



Washington
Department of
**FISH and
WILDLIFE**

Pinniped Management

August 11, 2018

Nate Pamplin, Policy Director

Outline

- Life History and Abundance of Pinnipeds in WA
- Brief Review of Chasco et al. (2017) and Nelson et al. (2018)
- Marine Mammal Protection Act (MMPA) of 1972
- MMPA Case Study: Columbia River pinniped management
- MMPA legislation
- Preview of New Bioenergetics Modeling

Pinnipeds in Washington



Harbor Seal



Steve Jeffries

Harbor Seal Diet Overview

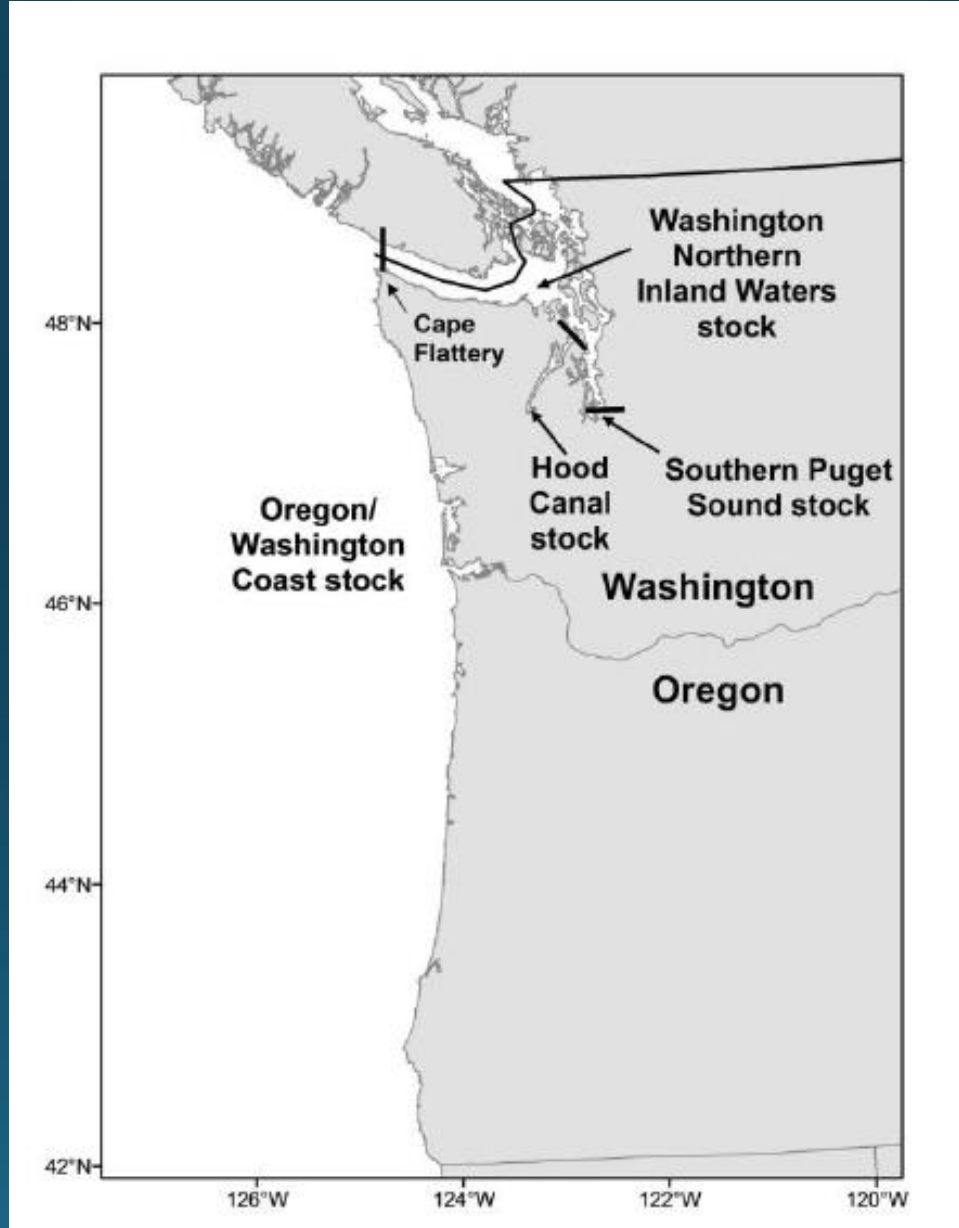
- Generalists
- In South Sound, diet consists of more than 50 fish species.
 - Diet dominated by hake, followed by forage fish (herring, sandlance, anchovies), surfperch, sculpins, and flounders. Octopus and squid were common.
 - Only 4% of scats had remains from salmonids. Both adult and juvenile salmon were present.

Harbor Seal Diet—Continued

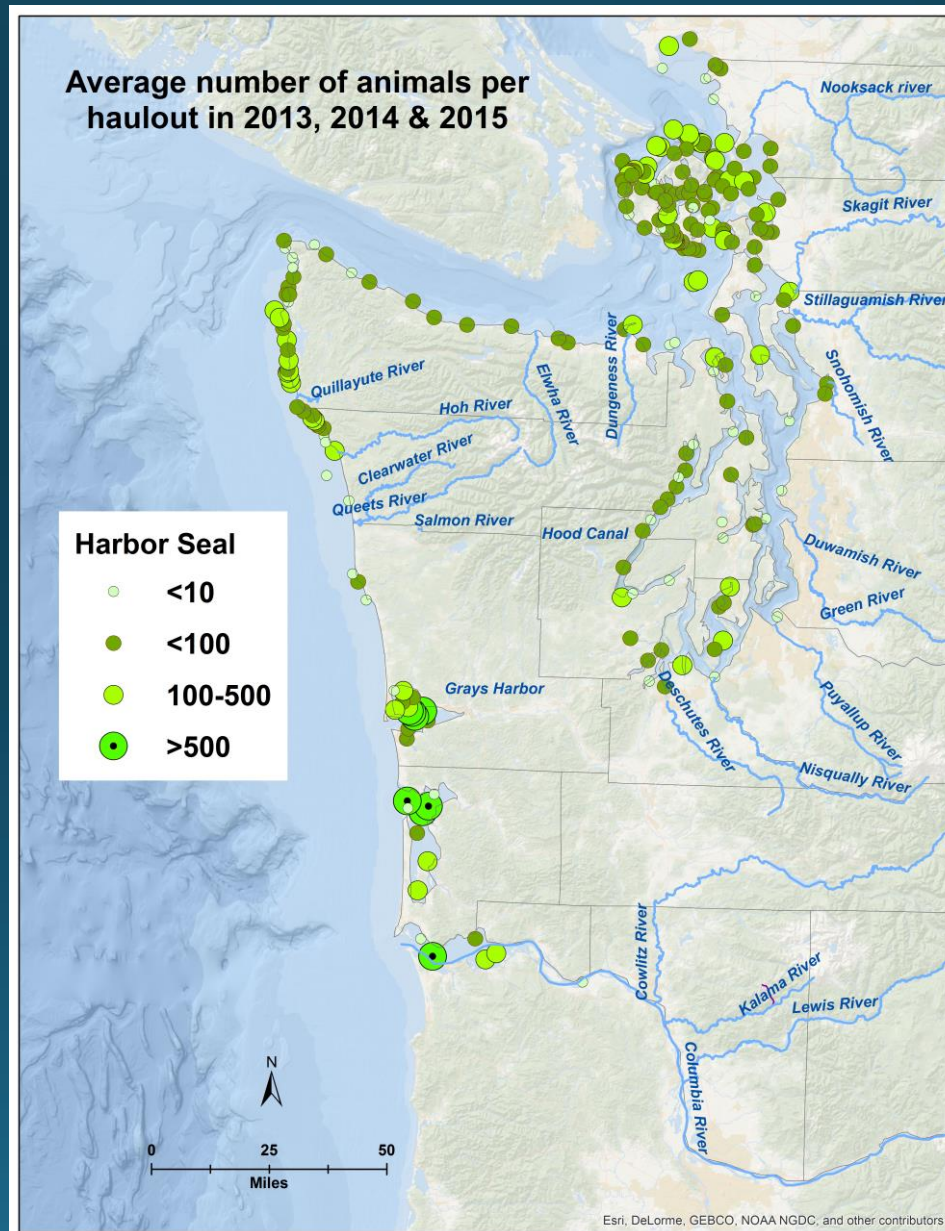


- Strait of Georgia (1990's)
 - Salmon = 1.3-8.6% salmon (Olesiuk 1993)
 - Chinook = 6% of salmon
- Strait of Georgia (2017)
 - Juvenile Chinook = 3%
 - Adult Chinook = 7% (Thomas et al. 2017)
- San Juan Island
 - Chinook 2% (Bromaghin et al. 2013)

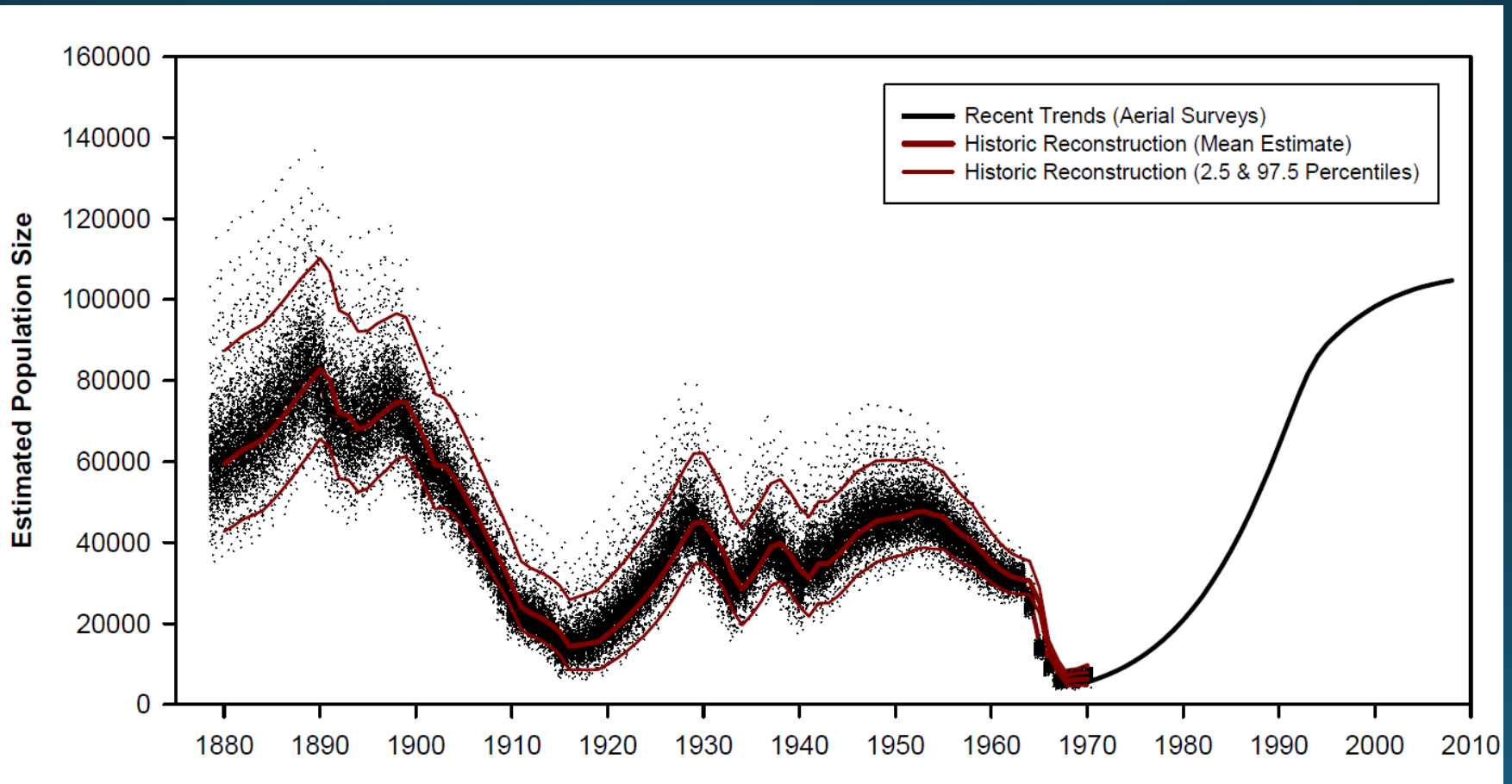
Harbor Seal Stocks in Washington



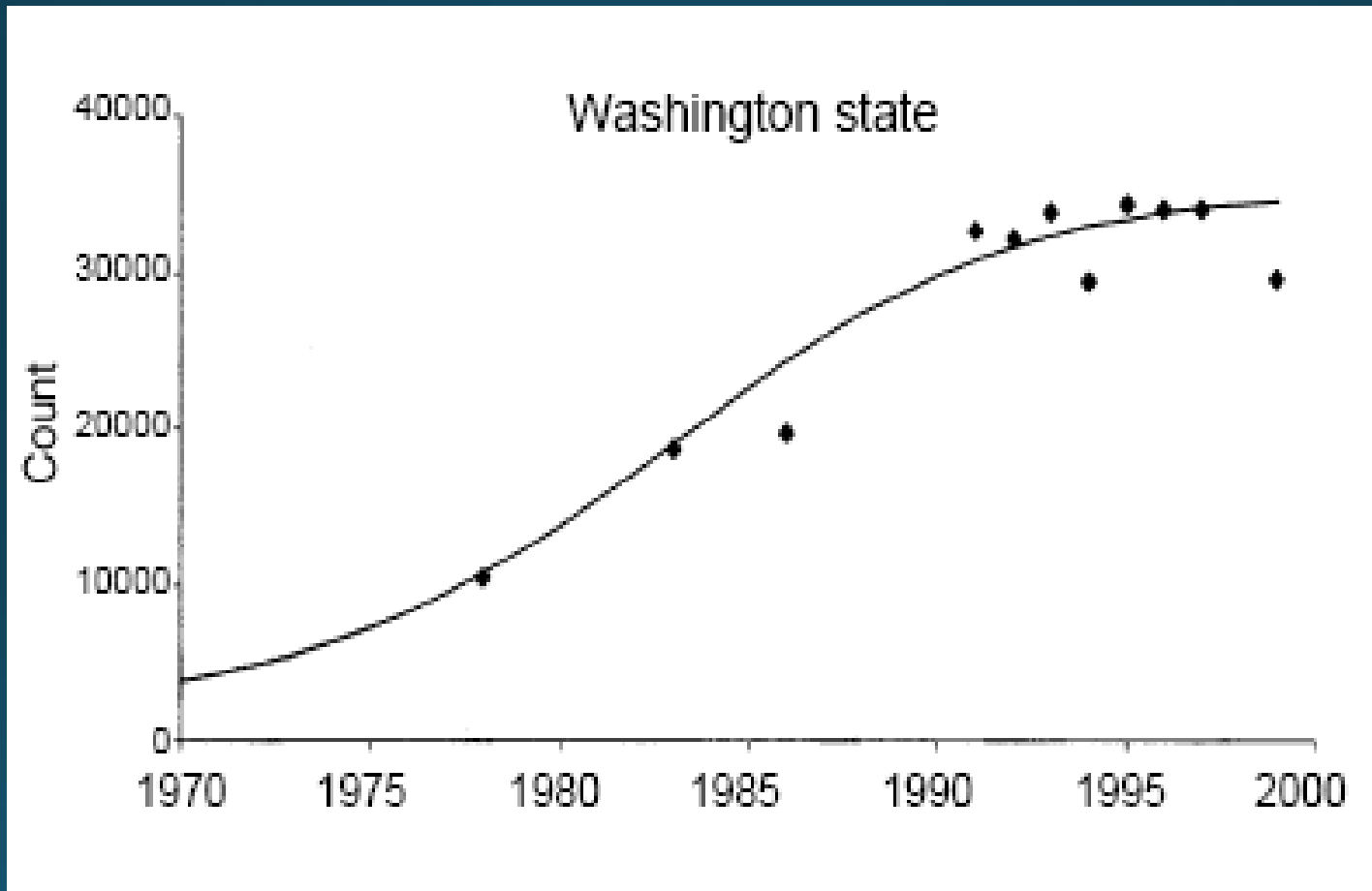
Harbor Seal Distribution



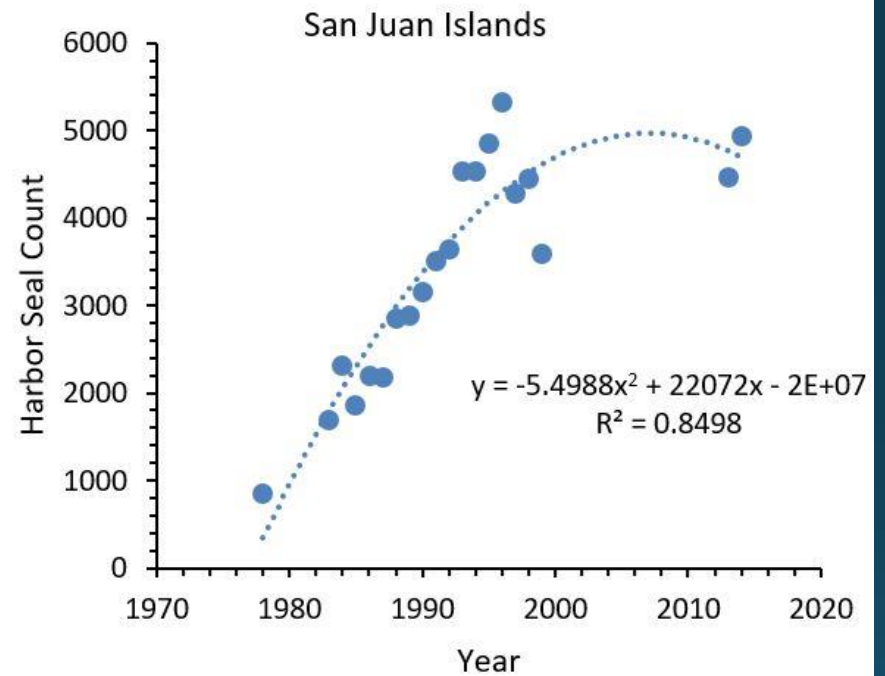
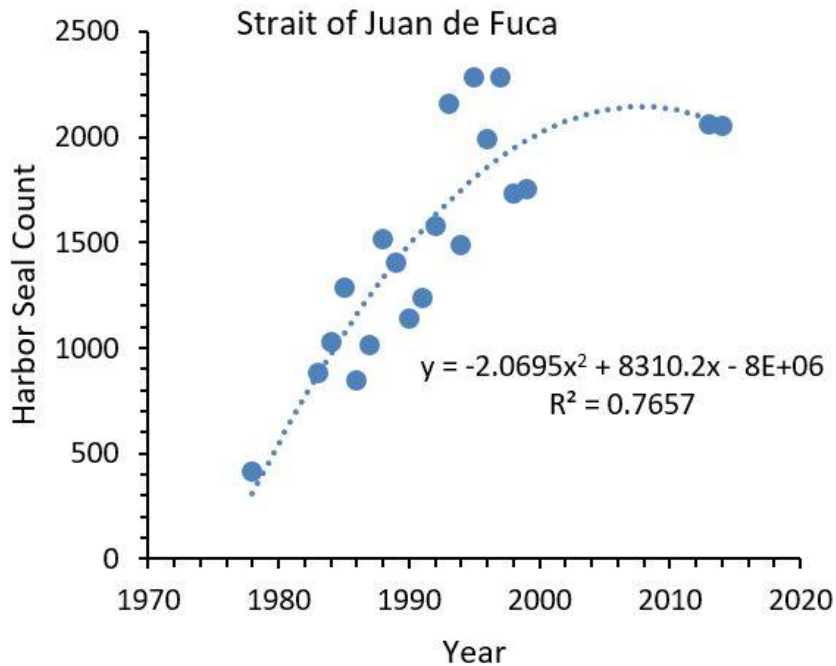
Department of Fisheries and Oceans Canada (DFO) Reconstruction of Historical Harbor Seal Abundance in British Columbia



Harbor Seal Abundance



Harbor Seal Recent Trends



California Sea Lion

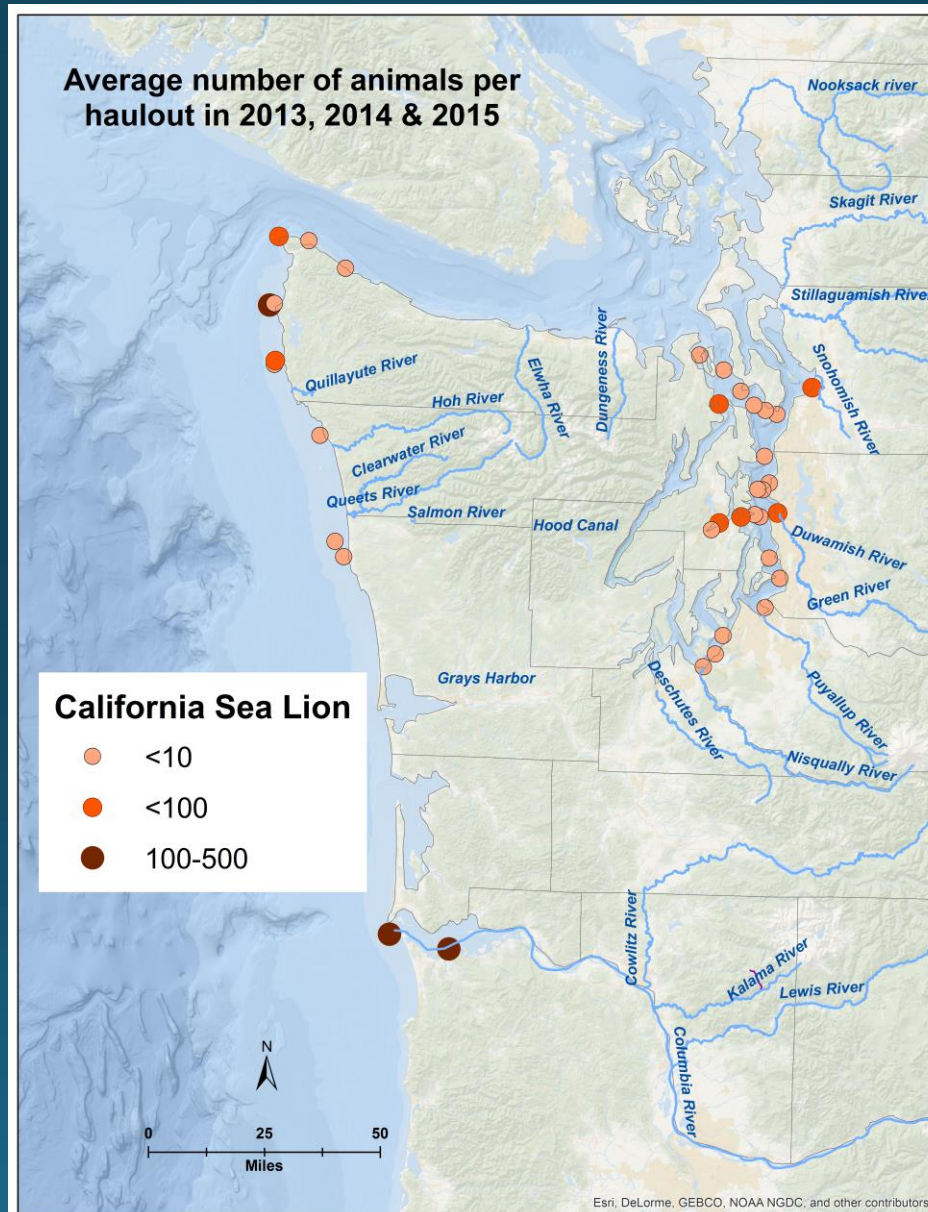


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California Sea Lion Diet

- Dominated by hake; followed by dogfish, salmon, forage fish (herring, smelt, sardine), pollock and squid.
- Salmon = 5-25% frequency of occurrence
 - Shilshole Bay, WA (1987) = 25% frequency of occurrence
 - Puget Sound, WA (1988) = 21 % frequency of occurrence
 - Everett, WA
 - April (1986) < 5%
 - May (1979) = 5%
 - Feb, May (1987) = 6%

California Sea Lion Distribution



California Sea Lion PNW Seasonal Distribution

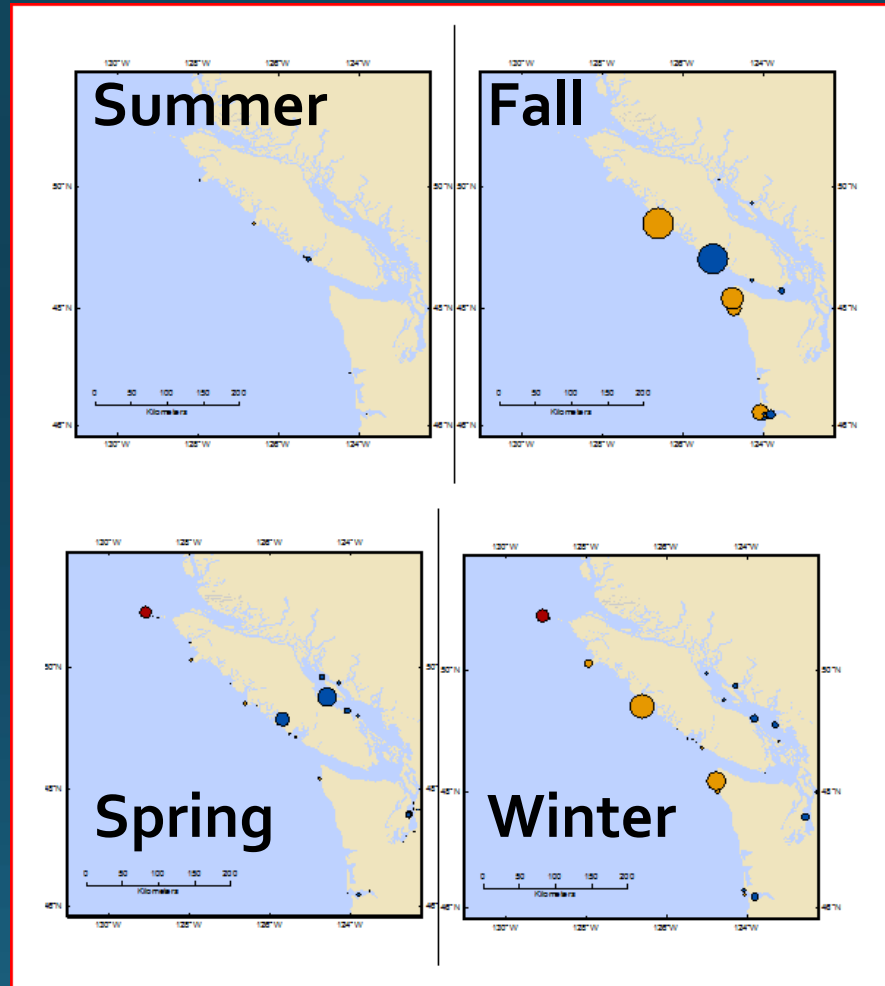
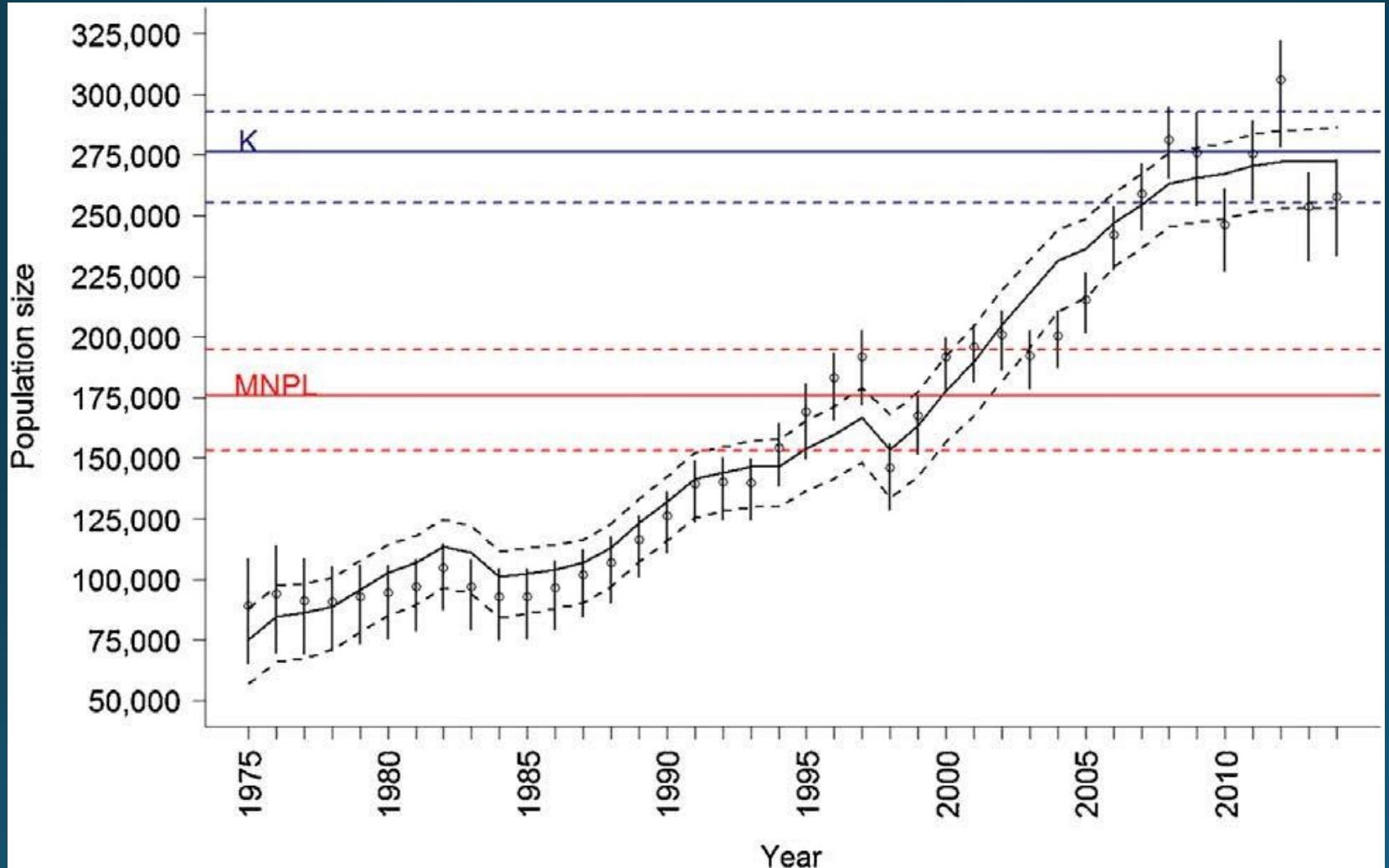


Figure 16. Maps showing seasonal changes in distribution of California sea lions counted during the summer (top left), fall (top right), winter (bottom right) and spring (bottom right) surveys. Symbol sizes are drawn proportional to the average site counts. Red symbols denote rookeries, orange symbols year-round haulout sites, and blue symbols winter haulout sites and swimming animals.

California Sea Lion Abundance



Steller Sea Lion

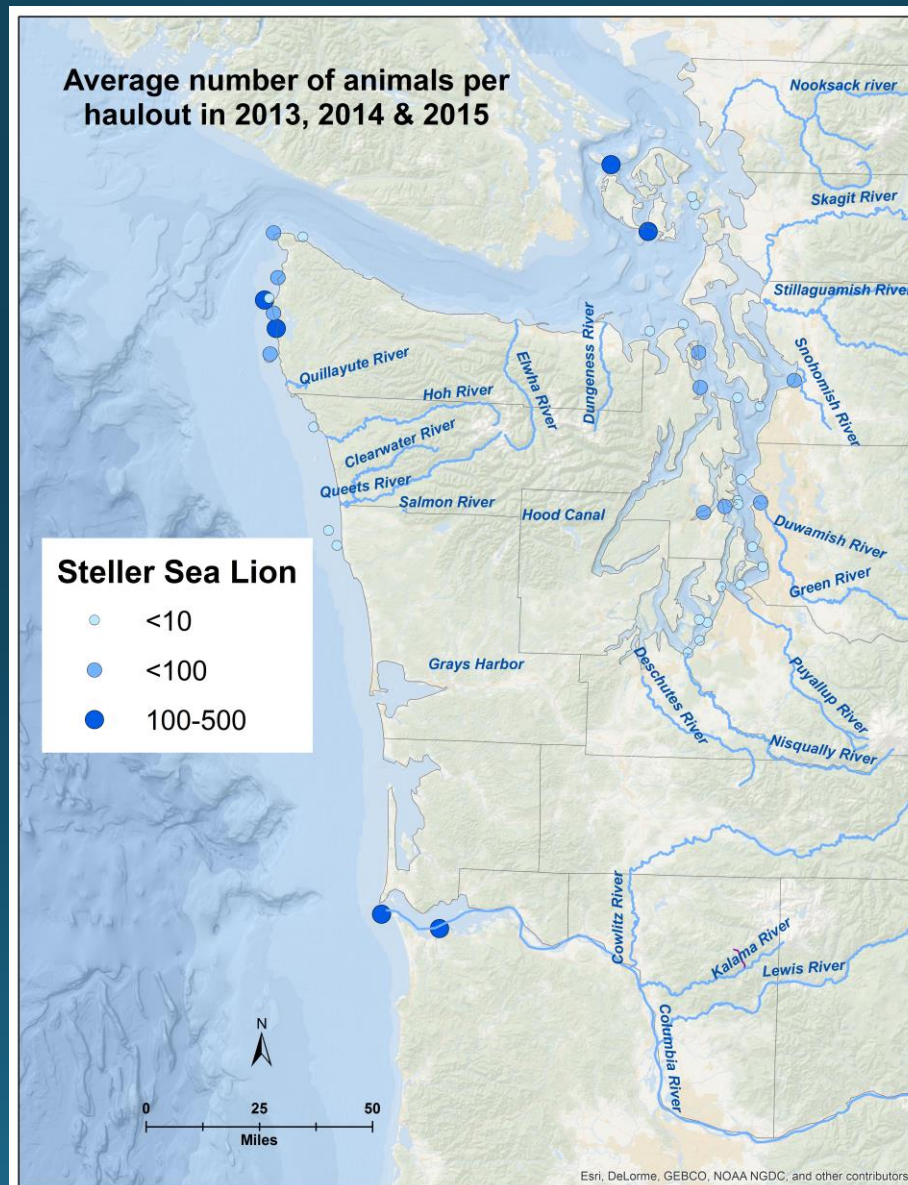


Peter Hodum

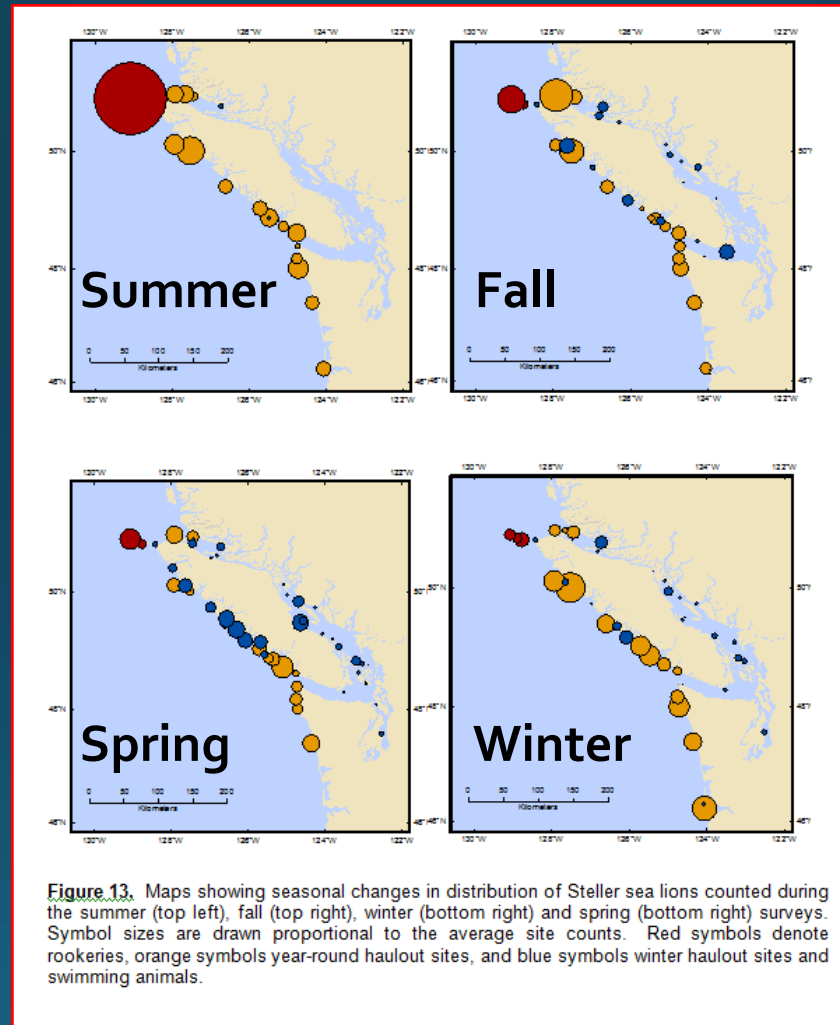
Steller Sea Lion Diet

- Dominated by hake, followed by forage fish (herring, sandlance, sardine), dogfish, skates, and salmon.
- Salmon = 10% of overall diet (range = 7% in spring to 15% in fall)
- Chinook composed about 18% of the salmon identified genetically

Steller Sea Lion Distribution



Steller Sea Lion PNW Seasonal Distribution



Steller Sea Lion Population Trends

- Increased off Oregon, northern California, and Washington (Brown and Riemer 1997; Brown et al. 2002; Pitcher et al. 2007, Jeffries pers. comm.).
- Increased between 2.3 and 3.5% per year for Oregon (Pitcher et al. 2007) and BC non-pup numbers have increased by 3.5%/year since the 1970s (National Marine Fisheries Service 2012).

Pitcher et al. 2007. Abundance and distribution of the eastern North Pacific Steller sea lion (*Eumetopias jubatus*) population. Fish. Bull. 107:102-115.

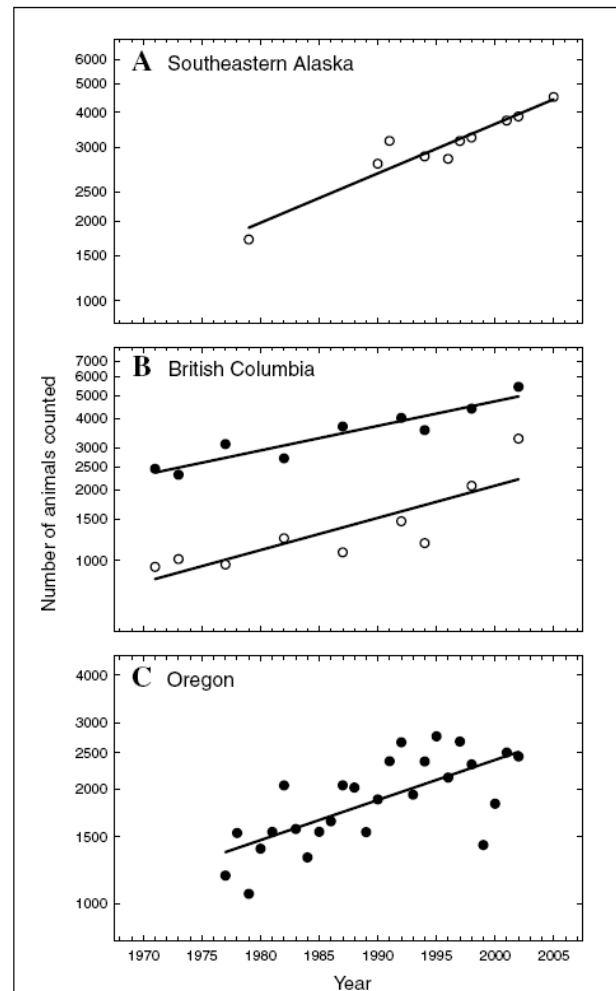


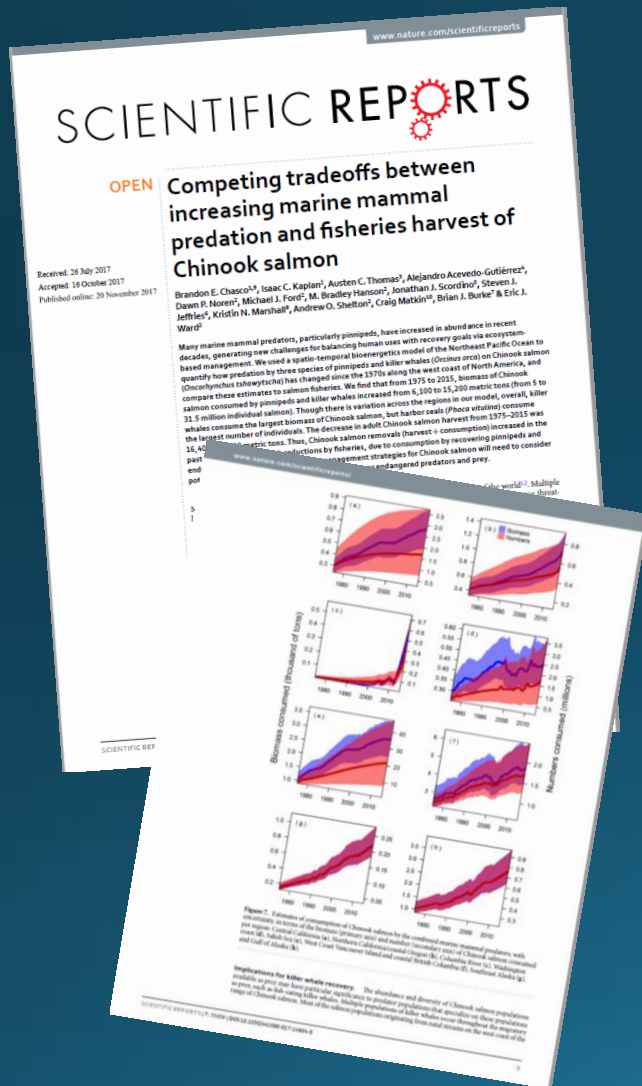
Figure 3

Recent trends in counts of Steller sea lion (*Eumetopias jubatus*) pups (○) and nonpups (●) on rookeries in (A) Southeastern Alaska, (B) British Columbia, and (C) Oregon. These areas combined account for over 90% of pup production in the eastern population. Survey techniques were standardized within each region, but differed among regions. The slopes are all statistically significant ($P < 0.001$), and none differed significantly from the overall rate of increase of 3.1%.

Pinniped Population Summary

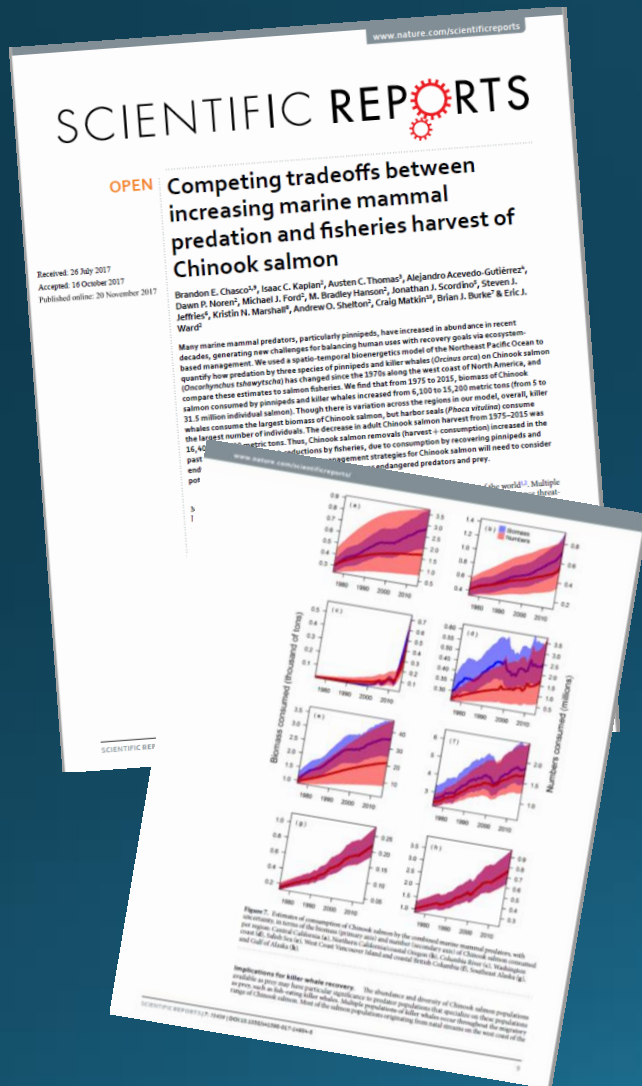
Species/Stock	Population Estimate	WA Population Estimate
Harbor Seal – WA/OR Coast (2014)	16,165	10,430
Harbor Seal- Northern Inland Waters (2014)	11,036	11,036
Harbor Seals - Southern Puget Sound (2014)	1,568	1,568
Harbor Seals – Hood Canal (2014)	1,088	1,088
CA Sea Lions	300,000	788 (Inland waters)
ENP Steller Sea Lions	71,562	4,000

Review of Chasco et al., 2017



- Coastwide spatio-temporal bioenergetics model
- Estimated consumption of Chinook salmon from 1970-2015
- Modeled energetic costs/demands for killer whales, California sea lions, Steller sea lions, and harbor seals compared with Chinook abundance
- Compared Chinook abundance with and without predation

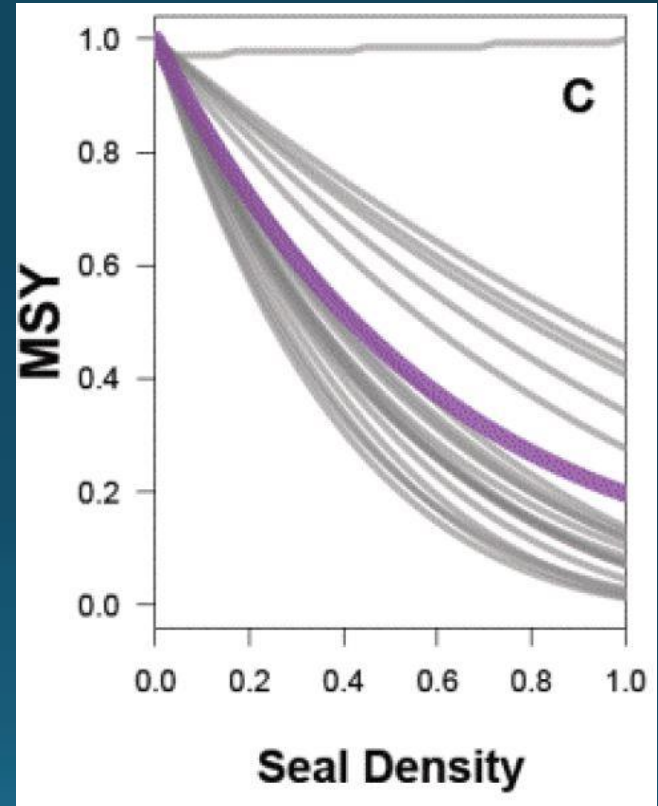
Review of Chasco et al., 2017



- Chinook consumed by killer whales and pinnipeds has increased from 6 to 15k metric tons (or 5 to 32M individuals)
- Killer whales consume the largest biomass, harbor seals consume the most individuals
- Commercial and recreational fishing declined from 16 to 10 metric tons (or from 3.6 – 2.1M individuals)
- Suggested predation could be masking the benefits of recovery as increases from recovery could be offset by predators

Review of Nelson et al., 2018

- Assessed potential impacts of harbor seal predation and hatchery releases on productivity of 20 wild Chinook stocks in BC and WA.
- Density of harbor seals in Strait of Georgia, Puget Sound, and along the WA coast was negatively associated with Chinook productivity in nearly every population in these three regions.
- Analysis did not support that hatchery smolt abundance negatively impacted marine survival of Chinook in the eastern Pacific.
- Likely a composite of factors which make juveniles vulnerable to opportunistic predators like seals.



Marine Mammal Protection Act



Goals of the MMPA

- To maintain species/stocks at their Optimum Sustainable Population (OSP) and be a significant functional element in the ecosystem.
- To restore depleted stocks to OSP.
- To reduce bycatch and serious injury of marine mammals incidental to commercial fisheries to insignificant levels approaching a zero mortality rate.

MMPA Section 101 Take Moratorium

“There shall be a moratorium on the ***taking*** and importation of marine mammals and marine mammal products...”

Take is defined as “harass, hunt, capture or kill, or attempt to harass, hunt, capture or kill any marine mammal.”

Similar to language in the ESA.

Management Options

- Apply for Waiver and Request Direct Take
 - Request waiver of the Take Moratorium [Section 101(a)(3)]
 - Rule-Making [Section 103]
 - Take Permit [Section 104]
- Request Return of Management Authority to State
 - Section 109
- Pinniped Removal Authority
 - Section 120
 - Intentional lethal taking of individually identifiable pinnipeds which are having a significant negative impact on the decline/recovery of salmonids

Potential Biological Removal

- The maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.
- Function of:
 - Minimum population estimate
 - One-half the maximum theoretical or estimated net productivity rate of the stock at a small population size.
 - A recovery factor between 0.1 and 1.0

NOAA Fisheries Stock Assessment Reports

Species/Stock	Population Estimate	Potential Biological Removal (PBR)
Harbor Seal – WA/OR Coast (2014)	16,165	N/A
Harbor Seal- Northern Inland Waters (2014)	11,036	N/A
Harbor Seals - Southern Puget Sound (2014)	1,568	N/A
Harbor Seals – Hood Canal (2014)	1,088	N/A
CA Sea Lions	300,000	9,200
Steller Sea Lions	71,562	2,498

Columbia River—Case Study



Bonneville Dam









Oregon

RM 145

Washington

Columbia River—Case Study

Deterrent Type	Effective	Ineffective	The Bottom Line
Physical Barriers for Fishways (SLEDs, FOGs)			No animals in <u>fishways</u> in 2008, but C404 was absent this year.
Acoustic Deterrents at Fishways			No visible effects on sea lion behavior near fishways.
Hazing Calif. Sea Lions			Effects seem temporary; Usual avoidance noted.
Hazing Steller Sea Lions			Not as effective as in 2006 and 2007.
Relocation (Trap & Release)			Most animals return to BON after release. <i>Does help individual ID efforts!</i>

Section 120 Permit Removal Criteria

- Each CA sea lion must be individually identifiable – this requires trapping, marking, and releasing the animal.
- Individual sea lions must be observed at Bonneville Dam for 5 days.
- Individual sea lions must be observed eating a salmon at Bonneville Dam.
- Individual sea lions must be subjected to hazing while at Bonneville Dam.

Section 120 Implementation— 2017 Data

	Individuals	Estimated Predation	Hazing Events	Lethal Removals
CA Sea Lions	92	2,142 (1.9% of run)	683	24
Steller Sea Lions	63	3,242 (2.8% of run)	1,852	N/A

Section 120 Implementation

Year	CA Sea Lion Euthanized
2008	0
2009	11
2010	14
2011	0
2012	12
2013	2
2014	15
2015	30
2016	59
2017	24
2018	29
TOTAL	196

Section 120 Permit Improvements Requested

WDFW, IDFG, ODFW, CRITFC requested NMFS in March 2018 to:

- Provide resources to expediently review ODFW's Section 120 Application for Upper Willamette steelhead.
- Adopt Task Force Recommendations to improve efficiency of current permit.
 - Modify requirement of seeing an individually identifiable sea lion eating a salmon ~~and~~ OR has been observed in the area for X days...
 - Reduce observation days from 5 days to 3 days.
- Provide pass-through funding for implementation.

Current MMPA Legislation

- H.R. 2083 – Congresswoman Herrera-Beutler (WA-R) & Congressman Schrader (OR-D)
 - Passed out of the House on June 6, 2018 with unanimous support by the delegations from WA, OR, and ID.
- S. 3119 – Senator Risch (ID-R) & Senator Cantwell (WA-D)
 - Passed out of the Commerce, Science and Transportation Senate Committee on August 1, 2018



Current MMPA Legislation

- Modifies Section 120
- Sea lion species
- Geography: RM 112 (I-205 Bridge) and tributaries w/ ESA-listed salmon
- Eligible entities
- Removal levels



Salmon Recovery: All H's and Predation

- Habitat
- Hydropower
- Hatcheries
- Harvest



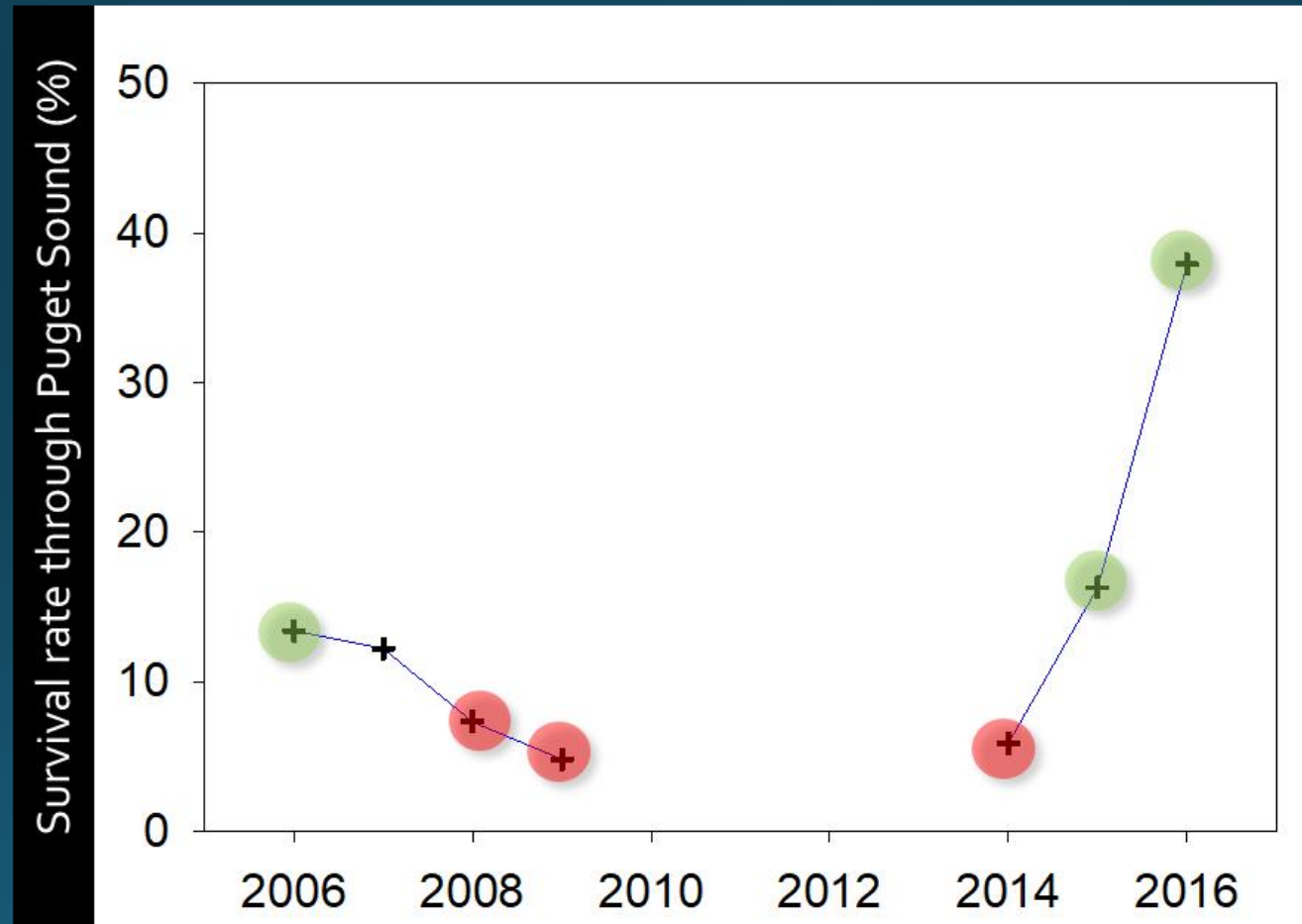
- Pinniped
- Avian
- Fish

Many Factors Affect Salmon and Steelhead Marine Survival

- Estuary habitat and food in the nearshore
- Contaminants and parasites
- Climate Change
- Forage fish abundance in Puget Sound—acting as buffer prey
- Predation

Anchovies Buffering Predation on Steelhead?

Marine survival rate of steelhead through Puget Sound relative to years of high ● vs. low ● anchovy abundance



Pinniped Predation Assessment

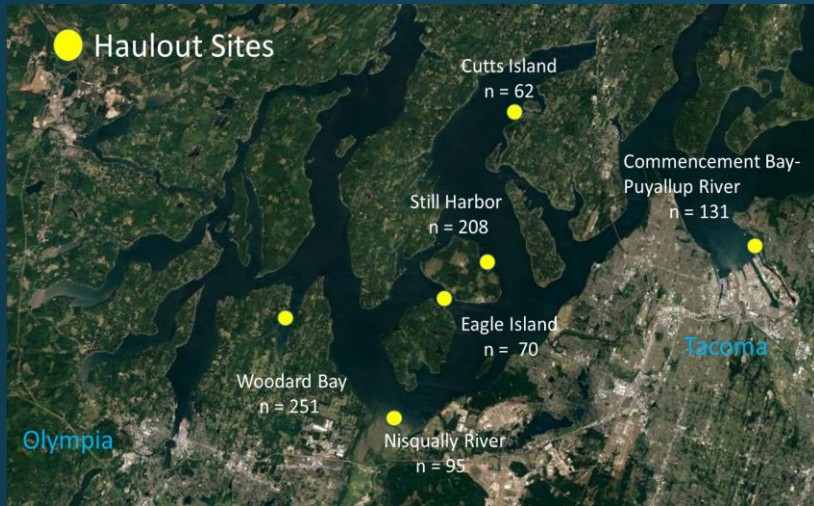
Partnership with Salish Sea Marine Survival Project, NOAA, and WDFW



- Update pinniped abundance by region and season
- Estimate diet by region/month
- Estimate daily energy demands and age-specific seasonal availability of H/W Chinook in each region

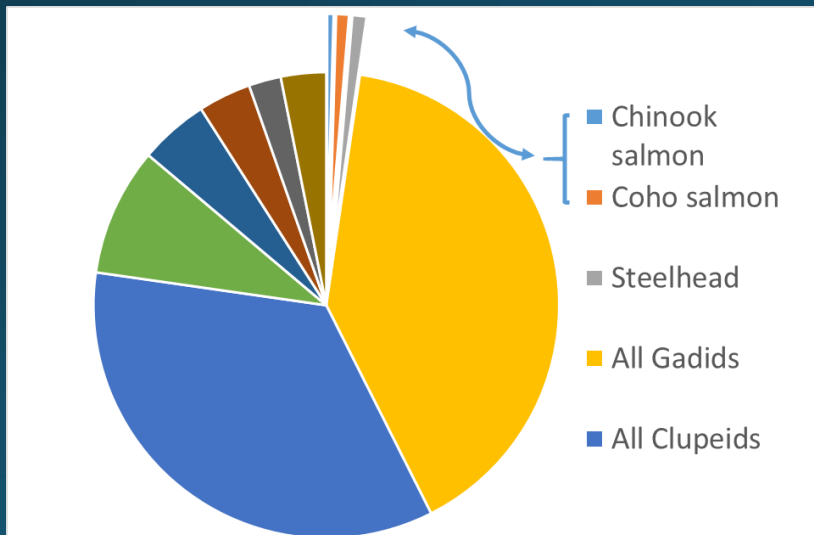
Harbor Seal Diet (example)

Assessing diet in Puget Sound (from Salish Sea Marine Survival Project)



Reconstructing diet from scat:

- Hard parts (bones, beaks, etc.)
- DNA



Preliminary results (2016 only)

- Salmon less than 5% of harbor seal diet
- Chinook less than 2% of diet

Pinniped Assessment Next Steps

(F&W Commission Briefing in Sept 2018)

- Use recent population estimates for all pinnipeds
- Organize data around meaningful geographic management units
- Use pinniped diet data from:
 - South Sound (Early Marine Survival Project – 2016 & 2017)
 - Puget Sound diet data for California sea lions (samples in hand but need to be processed – partnership with Nisqually Tribe)
- Use updated Chinook smolt and adult consumption estimates
 - Include availability of hatchery / wild Chinook
 - Include uncertainty in pinniped diet
 - Include uncertainty in pinniped population estimates
- Assess relative impact of consumption by pinnipeds to other factors.

Questions

