prey species in the AI, therefore the fishery may be of interest (though harvest rates are quite low and biomass is large and increasing). However, a scientific explanation is lacking to support the BIOP conclusion that AI p-cod fisheries are “fisheries of concern”. There are a large number of shortcomings in the FO data presented in the 2010 BIOP – as there was in the 2001 BIOP.

The 2001 BIOP Review Panel also noted that, *“The reliance on frequency of occurrence as the measure of the relative importance of prey is fraught with problems, and more informative and reliable measures should be sought.”*<sup>72</sup>

Frequency of occurrence does not represent a proportion of SSL diet. The Independent Review Panel noted that *“Frequency of occurrence is the percentage of fecal samples that contained the parts of one or more individual species or taxon of prey. They do not sum up to 100%, which means that a species with a 10% frequency of occurrence could ultimately represent less than 1% of a sea lion diet.”*<sup>73</sup>

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<sup>69</sup> Ibid, p. 5

<sup>70</sup> “Interactions in a multispecies age-structured assessment model in the Gulf of Alaska”. Kray et al 2010.

<sup>71</sup> Independent Scientific Review Panel, p. 65.

<sup>72</sup> “Review of the November 2000 BIOP and ITS with Respect to WDPS SSLs with Comments on the Draft August 2001 BIOP”, Bowen et al, September 2001, p. 8.

<sup>73</sup> Independent Scientific Review Panel, p. 29.



Frequency of occurrence can over-represent fish with harder bones that are more difficult to digest such as p-cod. Tollit et al 2009<sup>74</sup> found that standard hard parts analysis overestimated the FO of fish with harder bones (such as gadids and sculpins) and underestimated the FO of fish with softer bones (such as salmon and skates). Tollit compared standard hard parts analysis with DNA identification of species found in scat and found significant differences in relative diet contributions across scat.

Frequency of occurrence can also over-represent species that are found consistently on a year round basis in an area (such as groundfish like Atka mackerel, pollock, and p-cod) as well as under-representing important prey species (such as salmon) that may be available for a shorter period of time. The timing of the scat collection within a season can also influence the FO of these prey items. The BIOP provides little information on the status of important high caloric forage species such as salmon, herring, and sand lance in the Aleutian management areas.

Though it is difficult to discern in the BIOP, no scat samples have ever been collected in the WAI in the winter. Unlike the 2001 BIOP, the 2010 BIOP obscures this fact by combining CAI and the WAI in scat and FO tables. It should be noted that in the BIOP scat tables, April is considered winter but in tables involving telemetry and seasonal use, April is considered summer. Many of the “winter” scat samples in the CAI/WAI were collected in April.

The 26% winter p-cod FO for CAI/WAI in the BIOP exceeds previous winter FO estimates by Sinclair and Zeppelin (16.9% for the whole AI region winter); and NMFS 2000 BIOP (17.2% for CAI winter and 21.4% for the EAI winter).<sup>75</sup> The source of the winter FO of 26% for p-cod in the BIOP for winter in CAI/WAI is Table 3.16 and Figure 3.23. The attribution for the table and figure in the BIOP is NMFS 2006b. However, NMFS 2006b in turn provides little information as to the source of the data as well as area and month collected.

The final BIOP text (p. 103) also suggests that p-cod is not an important prey item in the CAI/WAI: “*Based on scat collection, Atka mackerel, pollock, and salmon have been found to be the most commonly reported prey items both in the Russian Far-East and in the central and western Aleutian Islands (Sinclair and Zeppelin 2002, Waite and Burkanov 2006).*” And (p. 104) “*Pacific cod is also an important prey in winter, especially in the Gulf of Alaska and eastern Aleutian Islands*”. P-cod may be an important winter prey in the eastern Aleutian Islands; however this is the area where the SSL population is currently increasing.

Updated information on scat FO compares 1990-1998 to 1999-2009<sup>76</sup>. Of interest in Regions 1 (CGOA), Region 2 (WGOA), and Region 3 (EAI) is that the FO of sandlance has significantly increased in both summer and winter in the 1999-2009 time period in all three areas (where SSL populations are increasing). Region 4 (CAI/WAI – area of SSL decline) has little to no presence of sandlance in scat FO. Also in Region 4, the FO of pollock has increased in winter but not in summer.

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<sup>74</sup> “*Development and application of DNA techniques for validating and improving pinniped diet estimates*”, Tollit et al 2009, p. 1.

<sup>75</sup> NMFS 2000 BIOP, Table 4.5b for winter (1990-98).

<sup>76</sup> “*Diet of Western stock SSLs from 1999-2009*”, SSLMC presentation, July 2012. It should be noted that this presentation is of scat FO and FO does not represent total diet or percent of diet.

## 11.) Statistical studies of the relationship between fisheries and SSLs; FIT studies

**New information:** Independent Review Panel; Hui 2011; SSLMC FIT presentation

The draft BIOP presentation asserted the effect of fisheries on SSLs remains “equivocal” and the possibility that fishery interaction may be the primary cause of the observed declines in natality cannot be eliminated.

The final BIOP (p. 301) states “*At this time with available data, it is not possible to demonstrate a statistically significant relationship between commercial fisheries on pollock, cod, Atka mackerel and arrowtooth flounder and the productivity of Steller sea lions in the western DPS. However, it is also **not possible with the available data** to conclude that commercial fisheries are not having a significant impact on the recovery of the western DPS of the Steller sea lion.*”

But there were available studies and data to NMFS to make that conclusion – studies that examined the statistical association between fishing and SSL demographics. The Review Panel summarized the results of these studies in Table 3.1 of their report. “*However, results for years after 2000 are unequivocal. None of these studies found statistically significant associations consistent with harm by fisheries, that is, 100% of the tests resulted in outcomes consistent with the groundfish fisheries having had no effect on sea lion numbers in the last 10-20 years.*”<sup>77</sup>

Studies such as Calkins 2008 and Trites 2010 were available to NMFS but were given little consideration in the BIOP. These studies are cursorily referenced in the BIOP in lists of cited studies. But these studies did not show up in the actual draft BIOP text until the month before the release of the draft BIOP. For a measure of the consideration that was given to Calkins, it was incorrectly cited as Calkins 2006 in the draft BIOP. This is particularly disturbing – as this study was commissioned by NMFS and was available to the agency for two years. Dr. Calkins provided written testimony to NMFS at the August 2010 NPFMC meeting expressing his dismay at the scant consideration given his report in the draft BIOP. Trites 2010 (on the association between the Atka mackerel fishery and SSLs) was also given little consideration in the BIOP.

The BIOP included less than one page of qualitative discussion of the overlap between fisheries and SSL prey in terms of size and depth. Quantitative information as to the extent of overlap was readily available in previous BIOPs and numerous NMFS analyses. These studies were raised repeatedly in public comment but the overlap issue was never addressed in the final BIOP. Generally, fisheries operate in waters deeper than 100 meters and catch fish greater than the size of prey utilized by SSLs. The overlap of cod size between fisheries in the Aleutian Islands and SSLs can be as low as 5% for some AI cod fisheries. The exposure analysis of fisheries is a significant shortcoming of the BIOP and will be addressed by another industry panel member.

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<sup>77</sup> Independent Scientific Review, p. xii.

Fisheries Interaction Team studies (FIT) across areas found little fisheries effect on prey fields.

- A localized depletion study of pollock off Kodiak found variable pollock biomass abundance – but not due to fishing. Changes in pollock abundance caused by fishery are likely small compared to natural fluctuation.
- A localized depletion study of p-cod in the Unimak Pass/Cape Sarichef area found no difference in seasonal abundance between fished and un-fished areas. An opportunistic tagging study showed that cod were highly mobile.
- A tagging study on Aleutian Islands mackerel showed that the areas with the highest biomass (Seguam, Kiska, and Tanaga) had small rates of movement of tagged fish between inside and outside trawl exclusion zones (TEZ). The area of the lowest biomass (Amchitka) had large rates movement between inside and outside trawl exclusion zones.
- An Aleutians Islands food web model for the area inside the TEZ estimated there is currently sufficient Atka mackerel for consumption by SSLs and other predators – with large surpluses in the Seguam, Tanaga, and Kiska area with the exception being Amchitka (the area of the lowest biomass and most movement).

The final BIOP (p. 345) states that “*while fisheries cannot be **unequivocally** shown to be a causative factor in continued Steller sea lion declines in the western portion of the wDPS in Alaska, analysis of **available data** indicate that an adverse relationship between Steller sea lions and the commercial fisheries **may** exist in the western Aleutian Islands sub-region and portions of the central Aleutian Islands sub-region where two specific fisheries, for Atka mackerel and Pacific cod, target important Steller sea lion prey.*”

However, contrary to the above statement, for a JAM determination, ESA calls for showing that an action is actually causing appreciable harm.

If there is a selective use of data and studies to reach a conclusion, then that conclusion is pre-determined by design. By giving little consideration to the studies that examined the statistical relationship between fishing and SSLs, and the failure to examine the extent of overlap between fisheries and SSLs, the BIOP did not utilize the best available information. By omitting studies that would provide more specificity as to the overlap between fisheries and SSL, the BIOP appears to be artificially creating uncertainty where considerably more information and certainty did exist. Given the amount of available information that was not considered or not given adequate consideration in the BIOP, it is not too surprising that NMFS still was able to find the effects of fisheries “equivocal” in the final BIOP. However, the best available information does not support that conclusion or the determination for jeopardy and adverse modification.

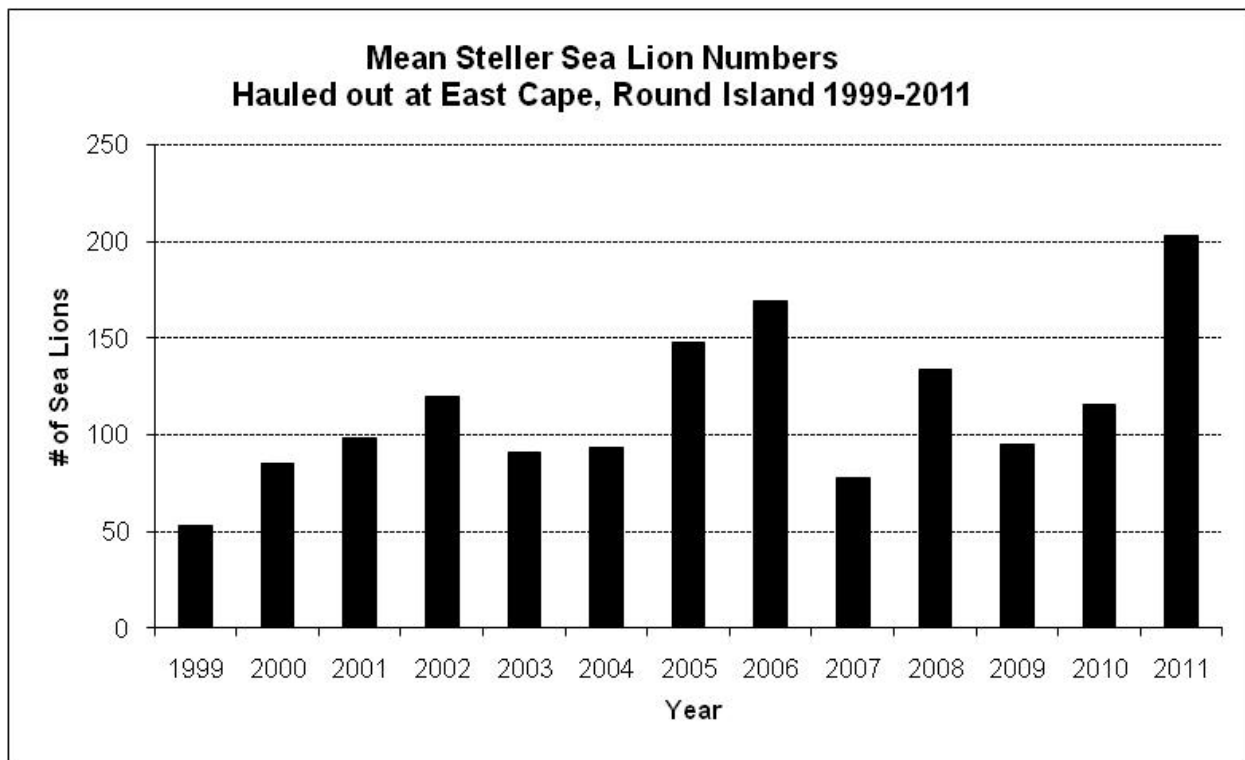
## 12.) Conclusions

- The total population of the WDPS has increased **+54% to 60%** since 2000. The best estimate of the total WDPS population in 2011 would be 77,000 – 80,000.
- The total population of the U.S. WDPS is **98%** of the recovery plan population downlisting threshold of 53,100 by 2015.
- The total pup counts in the U.S. WDPS in 2011 have increased **+4%** (from 2009; **+16%** (from 2005); and **+34%** (from 2002).
- The finding for jeopardy for the entire WDPS is not supported by the best available science as was concluded by the Independent Review Panel and Dr. Ian Boyd.
- The observations of Maniscalco 2010, Horning 2012, the Independent Review Panel, and the 2011 pup survey do not support the BIOP's contention that birth rates are continuing to fall in the CGOA (and by extension in the entire WDPS). In the CGOA, total pup counts increased **+16%** from 2009 to 2011. Pup counts at trend rookeries in the CGOA have increased **+29%** and **+33%** in the EGOA since 2004.
- The revised forage ratios in the final BIOP show that in 2008, the forage ratio in Critical Habitat in the Aleutian Islands is the highest of all areas and has increased **+39%** since 2000. The forage ratio in the WAI is highest (5X) of all the areas in the Aleutians.
- In the Western Aleutian Islands (543), the 2010 trawl survey biomass estimate for Atka mackerel increased **+151%** to 252,819 mt – with no new fishing restrictions imposed.
- The Aleutian Islands directed pollock fishery has been closed since 1998, however the biomass in 2011 is at the same level as 1998 – due to variability in recruitment.
- The forage ratios in Critical Habitat, the 2010 trawl survey, and Atka mackerel tagging studies do not support a finding of adverse modification of CH for the entire WDPS.
- The BIOP provides no quantitative information on SSL movement between sub-areas. In the Commander Islands in Russia, no branded SSLs have immigrated to the Medny rookery (while other Russian rookeries have on average 28% immigrants, 2002-2008). The Commander Islands have had 30 mile fishery closures since 1958.
- The biomass of Atka mackerel has increased in the AI and harvest rates are low (7%). P-cod comprises a small portion of the overall groundfish biomass in the AI, and the BIOP overstates harvest rates on AI p-cod by as much 2.5X times.
- The single species model does not incorporate predator-prey relationships. The multi-species food web model shows a small expected increase in SSL biomass and a decrease in pollock biomass from restrictions on the Atka mackerel fishery as well as potential deleterious effects on SSLs by restrictions on the p-cod fishery.

- The BIOP does not include any quantitative analysis of the overlap between fisheries and SSLs in terms of size of prey, depth, and spatial overlap. The AI fisheries are largely conducted in waters deeper than 100 meters (50 fathoms) on fish that are larger than those eaten by SSLs. The BIOP includes one half of one page of a qualitative discussion of overlap with the fisheries.
- The use of Frequency of Occurrence (FO) in the BIOP is fraught with numerous problems and does not represent percent of diet. Little rationale is provided for the ten percent threshold for a “fishery of concern”. The BIOP provides little information on the status of non-groundfish prey (salmon and herring) in the Aleutians.
- The BIOP gives little considerations to studies that examined the relationship between fishing and SSLs such as Calkins 2008 and Trites 2010. The Independent Review Panel found that since 2000 the studies are unequivocal and none of these studies found statistically significant associations consistent with harm by fisheries. FIT studies do not support persistent localized depletion due to fishing.

**Appendix I: Walrus Islands (Round Island in the EBS): SSL Mean Numbers, 1999-2011**

From: “Walrus Islands State Game Sanctuary Annual Management Report, 2011”, Sell and Weiss, ADF&G, December 2011.



**Figure 9. Mean Steller sea lion counts on Round Island 1999-2011. (\*Data prior to 2009 may be underrepresented. A new viewpoint established during the 2008 season allows better visibility and more complete counts of the whole haulout.)** From ADF&G Special Areas Management Report, p. 15.

## **Appendix II: Assessing the effectiveness of conservation measures: resolving the “wicked” problem of the Steller sea lion: I.L. Boyd. (Summary by Boyd)<sup>78</sup>**

- The analysis looks at the SSL population as a whole, and at the Eastern Distinct Population Segment (EDPS) and Western Distinct Population Segment (WDPS) individually.
- All other things being equal, future scenarios based on information about historical dynamics suggest that the SSL meets conservation objectives for the population as a whole and also for the EDPS and WDPS segments.
- For the Western DPS, the population meets the conservation objective (less than 1% chance of extinction in 100 years) under all scenarios.
- The “pup ratio” suggests current population productivity is close to or above the long-term mean.
- Although there are differences, pup production rates based upon the pup ratio are similar between the EDPS and WDPS when all sites are considered. WDPS appears to be at long term mean, EDPS is somewhat higher.
- Current population levels may be close to long-term mean but depends on interpretation of pre-1980 counts;
- There is uncertainty about the relationships between trends in western and east parts of the range but there is a suggestion of a shift in population distribution from west to east;
- The evidence from changes in numbers and pup ratios suggest there may have been some emigration from west to east in the 1980s although this would need to be confirmed by targeted genetic studies.
- Past measures to prevent decline and promote population increase have been either neutral or successful at preventing further decline.
- Long-term stability suggests the SSL population may be close to carrying capacity.

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<sup>78</sup> From cover letter of April 13, 2010 to NPFMC.

### **Appendix III: Independent Scientific Review Panel Findings<sup>79</sup>**

- A.)** The conclusions in the BiOp regarding the finding of jeopardy and its posited cause (nutritional stress from food competition with fisheries) do not follow logically from scientific, economic, and social information presented in the BiOp and attendant documents.
- B.)** The conclusions are contradicted both by information presented in the BiOp as well as information not presented in the BiOp.
- C.)** The conclusions cannot be characterized as “the most likely scientific explanation” given the current state of knowledge, because they are not supported by the scientific evidence.
- D.)** Two leading alternative scientific explanations for the apparent population dynamics of the WDPS of Steller sea lions were not thoroughly considered.
- E.)** Although the Reasonable and Prudent Actions are consistent with the hypothesis underlying the conclusion of jeopardy, modeling results reported in the BiOp suggest they will have little effect on Steller sea lion numbers.
- F.)** The RPAs are not relevant to the recovery of Steller sea lions.
- G.)** The BiOp and RIR do not demonstrate that the RPAs are likely to minimize economic and social impacts compared with potential alternatives which would achieve the same benefit for Steller sea lion recovery.
- H.)** The RPAs are unlikely to meet recovery goals for the WDPS of Steller sea lions.
- I.)** The scientific record reported in the BiOp is extensive and cites most of the relevant literature. However, the BiOp does not accurately reflect the scientific evidence in the literature it reports.
- J.)** There is little evidence that relevant peer and public comments were considered in developing the BiOp, particularly in its analysis of jeopardy.

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<sup>79</sup> Independent Scientific Review of the Biological Opinion, Bernard et al, October 8, 2011, p. 95-98

## **Appendix IV:**

### **A.) Information not included in the BIOP (and may have not been available).**

- 1.) No winter scat data collected in the WAI (BIOP obscures by lumping CAI/WAI).
- 2.) No SSLs tagged with telemetry in the WAI.
- 3.) No transient killer whale population estimates for the WAI.
- 4.) No direct evidence of nutritional stress.
- 5.) No vital rates in WDPS areas other than CGOA.
- 6.) No natality rates in WDPS areas other than CGOA (excluding pup/non-pup ratios).

### **B.) Information not included in the BIOP (but was available).**

- 1.) Quantitative extent of potential size overlap between AI fisheries and SSL prey.
- 2.) Quantitative extent of depth overlap between AI fisheries and SSL dives (mean and 90%).
- 3.) Total biomass estimates for groundfish in AI – as opposed to survey biomass.
- 4.) Quantification of extent of movement of SSLs – from brand/re-sight information.
- 5.) Quantification of natal fidelity to rookeries by females (from brand/re-sight).
- 6.) POP observations of killer whales in the AI – particularly in the WAI.
- 7.) No significant negative relationship between fisheries and SSL population since 2000.

### **C.) Information referenced in the BIOP (but given little consideration).**

- 1.) Multi-species food web model.
- 2.) Calkins 2008
- 3.) Trites 2010 and Dr. Trites comments on the draft BIOP.
- 4.) Dr. Ian Boyd research comments on SSL population structure.
- 5.) Burkanov presentation on brand/resight in Russia and natal fidelity.
- 6.) Revised forage ratios showed AI productivity higher than other areas.
- 7.) Studies on contaminants.
- 8.) Killer whale predation studies (and sudden trauma of SSLs studies).
- 9.) 2010 AI trawl survey (in forage ratios only).

### **D.) New information available since the release of the BIOP (partial list)**

- 1.) 2010 SSL non-pup survey.
- 2.) 2011 pup and non-pup surveys.
- 3.) Counts and sightings at Round Island and St. Lawrence.
- 4.) 2010 and 2011 SAFE documents for AI pollock, Atka mackerel, and BSAI p-cod.
- 5.) 2010 AI trawl surveys
- 6.) 2011 Russian population estimates.
- 7.) Hui 2011 – “*SSLs and Fisheries, Competition at Sea?*”
- 8.) Horning and Mellish 2012, “*Predation on an upper trophic marine predator, the SSL.*”
- 9.) Presentations at SSLMC on scat, killer whales, FIT studies, SSL movement.