CIE Presentation

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on behalf of Oceana, Ocean Conservancy, Greenpeace, and World Wildlife Fund
Steller Sea Lion
• Why we’re here

• Ecological footprint of fishing

• Ghosts of past overfishing and current high exploitation

• Problem not limited to Western Aleutians
• Successive SSL BiOps in 1998, 2000 and 2010 have concluded that fisheries reduce Steller sea lion prey resources, that fishing-induced reductions of prey in critical habitat are likely to reduce the ability of that habitat to support sea lions, and that a sustained reduction of prey resources across a broad geographic region (i.e., ecosystem) can reduce the carrying capacity of sea lions.
- large-scale removals of marine fish biomass *can* and *do* have significant short-term and long-term effects on food webs, habitats and the community of species in exploited marine ecosystems, and they can be ecosystem-altering in their cumulative effects.

- the Report to Congress of the Ecosystem Principles Advisory Panel (EPAP 1999) concluded that fisheries can be viewed as a keystone predator and should be expected to have profound effects on ecosystems.

Figure 1. Primary production required (PPR) to sustain global marine fisheries landings expressed as percentage of local primary production (PP).

http://www.plosone.org/article/info:doi/10.1371/journal.pone.0015143
More than 5 million metric tons (11 billion lb) of groundfish were caught in the Aleutian Islands between 1960 and 2011.
- 11 factory trawler (11 “boats”)
- 295 feet long
- Average ~ 40 mt haul after trawling for several kilometers
Observed Pup : Non-pup ratios are the best available proxies for natality outside of the central Gulf

- Pup/adult female ratios in the western Aleutian Islands are the lowest of any of the wDPS sub-regions (0.29), while all other regions range from 0.37 to 0.42 (BiOp xxviii).
Figure 2. Change in the number of Steller sea lion pups counted (or estimated for 7 sites in the western part of the central Aleutian Islands) at major haul-out and rookery sites between 2009 and 2011 in the western DPS in Alaska. Sites are displayed from west (left) to east (right) in AK, and are grouped into the sub-areas noted in Figure 1. ALEU = Aleutian Island; GULF = Gulf of Alaska; W = western; C = central; E = eastern.
Life History transmitters and branding data tell the same story

- Horning and Mellish (2012) conclude that juvenile survival in the PWS-Kenai Fjords region of the eastern Gulf of Alaska (RCA 10) continues to be very low and threatens recovery. However:
  - LHX data were for ages 2-5 only, whereas branding data cover ages 1-5
  - LHX tags were heavily skewed to males (28 of 36 animals), which have a higher juvenile mortality than females
  - Horning and Mellish compared mostly male survival from the LHX study to female-only survival estimates in Holmes et al. (2007), hence the apparent discrepancy
  - When LHX-tagged females and males were combined and compared to results from branded animals for years 1-5, they showed nearly identical cumulative survival in the 2000s
  - Moreover, the eastern Gulf of Alaska population (encompassing the LHX study area) is increasing at +5.8%/year (non-pups, 2000-2011), the most robust growth rate of any region in the wDPS
• All of which indicates:

– Survival to maturity is *not* currently low in the eastern GOA, but in fact is consistent with survivorship rates from Holmes et al. (2007)
– Natality rates considerably <1.0 were apparently capable of sustaining a robust population in the 1970s (Pitcher et al. 1998), and estimates at one EGOA rookery indicate that present natality rates may be comparable to the 1970s at that site
– KW predation on eastern GOA juvenile SSLs is not preventing sufficient female recruitment to reproductive age to support a growing population today
– EGOA SSLs are *not* in a predator pit
• Killer whales don’t cause reduced natality
Figure 3. Annual rate of change in total Steller sea lion pup counts at trend rookeries within each sub-area of the western DPS in Alaska between 2001/02 to 2011. DPS = distinct population segment. Sub-areas shown in Figure 1. Red = declining significantly ($P \leq 0.05$); Green = increasing significantly ($P \leq 0.05$); Black = rate of change not significantly different from 0 ($P > 0.05$).
SSL prey species have already been reduced by fisheries to 50% or less of unfished biomass

Atka mackerel
2012 status: 50% of unfished
2013 (projected): 40.6% of unfished

Aleutian pollock
2012 status: 30% of unfished
2013 (projected): 31.2% of unfished
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<th>Effect of the Fishery</th>
<th>Possible Outcome</th>
<th>Implications for Management</th>
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<td>Reduction in the spawning biomass of multiple target (prey) stocks (e.g., 60% on</td>
<td>• Reduction in overall availability of prey could reduce predator carrying capacity</td>
<td>• This effect could be very detrimental to the predator, even though the gross quantity of</td>
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<td>average)</td>
<td>by a similar large amount</td>
<td>remaining prey biomass might be judged to be enough to supply the food demands of the</td>
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<td>• Could push the predator over an energetic cost-benefit threshold, where the</td>
<td>predator</td>
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<td>predator now expends more energy searching for its prey than it gains from</td>
<td>• Very difficult to detect by monitoring predator and prey populations</td>
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<td>consuming it</td>
<td>(Malavear 2002)</td>
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Daniel Goodman (Chair) et al. (2002), Scientific Review of the Harvest Strategy Currently Used in the BSAI and GOA Groundfish Fishery Management Plans, Prepared for the NPFMC.
Fishing mortality

• Good pressure indicator of fishing on the ecosystem
• Past overfishing of Aleutian Pollock and collapse of Aleutian Basin Pollock
• Fishing mortality on Atka mackerel and Pacific cod in the Aleutians has increased significantly
Aleutian Pollock

Figure 1A.20  Fishing mortality rates (left) and fits to total catch in 1,000s of tons (right) for AI pollock over time 1978-2009. Fishing mortality rates are based on the average over ages 2-15.
Figure 17.5. Bottom-trawl survey CPUE distributions of Atka mackerel catches during the summers of 2004, 2006, and 2010.
Aleutian Atka mackerel biomass trend (2011 assessment)

From Lowe et al. 2011. Assessment of the Atka mackerel stock in the Bering Sea/ Aleutian Islands
Atka mackerel age 3+ Biomass in the Aleutians

- Biomass (mt)
- Linear (catch (mt))

$R^2 = 0.5469$
Atka mackerel exploitation rate in the Aleutians
Percent of age 3+ biomass removed
Atka mackerel consumption

Based on substantially larger 1994 sea lion population which was already in decline

From Aleutian Islands Fishery Ecosystem Plan (2007)
• Aleutian ecosystem particularly sensitive to increases in Atka mackerel mortality
Trites et al. 2010

• Is analysis as informative as author concludes?
  – Catch per haul is poor measure for CPUE and is non-standardized– boats may trawl until net is full or only deploy net in known areas
  – Apparent positive relationship btw fishing and sea lion trends could be due to similar response of catch, hauls, and sea lions increases when fish abundance increases
Pacific cod (Aleutian)

- Still managed and assessed as 1 stock from Bering Sea to Aleutian Islands
- Aleutian-specific stock assessment in progress
- Survey biomass estimates show clear decline
Aleutian Pacific cod biomass trends (2011 preliminary stock assessment)

Figure 1. Time series of biomass as observed by the trawl survey and estimated by the Kalman filter, with 95% confidence intervals. Values along the horizontal axis have been offset slightly for the Kalman filter to make the graph easier to read.
Aleutian cod biomass and catch trend
Fishing pressure on the Aleutian cod stock has increased dramatically.
Insight

An Empty Donut Hole: the Great Collapse of a North American Fishery

Kevin M. Bailey

ABSTRACT. Walleye pollock (Theragra chalcogramma) is North America’s most abundant and lucrative natural fishery, and is the world’s largest fishery for human food. The little-known demise of the “Donut Hole” stock of pollock in the Aleutian Basin of the central Bering Sea during the 1980s is the most spectacular fishery collapse in North American history, dwarfing the famous crashes of the northern cod and Pacific sardine (Sardinops sagax). This collapse has received scant recognition and became evident only in 1993 when fishing was banned by an international moratorium; nearly 20 years later it has not recovered. The history of fishing in the North Pacific Ocean after World War II offers some insights into how the Donut Hole pollock fishery developed, and the societal and economic pressures behind it that so influenced the stock’s fate. Overfishing was, without a doubt, the greatest contributor to the collapse of the Aleutian Basin pollock fishery, but a lack of knowledge about population biocomplexity added to the confusion of how to best manage the harvest. Unfortunately, the big scientific questions regarding the relationship of Donut Hole fish to other stocks are still unanswered.

Key Words: Aleutian Basin; Bering Sea; commercial fisheries; conservation; North Pacific; Theragra chalcogramma; walleye pollock

INTRODUCTION

It was a blustery, gray day in February 1986, and I was on a National Oceanic and Atmospheric Administration (NOAA) research ship in the middle of the commercial fleet fishing in the “Donut Hole”, an international zone in the middle of the Bering Sea between the coastal waters of the U.S. and USSR (Fig. 1). I counted 60 large factory trawlers around us belonging to four or five different nations. They lined up in a pattern of several rows to take turns dragging across a thin layer of Alaska pollock at about 400 m depth, fishing with cavernous nets that opened 45 m high for durations of several hours. That year, the Donut Hole sustained a “reported” winter catch of about 1 million tons. In hindsight, I was witnessing the extirpation of pollock in the Aleutian Basin.

Walleye pollock (Theragra chalcogramma), better known as Alaska pollock, is North America’s most abundant and lucrative fishery, making up about 40% of the total U.S. fisheries landings, with a gross value of more than U.S.$1 billion annually. It is the world’s largest human food fishery. Pollock in the eastern Bering Sea is considered to be one of the world’s best managed populations due to the observed stability in commercial landings (Morrison et al. 2009). However, in spite of the best efforts of harvest managers to engineer stability, fisheries ebb and flow as their target populations cycle through periods of high and low abundance.

Recent red-flag news articles in The Economist (2009) and Science (Morell 2009) expressed alarm about the health of the major stock of pollock that lives on the eastern Bering Sea shelf. Beyond the shelf, the little-known rise and fall of the pollock fishery in the Aleutian Basin (the deepwater between the continental shelves of Russia and United States) of the central Bering Sea during the 1980s ranks among the most spectacular fishery collapses to occur in the modern history of fisheries in the northern hemisphere, sharing that dubious honor with the coastal Norwegian spring spawning herring collapse of the 1970s. How did this happen and escape widespread attention?
“the most spectacular fishery collapse in North American history”

SSL Range-wide Non-pup Tren...
Steller Sea Lion Protection Measures in the Western Aleutian Islands

- Haulouts
- Rookeries
- Seasonal protections
- Year-round protections
- Designated Critical Habitat
- US Exclusive Economic Zone

Arctic Ocean
Bering Sea
Chukchi Sea
Beaufort Sea
Russia
Canada
Alaska
Pacific Ocean
Gulf of Alaska
SSL used to breed on St. George, St. Paul and Walrus Island. Today the only remaining rookery is on Walrus Island.

In 2005, the pup count at Walrus Island totaled 29, down from 2,866 pups born in 1960 – a 90% decline.

There have been no pup counts at Walrus Island rookery, since 2005.

This sole remaining rookery in the Pribilof Islands is at risk of extinction.
SSL Range-wide Non-pup Trends

Steller Sea Lion Range, Stocks, Terrestrial Sites
- Rookeries
- AK Major Haulouts
- Haulouts
- Critical Habitat w/DPS in AK
Past status of Steller sea lions on the Pribilof Islands

- Dalnoi Point on St. George Island is the major SSL haul out in the Pribilof Islands.

- Given the geographical isolation of the Pribilof Archipelago, the winter haulout sites on St. Paul and St. George Islands are very likely to be important for the sole remaining Pribilof breeding population at Walrus Island and for young of the year from this and other breeding areas during winter.

- Dalnoi Point Critical Habitat is closed to fishing only to 3 nm, despite the fact that St. George Traditional Council has repeatedly requested increased protection out to 20 nm, during previous meetings of the SSL Mitigation Committee.

- Steller sea lions are using haulouts on St. George in numbers that require a greater level of protection than that which is currently provided.
Pribilof sea lions and the 2010 BiOp

- Rookery Cluster Area 6 includes both the declining Pribilof Islands population and the stable or increasing eastern Aleutian Islands population thereby diluting the serious declines at the Walrus Island rookery.

- The Recovery Plan for the Steller Sea Lion states that “Because all parts of the range are currently occupied, it would be wise to maintain those populations as viable entities”.

- WWF recommends the Walrus Island rookery and Pribilof haulout areas be given special consideration in this analysis to use all means necessary to maintain the viability of the Pribilof breeding population.
The BiOp and the EA did not address the possibility of displaced fishing effort, and did not offer mitigation or other solutions to displaced effort.

- Has fishing effort increased around the Pribilof Islands or other areas due to the RPA fishing closures?

- If so, what actions have been taken to mitigate the increased fishing effort to protect the SSL populations in areas with additional fishing pressure (e.g. the Dalnoi Point haulout area)?
Recommendations for the CIE...

- Re-examine the Rookery Cluster Area that encompasses the Pribilof Islands and examine whether combining the Pribilofs with the Eastern Aleutian Islands places the continued existence of this historically important population at increased risk.

- Give guidance to NMFS and the Council moving forward as to how appropriately consider the to the geographically distinct and declining population in Pribilofs in the Rookery Cluster Area assessment, in order to best protect this unique area in the Bering Sea.

- Understand whether displaced fishing effort has impact SSL outside of the Areas 541 and 542 and if so, recommend mitigation.

- Recommend that NMFS consider additional protection measures for important Bering Sea haulout areas in the Pribilof Islands, especially if increased fishing effort occurred as a consequence of the BiOp Reasonable and Prudent Alternative (RPA).
Economic Effect of the RPA

-the effect on the groundfish fishery not as large as perceived

-Pacific cod catches in the BSAI have increased overall and are larger than prior to the RPA – increased harvests from the increasing Bering Sea biomass

-2011 Atka mackerel catch = 51,000 mt
-2010 Atka mackerel catch = 68,619 mt
Western Steller sea lion population decline

1950: 250-300,000

2012: 75,000
Steller Sea Lion