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December 6, 2022

### **MEMORANDUM**

**TO: Council Members**

**FROM: Mark Fritsch**

**SUBJECT: Report on sea lion predation and management in the Columbia Basin**

### **BACKGROUND:**

**Presenter:** Doug Hatch, CRITFC  
Casey Clark, WDFW

**Summary:** Doug and Casey representing the team implementing the joint permit authorizing removal of sea lions from Columbia River waters, will provide a brief history on sea lion predation on salmon, steelhead and white sturgeon in the Columbia Basin and management actions to date, including implementation and other issues. Other team members - Meagan West and John Edwards (WDFW), Paul Ward (CRITFC), Mike Brown (ODFW), and John Powell (IDFG) - will be available for questions.

**Relevance:** This topic is related to one of the seven emerging program priority areas in the [Investment Strategy](#) of the 2014 Fish and Wildlife Program – “preserving program effectiveness by supporting expanded management of predators”. Our continued understanding of in-river sea lion populations is important as we consider management for fish and pinniped interactions.

**Workplan:** Fish and Wildlife Division preliminary work plan 2022; Program Implementation; and Pursue implementation of 2014 Program and 2020 Program Addendum, including Council Program priorities.

Background: In 1994, Congress amended the Marine Mammal Protection Act (MMPA), adding section 120, which established a process for authorizing the intentional lethal take of individually identifiable pinnipeds that have a significant negative impact on the decline or recovery of salmonid fishery stocks (16 USC § 1389).

In March 2008, fish and wildlife managers in the Columbia River Basin received federal authorization under Section 120 of the Marine Mammal Protection Act (MMPA) to remove sea lions that have been observed preying on salmon and steelhead below Bonneville Dam. The federal authorization allowed the fish and wildlife managers to use lethal measures to remove sea lions that meet specific criteria<sup>1</sup>. The authorization is guided by the Pinniped-Fishery Interaction Task Force (Task Force). The Task Force is composed of NOAA Fisheries staff, independent scientists, representatives from affected conservation and fishing communities, tribes, states, and others.

In June 2019 the fish and wildlife managers requested authorization for more flexibility in effectively managing California and Steller sea lions predation and proposed to reduce the existing habituated population and to manage proactively by not allowing new animals to habituate within the mainstem Columbia River and select tributaries. The expected benefit of sea lion removal program in the Columbia River basin is to reduce or eliminate a source of mortality to listed and non-listed fish species.

In 2020, PL 115-329 was passed into law that allowed government agencies to lethally remove Steller and California Sea Lions in select locations of the Columbia and Willamette Rivers. Under this new law, the states of Washington, Oregon, and Idaho, and the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes and Bands of the Yakama Nation are eligible to apply for a permit from NOAA Fisheries to remove predatory sea lions on the Columbia River and specified tributaries.

More Info:

- Council Topic [Article on Sealions](#), 2018
- [Pinniped-Fishery Interaction Task Force, Bonneville Dam](#) – publications 2007 to 2022
- Marine Mammal Protection Act [Section 120 Pinniped Removal Program: Columbia River and Willamette River](#)

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<sup>1</sup> Removal of problem sea lions has proven to be the most effective means of protecting fish from predation. While exclusion gates keep sea lions out of the fishways, other non-lethal deterrents such as pyrotechnics and rubber buckshot fired at them have only a temporary effect.

# Sea Lion Impacts and Management in the Columbia River

Doug Hatch, CRITFC and Casey Clark, WDFW



Dec 2022; Northwest Power and Conservation Council



Columbia River Inter-Tribal Fish Commission



# The sea lion issue in the Columbia River has involved:

**Biology** – 238 sea lions removed under §120 and 90 sea lions removed under §120(f)

Sea lions eat around 3 to 5 salmon per day so 10s of thousands of salmon have been saved.

**Regulation** – 5 applications to NMFS for lethal removal; Pinniped Fishery Interaction Task Force has met 7 times

**Litigation** – Four lawsuits filed; twice to 9<sup>th</sup> Circuit

**Legislation** – HR 1769 introduced in 2007 110<sup>th</sup> Congress. PL 115-329 signed in Dec 2018 115<sup>th</sup> Congress.

**Teamwork** – Northwest Congressional Delegation, USACE, BPA, NMFS, NPCC, IDFG, ODFW, WDFW, Nez Perce Tribe, Umatilla Tribe, Yakama Nation, Warm Springs Tribe, and CRITFC.



# Steller Sea Lion

- rounded head
- lighter brown color
- males 800-2000 lbs



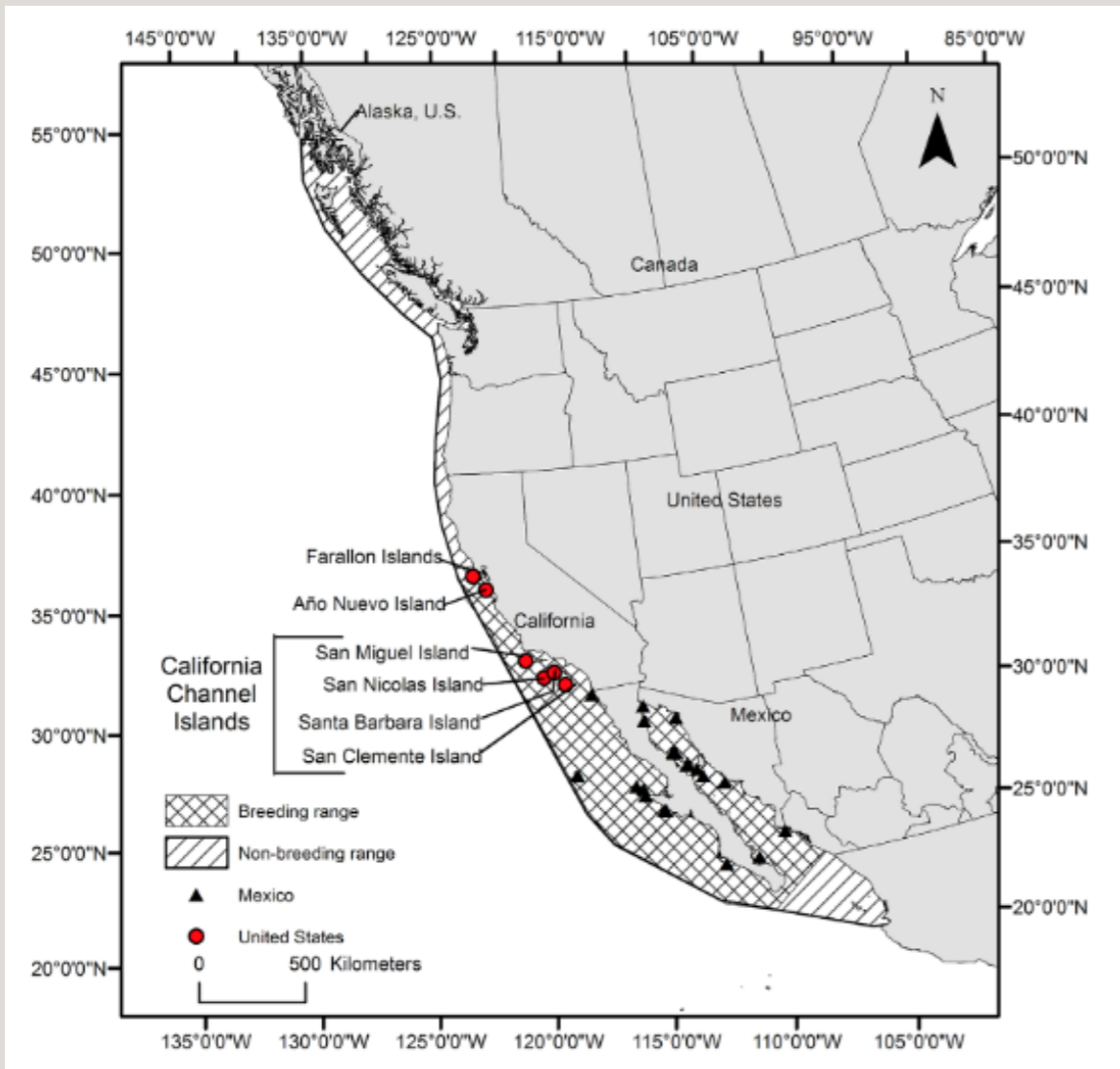
# California Sea Lion

- point on head
- darker brown color
- males 500-1200 lbs

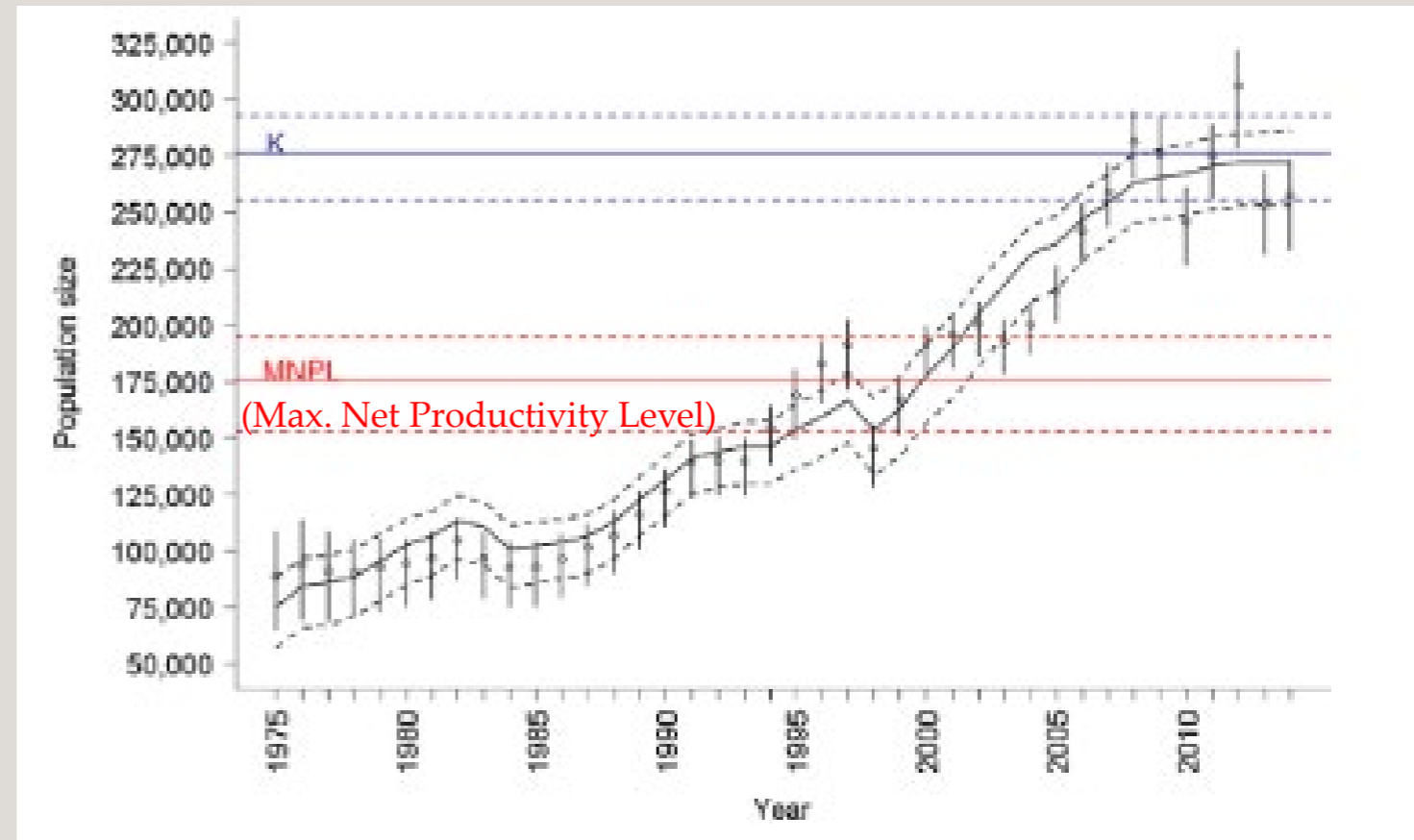




# Status of California Sea Lions



From Laake et al. 2017

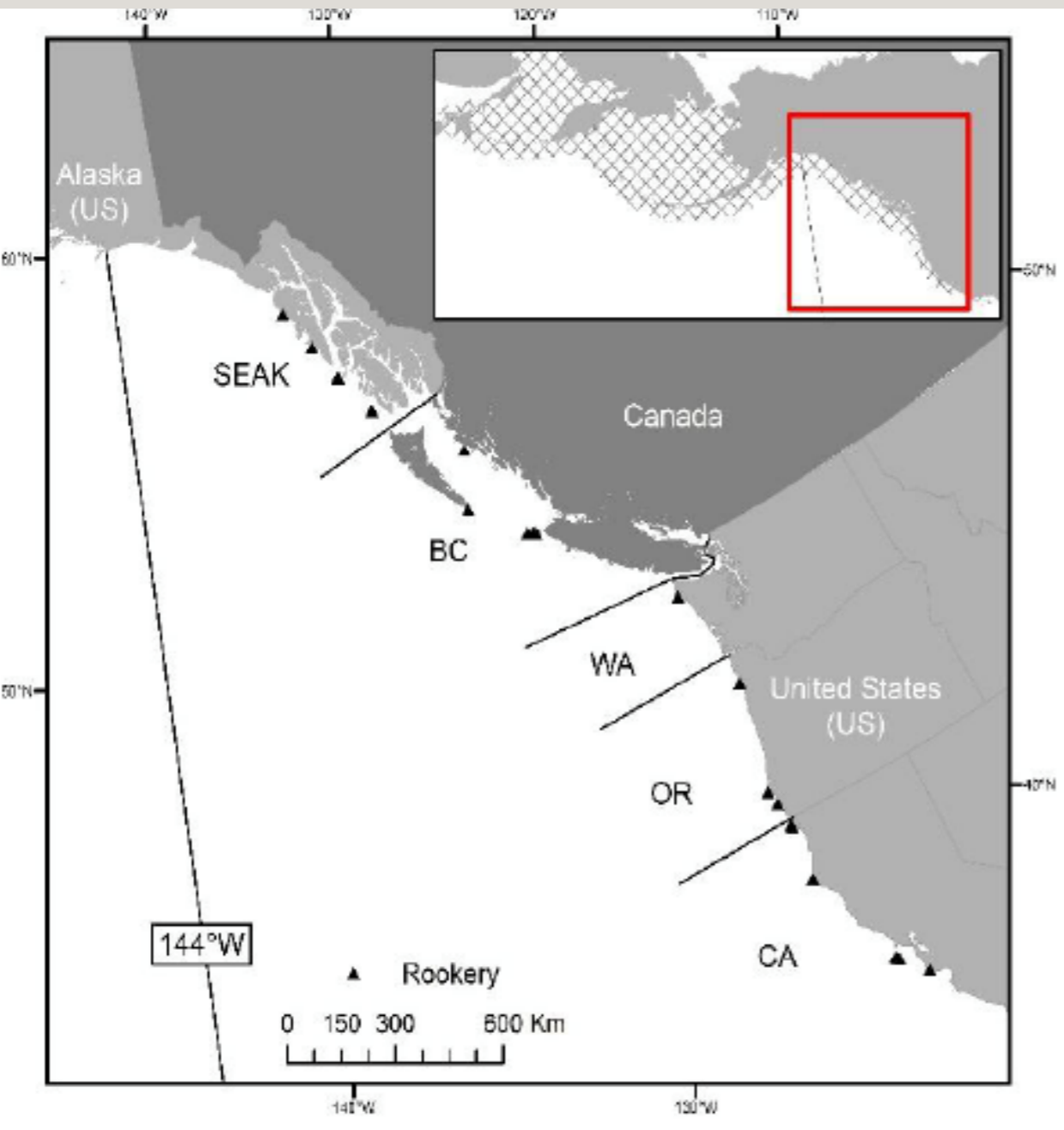


PBR (Potential Biological Removal)

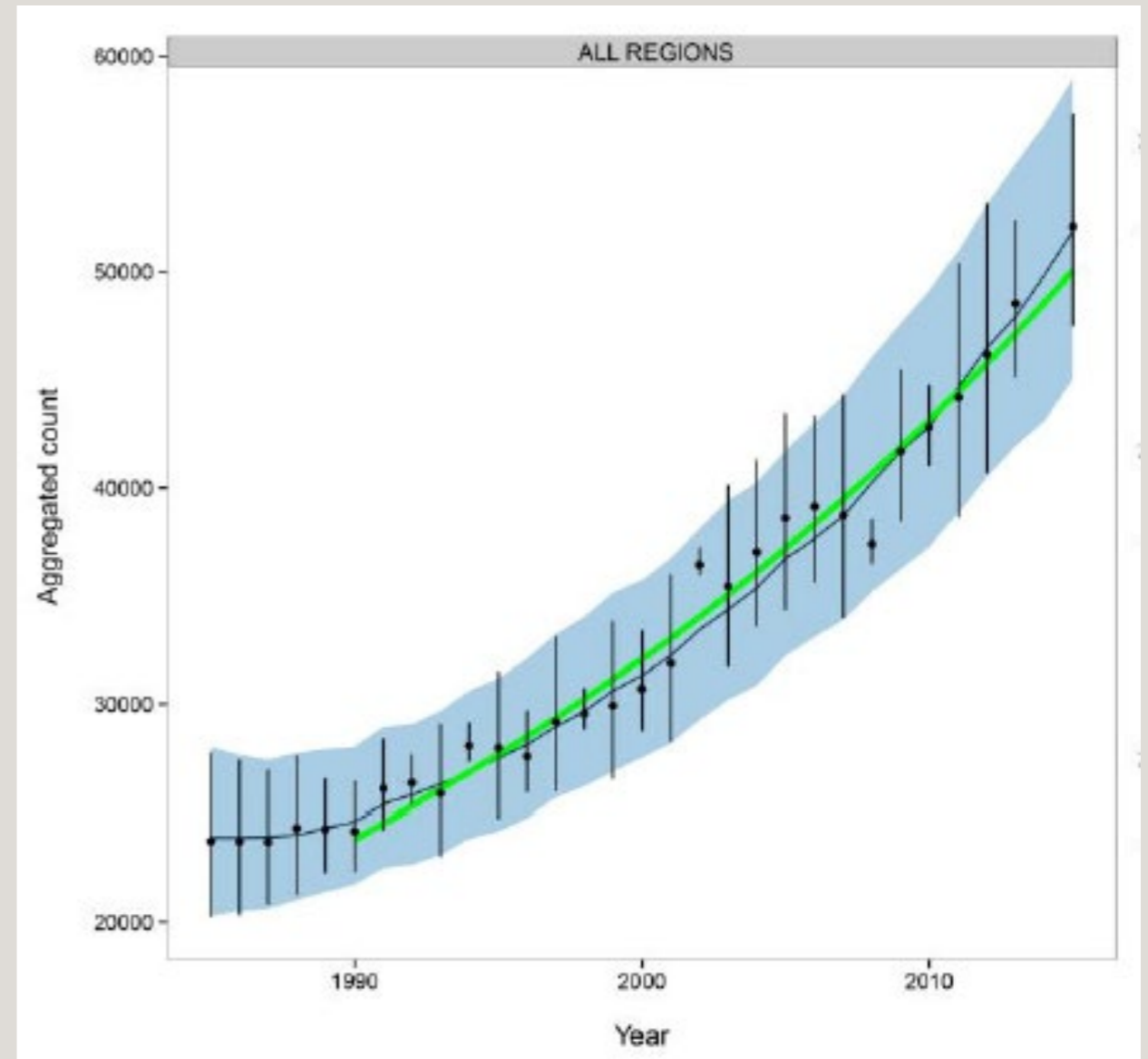
9,200



# Status of Steller Sea Lions



From NOAA 2017



PBR (Potential Biological Removal)

**2,378**





# Timeline of the Pinniped Issue

- Federal Columbia River Power System BiOp calls for evaluation of sea lion predation in the tailrace of Bonneville Dam

2000

- 0.4% of the spring run taken by pinnipeds in the Bonneville tailrace

2002

2001

- USACE begins documenting sea lion abundance and predation in the Bonneville Dam tailrace

2003

- 1.1% of the spring run taken by pinnipeds in the Bonneville tailrace



# Timeline of the Pinniped Issue

- 1.9% of the spring run taken by pinnipeds in the Bonneville tailrace

2004

- 2.8% of the spring run taken by pinnipeds in the Bonneville tailrace
- Expand non-lethal deterrence; CRITFC begins hazing
- *Washington, Oregon, & Idaho submit request for lethal removal §120*

2006

2005

- 3.4% of the spring run taken by pinnipeds in the Bonneville tailrace
- *C404 spotted in the fish ladders*
- *Oregon, Washington, & CRITFC test non-lethal deterrence*

2007

- 4.7% of the spring run taken by pinnipeds in the Bonneville tailrace
- NMFS accepts the states' lethal take application
- *Pinniped-Fishery Interaction Task Force meets; recommends approval of lethal take under §120.*
- *Rep. Brian Baird introduces HR 1769*



# Timeline of the Pinniped Issue

- 3.2% of spring run taken by pinnipeds in the tailrace
- *NOAA issues §120 take permit.*
- trap malfunction results in the death of 6 sea lions, removals suspended
- *litigation – District Court upholds the lethal removal program; plaintiffs appeal.*
- *Steller sea lions begin to appear in significant numbers*
- *BPA Project 2008-004-00 Sea Lion Hazing & Monitoring starts*

2008

- 2.4% of spring run taken by pinnipeds in the tailrace.
- Pinniped-Fishery Interaction Task Force meets (third season review)
- *9<sup>th</sup> Circuit decides that authorization for removal must be revised: procedural errors*
- States request new letter of authorization

2010

2009

- 2.7% of spring run taken by pinnipeds in the tailrace

2011

- 1.8% of spring run taken by pinnipeds in the tailrace
- *Steller sea lion abundance exceeds CSL abundance*
- *NOAA fixes flaws and issues removal permit to the states under §120*
- *HSUS files lawsuit; court dismisses legal case.*
- States submit new application for lethal removal
- Pinniped-Fishery Interaction Task Force meets and recommends approval of the application



# Timeline of the Pinniped Issue

- 1.4% of spring run taken by pinnipeds in the tailrace.
- HSUS files lawsuit

2012

- 2.1% of spring run taken by pinnipeds in the tailrace

2014

2013

- 2.4% of spring run taken by pinnipeds in the tailrace.
- *District Court rules in favor of NOAA Fisheries*
- *9<sup>th</sup> Circuit rules in favor of NOAA Fisheries*

2015

- 4.3% of spring run taken by pinnipeds in the tailrace



# Timeline of the Pinniped Issue

- *5.8% of spring run taken by pinnipeds in the tailrace.*
- **States submit new application for lethal removal**
- **Pinniped-Fishery Interaction Task Force meets and recommends approval of the application**
- *NOAA issues new permit*

2016

- *3.0 % of spring run taken by pinnipeds in the tailrace.*
- **Pinniped Fishery Interaction Task Force for Willamette Falls is convened.**
- **NOAA issues removal permit for Willamette Falls**
- *PL 115-329 signed into law; amends MMPA with §120(f) allows area-based mgt in Columbia R.*

2018

2017

- *4.7% of spring run taken by pinnipeds in the tailrace.*
- *Oregon submits §120 application for lethal removal at Willamette Falls*

2019

- *3.3 % of spring run taken by pinnipeds in the tailrace.*
- *Tribes and States submit joint application for sea lion removal under 120(f)*



# Timeline of the Pinniped Issue

- Pinniped Fishery Interaction Task Force convenes and recommends approval of §120(f) application
- NOAA issues §120(f) permit

2020

## § 120(f) is a Game Changer

- Includes the tribes as eligible entities
- Allows removal of Steller sea lions
- Area-based management instead of individual sea lion-based management



# Removal Program was Regulated by *Individual* from 2008 through 2020

- Must be individually identifiable CSL – must trap and brand.
- Individual must be observed at Bonneville 5 days.
- Individual must be observed eating a salmonid.
- Individual must be subjected to hazing.
- Once criteria is met, NMFS is notified and a request to add that individual to the removal list is made.
- If the individual is recaptured it can be removed.
- Up to 92 CSL could be removed per year.



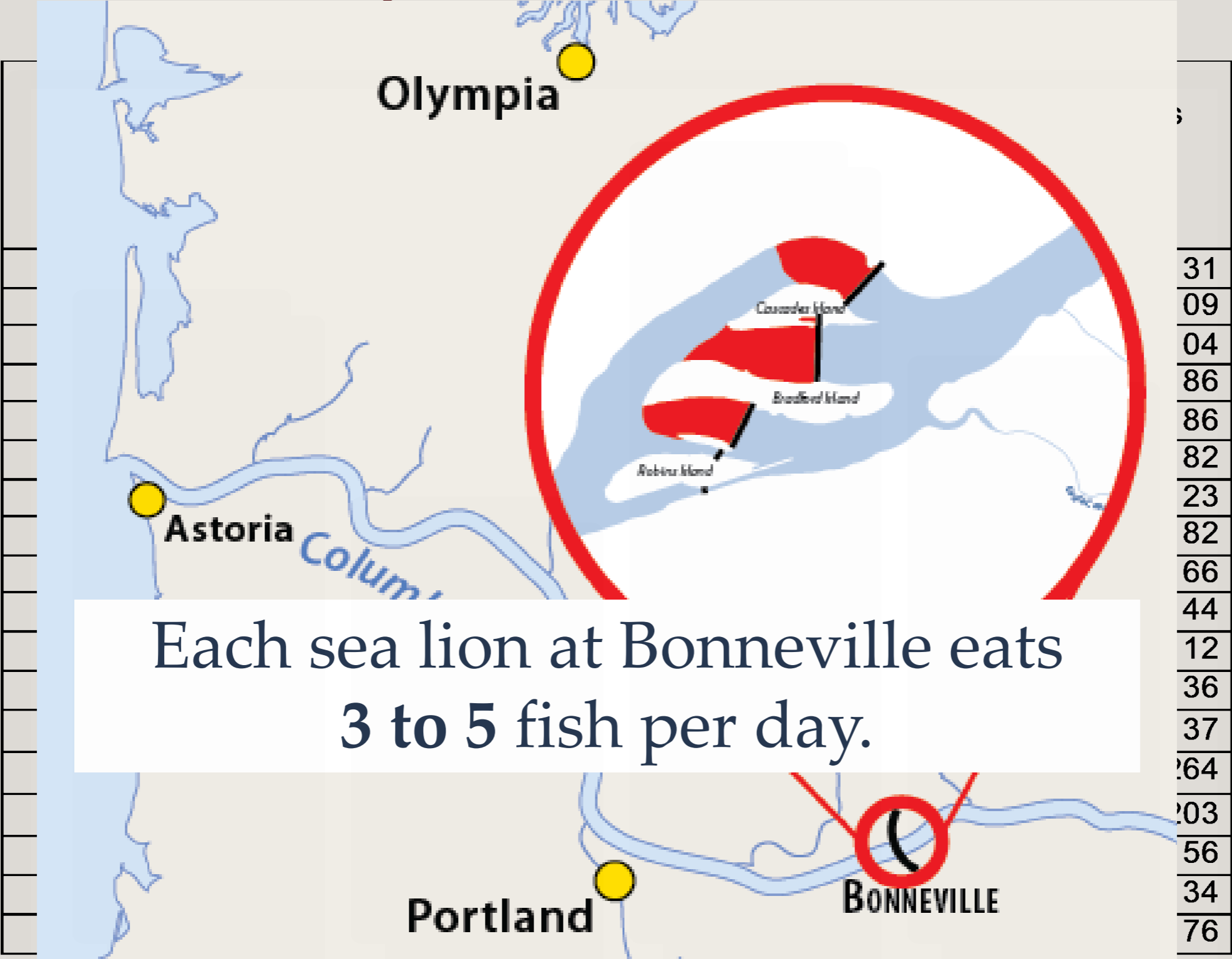
# Removal Program now Regulated by *Area* from 2020 through now

- CSL and SSL residing in the Columbia River between the I205 Bridge and McNary Dam and any salmon bearing tributary are deemed individually identifiable and having a significant negative impact on listed salmon, sturgeon, and lamprey and are eligible for removal under §120(f).





# Sea Lion Impacts at Bonneville



# Predation loss at **Bonneville** and the **lower river**

Year	Bonneville Dam salmonids passage (Jan 1 – May 31)	Adjusted salmonids consumption estimate in Bonneville tailrace	% of run (Jan 1 – May 31)	Predation of spring chinook between estuary and Bonneville	% of run (Jan 1 – May 31)
2010	267,194	6,542	2.39%	77,560	22%
2011	223,380	4,007	1.76%	59,480	21%
2012	171,665	2,382	1.37%	51,750	23%
2013	120,619	2,954	2.39%	35,210	23%
2014	219,929	4,746	2.11%	98,470	31%
2015	239,326	10,859	4.34%	224,450	48%

Bonneville Tailrace

+ lower River

From Tidwell et al. 2018 and Wargo Rub et al. 2019



# How many sea lions are around?

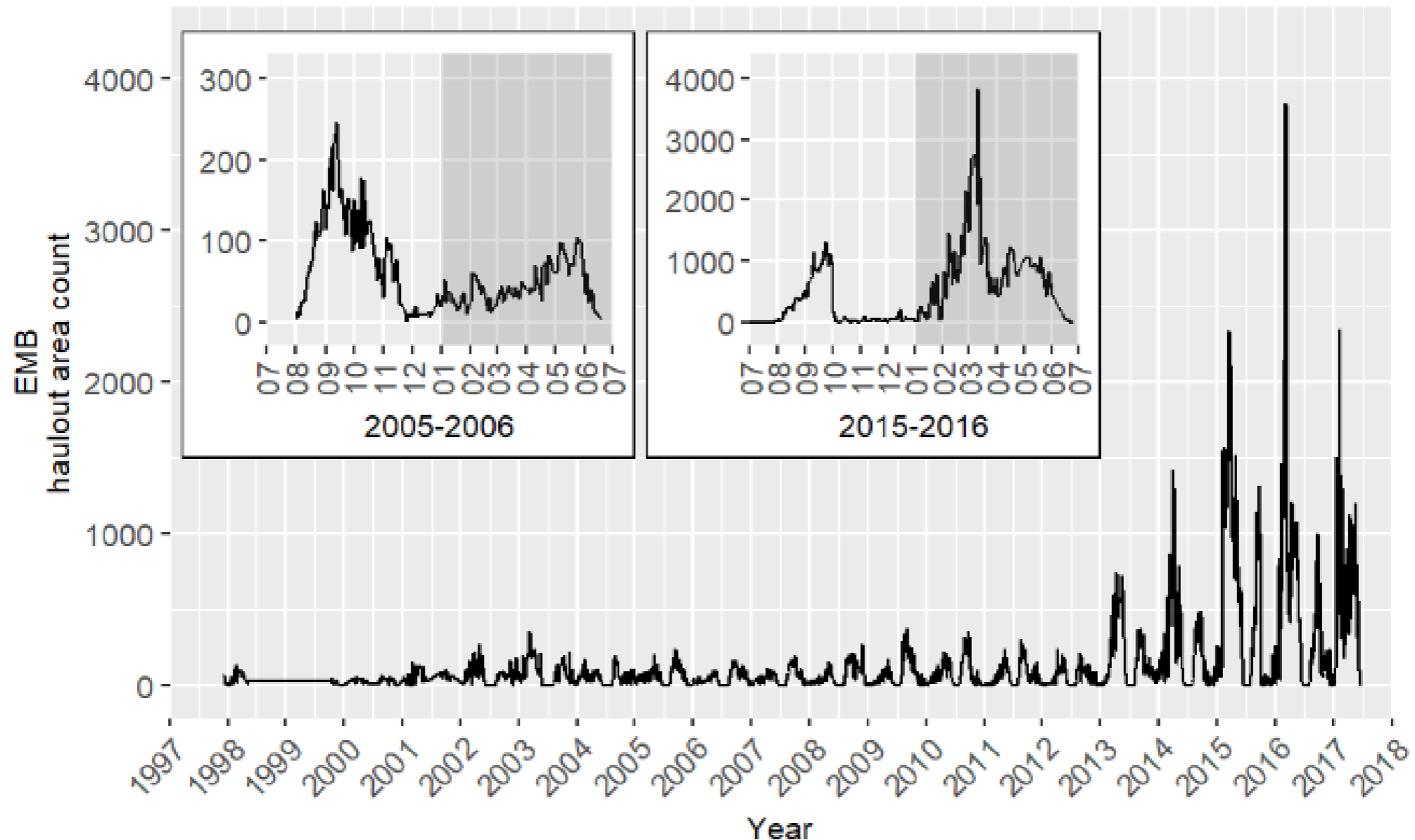


Figure 2. Time series of California sea lion haul-out area counts at the East Mooring Basin (EMB) in Astoria from December 1997 to June 2017. Insets illustrate the changes in magnitude and seasonality of California sea lion occurrence over the study period (x-axis denotes month; note difference in magnitude of counts on the y-axis scale between the two inset figures).

# Implementation & Future Plans

Casey Clark

WDFW Lead Marine Mammal Researcher



2007



2021





Cellular camera

Cellular trap alarm

Tarps

Lowered door drop

Animal and staff safety modifications

Electro-magnetic lock

Tunnel gates

Door safety pin

Head/flipper board

Joined traps

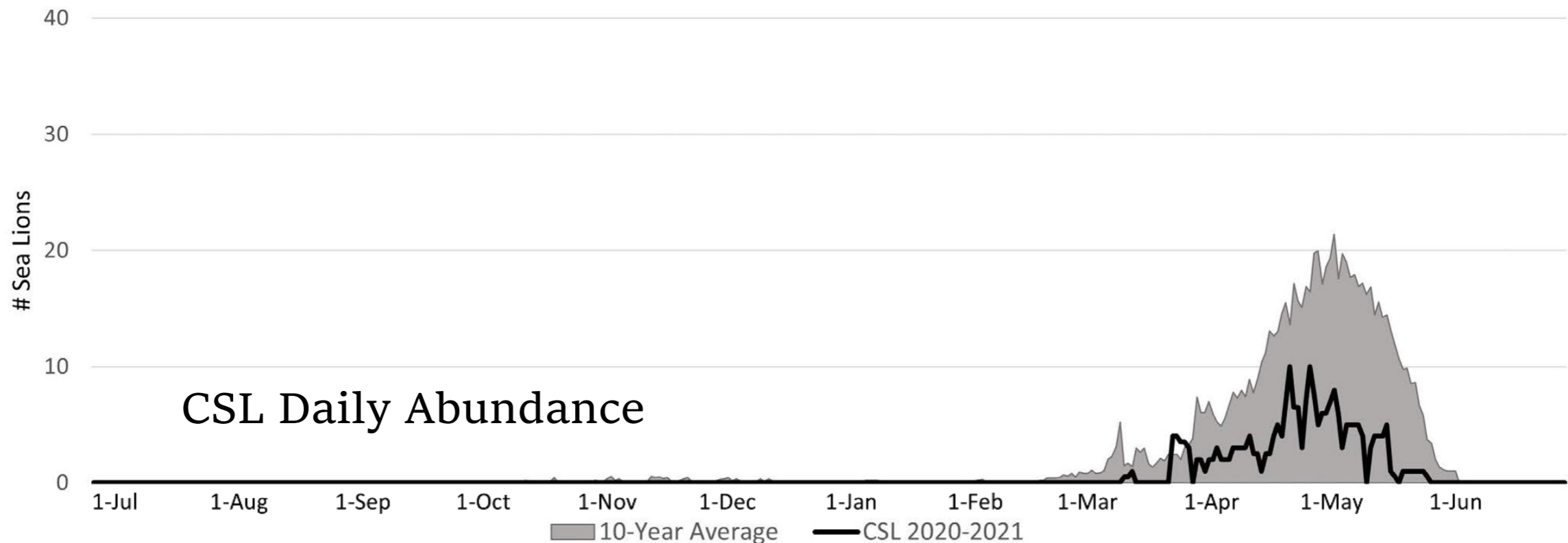


# History of Section 120 and 120(f) Pinniped Removals in the Columbia Basin (Bonneville and Willamette Falls)

Year	CA Sea Lions Removed	Steller Sea Lions Removed	Total
2008	11	2*	13
2009	15	N/A	15
2010	14	N/A	14
2011	1	N/A	1
2012	13	N/A	13
2013	4	N/A	4
2014	15	N/A	15
2015	35	1*	36
2016	59	N/A	59
2017	24	N/A	24
2018	33	N/A	33
2019	50	N/A	50
2020	0	6	6
2021	29	38	67
2022	17	9	26
<b>TOTAL</b>	<b>320</b>	<b>56</b>	<b>376</b>



# CA sea lion abundance at Bonneville Dam is on the decline

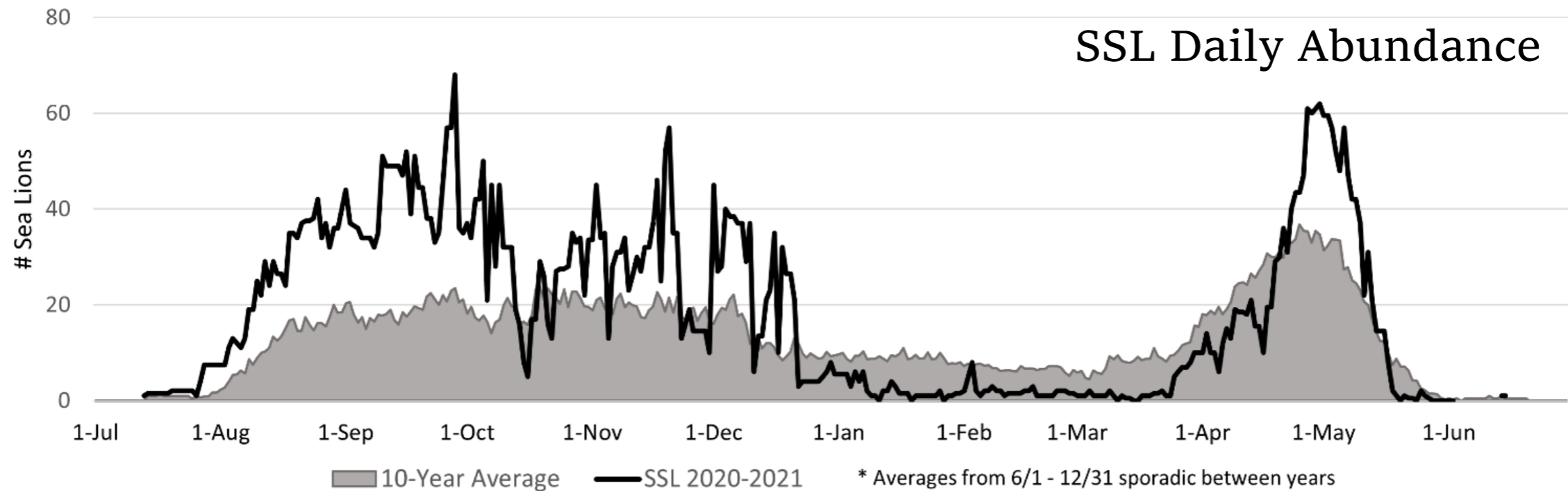


(van der Leeuw et al. 2021)





# Steller sea lion abundance at Bonneville Dam has increased

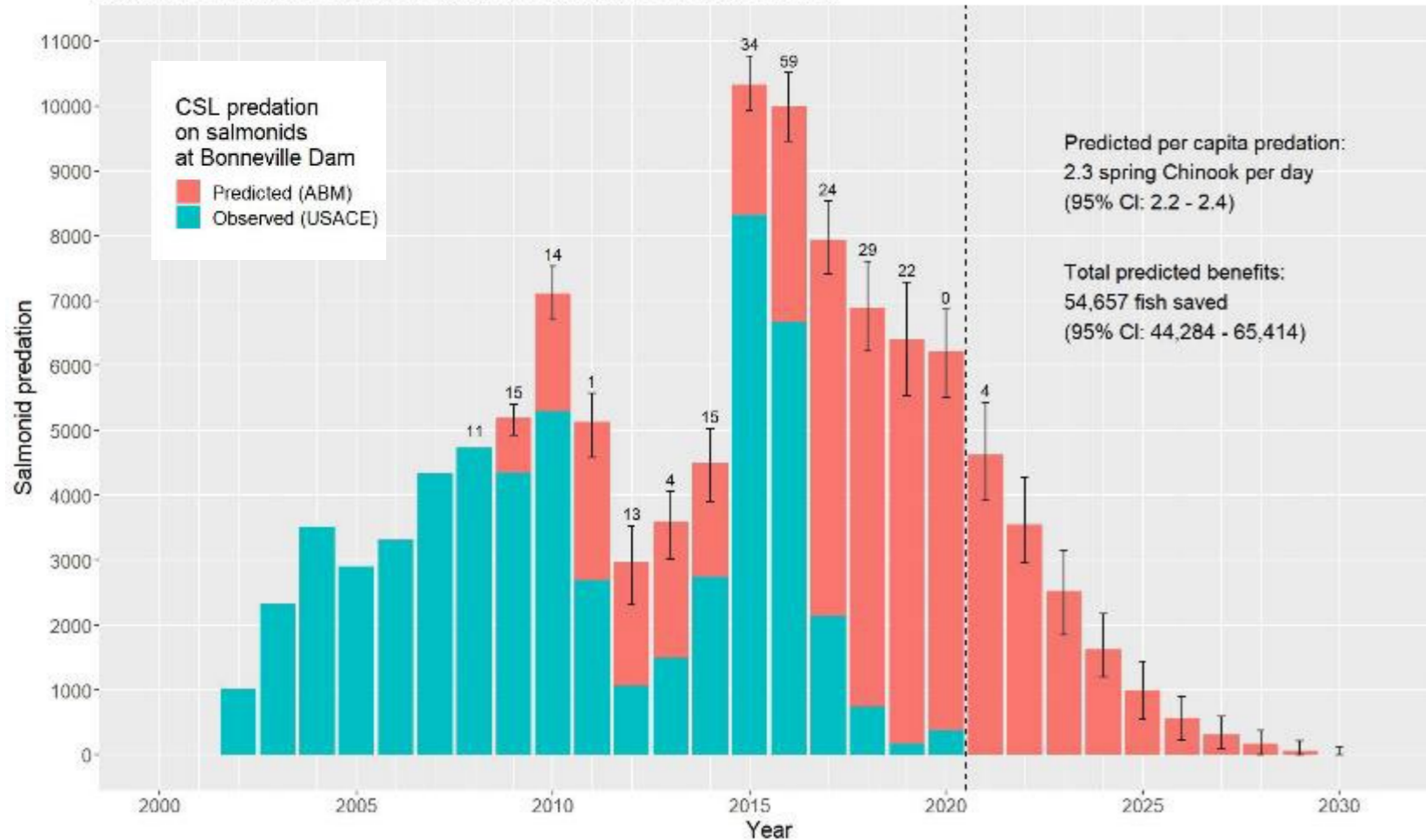


(van der Leeuw et al. 2021)



# Demonstrating success

Predicted benefits from 245 CSL removals at Bonneville Dam under MMPA Section 120  
 (Benefits represented as medians and 95% percentile confidence intervals from 100 repetitions of agent based model;  
 number of CSL removed per year under this authority noted at top of bars)



## Fish Impacts of 2008-2020 Removal of California Sea Lions under MMPA §120

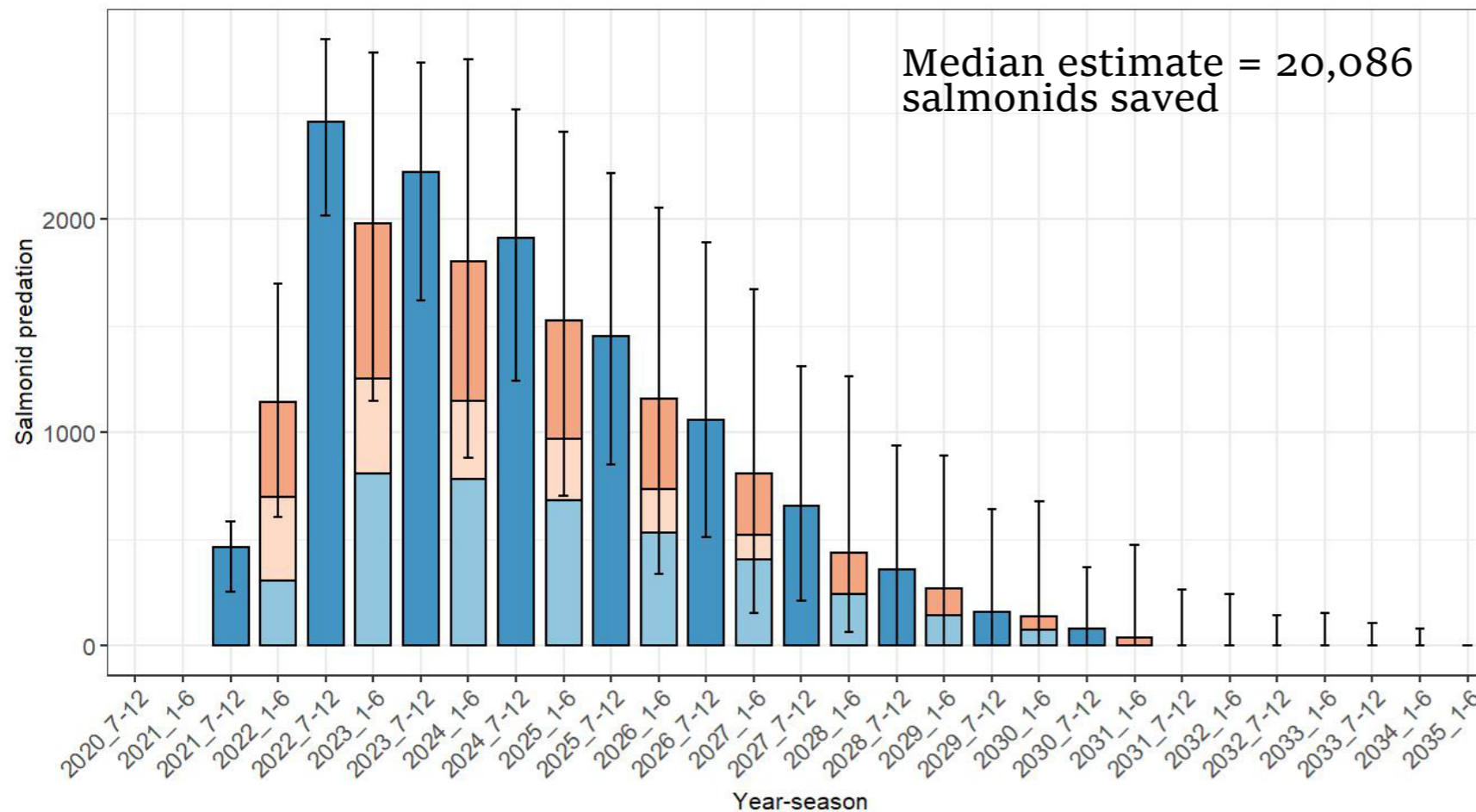
- 245 CSLs removed
- 54,657 salmon saved
- Conservative estimate of benefits – does not account for recruitment



# Demonstrating success

## Fish Saved Since MMPA §120(f) Implementation

■ CSL-BD-Spring 
 ■ CSL-WF-Spring 
 ■ SSL-BD-Fall 
 ■ SSL-BD-Spring 
 ■ SSL-WF-Spring



- Steller removals authorized
- Aug 2020-Jun 2022 removals: 53 SSL and 38 CSL
- 20,086 salmon saved
- Stellers larger, consume more fish per day, longer residency



# Why predation in the Columbia is so impactful

- Conservation efforts aimed at producing/protecting smolts important, but they face lots of challenges ahead (compensatory mortality)
- Adult fish passing Bonneville/Willamette have few remaining obstacles
- Saving salmon from predation at these sites equates nearly 1:1 to increasing fish on spawning grounds (additive mortality)



# Breaking the pattern of recruitment

California and Steller sea lion increases in Columbia River followed a similar pattern:

Small number of animals habituate to a location



Recruitment of new animals initially low, but increases rapidly



Habituated animals arrive earlier, stay longer, return to sites year after year



Habituated animals recruit new individuals





# Success at Willamette Falls

2017: Estimated 89% chance  
of extinction for Winter  
steelhead

Sea lions consumed ~25% of  
some runs

Two seasons of sea lion  
removals: steelhead rebound,  
extinction risk drops to 11%



# Success at Willamette Falls

## Winter steelhead at Willamette Falls **before removals**

Year	2014	2015	2016	2017	2018
Sea lion predation	780	557	915	270	503
% of potential escapement	13%	11%	14%	25%	22%

## Winter steelhead at Willamette Falls **after removals**

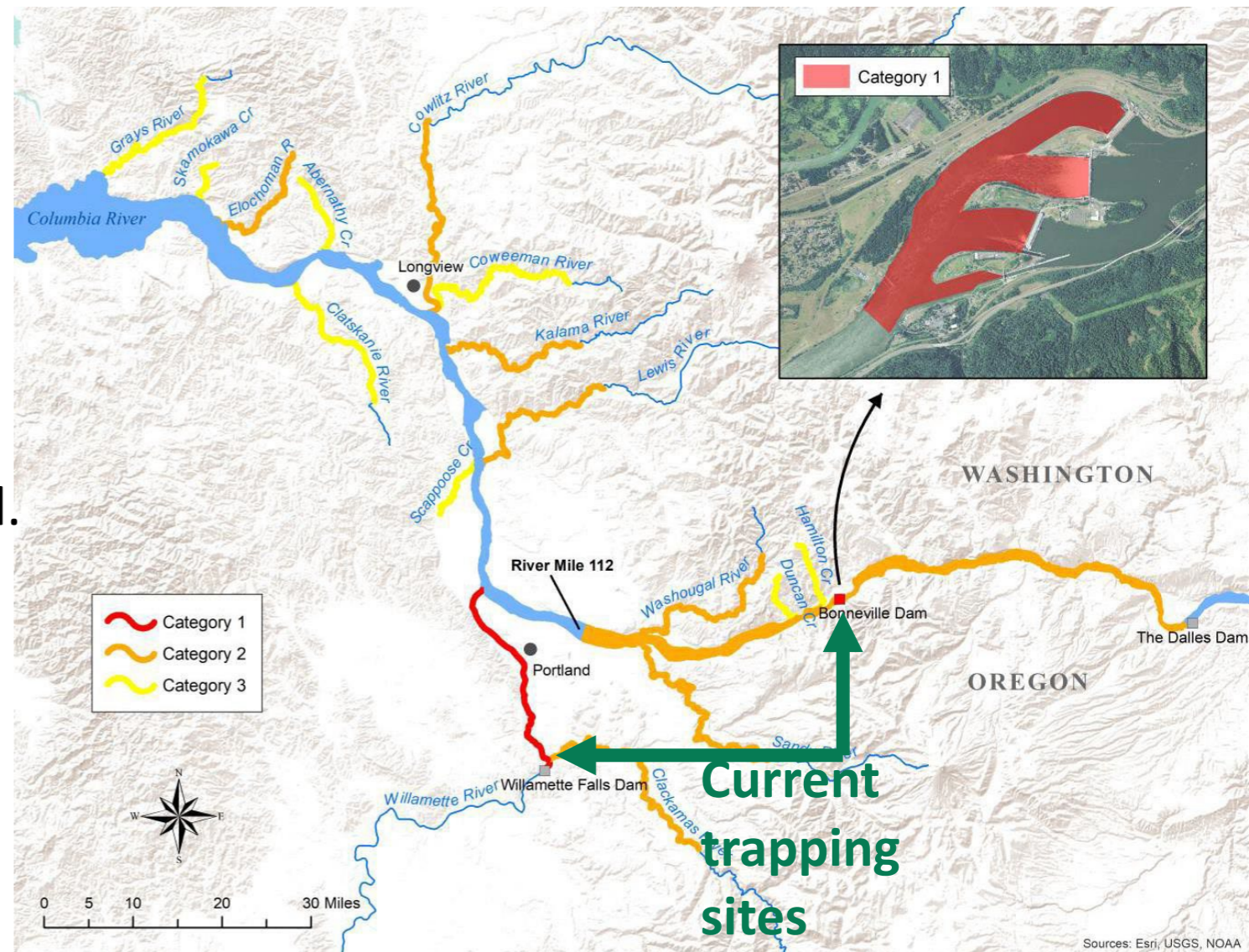
Year	2019	2020	2021
Sea lion predation	280	22	25
% of potential escapement	8%	0.4%	1.2%

Data from Wright et al. 2021



# Tributary Management

- ▲ Category 1: High CSL and SSL presence much of the year. Immediate and ongoing conservation risk for fish.
- ▲ Category 2: Low to moderate and/or periodic sea lion presence. Conservation concern for fish stocks if left unmanaged.
- ▲ Category 3: CSL and SSL have not been documented, but contain ESA spawning habitat.





# Current funding scheme

	State Funds	Federal Funds
WDFW	\$753,000	
ODFW	\$773,938	
IDFG	\$45,000	
CRITFC		\$254,593
<b>Total</b>	<b>\$1,571,938</b>	<b>\$254,593</b>

- Recent changes, and likely to shift in the future as management intensifies and expands in Washington and Oregon tributaries



# Acknowledgements

- Highly successful region-wide collaboration, state, tribal, and federal government, other organizations
- Thanks to the NWPCC for years of engagement, support, and facilitation

