

2019 North of Falcon #2 Agenda

April 3, 2019

Time	Discussion
9:30–10:15	Welcome and Intro <ul style="list-style-type: none">• Meeting breakouts• Management objectives• Stocks of Concern
10:15-10:45	Nate Pamplin, WDFW Marine Mammal Mgmt.
10:45-11:00	Remaining Meetings and Break
11:00-1:00	Regional Discussion Sessions
2:00-3:00	Plenary Session with NW Treaty Tribes
3:00-?	Continuation of Regional Discussion
Room	Regional Discussion Sessions
St. Helens/Baker	Puget Sound Recreational
401	Puget Sound Commercial
Boardrooms A&B	As needed



Puget Sound Recreational Discussion – 4/3/2019



A photograph of a fishing net on a boat. The net is dark and has a white life preserver inside it. A salmon is visible at the bottom of the net. The background shows a sunset over a body of water with mountains in the distance.

Outline of Presentation

- **Salmon Management Framework**
 - North of Falcon
- **Forecasts**
- **Management Objectives**
- **Challenges for 2019-20 seasons**
- **Public Comment**

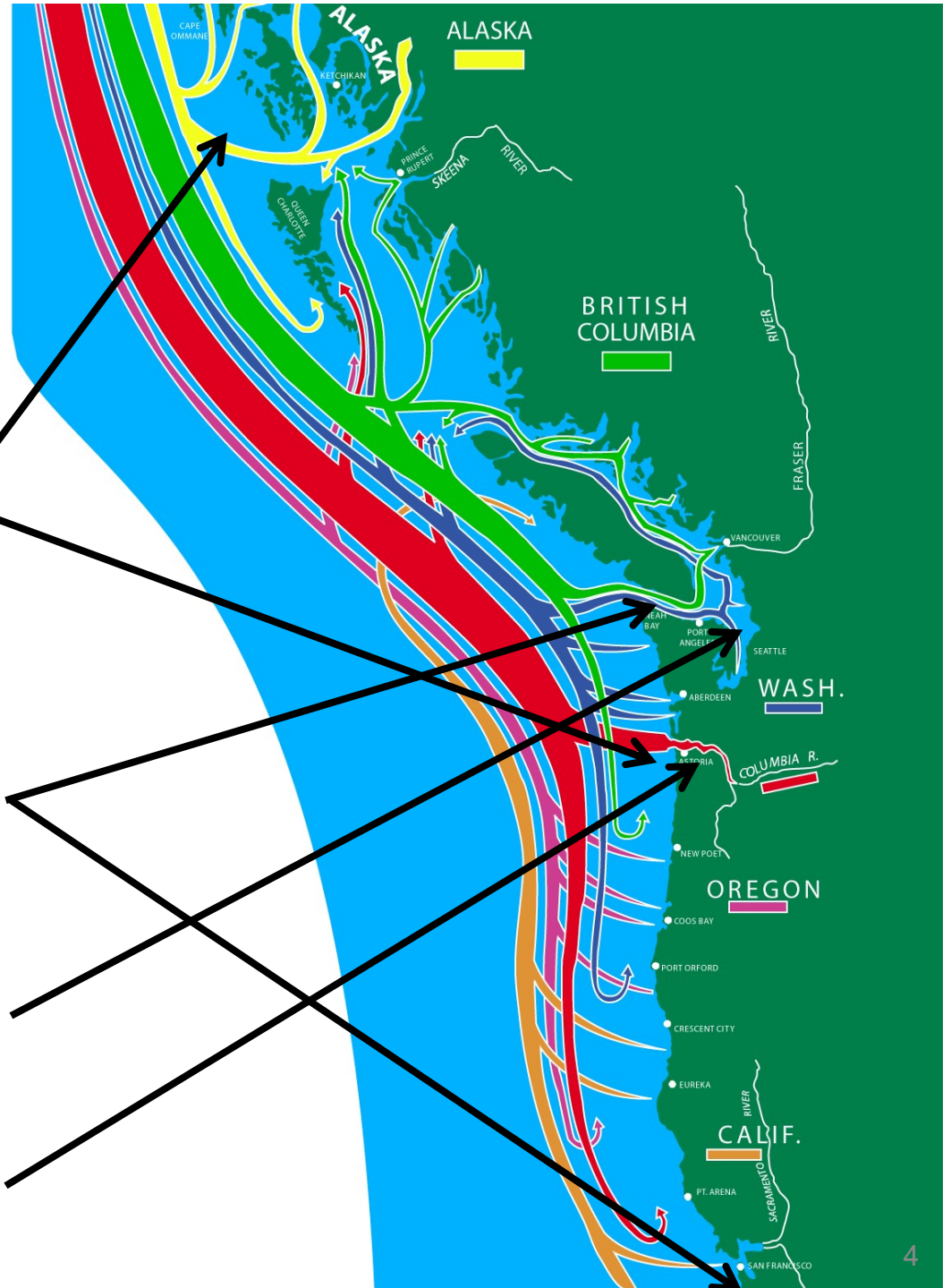
Complex, multi-jurisdictional processes

Pacific Salmon Treaty

Pacific Fishery Management Council

U.S. v Washington

U.S. v Oregon



Puget Sound Comanagement framework

- Puget Sound Salmon Management Plan (1985)
- Hood Canal Salmon Management Plan (1986)
- Stipulation on Mass Marking (1997)
- Comprehensive Coho Management Plan (1998)
- Puget Sound Chinook Harvest Management Plan (2004, 2010, 2019?)
- Summer Chum Salmon Conservation Initiative (2000)
- Equilibrium/Future Brood Document
- Annual List of Agreed Fisheries
- Annual watershed management plans / MOUs
- Misc. MOU's

North of Falcon Process

1. Forecast the abundance of each stock.
2. Determine if there is a harvestable surplus.
3. Propose fisheries - predict what we will catch.
4. Model fisheries to determine which stocks are of conservation concern, constraining fisheries.
5. Negotiate with tribes and other states for fair sharing of catch and stocks that are constraining.
6. Final agreed-to State and Tribal salmon fisheries (ocean, Puget Sound) are described in the "List of Agreed Fisheries" document.

Puget Sound Chinook Forecast Comparisons

Basin	Wild		
	2018	2019	Comparison
Hoko	1,071	1,438	1.34
Dungeness	89	282	3.17
Elwha	238	333	1.40
Nooksack springs	202	248	1.23
Skagit springs	2,317	2,003	0.86
Skagit summer/falls	13,340	13,825	1.04
Stillaguamish	487	378	0.78
Snohomish	3,460	3,744	1.08
Lake Washington	1,461	1,063	0.73
Green	2,110	4,833	2.29
Puyallup	672	1,724	2.57
White River springs	528	573	1.09
Nisqually	586	824	1.41
Skokomish	3,338	3,800~	1.14
Mid Hood Canal	358	285	0.80
Total (others included)	30,451	32,372	1.06

Puget Sound Chinook Forecast Comparisons

Basin	Hatchery		
	2018	2019	Comparison
Hoko	398	1,233	3.10
Dungeness	707	657	0.93
Elwha	4,931	7,066	1.43
Nooksack springs	4,782	5,808	1.21
Skagit springs	4,262	4,113	0.97
Skagit summer/falls	303	309	1.02
Stillaguamish	1,063	566	0.53
Snohomish	6,508	7,225	1.11
Lake Washington	4,761	4,266	0.90
Green	21,321	20,961	0.98
Puyallup	11,778	13,007	1.10
White River springs	3,301	1,623	0.49
Nisqually	28,514	20,223	0.71
Skokomish	31,250	37,160	1.19
Total (others included)	242,230	231,736	0.96

Puget Sound Coho Forecast Comparisons

Basin	Wild		
	2018	2019	Comparison
Dungeness	505	2,290	4.53
Elwha	718	1,363	1.90
other Strait	7,168	8,800	1.23
Nooksack/Samish	20,574	25,133	1.22
Skagit	59,196	57,933	0.98
Stillaguamish	18,950	23,820	1.26
Snohomish	65,925	62,600	0.95
Lake Washington	2,018	2,770	1.37
Green	3,320	3,001	0.90
Puyallup	4,964	9,349	1.88
Nisqually	1,268	4,816	3.80
Deschutes	59	574	9.73
Skokomish	1,334	11,015	8.26
other Hood Canal	59,770	40,616	0.68
Total (others included)	308,704	293,980	0.95

Puget Sound Coho Forecast Comparisons

Basin	Hatchery		
	2018	2019	Comparison
Dungeness	9,087	9,760	1.07
Elwha	242	4,230	17.48
Nooksack/Samish	61,256	59,790	0.98
Skagit	13,101	9,917	0.76
Stillaguamish	0	2,234	
Snohomish	7,092	7,709	1.09
Lake Washington	12,984	10,790	0.83
Green	48,032	68,680	1.43
Puyallup	17,985	32,220	1.79
Nisqually	952	10,298	10.82
SS Hatchery	24,010	50,880	2.12
Skokomish	20,690	20,510	0.99
other Hood Canal	62,285	66,020	1.06
Total (others included)	307,975	416,319	1.35

Puget Sound Pink Forecast Comparisons

Basin			
	2017	2019	Comparison
Nooksack	96,218	24,476	0.25
Skagit	85,600	114,769	1.34
Stillaguamish	40,205	47,919	1.19
Snohomish	171,632	128,362	0.75
Green	118,689	141,130	1.19
Puyallup	382,301	47,905	0.13
Nisqually	21,463	25,380	1.18
Hood Canal	229,440	70,675	0.31
Strait of Juan de Fuca	3,655	7,629	2.09
Total (others included)	1,150,522	608,388	0.53

2017 actual return was 510,857 or 44% of what was forecasted

Chinook Management Objectives

Management Unit	NMFS Guidance/Co-Manager Proposal
Nooksack Spring	10.5% SUS ER
Skagit Summer/Fall	48% Total ER
Skagit Spring-run	37.5% Total ER
Stillaguamish River	24% Total / 8% SUS max
Snohomish River	21% Total
Lake Washington	500 Escapement (13% PT SUS)
Green River	2,003 Escapement (13 PT SUS)
White River Spring-run	22% SUS
Puyallup	1,170 Escapement (13% PT SUS)
Nisqually	49% Total (47% + 2% exp selective fishery)
Skokomish fall-run	50% total
Mid Hood Canal	12% PT SUS
Dungeness	10% SUS
Elwha	10% SUS

Coho Management Objectives 2019

Puget Sound Wild Management Units	2019 Adult Forecast Ocean Age 3	2019 Assigned FMP Status	Total ER Ceiling
Strait of Juan de Fuca	8,800	Critical	10% SUS
Hood Canal	40,140	Low	45%
Skagit	57,933	Low	35%
Stillaguamish	23,820	Normal	50%
Snohomish	62,200	Low	40%
Thompson (Fraser Rv)	-	Low	10% SUS

Recreational Challenges-2019

- Timely agreement (1yr ESA coverage)
- Chinook management objectives
 - Constraining stocks
 - Chinook: Stillaguamish, Mid Hood Canal, Lake Washington, Green, Puyallup
 - Coho: Straits Tribs, Snohomish
- Meaningful angler opportunity-time on the water
- Skokomish
- Additional Orca protection

Ideas that have already been presented

- **Bubble fishery in lower Area 11 in May or Open Area 11 in May.**
- **NS Coho time in October in 7 and 8-1**
- **Return of June resident Coho season Area 10**
- **Later start or additional Chinook time in Area 10 in the summer.**
- **Elliot Bay Chinook fishery**
- **Expanded Spring Chinook in Skagit**
- **Recreational Fishing on Skokomish**

Current Coho Modeling (2019 Abundances with 2018 Fisheries)

Management Unit	ER CEILING	High	Mid	Low
SKAGIT	35%	33.8%	33.2%	31.4%
STILLY	50%	32.5%	31.9%	30.5%
SNOHOMISH	40%	33.7%	33.1%	31.6%
SNOHOMISH ESC	50,000	41,679	42,035	42,900
HOOD CANAL	45%	48.8%	48.2%	46.8%
JUAN DE FUCA TRIBS	10% SUS	7.8%	7.1%	5.2%
Lower Fraser (Thompson)	10% SUS	11.0%	10.1%	7.7%

Current Chinook Modeling (2019 Abundances with 2018 Fisheries)

Stock	Management Criteria			Model Prediction			
	Abundance Tier	ER Ceiling	ER Type	Escapement	Total ER	SUS ER	PT-SUS ER
Spring/Early:							
Nooksack - Total		10.5%	SUS		36.4%	11.1%	7.4%
North/Middle Fork	< LAT			168			
South Fork	< LAT			76			
Skagit - Total	> LAT	37.5%	Total	1,658	31.9%	20.6%	6.1%
Upper Sauk	> LAT			982			
Upper Cascade	> LAT			186			
Suiattle	> LAT			490			
White	> UMT	22.0%	SUS	1,836	25.5%	18.2%	6.8%
Dungeness	> UMT	10.0%	SUS	945	6.3%	1.7%	1.6%
Summer/Fall:							
Skagit - Total	> LAT	48.0%	Total	12,406	39.0%	17.9%	5.5%
Upper Skagit	> LAT			9,202			
Sauk	> LAT			582			
Lower Skagit	> LAT			2,344			
Stillaguamish - Total	900-1200	24.0%	Total	944			
Unmarked ER		8.0%	UM SUS		28.5%	18.2%	8.3%
Marked ER		12.0%	M SUS		30.9%	21.2%	11.7%
Snohomish - Total		21.0%	Total	3,219	17.4%	7.5%	6.2%
Skykomish	< LAT	15.0%	SUS	2,421			
Snoqualmie				798			
Lake WA (Cedar R.)	> UMT	13.0%	PT-SUS	1,209	35.8%	24.0%	15.1%
Green	> UB	13.0%	PT-SUS	6,402 9,429	50.8%	39.0%	15.1%
Puyallup	> UMT	13.0%	PT-SUS	2,621 4,566	51.3%	39.5%	15.1%
Nisqually	> LAT	49%	Total	10,727	51.0%	43.9%	17.5%
Western Strait-Hoko	> UMT	10%	SUS	2,321	20.4%	2.2%	2.2%
Elwha	> UMT	10%	SUS	6,655	6.8%	2.1%	2.0%
Mid-Hood Canal	< LAT	12%	PT-SUS	284	24.2%	14.1%	13.8%
Skokomish	> UMT	50%	Total	2,674 22,612	49.0%	38.9%	14.2%

Public Comment

On-line commenting – March-April

<http://wdfw.wa.gov/fishing/northfalcon/>

Puget Sound Sport Fishing Advisory Group

<http://wdfw.wa.gov/about/advisory/pssfag/>

Public Meetings

~~March 6-12 PFMC (Ocean Options) Vancouver, WA~~

~~March 19 – NOF #1, OB2 Olympia 9:00 am~~

~~March 21 – Sequim Trinity Church, 6:30 pm~~

~~March 27 – Mill Creek WDFW, 6 pm~~

April 3 – North of Falcon #2, Lynnwood Embassy Suites, 9:30 am

April 11-15 – PFMC #2, Rohnert Park, CA



Washington
Department of
**FISH and
WILDLIFE**

Impact of Pinnipeds on Chinook Salmon

Nate Pamplin, Policy Director

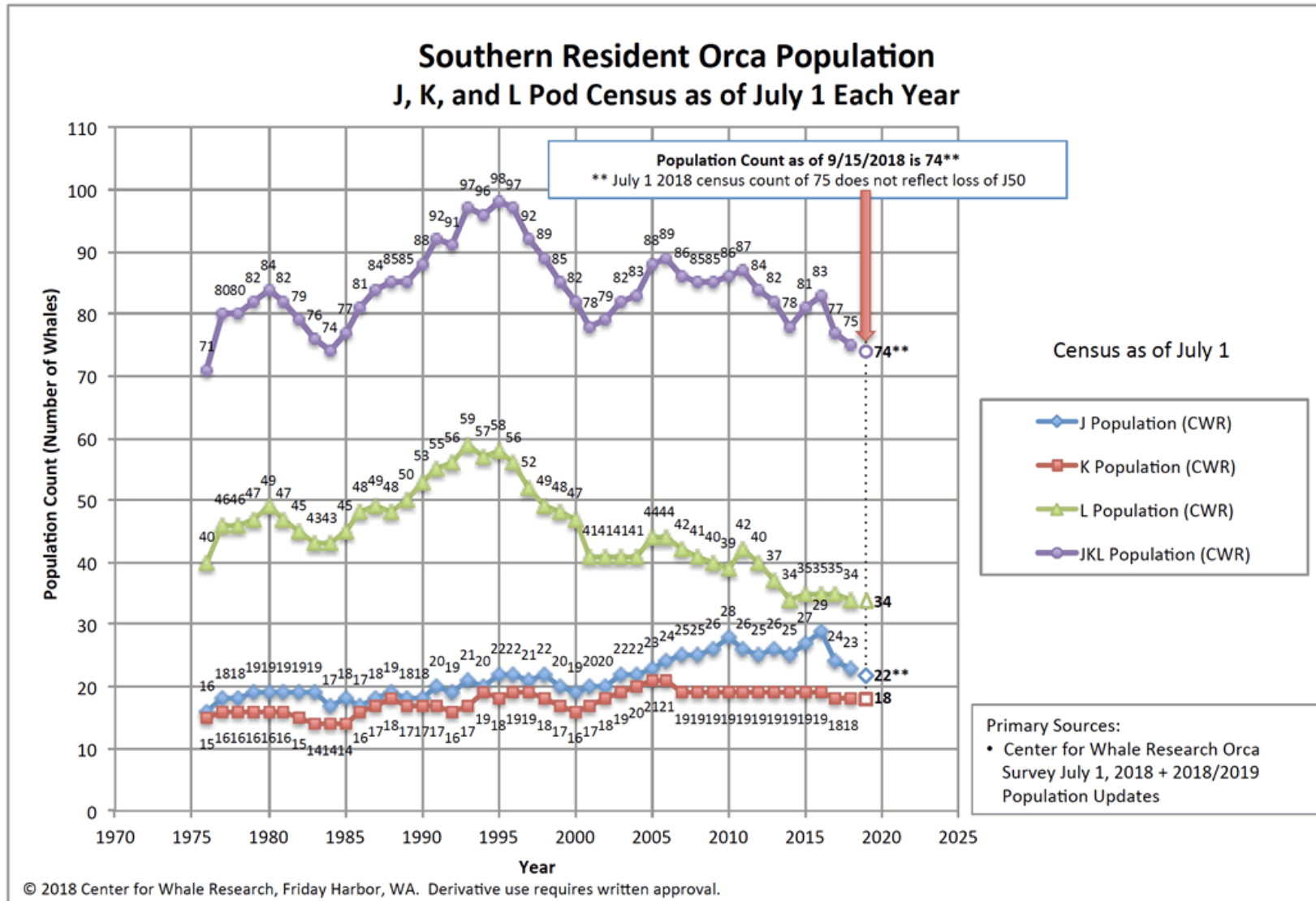
April 3, 2019



Today's Presentation

- Introduction/context
- What are the primary salmon-eating pinnipeds in Washington?
- Where are they located? How many are there? And what are their population trends?
- What administrative options are there to reduce pinniped predation?
- Columbia River case study
- Puget Sound/Outer Coast case study

Southern Resident Orca Trends

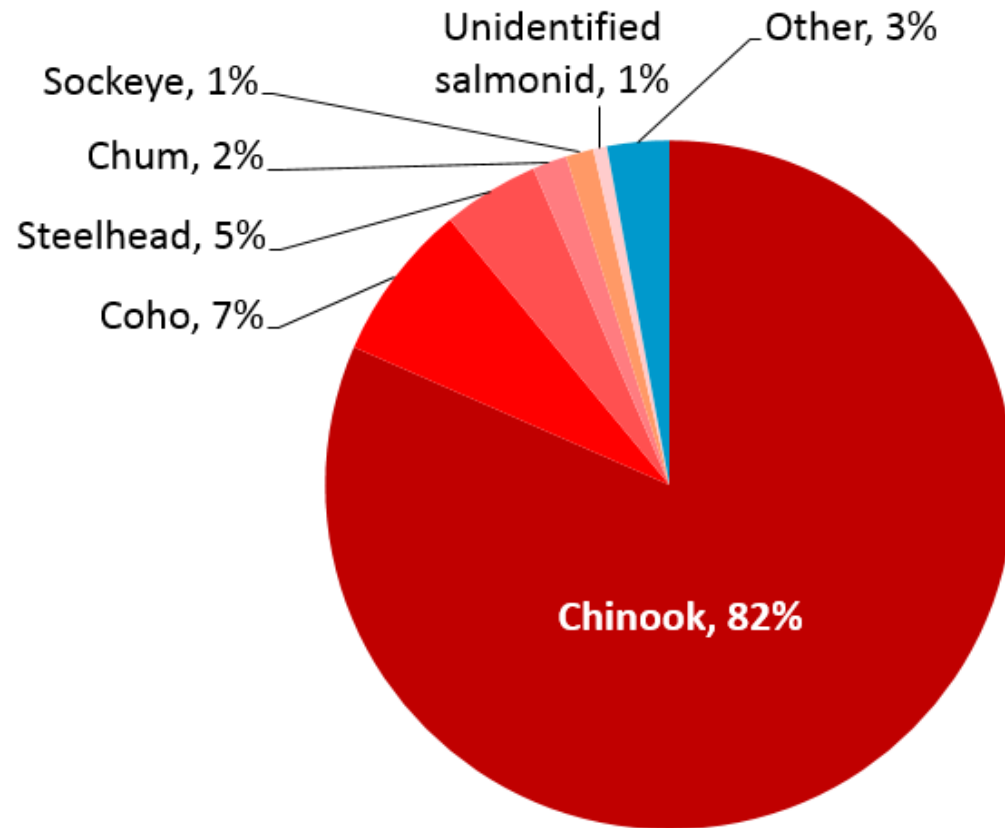


9/15/2018

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Chinook Important to Orca Diet

During summer months when Southern Resident Killer Whales are most present in the Salish Sea, 82% of their diet is Chinook salmon, almost 16 % are other salmonids and less than 3% are other fish including halibut and lingcod.

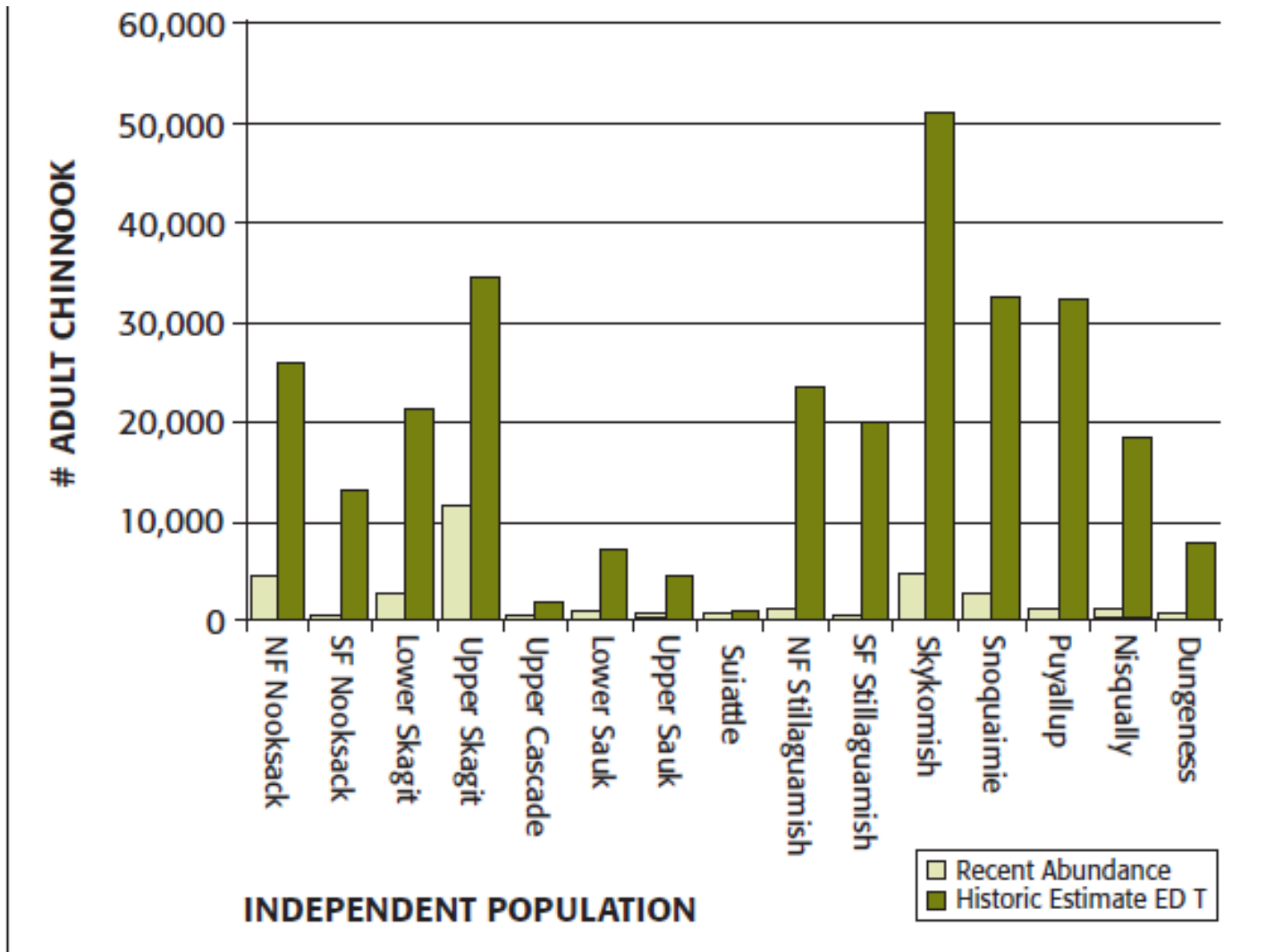


Data are from Hanson et al, 2010 who sampled the Strait of Juan de Fuca and San Juan



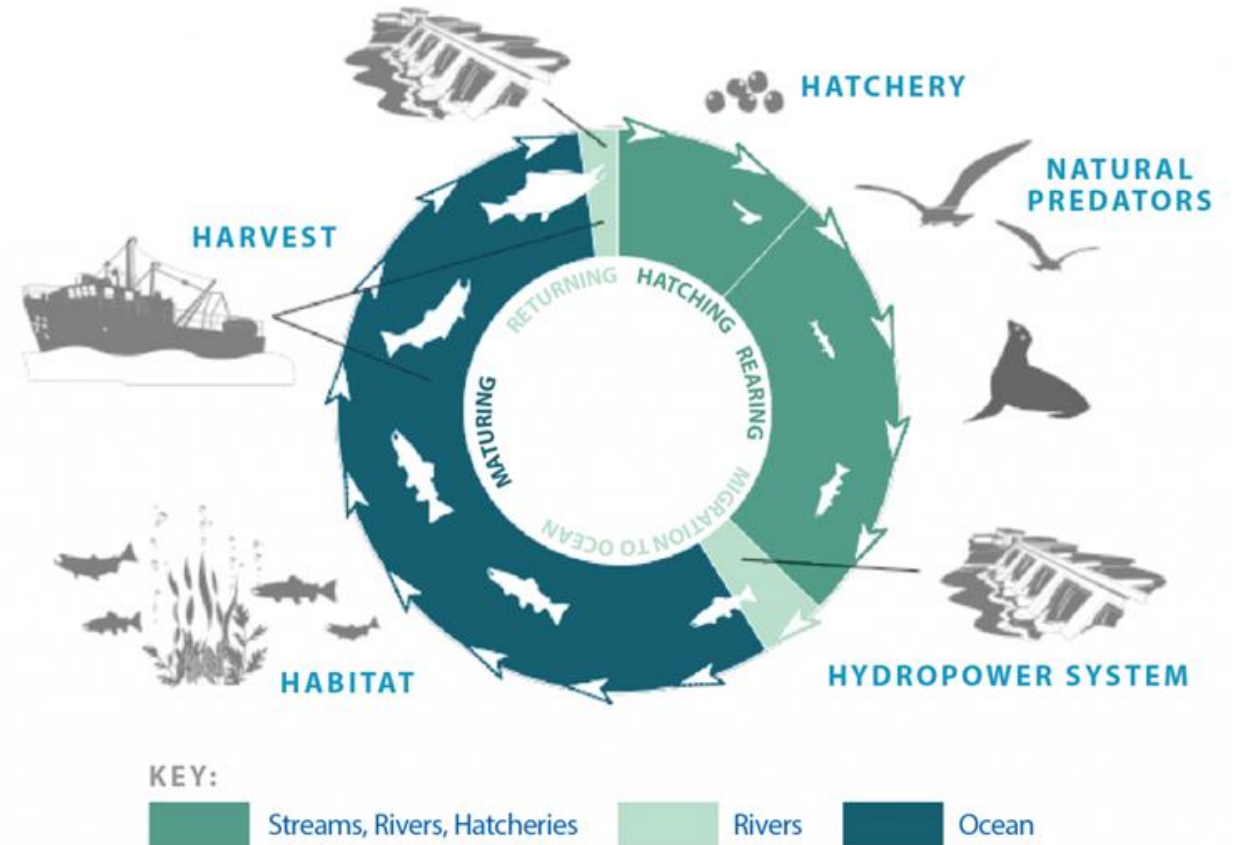
Source: Center for Whale Research

Major Declines in Natural Origin Chinook

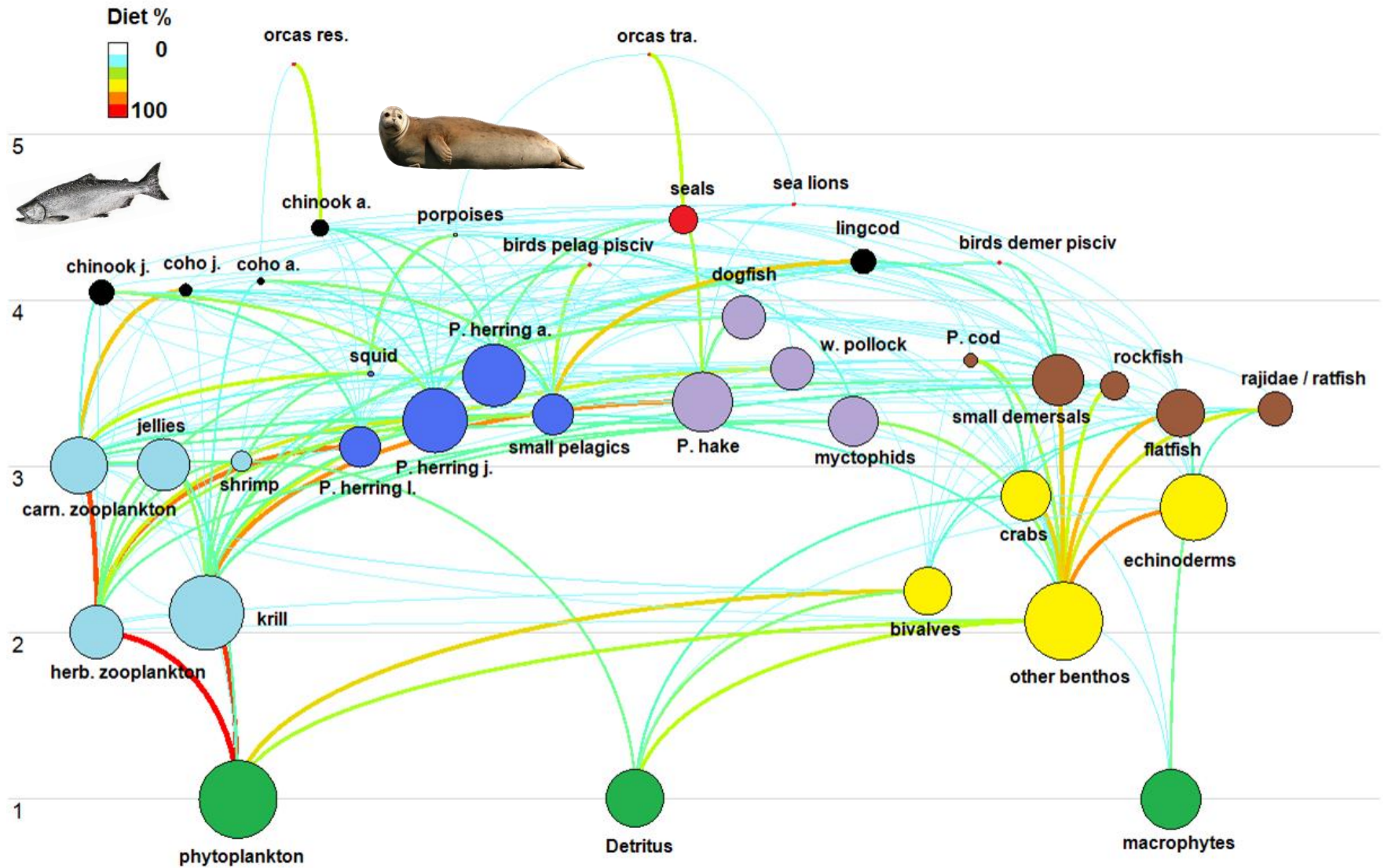


Predation is One of Many Factors Affecting Salmon Recovery

- Hydropower
- Hatcheries
- Habitat
- Harvest
- Disease and parasites
- Contaminants
- Predation

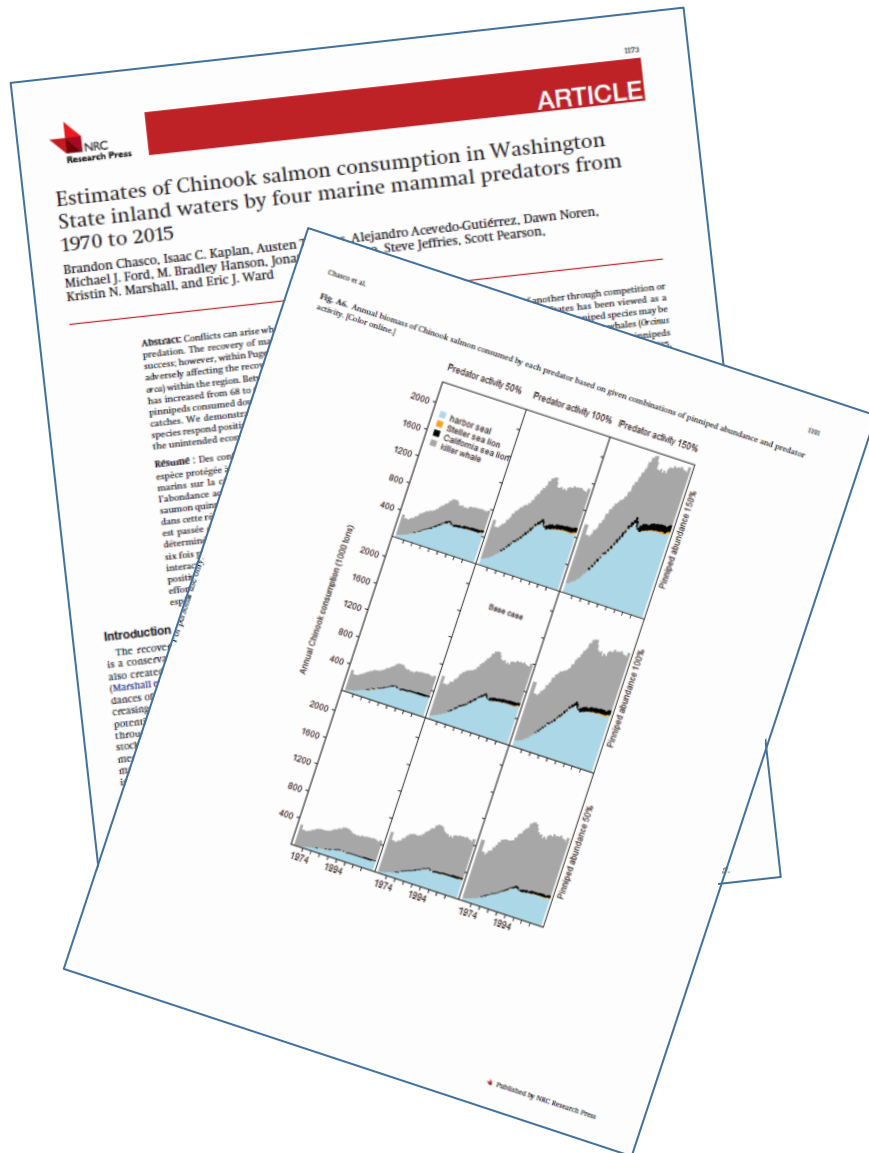


Complex Food Web



Source: Strait of Georgia ecosystem model – D. Preikshot & I. Perry, Fisheries and Oceans Canada

Chasco et al., 2016



- Puget Sound bioenergetics model
- Estimated consumption of Chinook salmon from 1970-2015
- Modeled population size, diet, and energetic demands for killer whales, California sea lions, Steller sea lions, and harbor seals
- Chinook consumed by pinnipeds increased from 68 to 625 metric tons
- Pinnipeds consumed more than killer whales and all fisheries

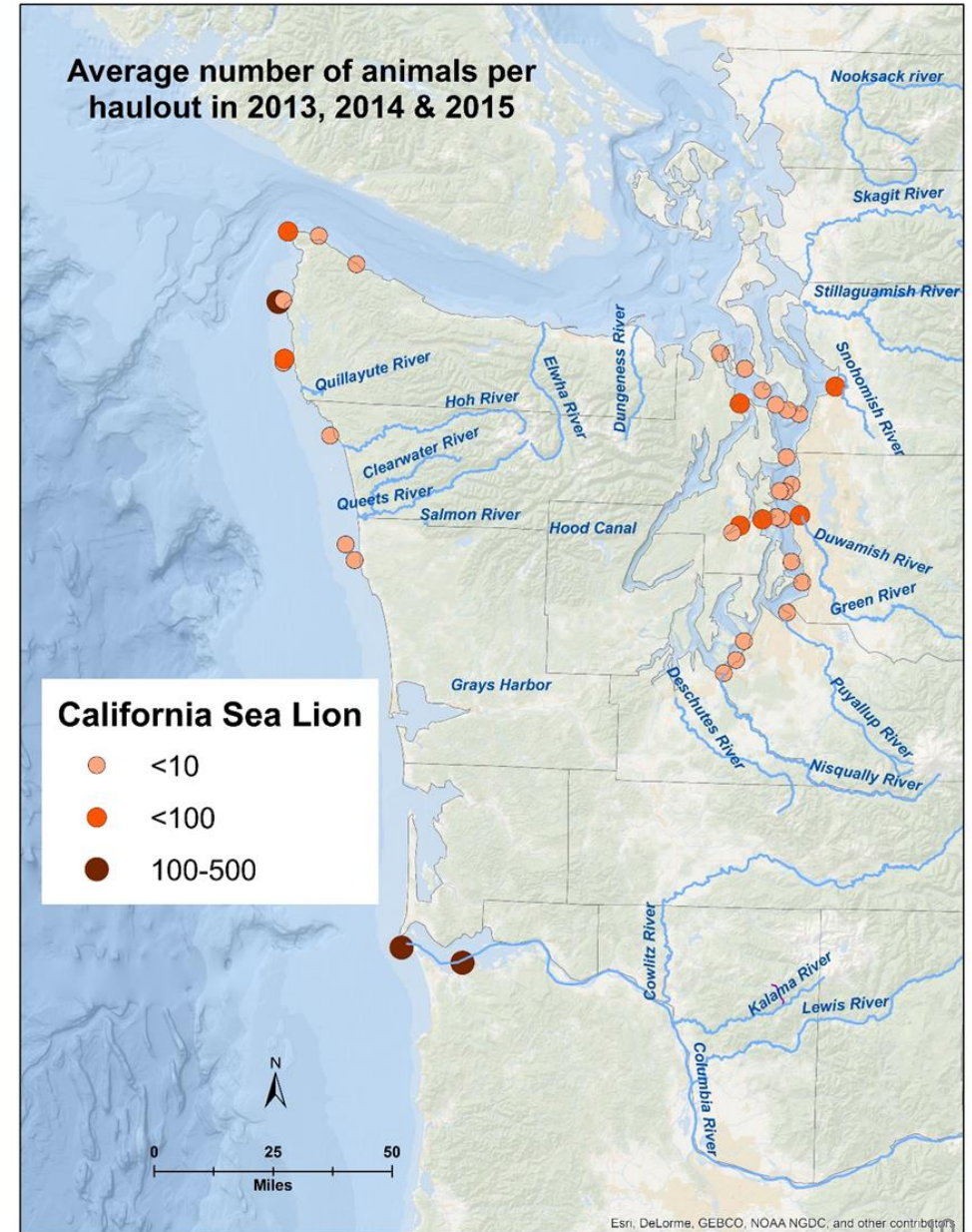
Focus on Three Species of Pinnipeds

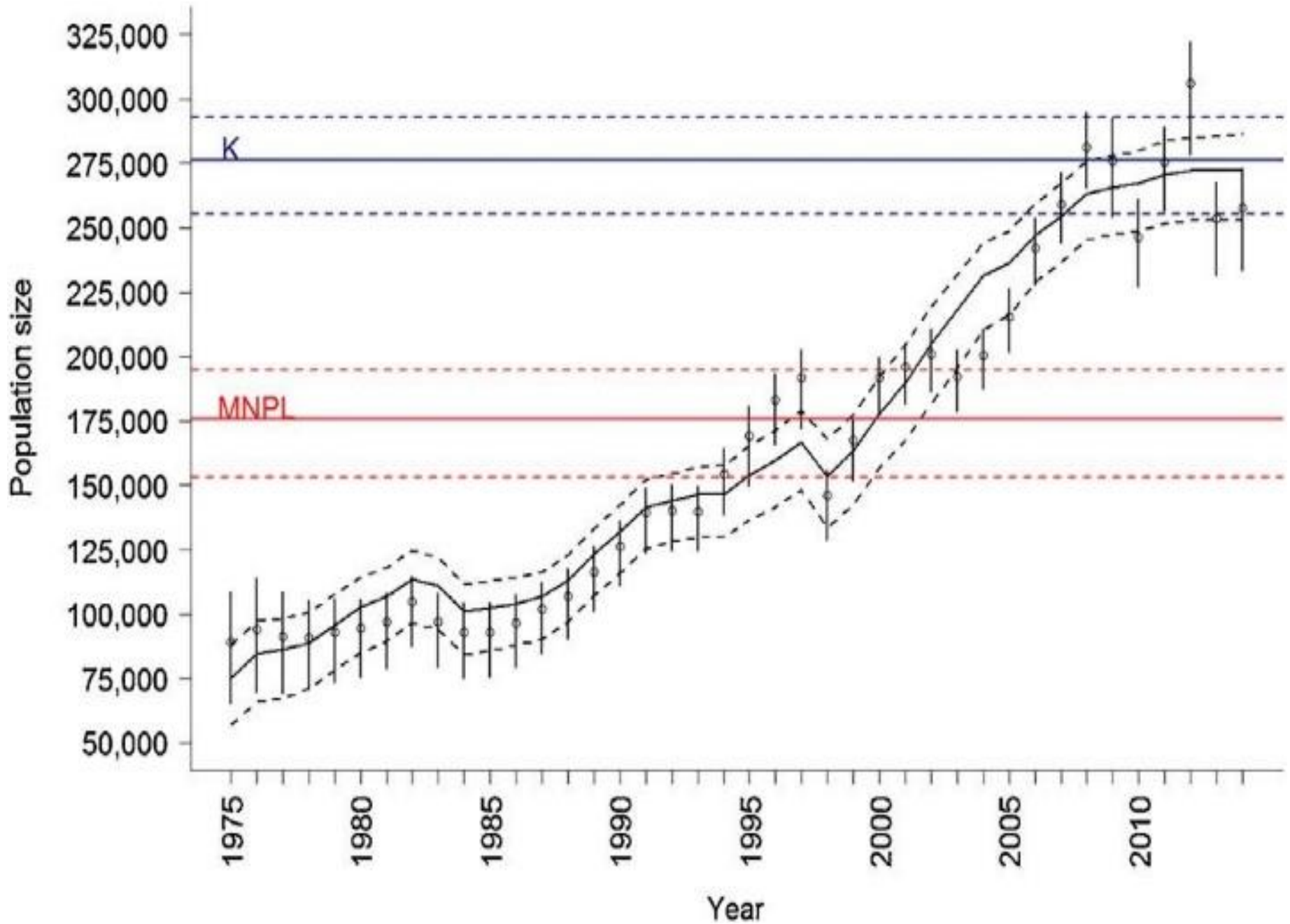
- Harbor Seal
- California Sea Lion
- Steller Sea Lion



California Sea Lion

- Primarily present in Washington waters in Sept - April
- A single US stock

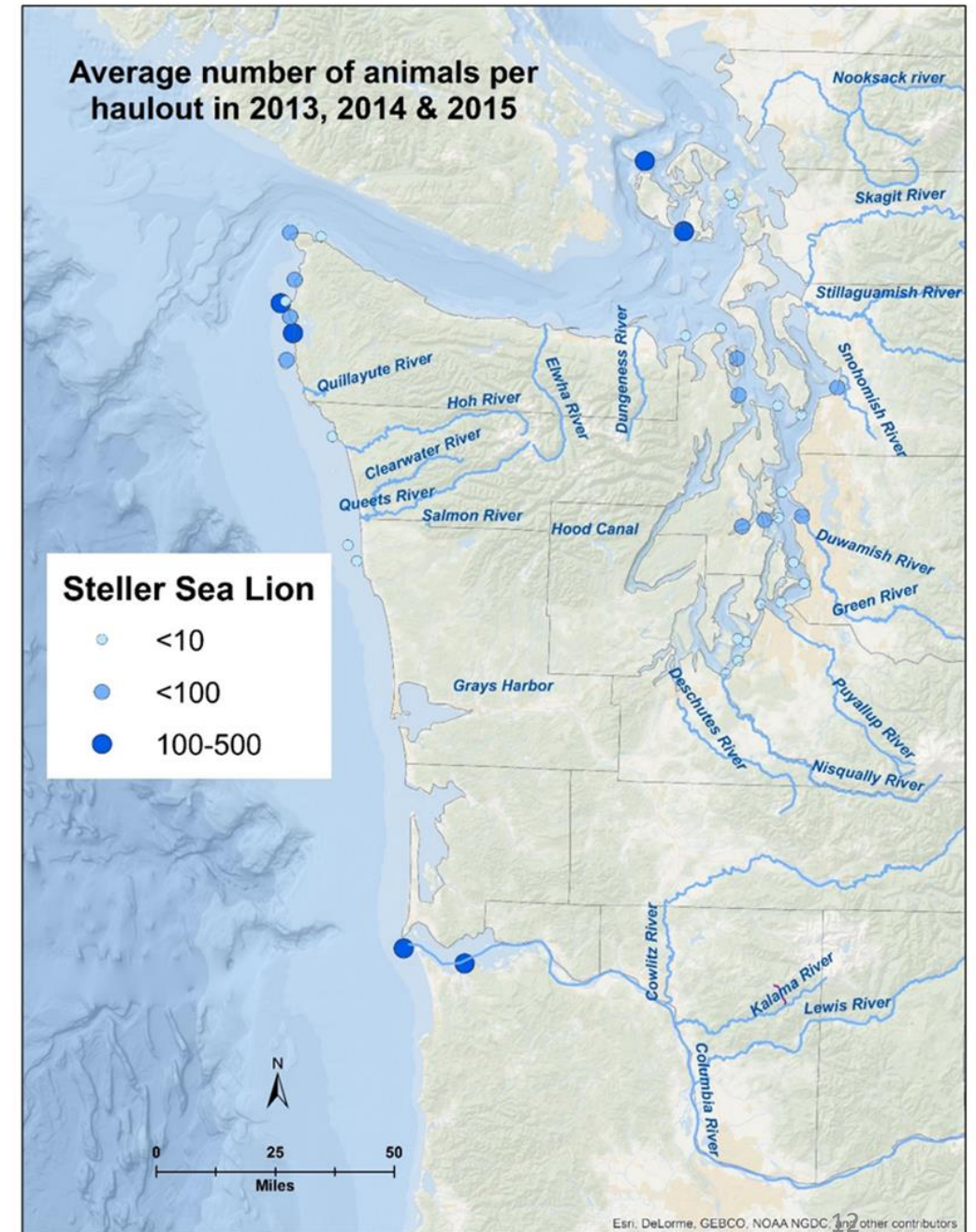


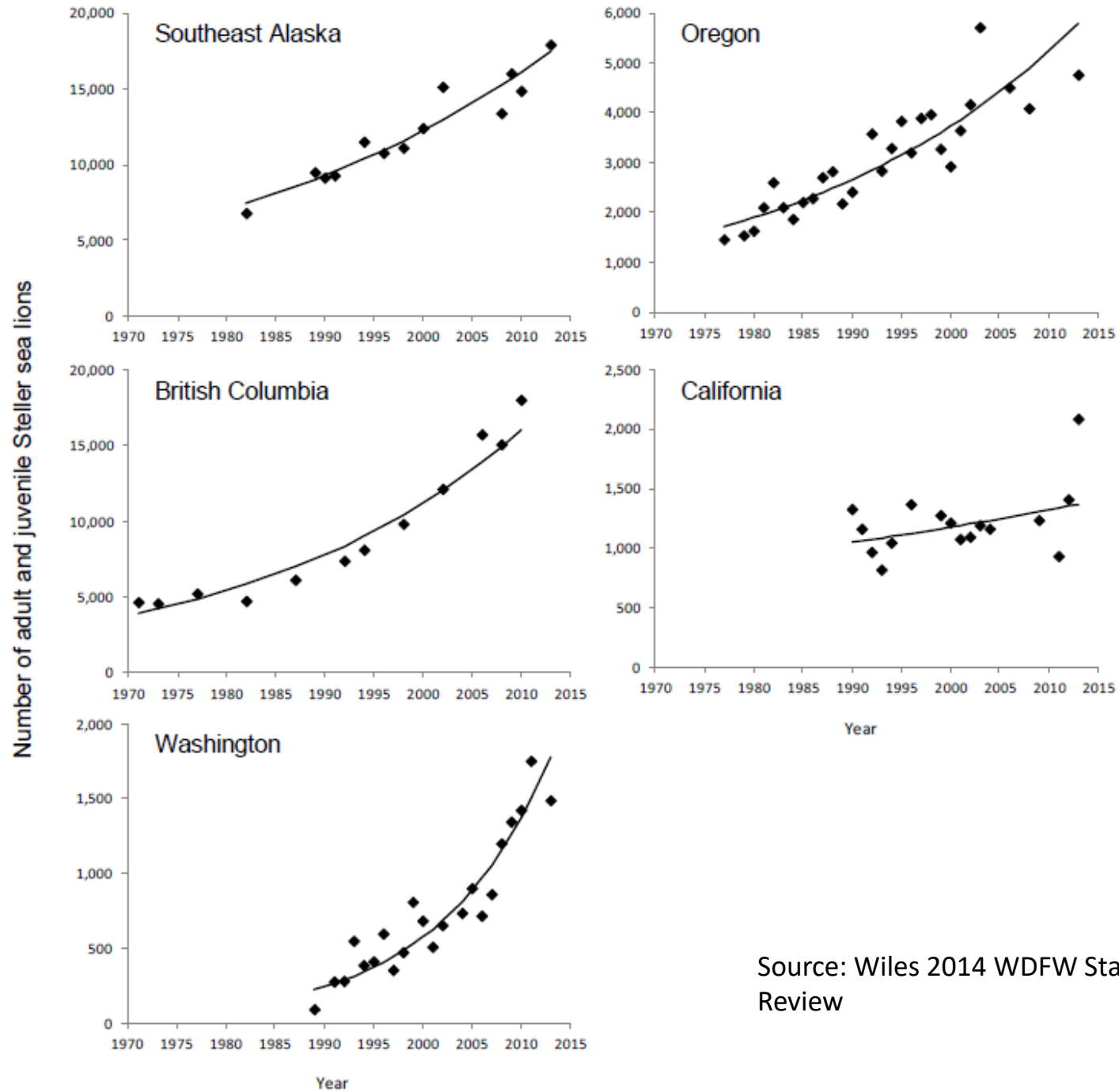


Source: Laake et al. 2018

Steller Sea Lion

- Primarily present in Washington waters between Sept. and April
- Washington's Stellers belong to the eastern distinct population segment
 - Ranges along the west coast of North America from Southeast Alaska to central California
 - This segment was delisted under the ESA

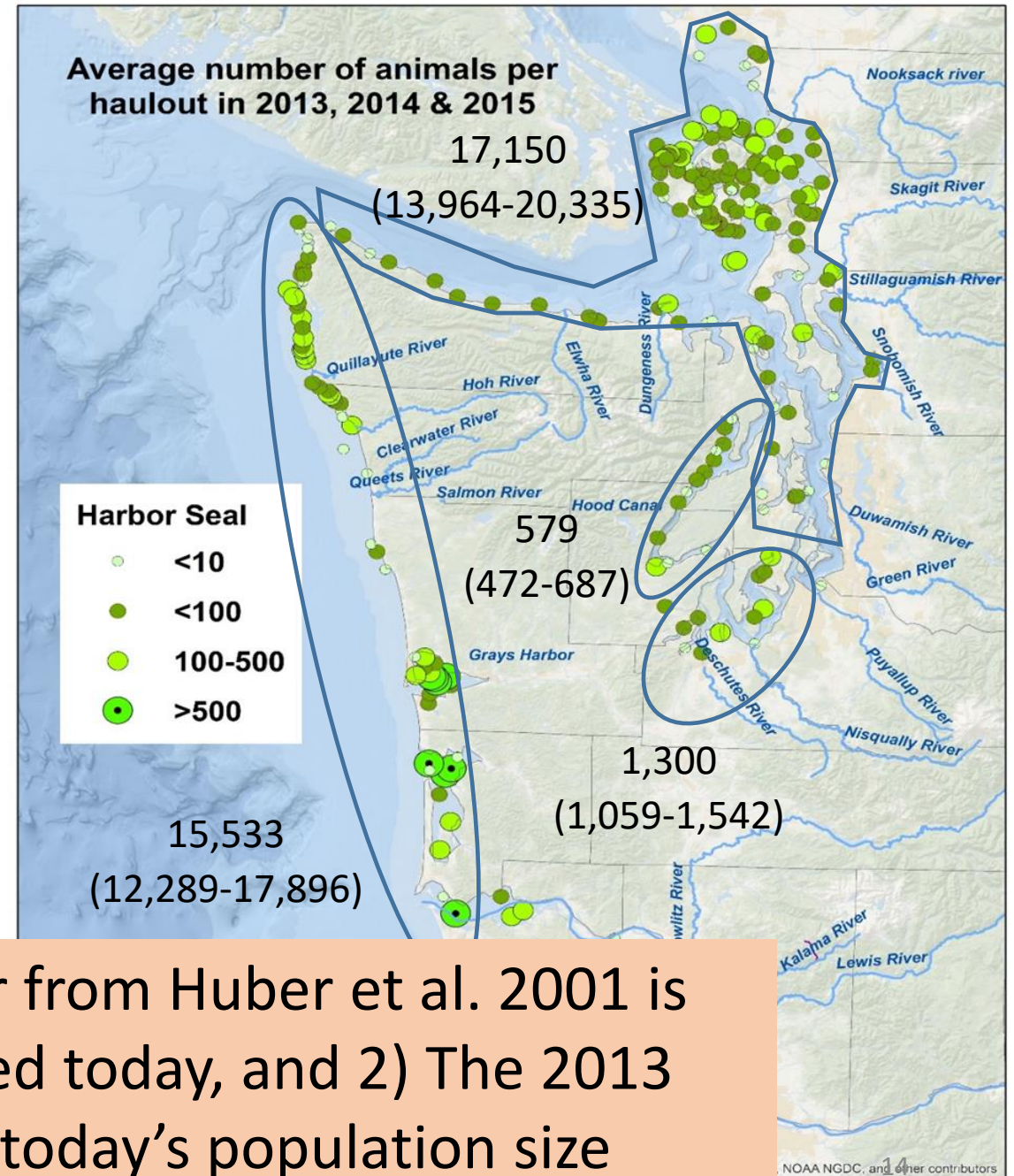




Source: Wiles 2014 WDFW Status Review

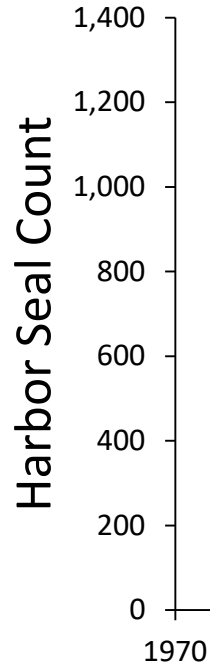
Harbor Seal

- Year-round resident
- 1 coastal stock and three stocks in the inland marine waters
 - Washington/Oregon coast
 - Northern inland waters
 - Hood Canal
 - South Puget Sound

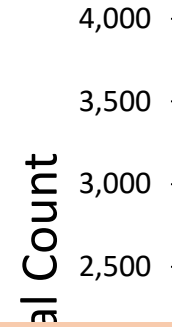


Key assumptions: 1) Correction factor from Huber et al. 2001 is reflective of haulout patterns observed today, and 2) The 2013 seal population estimate is similar to today's population size

Puget Sound

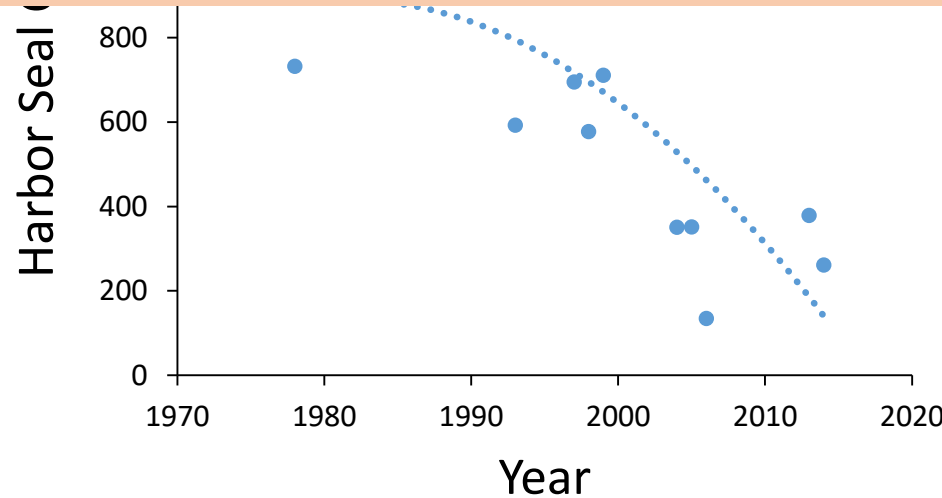


Strait of Juan de Fuca



Conclusions:

- 1) Uncertain trend in Hood Canal,
- 2) Different dynamics in the Puget Sound, Strait of Juan de Fuca and Hood Canal regions



Marine Mammal Protection Act (MMPA)



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 in the MMPA

- 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
 - Section 120(f)—MMPA amended December, 2018

Waiver of Take Moratorium and Direct Take Permit

MMPA Sections:

- Section 101(a)(3)(A)—Waiver on the Requirements to allow Take
- Section 103—Regulations on Taking of Marine Mammals
- Section 104—Permit authorizing Take

Considerations:

- Rarely pursued (<10 times since 1972)
- Extensive public process: Requires administrative law judge hearing, regulations, NEPA, consultation with Marine Mammal Commission
- Criteria: Stocks must be at OSP, best available science, population trends, ecosystem effects, technical feasibility, meet MMPA objectives, among others.
- No process timelines

Federal Transfer of MMPA Management Authority to State (Section 109)

Considerations:

- No successful transfer to date.
- Transfers management authority to state; Secretary enters co-op agreement with state.
- State develops program consistent with MMPA
 - May require RCWs
 - Will require WACs
 - Need to establish marine mammal program to implement regulatory activities consistent with MMPA
 - More financial investment by the state
- Transfer authority for stocks at OSP.
- Consult with Marine Mammal Commission and Pacific Fisheries Management Council
- No NEPA; SEPA would apply; no process timelines in MMPA

Pinniped Removal Authority (MMPA Section 120)

Considerations:

- Allows intentional lethal taking of pinnipeds which are having a significant negative impact on the recovery of salmonid fishery stocks which are:
 - Listed under ESA
 - Approaching ESA status
 - Migrate through Ballard Locks, WA
- Permit for specific numbers, location, timing
- Pinniped stocks are not depleted or listed as strategic stock(s)
- Pinniped Fishery Interaction Task Force
- NEPA
- Individually identifiable animals

Pinniped Removal Authority (MMPA Section 120(f))

Considerations:

- Sea lions meet the “individually identifiable” criteria if they are upstream of Columbia River Mile 112 or within a tributary with listed salmon
- California or Steller sea lions
- Pinniped Fishery Interaction Task Force
- NEPA




Bonneville Pinniped Predation



Bonneville Dam



Non-lethal Effectiveness

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>

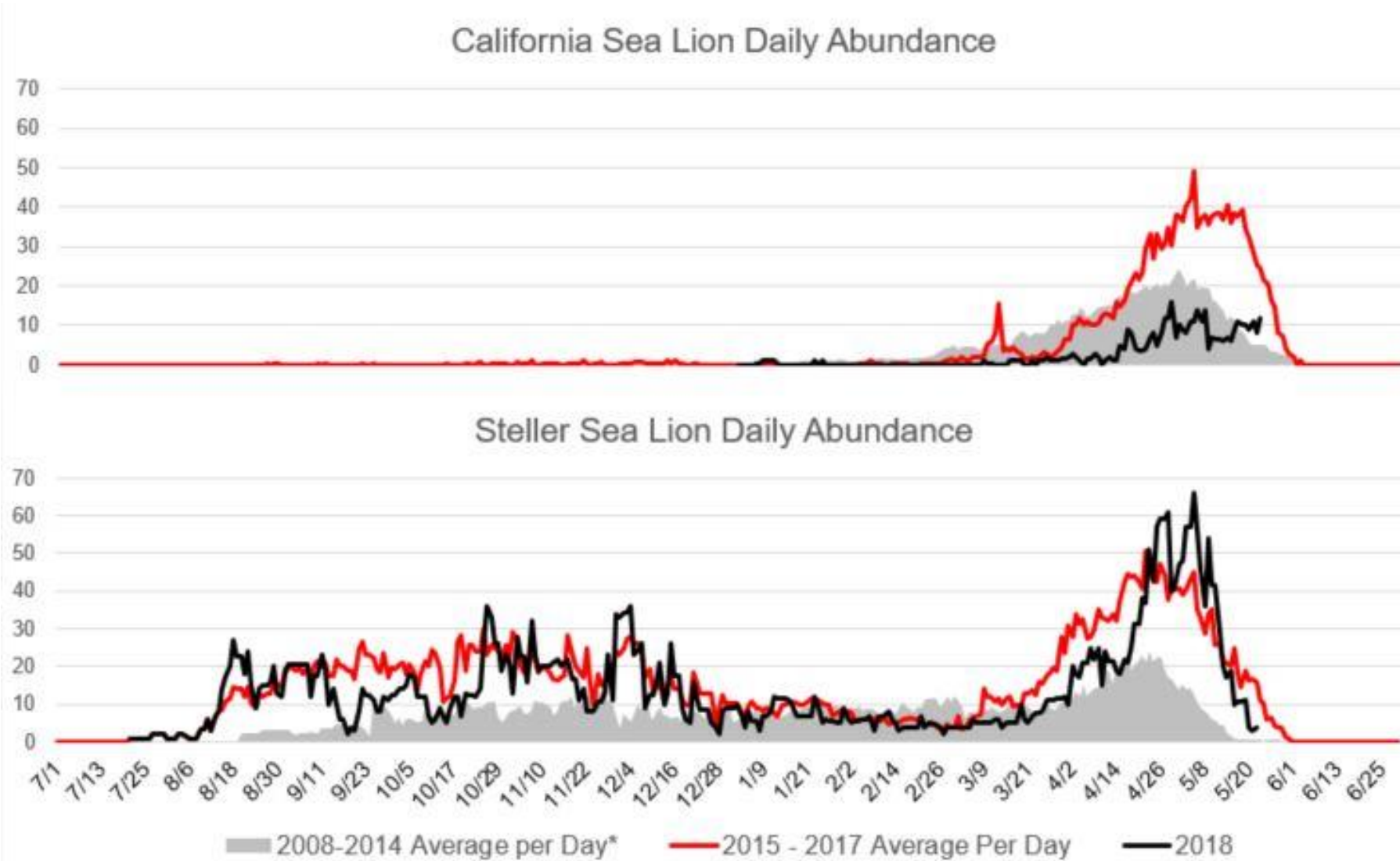
Section 120 Permit Removal Criteria

- 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

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

Bonneville Pinniped Abundance



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.

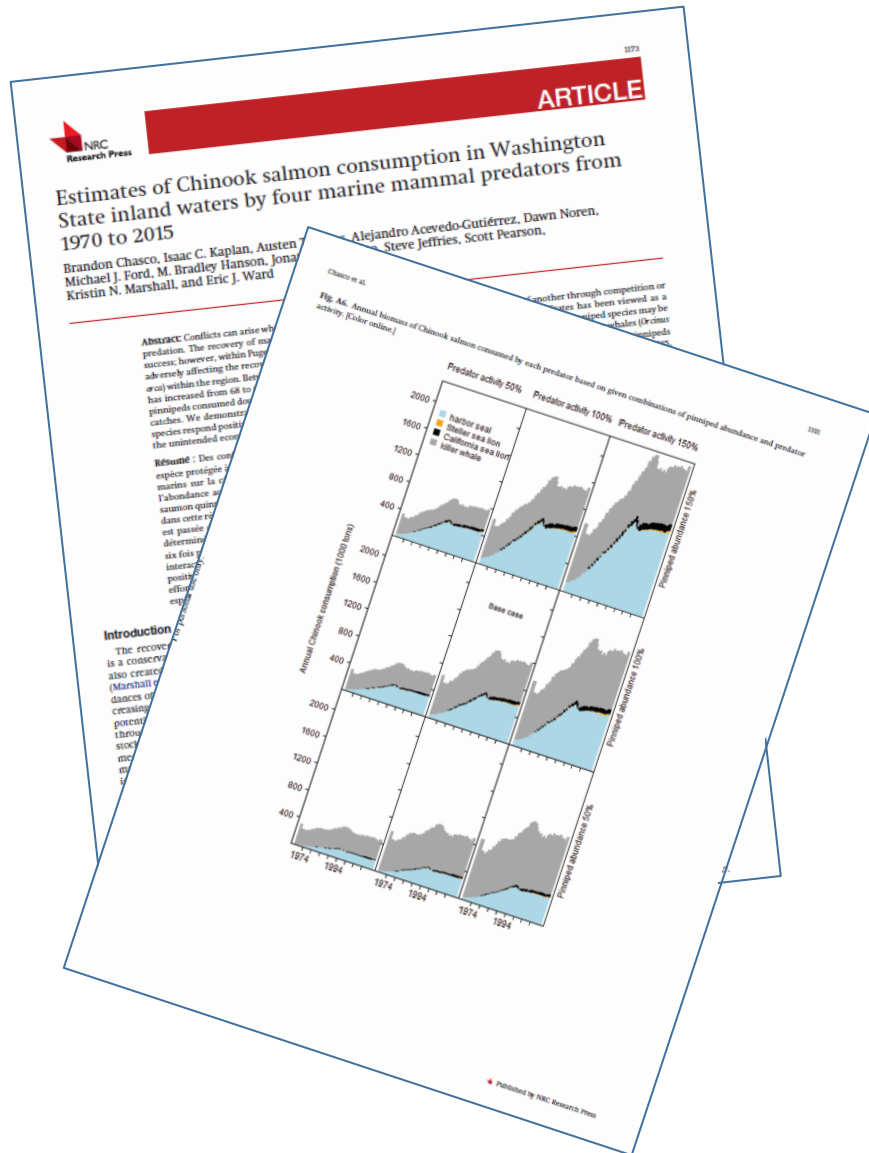
Section 120(f) Application

- WDFW, IDFG, ODFW, CRITFC submitting application later this month.
- California and Steller sea lions
- Likely a year for NEPA analysis
- Need budget support for operations

Harbor Seals in Puget Sound/Outer Coast



How Does Our Work Differ from Chasco?



- Use recent seal population estimates
- New seal diet information from Puget Sound
- Similar modelling approach but we account for sources of uncertainty not included in the “Chasco” model
- Express smolt consumption as fraction of total abundance
- Examine sensitivity to assumptions of marine survival after encountering seals

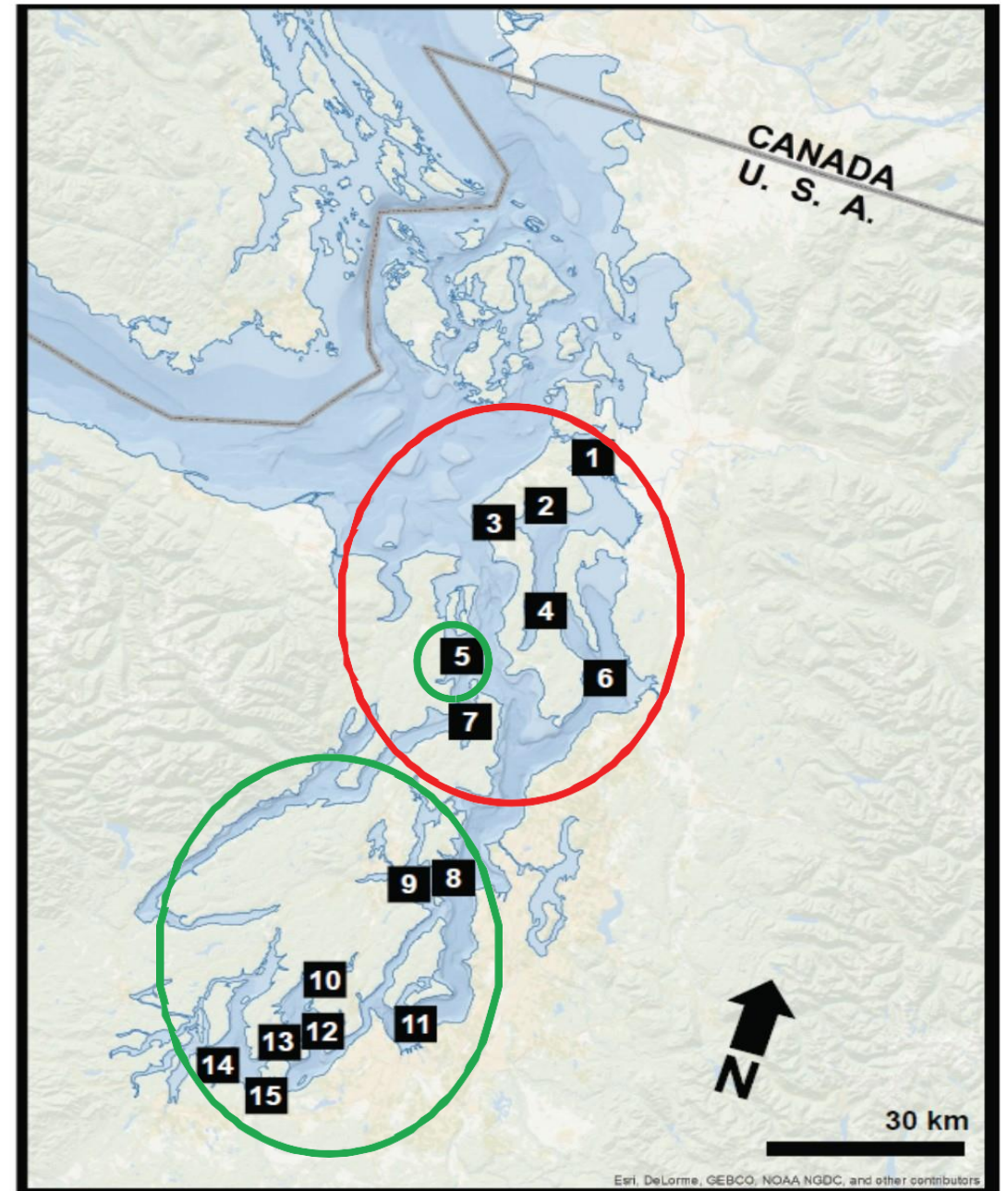
What a Scat Represents

- Prey from previous foraging bouts/meals
 - 1 “meal” occurs in 3.8 ± 1.8 scats (range 1–10)
 - Passed over 24-48 hours
 - Contain digested/degraded hard parts and DNA



Puget Sound Sampling in 2016

- **North Sound: Western Washington University**
- **South Sound: WDFW**
- **1,129 total samples**
- **Collected Jan-Aug**



Diet Reconstruction



Harbour seal scat



DNA metabarcoding



Prey bone identification

- Allows identification of different species in the feces
- Percent diet by species
- Distinguishes adults vs. juveniles

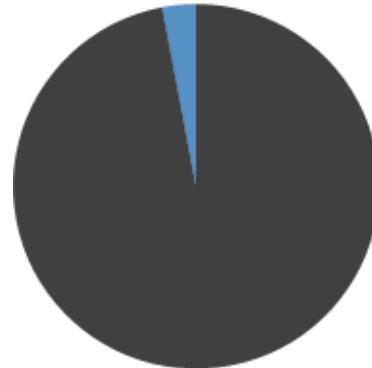
Key Findings

- Highly diverse diet (57 prey species)
- Highly variable diet in space and time
- Presenting estimates from a single year (2016)
- Considerable uncertainty associated with estimates
- Chinook salmon represent 1-2% of seal diet during February – August
- *This just in: harbor seals may be selecting for larger fish than average fish available*

For juvenile Chinook, why are we worried about small diet percentages?



1-2%



Smolts

Why are we worried about small diet percentages?



Seal daily needs (kg)	2.0	Range: 1.9-2.1kg

Why are we worried about small diet percentages?



Seal daily needs (kg)	2.0	Range: 1.9-2.1kg
Diet proportion juv Chinook	1%	95% CI: 0.2-2.4%

Why are we worried about small diet percentages?



Seal daily needs (kg)	2.0	Range: 1.9-2.1kg
Diet proportion juv Chinook	1%	95% CI: 0.2-2.4%
Mass of juv Chinook/day/seal (kg)	0.02	
Mass/juv Chinook (kg)	0.008	95% CI: 0.005-0.011kg

Why are we worried about small diet percentages?



Seal daily needs (kg)	2.0	Range: 1.9-2.1kg
Diet proportion juv Chinook	1%	95% CI: 0.2-2.4%
Mass of juv Chinook/day/seal (kg)	0.02	
Mass/juv Chinook (kg)	0.008	95% CI: 0.005-0.011kg
Avg. # juv Chinook/day/seal	2.5	

Why are we worried about small diet percentages?



Seal daily needs (kg)	2.0	Range: 1.9-2.1kg
Diet proportion juv Chinook	1%	95% CI: 0.2-2.4%
Mass of juv Chinook/day/seal (kg)	0.02	
Mass/juv Chinook (kg)	0.008	95% CI: 0.005-0.011kg
Avg. # juv Chinook/day/seal	2.5	
# Seals	19,000	95% CI: 15,458-22,542

Why are we worried about small diet percentages?

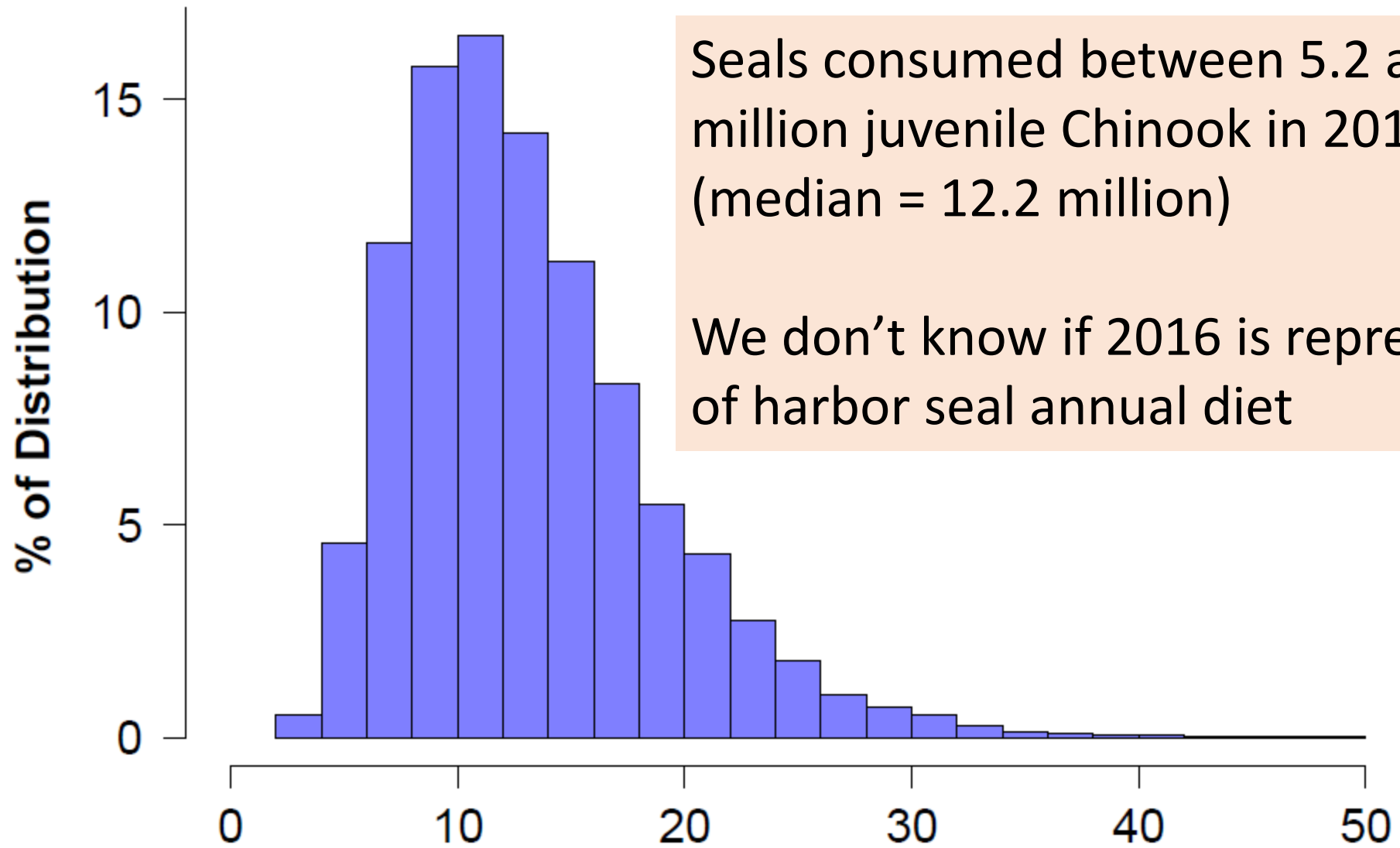


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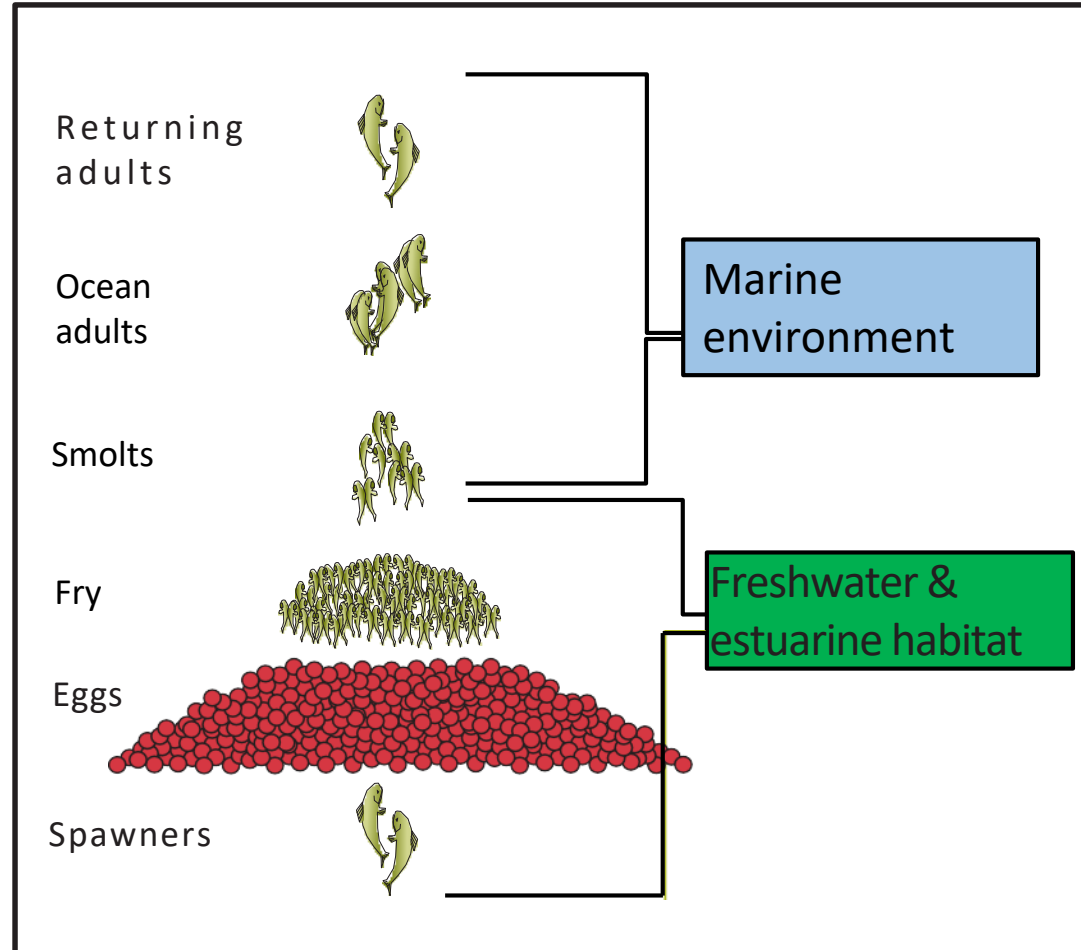


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Avg. # juv Chinook/day/seal	2.5	
# Seals	19,000	95% CI: 15,458-22,542
Juv Chinook eaten per day	47,500	
Juvenile Chinook eaten per month	1,425,000	95% CI: 518,000-2,418,000



Estimated total Chinook smolts consumed by Harbor Seals in 2016 (millions)

Impacts to Salmon Populations



Smolt Consumption

$$\text{Percent smolts consumed} = \frac{\text{Estimated number consumed}}{\text{Total hatchery smolts} + \text{Total natural smolts}}$$



Regional Mark Information System release database



Rotary screw trap data

Smolt Consumption

$$\text{Percent smolts consumed} = \frac{12.2 \text{ million (5.2 – 26.8 million)}}{41.6 \text{ million hatchery} + 4.5 \text{ million natural}}$$



Regional Mark Information System release database



Rotary screw trap data

Comparison to Survival

$$\text{smolt to adult return (SAR)} = \frac{\text{returning adults}}{\text{total smolts}}$$

Naturally produced

Watershed	Ocean entry years
Skagit	1994 – 2011
Cedar	2003 – 2011
Bear	2003 – 2011
Green	2003 – 2012
Nisqually	2009 – 2010
Dungeness	2005 – 2012

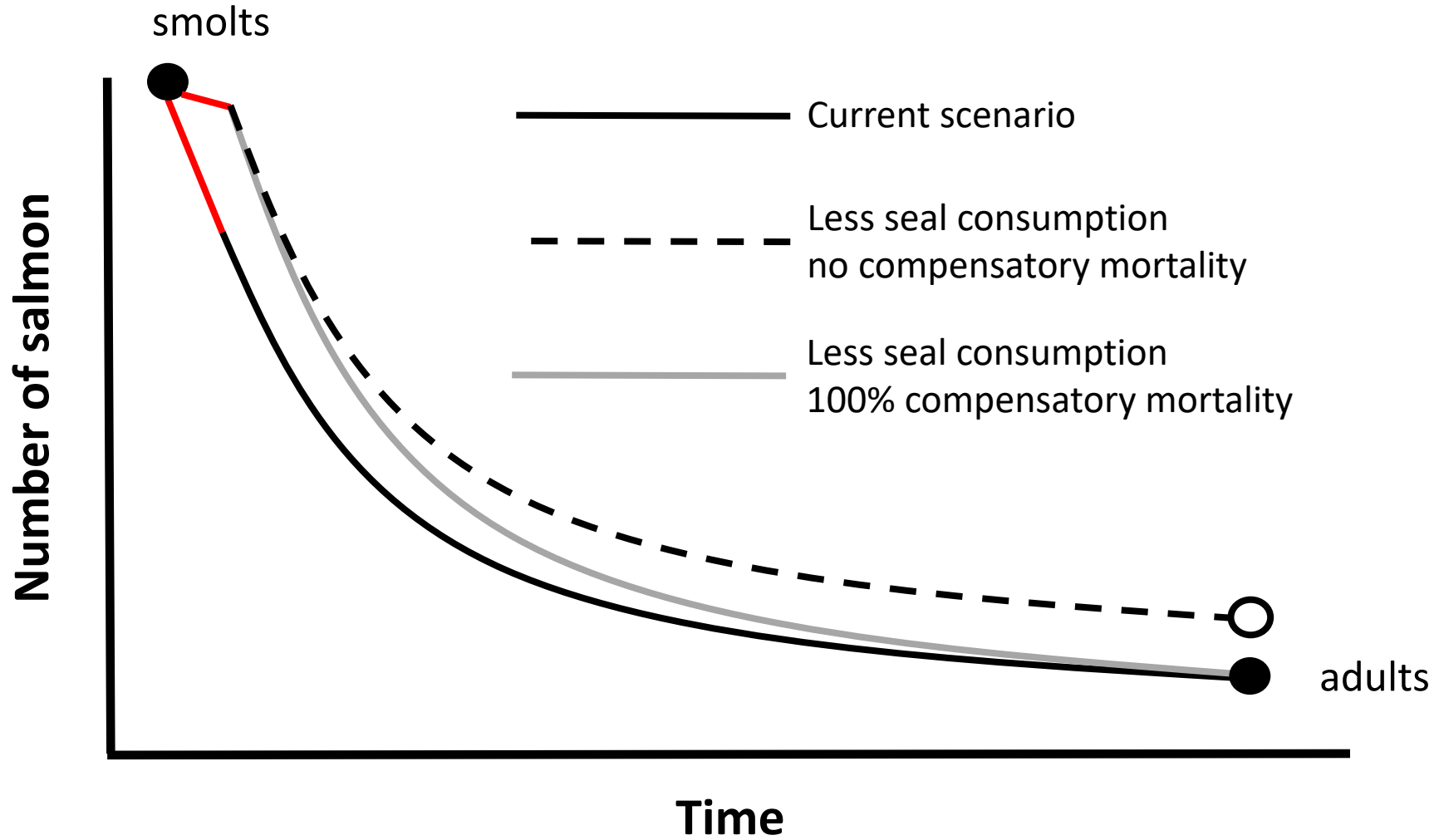
Data Source: WDFW smolt monitoring

Hatchery

Stock	Ocean entry years	Stock	Ocean entry years
Nooksack springs	2001 – 2011	Gorst fall	2002 – 04; 09 – 11
Samish fall	2001 – 2011	Nisqually fall	2001 – 2011
Skagit spring	2001 – 2011	Minter fall	2003 – 2005
Skykomish summer	2001 – 2011	Tumwater fall	2001 – 2005
Issaquah fall	2003 – 2007	Hoodsport fall	2003 – 2011
Green fall	2001 – 2011	Skokomish fall	2001 – 2011
Puyallup fall	2003 – 2008; 2010		

Data Source: Gary Marston (WDFW), from RMIS CWT database

Compensatory Mortality



Adult Equivalents

Assumed marine survival after seal consumption

Total adult return predicted from 46.1 M smolts

Lower

Higher

Adult abundance	232,000	464,000
Smolt to adult return rate (SAR)	0.5 %	1.0 %

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Total adult return predicted from 46.1 M smolts

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Adult equivalents of smolts consumed by seals

No compensatory mortality	84,000 (36,000 – 183,000)	167,000 (71,000 – 367,000)
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50% compensatory mortality	42,000 (18,000 – 92,000)	84,000 (36,000 – 183,000)

Adult Equivalents

Assumed marine survival after seal consumption

Total adult return predicted from 46.1 M smolts

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Adult abundance	232,000	464,000
Smolt to adult return rate (SAR)	0.5 %	1.0 %

Adult equivalents of smolts consumed by seals

No compensatory mortality	84,000 (36,000 – 183,000)	167,000 (71,000 – 367,000)
50% compensatory mortality	42,000 (18,000 – 92,000)	84,000 (36,000 – 183,000)
100% compensatory mortality	0	0

Most recent inland water seal population estimate = 19,000

Reduction in total juvenile Chinook consumption by seals

	10%	25%	50%
Target seal abundance	17,130	14,300	9,500
Initial removal	1,870	4,700	9,500
Annual removals	255	530	710

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

Potential Increase in the Number of Adult Chinook if Harbor Seals were Removed at PBR Level

Region	PBR	0% comp. mort	25% comp. mort.	50% comp. mort.
N. Inland	1,162	5,500 (2,200-12,500)	4,100 (1,600-9,300)	2,800 (1,100-6,200)
S. Sound	88	400 (150-950)	300 (120-710)	210 (80-470)
Hood Canal ¹	39	190 (70-420)	140 (60-310)	90 (40-210)
Inland Total	1,290	6,100 (2,400-13,800)	4,600 (1,800-10,400)	3,100 (1,200-6,900)
Coast ²	1,100	5,000 (2,000-11,300)	3,700 (1,500-8,500)	2,500 (1,000-5,600)

¹The issue of which correction factor to use for Hood Canal needs to be resolved; this is a tentative estimate using Huber's correction factor.

²For this exercise, the Washington coast was considered as its own stock. Ultimately, we will need harbor seal estimates from Oregon to calculate PBR for this stock.

SRKW Task Force Recommendation 12: Puget Sound/Outer Coast Pinnipeds

- Pilot project for removal/alteration of artificial haul out near locations with significant outmigration and predation of Chinook smolts.
- Complete ongoing research and coordinate an independent science panel to review/evaluate extent of pinniped predation.
- Engage NOAA to determine OSP for harbor seals.
- Convene co-management panel to coordinate with science panel and assess appropriate management actions.
- Provide funding for these recommendations.

Summary and Next Steps

- Important to consider the biological, administrative, logistical, and social aspects of this high-profile issue.
- While generalists, harbor seals collectively consume a significant number of Chinook smolts (*although, we may be overestimating size/amount in the 2016 analysis*).
- Ability to reduce pinniped predation impacts on returning adult Chinook is uncertain.
- MMPA administrative options are complex and limited.
- Worth pursuing further scientific collaboration and explore mitigating pinniped predation near estuaries of concern.
- Need to consider other pinniped impacts on adult Chinook and need to pilot artificial haul-out dissuasion.

Questions



3/21/2019

Chin1019 (High)
65k NT, 45k TR

Chin1119 (Mid)
55k NT, 35k TR

Chin1219 (Low)
45k NT, 25k TR

Stock	ER Ceiling	ER Type	Total ER	SUS ER	PT-SUS ER	Total ER	SUS ER	PT-SUS ER	Total ER	SUS ER	PT-SUS ER
Spring/Early:											
Nooksack - Total	10.5%	SUS	37.0%	11.8%	8.1%	36.4%	11.1%	7.4%	35.7%	10.3%	6.6%
Skagit - Total	37.5%	Total	32.2%	20.8%	6.4%	31.9%	20.6%	6.1%	31.7%	20.3%	5.8%
White	22.0%	SUS	25.8%	18.6%	7.2%	25.5%	18.2%	6.8%	25.1%	17.8%	6.3%
Dungeness	10.0%	SUS	6.3%	1.8%	1.7%	6.3%	1.7%	1.6%	6.2%	1.7%	1.6%
Summer/Fall:											
Skagit - Total	48.0%	Total	39.1%	18.1%	5.7%	39.0%	17.9%	5.5%	38.7%	17.6%	5.2%
Stillaguamish - Total	24.0%	Total									
Unmarked ER	8.0%	UM SUS	28.6%	18.4%	8.5%	28.5%	18.2%	8.3%	28.3%	18.0%	8.1%
Marked ER	12.0%	M SUS	31.1%	21.4%	11.9%	30.9%	21.2%	11.7%	30.7%	21.0%	11.4%
Snohomish - Total	21.0%	Total	17.7%	7.7%	6.4%	17.4%	7.5%	6.2%	17.0%	7.0%	5.7%
	15.0%	SUS									
Lake WA (Cedar R.)	13.0%	PT-SUS	36.9%	25.2%	16.4%	35.8%	24.0%	15.1%	34.6%	22.7%	13.8%
Green	13.0%	PT-SUS	51.8%	40.1%	16.4%	50.8%	39.0%	15.1%	49.7%	37.8%	13.8%
Puyallup	13.0%	PT-SUS	52.1%	40.4%	16.4%	51.3%	39.5%	15.1%	50.5%	38.5%	13.8%
Nisqually	49%	Total	51.8%	44.8%	18.9%	51.0%	43.9%	17.5%	49.9%	42.8%	15.9%
Western Strait-Hoko	10%	SUS	20.7%	2.4%	2.4%	20.4%	2.2%	2.2%	20.0%	1.8%	1.8%
Elwha	10%	SUS	6.9%	2.2%	2.1%	6.8%	2.1%	2.0%	6.7%	2.0%	2.0%
Mid-Hood Canal	12%	PT-SUS	25.5%	15.4%	15.1%	24.2%	14.1%	13.8%	22.7%	12.5%	12.2%
Skokomish	50%	Total	49.8%	39.8%	15.5%	49.0%	38.9%	14.2%	48.0%	37.8%	12.6%

LCN

38% Total

39.2%

36.7%

34.8%

Stillaguamish Natural AEQ Mortalities													
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total		
Ar 7 Sport	1.7	3.0	0.8	0.0	0.0	0.0	0.6	0.4	0.5	0.2	7.2		
Ar 5 Sport	0.8	0.4	0.1	0.0	0.0	0.0	0.0	0.1	0.3	0.5	2.1		
Ar 8-1 Spt	0.0	0.1	0.2	0.0	0.0	0.2	0.1	0.1	0.2	0.4	1.3		
Ar 9 Sport	0.6	0.3	0.2	0.0	0.0	0.0	0.7	0.4	0.2	0.3	2.7		
Ar 6 Sport	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.6	0.5	0.4	1.8		
A 10 Sport	0.3	0.4	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1.0		
A 11 Sport	0.2	0.4	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	1.3		
A 12 Sport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
A 13 Sport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

Mid Hood Canal Natural AEQ Mortalities													
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total		
Ar 7 Sport	0.5	1.0	0.3	0.0	0.0	0.0	0.2	0.2	0.2	0.1	2.5		
Ar 5 Sport	0.8	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	1.5		
Ar 8-1 Spt	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.4		
Ar 9 Sport	0.8	0.4	0.2	0.0	0.0	0.0	0.3	0.2	0.1	0.1	2.2		
Ar 6 Sport	1.7	0.6	0.2	0.0	0.0	0.0	0.0	0.3	0.2	0.2	3.1		
A 10 Sport	0.3	0.6	0.1	0.1	0.0	0.0	0.3	0.2	0.2	0.0	1.8		
A 11 Sport	0.8	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9		
A 12 Sport	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.6		
A 13 Sport	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5		