Ecosystem-Based Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey in the Strait of Georgia and Associated Waters, British Columbia, June 11 - 24, 2024

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ECOSYSTEM-BASED JUVENILE PACIFIC SALMON (*ONCORHYNCHUS* SPP.) TRAWL SURVEY IN THE STRAIT OF GEORGIA AND ASSOCIATED WATERS, BRITISH COLUMBIA, JUNE 11 - 24, 2024

by

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ABSTRACT

Tabata, A.M., FItzpatrick, L.C., Zubkowski, T.B., Flynn, K.L., and King, J.R. 2025. Ecosystem-Based Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey in the Strait of Georgia and Associated Waters, British Columbia, June 11 - 24, 2024. Can. Data Rep. Fish. Aquat. Sci. 1437: vi + 55 p.

Fisheries and Oceans Canada (DFO) conducted an ecosystem-based trawl survey in the Strait of Georgia and associated waters from June 11 to 24, 2024 on the CCGS *Sir John Franklin*. This study targeted juvenile Pacific Salmon (*Oncorhynchus* spp.). In 73 tows, there were 28 species sampled in 2,538 kg of catch, with 13% juvenile Pacific Salmon caught by weight (328.89 kg). North Pacific Spiny Dogfish (*Squalus suckleyi*), Northern Anchovy (*Engraulis mordax*), and Walleye Pollock (*Gadus chalcogrammus*) were the most abundant catch by weight. There were 6,887 individual lengths and 6,593 individual weights recorded, including all 5 Pacific Salmon species. Juvenile salmon species caught, in decreasing catch weight, were: Chum Salmon (*O. keta*), Pink Salmon (*O. gorbuscha*), Coho Salmon (*O. kitsutch*), Sockeye Salmon (*O. nerka*) and Chinook Salmon (*O. tshawytscha*), with catch distribution varied based on species. Common prey species for juvenile Pacific Salmon included unidentified fishes, crabs, euphausiids and other zooplankton. Biological samples for genetic stock composition, otoliths, energy density, and coded wire tags are archived at the Pacific Biological Station, Fisheries and Oceans Canada (Nanaimo, BC). Associated information at 34 stations on the physical oceanography and zooplankton composition was collected and will be analysed at the Institute of Ocean Sciences, Fisheries and Oceans Canada (Sidney, BC).

RÉSUMÉ

Tabata, A.M., FItzpatrick, L.C., Zubkowski, T.B., Flynn, K.L., and King, J.R. 2025. Ecosystem-Based Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey in the Strait of Georgia and Associated Waters, British Columbia, June 11 - 24, 2024. Can. Data Rep. Fish. Aquat. Sci. 1437: vi + 55 p.

Pêches et Océans Canada a mené une étude écosystémique au chalutage pélagique dans le détroit de Georgia et les eaux associées du juin 11 au 24, 2024 sur le *CCGS Sir John Franklin*. Cette étude ciblait les saumons du Pacifique juvéniles (*Oncorhynchus* spp.). En 73 traits, il y avait 28 espèces échantillonnées dans 2,538 kg de prises, avec 13% de juvénile saumon du Pacifique capturé en poids (328.89 kg). les aiguillat commun du Pacifique nord (*Squalus suckleyi*), les anchois du Pacifique (*Engraulis mordax*), et les goberge de l'Alaska (*Gadus chalcogrammus*) étaient les espèces les plus abondantes en poids. On a enregistré 6,887 longueurs individuelles et 6,593 poids individuels, dont les 5 espèces de saumon du Pacifique. Les espèces de saumon juvénile capturées par ordre décroissant d'abondance par comptage étaient les seuivantes: saumon kéta, saumon rose, saumon coho, saumon rouge et saumon quinnat, avec la répartition des prises variait selon les espèces. Les espèces de proies communes aux saumons juvéniles comprenaient des poissons non identifiés, des crabes, les euphausiacés et d'autres zooplanctons. Les échantillons biologiques pour la composition des stocks génétique, les otolithes, la densité énergétique et les micromarques magnétisées codées se trouvent à la Station biologique du Pacifique de Pêches et Océans Canada (Nanaimo, Colombie-Britannique). Des informations associées à 34 statioins sur l'océanographie physique et la composition du zooplancton ont été collectées et seront analysées à l'Institut des sciences de la mer, Pêches et Océans Canada (Sidney, C.-B.).

1 INTRODUCTION

The Strait of Georgia is an inland sea between the British Columbia (BC) mainland and Vancouver Island. It is an important ecosystem for juvenile Pacific Salmon (*Oncorhynchus* spp.) from the Fraser River and numerous other rivers and streams that spend from weeks to months rearing in this area. Fisheries and Oceans Canada (DFO) conducted an ecosystem-based midwater trawl survey from June 11 to 24, 2024 on the CCGS *Sir John Franklin* in the Strait of Georgia, Desolation Sound, and Discovery Passage targeting juvenile Pacific Salmon specifically Chum Salmon (*O. keta*), Chinook Salmon (*O. tshawytscha*), Coho Salmon (*O. kitsutch*), Pink Salmon (*O. gorbuscha*) and Sockeye Salmon (*O. nerka*). The main objectives of this survey were to determine:

1. the abundance, condition, distribution, and genetic stock composition of juvenile Pacific Salmon present in the Strait of Georgia, Discovery Passage and Desolation Sound in the early summer,
2. the associated physical oceanography, and
3. the distribution and biomass of prey species, including zooplankton.

Since the mid-1990s, similar midwater trawl surveys have been conducted annually to study juvenile Pacific Salmon in the Strait of Georgia (Beamish et al. 2000). The initial objectives of the survey were to determine the cause of the decline in juvenile Chinook Salmon and Coho Salmon survival and when and where the greatest marine mortality occurred (Neville, Fitzpatrick, and Beamish 2023). A survey design based on a standard trackline, has been used for these surveys since 1998 (Beamish et al. 2000), with surveys typically occurring during the summer (June – July) and fall (September – October) seasons. As time and research priorities allowed, locations outside of standard survey area but associated with the Strait of Georgia were also included but in an ad hoc manner. In 2024, the survey design was expanded along the trackline to include areas previously not routinely included, and also expanded into the northern Strait of Georgia and the migratory route that includes Desolation Sound, and Discovery Passage. The intent was to recognize the importance of maintaining consistency with the 20+ years of trawl surveys in this area, while updating methods in survey design, sample processing and data collection that are consistent with other pelagic trawl sampling efforts by DFO in southern BC (e.g., King et al. 2023; Tabata et al. 2024).

This Strait of Georgia midwater trawl survey supports research into linkages between oceanographic conditions, fish abundance and community composition, Pacific Salmon ocean ecology and forecasting adult returns. This survey continues to collaborate with and assist other DFO programs and external partners by the collection of additional data and samples, including the Strait of Georgia Oceanography Program (DFO), the Water Properties Program (DFO), the Pinniped Research Program (DFO), the Pacific Salmon Commission and The Pacific Salmon Foundation. This data report documents the biological, oceanographic, and zooplankton data and samples collected during the ecosystem-based juvenile Pacific Salmon survey from June 11 to 24, 2024.

2 METHODS

2.1 SURVEY LOCATIONS

Fishing, oceanographic, and zooplankton sampling occurred in the Strait of Georgia, Discovery Passage and Desolation Sound in Southern BC waters (Figures 1 and 2). Fishing locations in the Strait of Georgia (SOG) were chosen to complement the standard tracklines used in the historical Strait of Georgia juvenile salmon survey time series (Neville, Fitzpatrick, and Beamish 2023). Additional sampling was added in Discovery Passage and Desolation Sound to increase the geographic representation of the region and aid in the sampling requests of partner organizations.

2.2 FISHING OPERATIONS

The vessel deployed a coastal LFS 7742 trawl net (Appendix A, manufactured by LFS Trawl (LFS Net Systems, Bellingham, USA). This two-bridle midwater net has a codend liner (12.7 mm stretched) to retain smaller species. The LFS 7742 trawl net was designed to have a net opening of 30 m wide by 15 m high, or an area of 450 m^2 (Figure A.1). The net was towed at 4 to 5 knots (7.4 - 9.3 km/hr). The target headrope depths were 0 m (surface), 15 m, 30 m, 45 m and 60 m. Two A-6 floats 86.4 cm x 118.1 cm (34” x 46.5”) were attached to the headrope for surface tows. The target duration was 20 minutes for surface and 15 m depth tows, and 30 minutes for tows at a depth of 30 m, 45 m and 60 m. The start time and location of the tow was recorded when the doors were locked, and the end time and location when the retrieval of the doors was initiated.

The trawl net was fished with Thyborøn Type 15 VF, 4.5 m^2 midwater doors (approximately 798 kg each). Two chain clumps were attached to the footrope with approximately 204 kg (450 lbs) per chain clump. Vessel speed, direction, bottom depth and weather conditions were recorded for each tow (Appendix B). The vessel was equipped with a SCANMAR Trawl System and wireless SS4 Catch Sensor that provided real time door spread, headline depth and net opening values (SCANMAR, Åsgårdstrand, Norway). A RBR concerto data logger (RBR Ltd, Ottawa, ON) recording conductivity, temperature, depth, salinity and dissolved oxygen at 1 second intervals (1 Hz), was mounted inside a protective housing and attached to the top of the trawl net along the port ribline of the first belly of the lengthening piece. In addition, RBR duet (RBR Ltd., Ottawa, ON, Canada) temperature and depth sensors were attached to the headrope and footrope to record depth and temperature every 30 seconds to allow for determination of the vertical net depth and opening over time.

2.3 CATCH PROCESSING

At the end of each trawl tow, all retrieved specimens were sorted to the lowest taxonomic group possible. Large catches were randomly subsampled prior to sorting. The total catch (or the subsample) of each species or taxonomic group, was weighed using Marel Model M2200 dual range motion-compensating electronic scales and when practical, the number of individuals was recorded. For catches of a species or taxonomic group which totaled less than 0.01 kg, “trace”

weight was recorded. Pacific Salmon were divided into juveniles and adults based on their fork lengths to account for different migratory behaviour with a fork length of < 300 mm considered to be a juvenile. Jellyfish species catch weights include both whole and incomplete pieces, while counts are only inclusive of specimens with intact bells.

2.4 BIOLOGICAL SAMPLES

For each species, a pre-determined, target number of randomly selected specimens per tow were sampled for length and weight (Marel Model M2200 dual range motion-compensating electronic scales), with up to 10 of those randomly selected specimens also used for stomach content analyses. If the catch count was less than the target number, all specimens in that tow were sampled. Stomachs were analysed at sea following an established protocol (King, Boldt, and King 2018), and from these samples up to five whole bodies were collected for energy density analyses to be conducted back in the laboratory. Pacific Salmon had additional sampling and collections, which included: fin clips for genetic stock identification (GSI), otoliths, adipose fin status (i.e., clipped vs. non-clipped), and the presence and retention of coded wire tags (CWTs). Additional collection of specimens and samples were taken as requested by project collaborators.

2.5 OCEANOGRAPHY

A Sea-Bird SBE-911plus CTD (conductivity-temperature-depth) equipped with transmissometer, fluorometer, pH, salinity and dissolved oxygen sensors was used for oceanographic profiles (Sea-bird Electronics Bellevue Washington, USA). A Niskin bottle at 5 m from the surface was used for nutrient and chlorophyll (chl a) collections. Seawater samples for nitrate, phosphate, and silicate were placed in acid-washed glass test tubes and frozen. Seawater for chlorophyll a estimation was filtered with a 25 mm GF/F glass fibre filter disks. Filter disks were then placed in polypropylene scintillation vials and frozen. Both the nutrient and chl a samples were frozen and maintained at -20℃. Nutrient and chl a samples were returned for analyses at the Institute of Ocean Sciences, Fisheries and Oceans Canada (Sidney, BC).

2.6 ZOOPLANKTON

Vertical tows to sample zooplankton were conducted to within 10 m of the bottom with two 60 cm diameter, 253 micrometer mesh nets mounted in a bongo-drum style frame, one of which was equipped with a flow meter. Zooplankton collected from the flow meter side net were preserved in 10% buffered formalin and sent to the zooplankton laboratory at the Institute of Ocean Sciences, Fisheries and Oceans Canada (Sidney, BC) for species classification and enumeration. Zooplankton collected from the net without the flowmeter were sorted into four size fractions by successively sieving through 8.0, 1.7, 1.0, and 0.25 mm screens. Each size fraction was individually frozen for future analyses, such as energy density, stable isotope, and proximate analyses.

3 RESULTS

3.1 FISHING OPERATIONS

This survey conducted 74 trawl net tows in the Strait of Georgia, Discovery Passage and Desolation Sound with 73 trawls completed successfully and 1 unusable tow in which the net failed to set correctly and so was hauled back and reset (Figure 1 and Appendix Table C.1). There were 60 tows initiated in the area of the historical SOG standard survey trackline, and 14 tows in the other areas of Discovery Passage and Desolation Sound. Tows in the SOG were fished with a target depth of 0 - 60 m, with 38% of usable tows at at 0 m, 33% at 15 m, 15% at 30 m, and 7% at each of 45 and 60 m. Tows outside of the SOG were fished with a target headrope depth of 0 m (68% of tows) or 15 m (32% of tows). The sea state and weather were favourable throughout the survey area and all planned areas were successfully completed.

Tow speed averaged 8.6 km/hr (4.6 knots), and varied between 6.5 to 10 km/hr (3.5 - 5.4 knots) speed over ground, depending on the wind, tide, and current. Warp length ranged from 200 m to 450 m (Appendix Table C.1).

Net mensuration data from the Scanmar trawl sensors and RBR data loggers was collected for mouth opening height, gear depth and doorspread. The doorspread was used to calculate the horizontal net opening width. The difference between the headrope and footrope depth from the RBR duet data loggers was used to calculate the average mouth opening of each tow. Tows with missing mensuration data used tow depth-specific averages when required (i.e., an average height and width of 15 m and 48 m for surface tows and 9 m and 56 m for 15 m target depth tows; Appendix Table C.1).

CTD casts and water samples were completed at 35 sites (Figure 2) with cast depths ranging from 40 m to 600 m (Appendix Table D.1). Two CTD casts had equipment failures resulting in 33 successful casts. Samples were collected for nutrients and chlorophyll at approximately 5 m below the surface. Oceanographic data from the CTD casts and nutrient analysis of the water samples will be archived online within the Water Properties Data Inventory under cruise number 2024-025.

3.2 ZOOPLANKTON

Thirty-five vertical bongo tows were conducted at 34 stations (Figure 2) to depths ranging from 39 m to 557 m (Appendix Table D.1). One deployment at station SOG17 had a malfunction in the flowmeter, and the bongo was reset with a replacement flowmeter and successfully repeated. There was no bongo tow attempted at Station SOG73 due to the failure of the corresponding CTD cast. Formalin-preserved zooplankton samples will be enumerated at the Institute of Ocean Sciences, Fisheries and Oceans Canada (Sidney, BC). Data will be archived in the zooplankton database. Fractionated zooplankton samples are frozen at the Pacific Biological Station, Fisheries and Oceans Canada (Nanaimo, BC).

3.3 CATCH COMPOSITION

Total catch for the survey from usable tows was 2,538 kg, of which 328.89 kg (13%) were juvenile Pacific Salmon. Detailed catch composition for each tow is included in Appendix Table E.1. For each species captured during the survey, the number of tows in which the species was present, total catch weight and count, maximum tow catch weight, and mean tow catch weight in usable tows is presented in Table 1. The three most abundant species caught by weight were North Pacific Spiny Dogfish (926.11 kg), found in 25% of the tows, Northern Anchovy (348.04 kg), caught almost entirely in one tow in the Desolation Sound area, and Walleye Pollock (273.02 kg) in 7% of the tows (Table 1). The three most numerous species by count of individuals were Northern Anchovy, juvenile Pink Salmon and juvenile Chum Salmon.

Juvenile Pacific Salmon were caught throughout the survey region. The order of abundance, by weight, was: Chum Salmon, Pink Salmon, Coho Salmon, Sockeye Salmon and Chinook Salmon. Fishing occured at target headline depths of 0-60 m, however 99% of juvenile salmon were caught during tows with a target depth of 0 (surface) and 15 m (Appendix Table C.1, and Appendix Table E.1). The location and relative catch per unit effort, as determined by weight caught per volume swept (CPUE, tonnes/km^3) of juvenile salmon is shown in Figure 3. The Juvenile Chum Salmon were the most abundant salmon species by weight and second most abundant by count (Wt. = 122 kg; N = 6,726) and were primarily caught in the Discovery Islands and Desolation Sound outside of the standard SOG survey area, although Chum Salmon were present in smaller amounts inside the strait. Pink Salmon were the second most abundant salmon species by weight, and the most abundant juvenile Pacific Salmon by count (Wt. = 73 kg; N=7,259). They were caught in the northern Strait of Georgia, Discovery Islands and Desolation Sound, with smaller catches present through the southern strait. Juvenile Coho Salmon were somewhat less abundant (Wt. = 65 kg; N=1,290), however they were caught in more number of tows than any of the other salmon, and were widely distributed throughout the entire survey area. Juvenile Sockeye Salmon were less abundant in the standard SOG survey towss but were caught in higher numbers in the northern Strait of Georgia, Discovery Islands and Desolation Sound (Wt. = 48 kg; N = 3,431). Juvenile Chinook Salmon were the least abundant salmon species found by weight and count (Wt. =21 kg; N = 512) and were primarily caught along the BC mainland side of the Strait of Georgia, and off the southern Gulf Islands. The survey methods are targeted towards juvenile Pacific Salmon, and so the catches of adult Pacific Salmon should be interpreted with care.

The location and catch per unit effort (CPUE, tonnes/km^3) of other, non-salmonid, frequently caught species is shown in Figure 4.

3.4 BIOLOGICAL SAMPLES

Samples were collected for DNA stock composition (2,623), otoliths (1,002), energy density (636), and coded wire tags (118). These biological samples were returned to the Pacific Biological Station, Fisheries and Oceans Canada (Nanaimo, BC). Additional specimens and samples were collected as requested by collaborators and partners.

3.5 LENGTH AND WEIGHT

Lengths and weights of 20 species were recorded (Table 2). Coho Salmon had the largest maximum length (157 mm) and weight (51 g) of all juvenile salmon species, whereas Pink Salmon had the smallest maximum length (106 mm) and weight (12 g). Length frequencies and length-weight relationships are presented for Pacific Salmon species in Figures 5 to 9. Double log transformed length-weight regression coefficients were similar in Chinook Salmon, Chum Salmon, Coho Salmon and Pink Salmon. Sockeye Salmon had a slightly smaller coefficient. A larger coefficient typically represents better condition, whereas a smaller coefficient typically represents poorer condition. Length frequencies for other species with at least 50 individuals measured is shown in Figure 10.

3.6 STOMACH CONTENTS

Stomachs of 1,595 individual fish, from 14 species, were analysed at sea (Table 3). Juvenile Pacific Salmon species had between 3 and 16% empty stomachs, with juvenile Pink Salmon having the highest percentage and juvenile Coho Salmon having the lowest percentage (Table 3). The frequency of observation and average volume of identified prey is shown in Table 4. Unidentified fishes were the most frequently observed prey in the stomachs of juvenile Chinook Salmon, and also had the highest average volume. Crabs were the next most frequently observed prey with a similar average volume. Unidentified remains were by far the most frequently observed prey in Chum Salmon stomachs These remains were likely that of gelatinous prey, e.g., jellyfish, that are quickly digested. Unidentified zooplankton was less frequently observed but had the highest average volume. Juvenile Coho Salmon most frequently had crabs and unidentified fishes as prey in their stomachs, with similar average volumes. The most common prey in the stomachs of Pink Salmon were amphipods, with unidentified zooplankton as a close second, both in frequency of occurrence and average volume. Sockeye Salmon stomachs had the same prey present as for Pink Salmon, although amphipods were slightly more frequent.

4 DISCUSSION

The data generated by this ecosystem-based juvenile Pacific Salmon trawl survey in 2024 covers physical and biological oceanographic conditions, fish abundance and composition of the pelagic community, along with comprehensive sampling and stomach content analyses of all caught species. These data provide valuable information on distribution, abundance, condition, and genetic stock composition for juvenile Pacific Salmon in the Strait of Georgia, Discovery Passage and Desolation Sound. It extends a long-term trawl survey time series from southern British Columbia of juvenile Pacific Salmon and other important pelagic fish species. The physical oceanographic water profiles and zooplankton samples associated with the survey catches provide valuable additions to the understanding of the pelagic ecosystem. Associated data from laboratory analysis (i.e. GSI, energy density, coded wire tags, zooplankton composition) will be incorporated into longer term and broader scope research projects.

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7 TABLES

Table 1. All captured species (or taxonomic group), ordered by total catch weight (in kilograms), showing number of tows in which the species occurred, total catch count, (Count), total catch weight (Weight), maximum catch weight (Max), and mean catch weight (Mean) per tow for usable tows during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024. Blank weights indicate specimens which could not be weighed accurately (either released alive or too small).

Common Name	Scientific Name	Tows	Count	Weight	Max	Mean
North Pacific Spiny Dogfish	*Squalus suckleyi*	18	410	926.11	623.00	51
Northern Anchovy	*Engraulis mordax*	2	14,657	348.04	348.03	174
Walleye Pollock	*Gadus chalcogrammus*	5	865	273.02	269.00	55
Coho Salmon (Adults)	*Oncorhynchus kisutch*	27	168	264.64	40.94	10
Chinook Salmon (Adults)	*Oncorhynchus tshawytscha*	30	153	148.91	18.57	5
Chum Salmon (Juveniles)	*Oncorhynchus keta*	31	6,726	122.06	44.91	4
Moon Jellyfish	*Aurelia labiata*	44	664	97.23	32.36	2
Pink Salmon (Juveniles)	*Oncorhynchus gorbuscha*	36	7,259	72.58	17.52	2
Water Jellyfish	*Aequorea*	63		71.11	16.08	1
Coho Salmon (Juveniles)	*Oncorhynchus kisutch*	37	1,290	64.89	11.38	2
Sockeye Salmon (Juveniles)	*Oncorhynchus nerka*	35	3,431	48.11	16.50	1
Lions Mane	*Cyanea capillata*	21	28	23.81	3.33	1
Chinook Salmon (Juveniles)	*Oncorhynchus tshawytscha*	28	512	21.25	5.80	1
Pink Salmon (Adults)	*Oncorhynchus gorbuscha*	8	15	19.13	6.57	2
Pacific Herring	*Clupea pallasii*	18	616	11.85	4.26	1
Fried Egg Jellyfish	*Phacellophora camtschatica*	16	2	9.00	1.85	1
Salmonids	*Salmonidae*	1		4.36	4.36	4
Opalescent Inshore Squid	*Doryteuthis opalescens*	10	231	3.05	2.04	0
Chum Salmon (Adults)	*Oncorhynchus keta*	2	2	2.99	2.37	1
Yellowtail Rockfish	*Sebastes flavidus*	1	2	1.84	1.84	2
Starry Flounder	*Platichthys stellatus*	3	2	1.79	0.86	1
Lingcod	*Ophiodon elongatus*	1	1	0.66	0.66	1
Steelhead Trout	*Oncorhynchus mykiss*	1	5	0.66	0.66	1
River Lamprey	*Lampetra ayresii*	15	70	0.65	0.18	0
Wolf Eel	*Anarrhichthys ocellatus*	2	2	0.04	0.03	0
Soft Sculpin	*Psychrolutes sigalutes*	8	11	0.02	0.02	0
Poachers	*Agonidae*	13	21		0.00	0
Codfishes	*Gadidae*	7	25			
Flatfishes	*Pleuronectiformes*	7	11			
Rockfishes	*Sebastes*	6	17			
Bay Pipefish	*Syngnathus leptorhynchus*	1	1			
Threespine Stickleback	*Gasterosteus aculeatus*	1	1			

Table 2. Lengths and weights for each species (arranged descending by the number of length measurements for each by species) sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024. Tows = number of tows. Type = Type of length measurement (FL = Fork Length, TL = Total Length, SL = Standard Length, ML = Mantle Length, BD = Bell Diameter). Lengths = number of length measurements. Weights = number of weight measurements.

		Length (mm)					Weight (g)			
Common Name	Tows	Type	Lengths	Min	Max	Mean	Weights	Min	Max	Mean
Pink Salmon (Juveniles)	36	FL	1,611	67	155	106	1,610	2	38	12
Chum Salmon (Juveniles)	31	FL	1,251	74	159	117	1,251	4	47	17
Sockeye Salmon (Juveniles)	35	FL	1,238	73	172	116	1,238	4	48	14
Coho Salmon (Juveniles)	37	FL	914	80	245	157	914	4	190	51
Chinook Salmon (Juveniles)	28	FL	437	72	226	148	437	3	122	42
Pacific Herring	15	SL	338	29	195	114	284	4	80	26
North Pacific Spiny Dogfish	18	TL	231	86	1,070	650	231	136	5,940	1,499
Moon Jellyfish	30	BD	194	30	238	108				
Coho Salmon (Adults)	27	FL	167	279	566	502	167	286	2,632	1,565
Chinook Salmon (Adults)	30	FL	153	228	778	401	153	163	6,701	969
Northern Anchovy	2	SL	101	89	165	129	101	7	42	25
Opalescent Inshore Squid	8	ML	67	40	96	77	60	7	28	17
Walleye Pollock	5	FL	59	304	455	350	59	230	570	336
Lampreys	4	TL	41	110	230	149	34	2	28	6
Lions Mane	16	BD	29	30	466	210				
River Lamprey	9	TL	27	96	264	190	27	2	38	14
Pink Salmon (Adults)	8	FL	15	410	526	465	15	821	1,830	1,267
Fried Egg Jellyfish	2	BD	3	123	232	171				
Starry Flounder	3	TL	3	222	423	351	3	124	844	589
Chum Salmon (Adults)	2	FL	2	357	564	460	2	618	2,348	1,483
Wolf Eel	2	TL	2	333	390	362	2	14	28	21
Yellowtail Rockfish	1	FL	2	386	391	388	2	862	982	922
Lingcod	1	FL	1	443	443	443	1	671	671	671
Steelhead Trout	1	FL	1	231	231	231	1	139	139	139

Table 3. Number of tows with stomach samples (Tows), number of stomachs examined (Stomachs), number of empty stomachs (Empty), and percentage of empty stomachs for each species (Percent Empty), arranged descending by number of stomachs sampled, during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024.

Species	Tows	Stomachs	Empty	Percent Empty
Pink Salmon (Juveniles)	36	283	45	16
Sockeye Salmon (Juveniles)	34	261	25	10
Coho Salmon (Juveniles)	37	246	7	3
Chum Salmon (Juveniles)	31	246	16	7
Chinook Salmon (Juveniles)	28	172	13	8
Coho Salmon (Adults)	27	132	9	7
Chinook Salmon (Adults)	30	129	27	21
Pacific Herring	13	52	12	23
Walleye Pollock	5	19	3	16
Pink Salmon (Adults)	8	15	1	7
Northern Anchovy	2	11	0	0
North Pacific Spiny Dogfish	1	10	6	60
Lampreys	1	3	0	0
Chum Salmon (Adults)	2	2	0	0
Yellowtail Rockfish	1	2	0	0
Steelhead Trout	1	1	0	0
Lingcod	1	1	1	100
Starry Flounder	1	1	0	0

Table 4. Prey items (Prey) identified in the stomach contents of predator species (Species) sampled (alphabetical by Species) during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024. Frequency of occurrence (FO) is the proportion of non-empty stomachs containing that prey item and volume is the mean volume in cm^3.

Species	Prey	FO	Volume
Chinook Salmon (Adults)	Pacific Herring	0.36	16.54
Chinook Salmon (Adults)	Unidentified Fishes	0.29	2.22
Chinook Salmon (Adults)	Crabs	0.28	2.07
Chinook Salmon (Adults)	Unidentified Remains	0.15	0.94
Chinook Salmon (Adults)	Euphausiids	0.13	3.12
Chinook Salmon (Adults)	Amphipods	0.04	0.13
Chinook Salmon (Adults)	Squid	0.03	3.17
Chinook Salmon (Adults)	Rockfishes	0.03	2.44
Chinook Salmon (Adults)	Unidentified Zooplankton	0.03	0.77
Chinook Salmon (Adults)	Northern Anchovy	0.01	17.50
Chinook Salmon (Adults)	Invertebrates	0.01	0.40
Chinook Salmon (Adults)	Cephalopods	0.01	0.30
Chinook Salmon (Adults)	Pond Smelt	0.01	0.20
Chinook Salmon (Adults)	Poachers	0.01	0.01
Chinook Salmon (Adults)	Octopus	0.01	0.01
Chinook Salmon (Juveniles)	Unidentified Fishes	0.53	0.58
Chinook Salmon (Juveniles)	Crabs	0.26	0.50
Chinook Salmon (Juveniles)	Unidentified Zooplankton	0.11	0.51
Chinook Salmon (Juveniles)	Euphausiids	0.09	0.36
Chinook Salmon (Juveniles)	Amphipods	0.08	0.43
Chinook Salmon (Juveniles)	Unidentified Remains	0.08	0.20
Chinook Salmon (Juveniles)	Octopus	0.02	0.01
Chinook Salmon (Juveniles)	Rockfishes	0.01	2.40
Chinook Salmon (Juveniles)	Polychaete Worms	0.01	0.70
Chinook Salmon (Juveniles)	Squid	0.01	0.70
Chinook Salmon (Juveniles)	Pandalid Shrimp	0.01	0.35
Chinook Salmon (Juveniles)	Poachers	0.01	0.06
Chinook Salmon (Juveniles)	Blacktip Poacher	0.01	0.01
Chinook Salmon (Juveniles)	Cephalopods	0.01	0.01
Chum Salmon (Adults)	Unidentified Remains	1.00	10.25
Chum Salmon (Adults)	Comb Jellyfish	0.50	0.01
Chum Salmon (Juveniles)	Unidentified Remains	0.65	0.11
Chum Salmon (Juveniles)	Unidentified Zooplankton	0.28	0.33
Chum Salmon (Juveniles)	Euphausiids	0.04	0.16
Chum Salmon (Juveniles)	Amphipods	0.04	0.09
Chum Salmon (Juveniles)	Copepods	0.01	0.11
Chum Salmon (Juveniles)	Comb Jellyfish	0.01	0.10
Chum Salmon (Juveniles)	Crabs	0.01	0.01
Chum Salmon (Juveniles)	Unidentified Fishes	0.00	0.30
Chum Salmon (Juveniles)	Pandalid Shrimp	0.00	0.10
Chum Salmon (Juveniles)	Polychaete Worms	0.00	0.01
Chum Salmon (Juveniles)	Misc. Non-Marine	0.00	0.01
Coho Salmon (Adults)	Crabs	0.66	10.27
Coho Salmon (Adults)	Pacific Herring	0.24	43.38
Coho Salmon (Adults)	Amphipods	0.19	0.73

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Species	Prey	FO	Volume
Coho Salmon (Adults)	Unidentified Fishes	0.15	3.85
Coho Salmon (Adults)	Euphausiids	0.14	2.68
Coho Salmon (Adults)	Unidentified Remains	0.06	3.10
Coho Salmon (Adults)	Poachers	0.06	2.46
Coho Salmon (Adults)	Salmonids	0.02	17.25
Coho Salmon (Adults)	Unidentified Zooplankton	0.02	3.25
Coho Salmon (Adults)	Blacktip Poacher	0.02	1.65
Coho Salmon (Adults)	Northern Anchovy	0.01	40.00
Coho Salmon (Adults)	Sockeye Salmon	0.01	18.00
Coho Salmon (Adults)	Pink Salmon	0.01	9.00
Coho Salmon (Adults)	Bivalve Molluscs	0.01	0.01
Coho Salmon (Juveniles)	Crabs	0.44	0.81
Coho Salmon (Juveniles)	Unidentified Fishes	0.33	0.84
Coho Salmon (Juveniles)	Euphausiids	0.19	1.03
Coho Salmon (Juveniles)	Amphipods	0.18	0.51
Coho Salmon (Juveniles)	Unidentified Zooplankton	0.10	0.38
Coho Salmon (Juveniles)	Unidentified Remains	0.07	0.24
Coho Salmon (Juveniles)	Pacific Herring	0.03	3.19
Coho Salmon (Juveniles)	Rockfishes	0.01	2.10
Coho Salmon (Juveniles)	Salmonids	0.00	6.00
Coho Salmon (Juveniles)	Northern Sculpin	0.00	0.01
Lampreys	Unidentified Remains	1.00	1.00
North Pacific Spiny Dogfish	Unidentified Fishes	0.75	15.67
North Pacific Spiny Dogfish	Unidentified Remains	0.25	0.01
Northern Anchovy	Unidentified Zooplankton	0.91	0.32
Northern Anchovy	Euphausiids	0.09	0.30
Northern Anchovy	Unidentified Remains	0.09	0.01
Pacific Herring	Unidentified Remains	0.38	0.06
Pacific Herring	Unidentified Zooplankton	0.30	0.13
Pacific Herring	Amphipods	0.15	0.55
Pacific Herring	Euphausiids	0.15	0.24
Pacific Herring	Crabs	0.05	0.41
Pink Salmon (Adults)	Crabs	0.79	5.65
Pink Salmon (Adults)	Euphausiids	0.50	2.80
Pink Salmon (Adults)	Pacific Herring	0.14	24.25
Pink Salmon (Adults)	Amphipods	0.14	0.65
Pink Salmon (Adults)	Unidentified Fishes	0.14	0.06
Pink Salmon (Adults)	Unidentified Remains	0.07	2.50
Pink Salmon (Juveniles)	Amphipods	0.29	0.10
Pink Salmon (Juveniles)	Unidentified Zooplankton	0.28	0.11
Pink Salmon (Juveniles)	Unidentified Remains	0.26	0.08
Pink Salmon (Juveniles)	Euphausiids	0.19	0.51
Pink Salmon (Juveniles)	Crabs	0.04	0.06
Pink Salmon (Juveniles)	Copepods	0.02	0.05
Pink Salmon (Juveniles)	Unidentified Fishes	0.01	0.17
Pink Salmon (Juveniles)	Misc. Non-Marine	0.01	0.04
Pink Salmon (Juveniles)	Pandalid Shrimp	0.00	0.50
Pink Salmon (Juveniles)	Fish Eggs	0.00	0.10
Pink Salmon (Juveniles)	Pteropods	0.00	0.10

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Species	Prey	FO	Volume
Sockeye Salmon (Juveniles)	Amphipods	0.41	0.14
Sockeye Salmon (Juveniles)	Unidentified Zooplankton	0.31	0.16
Sockeye Salmon (Juveniles)	Unidentified Remains	0.18	0.06
Sockeye Salmon (Juveniles)	Euphausiids	0.12	0.23
Sockeye Salmon (Juveniles)	Crabs	0.04	0.11
Sockeye Salmon (Juveniles)	Copepods	0.02	0.03
Sockeye Salmon (Juveniles)	Comb Jellyfish	0.01	0.26
Sockeye Salmon (Juveniles)	Pandalid Shrimp	0.01	0.20
Sockeye Salmon (Juveniles)	Misc. Non-Marine	0.01	0.16
Sockeye Salmon (Juveniles)	Unidentified Fishes	0.00	0.30
Sockeye Salmon (Juveniles)	Squid	0.00	0.01
Sockeye Salmon (Juveniles)	Mysids	0.00	0.01
Starry Flounder	Crabs	1.00	2.00
Steelhead Trout	Unidentified Fishes	1.00	2.00
Walleye Pollock	Euphausiids	0.50	4.48
Walleye Pollock	Unidentified Remains	0.31	0.42
Walleye Pollock	Unidentified Zooplankton	0.19	2.50
Walleye Pollock	Comb Jellyfish	0.19	0.91
Walleye Pollock	Crabs	0.12	0.40
Walleye Pollock	Copepods	0.06	0.01
Yellowtail Rockfish	Euphausiids	1.00	7.50
Yellowtail Rockfish	Amphipods	0.50	6.50
Yellowtail Rockfish	Squid	0.50	2.00
Yellowtail Rockfish	Unidentified Remains	0.50	0.20
Yellowtail Rockfish	Unidentified Fishes	0.50	0.10

8 FIGURES

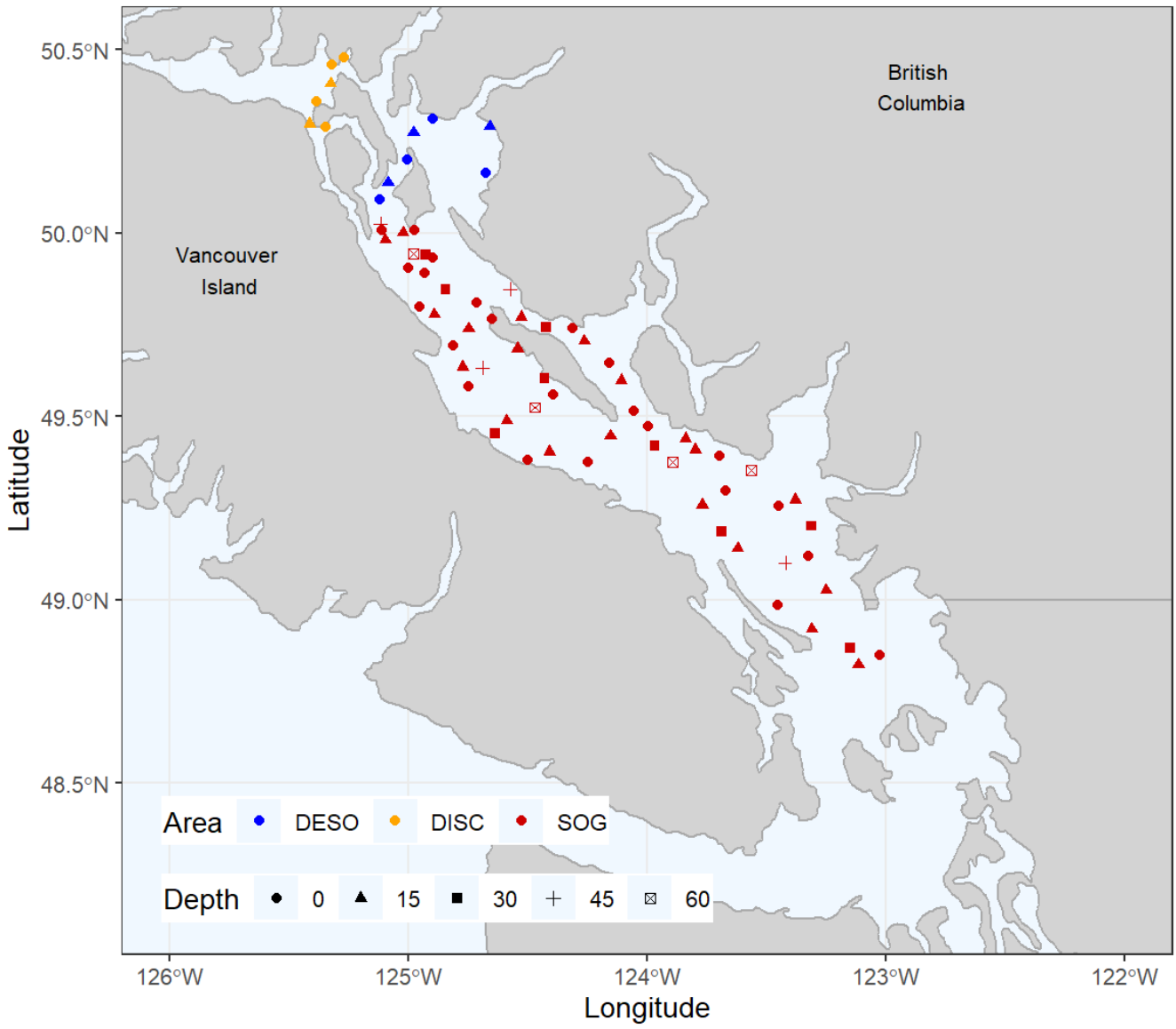

Figure 1. Location and target depths of survey midwater trawl fishing events during the ecosystem-based juvenile Pacific Salmon survey from June 11 to 24, 2024 on the CCGS *Sir John Franklin*. Red stations indicate stations designated as being in the historical SOG survey area, and black stations were additional tows conducted outside of the historical survey trackline area. Depth is indicated by the marker symbol. Color of marker indicates the area of the tow (DESO = Desolation Sound, DISC = Discovery Passage and SOG = Strait of Georgia).

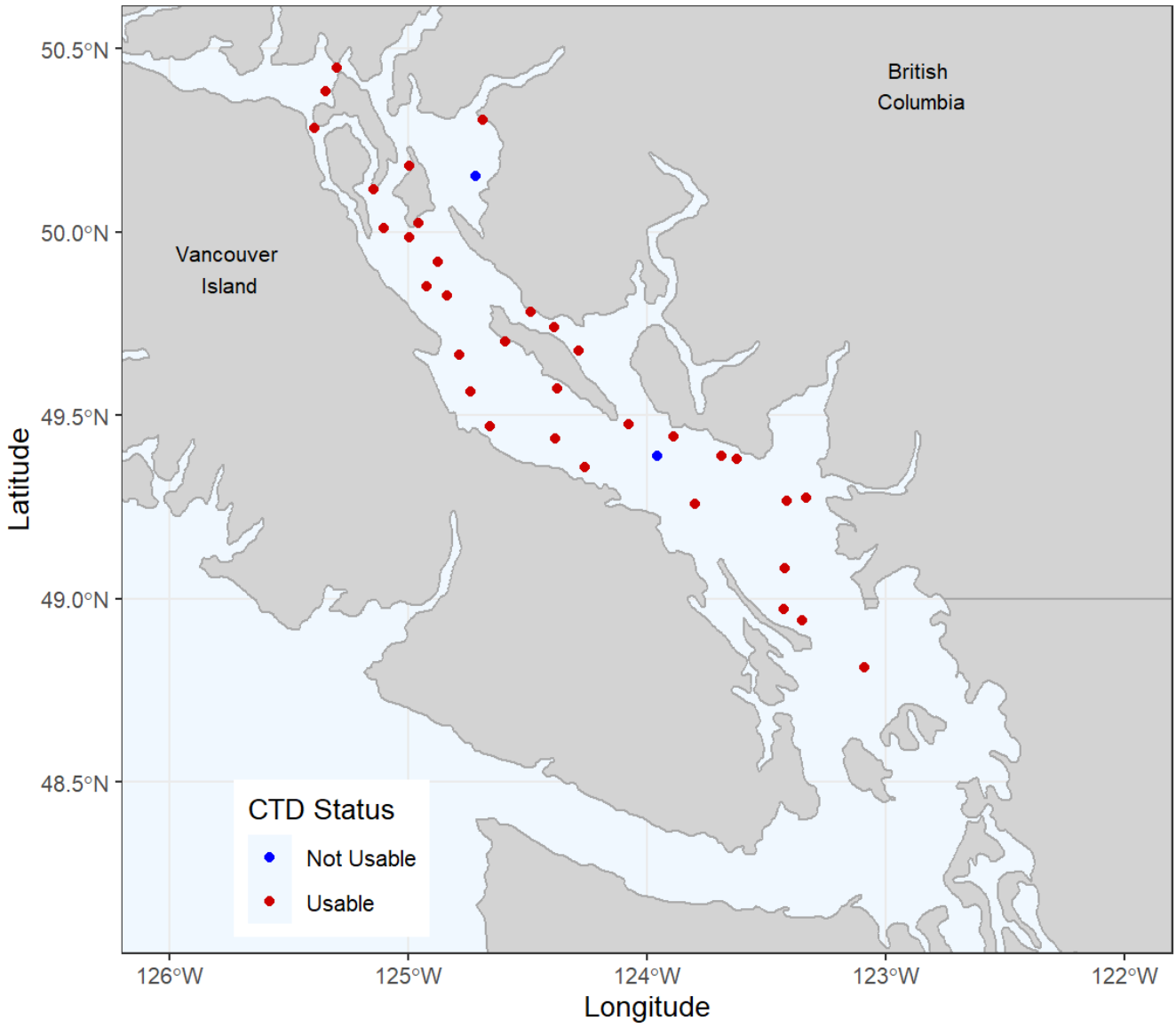

Figure 2. Location of survey oceanography events (CTD and plankton Bongos) during the ecosystem-based juvenile Pacific Salmon survey from June 11 to 24, 2024 on the CCGS *Sir John Franklin*. Red dots indicate stations with successful CTD and Bongo net tows, and black dots indicate stations with unusable CTD and no bongo tows.

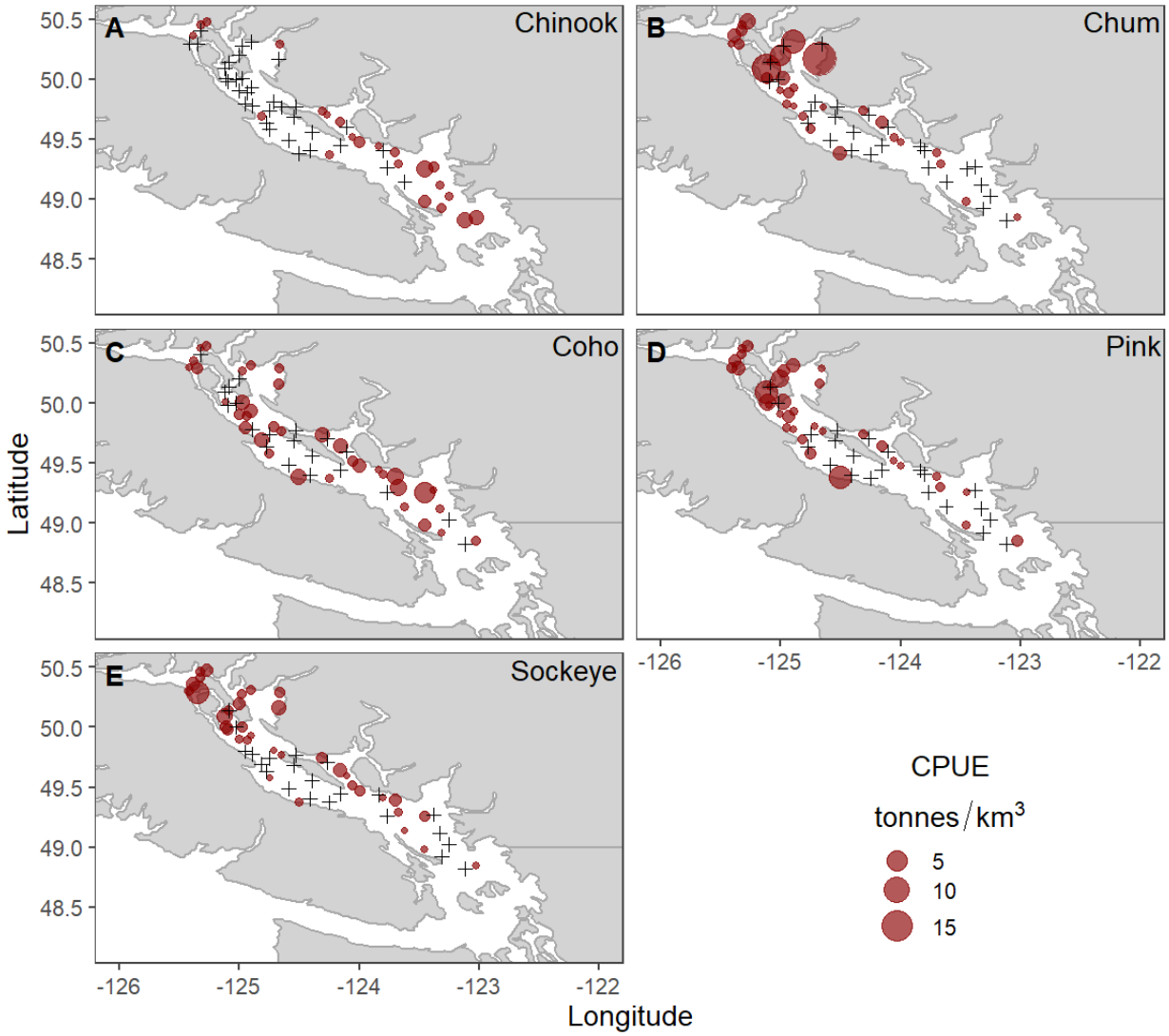

Figure 3. Juvenile Pacific Salmon (*Oncorhynchus spp.*) catch per unit effort (CPUE; tonnes/km^3) for each tow targeting 0 or 15 m headrope depths. (A) Chinook Salmon (*Oncorhynchus tshawytscha*), (B) Chum Salmon (*Oncorhynchus keta*), (C) Coho Salmon (*Oncorhynchus kisutch*), (D) Pink Salmon (*Oncorhynchus gorbusha*), and (E) Sockeye Salmon (*Oncorhynchus nerka*). Circles are proportional to catch abundance, and zero catches are shown with a cross (+).

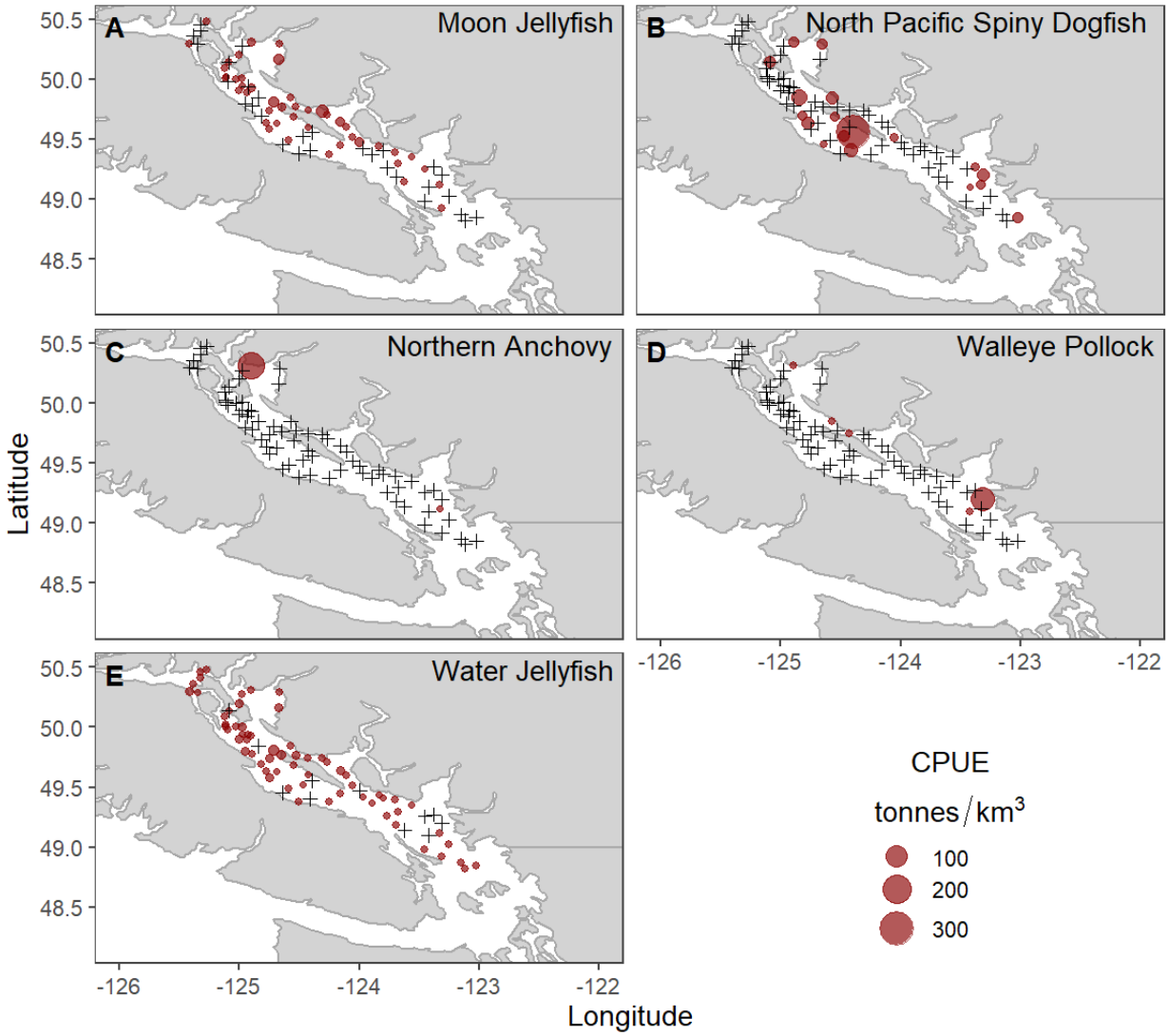

Figure 4. Catch per unit effort (CPUE; tonnes/km^3) by all tows for commonly caught species during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024. Circles are proportional to catch abundance, and zero catches are shown with a cross (+). (A) Moon Jellyfish (*Aurelia labiata*), (B) North Pacific Spiny Dogfish (*Squalus suckleyi*), (C) Northern Anchovy (*Engraulis mordax*), (D) Walleye Pollock (*Gadus chalcogrammus*), (E) Water Jellyfish (*Aequorea*).

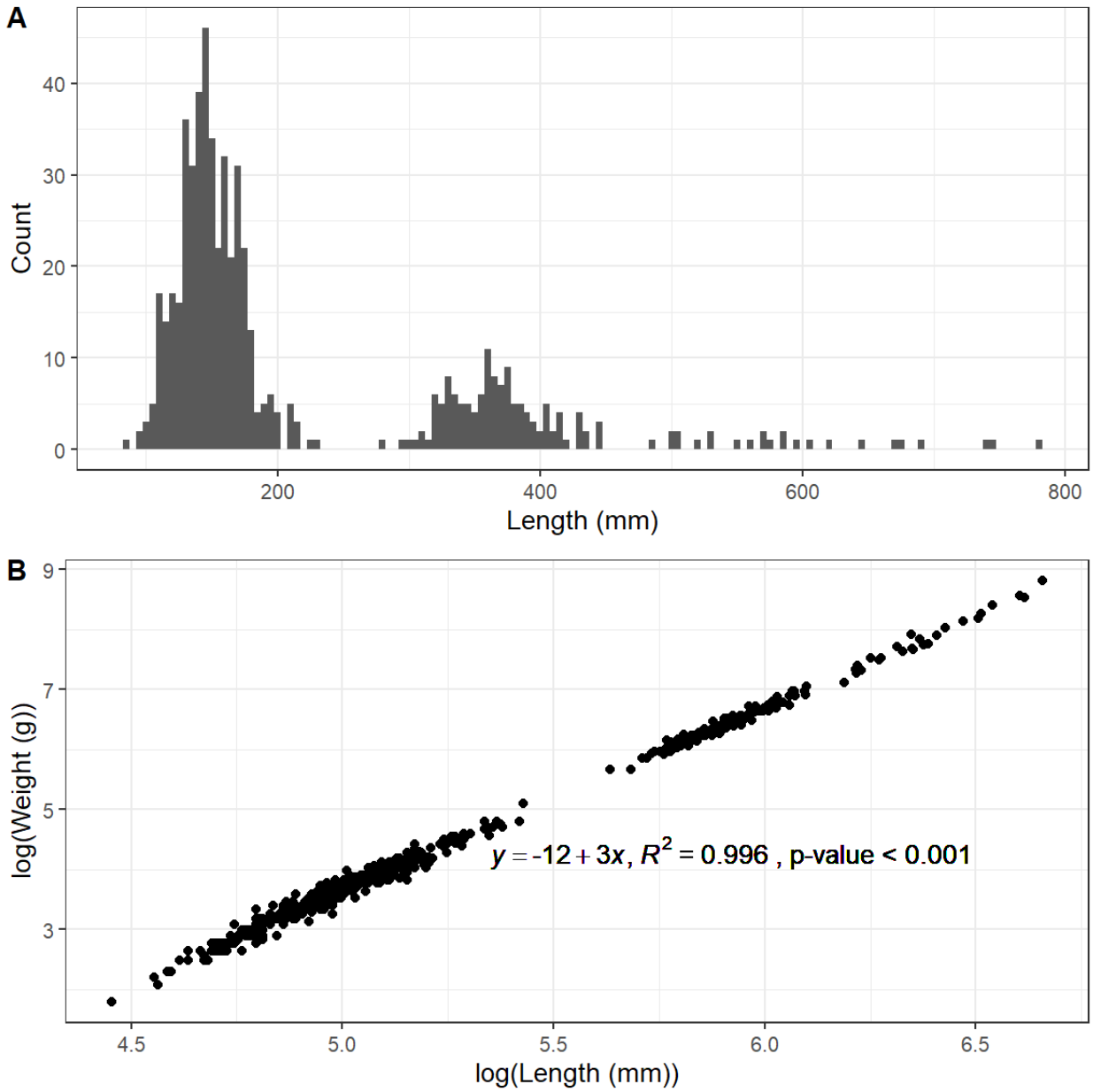

Figure 5. Chinook Salmon (*Oncorhynchus tshawytscha)*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

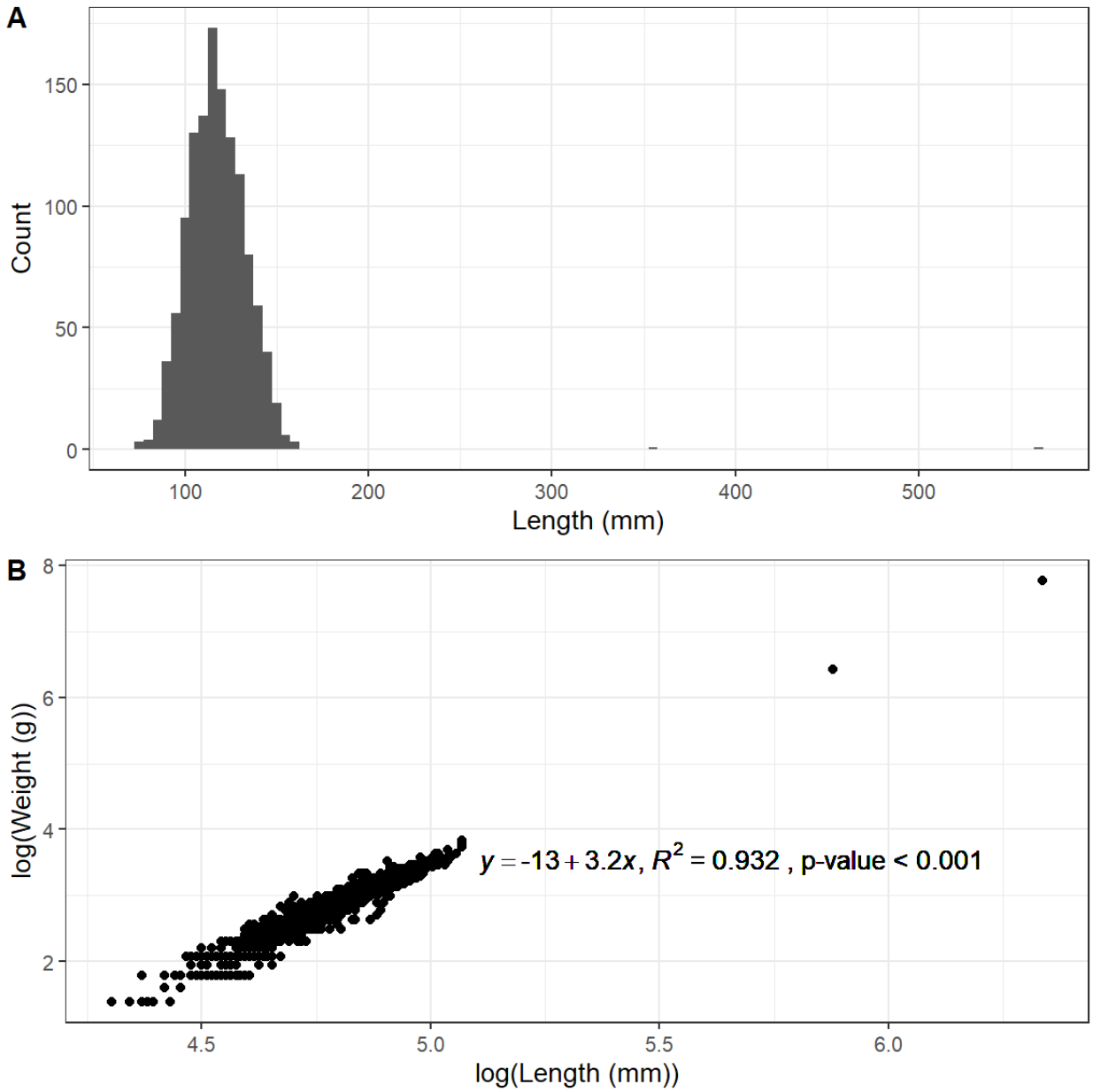

Figure 6. Chum Salmon (*Oncorhynchus keta*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

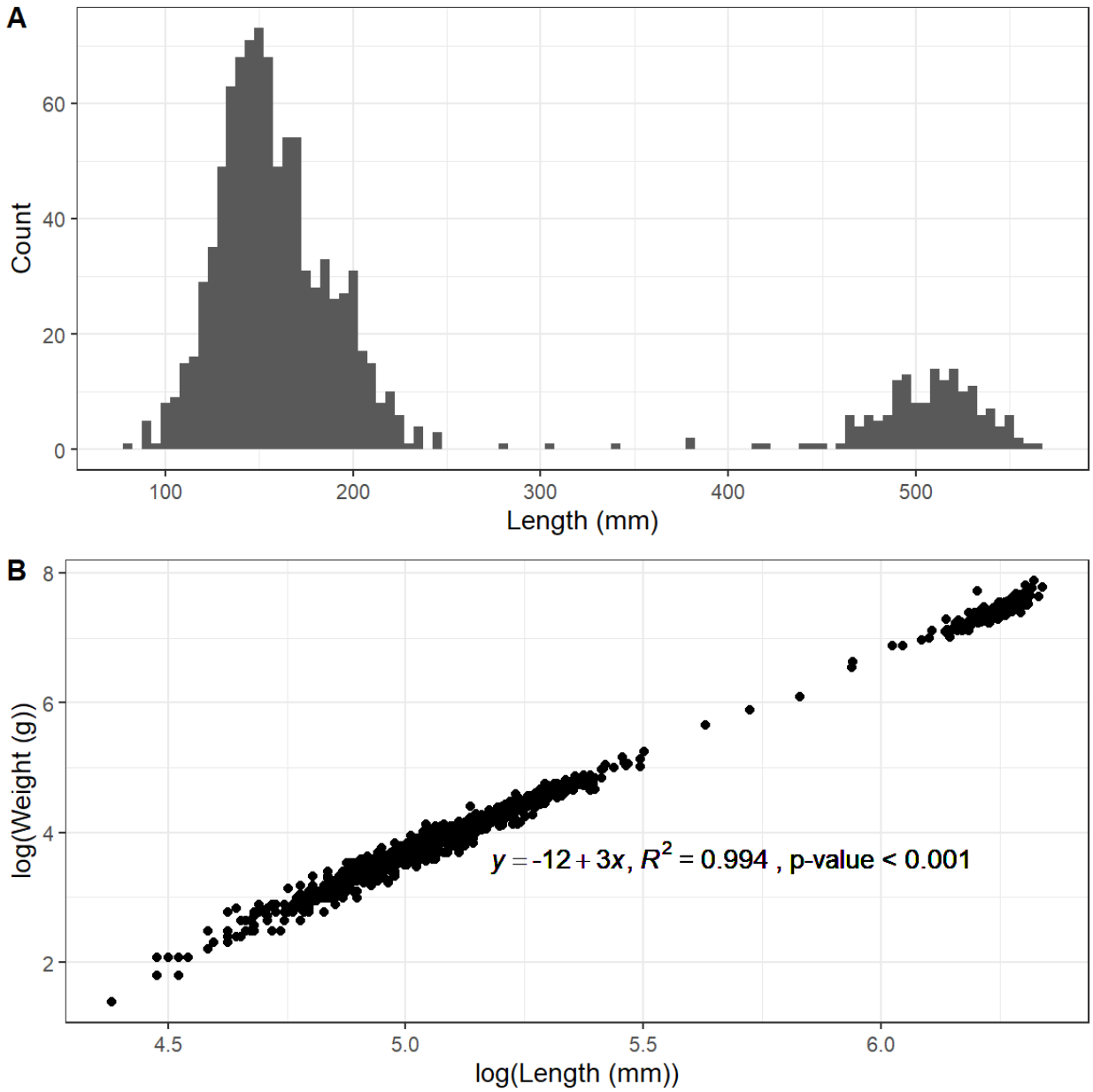

Figure 7. Coho Salmon (*Oncorhynchus kisutch*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

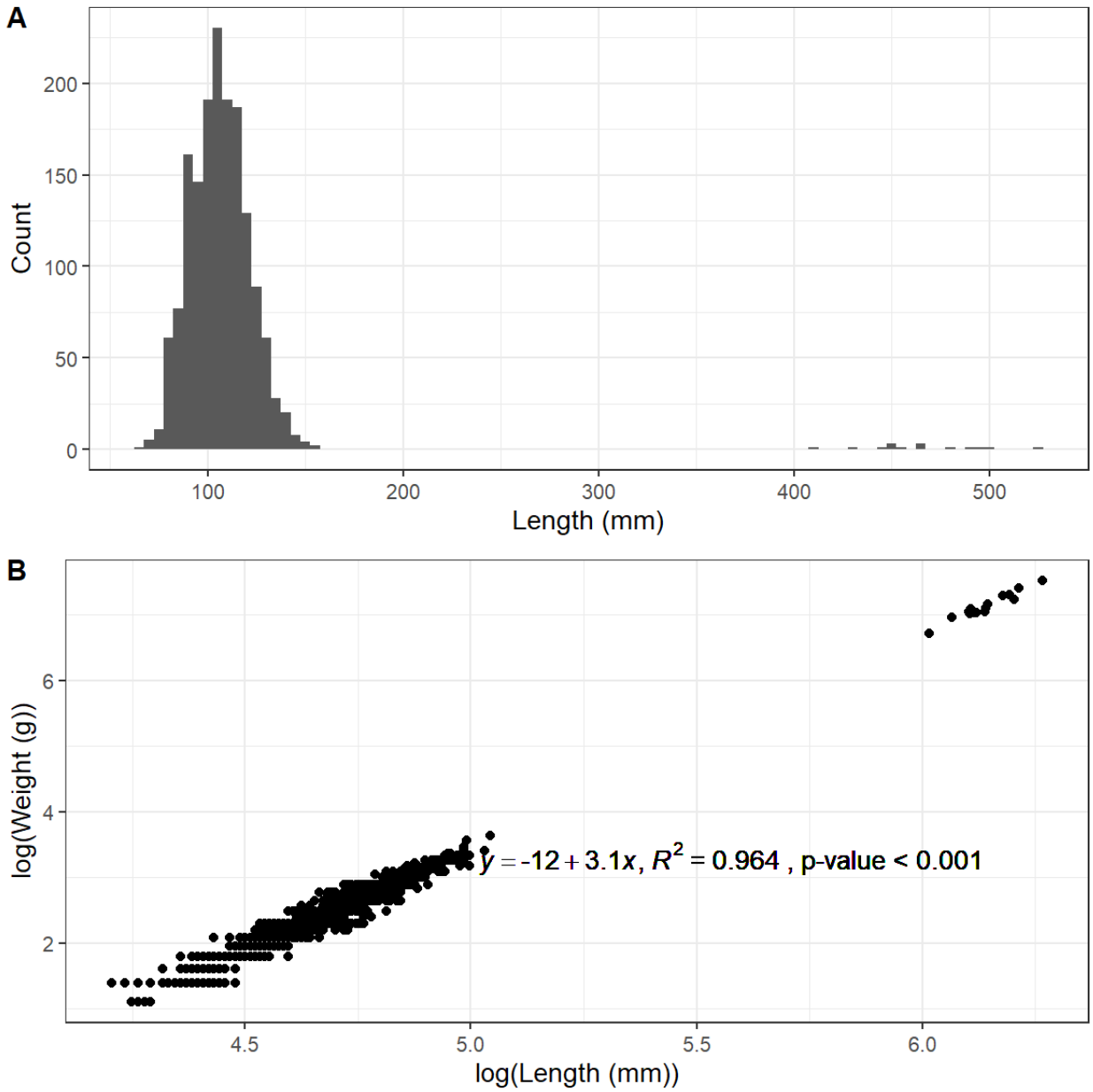

Figure 8. Pink Salmon (*Oncorhynchus gorbusha*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

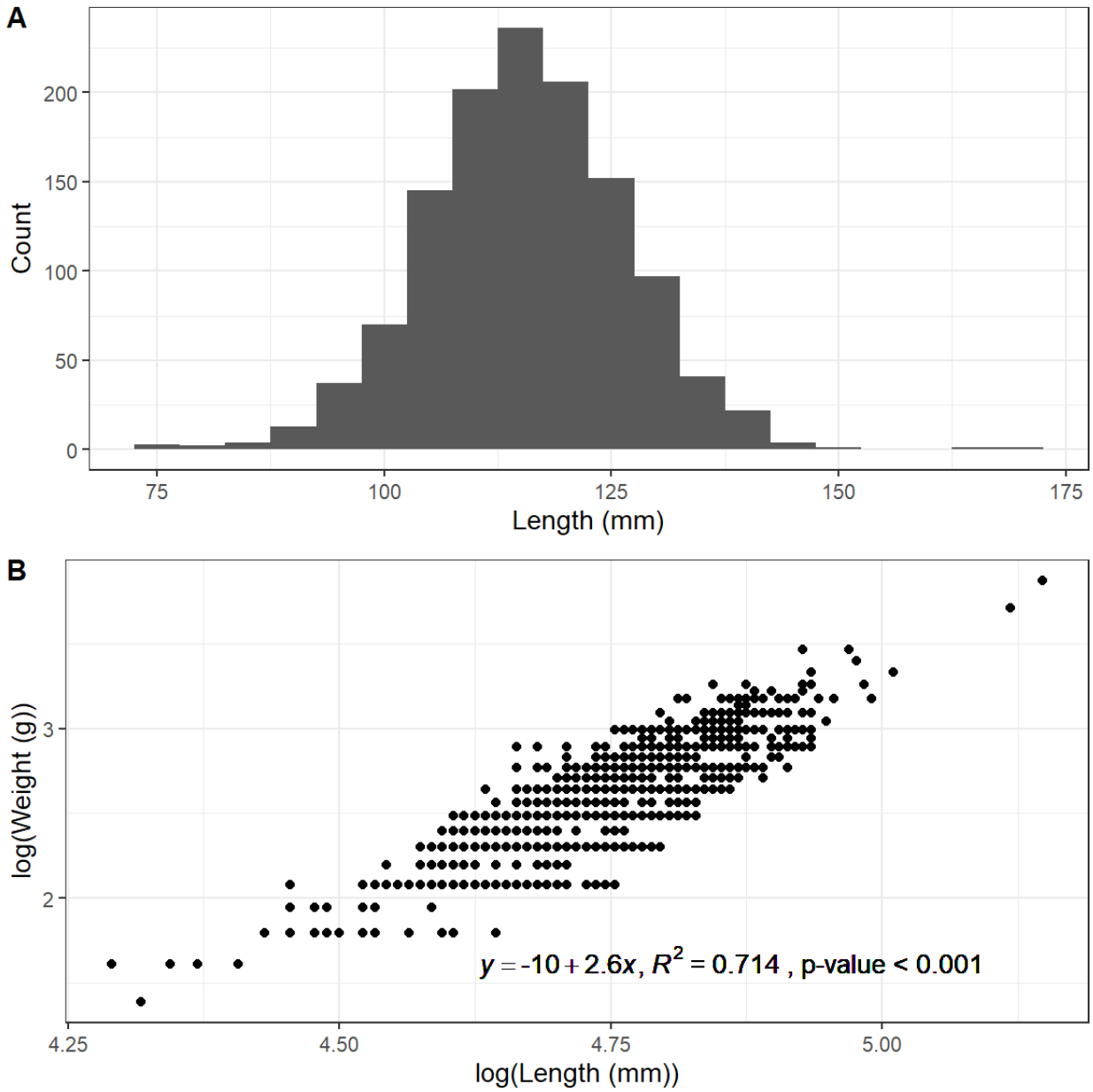

Figure 9. Sockeye Salmon (*Oncorhynchus nerka*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

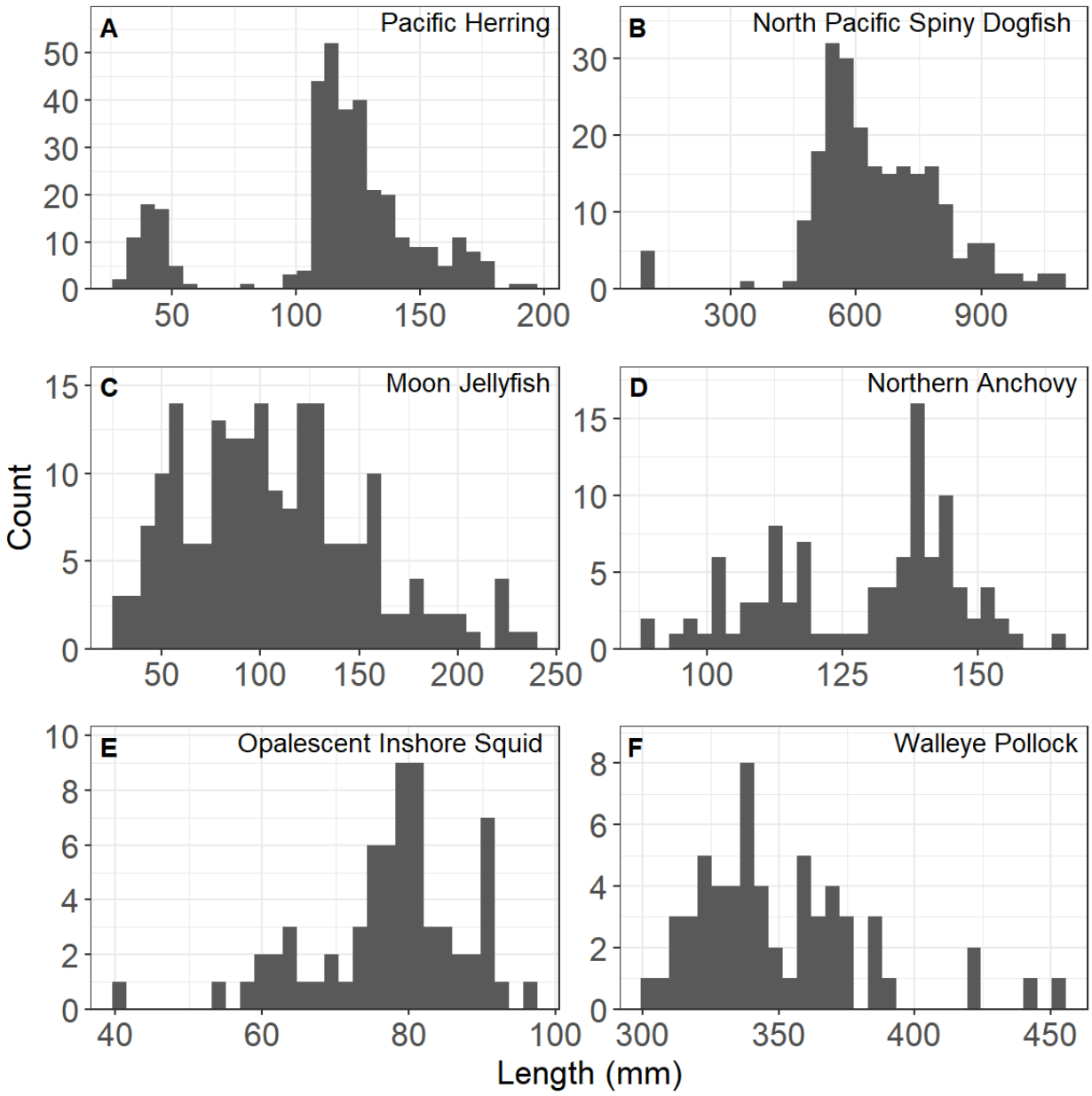

Figure 10. Length (mm) frequency plots for common species sampled (n>50 samples) during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024. (A) Pacific Herring (*Clupea pallasii*), length = Standard Length, (B) North Pacific Spiny Dogfish (*Squalus suckleyi*), length = Total Length, (C) Moon Jellyfish (*Aurelia labiata*), length = Bell Diameter, (D) Northern Anchovy (*Engraulis mordax*), length = Standard Length, (E) Opalescent Inshore Squid (*Doryteuthis opalescens*), length = Mantle Length, (F) Walleye Pollock (*Gadus chalcogrammus*), length = Fork Length.

APPENDIX A NET SPECIFICATIONS

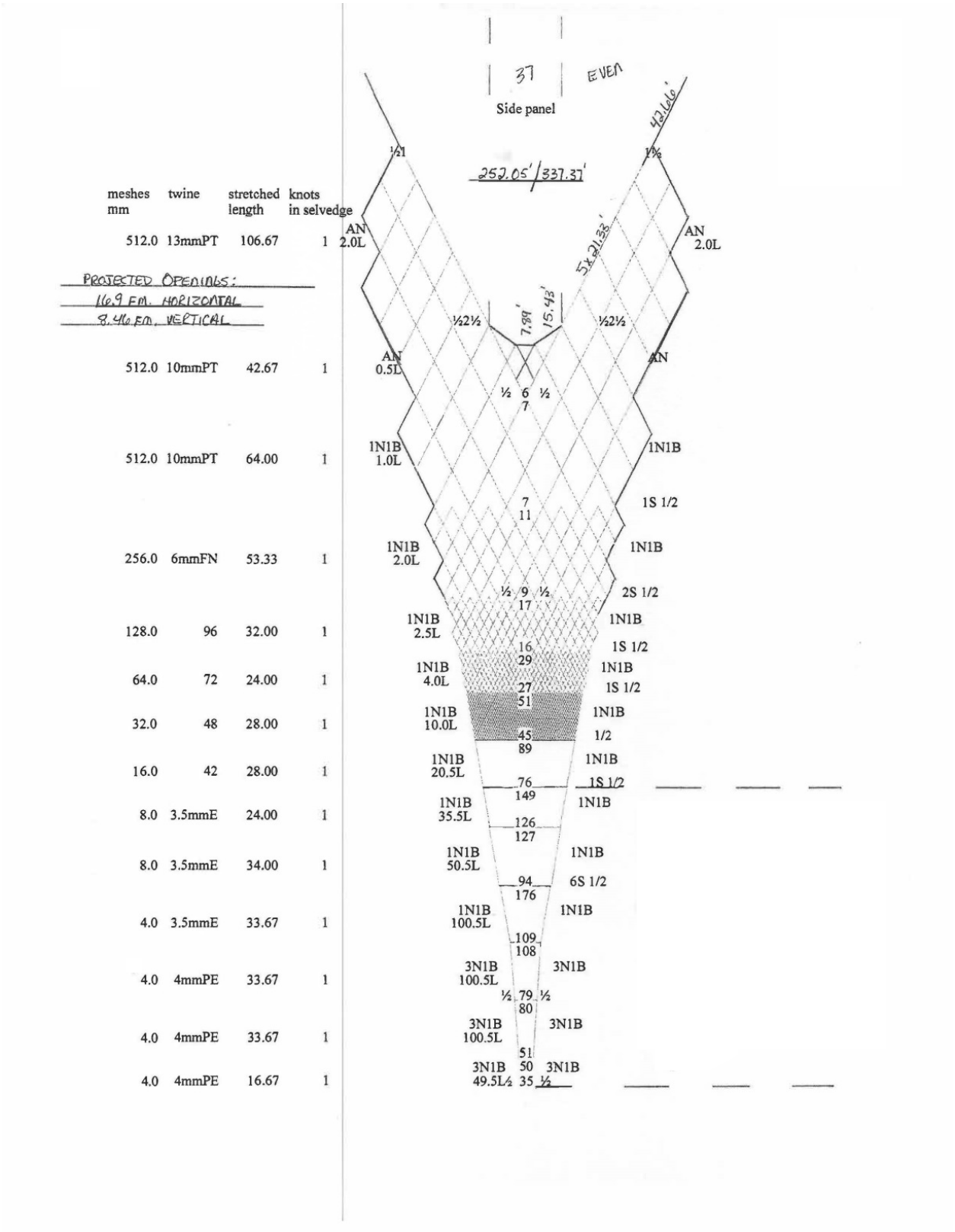

Figure A.1. Net specifications (side view) for the LFS 7742 trawl net used during the ecosystem-based juvenile Pacific Salmon survey from June 11 to 24, 2024 on the CCGS *Sir John Franklin*.

APPENDIX B THE BEAUFORT SCALE

Table B.1. The Beaufort Scale used to describe weather conditions.

Force	Description	Wind Speed (knots)	Sea State
0	Calm	<1	Sea like mirror
1	Light Air	1-3	Ripples; no foam crests
2	Light Breeze	4-6	Small wavelets
3	Gentle Breeze	7-10	Crests breaking
4	Moderate Breeze	11-16	Whitecaps
5	Fresh Breeze	17-21	Moderate waves - spray
6	Strong Breeze	22-27	Large waves
7	Moderate Gale	28-33	Sea heaps up
8	Fresh Gale	34-40	Moderately high waves
9	Strong Gale	41-47	High waves; spray
10	Whole Gale	48-55	Overhanging crests; sea white
11	Storm	56-63	Exceptionally high waves
12	Hurricane	64-118	Sea white

APPENDIX C TRAWL BRIDGE LOG DATA

Table C.1. Bridge log information for trawl tows during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, June 11 to 24, 2024. Area indicates Strait of Georgia (SOG), Discovery Passage (DISC) or Desolation Sound (DESO). STL indicates if the tow occurred along along the standard trackline of the historical survey time series (Y = Yes, N = No)

Station Name	SOG01	SOG02	SOG03	SOG04	SOG05	SOG06
Tow	1	2	3	4	5	6
Event Number	4	5	6	7	12	13
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-06-12	2024-06-12	2024-06-12	2024-06-12	2024-06-13	2024-06-13
Start Time (Pacific)	12:08	13:50	14:37	17:53	07:37	09:40
Start Latitude	48° 49’ 19" N	48° 50’ 52" N	48° 52’ 07" N	48° 55’ 10" N	48° 59’ 06" N	49° 01’ 34" N
Start Longitude	123° 06’ 57" W	123° 01’ 35" W	123° 08’ 54" W	123° 18’ 42" W	123° 27’ 13" W	123° 15’ 04" W
End Latitude	48° 49’ 50" N	48° 49’ 37" N	48° 52’ 47" N	48° 56’ 02" N	49° 00’ 01" N	49° 02’ 30" N
End Longitude	123° 08’ 52" W	122° 59’ 28" W	123° 10’ 39" W	123° 20’ 44" W	123° 28’ 53" W	123° 16’ 46" W
Target Headrope Depth (m)	15	0	30	15	0	15
Median Headrope Depth (m)						
Start Bottom Depth (m)	177	197	143	188	145	90
End Bottom Depth (m)	171	219	141	191	167	89
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	21	20	20	20	20
Direction of Tow (deg)	287	127	295	299	306	306
Vessel Speed (km/h)	8.0	8.3	7.4	8.7	7.9	8.0
Distance Towed (km)	2.54	3.47	2.47	2.95	2.64	2.69
Net Opening Width (m)	56	45	60	56	48	54
Net Opening Height (m)	9	15	9	9	15	9
Warp Length (m)	240	200	320	240	200	240
Beaufort Scale	2	1	1	2	1	2
Water Temperature (5m, ℃)			12.2	13.2	13.4	11.7
Median Temp at Headrope ℃)						
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG07	SOG08	SOG09	SOG10	SOG11	SOG12
Tow	7	8	9	10	11	12
Event Number	14	17	18	19	24	25
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-06-13	2024-06-13	2024-06-13	2024-06-13	2024-06-14	2024-06-14
Start Time (Pacific)	10:19	14:25	16:11	16:59	07:37	09:34
Start Latitude	49° 07’ 10" N	49° 05’ 59" N	49° 12’ 03" N	49° 16’ 19" N	49° 15’ 22" N	49° 08’ 25" N
Start Longitude	123° 19’ 33" W	123° 25’ 15" W	123° 18’ 41" W	123° 22’ 45" W	123° 27’ 03" W	123° 37’ 14" W
End Latitude	49° 08’ 37" N	49° 08’ 01" N	49° 14’ 22" N	49° 16’ 50" N	49° 14’ 46" N	49° 09’ 59" N
End Longitude	123° 19’ 02" W	123° 24’ 51" W	123° 18’ 21" W	123° 20’ 29" W	123° 29’ 14" W	123° 37’ 25" W
Target Headrope Depth (m)	0	45	30	15	0	15
Median Headrope Depth (m)					4	18
Start Bottom Depth (m)	102	259	123	248	248	116
End Bottom Depth (m)	112	235	138	186	317	192
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	30	30	20	20	20
Direction of Tow (deg)	009	003	001	067	243	351
Vessel Speed (km/h)	8.3	7.5	8.5	8.6	8.6	8.7
Distance Towed (km)	2.77	3.80	4.30	2.91	2.86	2.91
Net Opening Width (m)	49	62	58	55	47	56
Net Opening Height (m)	15	10	9	9	16	9
Warp Length (m)	200	350	310	240	200	260
Beaufort Scale	1	1	1	1	1	3
Water Temperature (5m, ℃)	13.7	13.7	13.1	12.6	13.8	14.0
Median Temp at Headrope ℃)					14.8	11.5
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG13	SOG14	SOG15	SOG16	SOG17	SOG18
Tow	13	14	15	16	17	18
Event Number	26	29	30	31	37	38
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-06-14	2024-06-14	2024-06-14	2024-06-14	2024-06-15	2024-06-15
Start Time (Pacific)	10:36	12:54	14:07	15:54	08:02	09:28
Start Latitude	49° 11’ 04" N	49° 15’ 29" N	49° 17’ 48" N	49° 21’ 11" N	49° 23’ 30" N	49° 24’ 31" N
Start Longitude	123° 41’ 16" W	123° 46’ 11" W	123° 40’ 16" W	123° 33’ 58" W	123° 41’ 56" W	123° 47’ 56" W
End Latitude	49° 12’ 35" N	49° 14’ 59" N	49° 17’ 28" N	49° 22’ 33" N	49° 24’ 13" N	49° 23’ 35" N
End Longitude	123° 44’ 05" W	123° 43’ 45" W	123° 37’ 46" W	123° 36’ 35" W	123° 44’ 10" W	123° 49’ 49" W
Target Headrope Depth (m)	30	15	0	60	0	15
Median Headrope Depth (m)	34	20	4	63	4	20
Start Bottom Depth (m)	206	407	225	176	171	88
End Bottom Depth (m)	325	401	216	176	180	177
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	31	21	20	30	20	20
Direction of Tow (deg)	305	103	097	304	292	228
Vessel Speed (km/h)	8.6	8.9	9.2	8.1	9.0	8.5
Distance Towed (km)	4.41	3.10	3.08	4.06	3.02	2.87
Net Opening Width (m)	60	55	49	64	48	56
Net Opening Height (m)	9	10	16	10	16	10
Warp Length (m)	340	240	200	430	200	250
Beaufort Scale	3	4	4	4	2	2
Water Temperature (5m, ℃)	14.2	14.3	14.5	14.8	14.8	14.7
Median Temp at Headrope ℃)	10.4	11.1	15.1	8.8	15.5	9.8
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG19	SOG20	SOG21	SOG22	SOG23	SOG24
Tow	19	20	21	22	23	24
Event Number	39	42	43	44	47	50
Area	SOG	SOG	SOG	SOG	DISC	DISC
STL	Y	Y	Y	Y	N	N
Date (Pacific)	2024-06-15	2024-06-15	2024-06-15	2024-06-15	2024-06-16	2024-06-16
Start Time (Pacific)	10:50	12:48	14:21	15:56	07:17	09:36
Start Latitude	49° 22' 26" N	49° 25' 13" N	49° 28' 22" N	49° 26' 20" N	50° 17' 22" N	50° 17' 50" N
Start Longitude	123° 53' 35" W	123° 58' 07" W	123° 59' 39" W	123° 50' 21" W	125° 20' 51" W	125° 24' 47" W
End Latitude	49° 23' 17" N	49° 26' 36" N	49° 27' 30" N	49° 26' 28" N	50° 17' 08" N	50° 19' 01" N
End Longitude	123° 56' 47" W	123° 55' 34" W	123° 57' 29" W	123° 52' 45" W	125° 23' 21" W	125° 24' 51" W
Target Headrope Depth (m)	60	30	0	15	0	15
Median Headrope Depth (m)	63	34	4	20	4	21
Start Bottom Depth (m)	253	319	173	192	121	229
End Bottom Depth (m)	414	215	222	222	136	160
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	31	30	20	20	20	20
Direction of Tow (deg)	288	047	118	271	259	355
Vessel Speed (km/h)	8.1	8.0	9.0	8.7	9.0	6.5
Distance Towed (km)	4.18	3.99	3.08	2.91	3.01	2.18
Net Opening Width (m)	63	61	48	75	49	56
Net Opening Height (m)	10	9	15	10	16	9
Warp Length (m)	430	360	200	240	200	240
Beaufort Scale	2	2	2	2	1	2
Water Temperature (5m, ℃)	14.3	14.6	14.5	15.1	9.8	9.8
Median Temp at Headrope ℃)	9.0	9.2	14.9	9.7	10.8	10.6
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG25	SOG26	SOG27	SOG28	SOG29	SOG30
Tow	25	26	27	28	29	30
Event Number	51	54	55	56	61	62
Area	DISC	DISC	DISC	DISC	SOG	SOG
STL	N	N	N	N	Y	Y
Date (Pacific)	2024-06-16	2024-06-16	2024-06-16	2024-06-16	2024-06-17	2024-06-17
Start Time (Pacific)	10:35	12:09	13:35	15:06	07:41	10:05
Start Latitude	50° 21’ 28" N	50° 24’ 24" N	50° 27’ 27" N	50° 28’ 39" N	49° 33’ 33" N	49° 31’ 25" N
Start Longitude	125° 23’ 07" W	125° 19’ 35" W	125° 19’ 23" W	125° 16’ 19" W	124° 23’ 30" W	124° 28’ 13" W
End Latitude	50° 22’ 14" N	50° 25’ 51" N	50° 28’ 21" N	50° 27’ 13" N	49° 32’ 53" N	49° 30’ 26" N
End Longitude	125° 21’ 01" W	125° 18’ 53" W	125° 21’ 22" W	125° 17’ 22" W	124° 25’ 44" W	124° 31’ 13" W
Target Headrope Depth (m)	0	15	0	0	0	60
Median Headrope Depth (m)	5	19	4	5	4	62
Start Bottom Depth (m)	286	268	197	179	220	192
End Bottom Depth (m)	212	325	132	310	134	215
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	20	20	20	20	31
Direction of Tow (deg)	057	014	303	202	242	240
Vessel Speed (km/h)	8.5	8.4	8.6	8.8	8.8	8.0
Distance Towed (km)	2.88	2.81	2.88	2.94	2.97	4.06
Net Opening Width (m)	49	55	49	48	48	63
Net Opening Height (m)	17	9	15	17	14	9
Warp Length (m)	200	260	200	200	210	450
Beaufort Scale	2	1	1	2	2	2
Water Temperature (5m, ℃)	9.5	9.7	9.6	9.5	13.9	14.0
Median Temp at Headrope ℃)	10.2	10.1	10.2	10.1	10.9	9.3
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG31	SOG32	SOG33	SOG34	SOG35	SOG36
Tow	31	32	33	34	35	36
Event Number	63	66	67	68	73	74
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-06-17	2024-06-17	2024-06-17	2024-06-17	2024-06-18	2024-06-18
Start Time (Pacific)	11:44	13:19	14:40	15:32	07:53	10:03
Start Latitude	49° 29’ 16" N	49° 27’ 07" N	49° 22’ 49" N	49° 24’ 10" N	49° 22’ 28" N	49° 36’ 10" N
Start Longitude	124° 35’ 23" W	124° 38’ 16" W	124° 30’ 08" W	124° 24’ 33" W	124° 14’ 56" W	124° 25’ 47" W
End Latitude	49° 28’ 46" N	49° 25’ 54" N	49° 22’ 32" N	49° 25’ 33" N	49° 24’ 02" N	49° 37’ 34" N
End Longitude	124° 37’ 40" W	124° 35’ 21" W	124° 27’ 43" W	124° 23’ 18" W	124° 14’ 16" W	124° 28’ 26" W
Target Headrope Depth (m)	15	30	0	15	0	30
Median Headrope Depth (m)	20	36	4	19	4	33
Start Bottom Depth (m)	65	85	82	277	322	233
End Bottom Depth (m)	109	115	84	351	299	335
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	31	20	20	20	29
Direction of Tow (deg)	248	119	097	027	012	306
Vessel Speed (km/h)	8.7	8.3	8.8	8.8	9.0	8.5
Distance Towed (km)	2.91	4.20	2.97	2.98	3.03	4.10
Net Opening Width (m)	56	61	48	55	47	62
Net Opening Height (m)	9	9	17	9	13	8
Warp Length (m)	260	350	200	240	200	370
Beaufort Scale	1	1	2	2	1	2
Water Temperature (5m, ℃)	14.0	13.7	13.7	13.5	14.4	14.4
Median Temp at Headrope ℃)	11.0	10.5	11.3	10.9	15.5	10.1
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG37	SOG38	SOG39	SOG40	SOG41	SOG42
Tow	37	38	39	40	41	42
Event Number	75	78	79	80	85	86
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-06-18	2024-06-18	2024-06-18	2024-06-18	2024-06-19	2024-06-19
Start Time (Pacific)	11:31	13:38	14:55	16:18	07:45	09:09
Start Latitude	49° 41’ 02" N	49° 45’ 54" N	49° 50’ 41" N	49° 46’ 14" N	49° 44’ 35" N	49° 44’ 20" N
Start Longitude	124° 32’ 36" W	124° 39’ 02" W	124° 34’ 17" W	124° 31’ 39" W	124° 25’ 29" W	124° 18’ 40" W
End Latitude	49° 42’ 02" N	49° 47’ 41" N	49° 48’ 29" N	49° 46’ 42" N	49° 45’ 15" N	49° 43’ 27" N
End Longitude	124° 34’ 34" W	124° 39’ 27" W	124° 34’ 22" W	124° 29’ 18" W	124° 22’ 00" W	124° 16’ 26" W
Target Headrope Depth (m)	15	0	45	15	30	0
Median Headrope Depth (m)	19	6	49	20	34	4
Start Bottom Depth (m)	144	120	178	320	319	138
End Bottom Depth (m)	187	96	314	276	107	145
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	21	30	20	30	21
Direction of Tow (deg)	305	348	178	069	070	118
Vessel Speed (km/h)	9.0	9.8	8.1	8.8	8.7	9.3
Distance Towed (km)	3.01	3.35	4.06	2.94	4.36	3.14
Net Opening Width (m)	57	48	61	56	58	46
Net Opening Height (m)	9	15	9	9	9	14
Warp Length (m)	280	200	370	250	330	200
Beaufort Scale	2	2	1	1	1	1
Water Temperature (5m, ℃)	14.6	14.5	14.8	14.3	14.5	14.8
Median Temp at Headrope ℃)	11.0	15.4	9.3	10.5	9.6	15.8
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG43	SOG44	SOG45	SOG46	SOG47	SOG48
Tow	43	44	45	46	47	48
Event Number	87	90	91	92	95	98
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-06-19	2024-06-19	2024-06-19	2024-06-19	2024-06-19	2024-06-20
Start Time (Pacific)	10:07	11:57	13:13	14:53	17:20	07:55
Start Latitude	49° 42’ 18" N	49° 38’ 40" N	49° 35’ 54" N	49° 30’ 54" N	49° 26’ 45" N	49° 34’ 55" N
Start Longitude	124° 15’ 51" W	124° 09’ 36" W	124° 06’ 34" W	124° 03’ 23" W	124° 09’ 15" W	124° 44’ 48" W
End Latitude	49° 40’ 48" N	49° 38’ 12" N	49° 34’ 27" N	49° 29’ 22" N	49° 25’ 09" N	49° 36’ 25" N
End Longitude	124° 16’ 43" W	124° 07’ 08" W	124° 07’ 36" W	124° 02’ 26" W	124° 09’ 09" W	124° 45’ 07" W
Target Headrope Depth (m)	15	0	15	0	15	0
Median Headrope Depth (m)	19	4	19	4	14	5
Start Bottom Depth (m)	191	159	269	168	132	59
End Bottom Depth (m)	318	130	356	121	78	83
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	20	21	21	21	21
Direction of Tow (deg)	197	102	201	155	174	349
Vessel Speed (km/h)	8.9	9.1	8.8	8.9	8.8	8.2
Distance Towed (km)	2.98	3.08	2.96	3.09	2.97	2.82
Net Opening Width (m)	55	44	54	47	54	47
Net Opening Height (m)	9	11	9	15	9	17
Warp Length (m)	260	200	260	200	240	200
Beaufort Scale	1	1	1	1	1	2
Water Temperature (5m, ℃)	15.0	15.5	15.8	15.7	15.8	14.9
Median Temp at Headrope ℃)	10.8	16.6	9.9	16.5	11.5	16.1
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG49	SOG50	SOG51	SOG52	SOG53	SOG54
Tow	49	50	51	52	53	54
Event Number	99	100	103	104	105	108
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-06-20	2024-06-20	2024-06-20	2024-06-20	2024-06-20	2024-06-20
Start Time (Pacific)	08:47	10:11	12:08	12:48	14:07	16:26
Start Latitude	49° 37’ 53" N	49° 38’ 05" N	49° 41’ 37" N	49° 44’ 20" N	49° 48’ 34" N	49° 50’ 45" N
Start Longitude	124° 41’ 19" W	124° 46’ 20" W	124° 48’ 50" W	124° 44’ 55" W	124° 42’ 45" W	124° 50’ 41" W
End Latitude	49° 39’ 51" N	49° 39’ 30" N	49° 43’ 10" N	49° 45’ 43" N	49° 49’ 21" N	49° 52’ 58" N
End Longitude	124° 40’ 02" W	124° 46’ 57" W	124° 49’ 46" W	124° 43’ 49" W	124° 44’ 51" W	124° 50’ 56" W
Target Headrope Depth (m)	45	15	0	15	0	30
Median Headrope Depth (m)	49	19	5	18	4	34
Start Bottom Depth (m)	148	55	63	341	170	294
End Bottom Depth (m)	156	104	79	354	196	175
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	31	21	20	21	20	30
Direction of Tow (deg)	020	341	336	024	297	353
Vessel Speed (km/h)	7.8	8.1	9.2	8.5	8.7	8.2
Distance Towed (km)	3.96	2.72	3.09	2.88	2.92	4.12
Net Opening Width (m)	62	54	46	57	48	60
Net Opening Height (m)	10	9	16	9	15	9
Warp Length (m)	380	250	200	250	200	350
Beaufort Scale	3	2	2	2	2	1
Water Temperature (5m, ℃)	15.1	15.0	15.3	15.2	14.8	14.5
Median Temp at Headrope ℃)	10.0	11.4	15.9	10.9	15.5	10.1
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG55	SOG56	SOG57	SOG58	SOG59	SOG60
Tow	55	56	57	58	59	60
Event Number	111	112	113	116	117	118
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-06-21	2024-06-21	2024-06-21	2024-06-21	2024-06-21	2024-06-21
Start Time (Pacific)	07:35	08:18	09:52	12:04	13:13	14:57
Start Latitude	49° 55’ 50" N	49° 56’ 22" N	49° 53’ 25" N	49° 46’ 39" N	49° 47’ 51" N	49° 54’ 13" N
Start Longitude	124° 53’ 50" W	124° 55’ 45" W	124° 56’ 03" W	124° 53’ 36" W	124° 57’ 18" W	125° 00’ 10" W
End Latitude	49° 56’ 50" N	49° 54’ 47" N	49° 51’ 49" N	49° 47’ 38" N	49° 47’ 00" N	49° 55’ 55" N
End Longitude	124° 55’ 33" W	124° 52’ 58" W	124° 55’ 34" W	124° 55’ 26" W	124° 55’ 11" W	125° 01’ 01" W
Target Headrope Depth (m)	0	30	0	15	0	0
Median Headrope Depth (m)	5	36	4	20	4	4
Start Bottom Depth (m)	73	193	158	82	72	118
End Bottom Depth (m)	155	168	247	87	67	224
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	30	20	21	20	20
Direction of Tow (deg)	309	128	166	307	119	339
Vessel Speed (km/h)	8.3	8.7	9.1	8.5	8.8	9.7
Distance Towed (km)	2.76	4.42	3.03	2.87	2.99	3.30
Net Opening Width (m)	45	57	47	56	47	49
Net Opening Height (m)	16	9	17	9	16	14
Warp Length (m)	200	370	200	260	200	200
Beaufort Scale	2	2	1	1	1	1
Water Temperature (5m, ℃)	14.4	14.5	15.4	15.5	15.5	15.1
Median Temp at Headrope ℃)	15.2	9.7	16.0	10.7	16.5	15.8
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG61	SOG62	SOG63	SOG64	SOG65	SOG66
Tow	61	62	63	64	65	66
Event Number	119	124	125	126	129	130
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-06-21	2024-06-22	2024-06-22	2024-06-22	2024-06-22	2024-06-22
Start Time (Pacific)	15:57	07:28	08:13	09:11	11:51	13:03
Start Latitude	49° 56’ 32" N	50° 00’ 26" N	50° 00’ 02" N	49° 58’ 52" N	50° 00’ 28" N	50° 01’ 26" N
Start Longitude	124° 58’ 39" W	124° 58’ 25" W	125° 01’ 26" W	125° 05’ 53" W	125° 06’ 46" W	125° 06’ 53" W
End Latitude	49° 58’ 44" N	49° 58’ 56" N	50° 00’ 59" N	50° 00’ 13" N	49° 58’ 44" N	50° 03’ 32" N
End Longitude	124° 59’ 27" W	124° 59’ 46" W	125° 03’ 24" W	125° 05’ 54" W	125° 05’ 59" W	125° 06’ 03" W
Target Headrope Depth (m)	60	0	15	15	0	45
Median Headrope Depth (m)	63	4	20	18	8	49
Start Bottom Depth (m)	159	75	97	130	209	251
End Bottom Depth (m)	166	141	140	258	102	209
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	31	20	20	21	20	31
Direction of Tow (deg)	344	207	304	356	161	011
Vessel Speed (km/h)	8.3		8.7	7.4	10.0	8.0
Distance Towed (km)	4.19	3.21	2.92	2.50	3.34	4.01
Net Opening Width (m)	63	61	54	53	50	61
Net Opening Height (m)	10	15	10	9	15	10
Warp Length (m)	410	200	260	260	210	370
Beaufort Scale	1	2	1	2	4	4
Water Temperature (5m, ℃)	15.0	15.5	15.2	15.4	15.5	15.7
Median Temp at Headrope ℃)	9.2	15.8	11.2	10.9	13.0	9.5
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG67	SOG68X	SOG68	SOG69	SOG70	SOG71
Tow	67	68	69	70	71	72
Event Number	131	134	135	138	139	140
Area	DESO	DESO	DESO	DESO	DESO	DESO
STL	N	N	N	N	N	N
Date (Pacific)	2024-06-22	2024-06-22	2024-06-22	2024-06-23	2024-06-23	2024-06-23
Start Time (Pacific)	14:33	16:23	17:16	08:22	09:40	10:26
Start Latitude	50° 05’ 27" N	50° 08’ 12" N	50° 08’ 15" N	50° 12’ 01" N	50° 16’ 27" N	50° 18’ 39" N
Start Longitude	125° 07’ 10" W	125° 05’ 15" W	125° 05’ 03" W	125° 00’ 18" W	124° 58’ 45" W	124° 53’ 50" W
End Latitude	50° 06’ 47" N	50° 08’ 13" N	50° 09’ 08" N	50° 13’ 41" N	50° 17’ 45" N	50° 18’ 03" N
End Longitude	125° 08’ 40" W	125° 05’ 14" W	125° 03’ 03" W	125° 01’ 24" W	124° 57’ 05" W	124° 51’ 20" W
Target Headrope Depth (m)	0	15	15	0	15	0
Median Headrope Depth (m)	4		19	4	20	4
Start Bottom Depth (m)	239	279	275	485	506	504
End Bottom Depth (m)	157	280	422	492	510	475
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	0	20	20	20	21
Direction of Tow (deg)	321	060	052	334	036	107
Vessel Speed (km/h)	9.0	8.1	8.4	9.9	9.3	9.4
Distance Towed (km)	3.06	0.01	2.89	3.34	3.12	3.18
Net Opening Width (m)	46	55	50	47	55	43
Net Opening Height (m)	15	9	10	14	9	14
Warp Length (m)	200	240	240	200	260	200
Beaufort Scale	3	2	4	1	1	1
Water Temperature (5m, ℃)	14.7	15.2	15.0	14.1	14.5	15.1
Median Temp at Headrope ℃)	14.8		10.2	14.2	10.3	15.6
Usable	Y	N	Y	Y	Y	Y

Station Name	SOG72	SOG73
Tow	73	74
Event Number	143	144
Area	DESO	DESO
STL	N	N
Date (Pacific)	2024-06-23	2024-06-23
Start Time (Pacific)	12:54	14:17
Start Latitude	50° 17’ 26" N	50° 09’ 50" N
Start Longitude	124° 39’ 37" W	124° 40’ 33" W
End Latitude	50° 16’ 06" N	50° 09’ 16" N
End Longitude	124° 38’ 15" W	124° 42’ 41" W
Target Headrope Depth (m)	15	0
Median Headrope Depth (m)	20	5
Start Bottom Depth (m)	711	709
End Bottom Depth (m)	722	671
Net	LFS 7742	LFS 7742
Duration (min)	20	20
Direction of Tow (deg)	144	244
Vessel Speed (km/h)	8.8	8.2
Distance Towed (km)	2.97	2.75
Net Opening Width (m)	53	48
Net Opening Height (m)	10	18
Warp Length (m)	260	200
Beaufort Scale	1	1
Water Temperature (5m, ℃)	16.9	15.8
Median Temp at Headrope ℃)	10.8	16.2
Usable	Y	Y

APPENDIX D CTD CASTS AND ZOOPLANKTON TOWS

Table D.1. CTD casts and vertical bongo tow times and depths during the ecosystem-based juvenile Pacific Salmon survey from June 11 to 24, 2024 on the CCGS *Sir John Franklin*. Blank entries indicate the event was unusable.

				CTD			BONGO		
Date	Station	Latitude	Longitude	Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)	Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)
2024-06-12	SOG01	48° 48’ 41" N	123° 05’ 17" W	11:46	144	134	12:01	151	140
2024-06-12	SOG04	48° 56’ 27" N	123° 21’ 00" W	18:54	195	186	19:19	196	186
2024-06-13	SOG05	48° 58’ 18" N	123° 25’ 43" W	07:10	129	117	07:27	126	115
2024-06-13	SOG08	49° 04’ 52" N	123° 25’ 27" W	13:53	280	270	13:42	279	250
2024-06-13	SOG10	49° 16’ 32" N	123° 20’ 04" W	18:35	164	154	18:54	165	157
2024-06-14	SOG11	49° 15’ 57" N	123° 24’ 53" W	07:10	185	175	07:28	188	178
2024-06-14	SOG14	49° 15’ 33" N	123° 47’ 57" W	12:07	409	400	12:43	410	400
2024-06-14	SOG16	49° 22’ 52" N	123° 37’ 21" W	17:42	176	165	18:07	176	167
2024-06-15	SOG17	49° 23’ 17" N	123° 41’ 12" W	07:15	171	160	07:54	170	160
2024-06-15	SOG19	49° 23’ 16" N	123° 57’ 33" W				12:20	402	390
2024-06-15	SOG22	49° 26’ 31" N	123° 53’ 20" W	16:48	223	213	17:11	223	213
2024-06-16	SOG23	50° 16’ 54" N	125° 23’ 40" W	08:25	189	175	08:46	195	179
2024-06-16	SOG25	50° 22’ 56" N	125° 20’ 44" W	11:31	248	234	11:54	228	220
2024-06-16	SOG28	50° 26’ 51" N	125° 18’ 05" W	16:27	317	294	16:53	297	286
2024-06-17	SOG29	49° 34’ 23" N	124° 22’ 28" W	07:03	318	308	07:33	325	319
2024-06-17	SOG32	49° 28’ 12" N	124° 39’ 31" W	12:56	111	100	13:10	109	100
2024-06-17	SOG34	49° 26’ 08" N	124° 23’ 02" W	17:31	340	330	18:01	340	330
2024-06-18	SOG35	49° 21’ 26" N	124° 15’ 33" W	07:17	286	278	07:42	290	280
2024-06-18	SOG37	49° 42’ 05" N	124° 35’ 37" W	12:46	236	225	13:09	238	226
2024-06-18	SOG40	49° 46’ 54" N	124° 29’ 10" W	17:37	224	205	18:00	212	203
2024-06-19	SOG41	49° 44’ 19" N	124° 23’ 19" W	07:07	329	319	07:36	328	319
2024-06-19	SOG43	49° 40’ 31" N	124° 17’ 05" W	11:07	357	337	11:37	339	319
2024-06-19	SOG46	49° 28’ 33" N	124° 04’ 43" W	15:58	391	380	16:33	391	380
2024-06-20	SOG48	49° 33’ 48" N	124° 44’ 24" W	07:36	50	40	07:47	49	39
2024-06-20	SOG50	49° 39’ 52" N	124° 47’ 08" W	11:32	102	91	11:46	102	92

Date	Station	Latitude	Longitude	CTD			BONGO		
				Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)	Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)
2024-06-20	SOG54	49° 49’ 32" N	124° 50’ 22" W	15:48	338	328	16:16	338	228
2024-06-21	SOG55	49° 55’ 08" N	124° 52’ 33" W	07:10	117	107	07:24	122	107
2024-06-21	SOG57	49° 51’ 00" N	124° 55’ 29" W	10:49	307	397	11:28	306	296
2024-06-21	SOG61	49° 59’ 05" N	124° 59’ 42" W	17:40	141	131	17:57	140	131
2024-06-22	SOG62	50° 01’ 24" N	124° 57’ 29" W	07:01	125	115	07:16	125	115
2024-06-22	SOG64	50° 00’ 38" N	125° 06’ 11" W	10:47	239	228	11:09	237	228
2024-06-22	SOG67	50° 07’ 01" N	125° 08’ 43" W	15:30	174	163	15:48	175	165
2024-06-23	SOG69	50° 10’ 46" N	124° 59’ 48" W	07:07	538	503	08:07	563	557
2024-06-23	SOG72	50° 18’ 16" N	124° 41’ 18" W	12:02	679	600	12:42	678	250

APPENDIX E CATCH DATA

Table E.1. Weight (kg) and counts of species (or taxa) per station during the ecosystem-based juvenile Pacific Salmon survey from June 11 to 24, 2024 on the CCGS *Sir John Franklin*. Jellyfish weights include all identified pieces but only counted if bells were intact. Counts with blank weights indicate catches too big or small to be weighed accurately.

Station Name	SOG01		SOG02		SOG03		SOG04		SOG05		SOG06		SOG07		SOG08	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)			2.68	5					1.20	2	0.87	1	18.57	14	0.51	1
Chinook Salmon (Juveniles)	2.54	50	3.68	91	1.52	27	0.40	7	2.06	39	0.08	2	0.16	11	0.10	4
Chum Salmon (Adults)																
Chum Salmon (Juveniles)			0.05	2					0.18	13						
Coho Salmon (Adults)			7.90	5					22.60	17			6.13	4		
Coho Salmon (Juveniles)			0.76	16			0.06	1	2.05	47			0.20	16		
Pink Salmon (Adults)																
Pink Salmon (Juveniles)			1.32	76					0.16	15						
Salmonids																
Sockeye Salmon (Juveniles)			0.07	8					0.02	2						
Steelhead Trout																
Bay Pipefish										1						
Codfishes								10								
Flatfishes										1						
Fried Egg Jellyfish							0.04		0.60							
Lingcod																
Lions Mane			0.64	1					0.42	1						
Moon Jellyfish							0.22	1					0.78			
North Pacific Spiny Dogfish			19.18	10									5.43	1	0.14	1
Northern Anchovy													0.01	1		
Opalescent Inshore Squid																
Pacific Herring			2.80	135	0.12	5					0.05	2	4.26	131		
Poachers										1						
River Lamprey			0.02	3									0.02	3		1
Rockfishes																
Soft Sculpin			0.02	2				2		1						
Starry Flounder			0.12	1									0.81	1		
Threespine Stickleback																
Walleye Pollock															1.23	3
Water Jellyfish	0.62		0.40		0.16		0.30		0.34		0.10		0.24			
Wolf Eel																
Yellowtail Rockfish															1.84	2
TOTAL	**3.16**	**50**	**39.64**	**355**	**1.80**	**32**	**1.02**	**21**	**29.63**	**140**	**1.10**	**5**	**36.61**	**182**	**3.82**	**12**

Station Name	SOG09		SOG10		SOG11		SOG12		SOG13		SOG14		SOG15		SOG16	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)	17.68	10			0.48	1										
Chinook Salmon (Juveniles)	0.15	5	0.57	17	5.80	130							0.17	2	0.38	11
Chum Salmon (Adults)					0.62	1										
Chum Salmon (Juveniles)													0.25	13		
Coho Salmon (Adults)					6.36	5	1.40	1			1.06	1	15.14	9		
Coho Salmon (Juveniles)			0.07	4	11.38	276	0.11	3					5.89	95	0.09	3
Pink Salmon (Adults)					0.83	1					1.17	1	6.57	5		
Pink Salmon (Juveniles)					0.12	12							0.39	17		
Salmonids																
Sockeye Salmon (Juveniles)					0.68	51	0.01	1					0.14	9		
Steelhead Trout																
Bay Pipefish																
Codfishes																6
Flatfishes																
Fried Egg Jellyfish							0.97				0.22		0.76			
Lingcod																
Lions Mane																
Moon Jellyfish					0.09	1	0.28	2					0.79	8	0.04	
North Pacific Spiny Dogfish	36.01	19	1.38	1												
Northern Anchovy																
Opalescent Inshore Squid													0.01	1		
Pacific Herring					0.07	2	0.02	1					0.04	1		
Poachers																2
River Lamprey	0.18	28		1	0.04	7										
Rockfishes																
Soft Sculpin								1		1						
Starry Flounder																
Threespine Stickleback																
Walleye Pollock	269.00	856														
Water Jellyfish									0.18		0.23		0.37		0.11	
Wolf Eel															0.03	1
Yellowtail Rockfish																
TOTAL	**323.02**	**918**	**2.02**	**23**	**26.47**	**487**	**2.79**	**9**	**0.18**	**1**	**2.68**	**2**	**30.52**	**160**	**0.65**	**23**

Station Name	SOG17		SOG18		SOG19		SOG20		SOG21		SOG22		SOG23		SOG24	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)	0.59	1			0.64	1			3.82	4						
Chinook Salmon (Juveniles)	0.42	12							1.23	42	0.10	3				
Chum Salmon (Adults)																
Chum Salmon (Juveniles)	0.15	13							0.09	4			1.23	74	0.05	3
Coho Salmon (Adults)	3.92	3							1.37	1						
Coho Salmon (Juveniles)	6.46	170	0.21	4					3.14	86	0.04	1	1.34	34	0.05	1
Pink Salmon (Adults)																
Pink Salmon (Juveniles)	0.14	17							0.08	5			3.03	272	0.42	39
Salmonids																
Sockeye Salmon (Juveniles)	1.92	177	0.03	3					0.74	50			16.50	1,244	0.22	15
Steelhead Trout																
Bay Pipefish																
Codfishes				1		2										
Flatfishes																
Fried Egg Jellyfish			0.15		0.09				1.85							
Lingcod																
Lions Mane									0.29	1	0.42	1				
Moon Jellyfish	0.76	6							6.03	38	0.70	3			0.62	5
North Pacific Spiny Dogfish																
Northern Anchovy																
Opalescent Inshore Squid																
Pacific Herring													3.20	197	0.09	2
Poachers																
River Lamprey	0.02	1							0.01	2						
Rockfishes																
Soft Sculpin														1		
Starry Flounder																
Threespine Stickleback		1														
Walleye Pollock																
Water Jellyfish	0.40		0.01		0.11		0.01				0.07		0.16		2.10	
Wolf Eel																
Yellowtail Rockfish																
TOTAL	**14.78**	**401**	**0.40**	**8**	**0.84**	**3**	**0.01**	**0**	**18.65**	**233**	**1.33**	**8**	**25.46**	**1,822**	**3.55**	**65**

Station Name	SOG25		SOG26		SOG27		SOG28		SOG29		SOG30		SOG31		SOG32	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)							8.12	14	5.63	2						
Chinook Salmon (Juveniles)	0.06	3			0.32	16	0.21	7								
Chum Salmon (Adults)																
Chum Salmon (Juveniles)	2.74	140	0.75	40	0.25	13	5.30	187								
Coho Salmon (Adults)							0.45	1	12.64	8						
Coho Salmon (Juveniles)	0.14	5			0.03	1	0.40	14								
Pink Salmon (Adults)																
Pink Salmon (Juveniles)	2.62	209	0.32	25	0.32	20	1.93	137								
Salmonids									4.36							
Sockeye Salmon (Juveniles)	3.52	255	0.41	28	0.54	30	2.71	171								
Steelhead Trout																
Bay Pipefish																
Codfishes																
Flatfishes																
Fried Egg Jellyfish																
Lingcod																
Lions Mane																
Moon Jellyfish							0.18	1					0.13	1		
North Pacific Spiny Dogfish									623.00	158	20.82	18			0.55	1
Northern Anchovy																
Opalescent Inshore Squid																
Pacific Herring							0.03	2								
Poachers				1				1								
River Lamprey																
Rockfishes																
Soft Sculpin				1				2								
Starry Flounder																
Threespine Stickleback																
Walleye Pollock																
Water Jellyfish	0.63		0.63		0.93		0.46				0.09		0.22			
Wolf Eel																
Yellowtail Rockfish																
TOTAL	**9.71**	**612**	**2.11**	**95**	**2.39**	**80**	**19.79**	**537**	**645.63**	**168**	**20.91**	**18**	**0.35**	**1**	**0.55**	**1**

Station Name	SOG33		SOG34		SOG35		SOG36		SOG37		SOG38		SOG39		SOG40	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)	12.82	17			3.06	5					0.51	1				
Chinook Salmon (Juveniles)		5			0.11	1										
Chum Salmon (Adults)																
Chum Salmon (Juveniles)	3.50	383									0.01	1				
Coho Salmon (Adults)	3.52	2			16.49	11					8.49	5				
Coho Salmon (Juveniles)	5.59	76			0.24	3					0.50	5				
Pink Salmon (Adults)					4.61	4					1.30	1				
Pink Salmon (Juveniles)	17.52	2,452									0.04	7				
Salmonids																
Sockeye Salmon (Juveniles)	0.19	14									0.06	4				
Steelhead Trout	0.66	5														
Bay Pipefish																
Codfishes						1										1
Flatfishes																3
Fried Egg Jellyfish					0.73				0.58		0.28				0.56	2
Lingcod																
Lions Mane	1.44										0.37	1				
Moon Jellyfish					0.37	6	0.03		0.22	1	3.43	23	0.21	1	0.60	5
North Pacific Spiny Dogfish			35.02	22					4.07	1			40.96	51		
Northern Anchovy																
Opalescent Inshore Squid											0.02	2				
Pacific Herring						1										
Poachers																
River Lamprey											0.03	1				
Rockfishes						2						2				1
Soft Sculpin																
Starry Flounder																
Threespine Stickleback																
Walleye Pollock													1.54	3		
Water Jellyfish	0.84				0.63		0.14		0.21		8.88		0.38		1.48	
Wolf Eel																
Yellowtail Rockfish																
TOTAL	**46.08**	**2,954**	**35.02**	**22**	**26.24**	**34**	**0.17**	**0**	**5.08**	**2**	**23.92**	**53**	**43.09**	**55**	**2.64**	**12**

Station Name	SOG41		SOG42		SOG43		SOG44		SOG45		SOG46		SOG47		SOG48	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)	6.71	1									3.53	2			11.93	18
Chinook Salmon (Juveniles)			0.27	7	0.02	1	0.31	8			0.07	2				
Chum Salmon (Adults)																
Chum Salmon (Juveniles)			0.59	42			1.58	104			0.16	13			0.59	58
Coho Salmon (Adults)			4.98	3							40.94	22	2.98	2	29.43	18
Coho Salmon (Juveniles)			3.88	77			2.79	73			0.89	21			0.63	5
Pink Salmon (Adults)																
Pink Salmon (Juveniles)			0.63	62			0.69	65			0.02	2			1.25	149
Salmonids																
Sockeye Salmon (Juveniles)			1.12	78			1.78	141	0.01	1	0.56	39			0.01	1
Steelhead Trout																
Bay Pipefish																
Codfishes				4												
Flatfishes								1						2		2
Fried Egg Jellyfish											0.08				0.75	
Lingcod																
Lions Mane	0.86	1	2.68		1.01	1	3.33	2			0.71	1				
Moon Jellyfish	0.10	1	32.36		0.16	1	6.80		1.06	4	1.30	6	0.62	1	0.31	
North Pacific Spiny Dogfish											3.21	1				
Northern Anchovy																
Opalescent Inshore Squid			2.04	117			0.03	3								1
Pacific Herring																6
Poachers				1				2								1
River Lamprey			0.08	8			0.09	5			0.06	4				
Rockfishes				3				1								8
Soft Sculpin																
Starry Flounder																
Threespine Stickleback																
Walleye Pollock	1.01	2														
Water Jellyfish	0.47		0.55		0.28		3.03		0.39		0.65		0.47		1.93	
Wolf Eel			0.01	1												
Yellowtail Rockfish																
TOTAL	**9.15**	**5**	**49.19**	**403**	**1.47**	**3**	**20.43**	**405**	**1.46**	**5**	**52.18**	**113**	**4.07**	**5**	**46.83**	**267**

Station Name	SOG49		SOG50		SOG51		SOG52		SOG53		SOG54		SOG55		SOG56	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)					2.53	5			1.43	2			6.25	11		
Chinook Salmon (Juveniles)					0.22	2										
Chum Salmon (Adults)									2.37	1						
Chum Salmon (Juveniles)					0.17	19							0.16	16		
Coho Salmon (Adults)					6.65	4			18.13	12			7.55	5		
Coho Salmon (Juveniles)					4.21	48			0.79	8			2.56	30		
Pink Salmon (Adults)					1.80	1										
Pink Salmon (Juveniles)					0.41	72			0.02	2			0.22	28		
Salmonids																
Sockeye Salmon (Juveniles)									0.01	1			0.05	4		
Steelhead Trout																
Bay Pipefish																
Codfishes																
Flatfishes						1								1		
Fried Egg Jellyfish							0.05									
Lingcod																
Lions Mane			0.51	1					3.28	2						
Moon Jellyfish	0.03	1	0.17				0.15		16.08				3.14			
North Pacific Spiny Dogfish			17.03	12	8.84	4					79.84	89				
Northern Anchovy																
Opalescent Inshore Squid						1							0.02	3		
Pacific Herring				1									0.07	69		
Poachers				1												
River Lamprey									0.04	3						
Rockfishes																
Soft Sculpin																
Starry Flounder													0.86			
Threespine Stickleback																
Walleye Pollock																
Water Jellyfish	0.08		0.36		1.84		1.87		16.08				0.50		0.39	
Wolf Eel																
Yellowtail Rockfish																
TOTAL	**0.11**	**1**	**18.07**	**15**	**26.67**	**157**	**2.07**	**0**	**58.23**	**31**	**79.84**	**89**	**21.38**	**167**	**0.39**	**0**

Station Name	SOG57		SOG58		SOG59		SOG60		SOG61		SOG62		SOG63		SOG64	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)	1.80	2			2.60	2	0.98	2			6.57	10				
Chinook Salmon (Juveniles)																
Chum Salmon (Adults)																
Chum Salmon (Juveniles)	1.00	88	0.01	1	0.15	7	0.05	3			3.53	306				
Coho Salmon (Adults)	3.25	2					26.76	16	1.81	1						
Coho Salmon (Juveniles)	0.56	4			1.88	17	0.73	6			4.85	72				
Pink Salmon (Adults)	1.49	1														
Pink Salmon (Juveniles)	2.30	250	0.02	3	0.27	18	0.07	5			5.79	617			0.06	4
Salmonids																
Sockeye Salmon (Juveniles)	0.35	22					0.19	13			1.40	60			0.72	44
Steelhead Trout																
Bay Pipefish																
Codfishes																
Flatfishes																
Fried Egg Jellyfish																
Lingcod											0.66	1				
Lions Mane	0.23	4	0.47		1.82	3	1.14	3			0.26		1.58	1	0.79	1
Moon Jellyfish	0.36	1					0.35		0.04	1	0.47	13	0.26	2		
North Pacific Spiny Dogfish																
Northern Anchovy																
Opalescent Inshore Squid																
Pacific Herring					0.08	17										
Poachers								1								
River Lamprey	0.03	1					0.03	2								
Rockfishes																
Soft Sculpin																
Starry Flounder																
Threespine Stickleback																
Walleye Pollock																
Water Jellyfish	1.14		0.58		4.88		3.08		0.11		2.60		0.60		0.80	
Wolf Eel																
Yellowtail Rockfish																
TOTAL	**12.51**	**375**	**1.08**	**4**	**11.68**	**64**	**33.38**	**51**	**1.96**	**2**	**26.13**	**1,079**	**2.44**	**3**	**2.37**	**49**

Station Name	SOG65		SOG66		SOG67		SOG68		SOG69		SOG70		SOG71		SOG72	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)			1.55	3	3.98	3	8.14	4	9.69	8			4.04	1		
Chinook Salmon (Juveniles)			0.12	1											0.18	6
Chum Salmon (Adults)																
Chum Salmon (Juveniles)	1.68	98	0.02	1	26.02	1,724	0.02	1	11.65	681			15.22	801		
Coho Salmon (Adults)	6.64	5			6.34	4			1.71	1						
Coho Salmon (Juveniles)	0.05	3									0.20	5	0.46	11	0.46	15
Pink Salmon (Adults)					1.36	1										
Pink Salmon (Juveniles)	6.53	467	0.03	1	14.99	1,339	0.02	2	6.46	548	1.33	98	2.52	172	0.03	1
Salmonids																
Sockeye Salmon (Juveniles)	2.06	136			4.36	320	0.22	15	2.01	157	0.48	30	0.57	34	0.76	50
Steelhead Trout																
Bay Pipefish																
Codfishes																
Flatfishes																
Fried Egg Jellyfish																
Lingcod																
Lions Mane	1.56	3														
Moon Jellyfish	0.33	8	0.06	1	0.90	13	0.20	1	0.64	15			1.94	11	0.12	2
North Pacific Spiny Dogfish							11.96	14					10.02	4	8.65	3
Northern Anchovy													348.03	14,656		
Opalescent Inshore Squid					0.13	6				5			0.80	92		
Pacific Herring	0.05	3			0.77	26			0.20	15						
Poachers		3						1		5		1				
River Lamprey																
Rockfishes																
Soft Sculpin																
Starry Flounder																
Threespine Stickleback																
Walleye Pollock													0.24	1		
Water Jellyfish	0.60		0.58		0.26		0.06		2.30		0.27		0.46		0.41	
Wolf Eel																
Yellowtail Rockfish																
TOTAL	**19.50**	**726**	**2.36**	**7**	**59.11**	**3,436**	**20.62**	**38**	**34.66**	**1,435**	**2.28**	**134**	**384.30**	**15,783**	**10.61**	**77**

Station Name	SOG73	
Common Name	Weight	Count
Chinook Salmon (Adults)		
Chinook Salmon (Juveniles)		
Chum Salmon (Adults)		
Chum Salmon (Juveniles)	44.91	1,877
Coho Salmon (Adults)		
Coho Salmon (Juveniles)	1.20	34
Pink Salmon (Adults)		
Pink Salmon (Juveniles)	0.51	51
Salmonids		
Sockeye Salmon (Juveniles)	3.69	223
Steelhead Trout		
Bay Pipefish		
Codfishes		
Flatfishes		
Fried Egg Jellyfish	1.29	
Lingcod		
Lions Mane		
Moon Jellyfish	13.80	480
North Pacific Spiny Dogfish		
Northern Anchovy		
Opalescent Inshore Squid		
Pacific Herring		
Poachers		
River Lamprey		
Rockfishes		
Soft Sculpin		
Starry Flounder		
Threespine Stickleback		
Walleye Pollock		
Water Jellyfish	2.06	
Wolf Eel		
Yellowtail Rockfish		
TOTAL	**67.46**	**2,665**