

Ecosystem-Based Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey in the Strait of Georgia and Associated Waters, British Columbia, September 16 - 30, 2024

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ECOSYSTEM-BASED JUVENILE PACIFIC SALMON (*ONCORHYNCHUS* SPP.) TRAWL
SURVEY IN THE STRAIT OF GEORGIA AND ASSOCIATED WATERS, BRITISH COLUMBIA,
SEPTEMBER 16 - 30, 2024

by

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ABSTRACT

King, J.R., Jung, Y., Tabata, A.M., and Zubkowski, T. 2025. Ecosystem-Based Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey in the Strait of Georgia and Associated Waters, British Columbia, September 16 - 30, 2024. Can. Data Rep. Fish. Aquat. Sci. 1449: vi + 57 p.

Fisheries and Oceans Canada (DFO) conducted an ecosystem-based trawl survey in the Strait of Georgia and associated waters from September 16 to 30, 2024 on the CCGS *Sir John Franklin*. This study targeted juvenile Pacific Salmon (*Oncorhynchus* spp.). In 88 tows, there were 24 species caught in 1,655 kg of catch, with 38% juvenile Pacific Salmon caught by weight (635.89 kg). juvenile Coho Salmon (*Oncorhynchus kisutch*), adult Chum Salmon (*Oncorhynchus keta*), and adult Coho Salmon (*Oncorhynchus kisutch*) were the most abundant catch by weight. There were 3,573 individual lengths and 3,315 individual weights recorded, including all 5 Pacific Salmon species. Juvenile salmon species caught, in decreasing catch weight, were: Coho Salmon, Chinook Salmon, Chum Salmon, Pink Salmon and Sockeye Salmon, 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 on the physical oceanography (37 locations), water samples for chemistry and chlorophyll *a* along with zooplankton samples (38 locations) were returned to the Institute of Ocean Sciences (DFO, Sidney, BC)

RÉSUMÉ

King, J.R., Jung, Y., Tabata, A.M., and Zubkowski, T. 2025. Ecosystem-Based Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey in the Strait of Georgia and Associated Waters, British Columbia, September 16 - 30, 2024. Can. Data Rep. Fish. Aquat. Sci. 1449: vi + 57 p.

Pêches et Océans Canada a mené une étude écosystémique au chalutage pélagique dans le détroit de Georgia et les eaux associées du septembre 16 to 30, 2024 sur le CCGS *Sir John Franklin*. Cette étude ciblait les saumons du Pacifique juvéniles (*Oncorhynchus* spp.). En 88 traits, il y avait 24 espèces échantillonnées dans 1,655 kg de prises, avec 38% de juvénile saumon du Pacifique capturé en poids (635.89 kg). juvénile Coho Salmon (*Oncorhynchus kisutch*), adult Chum Salmon (*Oncorhynchus keta*), et adult Coho Salmon (*Oncorhynchus kisutch*) étaient les espèces les plus abondantes en poids. On a enregistré 3,573 longueurs individuelles et 3,315 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 suivantes: saumon coho juvéniles, saumon quinnat juvéniles, saumon keta juvéniles, saumon rose juvéniles et saumon rouge juvéniles, 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 sur l'océanographie physique (37 sites), échantillons d'eau pour la chimie et la chlorophylle *a* et la composition du zooplancton (38 sites) 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 September 16 to 30, 2024 on the CCGS *Sir John Franklin* in the Strait of Georgia, Desolation Sound, Discovery Passage, Johnstone Strait and Queen Charlotte Strait 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, Desolation Sound, Discovery Passage, Johnstone Strait and Queen Charlotte Strait,
2. the associated physical oceanography, and
3. the distribution and biomass of prey species, including zooplankton.

Since the mid-1990s, similar surface and 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, Discovery Passage, Johnstone Strait and Queen Charlotte Strait. 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 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 September 16 to 30, 2024.

2 METHODS

2.1 SURVEY LOCATIONS

Fishing, oceanographic, and zooplankton sampling occurred in the Strait of Georgia, Desolation Sound, Discovery Passage, Johnstone Strait and Queen Charlotte Strait in Southern BC waters (Figures 1 and 2). Fishing locations in the Strait of Georgia 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 to cover missing areas in the Strait of Georgia and in Desolation Sound, Discovery Passage, Johnstone Strait, and Queen Charlotte Strait 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 m² (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 m² 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. Net mensuration data from the Scanmar trawl sensors and RBR data loggers were recorded 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 vertical mouth opening of each tow. When calculating swept volume (km³) as effort for catch per unit effort estimates, tow depth-specific averages were used for any tows with missing mensuration data.

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, except for Coho Salmon whose length threshold as juveniles was < 380 mm and Chinook Salmon was < 340 mm. 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 chl 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°C. 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 89 trawl net tows in the Strait of Georgia, Desolation Sound, Discovery Passage, Johnstone Strait and Queen Charlotte Strait with 88 trawls completed successfully and 1 unusable tow in which was aborted due to whales detected in the area (Figure 1 and Appendix Table C.1). There were 68 tows initiated in the area of the historical Strait of Georgia standard survey trackline, and 21 tows in the other areas of Desolation Sound, Discovery Passage, Johnstone Strait, and Queen Charlotte Strait. Tows in the Strait of Georgia 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 Strait of Georgia 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 8.4 km/hr (4.5 knots), and varied between 5.4 to 10.9 km/hr (2.9 - 5.9 knots) speed over ground, depending on the wind, tide, and current. Warp length ranged from 180 m to 390 m (Appendix Table C.1). The average height and width for surface tows was 15 m and 49 m respectively; 10 m and 55 m for 15 m target depth tows; 10 m and 59 m for 30 m target depth tows; 10 m and 75 m for 45 m target depth tows; 10 m and 60 m for 60 m target depth tows. A RBR unit malfunctioned from September 20, 2024 through September 23, 2024 resulting in missing data for median headrope depth (m) and median temperature (°C) at the headrope for Tows 21-50 (Appendix Table C.1).

CTD casts and water samples were completed at 36 sites (Figure 2) with cast depths ranging from 39 m to 697 m (Appendix Table D.1). Two CTD casts had equipment failures resulting in 36 successful casts. Samples were collected for nutrients and chl a 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 2024-027.

3.2 ZOOPLANKTON

Bongo tows were conducted at 37 stations (Figure 2) to depths ranging from 42 m to 511 m (Appendix Table D.1). 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 1,655 kg, of which 635.89 kg (38%) 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 juvenile Coho Salmon (456.23 kg), caught in 80% of the tows, adult Chum Salmon (381.94 kg), caught in 34% of the tows, and adult Coho Salmon (171.74 kg) in 42% of the tows (Table 1). The three most numerous species by count of individuals were Pacific Herring, juvenile Coho Salmon and juvenile Pink Salmon.

Juvenile Pacific Salmon were caught throughout the survey region. The order of abundance, by weight, was: Coho Salmon, Chinook Salmon, Chum Salmon, Pink Salmon and Sockeye Salmon. Fishing occurred at target headline depths of 0-60 m, however 95% 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/km³) of juvenile salmon is shown in Figure 3. Juvenile Coho Salmon were the most abundant salmon species by weight and second most abundant by count (Wt. = 456.23 kg; N = 1,497) and caught throughout the whole survey area. Chinook Salmon were the second most abundant juvenile salmon species by weight (Wt. = 65.14 kg; N=493). They were caught throughout the survey area, with a few larger catches in the southern strait. Juvenile Chum Salmon and Pink Salmon were somewhat less abundant by weight (57.16 kg and 56.78 kg, respectively); however, both species were more abundant by count (N=573 and 994, respectively) than Chinook Salmon. Both species were caught throughout the survey area, with larger catches in the northern partitions. Juvenile Sockeye Salmon were the least abundant salmon species found by weight and count (Wt. = 0.58 kg; N = 13) and were primarily caught in northern areas. 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/km³) of other, non-salmonid, frequently caught species is shown in Figure 4.

3.4 BIOLOGICAL SAMPLES

Samples were collected for DNA stock composition (1,673), otoliths (1,072), energy density (568), and coded wire tags (101). 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 19 species were recorded (Table 2). Coho Salmon had the largest maximum length (372 mm) and weight (720 g) of all juvenile salmon species, whereas Sockeye Salmon had the smallest mean length (197 mm) and weight (75 g). Length frequencies and length-weight relationships are presented for Pacific Salmon species in Figures 5 to 9 and double log transformed length-weight regression coefficients were estimated. A larger regression 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 1,129 individual fish, from 12 species groups, were analysed at sea (Table 3). Juvenile Pacific Salmon species had between 0 and 17% empty stomachs, with juvenile Sockeye Salmon having the lowest percentage and juvenile Coho Salmon having the highest percentage (Table 3). The frequency of observation and average volume of identified prey is shown in Table 4. Amphipods were the most frequently observed prey in the stomachs of juvenile Chinook Salmon, but Pacific Herring (*Clupea pallasii*) were prey items that were the highest mean volume. Euphausiids were the next most frequently observed prey item. 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. Amphipods was the second frequently observed prey item in Chum Salmon stomachs. Amphipods were very frequently consumed by juvenile Coho Salmon, Pink Salmon, and Sockeye Salmon, found in at least 80% of the stomachs examined.

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, Desolation Sound, Discovery Passage, Johnstone Strait and Queen Charlotte Strait. 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*, September 16 to 30, 2024. Blank weights indicate specimens which could not be weighed accurately (either released alive or too small). Juvenile and adult Pacific Salmon are presented as separate species' groups.

Common Name	Scientific Name	Tows	Count	Weight	Max	Mean
Coho Salmon (Juveniles)	<i>Oncorhynchus kisutch</i>	70	1,497	456.23	80.72	7
Chum Salmon (Adults)	<i>Oncorhynchus keta</i>	30	99	381.94	137.10	13
Coho Salmon (Adults)	<i>Oncorhynchus kisutch</i>	37	73	171.74	31.10	5
Pacific Herring	<i>Clupea pallasii</i>	8	18,840	134.68	63.99	17
Lions Mane	<i>Cyanea capillata</i>	24	24	98.69	24.10	4
North Pacific Spiny Dogfish	<i>Squalus suckleyi</i>	7	25	86.38	34.33	12
Chinook Salmon (Adults)	<i>Oncorhynchus tshawytscha</i>	17	31	84.70	18.18	5
Chinook Salmon (Juveniles)	<i>Oncorhynchus tshawytscha</i>	43	493	65.14	24.89	2
Chum Salmon (Juveniles)	<i>Oncorhynchus keta</i>	28	573	57.16	15.27	2
Pink Salmon (Juveniles)	<i>Oncorhynchus gorbuscha</i>	32	994	56.78	18.71	2
Moon Jellyfish	<i>Aurelia labiata</i>	32	81	42.41	23.65	1
Fried Egg Jellyfish	<i>Phacellophora camtschatica</i>	13	6	10.83	2.08	1
Yellowtail Rockfish	<i>Sebastes flavidus</i>	1	1	2.48	2.48	2
Sockeye Salmon (Adults)	<i>Oncorhynchus nerka</i>	2	2	2.37	1.71	1
Jellyfish	<i>Medusozoa</i>	6	3	0.93	0.29	0
Sockeye Salmon (Juveniles)	<i>Oncorhynchus nerka</i>	9	13	0.58	0.20	0
Pacific Hake	<i>Merluccius productus</i>	2	2	0.53	0.46	0
River Lamprey	<i>Lampetra ayresii</i>	8	14	0.48	0.21	0
Walleye Pollock	<i>Gadus chalcogrammus</i>	1	1	0.34	0.34	0
Opalescent Inshore Squid	<i>Doryteuthis opalescens</i>	13	136	0.33	0.22	0
Wolf Eel	<i>Anarrhichthys ocellatus</i>	4	4	0.07	0.03	0
Water Jellyfish	<i>Aequorea</i>	4	1	0.05	0.02	0
Northern Anchovy	<i>Engraulis mordax</i>	1	1	0.02	0.02	0
Bay Pipefish	<i>Syngnathus leptorhynchus</i>	6	7			

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*, September 16 to 30, 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. Juvenile and adult Pacific Salmon are presented as separate species' groups.

Common Name	Tows	Length (mm)					Weight (g)			
		Type	Lengths	Min	Max	Mean	Weights	Min	Max	Mean
Coho Salmon (Juveniles)	70	FL	1,204	192	372	286	1,203	76	720	304
Pink Salmon (Juveniles)	32	FL	702	138	229	178	700	26	126	57
Chum Salmon (Juveniles)	28	FL	483	159	270	210	482	34	231	100
Chinook Salmon (Juveniles)	43	FL	430	115	337	205	430	18	504	129
Pacific Herring	8	SL	236	67	191	89	236	3	88	9
Opalescent Inshore Squid	3	ML	116	21	59	38				
Moon Jellyfish	29	BD	104	30	297	118				
Chum Salmon (Adults)	30	FL	99	408	802	673	98	852	6,690	3,808
Coho Salmon (Adults)	37	FL	73	342	709	564	73	634	4,902	2,329
Chinook Salmon (Adults)	17	FL	31	411	985	553	31	836	12,340	2,718
North Pacific Spiny Dogfish	7	TL	25	237	1,110	808	25	44	6,260	3,447
Lions Mane	18	BD	23	316	660	486				
River Lamprey	8	TL	14	204	291	261	14	18	52	35
Sockeye Salmon (Juveniles)	9	FL	13	121	197	161	12	16	75	45
Fried Egg Jellyfish	5	BD	5	270	406	332				
Wolf Eel	4	TL	4	298	418	344	4	6	36	16
Bay Pipefish	3	TL	3	103	137	115				
Pacific Hake	2	FL	2	247	408	328	2	75	484	280
Sockeye Salmon (Adults)	2	FL	2	390	552	471	2	676	1,678	1,177
Northern Anchovy	1	SL	1	79	79	79	1	5	5	5
Tube Snout	1	TL	1	97	97	97				
Walleye Pollock	1	FL	1	357	357	357	1	344	344	344
Widow Rockfish	1	FL	1	551	551	551	1	2,484	2,484	2,484

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*, September 16 to 30, 2024. Juvenile and adult Pacific Salmon are presented as separate species' groups.

Species	Tows	Stomachs	Empty	Percent Empty
Coho Salmon (Juveniles)	70	430	71	17
Pink Salmon (Juveniles)	32	207	21	10
Chinook Salmon (Juveniles)	43	148	16	11
Chum Salmon (Juveniles)	28	147	4	3
Chum Salmon (Adults)	28	71	38	54
Coho Salmon (Adults)	33	63	23	37
Chinook Salmon (Adults)	14	21	12	57
Pacific Herring	4	14	6	43
Sockeye Salmon (Juveniles)	9	13	0	0
North Pacific Spiny Dogfish	1	7	6	86
Sockeye Salmon (Adults)	2	2	1	50
Pacific Hake	2	2	2	100
Northern Anchovy	1	1	1	100
Walleye Pollock	1	1	1	100
Wolf Eel	1	1	0	0
Widow Rockfish	1	1	1	100

Table 4. Prey items (Prey) identified in the stomach contents of predator species (Species; Juvenile and adult Pacific Salmon are presented as separate species' groups) sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, September 16 to 30, 2024. Frequency of occurrence (FO) is the proportion of non-empty stomachs containing that prey item and volume is the mean volume in cm³.

Species	Prey	FO	Volume
Chinook Salmon (Adults)	Pacific Herring	0.67	44.42
Chinook Salmon (Adults)	Euphausiids	0.33	0.50
Chinook Salmon (Adults)	Squid	0.11	0.30
Chinook Salmon (Adults)	Amphipods	0.11	0.01
Chinook Salmon (Juveniles)	Amphipods	0.61	0.52
Chinook Salmon (Juveniles)	Euphausiids	0.37	1.12
Chinook Salmon (Juveniles)	Pacific Herring	0.19	5.46
Chinook Salmon (Juveniles)	Unidentified Fishes	0.14	0.47
Chinook Salmon (Juveniles)	Crabs	0.13	0.04
Chinook Salmon (Juveniles)	Pteropods	0.04	0.12
Chinook Salmon (Juveniles)	Insects	0.04	0.01
Chinook Salmon (Juveniles)	Squid	0.03	1.10
Chinook Salmon (Juveniles)	Unidentified Remains	0.03	0.10
Chinook Salmon (Juveniles)	Invertebrates	0.02	0.14
Chinook Salmon (Juveniles)	Bay Pipefish	0.02	0.10
Chinook Salmon (Juveniles)	Poachers	0.02	0.10
Chinook Salmon (Juveniles)	Jellyfish	0.02	0.07
Chinook Salmon (Juveniles)	Polychaete Worms	0.02	0.04
Chinook Salmon (Juveniles)	Octopus	0.02	0.01
Chinook Salmon (Juveniles)	Rockfishes	0.01	0.30
Chinook Salmon (Juveniles)	Copepods	0.01	0.10
Chum Salmon (Adults)	Comb Jellyfish	0.48	1.06
Chum Salmon (Adults)	Unidentified Remains	0.45	1.17
Chum Salmon (Adults)	Euphausiids	0.12	1.55
Chum Salmon (Adults)	Jellyfish	0.12	1.38
Chum Salmon (Adults)	Amphipods	0.12	0.11
Chum Salmon (Adults)	Polychaete Worms	0.09	3.30
Chum Salmon (Adults)	Pacific Herring	0.03	14.00
Chum Salmon (Adults)	Unidentified Fishes	0.03	0.10
Chum Salmon (Juveniles)	Unidentified Remains	0.83	0.63
Chum Salmon (Juveniles)	Amphipods	0.58	0.56
Chum Salmon (Juveniles)	Comb Jellyfish	0.20	0.16
Chum Salmon (Juveniles)	Euphausiids	0.14	0.86
Chum Salmon (Juveniles)	Jellyfish	0.08	0.21
Chum Salmon (Juveniles)	Stones Or Pebbles	0.01	0.10
Chum Salmon (Juveniles)	Polychaete Worms	0.01	0.01
Chum Salmon (Juveniles)	Pteropods	0.01	0.01
Chum Salmon (Juveniles)	Arrow Worms	0.01	0.01
Chum Salmon (Juveniles)	Copepods	0.01	0.01
Chum Salmon (Juveniles)	Mysids	0.01	0.01
Chum Salmon (Juveniles)	Unidentified Fishes	0.01	0.01
Coho Salmon (Adults)	Euphausiids	0.68	4.41
Coho Salmon (Adults)	Amphipods	0.50	0.19
Coho Salmon (Adults)	Pacific Herring	0.20	33.67
Coho Salmon (Adults)	Unidentified Fishes	0.12	2.55

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Species	Prey	FO	Volume
Coho Salmon (Adults)	Unidentified Remains	0.07	0.24
Coho Salmon (Adults)	Arrow Worms	0.03	0.01
Coho Salmon (Adults)	Crabs	0.03	0.01
Coho Salmon (Juveniles)	Amphipods	0.80	1.10
Coho Salmon (Juveniles)	Euphausiids	0.38	2.52
Coho Salmon (Juveniles)	Unidentified Fishes	0.08	0.52
Coho Salmon (Juveniles)	Pacific Herring	0.05	6.20
Coho Salmon (Juveniles)	Invertebrates	0.04	0.21
Coho Salmon (Juveniles)	Pteropods	0.02	0.30
Coho Salmon (Juveniles)	Crabs	0.02	0.26
Coho Salmon (Juveniles)	Crustaceans	0.01	1.70
Coho Salmon (Juveniles)	Copepods	0.01	0.30
Coho Salmon (Juveniles)	Jellyfish	0.01	0.20
Coho Salmon (Juveniles)	Unidentified Remains	0.01	0.11
Coho Salmon (Juveniles)	Flatfishes	0.01	0.10
Coho Salmon (Juveniles)	Insects	0.01	0.06
Coho Salmon (Juveniles)	Pandalid Shrimp	0.00	2.00
Coho Salmon (Juveniles)	Comb Jellyfish	0.00	0.40
Coho Salmon (Juveniles)	Squid	0.00	0.30
Coho Salmon (Juveniles)	Bay Pipefish	0.00	0.10
Coho Salmon (Juveniles)	Polychaete Worms	0.00	0.01
Coho Salmon (Juveniles)	Skeleton Shrimp	0.00	0.01
North Pacific Spiny Dogfish	Unidentified Fishes	1.00	220.00
Pacific Herring	Euphausiids	0.62	0.60
Pacific Herring	Amphipods	0.38	0.53
Pacific Herring	Copepods	0.12	0.01
Pacific Herring	Unidentified Remains	0.12	0.01
Pink Salmon (Juveniles)	Amphipods	0.83	0.72
Pink Salmon (Juveniles)	Euphausiids	0.27	0.32
Pink Salmon (Juveniles)	Copepods	0.12	0.10
Pink Salmon (Juveniles)	Unidentified Remains	0.09	0.49
Pink Salmon (Juveniles)	Unidentified Fishes	0.03	0.22
Pink Salmon (Juveniles)	Pteropods	0.03	0.11
Pink Salmon (Juveniles)	Insects	0.02	0.07
Pink Salmon (Juveniles)	Squid	0.01	0.15
Pink Salmon (Juveniles)	Crabs	0.01	0.15
Pink Salmon (Juveniles)	Pandalid Shrimp	0.01	0.10
Pink Salmon (Juveniles)	Polychaete Worms	0.01	0.01
Pink Salmon (Juveniles)	Skeleton Shrimp	0.01	0.01
Sockeye Salmon (Adults)	Invertebrates	1.00	0.40
Sockeye Salmon (Adults)	Amphipods	1.00	0.20
Sockeye Salmon (Adults)	Jellyfish	1.00	0.10
Sockeye Salmon (Juveniles)	Amphipods	1.00	0.56
Sockeye Salmon (Juveniles)	Euphausiids	0.08	0.10
Sockeye Salmon (Juveniles)	Squid	0.08	0.01
Wolf Eel	Unidentified Fishes	1.00	0.01

8 FIGURES

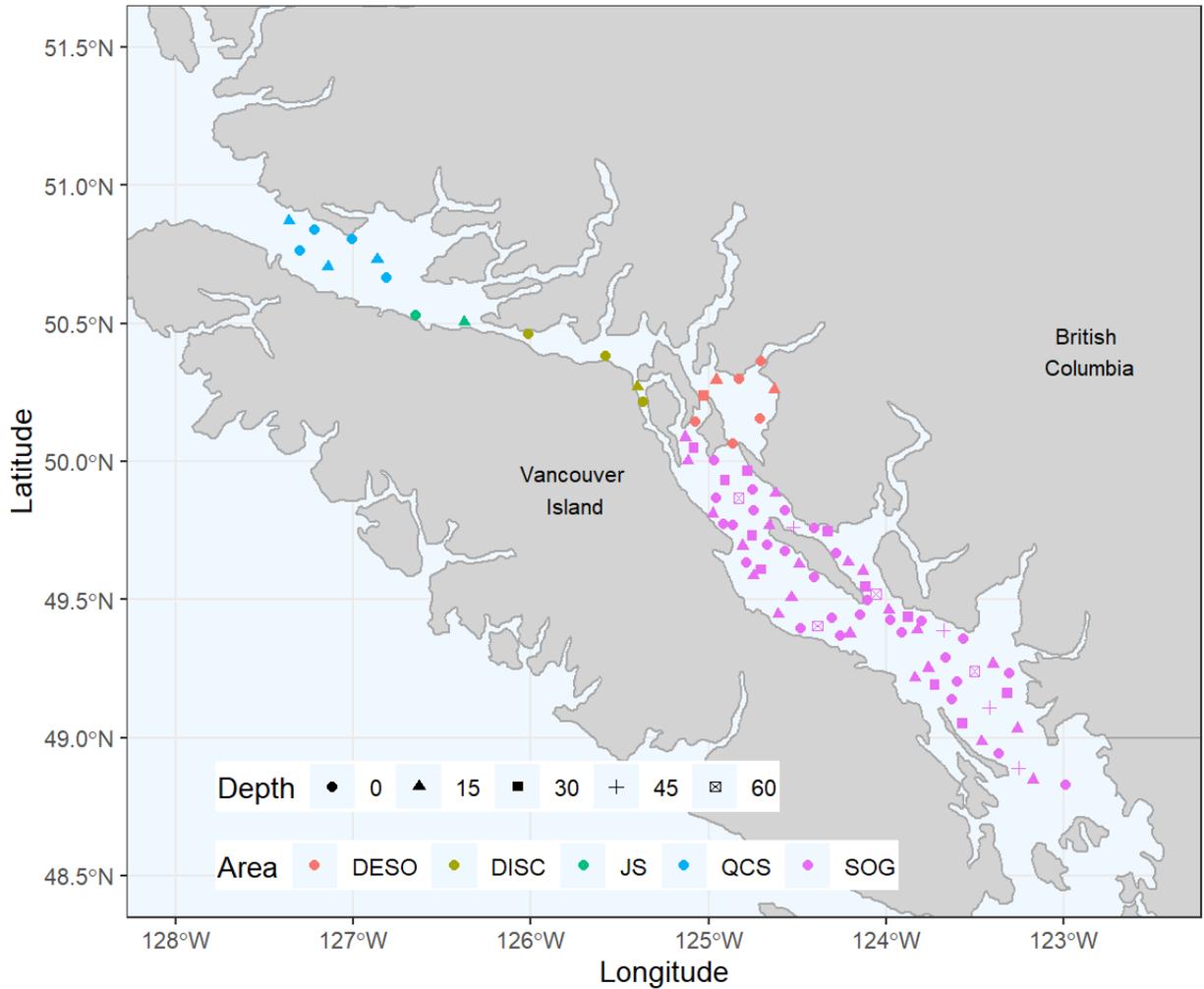


Figure 1. Location and target headrope depths of survey midwater trawl fishing events during the ecosystem-based juvenile Pacific Salmon survey from September 16 to 30, 2024 on the CCGS *Sir John Franklin*. Target headrope depth (m) is indicated by the marker symbol. Color of marker indicates the area of the fishing event (DESO = Desolation Sound, DISC = Discovery Passage, JS = Johnstone Strait, QCS = Queen Charlotte Strait, and SOG = Strait of Georgia).

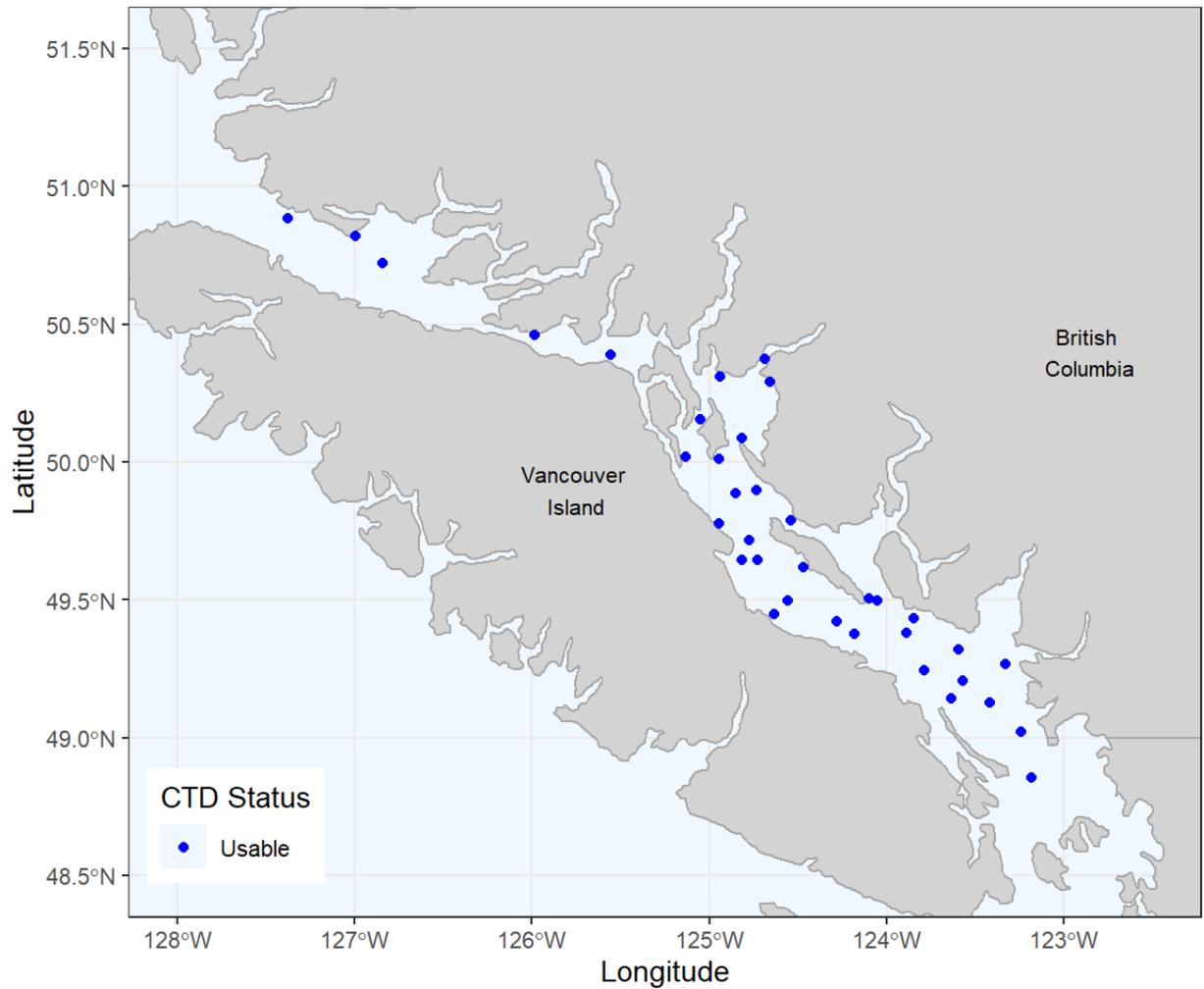


Figure 2. Location of survey oceanography events (CTD and plankton Bongos) during the ecosystem-based juvenile Pacific Salmon survey from September 16 to 30, 2024 on the CCGS *Sir John Franklin*. All events were usable.

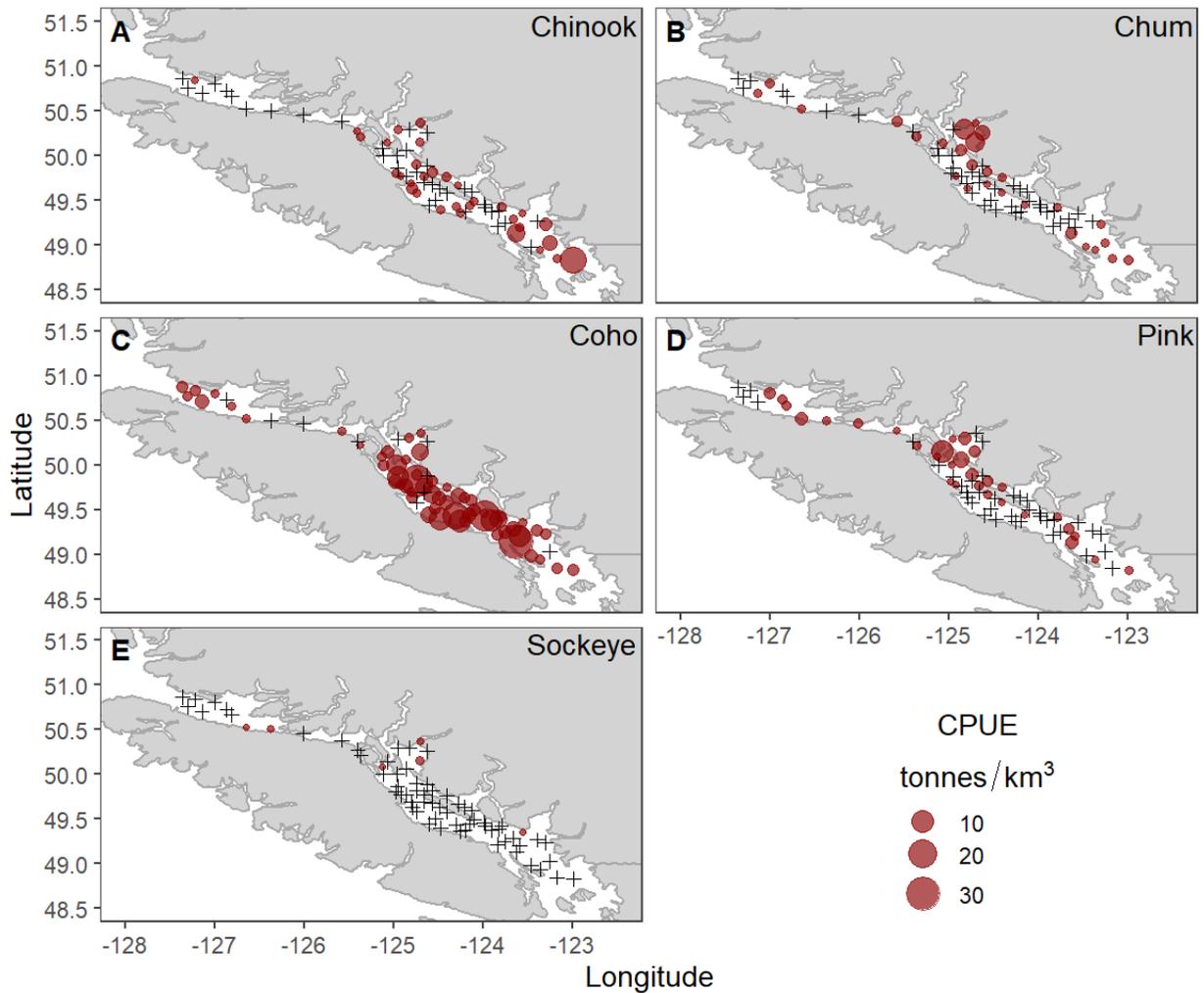


Figure 3. Juvenile Pacific Salmon (*Oncorhynchus spp.*) catch per unit effort (CPUE; tonnes/km³) for each tow targeting 0 or 15 m headrope depths. (A) Chinook Salmon (*Oncorhynchus tshawytscha*), (B) Chum Salmon (*Oncorhynchus keta*), (C) Coho Salmon (*Oncorhynchus kisutch*), (D) Pink Salmon (*Oncorhynchus gorbuscha*), and (E) Sockeye Salmon (*Oncorhynchus nerka*). Circles are proportional to catch abundance, and zero catches are shown with a cross (+).

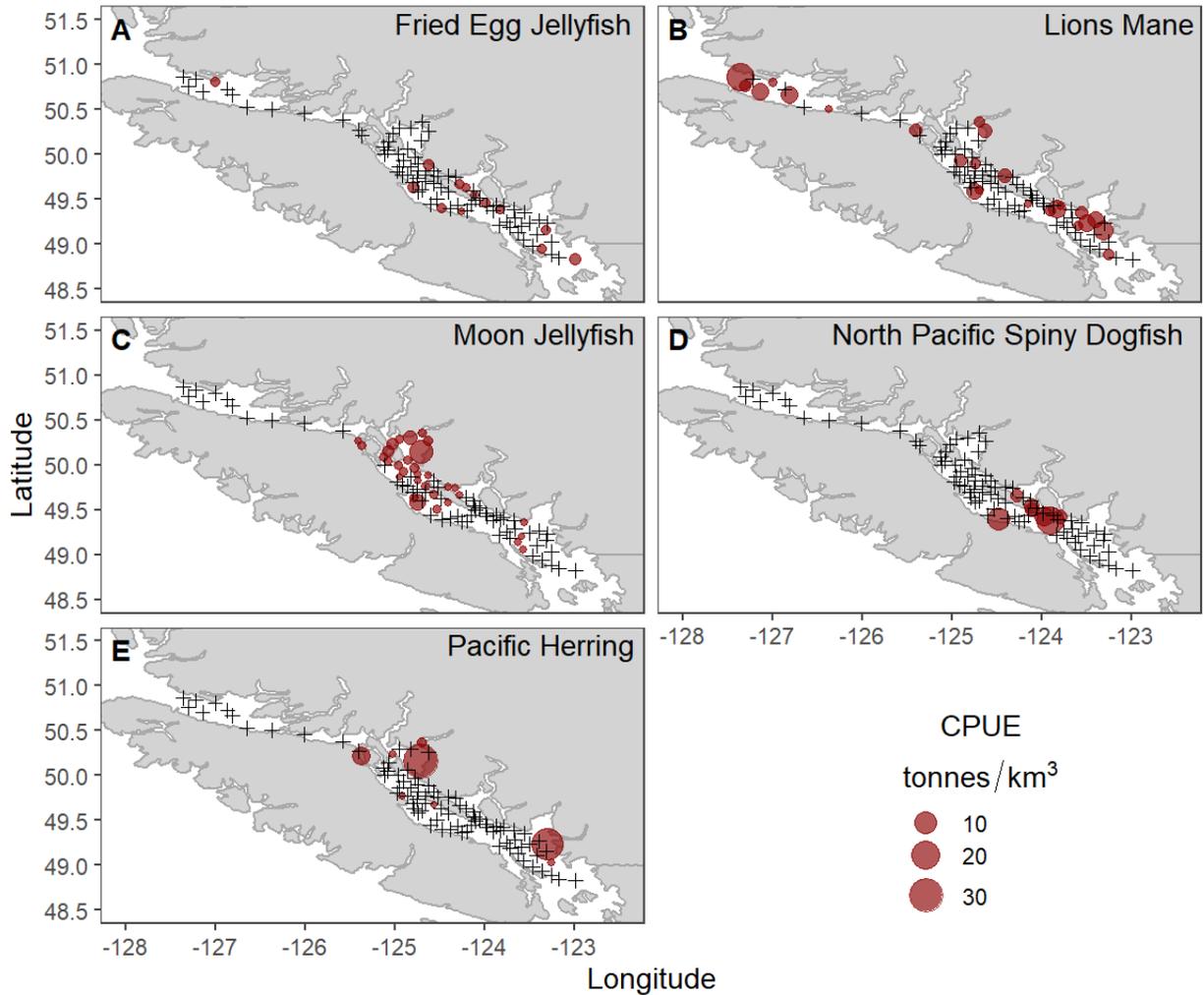


Figure 4. Catch per unit effort (CPUE; tonnes/km³) by all tows for commonly caught species during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, September 16 to 30, 2024. Circles are proportional to catch abundance, and zero catches are shown with a cross (+). (A) Fried Egg Jellyfish (*Phacellophora camtschatica*), (B) Lions Mane (*Cyanea capillata*), (C) Moon Jellyfish (*Aurelia labiata*), (D) North Pacific Spiny Dogfish (*Squalus suckleyi*), (E) Pacific Herring (*Clupea pallasii*).

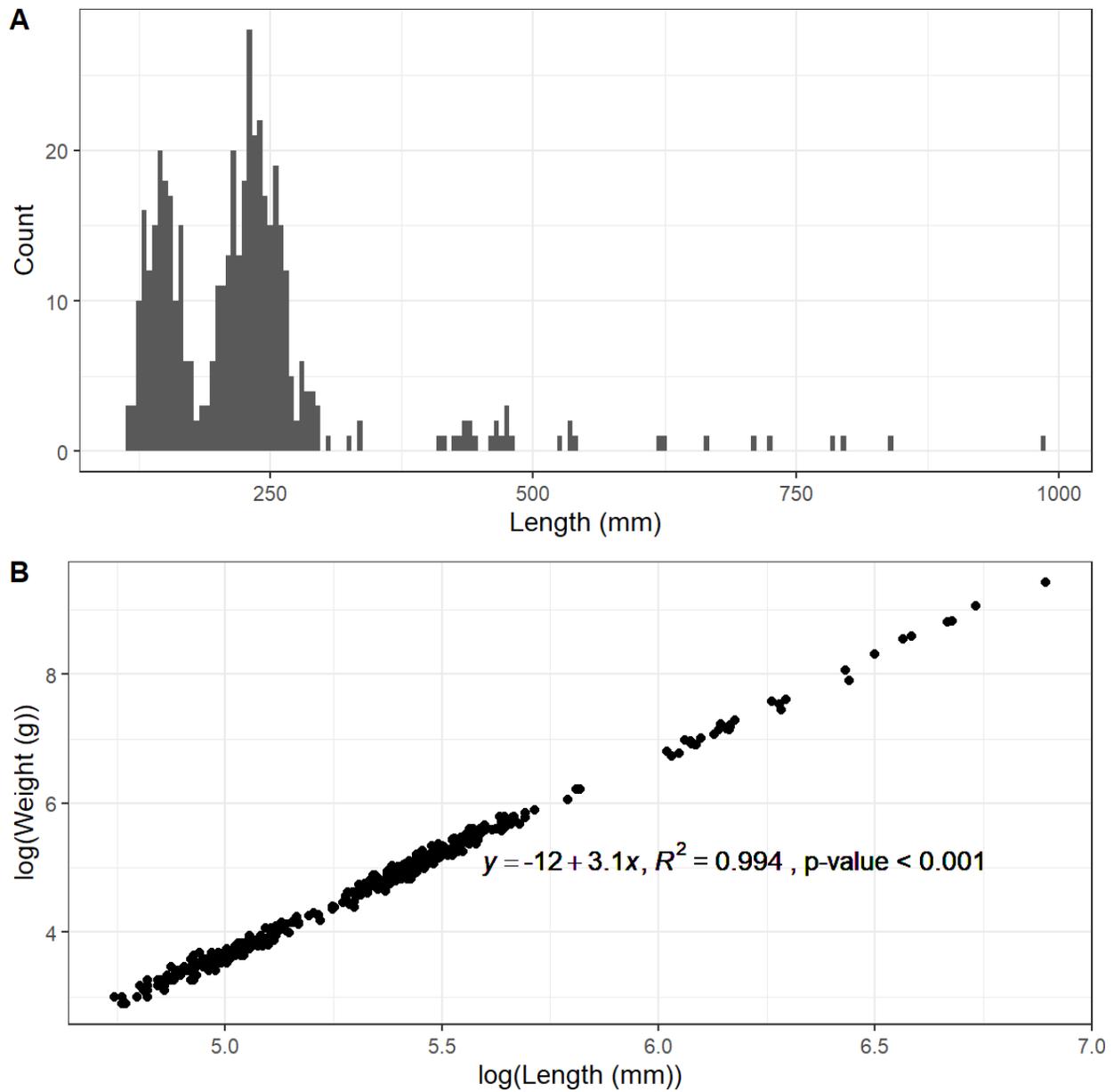


Figure 5. Chinook Salmon (*Oncorhynchus tshawytscha*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, September 16 to 30, 2024 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

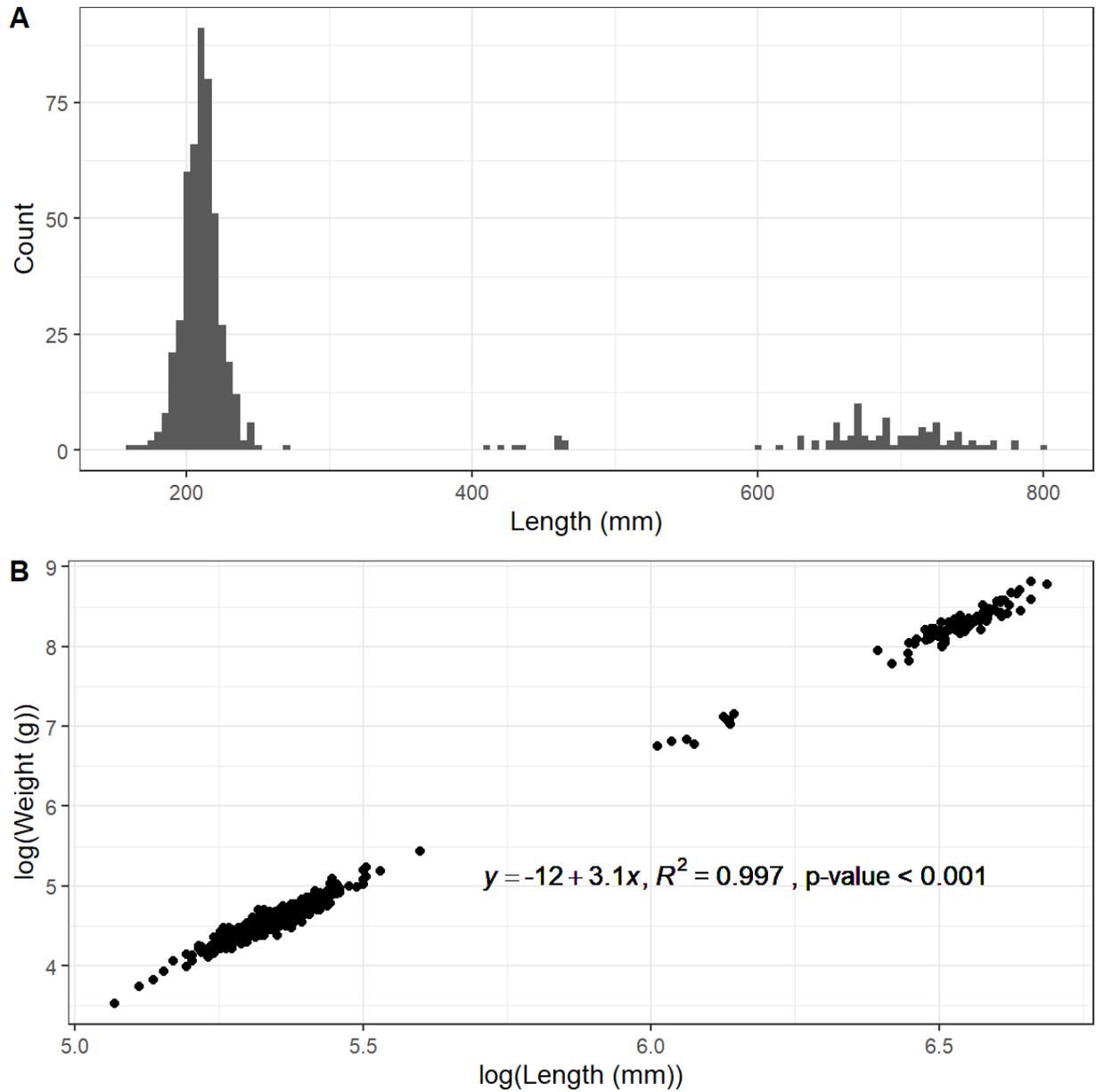


Figure 6. Chum Salmon (*Oncorhynchus keta*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, September 16 to 30, 2024 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

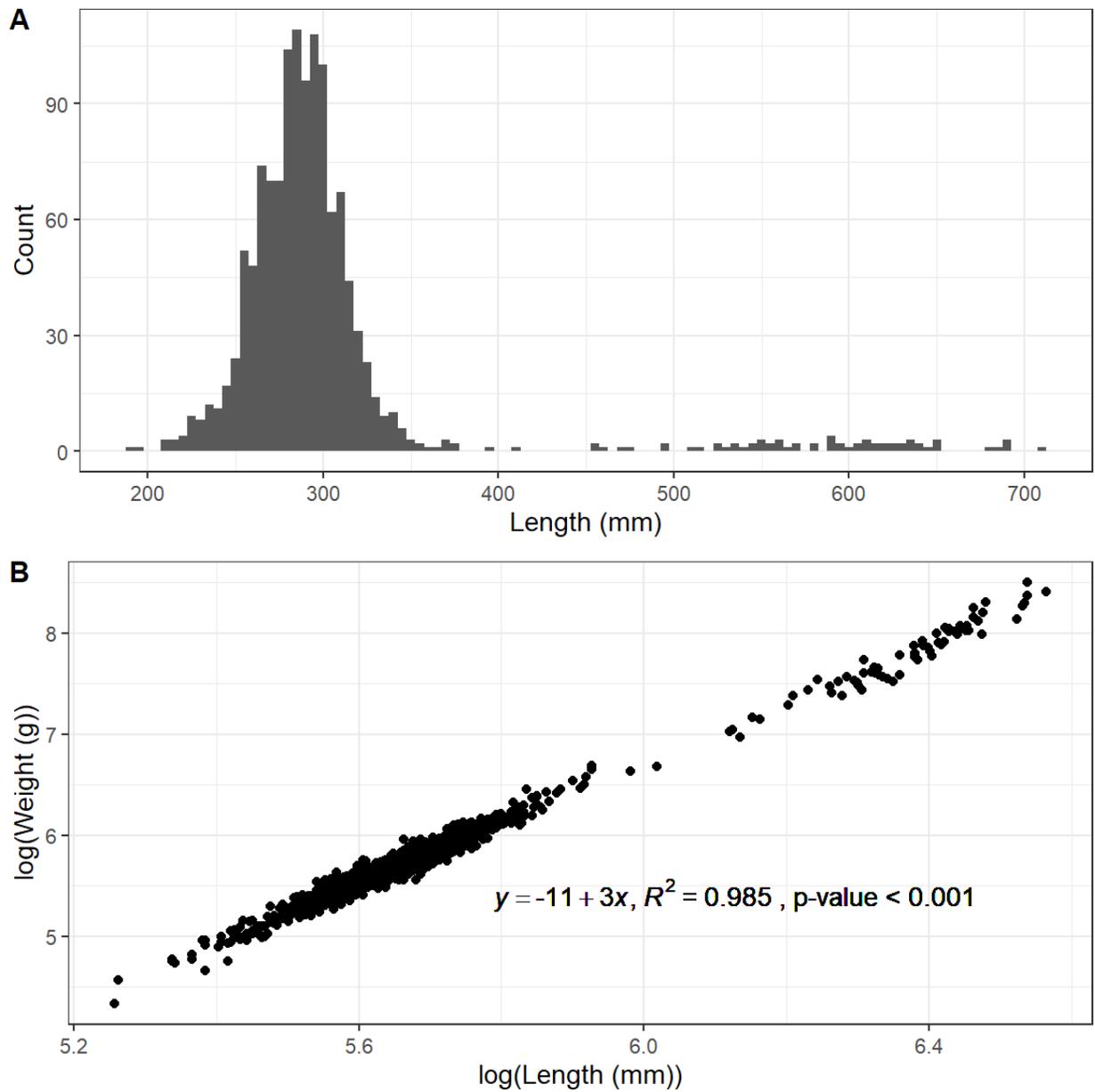


Figure 7. Coho Salmon (*Oncorhynchus kisutch*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, September 16 to 30, 2024 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

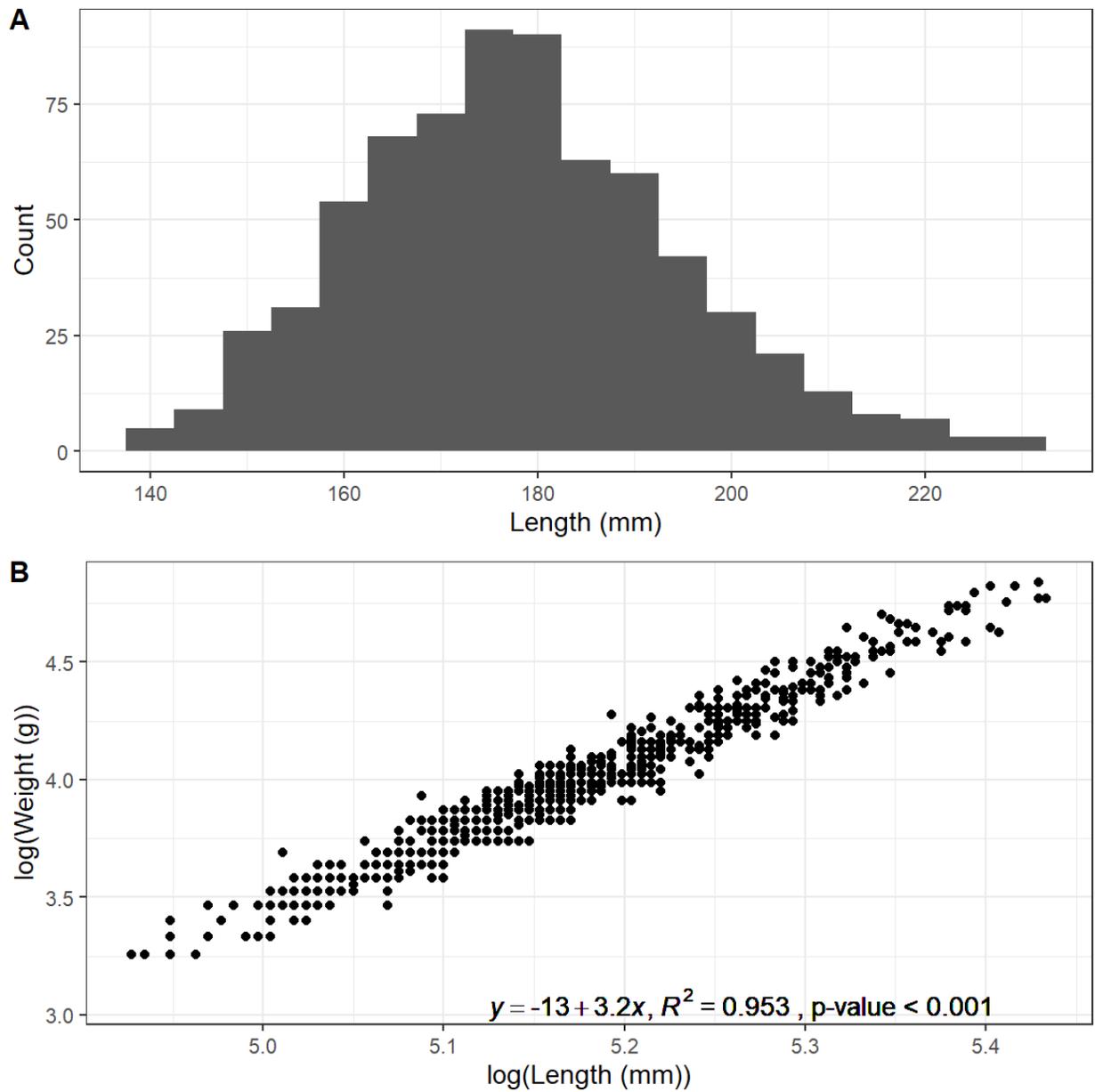


Figure 8. Pink Salmon (*Oncorhynchus gorbusha*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, September 16 to 30, 2024 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

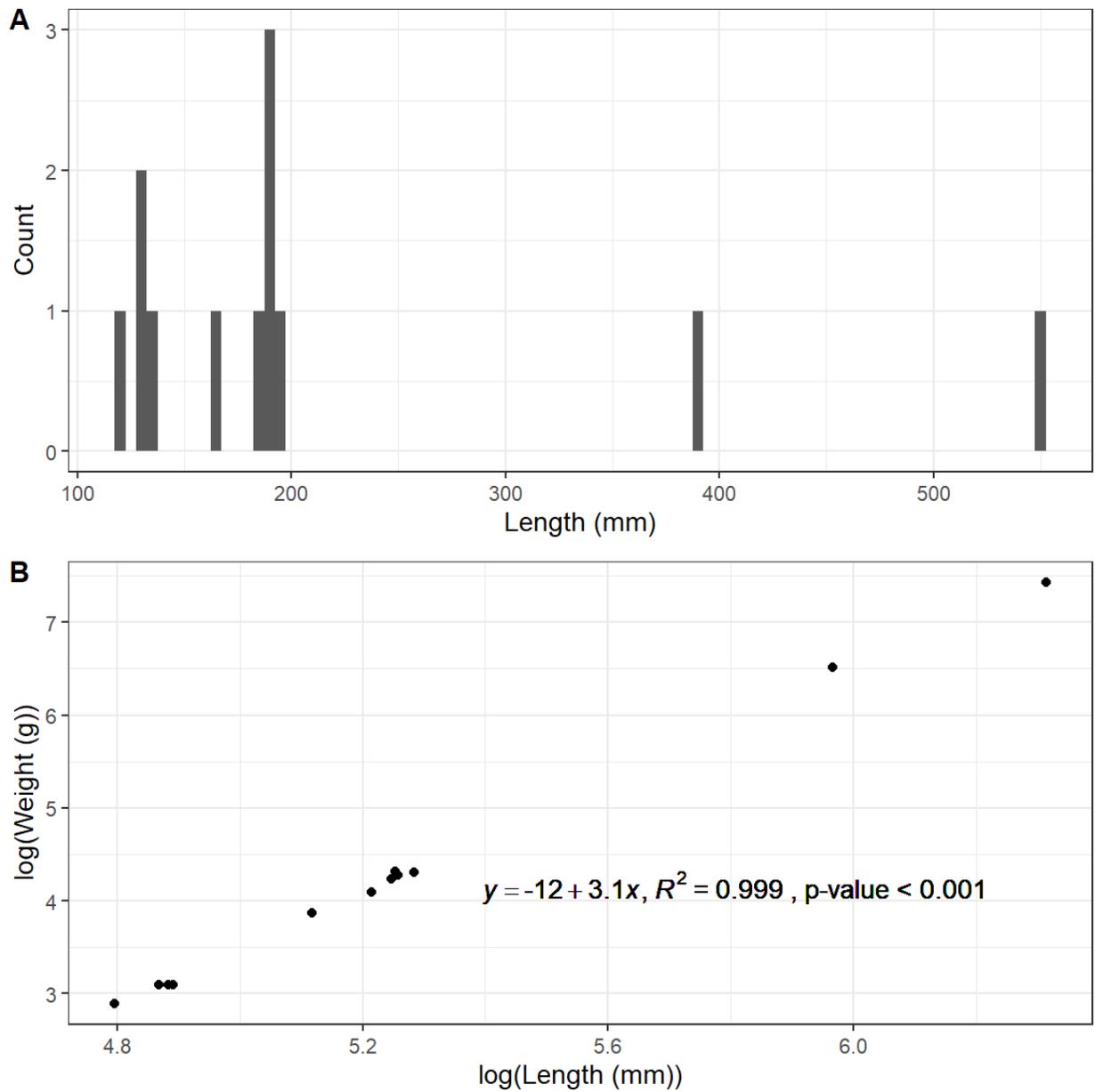


Figure 9. Sockeye Salmon (*Oncorhynchus nerka*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, September 16 to 30, 2024 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

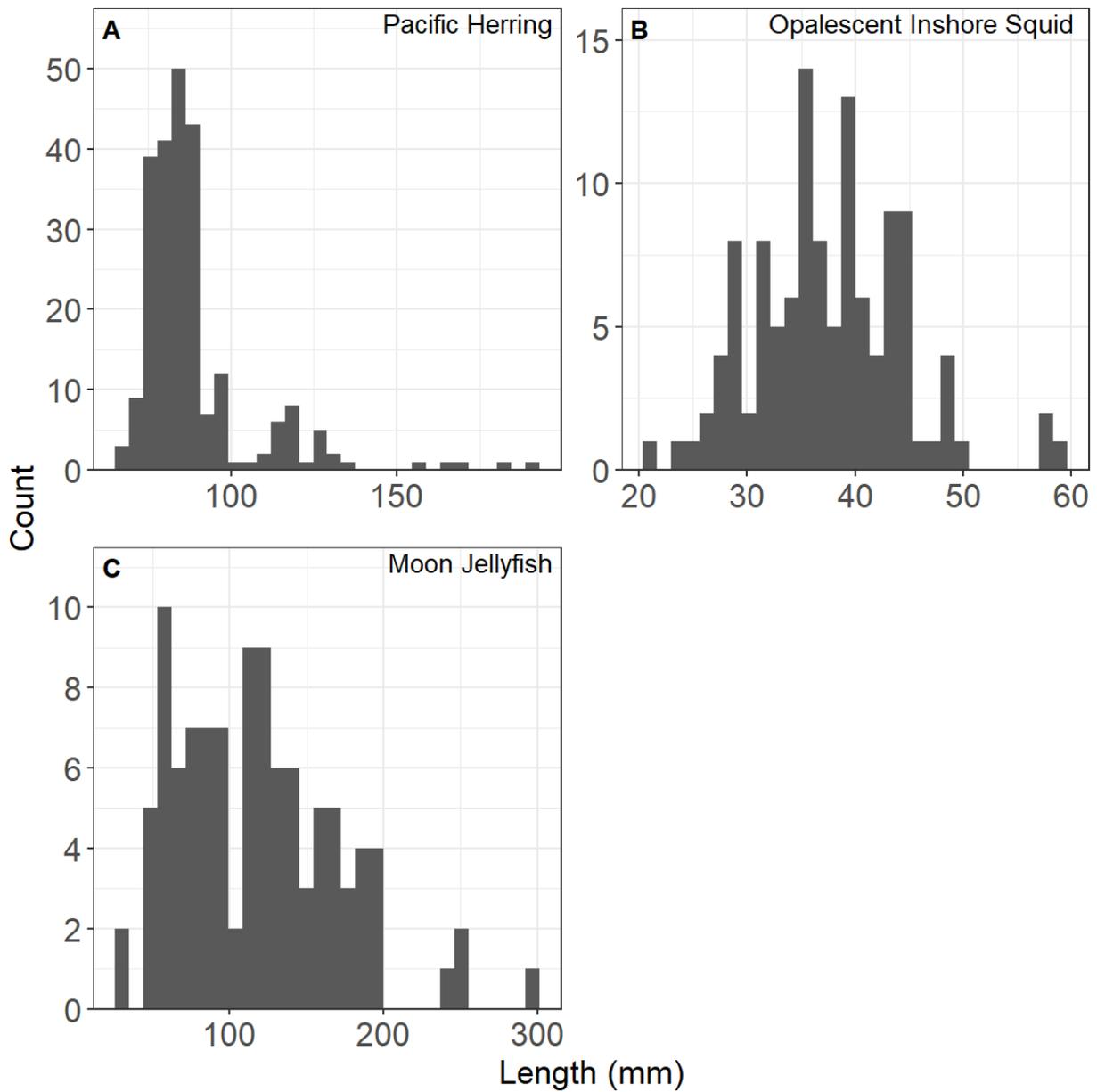


Figure 10. Length (mm) frequency plots for common species sampled ($n > 50$ samples) during the ecosystem-based juvenile Pacific Salmon survey aboard the CCGS *Sir John Franklin*, September 16 to 30, 2024. (A) Pacific Herring (*Clupea pallasii*), length = Standard Length, (B) Opalescent Inshore Squid (*Doryteuthis opalescens*), length = Mantle Length, (C) Moon Jellyfish (*Aurelia labiata*), length = Bell Diameter.

APPENDIX A NET SPECIFICATIONS

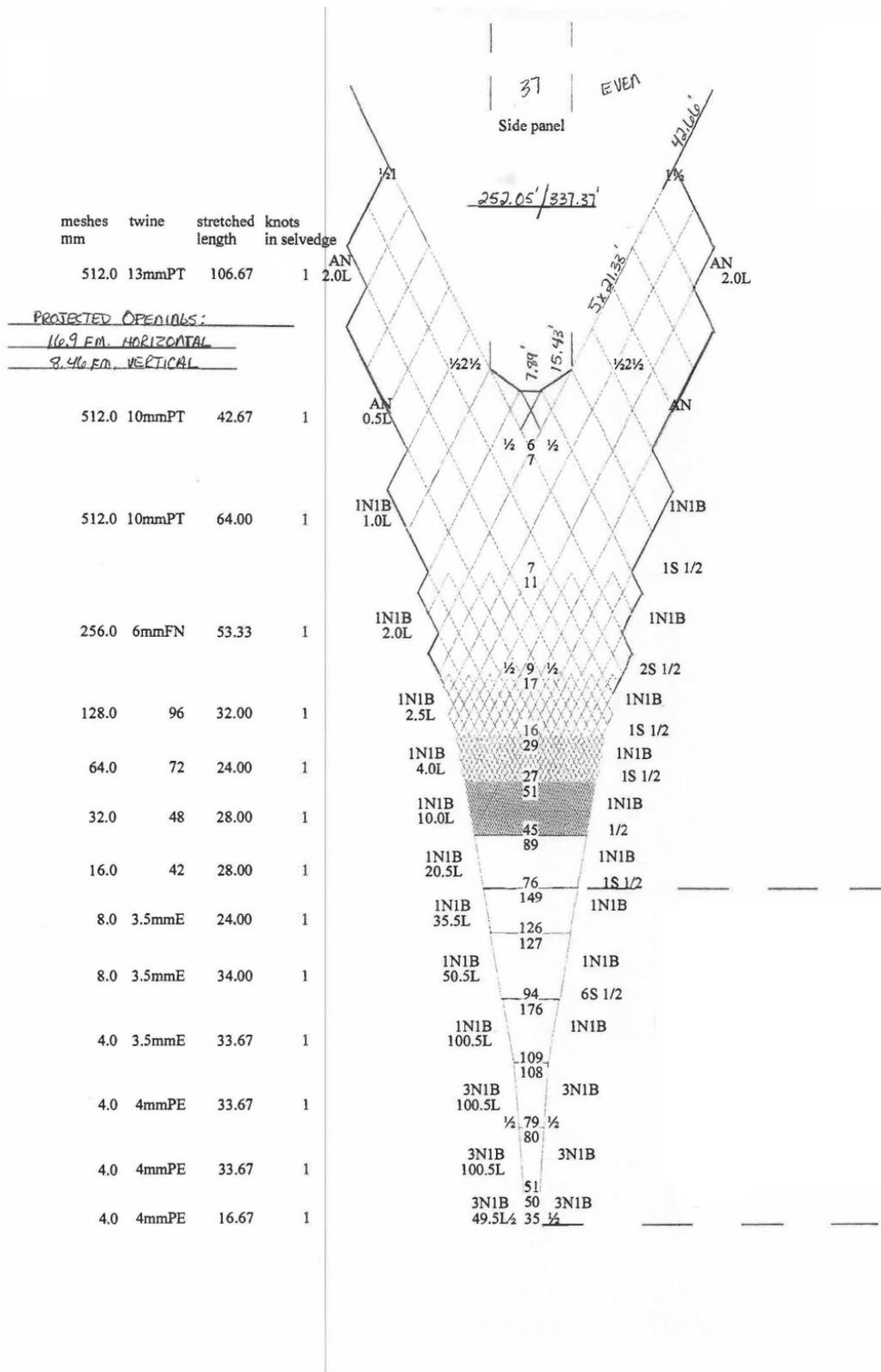


Figure A.1. Net specifications (side view) for the LFS 7742 trawl net used during the ecosystem-based juvenile Pacific Salmon survey from September 16 to 30, 2024 on the CCGS *Sir John Franklin*.

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*, September 16 to 30, 2024. Area indicates Strait of Georgia (SOG), Desolation Sound (DESO), Discovery Passage (DISC), Johnstone Strait (JS) or Queen Charlotte Strait (QCS) . 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	3	6	7	8	9	10
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-09-17	2024-09-17	2024-09-17	2024-09-17	2024-09-17	2024-09-17
Start Time (Pacific)	06:50	09:50	11:45	12:56	13:56	15:16
Start Latitude	48° 49' 37" N	48° 50' 53" N	48° 53' 18" N	48° 56' 26" N	48° 59' 10" N	49° 03' 07" N
Start Longitude	122° 59' 14" W	123° 10' 19" W	123° 15' 14" W	123° 21' 57" W	123° 27' 42" W	123° 34' 03" W
End Latitude	48° 49' 39" N	48° 51' 29" N	48° 54' 25" N	48° 57' 31" N	49° 00' 18" N	49° 02' 07" N
End Longitude	123° 01' 07" W	123° 11' 57" W	123° 16' 44" W	123° 24' 07" W	123° 29' 31" W	123° 32' 54" W
Target Headrope Depth (m)	0	15	45	0	15	30
Median Headrope Depth (m)	4	18	43	4	17	33
Start Bottom Depth (m)	226	211	197	194	169	204
End Bottom Depth (m)	217	214	200	196	215	189
Net	LFS 7742					
Duration (min)	20	20	20	20	20	20
Direction of Tow (deg)	267	295	314	303	310	138
Vessel Speed (km/h)	6.9	6.8	8.3	10.0	9.2	6.8
Distance Towed (km)	2.31	2.30	2.78	3.33	3.07	2.31
Net Opening Width (m)	48	52	62	56	53	56
Net Opening Height (m)	14	10	10	17	10	10
Warp Length (m)	230	250	350	230	240	300
Beaufort Scale	3	3	3	2	2	2
Water Temperature (5m, °C)	12.8	14.5	13.4	13.5	14.0	13.5
Median Temp at Headrope (°C)	13.4	12.6	10.6	13.9	12.5	11.0
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG07	SOG08	SOG09	SOG10	SOG11	SOG12
Tow	7	8	9	10	11	12
Event Number	13	16	19	20	21	24
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-09-18	2024-09-18	2024-09-18	2024-09-18	2024-09-18	2024-09-18
Start Time (Pacific)	07:32	09:58	12:15	13:49	14:49	16:25
Start Latitude	49° 08' 12" N	49° 06' 26" N	49° 01' 57" N	49° 09' 35" N	49° 14' 01" N	49° 16' 01" N
Start Longitude	123° 37' 33" W	123° 25' 00" W	123° 15' 35" W	123° 18' 55" W	123° 18' 23" W	123° 23' 47" W
End Latitude	49° 09' 40" N	49° 04' 53" N	49° 03' 00" N	49° 11' 01" N	49° 15' 26" N	49° 15' 56" N
End Longitude	123° 36' 19" W	123° 25' 09" W	123° 17' 20" W	123° 18' 49" W	123° 19' 04" W	123° 26' 05" W
Target Headrope Depth (m)	0	45	15	30	0	15
Median Headrope Depth (m)	5	44	18	30	6	17
Start Bottom Depth (m)	124	257	82	121	140	244
End Bottom Depth (m)	181	270	81	127	156	202
Net	LFS 7742					
Duration (min)	20	20	20	20	20	20
Direction of Tow (deg)	025	179	308	358	339	263
Vessel Speed (km/h)	9.3	8.6	8.7	8.0	8.3	8.4
Distance Towed (km)	3.11	2.89	2.89	2.67	2.75	2.80
Net Opening Width (m)	51	63	52	60	49	54
Net Opening Height (m)	16	10	10	10	16	10
Warp Length (m)	200	350	240	320	200	240
Beaufort Scale	2	4	3	4	3	3
Water Temperature (5m, °C)	14.0	14.5	12.8	14.3	13.4	14.6
Median Temp at Headrope (°C)	14.8	10.1	11.6	10.6	12.4	11.0
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG13	SOG14	SOG15	SOG16	SOG17	SOG18
Tow	13	14	15	16	17	18
Event Number	25	26	29	30	33	34
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-09-18	2024-09-19	2024-09-19	2024-09-19	2024-09-19	2024-09-19
Start Time (Pacific)	17:52	07:10	09:24	11:25	13:08	14:18
Start Latitude	49° 14' 23" N	49° 11' 25" N	49° 12' 14" N	49° 12' 57" N	49° 15' 06" N	49° 17' 24" N
Start Longitude	123° 30' 08" W	123° 43' 33" W	123° 35' 50" W	123° 50' 19" W	123° 45' 42" W	123° 39' 51" W
End Latitude	49° 13' 42" N	49° 12' 47" N	49° 12' 14" N	49° 13' 34" N	49° 15' 48" N	49° 18' 15" N
End Longitude	123° 31' 46" W	123° 42' 34" W	123° 37' 59" W	123° 47' 53" W	123° 43' 38" W	123° 37' 58" W
Target Headrope Depth (m)	60	30	0	15	15	0
Median Headrope Depth (m)	53	33	6	16	15	4
Start Bottom Depth (m)	335	211	363	138	406	248
End Bottom Depth (m)	350	384	387	149	406	292
Net	LFS 7742					
Duration (min)	20	20	20	21	20	20
Direction of Tow (deg)	233	021	266	065	058	051
Vessel Speed (km/h)	7.1	8.4	7.8	9.4	8.4	8.3
Distance Towed (km)	2.36	2.81	2.61	3.16	2.82	2.79
Net Opening Width (m)	61	56	48	59	53	48
Net Opening Height (m)	10	10	14	9	10	15
Warp Length (m)	380	320	200	240	240	200
Beaufort Scale	2	3	4	4	4	3
Water Temperature (5m, °C)	15.0	14.4	14.4	14.7	14.6	14.5
Median Temp at Headrope (°C)	9.8	10.4	14.7	12.0	11.0	15.2
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG20	SOG21	SOG22	SOG23	SOG24	SOG25
Tow	19	20	21	22	23	24
Event Number	37	38	39	40	43	44
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-09-19	2024-09-19	2024-09-20	2024-09-20	2024-09-20	2024-09-20
Start Time (Pacific)	15:51	17:52	07:28	08:32	10:12	11:32
Start Latitude	49° 21' 31" N	49° 23' 15" N	49° 25' 12" N	49° 23' 20" N	49° 22' 47" N	49° 25' 26" N
Start Longitude	123° 33' 44" W	123° 40' 31" W	123° 47' 48" W	123° 49' 29" W	123° 54' 38" W	123° 58' 36" W
End Latitude	49° 22' 19" N	49° 23' 40" N	49° 24' 02" N	49° 23' 45" N	49° 22' 48" N	49° 26' 00" N
End Longitude	123° 36' 21" W	123° 42' 44" W	123° 46' 26" W	123° 51' 44" W	123° 56' 53" W	123° 56' 14" W
Target Headrope Depth (m)	0	45	0	15	0	0
Median Headrope Depth (m)	4	44				
Start Bottom Depth (m)	181	180	116	185	325	337
End Bottom Depth (m)	180	180	124	206	403	222
Net	LFS 7742					
Duration (min)	20	21	20	20	20	20
Direction of Tow (deg)	291	282	139	282	266	066
Vessel Speed (km/h)	10.0	8.4	8.2	8.5	8.2	9.1
Distance Towed (km)	3.48	2.79	2.73	2.84	2.72	3.04
Net Opening Width (m)	48	52	48	54	47	51
Net Opening Height (m)	15	10	16	10	16	16
Warp Length (m)	200	350	200	240	200	210
Beaufort Scale	3	2	2	3	3	3
Water Temperature (5m, °C)	13.0	13.9	12.1	12.6	12.7	12.8
Median Temp at Headrope (°C)	13.3	9.9	12.9	11.2	13.8	13.3
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG26	SOG27	SOG28	SOG29	SOG30	SOG31
Tow	25	26	27	28	29	30
Event Number	47	48	51	52	55	56
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-09-20	2024-09-20	2024-09-20	2024-09-20	2024-09-21	2024-09-21
Start Time (Pacific)	13:10	14:58	16:17	17:44	08:05	09:28
Start Latitude	49° 26' 15" N	49° 27' 46" N	49° 31' 12" N	49° 32' 44" N	49° 29' 54" N	49° 36' 10" N
Start Longitude	123° 52' 34" W	123° 59' 07" W	124° 03' 22" W	124° 06' 55" W	124° 06' 19" W	124° 07' 51" W
End Latitude	49° 26' 46" N	49° 29' 06" N	49° 32' 41" N	49° 31' 27" N	49° 31' 39" N	49° 37' 10" N
End Longitude	123° 54' 38" W	124° 00' 26" W	124° 03' 13" W	124° 06' 05" W	124° 06' 38" W	124° 09' 39" W
Target Headrope Depth (m)	30	15	60	30	0	15
Median Headrope Depth (m)						
Start Bottom Depth (m)	224	197	180	382	427	135
End Bottom Depth (m)	225	125	182	419	416	203
Net	LFS 7742					
Duration (min)	20	20	20	20	20	20
Direction of Tow (deg)	287	323	360	154	350	307
Vessel Speed (km/h)	7.9	8.8	8.2	7.7	9.9	8.6
Distance Towed (km)	2.67	2.95	2.74	2.59	3.29	2.87
Net Opening Width (m)	63	54	58	59	46	56
Net Opening Height (m)	10	10	10	10	16	10
Warp Length (m)	330	240	380	310	210	240
Beaufort Scale	3	2	2	2	2	2
Water Temperature (5m, °C)	11.8	12.4	13.5	14.1	14.2	14.1
Median Temp at Headrope (°C)	10.3	11.4	9.8	10.0	15.2	10.6
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG32	SOG33	SOG34	SOG35	SOG36	SOG37
Tow	31	32	33	34	35	36
Event Number	57	60	61	62	63	66
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-09-21	2024-09-21	2024-09-21	2024-09-21	2024-09-21	2024-09-22
Start Time (Pacific)	10:18	12:43	13:54	15:13	16:14	06:58
Start Latitude	49° 38' 10" N	49° 39' 57" N	49° 44' 52" N	49° 45' 25" N	49° 45' 36" N	49° 26' 36" N
Start Longitude	124° 12' 49" W	124° 16' 44" W	124° 19' 46" W	124° 24' 25" W	124° 31' 20" W	124° 08' 53" W
End Latitude	49° 39' 06" N	49° 41' 05" N	49° 43' 53" N	49° 45' 54" N	49° 46' 23" N	49° 26' 00" N
End Longitude	124° 14' 47" W	124° 18' 12" W	124° 18' 00" W	124° 26' 53" W	124° 33' 07" W	124° 11' 02" W
Target Headrope Depth (m)	15	0	30	0	45	0
Median Headrope Depth (m)						
Start Bottom Depth (m)	365	362	139	171	197	150
End Bottom Depth (m)	352	304	144	234	273	128
Net	LFS 7742					
Duration (min)	20	20	20	20	20	20
Direction of Tow (deg)	302	317	127	283	300	243
Vessel Speed (km/h)	8.8	8.3	8.4	9.2	7.8	8.6
Distance Towed (km)	2.94	2.76	2.79	3.10	2.59	2.82
Net Opening Width (m)	54	48	60	50	124	49
Net Opening Height (m)	10	16	10	16	10	16
Warp Length (m)	240	200	320	200	350	200
Beaufort Scale	2	2	2	2	2	3
Water Temperature (5m, °C)	14.2	14.0	13.6	13.6	13.5	13.4
Median Temp at Headrope (°C)	10.8	14.5	10.3	14.4	10.0	14.8
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG38	SOG39	SOG40	SOG41	SOG42	SOG43
Tow	37	38	39	40	41	42
Event Number	69	70	73	74	75	78
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-09-22	2024-09-22	2024-09-22	2024-09-22	2024-09-22	2024-09-22
Start Time (Pacific)	09:11	10:35	12:36	14:01	15:04	17:33
Start Latitude	49° 22' 36" N	49° 22' 02" N	49° 25' 57" N	49° 24' 16" N	49° 23' 50" N	49° 26' 44" N
Start Longitude	124° 12' 15" W	124° 15' 30" W	124° 18' 14" W	124° 23' 17" W	124° 28' 51" W	124° 36' 34" W
End Latitude	49° 22' 36" N	49° 22' 40" N	49° 26' 51" N	49° 24' 54" N	49° 24' 55" N	49° 26' 32" N
End Longitude	124° 14' 32" W	124° 17' 45" W	124° 20' 19" W	124° 25' 04" W	124° 30' 39" W	124° 34' 22" W
Target Headrope Depth (m)	15	0	0	60	0	15
Median Headrope Depth (m)						
Start Bottom Depth (m)	335	284	313	328	143	127
End Bottom Depth (m)	328	307	318	340	182	148
Net	LFS 7742					
Duration (min)	20	20	20	20	20	21
Direction of Tow (deg)	266	289	300	295	310	095
Vessel Speed (km/h)	8.3	8.8	9.0	7.4	8.8	8.1
Distance Towed (km)	2.77	2.95	3.01	2.46	2.96	2.69
Net Opening Width (m)	55	50	48	59	49	57
Net Opening Height (m)	10	16	16	10	16	10
Warp Length (m)	240	230	210	390	200	240
Beaufort Scale	4	4	4	4	4	4
Water Temperature (5m, °C)	13.8	13.7	13.3	13.3	13.4	13.1
Median Temp at Headrope (°C)	12.4	15.0	14.6	10.0	14.8	11.1
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG44	SOG45	SOG46	SOG47	SOG48	SOG49
Tow	43	44	45	46	47	48
Event Number	81	82	85	86	87	88
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-09-23	2024-09-23	2024-09-23	2024-09-23	2024-09-23	2024-09-23
Start Time (Pacific)	07:56	09:19	10:54	12:13	13:23	13:32
Start Latitude	49° 30' 23" N	49° 34' 48" N	49° 37' 44" N	49° 40' 33" N	49° 41' 48" N	49° 36' 30" N
Start Longitude	124° 32' 02" W	124° 24' 16" W	124° 29' 26" W	124° 34' 11" W	124° 40' 06" W	124° 42' 14" W
End Latitude	49° 31' 14" N	49° 35' 46" N	49° 38' 53" N	49° 41' 40" N	49° 41' 44" N	49° 37' 57" N
End Longitude	124° 29' 54" W	124° 26' 26" W	124° 31' 21" W	124° 36' 13" W	124° 40' 14" W	124° 42' 53" W
Target Headrope Depth (m)	15	0	15	0	0	30
Median Headrope Depth (m)						
Start Bottom Depth (m)	145	327	338	165	296	131
End Bottom Depth (m)	167	357	335	275	297	150
Net	LFS 7742					
Duration (min)	20	20	21	20	2	20
Direction of Tow (deg)	055	301	309	307	226	341
Vessel Speed (km/h)	9.0	9.4	9.4	9.6	7.7	8.4
Distance Towed (km)	3.01	3.16	3.14	3.20	0.21	2.80
Net Opening Width (m)	55	49	54	50	48	59
Net Opening Height (m)	10	16	10	16	16	10
Warp Length (m)	240	210	240	200	200	320
Beaufort Scale	4	4	3	3	3	3
Water Temperature (5m, °C)	13.1	13.0	13.1	12.9	12.9	11.6
Median Temp at Headrope (°C)	10.6	14.5	13.9	14.3	13.9	10.6
Usable	Y	Y	Y	Y	N	Y

Station Name	SOG50	SOG51	SOG52	SOG53	SOG54	SOG55
Tow	49	50	51	52	53	54
Event Number	91	94	95	98	99	102
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-09-23	2024-09-24	2024-09-24	2024-09-24	2024-09-24	2024-09-24
Start Time (Pacific)	17:31	08:20	09:38	11:05	12:34	14:34
Start Latitude	49° 35' 10" N	49° 38' 06" N	49° 41' 36" N	49° 43' 56" N	49° 46' 11" N	49° 51' 59" N
Start Longitude	124° 44' 50" W	124° 47' 15" W	124° 48' 31" W	124° 45' 16" W	124° 51' 41" W	124° 49' 51" W
End Latitude	49° 36' 37" N	49° 37' 16" N	49° 43' 08" N	49° 45' 00" N	49° 47' 28" N	49° 50' 47" N
End Longitude	124° 45' 11" W	124° 45' 20" W	124° 49' 08" W	124° 43' 47" W	124° 49' 48" W	124° 48' 42" W
Target Headrope Depth (m)	15	0	15	30	0	60
Median Headrope Depth (m)		4	15	30	7	60
Start Bottom Depth (m)	71	53	77	326	139	164
End Bottom Depth (m)	82	65	99	361	342	192
Net	LFS 7742					
Duration (min)	20	20	20	20	22	12
Direction of Tow (deg)	348	120	342	039	040	145
Vessel Speed (km/h)	8.2	8.3	8.8	8.0	8.9	5.4
Distance Towed (km)	2.75	2.77	2.94	2.68	3.28	2.63
Net Opening Width (m)	54	48	53	60	50	62
Net Opening Height (m)	10	17	10	10	14	10
Warp Length (m)	230	200	240	320	200	390
Beaufort Scale	2	1	1	1	2	1
Water Temperature (5m, °C)	11.4	11.2	10.9	12.4	11.8	12.4
Median Temp at Headrope (°C)	10.5	12.0	10.6	10.4	12.7	9.6
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG56	SOG57	SOG58	SOG59	SOG60	SOG61
Tow	55	56	57	58	59	60
Event Number	103	104	107	108	109	110
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	Y	Y
Date (Pacific)	2024-09-24	2024-09-24	2024-09-25	2024-09-25	2024-09-25	2024-09-25
Start Time (Pacific)	15:40	16:46	07:36	08:50	09:47	10:47
Start Latitude	49° 49' 17" N	49° 46' 07" N	49° 46' 21" N	49° 48' 42" N	49° 52' 06" N	49° 55' 54" N
Start Longitude	124° 44' 44" W	124° 39' 35" W	124° 54' 53" W	124° 58' 32" W	124° 57' 33" W	124° 54' 25" W
End Latitude	49° 48' 37" N	49° 44' 36" N	49° 46' 02" N	49° 49' 51" N	49° 53' 38" N	49° 56' 56" N
End Longitude	124° 43' 21" W	124° 39' 59" W	124° 52' 21" W	125° 00' 04" W	124° 56' 56" W	124° 55' 58" W
Target Headrope Depth (m)	0	15	0	15	0	30
Median Headrope Depth (m)	4	15	3	15	11	31
Start Bottom Depth (m)	199	128	71	88	299	129
End Bottom Depth (m)	190	179	105	116	123	174
Net	LFS 7742					
Duration (min)	16	19	21	20	20	20
Direction of Tow (deg)	124	186	098	316	011	313
Vessel Speed (km/h)	7.7	8.8	9.2	8.4	8.9	8.0
Distance Towed (km)	2.07	2.86	3.10	2.82	2.94	2.67
Net Opening Width (m)	49	56	49	54	49	59
Net Opening Height (m)	17	10	15	10	14	10
Warp Length (m)	200	240	200	240	200	320
Beaufort Scale	1	1	1	1	1	3
Water Temperature (5m, °C)	12.5	13.0	10.0	11.3	12.0	12.8
Median Temp at Headrope (°C)	14.0	13.7	11.5	10.6	12.7	10.4
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG62	SOG63	SOG64	SOG66	SOG67	SOG65
Tow	61	62	63	64	65	66
Event Number	113	114	117	120	121	122
Area	SOG	SOG	SOG	SOG	SOG	SOG
STL	Y	Y	Y	Y	N	N
Date (Pacific)	2024-09-25	2024-09-25	2024-09-25	2024-09-26	2024-09-26	2024-09-26
Start Time (Pacific)	12:35	13:55	15:27	07:41	08:33	09:44
Start Latitude	50° 00' 08" N	50° 02' 51" N	50° 00' 03" N	49° 49' 22" N	49° 53' 09" N	49° 53' 56" N
Start Longitude	124° 58' 11" W	125° 04' 58" W	125° 07' 03" W	124° 34' 15" W	124° 37' 26" W	124° 45' 01" W
End Latitude	49° 59' 20" N	50° 01' 26" N	49° 58' 52" N	49° 50' 51" N	49° 54' 05" N	49° 53' 40" N
End Longitude	125° 00' 03" W	125° 04' 34" W	125° 05' 36" W	124° 35' 01" W	124° 39' 08" W	124° 42' 27" W
Target Headrope Depth (m)	0	30	15	0	15	0
Median Headrope Depth (m)	7	32	17	4	13	4
Start Bottom Depth (m)	118	124	165	241	92	136
End Bottom Depth (m)	108	242	197	208	105	143
Net	LFS 7742					
Duration (min)	20	20	20	21	20	21
Direction of Tow (deg)	234	167	139	338	307	096
Vessel Speed (km/h)	8.0	7.9	8.4	8.5	8.0	9.1
Distance Towed (km)	2.67	2.66	2.80	2.89	2.68	3.11
Net Opening Width (m)	50	63	54	49	56	50
Net Opening Height (m)	11	10	10	15	10	14
Warp Length (m)	200	320	240	200	240	200
Beaufort Scale	2	1	2	3	2	4
Water Temperature (5m, °C)	12.4	12.5	12.3	12.9	12.8	12.8
Median Temp at Headrope (°C)	14.0	10.4	10.6	14.4	13.6	14.4
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG68	SOG69	SOG70	SOG71	SOG72	SOG73
Tow	67	68	69	70	71	72
Event Number	123	124	127	128	133	134
Area	SOG	DESO	DESO	DESO	DESO	DESO
STL	N	N	N	N	N	N
Date (Pacific)	2024-09-26	2024-09-26	2024-09-26	2024-09-26	2024-09-27	2024-09-27
Start Time (Pacific)	11:10	12:25	14:40	16:06	07:52	09:05
Start Latitude	49° 57' 59" N	50° 03' 44" N	50° 09' 16" N	50° 15' 40" N	50° 21' 45" N	50° 17' 52" N
Start Longitude	124° 46' 57" W	124° 51' 44" W	124° 42' 43" W	124° 37' 49" W	124° 42' 07" W	124° 49' 35" W
End Latitude	49° 58' 32" N	50° 04' 38" N	50° 09' 58" N	50° 16' 57" N	50° 20' 39" N	50° 18' 06" N
End Longitude	124° 49' 02" W	124° 49' 38" W	124° 40' 36" W	124° 39' 06" W	124° 43' 46" W	124° 51' 37" W
Target Headrope Depth (m)	30	0	0	15	0	0
Median Headrope Depth (m)	29	6	4	15	5	9
Start Bottom Depth (m)	153	463	677	587	503	507
End Bottom Depth (m)	176	516	716	721	507	493
Net	LFS 7742					
Duration (min)	20	20	20	20	20	20
Direction of Tow (deg)	289	053	059	324	220	277
Vessel Speed (km/h)	8.1	9.1	8.5	8.4	8.5	7.3
Distance Towed (km)	2.69	3.02	2.83	2.83	2.82	2.45
Net Opening Width (m)	59	47	43	53	48	47
Net Opening Height (m)	10	15	17	10	16	13
Warp Length (m)	320	200	200	240	200	200
Beaufort Scale	4	4	2	1	2	2
Water Temperature (5m, °C)	12.1	12.3	12.8	12.3	12.5	12.2
Median Temp at Headrope (°C)	10.2	13.6	13.7	11.2	12.8	12.7
Usable	Y	Y	Y	Y	Y	Y

Station Name	SOG74	SOG75	SOG76	SOG77	SOG78	SOG79
Tow	73	74	75	76	77	78
Event Number	137	138	141	142	143	144
Area	DESO	DESO	DESO	SOG	DISC	DISC
STL	N	N	N	N	N	N
Date (Pacific)	2024-09-27	2024-09-27	2024-09-27	2024-09-27	2024-09-28	2024-09-28
Start Time (Pacific)	10:55	12:20	14:34	16:08	07:05	07:59
Start Latitude	50° 17' 42" N	50° 14' 11" N	50° 08' 42" N	50° 05' 15" N	50° 12' 53" N	50° 16' 11" N
Start Longitude	124° 57' 22" W	125° 01' 45" W	125° 04' 22" W	125° 07' 51" W	125° 22' 03" W	125° 24' 10" W
End Latitude	50° 16' 46" N	50° 12' 57" N	50° 07' 58" N	50° 03' 55" N	50° 14' 39" N	50° 17' 45" N
End Longitude	124° 58' 36" W	125° 00' 48" W	125° 06' 11" W	125° 07' 34" W	125° 23' 09" W	125° 25' 04" W
Target Headrope Depth (m)	15	30	0	15	0	15
Median Headrope Depth (m)	16	32	4	18	12	15
Start Bottom Depth (m)	512	475	342	245	195	128
End Bottom Depth (m)	508	532	278	263	234	243
Net	LFS 7742					
Duration (min)	20	20	20	20	20	20
Direction of Tow (deg)	217	151	235	169	335	337
Vessel Speed (km/h)	6.8	7.6	7.7	7.5	10.6	9.3
Distance Towed (km)	2.27	2.55	2.55	2.49	3.53	3.11
Net Opening Width (m)	56	57	48	55	49	54
Net Opening Height (m)	11	11	16	10	14	10
Warp Length (m)	240	320	200	230	200	220
Beaufort Scale	2	3	3	3	3	3
Water Temperature (5m, °C)	12.2	12.0	12.5	12.5	9.8	9.7
Median Temp at Headrope (°C)	12.2	10.0	13.4	13.1	10.8	10.7
Usable	Y	Y	Y	Y	Y	Y

Station Name	JS01	JS02	JS03	JS04	QCST01	QCST02
Tow	79	80	81	82	83	84
Event Number	147	150	151	152	153	156
Area	DISC	DISC	JS	JS	QCS	QCS
STL	N	N	N	N	N	N
Date (Pacific)	2024-09-28	2024-09-28	2024-09-28	2024-09-28	2024-09-29	2024-09-29
Start Time (Pacific)	10:15	13:38	15:29	17:27	07:10	08:39
Start Latitude	50° 22' 58" N	50° 27' 37" N	50° 30' 13" N	50° 31' 38" N	50° 39' 59" N	50° 43' 49" N
Start Longitude	125° 34' 55" W	126° 00' 44" W	126° 22' 35" W	126° 38' 56" W	126° 48' 46" W	126° 52' 01" W
End Latitude	50° 22' 34" N	50° 27' 46" N	50° 30' 13" N	50° 32' 24" N	50° 40' 39" N	50° 44' 33" N
End Longitude	125° 37' 13" W	126° 02' 44" W	126° 25' 17" W	126° 41' 46" W	126° 50' 57" W	126° 54' 04" W
Target Headrope Depth (m)	0	0	15	0	0	15
Median Headrope Depth (m)	5	4	18	4	4	16
Start Bottom Depth (m)	249	184	364	414	176	152
End Bottom Depth (m)	267	265	346	479	190	178
Net	LFS 7742					
Duration (min)	20	20	20	20	20	20
Direction of Tow (deg)	252	275	268	291	294	297
Vessel Speed (km/h)	8.5	7.2	9.5	10.9	8.6	8.3
Distance Towed (km)	2.84	2.39	3.18	3.62	2.86	2.76
Net Opening Width (m)	51	49	60	46	47	53
Net Opening Height (m)	17	16	10	17	17	9
Warp Length (m)	190	200	230	180	190	240
Beaufort Scale	3	2	2	3	2	2
Water Temperature (5m, °C)	9.4	8.8	9.0	8.9	8.1	8.2
Median Temp at Headrope (°C)	10.4	9.7	9.9	9.9	9.2	9.1
Usable	Y	Y	Y	Y	Y	Y

Station Name	QCST03	QCST04	QCST05	QCST06	QCST07
Tow	85	86	87	88	89
Event Number	159	160	161	162	165
Area	QCS	QCS	QCS	QCS	QCS
STL	N	N	N	N	N
Date (Pacific)	2024-09-29	2024-09-29	2024-09-29	2024-09-29	2024-09-29
Start Time (Pacific)	10:24	11:38	13:13	14:20	15:59
Start Latitude	50° 48' 16" N	50° 42' 20" N	50° 45' 43" N	50° 50' 13" N	50° 52' 11" N
Start Longitude	127° 00' 19" W	127° 08' 42" W	127° 18' 15" W	127° 13' 18" W	127° 21' 55" W
End Latitude	50° 46' 54" N	50° 42' 29" N	50° 46' 57" N	50° 51' 06" N	50° 51' 05" N
End Longitude	127° 01' 13" W	127° 10' 51" W	127° 17' 16" W	127° 15' 25" W	127° 20' 48" W
Target Headrope Depth (m)	0	15	0	0	15
Median Headrope Depth (m)	4	16	5	5	17
Start Bottom Depth (m)	126	142	255	157	160
End Bottom Depth (m)	159	113	183	130	146
Net	LFS 7742				
Duration (min)	20	20	20	20	20
Direction of Tow (deg)	201	275	026	302	146
Vessel Speed (km/h)	8.3	7.6	7.7	8.9	7.3
Distance Towed (km)	2.75	2.54	2.56	2.97	2.43
Net Opening Width (m)	63	55	50	50	58
Net Opening Height (m)	16	10	15	17	10
Warp Length (m)	200	240	200	200	240
Beaufort Scale	2	3	3	3	3
Water Temperature (5m, °C)	8.4	8.4	8.6	8.7	8.6
Median Temp at Headrope (°C)	9.5	9.2	9.6	9.6	9.2
Usable	Y	Y	Y	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 September 16 to 30, 2024 on the CCGS *Sir John Franklin*. Blank entries indicate the event was unusable.

Date	Station	Latitude	Longitude	CTD			BONGO		
				Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)	Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)
2024-09-17	SOG02	48° 51' 23" N	123° 10' 45" W	08:57	181	168.0	09:17	178	165
2024-09-17	SOG07	49° 08' 37" N	123° 38' 05" W	17:39	82	68.0	17:52	84	73
2024-09-18	SOG08	49° 07' 38" N	123° 24' 53" W	09:33	248	236.0	09:18	248	236
2024-09-18	SOG09	49° 01' 13" N	123° 14' 27" W	11:56	95	82.0	12:08	96	86
2024-09-18	SOG11	49° 15' 59" N	123° 19' 41" W	15:44	161	148.0	16:01	162	152
2024-09-19	SOG15	49° 12' 20" N	123° 34' 03" W	08:43	368	356.0	09:13	367	256
2024-09-19	SOG17	49° 14' 36" N	123° 47' 13" W	12:26	412	404.0	12:59	398	380
2024-09-19	SOG19	49° 19' 06" N	123° 35' 35" W	15:17	249	234.0	15:40	252	240
2024-09-20	SOG24	49° 22' 54" N	123° 53' 09" W	09:32	344	250.0	09:58	300	319
2024-09-20	SOG26	49° 25' 54" N	123° 50' 48" W	12:43	212	197.5	13:03	213	203
2024-09-20	SOG27	49° 29' 57" N	124° 02' 57" W	15:56	119	103.0	16:08	100	91
2024-09-21	SOG30	49° 30' 23" N	124° 05' 57" W	07:28	428	274.0	07:52	429	419
2024-09-21	SOG36	49° 47' 17" N	124° 32' 20" W	17:31	296	291.0	17:55	316	300
2024-09-22	SOG38	49° 22' 36" N	124° 10' 46" W	08:36	351	335.0	09:01	351	340
2024-09-22	SOG40	49° 25' 12" N	124° 16' 43" W	12:02	296	283.0	12:23	296	286
2024-09-22	SOG43	49° 26' 51" N	124° 37' 55" W	16:32	85	70.0	16:42	86	75
2024-09-23	SOG44	49° 29' 55" N	124° 33' 34" W	07:31	173	158.0	07:45	174	164
2024-09-23	SOG46	49° 37' 01" N	124° 28' 06" W	10:21	336	320.0	10:45	336	325
2024-09-23	SOG49	49° 38' 37" N	124° 43' 35" W	16:07	149	134.0	16:21	149	139
2024-09-24	SOG51	49° 38' 43" N	124° 48' 52" W	07:56	90	76.0	08:07	90	80
2024-09-24	SOG53	49° 42' 58" N	124° 46' 36" W	10:37	224	211.0	10:55	226	216
2024-09-24	SOG55	49° 53' 06" N	124° 50' 58" W	14:13	172	160.0	14:27	176	164
2024-09-25	SOG58	49° 46' 38" N	124° 56' 37" W	07:20	52	39.0	07:27	52	42
2024-09-25	SOG62	50° 00' 39" N	124° 56' 49" W	12:11	119	106.0	12:23	119	109
2024-09-25	SOG64	50° 01' 03" N	125° 08' 09" W	15:06	149	135.0	15:18	144	137

Date	Station	Latitude	Longitude	CTD			BONGO		
				Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)	Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)
2024-09-25	SOG65	49° 53' 54" N	124° 44' 08" W	17:54	104	90	18:05	100	91
2024-09-26	SOG69	50° 05' 06" N	124° 48' 48" W	13:24	521	504	13:56	521	511
2024-09-26	SOG71	50° 17' 32" N	124° 39' 35" W	17:54	715	697	17:40	715	250
2024-09-27	SOG72	50° 22' 31" N	124° 41' 01" W	07:12	497	480	07:39	497	250
2024-09-27	SOG74	50° 18' 35" N	124° 56' 22" W	10:08	514	498	10:37	514	504
2024-09-27	SOG76	50° 09' 23" N	125° 02' 52" W	13:56	436	435	14:24	452	425
2024-09-28	JS01	50° 23' 19" N	125° 33' 28" W	09:55	120	108	10:05	114	100
2024-09-28	JS02	50° 27' 34" N	125° 59' 01" W	13:20	103	88	13:31	103	92
2024-09-29	QCST02	50° 43' 19" N	126° 50' 36" W	08:18	190	175	08:33	190	180
2024-09-29	QCST03	50° 49' 15" N	126° 59' 42" W	10:02	107	92	10:13	104	96
2024-09-29	QCST07	50° 53' 00" N	127° 22' 46" W	15:36	152	143	15:49	158	147

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 September 16 to 30, 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)	2.29	2	1.06	1									18.15	6	8.56	1
Chinook Salmon (Juveniles)	24.89	163	0.27	2	0.84	5	0.21	1			0.64	3	13.98	62		
Chum Salmon (Adults)													4.36	1		
Chum Salmon (Juveniles)	0.74	8	0.17	1			0.07	1	0.08	1			2.31	22		
Coho Salmon (Adults)	3.36	1					3.65	1					5.90	3		
Coho Salmon (Juveniles)	1.70	7	0.84	4	0.33	1	1.55	7	2.07	8	1.40	5	80.72	275		
Pink Salmon (Juveniles)	0.39	7					0.10	2					3.33	49		
Sockeye Salmon (Adults)																
Sockeye Salmon (Juveniles)																
Bay Pipefish																
Fried Egg Jellyfish	1.51	1					1.21	1								
Jellyfish																
Lions Mane					1.34	1										
Moon Jellyfish											0.05		0.07	1		
North Pacific Spiny Dogfish																
Northern Anchovy																
Opalescent Inshore Squid												4				
Pacific Hake																
Pacific Herring																
River Lamprey											0.03	1				
Walleye Pollock											0.34	1				
Water Jellyfish																
Wolf Eel													0.02	1		
Yellowtail Rockfish																
TOTAL	34.88	189	2.34	8	2.51	7	6.79	13	2.15	9	2.46	14	128.84	420	8.56	1

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)	18.18	3			6.32	2										
Chinook Salmon (Juveniles)	4.63	60	1.34	32	2.97	69			2.32	12			0.31	1		
Chum Salmon (Adults)					18.54	4										
Chum Salmon (Juveniles)	0.14	1			0.52	3										
Coho Salmon (Adults)					2.46	1					3.01	2				
Coho Salmon (Juveniles)					1.37	6	1.76	7	0.45	1	0.48	1	15.54	60	2.23	9
Pink Salmon (Juveniles)													0.20	3		
Sockeye Salmon (Adults)																
Sockeye Salmon (Juveniles)			0.05	1												
Bay Pipefish																
Fried Egg Jellyfish			0.66	1												
Jellyfish	0.28										0.26					0.29
Lions Mane			9.03	2			5.69	1	6.15	1			0.63			
Moon Jellyfish													0.02	1		
North Pacific Spiny Dogfish																
Northern Anchovy																
Opalescent Inshore Squid				2												
Pacific Hake																
Pacific Herring	0.12	2			57.14	8,403										
River Lamprey	0.21	5			0.04	1										
Walleye Pollock																
Water Jellyfish																
Wolf Eel																
Yellowtail Rockfish											2.48	1				
TOTAL	23.56	71	11.08	38	89.36	8,489	7.45	8	8.92	14	6.23	4	16.70	65	2.52	9

Station Name	SOG17		SOG18		SOG20		SOG21		SOG22		SOG23		SOG24		SOG25	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)									1.29	1						
Chinook Salmon (Juveniles)			0.25	1	0.06	3	0.30	2	0.55	8						
Chum Salmon (Adults)			1.17	1									0.88	1		
Chum Salmon (Juveniles)									0.31	3						
Coho Salmon (Adults)	3.14	1					4.04	1	3.86	1			3.85	2		
Coho Salmon (Juveniles)	2.17	7	5.67	23	0.60	4			0.97	5	7.57	28	18.56	62	55.52	196
Pink Salmon (Juveniles)			1.75	20					0.19	3						
Sockeye Salmon (Adults)													0.66	1		
Sockeye Salmon (Juveniles)					0.01	1										
Bay Pipefish				1												1
Fried Egg Jellyfish											0.47					
Jellyfish																
Lions Mane					3.54	1			0.09	1	8.06	1	1.55	1		
Moon Jellyfish					0.16	1										
North Pacific Spiny Dogfish									4.04	1			34.33	7	14.36	9
Northern Anchovy																
Opalescent Inshore Squid																
Pacific Hake																
Pacific Herring																
River Lamprey			0.04	2					0.03	1						
Walleye Pollock																
Water Jellyfish																
Wolf Eel													0.03	1		
Yellowtail Rockfish																
TOTAL	5.31	8	8.88	48	4.37	10	4.34	3	11.33	24	16.10	29	59.86	75	69.88	206

Station Name	SOG26		SOG27		SOG28		SOG29		SOG30		SOG31		SOG32		SOG33	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)																
Chinook Salmon (Juveniles)	0.30	1			0.26	1	0.16	1	0.32	1					0.06	1
Chum Salmon (Adults)									3.48	1			3.11	1	4.39	1
Chum Salmon (Juveniles)																
Coho Salmon (Adults)	2.74	1							0.79	1						
Coho Salmon (Juveniles)	0.22	1	0.32	1			0.50	2	3.74	15	1.63	7	0.94	3	5.66	23
Pink Salmon (Juveniles)																
Sockeye Salmon (Adults)																
Sockeye Salmon (Juveniles)																
Bay Pipefish																1
Fried Egg Jellyfish			0.54	1			0.32						0.27		1.06	
Jellyfish															0.01	2
Lions Mane																
Moon Jellyfish															0.09	1
North Pacific Spiny Dogfish							3.72	1	4.43	1					3.41	1
Northern Anchovy																
Opalescent Inshore Squid																
Pacific Hake																
Pacific Herring																
River Lamprey	0.02	1														
Walleye Pollock																
Water Jellyfish														1		
Wolf Eel															0.01	1
Yellowtail Rockfish																
TOTAL	3.28	4	0.86	2	0.26	1	4.70	4	12.76	21	1.63	7	4.32	5	14.69	31

Station Name	SOG34		SOG35		SOG36		SOG37		SOG38		SOG39		SOG40		SOG41	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)							4.34	2								
Chinook Salmon (Juveniles)			0.88	3	0.29	1	0.23	1			0.49	2	0.50	1		
Chum Salmon (Adults)			4.50	1	13.19	3	2.04	2			24.71	5				
Chum Salmon (Juveniles)			0.28	2			0.16	1								
Coho Salmon (Adults)			5.27	2			5.74	3			14.56	6	3.91	2	1.27	1
Coho Salmon (Juveniles)			0.41	2			4.53	16	1.46	5	22.00	63	36.87	117		
Pink Salmon (Juveniles)			0.49	6			0.16	2								
Sockeye Salmon (Adults)																
Sockeye Salmon (Juveniles)	0.07	1														
Bay Pipefish															1	
Fried Egg Jellyfish											0.07					
Jellyfish																
Lions Mane			4.61	1			0.11									
Moon Jellyfish	0.11	1	0.18	1												
North Pacific Spiny Dogfish																
Northern Anchovy																
Opalescent Inshore Squid							0.22	90		2						
Pacific Hake																
Pacific Herring																
River Lamprey																
Walleye Pollock																
Water Jellyfish																
Wolf Eel																
Yellowtail Rockfish																
TOTAL	0.18	2	16.62	18	13.48	4	17.53	117	1.46	7	61.83	76	41.28	121	1.27	1

Station Name	SOG42		SOG43		SOG44		SOG45		SOG46		SOG47		SOG49		SOG50	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)							6.75	1			4.30	3				
Chinook Salmon (Juveniles)	0.43	2													0.24	2
Chum Salmon (Adults)	3.74	1					9.71	3	6.97	2	4.55	1				
Chum Salmon (Juveniles)							0.12	1			0.09	1				
Coho Salmon (Adults)	4.43	2	9.26	3			2.44	1			5.53	3				
Coho Salmon (Juveniles)	23.68	67	4.92	15	1.63	5	5.56	17	3.41	11	12.23	34	1.15	3		
Pink Salmon (Juveniles)							0.05	1			0.36	6				
Sockeye Salmon (Adults)																
Sockeye Salmon (Juveniles)																
Bay Pipefish																
Fried Egg Jellyfish	0.67															
Jellyfish																
Lions Mane													0.23		5.10	1
Moon Jellyfish					0.18	1	0.20	1			0.26	1			5.56	
North Pacific Spiny Dogfish	22.09	5														
Northern Anchovy																
Opalescent Inshore Squid																
Pacific Hake																
Pacific Herring											0.02	3				
River Lamprey							0.09	2								
Walleye Pollock																
Water Jellyfish													0.02			
Wolf Eel																
Yellowtail Rockfish																
TOTAL	55.04	77	14.18	18	1.81	6	24.92	27	10.38	13	27.34	52	1.40	3	10.90	3

Station Name	SOG51		SOG52		SOG53		SOG54		SOG55		SOG56		SOG57		SOG58	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)	2.37	1			1.00	1					2.98	2				
Chinook Salmon (Juveniles)	2.09	15	0.11	1									0.16	1	0.18	2
Chum Salmon (Adults)											9.08	5				
Chum Salmon (Juveniles)	0.12	1													0.08	1
Coho Salmon (Adults)	7.24	2					6.60	3			31.10	14				
Coho Salmon (Juveniles)	2.16	8	0.76	3	4.04	11	5.02	15	0.34	1	44.68	119	6.74	19	0.89	3
Pink Salmon (Juveniles)													0.42	4	0.06	1
Sockeye Salmon (Adults)																
Sockeye Salmon (Juveniles)																
Bay Pipefish																
Fried Egg Jellyfish	2.08															
Jellyfish																
Lions Mane																
Moon Jellyfish	0.52	7									0.04	1	0.30	1		
North Pacific Spiny Dogfish																
Northern Anchovy																
Opalescent Inshore Squid				2								1				
Pacific Hake																
Pacific Herring															0.08	1
River Lamprey											0.02	1				
Walleye Pollock																
Water Jellyfish	0.01															
Wolf Eel							0.01	1								
Yellowtail Rockfish																
TOTAL	16.59	34	0.87	6	5.04	12	11.63	19	0.34	1	87.90	143	7.62	25	1.29	8

Station Name	SOG59		SOG60		SOG61		SOG62		SOG63		SOG64		SOG66		SOG67	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)																
Chinook Salmon (Juveniles)	0.38	2							0.15	1			1.19	8		
Chum Salmon (Adults)	8.83	2											21.15	5		
Chum Salmon (Juveniles)													0.59	7		
Coho Salmon (Adults)	2.13	1	1.89	1											3.13	1
Coho Salmon (Juveniles)	3.53	10	17.27	45	0.61	2	10.58	33			1.28	4	1.81	6		
Pink Salmon (Juveniles)	0.07	1					0.13	3					1.80	32		
Sockeye Salmon (Adults)																
Sockeye Salmon (Juveniles)																
Bay Pipefish																
Fried Egg Jellyfish															1.00	1
Jellyfish																
Lions Mane					2.19	1										
Moon Jellyfish			0.02	1	0.26	1	0.18	3	0.19	1					0.12	1
North Pacific Spiny Dogfish																
Northern Anchovy																
Opalescent Inshore Squid								3		1						
Pacific Hake																
Pacific Herring																
River Lamprey																
Walleye Pollock																
Water Jellyfish																
Wolf Eel																
Yellowtail Rockfish																
TOTAL	14.94	16	19.18	47	3.06	4	10.89	42	0.34	3	1.28	4	26.54	58	4.25	3

Station Name	SOG65		SOG68		SOG69		SOG70		SOG71		SOG72		SOG73		SOG74	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)	2.31	2			1.24	1							2.72	1		
Chinook Salmon (Juveniles)	0.71	3					0.48	3			1.04	8			0.14	1
Chum Salmon (Adults)	27.01	6			137.10	33	7.54	2			5.35	1	4.09	1		
Chum Salmon (Juveniles)	1.58	15			1.94	20	12.52	129	4.20	43	0.10	1	11.18	111		
Coho Salmon (Adults)	1.49	1					1.30	2			4.27	2	3.06	1		
Coho Salmon (Juveniles)	1.74	5			1.02	4	8.64	32			0.31	2	0.67	3		
Pink Salmon (Juveniles)	3.22	52	0.22	4	8.54	149	2.32	32					2.29	39	0.04	1
Sockeye Salmon (Adults)																
Sockeye Salmon (Juveniles)							0.20	3			0.08	1				
Bay Pipefish																
Fried Egg Jellyfish																
Jellyfish																
Lions Mane	1.22	1							2.86	1	1.47	1				
Moon Jellyfish	0.12	2	0.68	5	0.56	6	23.65		0.76	4	0.24	3	3.50	8	0.33	4
North Pacific Spiny Dogfish																
Northern Anchovy											0.02	1				
Opalescent Inshore Squid	0.08	21		3							0.03	5		1		
Pacific Hake	0.07	1														
Pacific Herring							63.99	8,140			0.58	29				
River Lamprey																
Walleye Pollock																
Water Jellyfish																
Wolf Eel																
Yellowtail Rockfish																
TOTAL	39.55	109	0.90	12	150.40	213	120.64	8,343	7.82	48	13.49	54	27.51	165	0.51	6

Station Name	SOG75		SOG76		SOG77		SOG78		SOG79		JS01		JS02		JS03	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)			0.84	1												
Chinook Salmon (Juveniles)	0.03	1	0.16	1			0.35	3	0.09	1						
Chum Salmon (Adults)			7.47	2			4.34	1	7.01	2	3.13	1			21.77	6
Chum Salmon (Juveniles)	15.27	149	0.50	5			1.04	11			1.32	15				
Coho Salmon (Adults)			3.11	1	3.07	1	2.46	1			1.70	1			4.55	1
Coho Salmon (Juveniles)	0.22	1	2.60	11	0.48	2	0.20	1			0.51	1				
Pink Salmon (Juveniles)	1.35	23	18.71	308	0.05	1	0.57	10			0.20	3	0.63	12	0.32	8
Sockeye Salmon (Adults)																
Sockeye Salmon (Juveniles)	0.06	1			0.01	1									0.08	3
Bay Pipefish				2		1										
Fried Egg Jellyfish																
Jellyfish											0.09					
Lions Mane									3.04	1					0.10	
Moon Jellyfish	1.51	5	1.85	13	0.16	3	0.49	2	0.05	1						
North Pacific Spiny Dogfish																
Northern Anchovy																
Opalescent Inshore Squid																
Pacific Hake					0.46	1										
Pacific Herring	0.09	1					12.66	2,261								
River Lamprey																
Walleye Pollock																
Water Jellyfish																
Wolf Eel																
Yellowtail Rockfish																
TOTAL	18.53	181	35.24	344	4.23	10	22.11	2,290	10.19	5	6.95	21	0.63	12	26.82	18

Station Name	JS04		QCST01		QCST02		QCST03		QCST04		QCST05		QCST06		QCST07	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Adults)																
Chinook Salmon (Juveniles)													0.16	1		
Chum Salmon (Adults)			2.72	1			10.01	3								
Chum Salmon (Juveniles)	0.60	8					0.98	11	0.15	1						
Coho Salmon (Adults)	2.01	1			3.42	1										
Coho Salmon (Juveniles)	0.40	1	0.24	1			0.62	4	2.88	13	0.74	3	1.31	5	1.58	6
Pink Salmon (Juveniles)	5.23	135	0.61	14	0.40	10	2.58	53								
Sockeye Salmon (Adults)	1.71	1														
Sockeye Salmon (Juveniles)	0.02	1														
Bay Pipefish																
Fried Egg Jellyfish							0.97	1								
Jellyfish																
Lions Mane			9.32	1			0.65		5.42	1	2.19	1			24.10	5
Moon Jellyfish																
North Pacific Spiny Dogfish																
Northern Anchovy																
Opalescent Inshore Squid																
Pacific Hake																
Pacific Herring																
River Lamprey																
Walleye Pollock																
Water Jellyfish	0.02															
Wolf Eel																
Yellowtail Rockfish																
TOTAL	9.99	147	12.89	17	3.82	11	15.81	72	8.45	15	2.93	4	1.47	6	25.68	11