Oregon
Kate Brown, Governor

Department of Fish and Wildlife
South Willamette Watershed District Office
7118 NE Vandenberg Avenue
Corvallis, OR 97330
(541) 757-4186
FAX (541) 757-4252

October 31, 2019

Barry Thom
Regional Administrator, West Coast Region
National Marine Fisheries Service
1201 Northeast Lloyd Boulevard, Suite 1100
Portland, OR 97232

Dear Mr. Thom:

The following information comprises our 2019 annual report to the National Marine Fisheries Service (NMFS) from the Oregon Department of Fish and Wildlife, documenting compliance with the terms and conditions of our authorization for the lethal removal of predatory California sea lions (CSLs) in the vicinity of in the vicinity of Willamette Falls (Oregon City, Oregon) under §120 of the Marine Mammal Protection Act. The current authorization was granted November 14, 2018 for a 5-year period until November 14, 2023.

Terms and Conditions

No. 1
The State of Oregon lethally removed 33 individually identifiable predatory CSLs that were having a significant negative impact on ESA-listed salmonids at Willamette Falls.

No. 2
Based on trained observer data, the State of Oregon requested in writing the addition of 18 new CSLs to the Appendix of individuals meeting the criteria for removal at this location.

No. 3
The State of Oregon did not exceed the limit of taking more than one percent of the current PBR (i.e. 33 actual removals ≤ 92 potential removals).

No. 4
The State of Oregon consulted with our Institutional Animal Care and Use Committee (IACUC) prior to conducting work during the 2018-2019 field season in order to review protocols for capture, holding, and euthanasia of individually identifiable predatory CSLs.

No. 5
No pre-approved permanent holding facilities requested CSLs and therefore all 33 animals meeting the criteria for removal were euthanized according to IACUC-approved methods.

No. 6
The State of Oregon has ensured that transfer or disposal of any carcass or parts were done in accordance with applicable laws, and worked with researchers to make carcasses, tissues or parts of lethally removed animals available for research and/or education.

No. 7
The State notified the Regional Administrator, NMFS West Coast Region, in writing of all sea lion removal operations within the required three-day period.

No. 8
The State of Oregon developed and began implementation of a multi-year monitoring plan to evaluate 1) the impacts of CSL predation on UWR spring-run Chinook salmon and UWR winter steelhead; and 2) the effectiveness of permanent removal of individually identifiable predator CSLs as a method to reduce adult salmonid mortality. The State has or will perform by the end of the authorization period, the following actions:

a) Monitored and reported specific CSLs observed, including when animals were removed and residence time at Willamette Falls;
b) Monitored and reported the number of prey observed and estimated to have been taken;
c) Monitored, evaluated, and reported on expedience (number of days animal present before removal) of removal;
d) Monitored and reported key population parameters for UWR spring-run Chinook salmon and UWR winter steelhead populations so that changes in population status can be detected;
e) Ensured that monitoring efforts included other pinnipeds that occurred in the vicinity of Willamette Falls;
f) Will update the population viability analysis for UWR spring-run Chinook salmon and UWR winter steelhead after 5 years of implementation (after December 2023) to determine, to the extent possible, any changes in the estimated extinction risk to the salmonid stocks in question.

No. 9
This letter describing our compliance with the terms and conditions of the 2018 LOA and the attached two reports on monitoring and management activities conducted in 2018-2019 represents our annual monitoring reports to NMFS. The State of Oregon is currently planning to conduct the same or similar work in 2019-2020.

No 10
The State of Oregon reviewed observation data from Willamette Falls to determine of additional individually-identifiable CSLs qualified as predatory (Condition 1) and requested in writing that NMFS add these 18 newly qualifying CSLs to the approved removal list (see Term and Condition No. 3 above).

No. 11
We understand that the authorization may be modified, suspended, or revoked by NMFS at any time given 72 hours' notice to the State.

No. 12
We understand that this authorization is valid until November 14, 2023, at which time it may be extended by NMFS for an additional period to be determined by NMFS.

The State of Oregon remains committed to pursuing all reasonable approaches to reduce pinniped predation on threatened Willamette River salmonids. As you know, however, existing non-lethal tools have proven highly ineffective and no effective new options have been identified. While we would prefer to find and implement successful non-lethal methods for reducing predation, permanent removal of some number of repeat offending predatory sea lions may continue to be necessary for the foreseeable future.

We thank you for your assistance and support of our work to monitor and reduce sea lion predation on threatened salmonids below Willamette Falls and elsewhere in the lower Columbia River basin. Please let us know if we can provide further information related to our annual reporting obligations.

Sincerely,

Sheanna M Steingass, PhD

Attached:
ANNUAL REPORT: PINNIPED MANAGEMENT AT WILLAMETTE FALLS, 2018-2019
ANNUAL REPORT: PINNIPED MONITORING AT WILLAMETTE FALLS, 2018-2019

ANNUAL REPORT:
PINNIPED MANAGEMENT AT WILLAMETTE FALLS, 2018-2019

October 31, 2019

Oregon Department of Fish and Wildlife

Project staff:

Sheanna Steingass, Bryan Wright, Mike Brown, Shay Valentine, Dan Heiner, Susan Riemer
Zane Kroneberger, Eric Nass, Ben Sorenson, Brad Tripplet
Julia Burco, Colin Gillin

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INTRODUCTION

Willamette Falls is a natural waterfall located approximately 26 miles from the confluence of the Columbia and Willamette Rivers. While sea lions were not traditionally present there, they increasingly began occurring in the 1990s, prompting the Oregon Department of Fish and Wildlife (ODFW) to begin a monitoring program at this location in 1995. Due to further increases in the 2000s, ODFW conducted a non-lethal hazing program in 2010-2013. The non-lethal hazing program, despite expending considerable resources, had minimal effect on reducing predation or the number of sea lions present and was discontinued in favor of a rigorous monitoring program. In 2014, 27 individual sea lions were noted in the area. This increased to 35 individuals in 2016, and more than 40 individuals in 2017. Because of these growing numbers of sea lions, the State initiated management action to prevent a scenario similar to those at Ballard Locks and Bonneville Dam.

In 2017, the State of Oregon submitted an application to the NOAA National Marine Fisheries Service (NMFS) to remove a number of California sea lions present below Willamette Falls under Section 120 of the Marine Mammal Protection Act (MMPA). This was in part due to findings of the Upper Willamette River Winter Steelhead Population Viability Study conducted by ODFW scientists, which concluded the upper Willamette River native (winter) steelhead were at significant risk of extinction due to predation by California sea lions present at this location. In 2017, the number of wild winter steelhead that successfully passed Willamette Falls dropped to an all-time low of 512 fish, with pinnipeds consuming an estimated 25% of the run.

In August 2018, a Task Force Meeting was convened in which Task Force members reviewed the Section 120 application by the State of Oregon and provided a set of recommendations and requirements to NMFS for management actions at Willamette Falls. On November 14, 2018, the State of Oregon's Section 120 management application was approved, and management protocols were submitted and reviewed by an Institutional Animal Care and Use Committee (IACUC) and approved in December 2018. This report summarizes the implementation and results from the first year of work conducted under our Section 120 authority. Specifically, we report here on the management aspects of that work whereas the monitoring requirements are provided in a separate report (see Steingass et al. 2019).

METHODS

Trapping

Sea lions were captured using haul-out traps placed at the upstream end of Sportcraft Landing Moorages on the Willamette River approximately 1.7 km downstream of Willamette Falls. Sea lions use these traps as haul-out sites, entering and exiting traps via a vertically sliding door, which was pad-locked open prior to a scheduled capture attempt. Armed traps were monitored in person, or remotely via game cameras by ODFW staff. Wireless trap monitoring sensors were installed on all trap doors to automatically notify project staff by text in the event of an unplanned trap closure.

Tailrace trap doors were closed using a remote-controlled magnetic release mechanism. Once sea lions were captured, they were herded into holding cages on a barge built specifically to handle sea lions. Once animals were moved from the trap to a transfer cage on the barge, plywood boards were placed on all sides of the transfer cage to reduce visual stimuli and stress on the animal. Two boats were then used to move the barge downriver to a boat ramp where sea lions were transferred onto trucks for transport to a secure off-site facility.

Animals may be held up to 48 hours as per the Willamette Falls IACUC (December 2018), although animals are typically held for less than three hours in the covered transfer cage either indoors or outdoors, and are regularly monitored and wet down with a hose to reduce the chance of thermal stress. If an approved zoo or aquarium facility were available to receive candidate sea lions for permanent holding, then captured animals would be given a health screening by field staff and veterinarians, including members of the States' Institutional Animal Care and Use Committee. If an animal passed the health screening it would be transferred to an approved temporary housing facility prior to shipment to a zoo or aquarium. If an animal failed the health exam, or if there were no approved facilities prepared to accept an animal, then it would be chemically euthanized. Euthanized animals were necropsied and various samples (e.g., teeth, stomachs, whiskers) were collected and stored for later analysis.

Diet analysis

Stomachs and large intestines from euthanized CSLs were collected as well as scanned for PIT tags to gather dietary information. Processing of gastrointestinal (GI) tracts followed established procedures (e.g., see Lance et al. 2001). Undigested remains were washed through a series of nested sieves (2mm, 1mm and .05mm) and all parts were collected for later identification. Samples were identified using a dissecting microscope to the lowest possible taxonomic level by comparing all identifiable prey remains (e.g., bones, otoliths, cartilaginous parts, lenses, teeth and cephalopod beaks) against a reference collection of fish from the northeastern Pacific Ocean and Oregon estuaries. Prey were enumerated by pairing of skeletal structures (otoliths, tail structures, mouthparts, etc.) to achieve the greatest number of prey in the sample. Enumeration takes into account both left and right sides of paired structures and also size of recovered prey remains.

Effect of removals

The effect of the CSL removal program at Willamette Falls in 2018-2019 was assessed in several ways. First, we compared monitoring data from pre- and post- removal authority years. Specifically, we compared predation estimates from 2017 and 2018 (pre-removal authority) to 2019 (post-removal authority). In addition, we compared CSL abundance estimates from 2017-2018 (pre-removal authority) to 2018-2019 (post-removal authority), as well as for the current season (2019-2020) thus far.

Second, we predicted how many salmon and steelhead were "saved" by the removal program. We did this by taking the cumulative sum of the product between: 1) the predicted residency of euthanized CSLs; 2) the predicted daily salmonid composition available as prey for euthanized CSLs; and 3) a constant reflecting the number of salmonids included (or required) in a daily diet.

We estimated predicted residency for a euthanized sea lion as the day on which it was euthanized until the date it departed in the previous season. If it was a newly marked animal for which a previous departure date was unavailable then we used the median departure date of all marked animals in the previous year. We estimated daily salmonid prey composition by pooling fish passage data over the falls for 14 days and then calculating the proportion of each run (coho salmon, winter steelhead, summer steelhead, wild/unmarked spring Chinook salmon, hatchery/marked spring Chinook salmon). Lastly, we used a constant of 2.5 salmonids per day in the diet, which is the average of spring Chinook salmon (2/day) and winter steelhead (3/day) requirements derived from bioenergetics modeling. As a result of using the average of the two species, steelhead savings may be underestimated and Chinook salmon savings may be overestimated; future effects modeling will include prey-specific requirements and measures of uncertainty.

RESULTS

Trapping

Trapping effort below Willamette Falls occurred over 73 days from 12/10/2018 to 5/23/2019 (Table 1, Figure 1). Trapping resulted in 53 sea lion captures, where a single sea lion may have been captured more than once. Steller sea lions and California sea lions were captured 6 and 47 times, respectively. Of the 47 California sea lion captures, 14 were marked (if necessary) and released since they did not yet meet the criteria for removal; the remainder were euthanized (including recaptures of previously released individuals).

The average weight of euthanized CSLs (n = 33) was 286 kg (630 lbs), with a range of 191-375 kg (420-825 lbs). The average length of euthanized CSLs (n = 33) was 232 cm (7.6 ft), with a range of 209-249 cm (6.9-8.2 ft). Age data based on sectioned teeth were not yet available for euthanized animals from 2019 but recently completed ageing of 49 CSLs euthanized at Bonneville Dam showed an average age of 9 years with a range of 5-15 years. Thirteen of the 33 removals (39%) were animals that had also been observed at Bonneville Dam and three had qualified for removal at Bonneville Dam (i.e., they occurred on authorized removal lists from both sites).

Diet analysis

Thirty-three GI-tracts were collected from euthanized sea lions, of which 31 contained undigested prey remains (Table 2). Adult salmonid remains were recovered from 23 GI-tracts representing at least 28 Chinook salmon, 18 steelhead, and 10 unidentified salmonids. Juvenile salmonids were recovered in 7 GI-tracts representing at least 18 individual fish. Additional prey included Pacific lamprey (21 GI-tracts, 307 individual fish) and river lamprey (*Lampetra ayresii*) (4 GI-tracts, 9 individual fish), as well as eulachon (*Thaleichthys pacificus*), unidentified Cyprinidae, common carp (*Cyprinus carpio*), and American shad (*Alosa sapidissima*).

Effect of removals

Monitoring results (see Steingass et al. 2019) showed that the first year of CSL management resulted in substantial decreases in salmonid predation (Figure 2) and CSL abundance (Figure 3). When compared to 2018, estimated CSL predation on salmonids in 2019 decreased by 67% and maximum single-day CSL abundance decreased by 57%. We estimated that without sea lion removals, the maximum single-day CSL count would have been as high as 40 individuals (dashed line in Figure 3). In addition, no confirmed CSL sightings have been occurred below Willamette Falls thus far in the 2019-2020 season (green line in Figure 3), unlike for the similar period in the last two years. Finally, we estimated that removals prevented an additional 1,761 additional California-sea-lion-days of predation pressure and an associated loss of 4,402 additional salmonids, the majority of which would have been ESA-listed winter steelhead (Figure 4).

DISCUSSION

The first season of the Willamette Falls Section 120 program was largely successful. The 33 CSLs that were removed represented approximately 80% of the CSLs that were observed below the falls throughout the season. The approximately eight CSLs that were not removed was due either to their limited use of the traps or the need to first capture, mark, and release them in order to meet the individually identifiable removal criteria.

As we move into the second year of the program (fall 2019-spring 2020), there have been no documented sightings of CSLs below Willamette Falls through October (Figure 3). This is in contrast to at least the last two years when the first CSLs have shown up in August. We suspect that the reason for this is that there were two behavioral "types" of CSLs at Willamette Falls based on their arrival times (see Figure 1). Of the approximately dozen CSLs that comprised the "fall/winter cohort" (arriving before March 1), all either were removed or are presumed to have died due to old age (i.e., U253, C742). Nearly all of these animals showed high annual site fidelity to Willamette Falls and had been returning for many years. Since this group is now completely gone, coupled with the fact that the majority of the "spring cohort" (i.e., post March 1 arrivals) was also removed, we predict that the first significant returns of CSLs will not occur until the spring of 2020, and will be significantly fewer in number than in previous years.

While there is uncertainty associated with any attempt to predict what might have occurred had something not happened, it is reasonable to assume—and the data support—that the removal of CSLs below Willamette Falls in 2018-2019 had a positive conservation impact on listed Willamette River salmonids. The removal program demonstrably reduced CSL abundance and associated salmonid predation over prior years (see Figures 2-4), and while many factors affect fish returns, passage over Willamette Falls of listed winter steelhead and spring Chinook salmon were both higher in 2019 than in the past several years (see Steingass et al. 2019).

Sea lion management is scheduled to continue for the near future at Willamette Falls although it may be subsumed by larger basin-wide pinniped management efforts. Regardless, it's current benefits already extend beyond the Willamette River since nearly 40% of the CSLs removed at Willamette Falls had also been documented at Bonneville Dam (including three that were authorized for removal at both sites). Management efforts at Bonneville Dam and Willamette

Falls continue to serve as an effective inter-agency effort to solve a difficult and complex natural resource problem. Continued monitoring will help determine whether these efforts are successful in increasing the long-term survival probability for listed Columbia River Basin salmonids.

ACKNOWLEDGEMENTS

We wish to acknowledge and thank all those who cooperated in the conduct of this work:

- ODFW: Shaun Clements, Jeff Boechler, Tucker Jones, Tom Murtagh, Kevleen Melcher, Chris Kern, David Fox.
- PSMFC: Colpo, Sarah Kirk.
- NMFS: Robert Anderson, Scott Rumsey, Robert DeLong.
- WDFW: Steve Jeffries, Elliot Johnson, Coral Pasi, Trevor Barker
- Oregon State Police: Sgt. Chris Allori
- Clackamas County Sheriff Marine Unit: Sgt. Nate Thompson, Deputy Jed Wilson
- Sportcraft Landing Moorages

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LITERATURE CITED

Lance, M. M., A. J. Orr, S. D. Riemer, M. J. Weise, and J. L. Laake. 2001. Pinniped food habits and prey identification techniques protocol. AFSC (Alaska Fisheries Science Center) Proc. Rep. 2001-04, 36 p. Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115.

Steingass, S., B. Wright, C. Owen, K. Sandoval, M. Brown, S. Valentine, Z. Kroneberger, and S. Riemer. 2019. Annual report: pinniped monitoring at Willamette Falls, 2018-2019. Oregon Department of Fish and Wildlife. 29 pp.

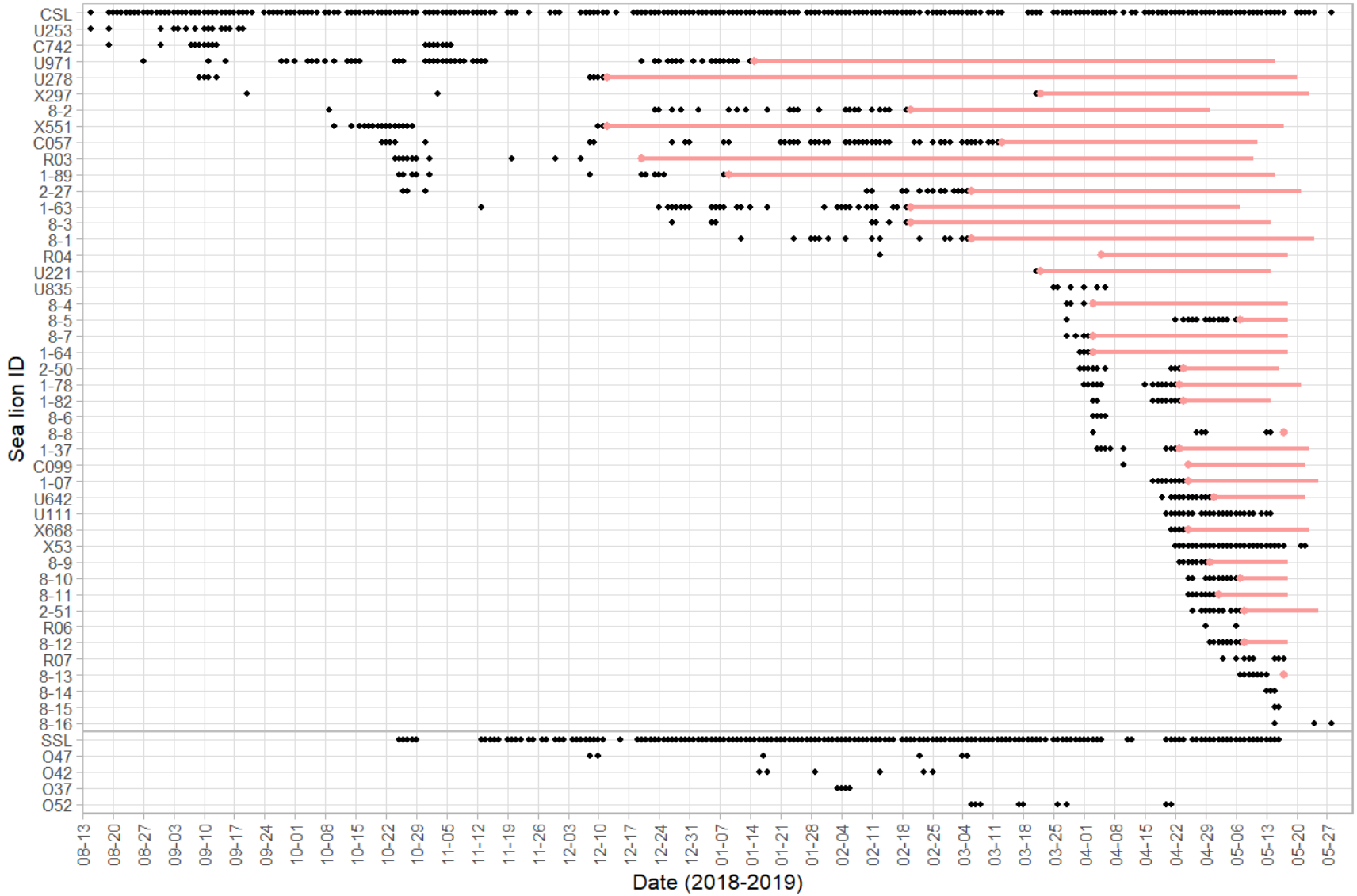

Figure 1. Summary of sea lion sightings below Willamette Falls. Sea lions are identified by individual ID except for "CSL" and "SSL" which includes all resights for that species. Red lines indicate euthanized CSLs from date of removal to predicted departure.

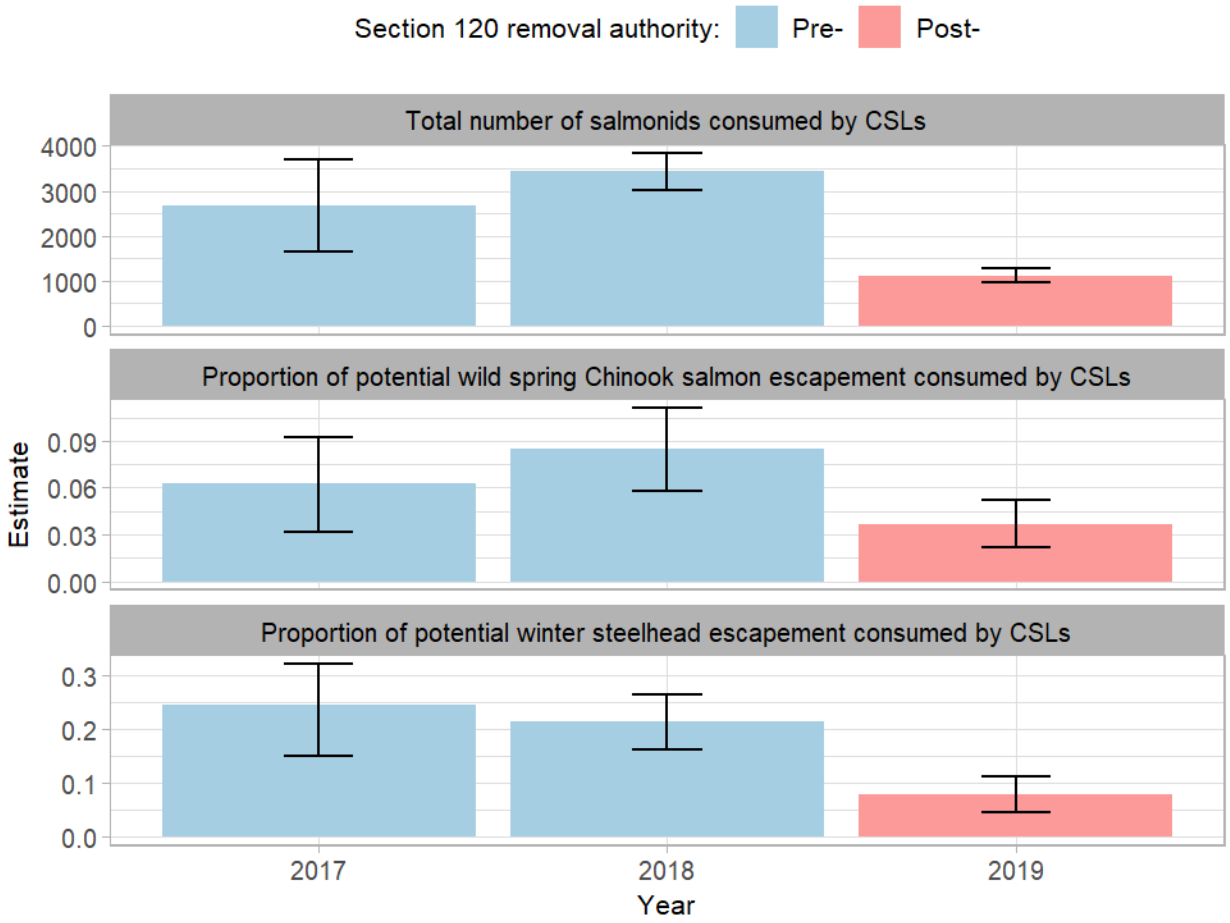

Figure 2. Comparison of CSL predation estimates between years with and without sea lion removal authority; error bars indicate 95% confidence interval limits. See Steingass et al. (2019) for estimation details.

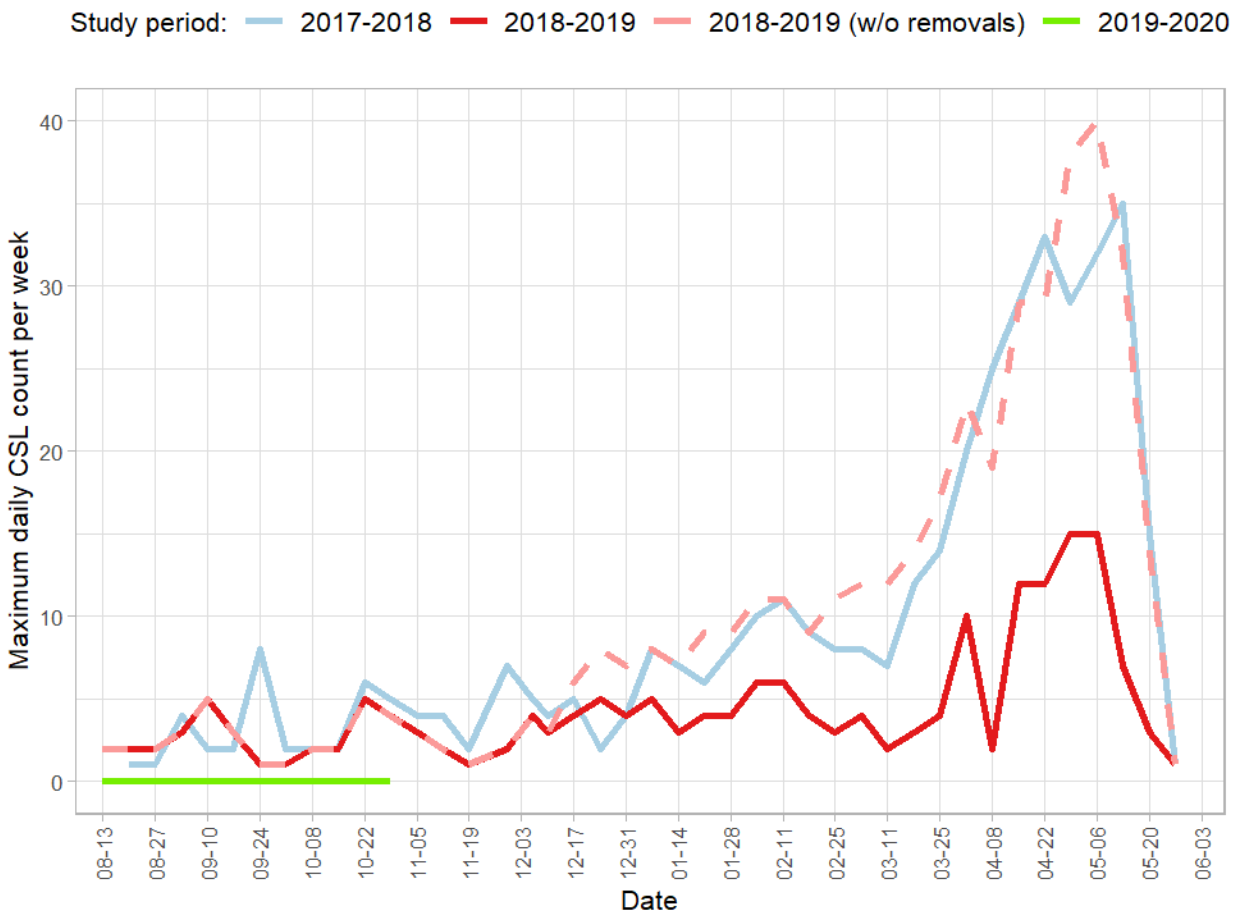

Figure 3. Comparison of weekly CSL counts for fall-spring 2017-2018, 2018-2019, and 2019-2020 (through October 30, 2019). The dashed line for 2018-2019 indicates what might have occurred had CSLs not been euthanized (and was estimated by replacing the red lines in Figure 1 with black dots).

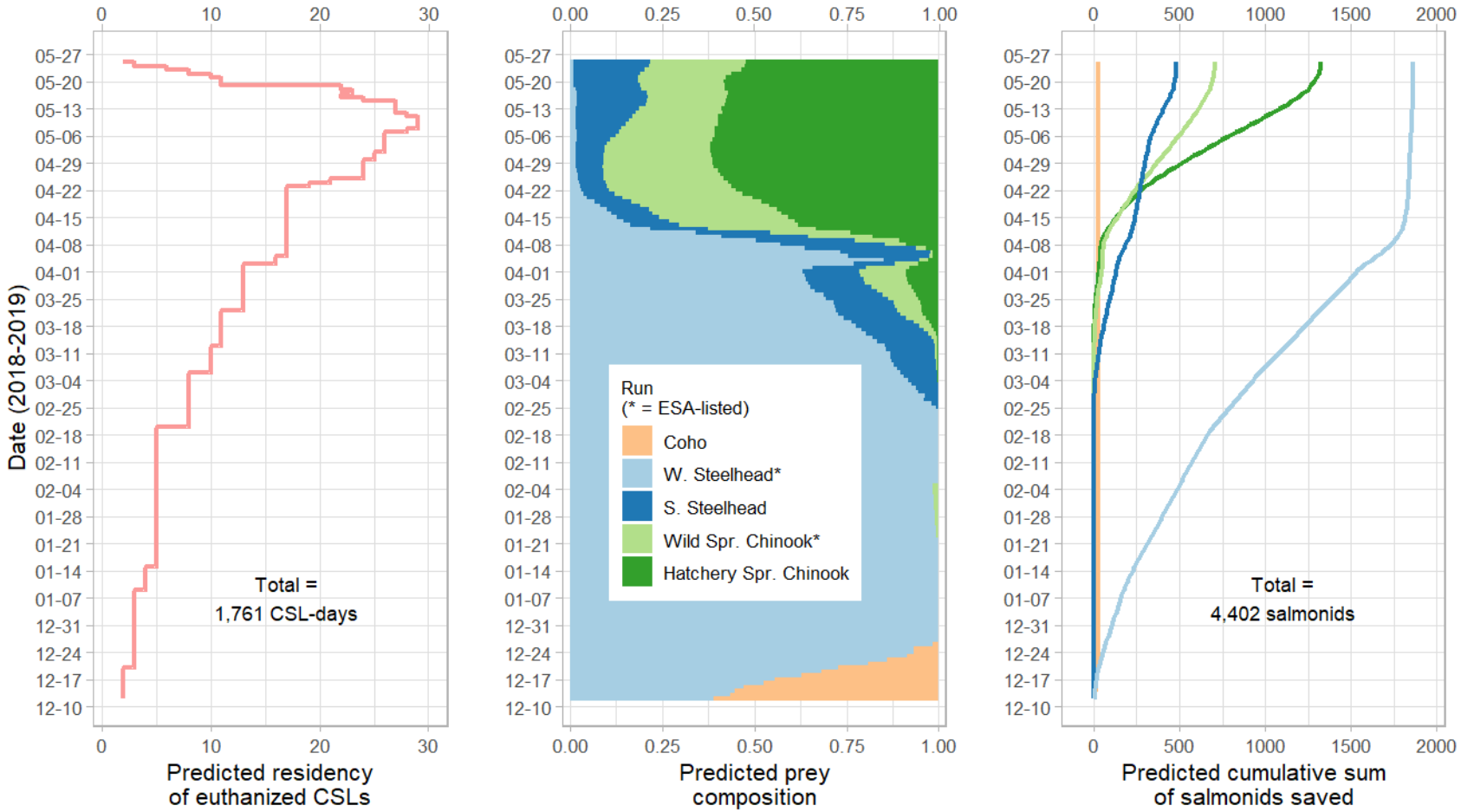

Figure 4. Summary of removal effect calculations for CSLs at Willamette Falls. Panel at left shows predicted residency of euthanized CSL based on their observed or estimated departure date from the previous year. Middle panel shows daily salmonid prey composition based on 14-day pooled passage data over Willamette Falls. Final panel at right shows the cumulative sum of the product of the first panel, the middle panel, and 2.5 salmonids per day (see methods for additional details).

Table 1. Weekly summary of sea lion capture effort and outcomes at Willamette Falls, 2018-2019.

Week #	Week of	Trap effort (days)	Total caught[1]	Total SSL[2]	Total CSL	CSL marked/ released[3]	CSL euthanized
1	2018-12-10	4	2		2		2
2	2018-12-17	4	1		1		1
3	2018-12-24	0	*(Limited staff availability)*				
4	2018-12-31	0	*(Limited staff availability)*				
5	2019-01-07	5	1		1		1
6	2019-01-14	4	1		1		1
7	2019-01-21	4					
8	2019-01-28	0	*(Displacement of CSLs from traps by SSLs)*				
9	2019-02-04	3					
10	2019-02-11	3					
11	2019-02-18	4	6	2	4	1	3
12	2019-02-25	3					
13	2019-03-04	4	3	1	2		2
14	2019-03-11	3	3	2	1		1
15	2019-03-18	4	3	1	2		2
16	2019-03-25	4	3		3	3	
17	2019-04-01	4	6		6	2	4
18	2019-04-08	0	*(Willamette River near flood stage)*				
19	2019-04-15	0	*(Willamette River near flood stage)*				
20	2019-04-22	4	10		10	3	7
21	2019-04-29	4	4		4	1	3
22	2019-05-06	4	5		5	1	4
23	2019-05-13	4	5		5	3	2
24	2019-05-20	4					
Total		73	53	6	47	14	33

[1] Some individual sea lions may have been caught more than once within and between weeks.
[2] All SSL were released or escaped without handling.
[3] Includes one animal with natural markings; the remainder were flipper-tagged.

Table 2. Prey remains identified from gastro-intestinal (GI) tracts (stomach and large intestines only) collected from 33 euthanized California sea lion below Willamette Falls, 2018-2019.

Date	ID	Adult Steelhead	Adult Chinook salmon	Adult salmonid	Juvenile salmonid	Pacific lamprey	River lamprey	Other
2018-12-12	U278			1		1		
	X551	2			1			
2018-12-20	R03					54		1
2019-01-09	1-89			1		1		
2019-01-15	U971			1	1		1	
2019-02-20	8-2	4					2	
	8-3	1				1		
	1-63			1	1	1		1
2019-03-06	2-27			1				
	8-1	1						2
2019-03-13	C057	5				33	1	
2019-03-22	U221				1			50[c]
	X297[a]							
2019-04-03	8-4			1		1		
	8-7[a]							
	1-64				1	9	5	
2019-04-05	R04				5	87		
2019-04-23	1-37					2		4
	1-78		1	1				
2019-04-24	2-50			1	8	2		
	1-82	5	6			1		
2019-04-25	C099					19		
	1-07		2			33		
	X668			1		21		
2019-04-30	8-9		3			1		1
2019-05-01	U642					11		
2019-05-02	8-11		5					
2019-05-07	8-5		2	1		6		1
	8-10		1					
2019-05-08	8-12		4			6		
	2-51		1			13[b]		
2019-05-14	8-8							36[d]
	8-13		3			4[b]		8
Total		18	28	10	18	307	9	104

[a] No undigested prey remains
[b] Contained PIT tag and dart tag
[c] Eulachon
[d] American shad