Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey on the South Coast of British Columbia, September 29- October 08, 2017

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

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 1385

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 1385

2024

JUVENILE PACIFIC SALMON (*ONCORHYNCHUS* SPP.) TRAWL SURVEY ON THE SOUTH COAST OF BRITISH COLUMBIA, SEPTEMBER 29- OCTOBER 08, 2017

by

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

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

Cat. No. Fs97-13/1385E-PDF ISBN 978-0-660-69676-8 ISSN 1488-5395

Correct citation for this publication:

King, J.R., Tabata, A.T., Flynn, K.L., and Zubkowski, T.B. 2024. Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey on the South Coast of British Columbia, September 29-October 08, 2017. Can. Data Rep. Fish. Aquat. Sci. 1385: vi + 39 p.

CONTENTS

ABSTRACT

King, J.R., Tabata, A.T., Flynn, K.L., and Zubkowski, T.B. 2024. Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey on the South Coast of British Columbia, September 29-October 08, 2017. Can. Data Rep. Fish. Aquat. Sci. 1385: vi + 39 p.

Fisheries and Oceans Canada (DFO) conducted a surface trawl survey from September 29 - October 08, 2017 on the *CFV Seacrest*. This study targeted juvenile Pacific Salmon (*Oncorhynchus* spp.) in southern British Columbia (BC). There were 32,209 individuals caught from 19 species in 77 tows. Opalescent Inshore Squid was the most abundant species with 62% of the total catch. Juvenile salmon species caught in decreasing abundance by count were: Chum Salmon, Pink Salmon, Chinook Salmon, Sockeye Salmon and Coho Salmon, with catch distribution varied based on species. Biological samples for genetic stock composition, otoliths, and coded wire tags were returned to the Pacific Biological Station (DFO, Nanaimo, BC). Associated information on the physical oceanography (30 locations), water samples for chemistry and chlorophyll *a* along with zooplankton samples (30 locations) were returned to the Institute of Ocean Sciences (DFO, Sidney, BC).

RÉSUMÉ

King, J.R., Tabata, A.T., Flynn, K.L., and Zubkowski, T.B. 2024. Juvenile Pacific Salmon (*Oncorhynchus* spp.) Trawl Survey on the South Coast of British Columbia, September 29-October 08, 2017. Can. Data Rep. Fish. Aquat. Sci. 1385: vi + 39 p.

Pêches et Océans Canada a effectué un relevé au chalut de surface entre septembre 29 to octobre 08, 2017 sur le *CFV Seacrest*. Cette étude ciblait le saumon du Pacifique juvénile (*Oncorhynchus* spp.) dans le sud de la Colombie-Britannique (C.-B.). 32,209 individus de 19 espèces ont été capturés au cours de 77 traits. Le calmars opales était l'espèce la plus abondante avec 62% de la prise totale. Les espèces de saumon juvénile capturées par ordre décroissant d'abondance par comptage étaient les seuivantes: saumon kéta juvéniles, saumon rose juvéniles, saumon quinnat juvéniles, saumon rouge juvéniles et saumon coho juvéniles, avec la répartition des prises variait selon les espèces. Les échantillons biologiques pour la composition génétique des stocks, les otolithes, et les micromarques magnétisées codées ont été retournés à la Station biologique du Pacifique (MPO, Nanaimo, C.-B.). Les informations associées sur l'océanographie physique (30 sites) les échantillions d'eau pour la chimie et la chlorophylle *a* ainsi que les échantillons de zooplancton (30 sites) ont été retournés à l'Institut des sciences de la mer (MPO, Sidney, C.-B.).

1 INTRODUCTION

Fisheries and Oceans Canada (DFO) conducted a trawl survey, targeting juvenile Pacific Salmon (*Oncorhynchus* spp.) from September 29 to October 08, 2017 on the *CFV Seacrest*. 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;
2. the associated physical oceanography; and
3. the distribution and biomass of zooplankton.

This survey was led by the Basin and Coastal-Scale Interactions Program (DFO) and extends a suite of surveys in support of research on Pacific Salmon ocean ecology. These surveys were conducted annually between 1997-2016 from the Gulf of Alaska to the southern continental shelf (Welch et al., 2002), albeit with differences in location and timing in each year. This data report documents the biological, oceanographic, and zooplankton data and samples collected.

2 METHODS

2.1 SURVEY LOCATIONS

Fishing, oceanographic, and zooplankton sampling occurred off the north and west coast of Vancouver Island, including Johnstone Strait, Queen Charlotte Strait, and southern Queen Charlotte Sound including Smith and Rivers Inlets and Fitzhugh and Milbanke Sounds (Figure 1).

2.2 FISHING OPERATIONS

The *CFV Seacrest* deployed a Cantrawl model 250 midwater trawl net (approximately 90 m long x 30 m wide x 15 m high; (Cantrawl Nets Ltd., Richmond, Canada; Appendix Table A and Appendix Figure B). This three-bridle midwater net had a codend liner with 12.7 mm mesh (stretched) to retain smaller species. On this survey, the mean trawl net opening was 30 m wide by 12 m high, or an area of 360 m^2.

Tow speed averaged 7.7 km/hr, and varied between 4.1 to 15.2 km/hr speed over ground, depending on the wind, tide, and current. The target headrope depths were 0 m, 15 m, and 30 m. Warp length ranged from 150 m to 275 m (Appendix C). Tow duration was 13-24 min, with the time starting when the Jet 5 m^2 trawls doors were locked and the net started fishing.

2.3 CATCH PROCESSING

All fish were sorted to species and counted. Juvenile Pacific salmon catch by species (number of fish) were divided by swept volume to calculate catch per unit effort (CPUE).

2.4 BIOLOGICAL SAMPLING

All salmon species were measured for fork length (mm) and weight (g), sex determined, and presence of lice recorded. Pacific Salmon were divided into juveniles and adults based on their fork lengths. All Pacific Salmon species that were < 300 mm in length were considered juveniles, except for Coho Salmon whose length threshold as juveniles was 350 mm. Additional collections included: fin clips for genetic stock identification (GSI), muscle tissue for energy density estimation, stable isotope analyses or proximate analyses, otoliths, adipose fin status (i.e. clipped vs. non-clipped), and coded wire tags (CWTs). Other fish species were measured for length (mm) and weight (g) as time permitted.

2.5 OCEANOGRAPHY

A Sea-Bird 911plus CTD (conductivity-temperature-depth; Sea-Bird Scientific, Bellevue, WA) was used for oceanographic profiles at 30 locations (Figure 1, Appendix D). A Niskin bottle at 10 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 samples for chl *a* estimation were filtered with 25 mm GF/F glass fibre filter disks under vacuum, not exceeding 5 inHg. Filter disks were then placed in polypropylene scintillation vials and frozen. Both the nutrient and chl *a* samples were frozen and maintained at -18℃. Nutrient and chl *a* samples were sent for analyses at the Institute of Ocean Sciences (DFO, Sidney, BC).

2.6 ZOOPLANKTON

At 30 locations (Figure 1, Appendix D), 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 one bongo net were preserved in 10% formalin and sent to the zooplankton laboratory at the Institute of Ocean Sciences (DFO, Sidney, BC) for species enumeration. The zooplankton sample from the other bongo net was sorted into four size fractions by successively sieving through 8.0, 1.7, 1.0, and 0.25 mm screens. Individual size fractions were frozen for future stable isotope, energy density, or proximate analyses and sent to the Pacific Biological Station (DFO, Nanaimo, BC) for processing or archiving.

3 RESULTS

3.1 FISHING OPERATIONS

This survey conducted 78 trawl net tows off the north and west coast of Vancouver Island (Figure 1, Appendix C) with 77 trawls completed successfully. There was 1 unusable tow due to problems with equipment deployment identified by Usable = N in Appendix C.

3.2 CATCH COMPOSITION

Total catch for the survey from usable tows was 32,209 fish, with 2,825 (or 9%) 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 count, maximum tow catch count, and mean tow catch count in usable tows is presented in Table 1. The top three abundant species caught by count were Opalescent Inshore Squid (n=19,872), Pacific Herring (n=5,054), then Pacific Sand Lance (n=3,124; Table 1). Juvenile Pacific Salmon species caught, in order of abundance by count, were: Chum Salmon, Pink Salmon, Chinook Salmon, Sockeye Salmon and Coho 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, count/kmˆ3) of juvenile salmon is shown in Figure 2. Juvenile Chinook Salmon were caught everywhere except for Queen Charlotte Sound. Juvenile Chum Salmon were caught sporadically, but in high numbers throughout the survey area. Juvenile Coho Salmon were caught infrequently and limited to northern portions of the survey area in Queen Charlotte Sound, Smith Sound and Fitzhugh Sound. Juvenile Pink Salmon were abundant, focused mainly in Johnstone Strait. High Juvenile Pink Salmon catches were expected given that Pink Salmon have alternating large and small return years. Juvenile Sockeye Salmon were localized within Johnstone Strait and the Broughton Group, and more notherly off Rivers Inlet and in Fitzhugh Sound.

3.3 BIOLOGICAL SAMPLES

Samples were collected for GSI (n=847), otoliths (n=565), energy density and stable isotope analyses (n=747). CWTs (n=26) when present and detected were retained. These biological samples were archived at the Pacific Biological Station, Fisheries and Oceans Canada (Nanaimo, BC).

3.4 LENGTH AND WEIGHT

Length frequencies and length-weight relationships are presented for juvenile Pacific Salmon species in Figures 3 to 7. Double log transformed length-weight regressions coefficients were similar across all juvenile salmon; juvenile Pink Salmon had a slightly smaller coefficient. A

larger coefficient typically represents better condition, whereas a smaller coefficient typically represents worse condition. Lengths and weights of 20 species were recorded (Table 2). The length frequencies for species with greater than 50 length measurements (Opalescent Inshore Squid, Pacific Herring, Sablefish and Pacific Sand Lance) are presented in Figure 8.

Within juvenile Pacific salmon, Coho Salmon had the largest maximum length (272 mm) and weight (258 g), whereas Sockeye Salmon had the smallest maximum length (155 mm) and weight (40 g).

3.5 OCEANOGRAPHY

CTD casts and water samples were completed at 30 sites with cast depths ranging from 35 m to 250 m (Appendix D). For Appendix D, station locations (latitude, longitude) are reported by midwater trawl start locations. Oceanographic data from the CTD casts and nutrient analysis of the water samples are archived online within the Water Properties Data Inventory (Institute of Ocean Sciences, DFO, Sidney, BC) under cruise number 201778.

3.6 ZOOPLANKTON

Vertical bongo tows were conducted at 30 stations to depths ranging from 35 m to 250 m (Appendix D). Zooplankton enumeration data are archived in the zooplankton database (Institute of Ocean Sciences, DFO, Sidney, BC) under cruise number 201778.

4 DISCUSSION

This juvenile Pacific Salmon trawl survey collected valuable information on distribution, abundance, condition, and genetic stock composition for juvenile Pacific Salmon off the north and west coast of Vancouver Island. Overall, juvenile Chum Salmon and juvenile Pink Salmon were most abundant, whereas juvenile Coho Salmon were least abundant. Distributions varied by species and life stage. This survey data supplements historic juvenile Pacific Salmon surveys that have been reported in Fisheries and Oceans Canada's State of the Pacific Ocean, and are being incorporated into longer term and broader scope research projects.

5 REFERENCES

Welch, D.W., Morris, J.F.T., and Demers, E. 2002. *CCGS W.E. Ricker* Gulf of Alaska salmon survey, March - April, 1997. Can. Data Rep. Fish. Aquat. Sci. 1101: 19 p.

6 ACKNOWLEDGEMENTS

We would like to thank the Captain, Nathan Dobie, and crew of the *CFV Seacrest*. Strahan Tucker was Chief Scientist on this survey.

7 TABLES

Table 1. All captured species (or taxonomic group), ordered by total catch count, showing number of tows in which the species occurred, total catch count, maximum catch count, and mean catch count per tow for usable tows during the juvenile Pacific Salmon trawl survey aboard the *CFV Seacrest*, September 29 to October 08, 2017.

Common Name	Scientific Name	Tows	Count	Max	Mean
Opalescent Inshore Squid	*Doryteuthis opalescens*	15	19,872	7,409	1,419
Pacific Herring	*Clupea pallasii*	22	5,054	956	230
Pacific Sand Lance	*Ammodytes personatus*	6	3,124	3,000	625
Chum Salmon (Juveniles)	*Oncorhynchus keta*	32	1,979	420	62
Sablefish	*Anoplopoma fimbria*	18	750	549	42
Threespine Stickleback	*Gasterosteus aculeatus*	2	428	427	214
Pink Salmon (Juveniles)	*Oncorhynchus gorbuscha*	19	426	106	22
Chinook Salmon (Juveniles)	*Oncorhynchus tshawytscha*	45	216	30	5
Sockeye Salmon (Juveniles)	*Oncorhynchus nerka*	20	184	82	9
Walleye Pollock	*Gadus chalcogrammus*	6	74	54	12
Chum Salmon (Adults)	*Oncorhynchus keta*	13	36	15	3
Coho Salmon (Juveniles)	*Oncorhynchus kisutch*	11	20	5	2
Chinook Salmon (Adults)	*Oncorhynchus tshawytscha*	9	11	2	1
North Pacific Spiny Dogfish	*Squalus suckleyi*	4	8	3	2
Eulachon	*Thaleichthys pacificus*	1	8	8	8
Coho Salmon (Adults)	*Oncorhynchus kisutch*	7	7	1	1
Prowfish	*Zaprora silenus*	5	6	2	1
Black Rockfish	*Sebastes melanops*	2	2	1	1
Big Skate	*Beringraja binoculata*	1	1	1	1
Pacific Ocean Perch	*Sebastes alutus*	1	1	1	1
Pacific Staghorn Sculpin	*Leptocottus armatus*	1	1	1	1
Shortbelly Rockfish	*Sebastes jordani*	1	1	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 juvenile Pacific Salmon trawl survey aboard the *CFV Seacrest*, September 29 to October 08, 2017. Tows = number of tows. Type = Type of length measurement (FL = Fork Length, TL = Total Length, SL = Standard Length, ML = Mantle Length, BD = Bell Diameter). Measured = number of length measurements. Weighed = number of weight measurements.

		Length (mm)					Weight (g)			
Common Name	Tows	Type	Measured	Min	Max	Mean	Weighed	Min	Max	Mean
Chum Salmon	38	FL	559	156	856	227	529	34	8,410	395
Opalescent Inshore Squid	12	ML	317	3	128	45				
Pacific Herring	19	SL	284	83	216	123	254	7	104	24
Pink Salmon	19	FL	238	151	233	180	238	30	131	57
Chinook Salmon	46	FL	226	124	448	202	226	18	1,202	124
Sockeye Salmon	19	FL	130	107	216	155	130	12	109	40
Sablefish	16	FL	113	241	415	349	86	148	651	399
Pacific Sand Lance	4	FL	57	72	96	81	6	3	3	3
Walleye Pollock	6	FL	49	69	469	244	49	2	766	130
Threespine Stickleback	1	TL	30	47	80	60				
Coho Salmon	15	FL	27	153	749	377	27	34	6,790	1,383
Eulachon	1	FL	8	127	211	164	8	10	79	31
North Pacific Spiny Dogfish	4	FL	8	305	1,000	654				
Prowfish	5	FL	6	175	254	216	4	125	259	176
Black Rockfish	2	FL	2	377	445	411	1	1,290	1,290	1,290
Sockeye Salmon (Juveniles)	1	FL	2	149	156	152	2	29	35	32
Big Skate	1	TL	1	193	193	193	1	38	38	38
Pacific Ocean Perch	1	FL	1	280	280	280	1	234	234	234
Pacific Staghorn Sculpin	1	FL	1	141	141	141				
Shortbelly Rockfish	1	FL	1	71	71	71	1	6	6	6

8 FIGURES

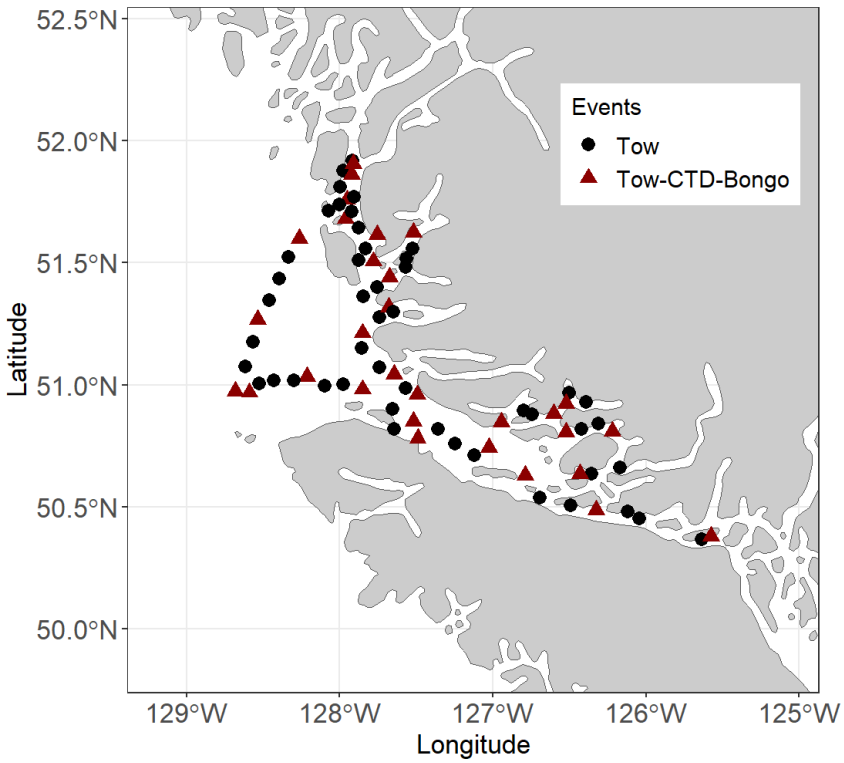

Figure 1. Location of survey events (fishing tows, CTD casts and zooplankton bongo casts) during the juvenile Pacific Salmon trawl survey from September 29 to October 08, 2017 on the *CFV Seacrest*.

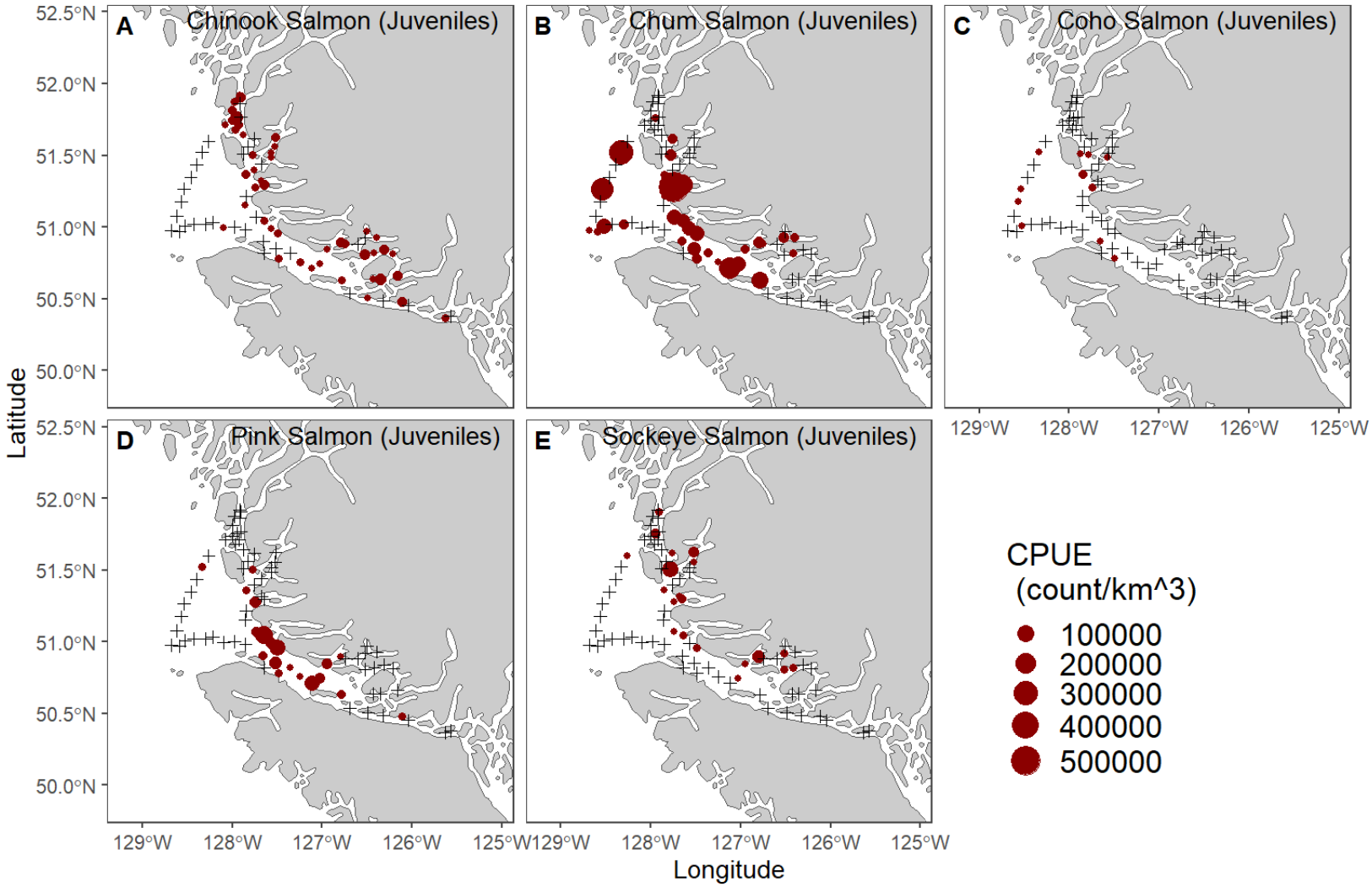

Figure 2. Juvenile Pacific Salmon (*Oncorhynchus spp.*) catch (count) per unit effort (CPUE; number of fish/km^3) for each tow. Circles are proportional to maximum abundance, and zero catches are shown with a cross (+).

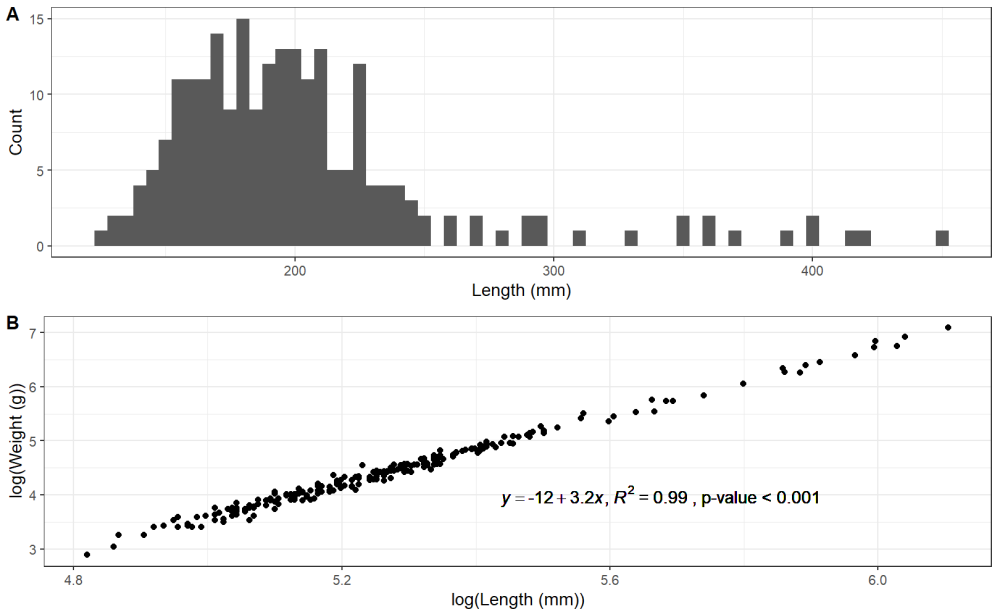

Figure 3. Chinook Salmon (*Oncorhynchus tshawytscha)*) length frequency plot as sampled during the juvenile Pacific Salmon trawl survey aboard the *CFV Seacrest*, September 29 to October 08, 2017 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

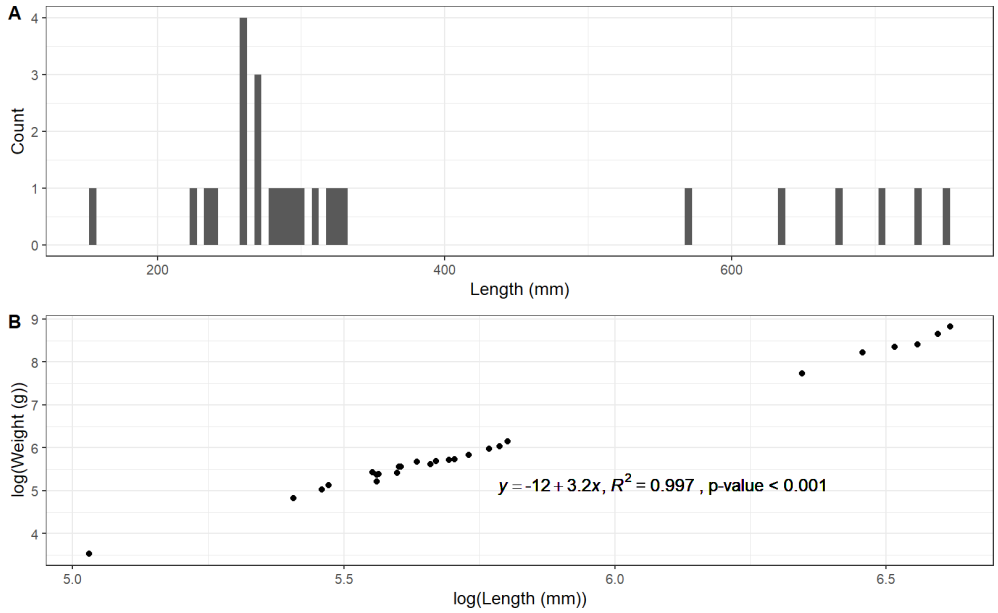

Figure 4. Coho Salmon (*Oncorhynchus kisutch*) length frequency plot as sampled during the juvenile Pacific Salmon trawl survey aboard the *CFV Seacrest*, September 29 to October 08, 2017 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

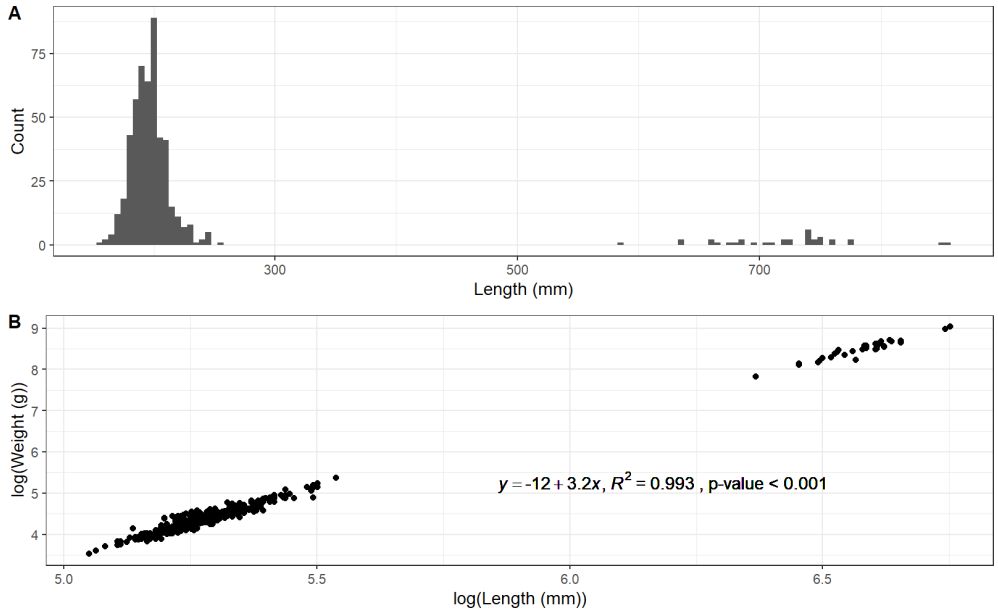

Figure 5. Chum Salmon (*Oncorhynchus keta*) length frequency plot as sampled during the juvenile Pacific Salmon trawl survey aboard the *CFV Seacrest*, September 29 to October 08, 2017 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

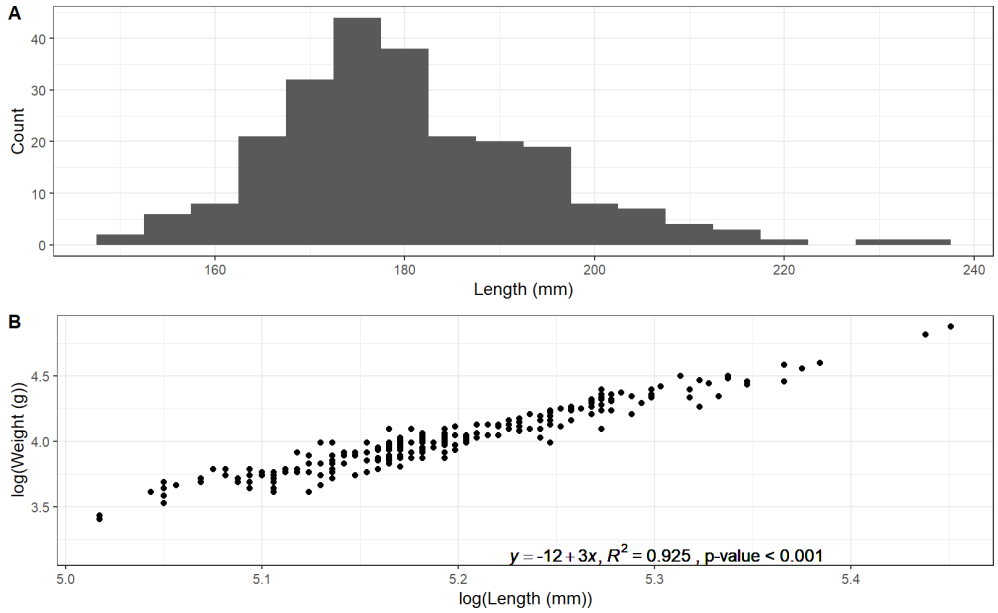

Figure 6. Pink Salmon (*Oncorhynchus gorbusha*) length frequency plot as sampled during the juvenile Pacific Salmon trawl survey aboard the *CFV Seacrest*, September 29 to October 08, 2017 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

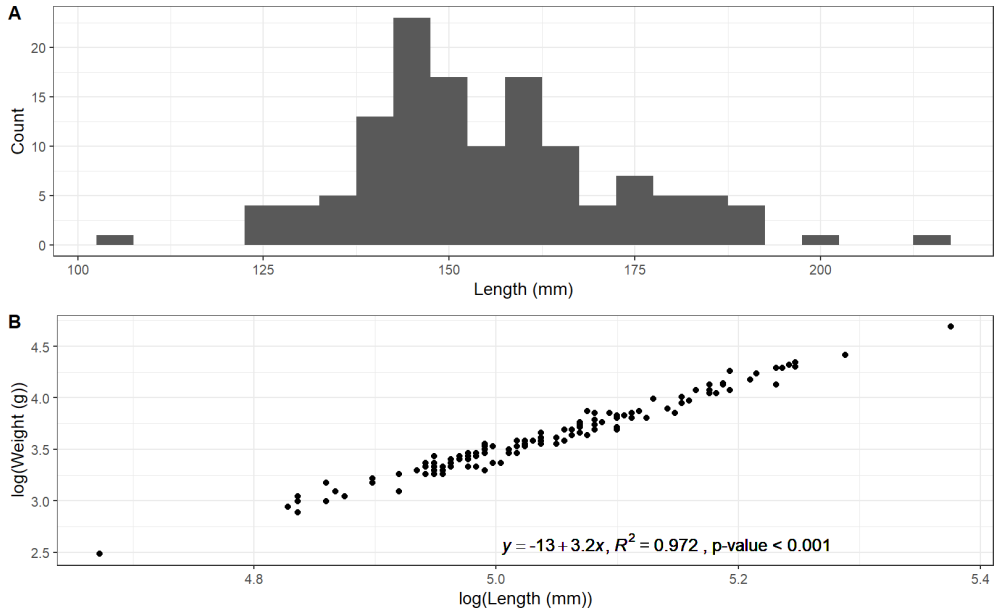

Figure 7. Sockeye Salmon (*Oncorhynchus nerka*) length frequency plot as sampled during the juvenile Pacific Salmon trawl survey aboard the *CFV Seacrest*, September 29 to October 08, 2017 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

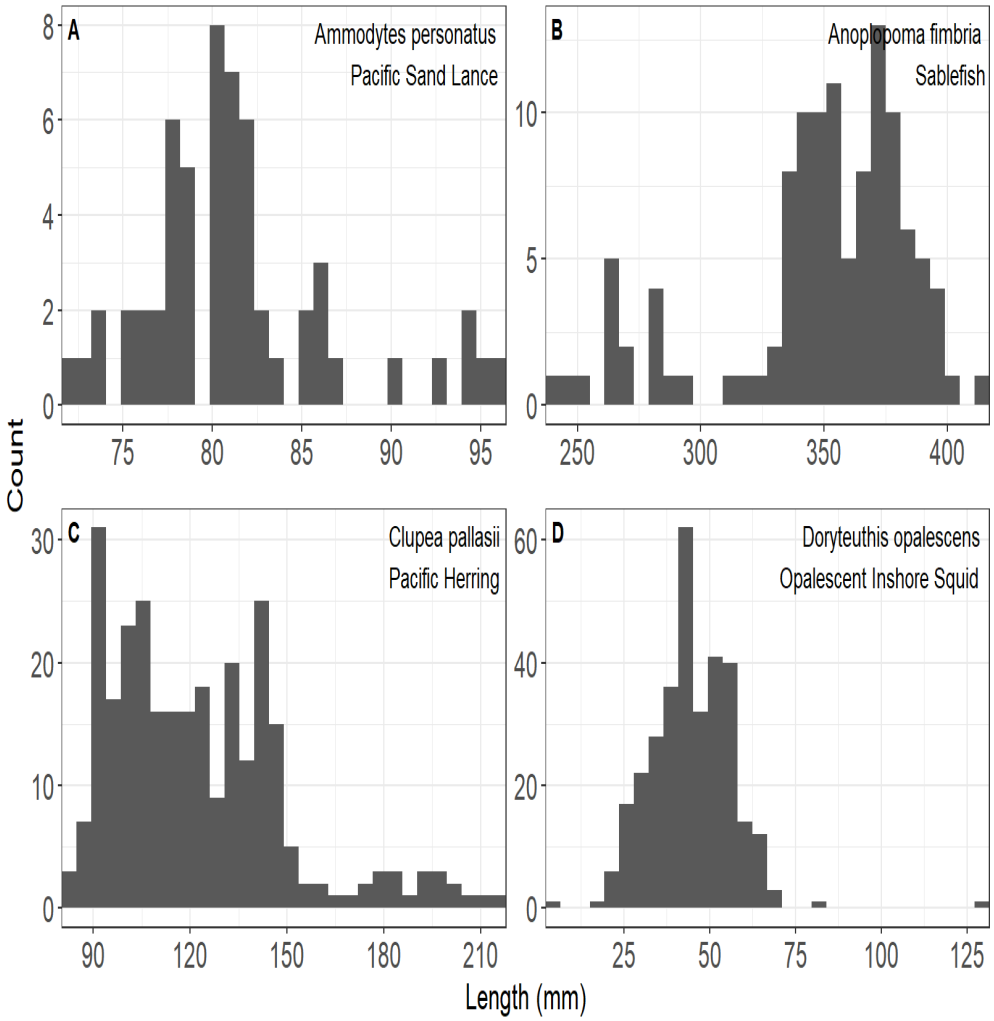

Figure 8. Length (mm) frequency plots for common species sampled (n>50 samples) during the juvenile Pacific Salmon trawl survey aboard the *CFV Seacrest*, September 29 to October 08, 2017. (A) Opalescent Inshore Squid (*Doryteuthis opalescens*), length = Mantle Length, (B) Pacific Herring (*Clupea pallasii*), length = Standard Length, (C) Sablefish (*Anoplopoma fimbria*), length = Fork Length, (D) Pacific Sand Lance (*Ammodytes personatus*), length = Fork Length.

APPENDIX A CANTRAWL 250 NET SPECIFICATIONS

Table A.1. Net specifications for the CanTrawl 250 net used during the juvenile Pacific Salmon trawl survey aboard the *CFV Seacrest*, September 29 to October 08, 2017.

Part	Size	Material
Doors	2 m^2	Jet
Door Legs	12.2 m (6.67 fm)	1 inch Spectra rope
Bridles	45.72 m (25 fm)	5/8 Wire Rope
Head Line	76.2 m (41.7 fm)	1 1/8 inch Tenex
Foot Rope	76.2 (41.7 fm)	1/2 chain
Mesh incl. Codend	3.8 cm (1.5 inch)	Knotted nylon
Codend Liner	12.7 mm (0.5 inch)	210/20 knotless liner

APPENDIX B CANTRAWL 250 NET DIAGRAM

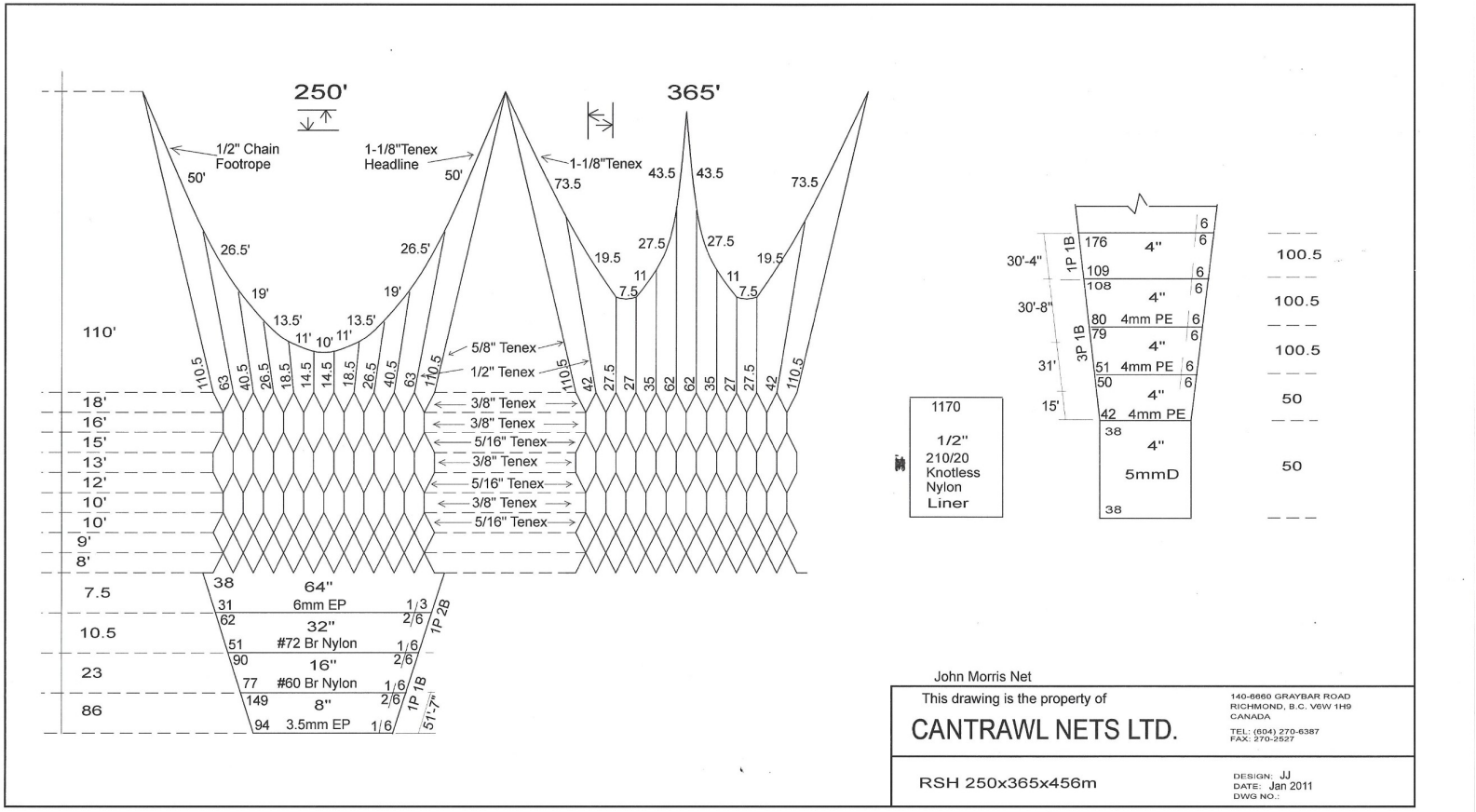

Figure B.1. Net diagram for CanTrawl 250 trawl net used during the juvenile Pacific Salmon trawl survey aboard the *CFV Seacrest*, September 29 to October 08, 2017.

APPENDIX C TRAWL BRIDGE LOG DATA

Table C.1. Bridge log information for trawl tows during the juvenile Pacific Salmon trawl survey aboard the *CFV Seacrest*, September 29 to October 08, 2017.

Station Name	QCSD01	QCSD02	QCSD03	QCSD04	QCSD05	QCSD06
Tow	1	2	3	4	5	6
Date (Pacific)	2017-09-29	2017-09-29	2017-09-29	2017-09-29	2017-09-29	2017-09-29
Start Time (Pacific)	08:10:00	09:26:00	10:37:00	12:26:00	13:42:00	15:00:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	20	20	20	20	20	20
Start Latitude	50° 58’ 52" N	51° 00’ 04" N	50° 59’ 38" N	51° 02’ 02" N	51° 01’ 02" N	51° 01’ 01" N
Start Longitude	127° 51’ 07" W	127° 58’ 41" W	128° 05’ 53" W	128° 12’ 50" W	128° 18’ 02" W	128° 25’ 44" W
End Latitude	50° 59’ 31" N	51° 00’ 32" N	50° 59’ 49" N	51° 01’ 26" N	51° 00’ 56" N	51° 01’ 37" N
End Longitude	127° 52’ 59" W	128° 00’ 47" W	128° 08’ 02" W	128° 15’ 14" W	128° 20’ 07" W	128° 27’ 43" W
Direction of Tow (deg)	299	290	278	248	270	300
Vessel Speed (km/h)	7.4	7.8	7.6	9.1	7.4	7.6
Distance Towed (km)	2.50	2.61	2.54	3.02	2.43	2.56
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	275	150	200	275	150	200
Target Headrope Depth (m)	25	0	15	30	0	15
Start Bottom Depth (m)	130	119	90	148	98	104
End Bottom Depth (m)	130	128	100	129	82	101
Usable	Y	Y	Y	Y	Y	Y

Station Name	QCSD07	QCSD08	QCSD09	QCSD10	QCSD11	QCSD12
Tow	7	8	9	10	11	12
Date (Pacific)	2017-09-29	2017-09-29	2017-09-30	2017-09-30	2017-09-30	2017-09-30
Start Time (Pacific)	16:13:00	17:11:00	07:48:00	09:09:00	10:21:00	12:12:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	20	20	20	20	20	20
Start Latitude	51° 00’ 18" N	50° 58’ 08" N	50° 58’ 23" N	51° 04’ 26" N	51° 10’ 26" N	51° 16’ 01" N
Start Longitude	128° 31’ 23" W	128° 35’ 17" W	128° 40’ 48" W	128° 36’ 54" W	128° 33’ 50" W	128° 32’ 13" W
End Latitude	50° 59’ 46" N	50° 57’ 07" N	50° 59’ 46" N	51° 05’ 38" N	51° 11’ 49" N	51° 17’ 17" N
End Longitude	128° 33’ 18" W	128° 36’ 25" W	128° 39’ 58" W	128° 36’ 04" W	128° 33’ 58" W	128° 31’ 26" W
Direction of Tow (deg)	246	215	21	24	357	21
Vessel Speed (km/h)	7.4	6.9	8.1	7.2	7.6	7.6
Distance Towed (km)	2.44	2.32	2.78	2.43	2.56	2.50
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	150	200	150	275	200	150
Target Headrope Depth (m)	0	15	0	30	15	0
Start Bottom Depth (m)	89	66	69	95	180	183
End Bottom Depth (m)	79	60	63	113	195	130
Usable	Y	Y	Y	Y	Y	Y

Station Name	QCSD13	QCSD14	QCSD15	QCSD16	FH01	HP01
Tow	13	14	15	16	17	18
Date (Pacific)	2017-09-30	2017-09-30	2017-09-30	2017-09-30	2017-10-01	2017-10-01
Start Time (Pacific)	13:28:00	14:41:00	15:54:00	17:10:00	08:20:00	09:46:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	20	20	23	19	20	20
Start Latitude	51° 20’ 46" N	51° 26’ 02" N	51° 31’ 23" N	51° 35’ 53" N	51° 40’ 44" N	51° 42’ 47" N
Start Longitude	128° 27’ 43" W	128° 23’ 38" W	128° 20’ 02" W	128° 15’ 47" W	127° 57’ 43" W	128° 04’ 26" W
End Latitude	51° 21’ 40" N	51° 27’ 22" N	51° 32’ 49" N	51° 35’ 46" N	51° 42’ 07" N	51° 43’ 19" N
End Longitude	128° 26’ 02" W	128° 23’ 02" W	128° 19’ 01" W	128° 13’ 48" W	127° 58’ 41" W	128° 02’ 20" W
Direction of Tow (deg)	49	16	24	96	337	67
Vessel Speed (km/h)	7.6	7.6	7.6	7.0	8.3	7.8
Distance Towed (km)	2.56	2.54	2.91	2.30	2.78	2.61
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	275	200	150	275	150	275
Target Headrope Depth (m)	30	15	0	30	0	30
Start Bottom Depth (m)	162	164	163	144	323	332
End Bottom Depth (m)	153	174	158	120	293	156
Usable	Y	Y	Y	Y	Y	Y

Station Name	HP02	FH02	FH03	FH04	FH05	FH06
Tow	19	20	21	22	23	24
Date (Pacific)	2017-10-01	2017-10-01	2017-10-01	2017-10-01	2017-10-01	2017-10-01
Start Time (Pacific)	10:38:00	12:12:00	12:54:00	13:57:00	15:00:00	15:45:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	20	20	20	20	18	20
Start Latitude	51° 44’ 20" N	51° 45’ 29" N	51° 48’ 40" N	51° 52’ 37" N	51° 55’ 05" N	51° 54’ 18" N
Start Longitude	128° 00’ 04" W	127° 57’ 00" W	127° 59’ 53" W	127° 58’ 34" W	127° 55’ 01" W	127° 54’ 32" W
End Latitude	51° 44’ 42" N	51° 46’ 41" N	51° 49’ 55" N	51° 53’ 42" N	51° 55’ 05" N	51° 54’ 11" N
End Longitude	127° 57’ 47" W	127° 57’ 54" W	128° 00’ 29" W	127° 57’ 00" W	127° 53’ 24" W	127° 56’ 53" W
Direction of Tow (deg)	76	385	344	42	90	265
Vessel Speed (km/h)	8.1	7.4	7.2	8.0	6.1	8.0
Distance Towed (km)	2.70	2.44	2.43	2.69	1.85	2.78
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	200	150	200	150	200	150
Target Headrope Depth (m)	15	0	15	0	10	0
Start Bottom Depth (m)	193	146	196	317	168	126
End Bottom Depth (m)	390	381	221	331	136	344
Usable	Y	Y	Y	Y	Y	Y

Station Name	FH07	FH08	FH09	FH10	FH11	FH12
Tow	25	26	27	28	29	30
Date (Pacific)	2017-10-02	2017-10-02	2017-10-02	2017-10-02	2017-10-02	2017-10-02
Start Time (Pacific)	07:59:00	09:08:00	10:04:00	11:28:00	13:30:00	14:22:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	20	20	21	20	16	20
Start Latitude	51° 51’ 36" N	51° 46’ 08" N	51° 42’ 29" N	51° 38’ 35" N	51° 36’ 50" N	51° 33’ 32" N
Start Longitude	127° 55’ 12" W	127° 54’ 25" W	127° 55’ 19" W	127° 52’ 34" W	127° 45’ 25" W	127° 49’ 44" W
End Latitude	51° 50’ 13" N	51° 44’ 46" N	51° 40’ 55" N	51° 37’ 08" N	51° 36’ 43" N	51° 32’ 28" N
End Longitude	127° 55’ 12" W	127° 53’ 49" W	127° 55’ 01" W	127° 52’ 23" W	127° 47’ 20" W	127° 50’ 20" W
Direction of Tow (deg)	180	165	173	176	264	199
Vessel Speed (km/h)	7.6	8.0	8.1	8.0	8.1	6.3
Distance Towed (km)	2.56	2.65	2.91	2.69	2.22	2.11
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	200	150	275	200	150	275
Target Headrope Depth (m)	15	0	30	15	0	30
Start Bottom Depth (m)	288	278	342	222	182	190
End Bottom Depth (m)	316	307	340	206	209	176
Usable	Y	Y	Y	Y	Y	Y

Station Name	FH13	FH14	RI01	RI02	RI03	RI04
Tow	31	32	33	34	35	36
Date (Pacific)	2017-10-02	2017-10-02	2017-10-03	2017-10-03	2017-10-03	2017-10-03
Start Time (Pacific)	15:20:00	16:53:00	08:14:00	09:20:00	10:14:00	11:06:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	24	20	20	20	21	20
Start Latitude	51° 30’ 36" N	51° 30’ 22" N	51° 37’ 23" N	51° 33’ 25" N	51° 31’ 05" N	51° 28’ 59" N
Start Longitude	127° 52’ 41" W	127° 46’ 44" W	127° 31’ 12" W	127° 31’ 19" W	127° 33’ 55" W	127° 34’ 12" W
End Latitude	51° 28’ 44" N	51° 31’ 01" N	51° 36’ 07" N	51° 32’ 02" N	51° 29’ 38" N	51° 27’ 58" N
End Longitude	127° 52’ 08" W	127° 44’ 38" W	127° 32’ 24" W	127° 31’ 26" W	127° 34’ 57" W	127° 35’ 38" W
Direction of Tow (deg)	170	63	211	183	180	221
Vessel Speed (km/h)	8.7	8.1	8.1	7.6	8.3	7.6
Distance Towed (km)	3.50	2.70	2.72	2.56	2.91	2.52
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	200	150	150	275	200	150
Target Headrope Depth (m)	15	0	0	30	15	0
Start Bottom Depth (m)	152	137	317	146	325	282
End Bottom Depth (m)	133	178	326	196	317	299
Usable	Y	Y	Y	Y	Y	Y

Station Name	RI05	RI06	QCSD17	SS01	SS02	SS03
Tow	37	38	39	40	41	42
Date (Pacific)	2017-10-03	2017-10-03	2017-10-03	2017-10-03	2017-10-03	2017-10-04
Start Time (Pacific)	12:39:00	13:36:00	14:26:00	15:45:00	16:34:00	07:32:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	20	20	20	20	20	21
Start Latitude	51° 26’ 24" N	51° 23’ 56" N	51° 21’ 43" N	51° 16’ 37" N	51° 19’ 05" N	51° 17’ 53" N
Start Longitude	127° 40’ 34" W	127° 45’ 18" W	127° 50’ 42" W	127° 44’ 31" W	127° 40’ 44" W	127° 38’ 49" W
End Latitude	51° 26’ 02" N	51° 23’ 20" N	51° 20’ 38" N	51° 17’ 46" N	51° 19’ 37" N	51° 17’ 06" N
End Longitude	127° 42’ 40" W	127° 47’ 20" W	127° 50’ 06" W	127° 44’ 02" W	127° 39’ 58" W	127° 40’ 44" W
Direction of Tow (deg)	255	245	161	15	42	237
Vessel Speed (km/h)	7.6	7.8	6.3	6.5	4.1	7.6
Distance Towed (km)	2.52	2.61	2.11	2.19	1.33	2.67
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	275	200	150	150	200	150
Target Headrope Depth (m)	30	15	0	0	15	0
Start Bottom Depth (m)	212	94	97	89	126	138
End Bottom Depth (m)	120	77	79	107	106	165
Usable	Y	Y	Y	Y	Y	Y

Station Name	QCSD18	QCSD19	QCSD20	QCSD21	QCST01	QCST02
Tow	43	44	45	46	47	48
Date (Pacific)	2017-10-04	2017-10-04	2017-10-04	2017-10-04	2017-10-04	2017-10-04
Start Time (Pacific)	09:28:00	10:25:00	11:40:00	13:15:00	14:13:00	15:17:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	20	20	20	20	20	20
Start Latitude	51° 12’ 43" N	51° 09’ 04" N	51° 04’ 16" N	51° 02’ 31" N	50° 59’ 10" N	50° 57’ 32" N
Start Longitude	127° 50’ 56" W	127° 51’ 25" W	127° 44’ 24" W	127° 38’ 35" W	127° 34’ 05" W	127° 29’ 38" W
End Latitude	51° 10’ 55" N	51° 07’ 34" N	51° 02’ 53" N	51° 01’ 37" N	50° 58’ 01" N	50° 56’ 38" N
End Longitude	127° 50’ 02" W	127° 51’ 00" W	127° 44’ 20" W	127° 36’ 58" W	127° 32’ 53" W	127° 28’ 12" W
Direction of Tow (deg)	163	170	178	131	146	135
Vessel Speed (km/h)	10.6	8.5	7.6	7.6	7.6	7.0
Distance Towed (km)	3.50	2.82	2.56	2.52	2.54	2.37
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	200	275	150	200	275	150
Target Headrope Depth (m)	15	30	0	15	30	0
Start Bottom Depth (m)	108	106	99	171	142	141
End Bottom Depth (m)	100	107	95	143	162	143
Usable	Y	Y	Y	Y	Y	Y

Station Name	QCST03	QCST04	QCST05	QCST06	QCST07	QCST08
Tow	49	50	51	52	53	54
Date (Pacific)	2017-10-05	2017-10-05	2017-10-05	2017-10-05	2017-10-05	2017-10-05
Start Time (Pacific)	08:02:00	09:11:00	10:46:00	12:07:00	13:22:00	14:39:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	20	20	20	21	15	15
Start Latitude	50° 46’ 53" N	50° 49’ 05" N	50° 54’ 00" N	50° 51’ 00" N	50° 49’ 12" N	50° 45’ 25" N
Start Longitude	127° 29’ 25" W	127° 38’ 35" W	127° 39’ 07" W	127° 31’ 05" W	127° 21’ 25" W	127° 14’ 46" W
End Latitude	50° 47’ 18" N	50° 49’ 34" N	50° 53’ 20" N	50° 50’ 24" N	50° 49’ 26" N	50° 44’ 24" N
End Longitude	127° 31’ 54" W	127° 40’ 26" W	127° 37’ 16" W	127° 26’ 38" W	127° 19’ 44" W	127° 14’ 17" W
Direction of Tow (deg)	270	292	119	102	77	163
Vessel Speed (km/h)	9.1	7.0	7.4	15.2	8.0	7.8
Distance Towed (km)	3.00	2.35	2.50	5.32	2.02	1.96
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	200	275	150	200	275	150
Target Headrope Depth (m)	15	30	0	15	30	0
Start Bottom Depth (m)	374	364	430	175	157	237
End Bottom Depth (m)	337	354	431	210	177	206
Usable	Y	Y	Y	Y	Y	Y

Station Name	QCST09	QCST10	BR01	BR02	BR03	BR04
Tow	55	56	57	58	59	60
Date (Pacific)	2017-10-05	2017-10-05	2017-10-06	2017-10-06	2017-10-06	2017-10-06
Start Time (Pacific)	16:17:00	17:27:00	08:22:00	09:42:00	10:37:00	12:21:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	15	15	20	22	20	21
Start Latitude	50° 42’ 36" N	50° 44’ 31" N	50° 50’ 46" N	50° 53’ 42" N	50° 52’ 48" N	50° 52’ 55" N
Start Longitude	127° 07’ 12" W	127° 01’ 37" W	126° 56’ 38" W	126° 47’ 49" W	126° 44’ 35" W	126° 36’ 00" W
End Latitude	50° 43’ 12" N	50° 45’ 00" N	50° 51’ 25" N	50° 53’ 06" N	50° 51’ 58" N	50° 53’ 42" N
End Longitude	127° 06’ 07" W	127° 03’ 14" W	126° 54’ 58" W	126° 45’ 14" W	126° 42’ 47" W	126° 34’ 01" W
Direction of Tow (deg)	49	295	58	110	126	58
Vessel Speed (km/h)	6.7	8.3	6.9	8.5	7.8	7.8
Distance Towed (km)	1.69	2.09	2.32	3.22	2.61	2.72
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	150	200	150	150	200	275
Target Headrope Depth (m)	0	15	0	0	15	30
Start Bottom Depth (m)	189	165	180	125	200	452
End Bottom Depth (m)	178	184	102	237	250	479
Usable	Y	Y	Y	Y	Y	Y

Station Name	BR05	BR06	BR07	BR08	BR09	BR10
Tow	61	62	63	64	65	66
Date (Pacific)	2017-10-06	2017-10-06	2017-10-06	2017-10-07	2017-10-07	2017-10-07
Start Time (Pacific)	13:39:00	15:39:00	16:41:00	08:01:00	09:00:00	10:11:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	20	20	20	20	20	20
Start Latitude	50° 58’ 05" N	50° 55’ 41" N	50° 55’ 19" N	50° 48’ 22" N	50° 49’ 05" N	50° 50’ 24" N
Start Longitude	126° 30’ 11" W	126° 23’ 31" W	126° 31’ 08" W	126° 31’ 19" W	126° 25’ 08" W	126° 18’ 40" W
End Latitude	50° 59’ 28" N	50° 55’ 52" N	50° 54’ 29" N	50° 48’ 29" N	50° 49’ 26" N	50° 50’ 10" N
End Longitude	126° 30’ 54" W	126° 25’ 44" W	126° 32’ 53" W	126° 28’ 59" W	126° 23’ 13" W	126° 16’ 26" W
Direction of Tow (deg)	342	277	233	85	73	260
Vessel Speed (km/h)	8.1	7.8	7.6	8.3	7.0	8.0
Distance Towed (km)	2.69	2.61	2.56	2.74	2.37	2.63
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	150	150	150	150	150	150
Target Headrope Depth (m)	0	0	0	0	0	0
Start Bottom Depth (m)	462	311	480	151	233	255
End Bottom Depth (m)	376	365	480	186	227	303
Usable	Y	Y	Y	Y	Y	Y

Station Name	BR11	BR12	BR13	BR14	QCST11	JS01
Tow	67	68	69	70	71	72
Date (Pacific)	2017-10-07	2017-10-07	2017-10-07	2017-10-07	2017-10-08	2017-10-08
Start Time (Pacific)	11:47:00	14:01:00	15:17:00	16:12:00	08:01:00	09:56:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	20	20	20	20	20	20
Start Latitude	50° 48’ 36" N	50° 39’ 32" N	50° 38’ 06" N	50° 38’ 06" N	50° 37’ 44" N	50° 32’ 17" N
Start Longitude	126° 13’ 01" W	126° 10’ 01" W	126° 21’ 21" W	126° 25’ 52" W	126° 47’ 10" W	126° 41’ 38" W
End Latitude	50° 47’ 17" N	50° 39’ 14" N	50° 38’ 01" N	50° 38’ 02" N	50° 39’ 04" N	50° 31’ 30" N
End Longitude	126° 12’ 11" W	126° 12’ 04" W	126° 23’ 25" W	126° 27’ 54" W	126° 45’ 40" W	126° 40’ 37" W
Direction of Tow (deg)	158	257	270	267	36	140
Vessel Speed (km/h)	8.0	7.4	7.4	7.2	9.1	5.6
Distance Towed (km)	2.63	2.46	2.43	2.41	3.02	1.89
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	200	200	150	275	150	200
Target Headrope Depth (m)	30	15	0	30	0	15
Start Bottom Depth (m)	160	166	211	234	150	500
End Bottom Depth (m)	179	184	232	196	122	475
Usable	Y	Y	Y	Y	Y	Y

Station Name	JS02	JS03	JS04	JS05	JS06	JS07
Tow	73	74	75	76	77	78
Date (Pacific)	2017-10-08	2017-10-08	2017-10-08	2017-10-08	2017-10-08	2017-10-08
Start Time (Pacific)	11:38:00	13:16:00	14:39:00	15:31:00	17:37:00	18:29:00
Net	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250	CanTrawl 250
Duration (min)	20	20	20	21	18	13
Start Latitude	50° 30’ 18" N	50° 29’ 10" N	50° 28’ 44" N	50° 27’ 04" N	50° 22’ 01" N	50° 22’ 44" N
Start Longitude	126° 29’ 20" W	126° 19’ 37" W	126° 07’ 01" W	126° 02’ 31" W	125° 38’ 10" W	125° 34’ 30" W
End Latitude	50° 29’ 53" N	50° 29’ 02" N	50° 28’ 34" N	50° 26’ 13" N	50° 22’ 23" N	50° 23’ 17" N
End Longitude	126° 27’ 36" W	126° 17’ 31" W	126° 04’ 59" W	126° 00’ 18" W	125° 36’ 00" W	125° 33’ 25" W
Direction of Tow (deg)	111	95	98	121	75	52
Vessel Speed (km/h)	6.5	7.4	7.2	8.7	8.7	7.2
Distance Towed (km)	2.19	2.48	2.43	3.06	2.65	1.63
Net Opening Height (m)	12	12	12	12	12	12
Net Opening Width (m)	30	30	30	30	30	30
Warp Length (m)	150	275	150	200	150	150
Target Headrope Depth (m)	0	30	0	15	0	0
Start Bottom Depth (m)	389	367	230	150	234	237
End Bottom Depth (m)	395	352	259	210	248	105
Usable	Y	Y	Y	Y	Y	N

APPENDIX D CTD CASTS AND ZOOPLANKTON TOWS

Table D.1. CTD casts and vertical bongo tow times and depths during the juvenile Pacific Salmon trawl survey from September 29 to October 08, 2017 on the *CFV Seacrest*.

				CTD			BONGO		
Date	Station	Latitude	Longitude	Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)	Start Time (PDT)	Bottom Depth (m)	Gear Depth (m)
2017-09-29	QCSD01	50° 58' 52" N	127° 51' 07" W	07:37	130	120	07:47	130	120
2017-09-29	QCSD04	51° 02' 02" N	128° 12' 50" W	11:56	155	145	12:05	155	145
2017-09-29	QCSD08	50° 58' 08" N	128° 35' 17" W	17:58	63	50	18:03	63	50
2017-09-30	QCSD09	50° 58' 23" N	128° 40' 48" W	07:25	77	65	07:31	77	65
2017-09-30	QCSD12	51° 16' 01" N	128° 32' 13" W	11:37	190	180	11:49	190	180
2017-09-30	QCSD16	51° 35' 53" N	128° 15' 47" W	17:52	118	105	18:00	119	105
2017-10-01	FH01	51° 40' 44" N	127° 57' 43" W	07:36	333	250	07:47	333	250
2017-10-01	FH02	51° 45' 29" N	127° 57' 00" W	11:18	385	250	11:30	384	250
2017-10-01	FH06	51° 54' 18" N	127° 54' 32" W	16:36	264	250	16:49	298	250
2017-10-02	FH07	51° 51' 36" N	127° 55' 12" W	07:23	307	250	07:34	306	250
2017-10-02	FH11	51° 36' 50" N	127° 45' 25" W	12:44	177	165	12:52	177	165
2017-10-02	FH14	51° 30' 22" N	127° 46' 44" W	16:32	76	100	16:38	112	100
2017-10-03	RI01	51° 37' 23" N	127° 31' 12" W	07:23	319	250	07:44	318	250
2017-10-03	RI05	51° 26' 24" N	127° 40' 34" W	12:00	228	205	12:09	218	205
2017-10-03	SS02	51° 19' 05" N	127° 40' 44" W	17:15	161	150	17:22	160	150
2017-10-04	QCSD18	51° 12' 43" N	127° 50' 56" W	09:03	111	100	09:10	108	100
2017-10-04	QCSD21	51° 02' 31" N	127° 38' 35" W	12:46	198	190	12:55	200	190
2017-10-04	QCST02	50° 57' 32" N	127° 29' 38" W	15:59	110	90	16:05	90	90
2017-10-05	QCST03	50° 46' 53" N	127° 29' 25" W	07:35	152	140	07:42	230	140
2017-10-05	QCST06	50° 51' 00" N	127° 31' 05" W	11:46	87	70	11:51	79	70
2017-10-05	QCST10	50° 44' 31" N	127° 01' 37" W	18:03	203	185	18:13	193	185
2017-10-06	BR01	50° 50' 46" N	126° 56' 38" W	07:40	108	120	07:51	140	120
2017-10-06	BR04	50° 52' 55" N	126° 36' 00" W	11:48	435	250	11:58	436	250
2017-10-06	BR07	50° 55' 19" N	126° 31' 08" W	17:26	479	250	17:37	479	250
2017-10-07	BR08	50° 48' 22" N	126° 31' 19" W	07:31	132	120	07:39	135	120
2017-10-07	BR11	50° 48' 36" N	126° 13' 01" W	11:16	165	155	11:23	163	155
2017-10-07	BR14	50° 38' 06" N	126° 25' 52" W	17:05	160	150	17:20	162	150
2017-10-08	QCST11	50° 37' 44" N	126° 47' 10" W	07:31	100	90	07:37	106	90
2017-10-08	JS03	50° 29' 10" N	126° 19' 37" W	12:42	371	250	12:52	364	250
2017-10-08	JS07	50° 22' 44" N	125° 34' 30" W	19:03	45	35	19:07	47	35

APPENDIX E CATCH DATA

Table E.1. Catch (counts) of species (or taxonomic groups where species identification could not be made with certainty) captured during the juvenile Pacific Salmon trawl survey from September 29 to October 08, 2017 on the *CFV Seacrest*.

Tow	1	2	3	4	5	6	7	8	9	10	11
Station ID	QCSD01	QCSD02	QCSD03	QCSD04	QCSD05	QCSD06	QCSD07	QCSD08	QCSD09	QCSD10	QCSD11
Chinook Salmon (Adults)					1						
Chinook Salmon (Juveniles)			1								
Chum Salmon (Adults)					2	15	1	3	3	3	1
Chum Salmon (Juveniles)					6		60	3	2		
Coho Salmon (Adults)						1			1		
Coho Salmon (Juveniles)							1				1
Pink Salmon (Juveniles)											
Sockeye Salmon (Juveniles)											
Big Skate											
Black Rockfish											
Eulachon											
North Pacific Spiny Dogfish											
Opalescent Inshore Squid	2				1172				345	53	5689
Pacific Herring	3							9	3	1	
Pacific Ocean Perch			1								
Pacific Sand Lance											
Pacific Staghorn Sculpin											
Prowfish											1
Sablefish	2	8	549	126	4						4
Shortbelly Rockfish									1		
Threespine Stickleback											
Walleye Pollock									2		
TOTAL	7	8	551	126	1185	16	62	15	357	57	5696

Tow	12	13	14	15	16	17	18	19	20	21	22
Station ID	QCSD12	QCSD13	QCSD14	QCSD15	QCSD16	FH01	HP01	HP02	FH02	FH03	FH04
Chinook Salmon (Adults)									2		
Chinook Salmon (Juveniles)						4	1	6	30	6	4
Chum Salmon (Adults)											1
Chum Salmon (Juveniles)	206			311					2		
Coho Salmon (Adults)											
Coho Salmon (Juveniles)	1			2							
Pink Salmon (Juveniles)				5							
Sockeye Salmon (Juveniles)					1				10		
Big Skate											
Black Rockfish											
Eulachon											
North Pacific Spiny Dogfish											
Opalescent Inshore Squid	2170	1100	7409	1437	441		0				
Pacific Herring											
Pacific Ocean Perch											
Pacific Sand Lance											
Pacific Staghorn Sculpin											
Prowfish				1							
Sablefish	1		14	9							
Shortbelly Rockfish											
Threespine Stickleback											
Walleye Pollock										1	
TOTAL	2378	1100	7423	1765	442	4	1	6	44	7	5

Tow	23	24	27	28	29	31	32	33	34	35	36
Station ID	FH05	FH06	FH09	FH10	FH11	FH13	FH14	RI01	RI02	RI03	RI04
Chinook Salmon (Adults)							1			1	
Chinook Salmon (Juveniles)	1	12	6	1			3	7	1	1	2
Chum Salmon (Adults)								1			
Chum Salmon (Juveniles)					12		28				
Coho Salmon (Adults)		1					1				1
Coho Salmon (Juveniles)						2	2				1
Pink Salmon (Juveniles)							3				
Sockeye Salmon (Juveniles)		3			1		82	20	1		
Big Skate							1				
Black Rockfish											
Eulachon											
North Pacific Spiny Dogfish											
Opalescent Inshore Squid											
Pacific Herring											
Pacific Ocean Perch											
Pacific Sand Lance											
Pacific Staghorn Sculpin											
Prowfish								1			
Sablefish											
Shortbelly Rockfish											
Threespine Stickleback								427			
Walleye Pollock											
TOTAL	1	16	6	1	13	2	121	456	2	2	4

Tow	38	39	40	41	42	43	44	45	46	47	48
Station ID	RI06	QCSD17	SS01	SS02	SS03	QCSD18	QCSD19	QCSD20	QCSD21	QCST01	QCST02
Chinook Salmon (Adults)		1			2						
Chinook Salmon (Juveniles)	2	5	2	1	11		1		3	2	2
Chum Salmon (Adults)		2									1
Chum Salmon (Juveniles)		2	420	2	187	1		66	45	60	67
Coho Salmon (Adults)								1			
Coho Salmon (Juveniles)		5	2								
Pink Salmon (Juveniles)		3	24					11	106	24	77
Sockeye Salmon (Juveniles)		1	1	1	5			1	3		4
Big Skate											
Black Rockfish											
Eulachon											
North Pacific Spiny Dogfish					3						
Opalescent Inshore Squid							51	1	1		
Pacific Herring		3	3	15	735	18	198	19		956	32
Pacific Ocean Perch											
Pacific Sand Lance											
Pacific Staghorn Sculpin											
Prowfish					2		1				
Sablefish	2				1	1	1	1			
Shortbelly Rockfish											
Threespine Stickleback											
Walleye Pollock										54	
TOTAL	4	22	452	19	946	20	252	100	158	1096	183

Tow	49	50	51	52	53	54	55	56	57	58	59
Station ID	QCST03	QCST04	QCST05	QCST06	QCST07	QCST08	QCST09	QCST10	BR01	BR02	BR03
Chinook Salmon (Adults)	1								1		
Chinook Salmon (Juveniles)	2					3	1	1	1	13	7
Chum Salmon (Adults)					2						
Chum Salmon (Juveniles)	7		8	98	5	1	135	55	7	30	2
Coho Salmon (Adults)	1										
Coho Salmon (Juveniles)	1		2								
Pink Salmon (Juveniles)	2		6	76	1	1	49	12	15	2	
Sockeye Salmon (Juveniles)								1	1	40	
Big Skate											
Black Rockfish		1	1								
Eulachon											
North Pacific Spiny Dogfish		1									
Opalescent Inshore Squid											
Pacific Herring	21	10			3						
Pacific Ocean Perch											
Pacific Sand Lance											6
Pacific Staghorn Sculpin											
Prowfish											
Sablefish	1	22	3	1							
Shortbelly Rockfish											
Threespine Stickleback											
Walleye Pollock		1									
TOTAL	36	35	20	175	11	5	185	69	25	85	15

Tow	60	61	62	63	64	65	66	67	68	69	70
Station ID	BR04	BR05	BR06	BR07	BR08	BR09	BR10	BR11	BR12	BR13	BR14
Chinook Salmon (Adults)						1					
Chinook Salmon (Juveniles)		1	2		21	1	9	1	9	12	1
Chum Salmon (Adults)											
Chum Salmon (Juveniles)			7	19		2					
Coho Salmon (Adults)											
Coho Salmon (Juveniles)											
Pink Salmon (Juveniles)											
Sockeye Salmon (Juveniles)				3	3	2					
Big Skate											
Black Rockfish											
Eulachon											8
North Pacific Spiny Dogfish	1	3									
Opalescent Inshore Squid											
Pacific Herring	9							538	11		762
Pacific Ocean Perch											
Pacific Sand Lance	0					64		48		6	
Pacific Staghorn Sculpin											
Prowfish											
Sablefish											
Shortbelly Rockfish											
Threespine Stickleback		1									
Walleye Pollock									1		15
TOTAL	10	5	9	22	24	70	9	587	21	18	786