

# **Ecosystem-Based Juvenile Pacific Salmon (*Oncorhynchus spp.*) Trawl Survey off North and West Coast Vancouver Island, British Columbia, October 5 - 14, 2023**

Amy M. Tabata, Kelsey L. Flynn, Tyler B. Zubkowski, and Jackie R. King

Pacific Biological Station  
Fisheries and Oceans Canada  
3190 Hammond Bay Road  
Nanaimo, British Columbia  
V9T 6N7, Canada

2024

## **Canadian Data Report of Fisheries and Aquatic Sciences 1394**



Fisheries and Oceans  
Canada

Pêches et Océans  
Canada

**Canada**

## **Canadian Data Report of Fisheries and Aquatic Sciences**

Data reports provide a medium for filing and archiving data compilations where little or no analysis is included. Such compilations commonly will have been prepared in support of other journal publications or reports. The subject matter of the series reflects the broad interests and policies of Fisheries and Oceans Canada, namely, fisheries management, technology and development, ocean sciences, and aquatic environments relevant to Canada.

The correct citation appears above the abstract of each report. Each report is abstracted in the data base *Aquatic Sciences and Fisheries Abstracts*.

Data reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page.

Numbers 1-25 in this series were issued as Fisheries and Marine Service Data Records. Numbers 26-160 were issued as Department of Fisheries and Environment, Fisheries and Marine Service Data Reports. The current series name was changed with report number 161.

## **Rapport statistique canadien des sciences halieutiques et aquatiques**

Les rapports statistiques servent de base à la compilation des données de classement et d'archives pour lesquelles il y a peu ou point d'analyse. Cette compilation aura d'ordinaire été préparée pour appuyer d'autres publications ou rapports. Les sujets des rapports statistiques reflètent la vaste gamme des intérêts et politiques de Pêches et Océans Canada, notamment la gestion des pêches, la technologie et le développement, les sciences océaniques et l'environnement aquatique, au Canada.

Le titre exact figure au haut du résumé de chaque rapport. Les rapports à l'industrie sont résumés dans la base de données *Résumés des sciences aquatiques et halieutiques*.

Les rapports statistiques sont produits à l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement d'origine dont le nom figure sur la couverture et la page du titre.

Les numéros 1 à 25 de cette série ont été publiés à titre de Records statistiques, Service des pêches et de la mer. Les numéros 26-160 ont été publiés à titre de Rapports statistiques du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom de la série a été modifié à partir du numéro 161.

Canadian Data Report of  
Fisheries and Aquatic Sciences 1394

2024

ECOSYSTEM-BASED JUVENILE PACIFIC SALMON (*ONCORHYNCHUS* SPP.) TRAWL  
SURVEY OFF NORTH AND WEST COAST VANCOUVER ISLAND, BRITISH COLUMBIA,  
OCTOBER 5 - 14, 2023

by

Amy M. Tabata, Kelsey L. Flynn, Tyler B. Zubkowski, and Jackie R. King

Pacific Biological Station  
Fisheries and Oceans Canada, 3190 Hammond Bay Road  
Nanaimo, British Columbia, V9T 6N7, Canada

© His Majesty the King in Right of Canada, as represented by the Minister of the  
Department of Fisheries and Oceans, 2024  
Cat. No. Fs97-13/1394E-PDF ISBN 978-0-660-71339-7 ISSN 1488-5395

Correct citation for this publication:

Tabata, A.M., Flynn, K.L., Zubkowski, T.B., and King, J.R. 2024. Ecosystem-Based Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey off North and West Coast Vancouver Island, British Columbia, October 5 - 14, 2023. Can. Data Rep. Fish. Aquat. Sci. 1394: vi + 34 p.

## CONTENTS

<b>ABSTRACT</b>	<b>v</b>
<b>RÉSUMÉ</b>	<b>vi</b>
<b>1 INTRODUCTION</b>	<b>1</b>
<b>2 METHODS</b>	<b>1</b>
2.1 SURVEY LOCATIONS . . . . .	1
2.2 FISHING OPERATIONS . . . . .	1
2.3 CATCH PROCESSING . . . . .	2
2.4 BIOLOGICAL SAMPLES . . . . .	2
2.5 OCEANOGRAPHY . . . . .	2
2.6 ZOOPLANKTON . . . . .	3
<b>3 RESULTS</b>	<b>3</b>
3.1 FISHING OPERATIONS . . . . .	3
3.2 CATCH COMPOSITION . . . . .	4
3.3 BIOLOGICAL SAMPLES . . . . .	4
3.4 LENGTH AND WEIGHT . . . . .	4
3.5 STOMACH CONTENTS . . . . .	5
3.6 OCEANOGRAPHY . . . . .	5
3.7 ZOOPLANKTON . . . . .	5
<b>4 DISCUSSION</b>	<b>5</b>
<b>5 ACKNOWLEDGEMENTS</b>	<b>6</b>
<b>6 REFERENCES</b>	<b>7</b>
<b>7 TABLES</b>	<b>7</b>

<b>8 FIGURES</b>	<b>12</b>
<b>APPENDICES</b>	<b>21</b>
<b>A NET SPECIFICATIONS</b>	<b>21</b>
<b>B THE BEAUFORT SCALE</b>	<b>23</b>
<b>C TRAWL BRIDGE LOG DATA</b>	<b>24</b>
<b>D CTD CASTS AND ZOOPLANKTON TOWS</b>	<b>29</b>
<b>E CATCH DATA</b>	<b>31</b>

## ABSTRACT

Tabata, A.M., Flynn, K.L., Zubkowski, T.B., and King, J.R. 2024. Ecosystem-Based Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey off North and West Coast Vancouver Island, British Columbia, October 5 - 14, 2023. Can. Data Rep. Fish. Aquat. Sci. 1394: vi + 34 p.

Fisheries and Oceans Canada conducted an ecosystem-based trawl survey from October 05 to 14, 2023 on the *CCGS Sir John Franklin*. This study targeted juvenile Pacific Salmon (*Oncorhynchus* spp.) off the north and west coast of Vancouver Island. Vessel breakdown precluded completion of the full survey, so only 8 fishing days were completed. In 21 tows, there were 29 species sampled in 1,175 kg of catch, with 7% juvenile Pacific Salmon caught by weight (79.58 kg). *Water Jellyfish (Aequorea)*, Pacific Herring (*Clupea pallasii*), and adult Chum Salmon (*Oncorhynchus keta*) were the most abundant catch by weight. There were 1,281 individual lengths and 829 individual weights recorded, including all 5 Pacific Salmon (*Oncorhynchus*) species. Juvenile salmon species caught, in decreasing catch weight, were: Pink Salmon, Chum Salmon, Coho Salmon, Chinook Salmon and Sockeye Salmon, with catch distribution varied based on species. Common prey species for juvenile salmon included unidentified fishes, crabs, Opalescent Inshore Squid and unidentified remains. Biological samples for genetic stock composition, otoliths, energy density, gills, and coded wire tags are at the Pacific Biological Station, Fisheries and Oceans Canada (Nanaimo, BC). Associated information on the physical oceanography (19 stations) and zooplankton composition (14 stations) was collected and will be analysed at the Institute of Ocean Sciences, Fisheries and Oceans Canada (Sidney, BC).

## RÉSUMÉ

Tabata, A.M., Flynn, K.L., Zubkowski, T.B., and King, J.R. 2024. Ecosystem-Based Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey off North and West Coast Vancouver Island, British Columbia, October 5 - 14, 2023. Can. Data Rep. Fish. Aquat. Sci. 1394: vi + 34 p.

Pêches et Océans Canada a mené une étude écosystémique au chalutage pélagique du octobre 05 du 14, 2023 sur le *CCGS Sir John Franklin*. Cette étude ciblait les saumons du Pacifique juvéniles (*Oncorhynchus* spp.) de la région du nord et ouest de l'île de Vancouver. En 21 traits, il y avait 29 espèces échantillonnées dans 1,175 kg de prises, avec 7% de juvénile saumon du Pacifique capturé en poids (79.58 kg). *Aequorea* (*Aequorea*), le hareng du Pacifique (*Clupea pallasii*), et les saumon kéta adultes (*Oncorhynchus keta*) étaient les espèces les plus abondantes en poids. On a enregistré 1,281 longueurs individuelles et 829 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 rose, saumon kéta, saumon coho, saumon quinnat et saumon rouge, avec la répartition des prises variait selon les espèces. Les espèces de proies communes aux saumons juvéniles comprenaient des poissons non identifiés, des crabes, des calmars opales et des restes non identifiés. Les échantillons biologiques pour la composition des stocks génétique, les otolithes, la densité énergétique, les branchies 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 (19 stations) et la composition du zooplancton (14 stations) ont été collectées et seront analysées à l'Institut des sciences de la mer, Pêches et Océans Canada (Sidney, C.-B.).



## 1 INTRODUCTION

Fisheries and Oceans Canada conducted an ecosystem-based midwater trawl survey, targeting juvenile Pacific Salmon (*Oncorhynchus* spp.) from October 05 to 14, 2023 on the *CCGS Sir John Franklin*. The main objectives of this survey were:

1. to determine the abundance, condition, distribution, and genetic stock composition of juvenile Pacific Salmon present off the north and west coast of Vancouver Island in the fall,
2. the associated physical oceanography, and
3. the distribution and biomass of prey species, including zooplankton.

This survey supports research into linkages between oceanographic conditions, fish abundance and community composition, Pacific Salmon ocean ecology and forecasting adult returns. This data report documents the biological, oceanographic, and zooplankton data and samples collected during the ecosystem-based juvenile Pacific Salmon survey from October 05 to 14, 2023.

## 2 METHODS

### 2.1 SURVEY LOCATIONS

Fishing, oceanographic, and zooplankton sampling occurred off the north and west coast of Vancouver Island, including Queen Charlotte Strait, Queen Charlotte Sound, and west coast Vancouver Island (Figures 1 and 2).

### 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<sup>2</sup> (Figure A.1). The net was towed at 4 to 5 knots (7.4 - 9.3 km/hr) for a target duration of 20 minutes. 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 target headrope depths were 0 m (surface) and 15 m (depth). Two A-6 floats 86.4 cm x 118.1 cm (34" x 46.5") were attached to the headrope for surface tows.

The trawl net was fished with Thyborøn Type 15 VF, 4.5 m<sup>2</sup> 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 behavior, with Coho Salmon considered juveniles < 400 mm and all other Pacific Salmon species considered juveniles < 350 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 and then five subsequent muscle tissues for stable isotope analyses. 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), presence and retention of coded wire tags (CWTs) and gill tissues for infectious agents and fitness.

## **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 approximately 250 m or 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 stable isotope, energy density, and proximate analyses.

## **3 RESULTS**

### **3.1 FISHING OPERATIONS**

The survey was terminated 8 days early, on October 12 after a major vessel failure necessitated stopping all survey activities to return to port. This resulted in a large reduction to the survey area covered. This survey conducted 22 trawl net tows off the north and west coast of Vancouver Island with 21 trawls completed successfully (Figure 1 and Appendix C). There was 1 unusable tow due to inclement weather conditions resulting in problems with equipment deployment (identified by Usable = N in Appendix C). The survey area was initially impacted by high winds and sea state, resulting in additional sampling days in Quatsino Sound.

The survey area was initially impacted by high winds and sea state, resulting in additional sampling days in Quatsino Sound. The survey was terminated 8 days early, on October 12 after a major vessel failure necessitated stopping all survey activities to return to port. This resulted in a large reduction to the survey area covered.

Tow speed averaged 7.5 km/hr (4 knots), and varied between 5.4 to 8.5 km/hr (2.9 - 4.6 knots) speed over ground, depending on the wind, tide, and current. Warp length ranged from 200 m to 240 m (Appendix C).

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 16 m and 48 m for surface tows and 11 m and 53 m for 15 m target depth tows; Table C.1).

### **3.2 CATCH COMPOSITION**

Total catch for the survey from usable tows was 1,175 kg, with 79.58 kg (7% ) juvenile Pacific Salmon. Detailed catch composition for each tow is included in Appendix E. 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 Water Jellyfish (633.52 kg), in 100% of the tows, Pacific Herring (171.6 kg) in 19% of the tows, and adult Chum Salmon (131.7 kg in 29% of the tows (Table 1). Juvenile Pacific Salmon species caught, in order of abundance by weight, were: Pink Salmon, Chum Salmon, Coho Salmon, Chinook Salmon and Sockeye Salmon. The survey targeted juvenile Pacific Salmon so the catches of adult Pacific Salmon should be interpreted with care.

The location and catch per unit effort (CPUE,  $\text{kg}/\text{km}^3$ ) of juvenile salmon is shown in Figure 3. Juvenile Chinook Salmon were caught along the west coast of Vancouver Island, both on the shelf and in Quatsino Sound. Juvenile Chum Salmon, Coho Salmon and Pink Salmon were caught in Queen Charlotte Strait and Queen Charlotte Sound, with juvenile Chum Salmon also being caught in Quatsino Sound and Coho Salmon also being found along the shelf off the west coast of Vancouver Island. Juvenile Sockeye Salmon were the least abundant salmon species found only in the northern-most stations around Triangle Island. The location and catch per unit effort (CPUE,  $\text{kg}/\text{km}^3$ ) of other, non-salmonid, frequently caught species is shown in Figure 4.

### **3.3 BIOLOGICAL SAMPLES**

Samples were collected for DNA stock composition (369), otoliths (230), energy density (132), stable isotope analysis (117), coded wire tags (4), and gill samples for infectious agents (40). These biological samples were returned to the Pacific Biological Station, Fisheries and Oceans Canada (Nanaimo, BC).

### **3.4 LENGTH AND WEIGHT**

Lengths and weights of 17 species were recorded (Table 2). Within juvenile Pacific salmon, Coho Salmon had the largest maximum length (294 mm) and weight (324 g), whereas Chinook Salmon had the smallest maximum length (162 mm) and weight (60 g). Length frequencies and length-weight relationships are presented for Pacific Salmon species in Figures 5 to 8. Sockeye Salmon is not shown due to the small sample size ( $n=3$ ). 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, however the sample size for Sockeye Salmon was small. A larger coefficient typically represents better condition, whereas a smaller coefficient typically represents worse condition. Length frequencies for species for other species with at least 50 individuals measured is shown in Figure 9.

### **3.5 STOMACH CONTENTS**

Stomachs of 256 individual fish, from 10 species, were analysed at sea (Table 3). Juvenile Pacific Salmon species had between 5 and 67% empty stomachs, with juvenile Sockeye Salmon having the highest percentage and juvenile Chum Salmon having the lowest percentage (Table 3). The frequency of observation and average volume of identified prey is shown in Table 4. Squid was the most frequently observed prey for juvenile Chinook Salmon, while Pacific Herring and then crabs had the highest average volume. For juvenile Chum Salmon, the most common stomach contents were unidentified remains, while euphausiids had the highest average volume when present. Since gelatinous prey are digested quickly, it is likely that the unidentified remains in the juvenile Chum Salmon may be ctenophores and jellyfish. More juvenile Coho Salmon stomach contained crabs compared to other prey, although the most voluminous prey was unidentified fish (Table 4). The most common prey for juvenile Pink Salmon was amphipods, although the most voluminous prey was unidentified fish. Finally, for juvenile Sockeye Salmon the only sample containing stomach contents had only a trace amount of unidentified remains.

### **3.6 OCEANOGRAPHY**

CTD casts and water samples were completed at 19 sites (Figure 2) with cast depths ranging from 61 m to 1,306 m (Appendix D). Samples were collected for nutrients and chlorophyll at approximately 5 m below the surface. Additional sampling time in Quatsino Sound allowed for additional oceanography only sampling locations in support of the Fisheries and Oceans Canada Water Properties programs. 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 2023-009, as well as [Canadian Integrated Ocean Observing System](#) or CIOOS.

### **3.7 ZOOPLANKTON**

Vertical bongo tows were conducted at 14 stations (Figure 2) to depths ranging from 56 m to 250 m (Appendix D). 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).

## **4 DISCUSSION**

The data generated by this ecosystem-based juvenile Pacific Salmon trawl survey in 2023 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. Although the geographic range of this survey in 2023 was limited due to weather, and then vessel failure, this data provides valuable information on distribution,

abundance, condition, and genetic stock composition for juvenile Pacific Salmon off the north and west coast of Vancouver Island north of Kyoquot Sound and 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. As it becomes available, the data from laboratory analysis (i.e. GSI, energy density, isotopic analysis, zooplankton composition) will be integrated into the survey data. This data supplements historic juvenile Pacific Salmon surveys, and will be reported in Fisheries and Oceans Canada [State of the Pacific Ocean](#), and is being incorporated into longer term and broader scope research projects.

## 5 ACKNOWLEDGEMENTS

We would like to acknowledge that we conducted scientific research in the following First Nations territories: Ahousaht, Cowichan, Dididaht, Dzawada'enuxw (Tsawataineuk), Ehattesaht, Gitxaala, Gwa'sala-Nakwaxda'xw, Gwawaenuk, Halalt, Heitsuk, Hesquiaht, Hupacasath, Huu-ay-aht, Kyuquot/Chesleseht, Kwakiutl, Kwikwasut'inuxw Haxwa'mis, Lyackson, Mamalilikulla, Mowachacht/Muchalaht, 'Namgis, Nuchatlaht, Pacheedaht, Penelakut, Quatsino, Tla-o-qui-aht, Tlatlasikwala, Tseshaht, T'Sou-ke, Ts'uubaa-asatx, Wuikinuxv. We would like to thank Captain Dustin Flahr, and crew of the *CCGS Sir John Franklin*. We appreciate the expertise of the following additional science staff who participated in the survey: Colin Bailey, Spencer Chaisson, Sebastian Pardo and Cindy Wright.

## 6 REFERENCES

King, J., J. L. Boldt, and S. King. 2018. "Proceedings of the Pacific Region Workshop on Stomach Content Analyses, February 27-March 1 2018, Nanaimo, British Columbia." *Can. Tech. Rep. Fish. Aquat. Sci.*, no. 3274: v + 55 p.

## 7 TABLES

Table 1. All captured species (or taxonomic group), ordered by total catch weight (in grams), 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*, October 05 to 14, 2023. 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
Water Jellyfish	<i>Aequorea</i>	21		633.52	116.00	30
Pacific Herring	<i>Clupea pallasii</i>	4	42,301	171.60	160.66	43
Chum Salmon (Adults)	<i>Oncorhynchus keta</i>	6	40	131.70	77.23	22
Moon Jellyfish	<i>Aurelia labiata</i>	17	59	52.96	18.34	3
Lions Mane	<i>Cyanea capillata</i>	10	10	35.49	12.20	4
Pink Salmon (Juveniles)	<i>Oncorhynchus gorbuscha</i>	7	618	32.46	13.76	5
Sea Nettle	<i>Chrysaora fuscescens</i>	6		27.04	6.77	5
Chum Salmon (Juveniles)	<i>Oncorhynchus keta</i>	11	209	21.55	12.63	2
Coho Salmon (Juveniles)	<i>Oncorhynchus kisutch</i>	10	45	14.60	7.73	1
Jack Mackerel	<i>Trachurus symmetricus</i>	2	12	12.03	12.03	12
Opalescent Inshore Squid	<i>Doryteuthis opalescens</i>	7	7,010	11.00	7.23	2
Fried Egg Jellyfish	<i>Phacellophora camtschatica</i>	3	2	10.79	10.28	4
Chinook Salmon (Juveniles)	<i>Oncorhynchus tshawytscha</i>	9	179	10.75	4.64	1
Coho Salmon (Adults)	<i>Oncorhynchus kisutch</i>	2	2	5.75	3.11	3
Molas	<i>Molidae</i>	1	1	2.47	2.47	2
Sablefish	<i>Anoplopoma fimbria</i>	3	3	0.58	0.21	0
Moon Jellyfish	<i>Aurelia</i>	1		0.45	0.45	0
Prowfish	<i>Zaprora silenus</i>	4	6	0.24	0.08	0
Sockeye Salmon (Juveniles)	<i>Oncorhynchus nerka</i>	2	3	0.22	0.15	0
Jellyfish	<i>Scyphozoa</i>	1	4	0.22	0.22	0
Deacon Rockfish	<i>Sebastes diaconus</i>	1	1	0.02	0.02	0
Wolf Eel	<i>Anarrhichthys ocellatus</i>	1	1	0.02	0.02	0
Rockfishes	<i>Sebastes</i>	5	10			
Codfishes	<i>Gadidae</i>	1	1			
Comb Jellyfish	<i>Ctenophora</i>	1	1			
Cross Jellyfish	<i>Mitrocoma cellularia</i>	1	1			
Flatfishes	<i>Pleuronectiformes</i>	1	1			
Pipefishes	<i>Syngnathidae</i>	1	1			
Threespine Stickleback	<i>Gasterosteus aculeatus</i>	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*, October 05 to 14, 2023. 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.

Common Name	Tows	Length (mm)					Weight (g)			
		Type	Lengths	Min	Max	Mean	Weights	Min	Max	Mean
Pink Salmon (Juveniles)	7	FL	313	125	236	179	313	18	144	61
Chum Salmon (Juveniles)	11	FL	208	164	258	207	208	37	217	104
Opalescent Inshore Squid	4	ML	203	9	62	28				
Pacific Herring	4	SL	199	65	215	76	24	4	108	17
Chinook Salmon (Juveniles)	9	FL	175	120	268	162	174	20	246	60
Moon Jellyfish	15	BD	58	70	361	246				
Coho Salmon (Juveniles)	10	FL	45	207	341	294	45	96	492	324
Chum Salmon (Adults)	6	FL	38	574	728	641	38	2434	5118	3296
Jack Mackerel	1	FL	10	453	513	475	10	972	1461	1167
Lions Mane	6	BD	10	173	518	335				
Prowfish	4	FL	6	95	187	147	6	10	74	40
Prowfish	4	TL	6	95	187	147	6	10	74	40
Fried Egg Jellyfish	2	BD	3	87	197	128				
Sablefish	3	FL	3	263	295	279	3	161	218	194
Sockeye Salmon (Juveniles)	2	FL	3	176	201	186	3	62	86	71
Coho Salmon (Adults)	2	FL	2	628	646	637	2	2624	3086	2855
Mackerels	1	FL	2	53	57	55				
Deacon Rockfish	1	TL	1	129	129	129	1	25	25	25
Molas	1	TL	1	333	333	333	1	2454	2454	2454
Wolf Eel	1	TL	1	385	385	385	1	20	20	20



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), arranged descending by number of tows, during the ecosystem-based juvenile Pacific Salmon survey aboard the *CCGS Sir John Franklin*, October 05 to 14, 2023.

Species	Tows	Stomachs	Empty	Percent
Chum Salmon (Juveniles)	11	56	3	5
Coho Salmon (Juveniles)	10	33	7	21
Chinook Salmon (Juveniles)	9	52	6	12
Pink Salmon (Juveniles)	7	62	6	10
Chum Salmon (Adults)	6	24	7	29
Prowfish	4	6	1	17
Sablefish	3	3	0	0
Pacific Herring	2	4	2	50
Coho Salmon (Adults)	2	2	2	100
Sockeye Salmon (Juveniles)	2	3	2	67
Jack Mackerel	1	10	3	30
Deacon Rockfish	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*, October 05 to 14, 2023. Frequency of occurrence (FO) is the proportion of non-empty stomachs containing that prey item and volume is the mean volume in cm<sup>3</sup>.

Species	Prey	FO	Volume
Chinook Salmon (Juveniles)	Opalescent Inshore Squid	0.50	0.96
Chinook Salmon (Juveniles)	Unidentified Fishes	0.41	0.90
Chinook Salmon (Juveniles)	Crabs	0.13	3.27
Chinook Salmon (Juveniles)	Squid	0.13	1.03
Chinook Salmon (Juveniles)	Unidentified Remains	0.11	0.18
Chinook Salmon (Juveniles)	Flatfishes	0.11	0.10
Chinook Salmon (Juveniles)	Amphipods	0.07	0.01
Chinook Salmon (Juveniles)	Octopus	0.04	0.70
Chinook Salmon (Juveniles)	Euphausiids	0.04	0.16
Chinook Salmon (Juveniles)	Pacific Herring	0.02	3.90
Chum Salmon (Adults)	Unidentified Remains	0.94	1.31
Chum Salmon (Adults)	Opalescent Inshore Squid	0.06	1.10
Chum Salmon (Juveniles)	Unidentified Remains	0.83	0.24
Chum Salmon (Juveniles)	Amphipods	0.09	0.28
Chum Salmon (Juveniles)	Comb Jellyfish	0.08	0.43
Chum Salmon (Juveniles)	Euphausiids	0.06	0.93
Chum Salmon (Juveniles)	Squid	0.06	0.27
Chum Salmon (Juveniles)	Unidentified Fishes	0.04	0.85
Chum Salmon (Juveniles)	Flatfishes	0.02	0.30
Chum Salmon (Juveniles)	Unidentified Plankton	0.02	0.01
Coho Salmon (Juveniles)	Crabs	0.58	0.67
Coho Salmon (Juveniles)	Euphausiids	0.31	1.17
Coho Salmon (Juveniles)	Unidentified Fishes	0.23	3.85
Coho Salmon (Juveniles)	Unidentified Remains	0.19	0.15
Coho Salmon (Juveniles)	Amphipods	0.15	1.70
Coho Salmon (Juveniles)	Jack Mackerel	0.04	2.30
Coho Salmon (Juveniles)	Flatfishes	0.04	0.20
Deacon Rockfish	Euphausiids	1.00	0.80
Jack Mackerel	Unidentified Remains	0.57	0.85
Jack Mackerel	Jellyfish	0.43	1.03
Jack Mackerel	Pacific Herring	0.14	22.00
Jack Mackerel	Comb Jellyfish	0.14	0.10
Jack Mackerel	Squid	0.14	0.10
Pacific Herring	Amphipods	0.50	0.20
Pacific Herring	Crabs	0.50	0.10
Pink Salmon (Juveniles)	Amphipods	0.62	0.02
Pink Salmon (Juveniles)	Crabs	0.45	0.04
Pink Salmon (Juveniles)	Euphausiids	0.38	0.03
Pink Salmon (Juveniles)	Unidentified Remains	0.23	0.19
Pink Salmon (Juveniles)	Arrow Worms	0.09	0.03
Pink Salmon (Juveniles)	Copepods	0.04	0.01
Pink Salmon (Juveniles)	Misc. Non-Marine	0.04	0.01
Prowfish	Unidentified Remains	0.80	0.50
Prowfish	Amphipods	0.60	0.07
Sablefish	Unidentified Fishes	0.33	7.50

*Continued on next page ...*

... Continued from previous page

---

Species	Prey	FO	Volume
Sablefish	Jellyfish	0.33	0.60
Sablefish	Euphausiids	0.33	0.10
Sablefish	Crabs	0.33	0.10
Sablefish	Unidentified Remains	0.33	0.01
Sockeye Salmon (Juveniles)	Unidentified Remains	1.00	0.01

---

## 8 FIGURES

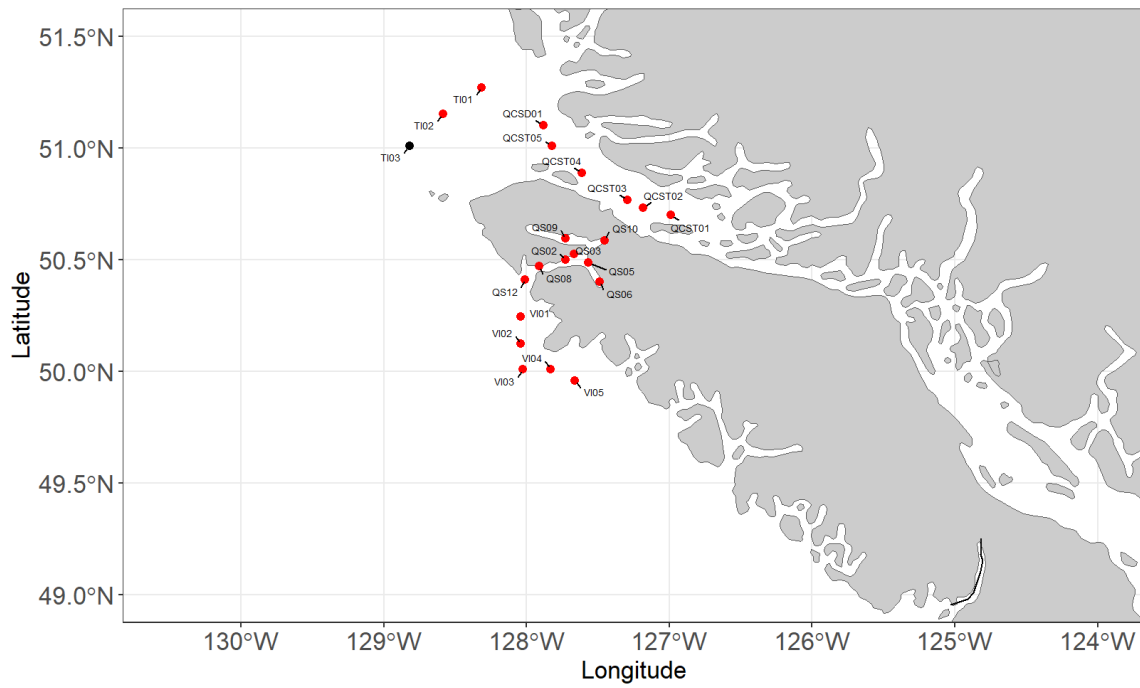


Figure 1. Location of survey midwater trawl fishing events during the ecosystem-based juvenile Pacific Salmon survey from October 05 to 14, 2023 on the *CCGS Sir John Franklin*. Location in black is unusable tow aborted due to inclement weather.

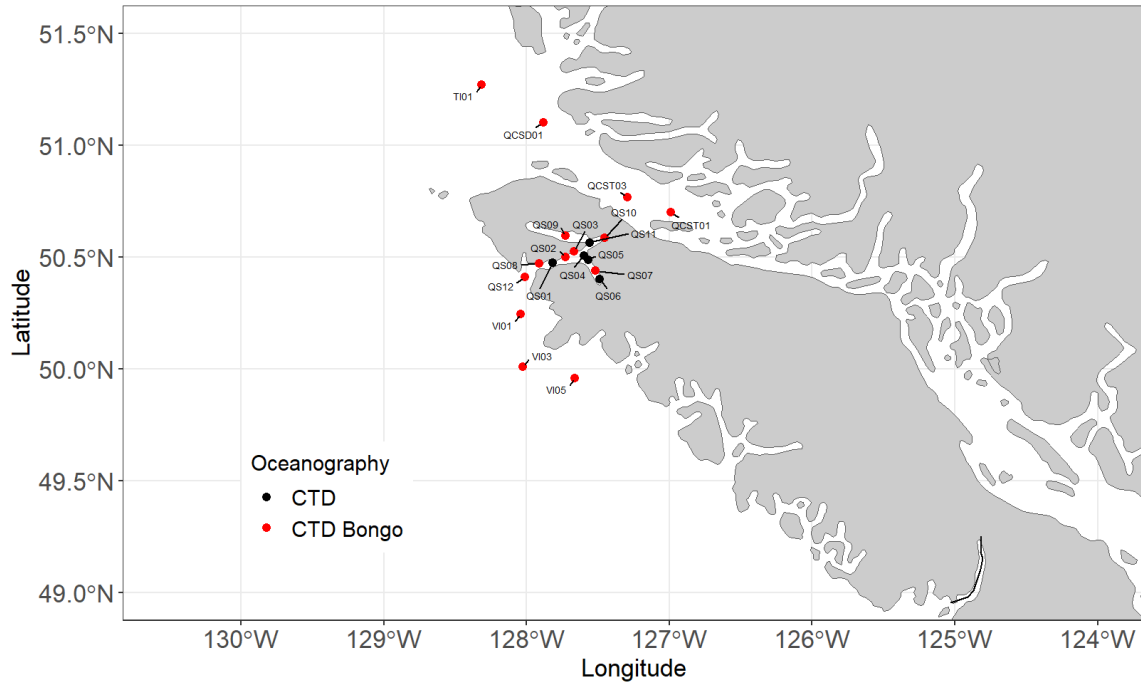


Figure 2. Location of survey oceanography events (CTD and plankton Bongos) during the ecosystem-based juvenile Pacific Salmon survey from October 05 to 14, 2023 on the CCGS *Sir John Franklin*.

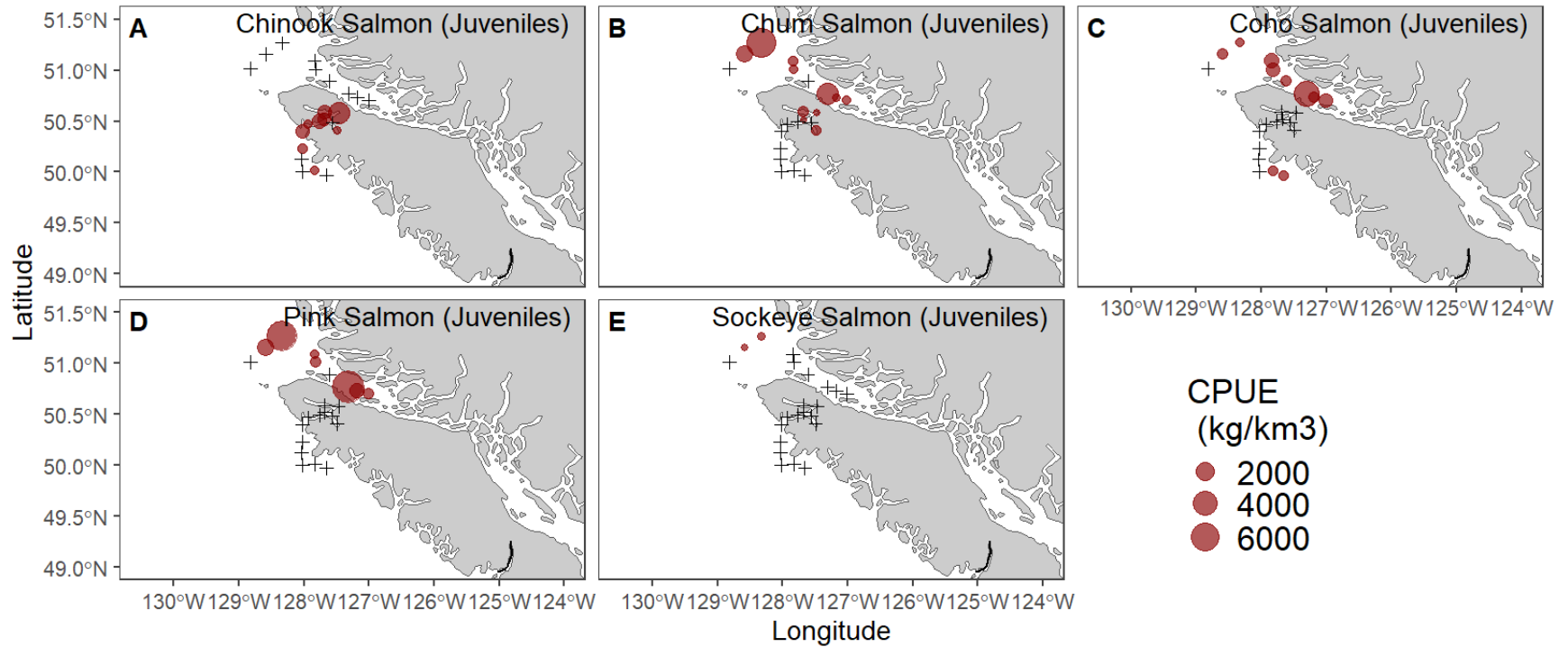


Figure 3. Juvenile Pacific Salmon (*Oncorhynchus* spp.) catch per unit effort (CPUE; kg/km<sup>3</sup>) for each tow. (A) Chinook Salmon (*Oncorhynchus tshawytscha*), (B) Chum Salmon (*Oncorhynchus keta*), (C) Coho Salmon (*Oncorhynchus kisutch*), (D) Pink Salmon (*Oncorhynchus gorbusha*) and (E) Sockeye Salmon (*Oncorhynchus nerka*). Circles are proportional to catch abundance, and zero catches are shown with a cross (+).

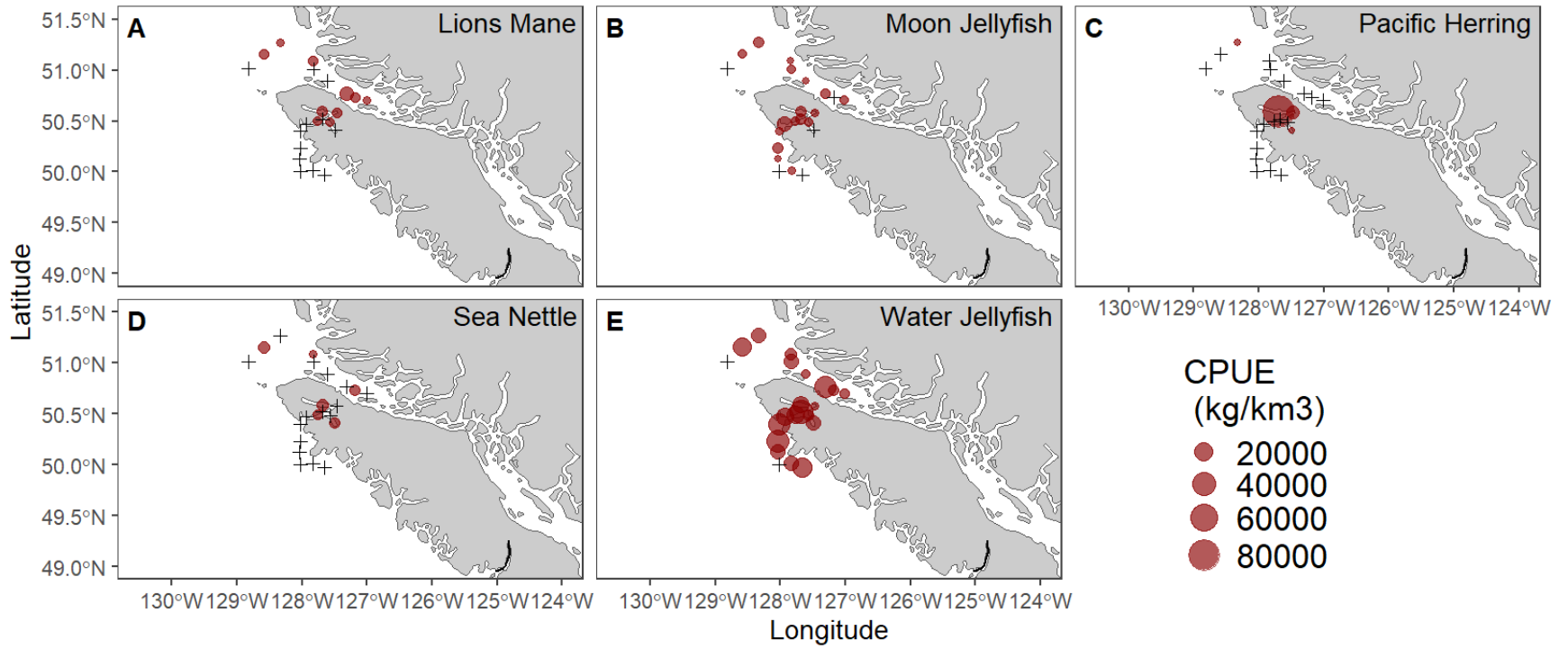


Figure 4. Catch per unit effort (CPUE; kg/km<sup>3</sup>) for commonly caught species by tow. Circles are proportional to catch abundance, and zero catches are shown with a cross (+).

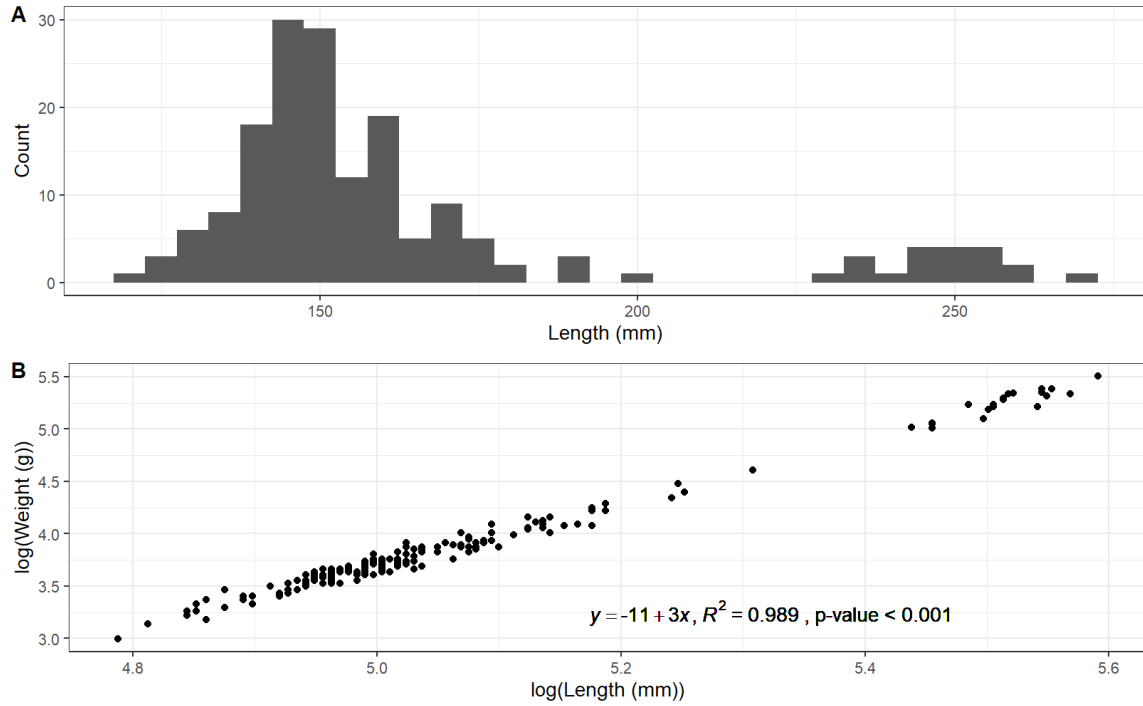


Figure 5. Chinook Salmon (*Oncorhynchus tshawytscha*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the *CCGS Sir John Franklin*, October 05 to 14, 2023 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).



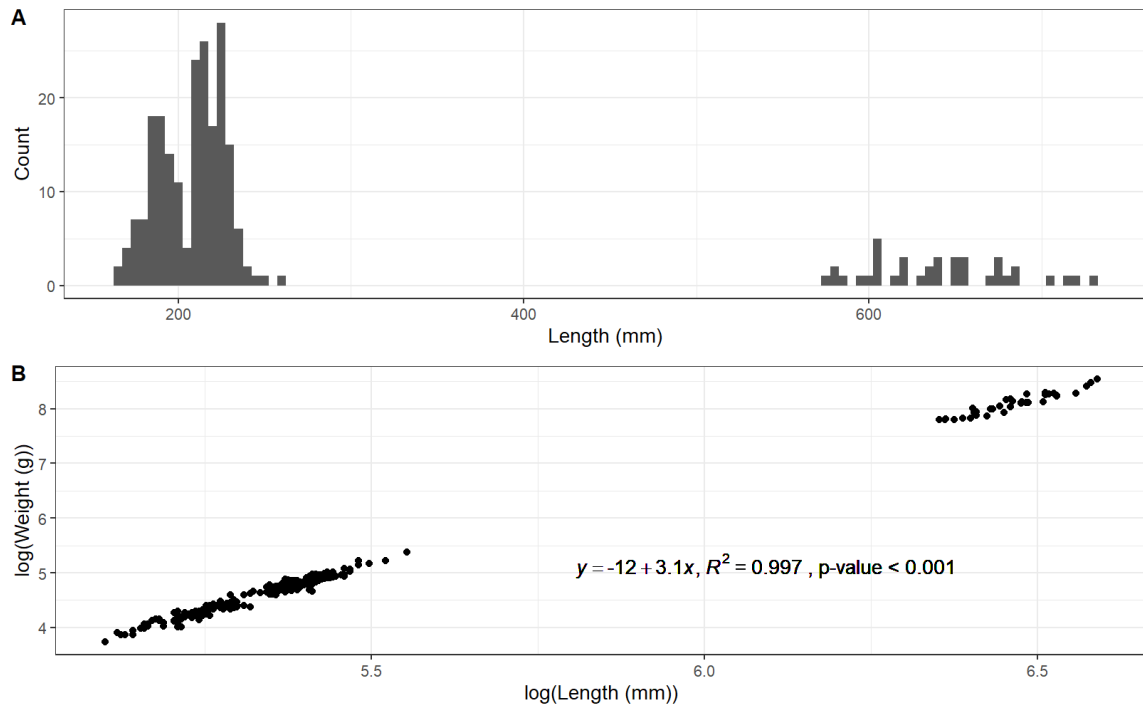


Figure 6. Chum Salmon (*Oncorhynchus keta*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the *CCGS Sir John Franklin*, October 05 to 14, 2023 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

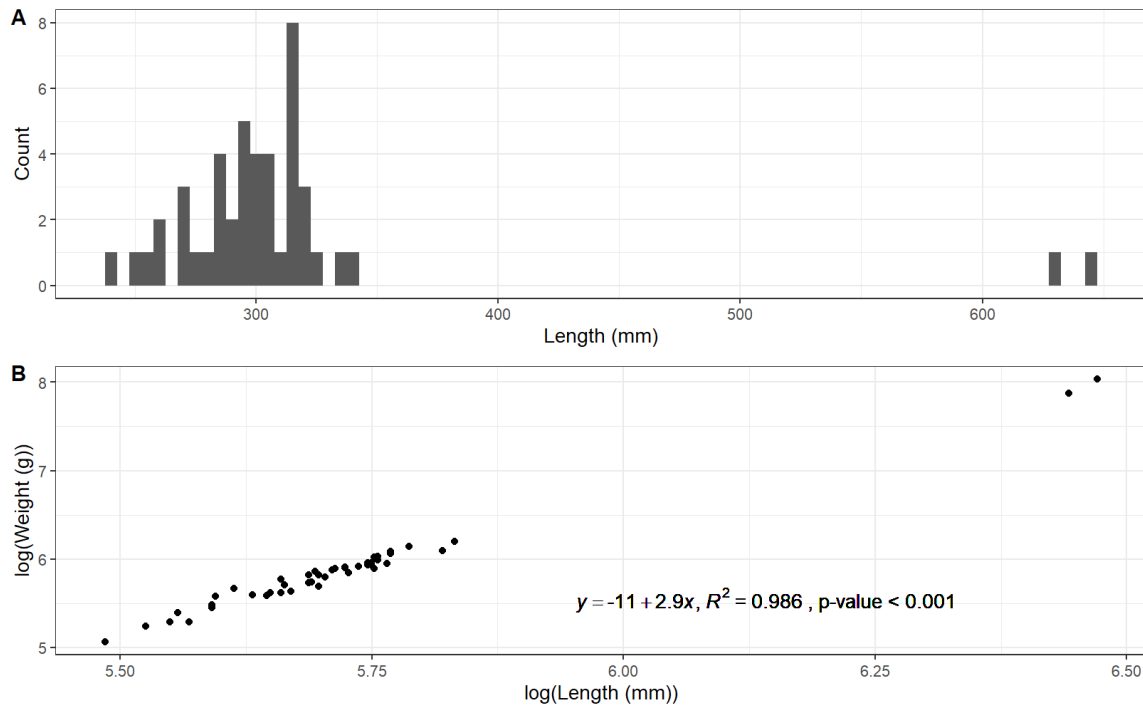


Figure 7. Coho Salmon (*Oncorhynchus kisutch*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the *CCGS Sir John Franklin*, October 05 to 14, 2023 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

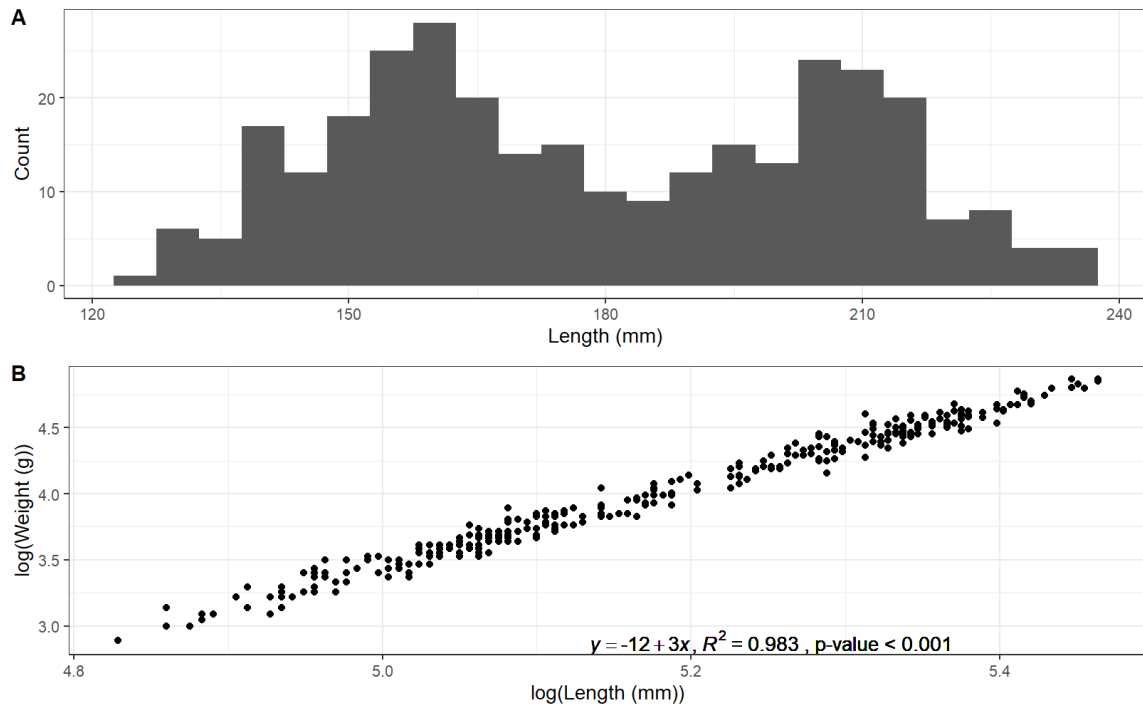


Figure 8. Pink Salmon (*Oncorhynchus gorbusha*) length frequency plot as sampled during the ecosystem-based juvenile Pacific Salmon survey aboard the *CCGS Sir John Franklin*, October 05 to 14, 2023 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

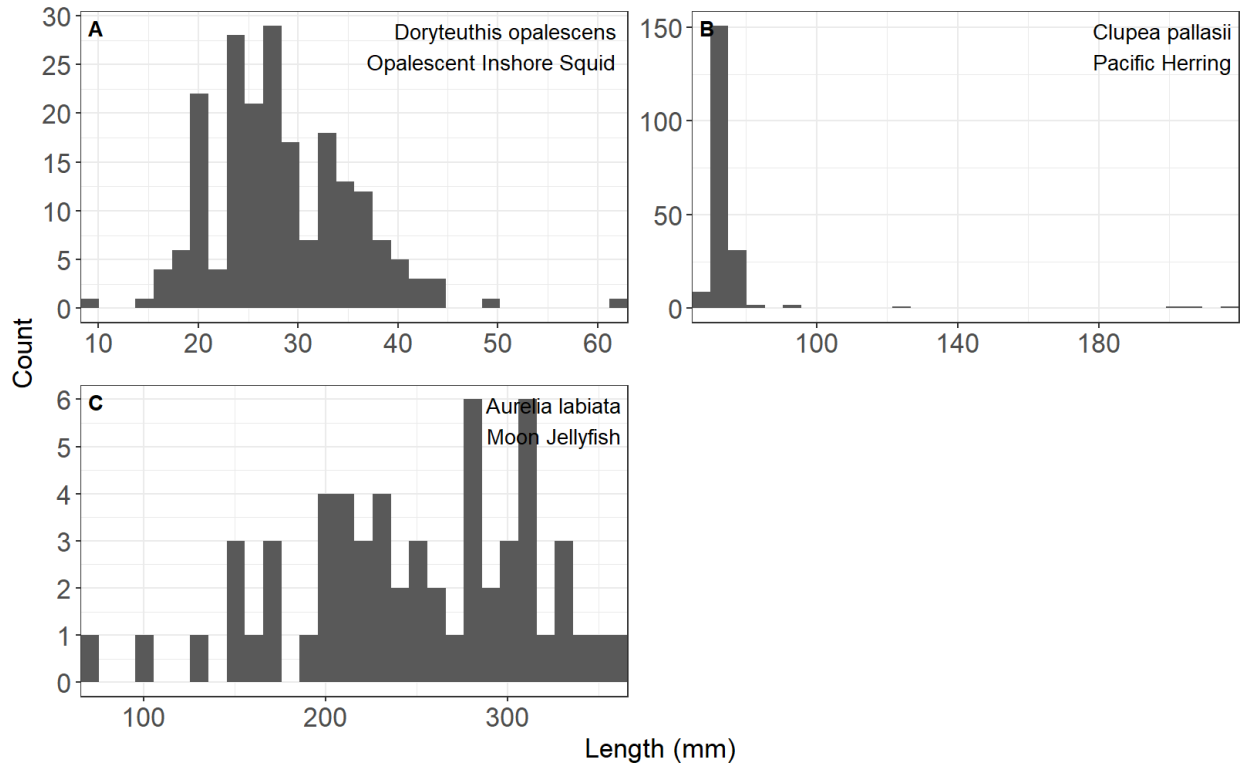


Figure 9. Length (mm) frequency plots for common species sampled ( $n > 50$  samples) during the ecosystem-based juvenile Pacific Salmon survey aboard the *CCGS Sir John Franklin*, October 05 to 14, 2023. (A) Opalescent Inshore Squid (*Doryteuthis opalescens*), length = Mantle Length, (B) Pacific Herring (*Clupea pallasii*), length = Standard Length, (C) Moon Jellyfish (*Aurelia labiata*), length = Bell Diameter.

## APPENDIX A NET SPECIFICATIONS

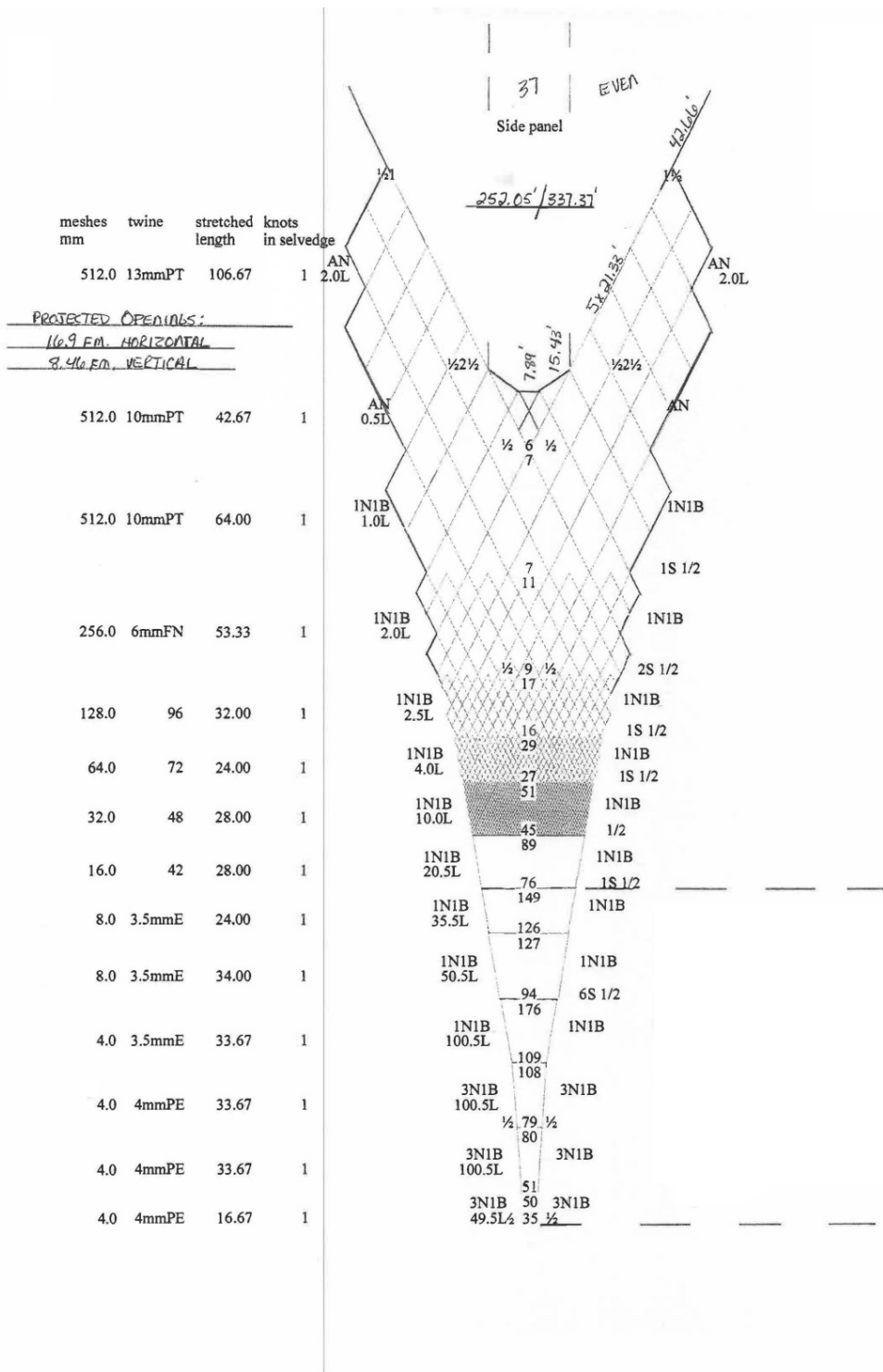


Figure A.1. Net specifications (side view) for the LFS 7742 trawl net used during the ecosystem-based juvenile Pacific Salmon survey from October 05 to 14, 2023 on the CCGS Sir John Franklin.

## 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*, October 05 to 14, 2023.

Station Name	QCST01	QCST02	QCST03	QCST04	QCST05	QCSD01
Tow	1	2	3	4	5	6
Event Number	3	4	7	8	9	10
Date (Pacific)	2023-10-07	2023-10-07	2023-10-07	2023-10-07	2023-10-07	2023-10-07
Start Time (Pacific)	07:43	09:30	11:21	13:22	14:43	15:57
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	21	20	20	20	20
Start Latitude	50° 42' 20" N	50° 44' 02" N	50° 46' 15" N	50° 53' 24" N	51° 00' 37" N	51° 05' 25" N
Start Longitude	127° 00' 36" W	127° 10' 54" W	127° 18' 37" W	127° 36' 44" W	127° 49' 25" W	127° 50' 21" W
End Latitude	50° 42' 54" N	50° 44' 24" N	50° 46' 29" N	50° 54' 17" N	51° 02' 04" N	51° 05' 45" N
End Longitude	127° 02' 37" W	127° 12' 55" W	127° 20' 53" W	127° 38' 33" W	127° 49' 54" W	127° 52' 30" W
Direction of Tow (deg)	292	285	278	307	347	283
Vessel Speed (km/h)	7.7	7.4	8.1	8.0	8.2	7.7
Distance Towed (km)	2.60	2.48	2.69	2.70	2.75	2.59
Net Opening Width (m)	47	53	46	54	49	54
Net Opening Height (m)	15	12	14	12	17	12
Warp Length (m)	200	240	200	240	200	240
Target Headrope Depth (m)	0	15	0	15	0	15
Median Headrope Depth (m)	4	17	4	20	6	16
Start Bottom Depth (m)	178	189	213	398	144	109
End Bottom Depth (m)	167	198	258	430	144	123
Usable	Y	Y	Y	Y	Y	Y

Station Name	TI01	TI02	TI03	QS02	QS03	QS05
Tow	7	8	9	10	11	12
Event Number	15	16	17	19	24	27
Date (Pacific)	2023-10-08	2023-10-08	2023-10-08	2023-10-09	2023-10-09	2023-10-09
Start Time (Pacific)	07:32	09:21	11:30	08:05	10:17	14:52
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	20	2	20	20	20
Start Latitude	51° 15' 56" N	51° 09' 11" N	51° 00' 41" N	50° 29' 42" N	50° 31' 09" N	50° 28' 55" N
Start Longitude	128° 19' 44" W	128° 35' 03" W	128° 49' 12" W	127° 45' 47" W	127° 40' 51" W	127° 33' 34" W
End Latitude	51° 15' 10" N	51° 08' 40" N	51° 00' 34" N	50° 30' 02" N	50° 30' 10" N	50° 27' 42" N
End Longitude	128° 21' 32" W	128° 36' 50" W	128° 49' 05" W	127° 43' 30" W	127° 42' 23" W	127° 32' 22" W
Direction of Tow (deg)	235	245	146	076	224	147
Vessel Speed (km/h)	7.6	6.8	8.2	8.3	7.7	7.9
Distance Towed (km)	2.55	2.28	0.25	2.79	2.57	2.67
Net Opening Width (m)	49	52	53	54	47	53
Net Opening Height (m)	16	12	0	12	16	12
Warp Length (m)	200	240	240	240	200	240
Target Headrope Depth (m)	0	0	15	15	0	15
Median Headrope Depth (m)	6	16	22	18	5	15
Start Bottom Depth (m)	82	157	64	117	138	193
End Bottom Depth (m)	93	142	64	120	118	191
Usable	Y	Y	N	Y	Y	Y

Station Name	QS06	QS08	QS09	QS10	QS12	VI01
Tow	13	14	15	16	17	18
Event Number	29	34	37	40	44	47
Date (Pacific)	2023-10-09	2023-10-10	2023-10-10	2023-10-10	2023-10-11	2023-10-12
Start Time (Pacific)	16:27	08:44	13:18	15:40	15:55	07:43
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	21	20	15	20	20
Start Latitude	50° 24' 33" N	50° 28' 16" N	50° 35' 22" N	50° 34' 57" N	50° 24' 02" N	50° 13' 50" N
Start Longitude	127° 29' 38" W	127° 55' 40" W	127° 41' 11" W	127° 28' 09" W	128° 01' 26" W	128° 01' 47" W
End Latitude	50° 25' 51" N	50° 28' 15" N	50° 35' 15" N	50° 34' 48" N	50° 22' 59" N	50° 12' 29" N
End Longitude	127° 30' 39" W	127° 53' 16" W	127° 38' 50" W	127° 29' 48" W	128° 03' 05" W	128° 01' 09" W
Direction of Tow (deg)	333	090	094	261	224	162
Vessel Speed (km/h)	8.1	8.5	8.3	7.9	8.2	7.8
Distance Towed (km)	2.70	2.85	2.78	1.98	2.75	2.59
Net Opening Width (m)	48	53	47	48	51	49
Net Opening Height (m)	15	12	14	18	12	17
Warp Length (m)	200	240	200	200	240	200
Target Headrope Depth (m)	0	15	0	0	15	0
Median Headrope Depth (m)	4	19	4	5	16	6
Start Bottom Depth (m)	138	196	111	76	161	71
End Bottom Depth (m)	181	130	118	79	129	74
Usable	Y	Y	Y	Y	Y	Y

Station Name	VI02	VI03	VI04	VI05
Tow	19	20	21	22
Event Number	48	51	52	53
Date (Pacific)	2023-10-12	2023-10-12	2023-10-12	2023-10-12
Start Time (Pacific)	09:18	12:22	14:24	15:51
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	20	20	20
Start Latitude	50° 07' 22" N	50° 00' 19" N	50° 00' 38" N	49° 58' 16" N
Start Longitude	128° 02' 18" W	128° 01' 31" W	127° 49' 46" W	127° 39' 31" W
End Latitude	50° 06' 36" N	49° 59' 15" N	50° 00' 00" N	49° 57' 11" N
End Longitude	128° 00' 54" W	128° 01' 15" W	127° 48' 37" W	127° 39' 00" W
Direction of Tow (deg)	130	170	130	162
Vessel Speed (km/h)	6.6	6.0	5.4	6.3
Distance Towed (km)	2.20	1.99	1.83	2.10
Net Opening Width (m)	53		54	46
Net Opening Height (m)	12	18	13	17
Warp Length (m)	240	200	240	200
Target Headrope Depth (m)	15	0	15	0
Median Headrope Depth (m)	17	6	21	7
Start Bottom Depth (m)	571	1317	478	90
End Bottom Depth (m)	167	1156	526	100
Usable	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 October 05 to 14, 2023 on the *CCGS Sir John Franklin*.

Date	Station	Latitude	Longitude	CTD			BONGO		
				Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)	Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)
2023-10-07	QCST01	50° 41' 49" N	126° 58' 46" W	07:11	201	190	07:33	202	190
2023-10-07	QCST03	50° 46' 03" N	127° 17' 03" W	10:52	199	190	11:13	175	164
2023-10-07	QCSD01	51° 06' 33" N	127° 54' 16" W	17:39	126	115	17:55	127	116
2023-10-08	TI01	51° 16' 35" N	128° 18' 18" W	07:06	72	62	07:21	72	62
2023-10-09	QS01	50° 28' 32" N	127° 48' 58" W	07:43	138	132			
2023-10-09	QS02	50° 30' 06" N	127° 42' 21" W	09:06	119	113	09:20	119	108
2023-10-09	QS03	50° 31' 44" N	127° 39' 26" W	09:56	111	105	10:11	109	100
2023-10-09	QS04	50° 30' 26" N	127° 35' 56" W	13:58	144	134			
2023-10-09	QS05	50° 29' 43" N	127° 34' 28" W	14:43	149	138			
2023-10-09	QS06	50° 23' 40" N	127° 28' 56" W	16:19	96	90			
2023-10-09	QS07	50° 26' 24" N	127° 31' 11" W	18:18	188	183	18:38	189	180
2023-10-10	QS08	50° 28' 16" N	127° 54' 17" W	08:19	223	215	08:06	223	213
2023-10-10	QS09	50° 35' 50" N	127° 45' 01" W	13:00	77	72	13:13	77	67
2023-10-10	QS10	50° 35' 17" N	127° 26' 31" W	15:23	66	61	15:35	66	56
2023-10-10	QS11	50° 33' 54" N	127° 33' 32" W	16:46	129	123			
2023-10-11	QS12	50° 24' 59" N	128° 00' 05" W	15:26	173	168	15:50	166	156
2023-10-12	VI01	50° 15' 09" N	128° 02' 39" W	07:24	82	72	07:37	82	72
2023-10-12	VI03	50° 00' 31" N	128° 01' 24" W	11:25	1,313	1,306	11:09	1,313	250
2023-10-12	VI05	49° 57' 00" N	127° 39' 32" W	16:55	104	93	17:10	96	85

## 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 October 05 to 14, 2023 on the *CCGS Sir John Franklin*. Jellyfish weights include all identified pieces but only counted if bells were intact. Euphausiacea were not counted. Counts with blank weights indicate catches too big or small to be weighed accurately.

Station Name	QCST01		QCST02		QCST03		QCST04		QCST05		QCSD01		TI01	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Juveniles)														
Chum Salmon (Adults)	77.23	24			10.34	3			7.65	3				
Chum Salmon (Juveniles)	0.25	3	0.15	3	4.95	67			0.30	3	0.37	3	12.63	100
Coho Salmon (Adults)														
Coho Salmon (Juveniles)	1.42	5	0.52	3	7.73	22	0.47	1	1.61	5	1.58	5	0.30	1
Pink Salmon (Juveniles)	0.58	15	1.44	39	13.76	371			0.66	9	0.27	3	13.65	155
Sockeye Salmon (Juveniles)													0.15	2
Codfishes				1										
Comb Jellyfish														
Cross Jellyfish												1		
Deacon Rockfish														
Flatfishes														
Fried Egg Jellyfish														
Jack Mackerel														
Jellyfish														
Lions Mane	1.16		3.31		12.20						2.50	2	1.09	1
Molas														
Moon Jellyfish	1.42	4			3.02	4	0.25	1	2.04	2	0.34		5.86	4
Moon Jellyfish														
Opalescent Inshore Squid														1
Pacific Herring													0.32	3
Pipefishes														
Prowfish					0.08	2								
Rockfishes														2
Sablefish					0.21	1			0.21	1				
Sea Nettle			4.05								1.10			
Threespine Stickleback						1								
Water Jellyfish	2.72		5.58		52.00		1.26		20.11		7.34		18.14	
Wolf Eel														
<b>TOTAL</b>	<b>84.78</b>	<b>51</b>	<b>15.05</b>	<b>46</b>	<b>104.29</b>	<b>471</b>	<b>1.98</b>	<b>2</b>	<b>32.58</b>	<b>23</b>	<b>13.50</b>	<b>14</b>	<b>52.14</b>	<b>269</b>



Station Name	TI02		QS02		QS03		QS05		QS06		QS08		QS09	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Juveniles)			1.76	13	0.97	11			0.13	2	0.21	1	1.28	29
Chum Salmon (Adults)							3.27	1	27.76	7			5.45	2
Chum Salmon (Juveniles)	1.88	16			0.08	1			0.37	5			0.49	7
Coho Salmon (Adults)			2.64	1									3.11	1
Coho Salmon (Juveniles)	0.38	1												
Pink Salmon (Juveniles)	2.10	26												
Sockeye Salmon (Juveniles)	0.07	1												
Codfishes														
Comb Jellyfish														
Cross Jellyfish														
Deacon Rockfish													0.02	1
Flatfishes														
Fried Egg Jellyfish														
Jack Mackerel														
Jellyfish														
Lions Mane	2.23	1	1.96	2			2.13						5.91	3
Molas														
Moon Jellyfish	1.41	1	1.95	2	4.63	6	1.24	1			18.34	17	4.55	6
Moon Jellyfish														
Opalescent Inshore Squid			0.08	75	3.25	2,828	0.40	500	7.23	3,555	0.04	39		
Pacific Herring									0.03	1			160.66	39,776
Pipefishes				1										
Prowfish	0.06	2					0.04	1	0.06	1				
Rockfishes				2		2						1		
Sablefish														
Sea Nettle	6.21		3.35						5.56				6.77	
Threespine Stickleback														
Water Jellyfish	28.48		29.88		77.75		4.77		17.96		34.33		27.34	
Wolf Eel	0.02	1												
<b>TOTAL</b>	<b>42.84</b>	<b>49</b>	<b>41.62</b>	<b>96</b>	<b>86.68</b>	<b>2,848</b>	<b>11.85</b>	<b>503</b>	<b>59.10</b>	<b>3,571</b>	<b>52.92</b>	<b>58</b>	<b>215.58</b>	<b>39,825</b>

Station Name	QS10		QS12		VI01		VI02		VI03		VI04		VI05	
Common Name	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count	Weight	Count
Chinook Salmon (Juveniles)	4.64	114	1.17	6	0.40	2					0.19	1		
Chum Salmon (Adults)														
Chum Salmon (Juveniles)	0.08	1												
Coho Salmon (Adults)														
Coho Salmon (Juveniles)											0.30	1	0.29	1
Pink Salmon (Juveniles)														
Sockeye Salmon (Juveniles)														
Codfishes														
Comb Jellyfish												1		
Cross Jellyfish														
Deacon Rockfish														
Flatfishes						1								
Fried Egg Jellyfish	10.28		0.07										0.44	2
Jack Mackerel						2					12.03	10		
Jellyfish											0.22	4		
Lions Mane	3.00	1												
Molas			2.47	1										
Moon Jellyfish	0.54	2	0.75	1	6.20	5	0.05	1			0.37	2		
Moon Jellyfish									0.45					
Opalescent Inshore Squid												12		
Pacific Herring	10.59	2,521												
Pipefishes														
Prowfish														
Rockfishes				3										
Sablefish					0.16	1								
Sea Nettle														
Threespine Stickleback														
Water Jellyfish	0.62		52.65		75.00		13.35		116.00		12.61		35.63	
Wolf Eel														
<b>TOTAL</b>	<b>29.75</b>	<b>2,639</b>	<b>57.11</b>	<b>11</b>	<b>81.76</b>	<b>11</b>	<b>13.40</b>	<b>1</b>	<b>116.45</b>	<b>0</b>	<b>25.72</b>	<b>31</b>	<b>36.36</b>	<b>3</b>