Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf, July 4 - August 2, 2022

Jackie R. King, Amy M. Tabata, Hilari Dennis-Bohm, Tyler B. Zubkowski, Kelsey L. Flynn and Jennifer L. Boldt

Fisheries and Oceans Canada
Science Branch, Pacific Region
Pacific Biological Station
Nanaimo, British Columbia
V9T 6N7

2023

Canadian Technical Report of
Fisheries and Aquatic Sciences 3545

Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

Canadian Technical Report of Fisheries and Aquatic Sciences

Technical reports contain scientific and technical information that contributes to existing knowledge but which is not normally appropriate for primary literature. Technical reports are directed primarily toward a worldwide audience and have an international distribution. No restriction is placed on subject matter and the series reflects the broad interests and policies of Fisheries and Oceans Canada, namely, fisheries and aquatic sciences.

Technical reports may be cited as full publications. The correct citation appears above the abstract of each report. Each report is abstracted in the data base *Aquatic Sciences and Fisheries Abstracts*.

Technical 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 1-456 in this series were issued as Technical Reports of the Fisheries Research Board of Canada. Numbers 457-714 were issued as Department of the Environment, Fisheries and Marine Service, Research and Development Directorate Technical Reports. Numbers 715-924 were issued as Department of Fisheries and Environment, Fisheries and Marine Service Technical Reports. The current series name was changed with report number 925.

Rapport technique canadien des sciences halieutiques et aquatiques

Les rapports techniques contiennent des renseignements scientifiques et techniques qui constituent une contribution aux connaissances actuelles, mais qui ne sont pas normalement appropriés pour la publication dans un journal scientifique. Les rapports techniques sont destinés essentiellement à un public international et ils sont distribués à cet échelon. II n'y a aucune restriction quant au sujet; de fait, la série reflète la vaste gamme des intérêts et des politiques de Pêches et Océans Canada, c'est-à-dire les sciences halieutiques et aquatiques.

Les rapports techniques peuvent être cités comme des publications à part entière. Le titre exact figure au-dessus du résumé de chaque rapport. Les rapports techniques sont résumés dans la base de données *Résumés des sciences aquatiques et halieutiques.*

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

Les numéros 1 à 456 de cette série ont été publiés à titre de Rapports techniques de l'Office des recherches sur les pêcheries du Canada. Les numéros 457 à 714 sont parus à titre de Rapports techniques de la Direction générale de la recherche et du développement, Service des pêches et de la mer, ministère de l'Environnement. Les numéros 715 à 924 ont été publiés à titre de Rapports techniques du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom actuel de la série a été établi lors de la parution du numéro 925.

Canadian Technical Report of
Fisheries and Aquatic Sciences 3545

2023

INTEGRATED PELAGIC ECOSYSTEM SURVEY ON THE VANCOUVER ISLAND CONTINENTAL SHELF, JULY 4 - AUGUST 2, 2022

by

Jackie R. King[1], Amy M. Tabata[1], Hilari Dennis-Bohm[1], Tyler B. Zubkowski[1], Kelsey L. Flynn[1], and Jennifer L. Boldt[1]

[1]Fisheries and Oceans Canada, Science Branch, Pacific Region, Pacific Biological Station, 3190 Hammond Bay Road, Nanaimo, BC, Canada V9T 6N7

Cat. No. Fs97-6/3545E-PDF ISBN 978-0-660-48824-0 ISSN 1488-5379

Correct citation for this publication:

King, J.R., Tabata, A.M., Dennis-Bohm, H., Zubkowski, T.B., Flynn, K.L., and Boldt, J.L. 2023. Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf, July 4 - August 2, 2022. Can. Tech. Rep. Fish. Aquat. Sci. 3545: vii + 102 p.

CONTENTS

ABSTRACT

King, J.R., Tabata, A.M., Dennis-Bohm, H., Zubkowski, T.B., Flynn, K.L., and Boldt, J.L. 2023. Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf, July 4 - August 2, 2022. Can. Tech. Rep. Fish. Aquat. Sci. 3545: vii + 102 p.

Fisheries and Oceans Canada (DFO) mandates and policies require the development and application of an ecosystem based approach to fisheries management as well as cumulative risk assessments. Required to meet these mandates is a comprehensive understanding of factors that affect the distribution and abundance of fish and prey species, trophic structure, predator-prey dynamics, and species interdependencies. The Integrated Pelagic Ecosystem Survey (IPES) is the only broad-scale pelagic ecosystem survey in the Pacific Region that collects this type of information. The goal of the IPES is to understand factors affecting the distribution, abundance, and food web linkages of pelagic fish species, such as Pacific Herring and juvenile Pacific Salmon. To accomplish this goal, we have conducted a random stratified survey with 8 strata on the north and west continental shelf of Vancouver Island since 2017. IPES provides comprehensive biological sampling and stomach analyses of all caught species, along with physical and biological oceanographic sampling. The survey produces data required for ecosystem monitoring and modelling, data for SARA-listed species, and supports both DFO's State of the Pacific Ocean reporting and the State of the Salmon program. This report summarizes the IPES design, methods, and results from the 2022 survey. In 2022, the majority of catch weight comprised Pacific Herring, North Pacific Spiny Dogfish, Jack Mackerel, Walleye Pollock, and adult Coho Salmon. Pacific Herring dominated biomass estimates and were the most frequently sampled vertebrate species. Of the juvenile Pacific Salmon species sampled, Chinook and Coho Salmon had the highest biomass estimates and, along with Pink and Chum Salmon, were encountered more frequently than Sockeye Salmon. The highest invertebrate catch weights were for Lions Mane and Water Jellyfish. A few Pyrosomes were encountered in 2022; they were observed for the first time in BC waters in 2017 and 2018 (not in 2019). Fish diet analyses indicated that the most common prey items were Pacific Herring, Euphausiids, and fish (such as Eulachons, Pacific Saury or juvenile rockfish). Data generated from the survey supports research into 1) linkages between oceanographic conditions and fish abundance, distribution, and community composition; 2) Pacific Salmon and ocean ecology; 3) forecasts of adult fish returns, and 4) food-web dynamics.

RÉSUMÉ

King, J.R., Tabata, A.M., Dennis-Bohm, H., Zubkowski, T.B., Flynn, K.L., and Boldt, J.L. 2023. Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf, July 4 - August 2, 2022. Can. Tech. Rep. Fish. Aquat. Sci. 3545: vii + 102 p.

Les mandats et les politiques de Pêches et Océans Canada (MPO) exigent l'élaboration et l'application d'une approche écosystémique à l'égard de la gestion des pêches, ainsi que des évaluations des risques cumulatifs. Pour remplir ces mandats, il est nécessaire de bien comprendre les facteurs qui influent sur la répartition et l'abondance des poissons et des proies, la structure trophique, la dynamique prédateur-proie et les interdépendances des espèces. Les relevés intégrés des écosystèmes pélagiques (RIEP) sont la seule étude à grande échelle de l'écosystème pélagique dans la région du Pacifique qui recueille ce type d'information. Le but des RIEP est de comprendre les facteurs ayant une incidence sur la distribution, l'abondance et les liens du réseau trophique des espèces de poissons pélagiques, comme le hareng du Pacifique et le saumon du Pacifique jeune. Pour atteindre cet objectif, nous avons effectué une relevé aléatoire stratifié de huit strates sur le plateau continental nord et ouest de l'île de Vancouver depuis 2017. Les RIEP fournissent des échantillonnages biologiques complets et des analyses d'estomac de toutes les espèces capturées, ainsi que des échantillonnages océanographiques physiques et biologiques. Ils génèrent les données nécessaires à la surveillance et à la modélisation de l'écosystème, les données sur les espèces inscrites sur la liste de la LEP, et appuient les rapports du MPO sur l'état de l'océan Pacifique et le programme sur l'état du saumon. Le présent rapport résume la conception, les méthodes, et les résultats des RIEP de 2022. La majorité de poids des prises comprenaient du hareng du Pacifique, de l'aiguillat commun du Pacifique nord, du chinchard gros yeux du Pacifique, de la goberge de l'Alaska, et du saumon coho adulte. Le hareng du Pacifique dominait les estimations de la biomasse, et était l'espèce la plus souvent échantillonnée. Parmi les espèces saumons juvéniles échantillonnés, le saumon quinnat et coho avaient les estimations les plus élevées de la biomasse. Ces deux espèces de saumon, avec le saumon rose et kéta, étaient présents plus fréquemment que le saumon sockeye. Les prises des invertébrés dominants comprenaient des méduses à crinière de lion et des méduses du genre Aequorea. Pyrosomes ont été observés en 2017 et 2018, mais pas en 2019. En 2022, seulement quelques pyrosomes ont été rencontrés. Les analyses du régime alimentaire des poissons ont indiqué que les proies les plus courantes étaient le hareng du Pacifique, les euphausiacés, et les poissons comme les eulakanes, les balaous japonais (Cololabis saira), ou les sébastes juvéniles. Les données générées par les relevés appuient la recherche sur les liens entre les conditions océanographiques et l'abondance ou la composition des communautés de poissons, l'écologie océanique du saumon du Pacifique et d'autres espèces de poissons, la prévision des montaisons de poissons adultes, et la dynamique de la chaîne alimentaire.

1 INTRODUCTION

In British Columbia (BC), Canada, the Vancouver Island (VI) continental shelf (< 200 m) is a productive ecosystem found off the Island's west and north coasts from Juan de Fuca Strait in the south, northward through the Scott Islands and eastward to include southern Queen Charlotte Sound (QCS, Figure 1). Off the west coast, the continental shelf ecosystem is the northern extent of the California Current upwelling system, with a typical northern boundary around Brooks Peninsula (Figure 1). The ecosystem supports important First Nations, commercial, and recreational fisheries, namely for Pacific Salmon (*Onchorhynchus* spp.) and Pacific Herring (*Clupea pallasii*).

The region has been a focus for pelagic fish research surveys for decades. Most notable were the 1) Pacific Sardine (*Sardinops sagax*) ecology trawl survey, conducted annually in July/August from 1997 to 2010, which was then adapted to the annual nighttime pelagic ecosystem trawl survey, 2010-2014 (DFO 2012; Flostrand et al. 2015), 2) the annual juvenile Pacific Salmon trawl survey conducted in June/July, 1998-2015 (for example see Welch et al. 2003), and 3) the annual La Perouse acoustic-trawl pelagic fish and ecosystem survey conducted during 2011-2015 (Boldt et al. 2016). The Pacific Sardine ecology trawl survey conducted sub-surface trawls (15 m headrope depths) along transects during the daytime from 1997 to 2005, then during the nighttime from 2006 to 2009. In 2010, the survey was redesigned as a nighttime pelagic ecosystem survey, with nighttime surface (4 m headrope depths) trawling using a random stratified survey design instead of transects. The juvenile Pacific Salmon surveys conducted daytime surface trawling (0 m, 15 m and 30 m headrope depths) along transects. The La Perouse acoustic-trawl survey included the collection of acoustic data along parallel transects in a core survey area; acoustic echosign was verified using a midwater trawl net and cameras and biological data were collected from net samples.

The DFO Pelagic Integrated Ecosystem Science (PIES) team was formed to address challenges and implement collaborative monitoring and integrated research plans on pelagic ecosystems in BC. Challenges included limited resources and vessel time; therefore, one recommendation was to combine multiple surveys while trying to address all survey goals and objectives. The three above-mentioned surveys were integrated into the Integrated Pelagic Ecosystem Survey (IPES; J. King, Boldt, Dennis-Bohm, et al. 2019), initiated in July 2017, and repeated in July 2018 and 2019. No survey was conducted to 2020 due to COVID-19 restrictions, and the 2021 survey was cancelled due to mechanical failure of the research vessel. The nighttime pelagic ecosystem and the juvenile Pacific Salmon surveys have been integrated and the La Perouse acoustic-trawl survey has been partly integrated. The three surveys previously deployed the same trawl gear, with some overlaps in survey timing and locations that provided an opportunity for collaborative research. The goal of the IPES is to understand factors affecting the distribution, abundance, and food web linkages of pelagic fish species, such as juvenile Pacific Salmon and Pacific Herring. To accomplish this goal, specific objectives of the survey are to: 1) examine species distribution, composition, and abundance; 2) collect morphometric data, diet data, and biological samples; 3) examine the prey environment by sampling zooplankton (vertical bongo net hauls) and conducting oceanographic monitoring (temperature, salinity, fluorescence). The IPES is currently the only broad-scale pelagic ecosystem survey in the Pacific Region, providing comprehensive biological sampling and stomach content analyses of all caught species, along with physical and biological oceanographic sampling. The survey produces data required for ecosystem

monitoring and modelling, data for SARA-listed species (e.g., Tope Sharks, *Galeorhinus galeus*), and supports State of the Pacific Ocean reporting and the State of the Salmon program of DFO. Data generated from the survey supports research into 1) linkages between oceanographic conditions and fish abundance, distribution, and community composition; 2) Pacific Salmon and ocean ecology; 3) forecasts of adult fish returns, and 4) food-web dynamics. The objectives of this report are to summarize methods used and data collected during the 2022 IPES to address research goals.

2 METHODS

2.1 Survey Area and Design

The survey was conducted on the continental shelf, west and north of Vancouver Island, between the 50 and 200 m isobaths (Figure 1).

2.1.1 Survey strata and blocks

A random, stratified survey design was used. The survey area was divided into 8 distinct strata, based on bathymetry (50-100; 100-200 m) and known ecosystem distinctions (Figure 1). The survey area was divided into a contiguous grid of 4 km^2 blocks, representing possible trawl tow locations. For each survey year, random blocks are selected within each stratum, with the number of blocks based on stratum area so that the total number of blocks is about 70 (i.e. the estimated total number of stations that could be completed given the number of fishing days available assuming 6 tows per day) (Table 1). Within a stratum, an equal number of tows with the headrope at 0 m (surface) and at 15 m were selected.

2.2 Vessel and Fishing Gear

In 2022, the survey was conducted on the *CFV Nordic Pearl*, a 35 m stern trawler. Tows were conducted with a two-bridle LFS Trawl LFS 7742 mid-water trawl net (LFS Net Systems, Bellingham, USA; Appendix A Figure A.1) with a codend liner. The front end consists of a 252 foot headline of 5/8 inch coated spectra rope. The next section is 512 inch diamond mesh of 13 mm, and 10 mm synthetic rope. A tapered net body consists of 256 inch, 128 inch, 64 inch, 32 inch, 16 inch, 8 inch, and then 4 inch meshes. The intermediate section of the net is 4 inch mesh with 1 in-8 strand riblines. The cod end has a 4 inch web with a 0.5 inch (12.7 mm) mesh insert. The vessel was equipped with a Marport Trawl System and wireless Marport Trawleye that provided realtime doorspread, headline depth and net opening values (Marport Americas Inc., Washington, USA).

The LFS 7742 Midwater trawl was setup on the *CFV Nordic Pearl* using a dual door leg hookup: a door leg from the top of the door was directly connected to the top link of the net and a bottom door leg directly to the bottom link of the net. Two large chain clumps, approximately 204 kg (450

lbs) each, were placed on the lower wingtips, one on each side to increase the weight of the bottom of the net. There was an adjustable setback hookup system in place; on surface tows there was a reduced setback of approximately 18 chain links (Viking Links on the setback chain hooked together), and at 15 m depth tows, the setback was increased to 36 chain links (full chain length, Viking Links unhooked). Two A-6 floats 86.4 cm x 118.1 cm (34" x 46.5") were attached to the headrope for surface tows, at the 4th splice from the kite where the 13 mm twine meets the headline. The A4 floats were only used on the surface tows. The CFV Nordic Pearl uses a third wire connected to the center of the kite to increase lift at both surface and 15 m depth tows. The trawl doors were Thyboron type 15, 4.5 m^2 pelagic doors approximately 798 kg each, with a door spread sensor in each door (Thyboron Trawldoor, Thyboron, Denmark). For surface tows, 137.2 to 200 m of warp were used and at 15 m depth tows, 200 to 220 m of warp were used.

2.3 Fishing Operations

2.3.1 Time and duration of tows

To provide a continuous time series for both the former juvenile Pacific Salmon survey (fishing conducted during daytime hours) and the former nighttime pelagic ecosystem survey (fishing conducted during nighttime hours), each selected block was fished once during daytime hours and a second time during nighttime hours. Fishing operations began at approximately 16:00 and ended at approximately 04:00 the following day. The net was towed at 4 to 5 knots for a target duration of 20 minutes (with a minimum acceptable tow duration of 5 minutes; note the minimal acceptable tow duration was shortened from 15 minutes in 2018 to 10 minutes in 2019 to 5 minutes in 2022 to minimize the frequency of anomalously large catches). 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.

2.3.2 Other data recorded during tows

Vessel speed, direction, bottom depth, weather conditions (Appendix B), vertical net opening, and trawl door spread were recorded for each tow. 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 rib line of the first belly of the lengthening piece. In addition, two RBR duet temperature and depth sensors (RBR Ltd., Ottawa, ON, Canada) recording depth at 30 second intervals (0.033 Hz) were also mounted inside protective housings with one attached to the kite at the center of the headrope and one attached to the center of the footrope using stainless steel shackles. These sensors were attached to the net by the deck crew at the start of each day, and retrieved by the crew at the end of the day and downloaded by science crew at regular intervals during the survey. The vertical net opening was calculated from the difference in the headrope and footrope depth sensors after the doors were locked. The horizontal net opening was calculated from the door spread and the net dimensions (Appendix A Table A.1) using trigonometry.

2.4 Acoustic Transects

In 2022, continuous acoustic data were collected and recorded when fishing was not occurring (i.e., usually between approximately 06:30 and 15:00, but also during some nighttime hours). Acoustic data were collected with a SIMRAD EK60 scientific echo sounder operating at 38 kHz and 120 kHz. Data were collected along predetermined parallel transects, which were selected based on DFO's biennial Pacific Hake (*Merluccius productus*) survey and spaced 10 nautical miles apart (Figure 3; Edwards et al. 2018). Data were collected from the 50 m to the 1,500 m isobath. Although there were no trawl tows conducted to verify species composition of the echosign, the echosign patterns and trawl catches from this standardized survey were used to determine the spatial distribution of euphausiids, coastal pelagic fish (primarily Pacific Herring), and Pacific Hake. Previous surveys have validated echosigns for these three taxonomic groupings.

2.5 Oceanographic Data

Within each selected block, a vertical conductivity-temperature-depth (CTD) cast was conducted with a Seabird SBE 25 CTD profiler (Sea-Bird Scientific, Seattle, USA) to 250 m or to within 10 m of the bottom. One CTD cast was conducted per block, unless blocks were located next to each other or sampling time was limited. In addition, seawater samples for nitrate, phosphate, and silicate were collected with a Niskin bottle at 5 m from the surface, placed in acid-washed glass test tubes and frozen. Seawater for chlorophyll a (chl *a*) estimation were filtered with GF/F glass fibre filter disks. Filter disks were then placed in polypropylene scintillation vials and frozen. Water for domoic acid analyses was collected from the Niskin bottle, at 6 equally spaced stations along the west coast, within 5-10 km from shore. Seawater and chl *a* samples were sent for analyses at DFO's Institute of Ocean Sciences, Sidney, BC.

2.6 Zooplankton Sampling

Within each selected block, vertical zooplankton tows were conducted to approximately 250 m or within 10 m of the bottom with two paired 60 cm diameter, 253 μm Nitex zooplankton nets mounted in a bongo-drum style black frame. Zooplankton tows were conducted immediately following the CTD cast. A RBR duet temperature and depth logger (RBR Ltd., Ottawa, ON) collecting depth was attached to the bongo frame at the start of each survey, and retrieved periodically and at the end of each survey to estimate velocity and depth of the net. A flowmeter was attached inside one net to record the water volume sampled. Zooplankton collected from the flow meter-side net were preserved in 10% formalin and sent to the zooplankton laboratory at DFO's Institute of Ocean Sciences, for species classification and enumeration (Galbraith and Young 2019). 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 in a pre-weighed Ziploc bag for future stable isotopes, bomb calorimetry, and proximate analyses.

2.7 Catch Processing

At the end of each trawl, the net was retrieved and the catch dumped into a hopper in the fish processing lab for sorting on a conveyor belt. Large catches were randomly subsampled prior to sorting. The catch was sorted to the lowest taxonomic group possible. Juvenile Pacific Salmon (<300 mm total length) were recorded separately from adult Pacific Salmon. The total catch (or the subsample) of each species or taxonomic group, was weighed to the nearest 0.1 kg using a large capacity, motion-compensating electronic balance (Marel Model M1100, 60 kg capacity). For catches of a species or taxonomic group which totalled less than 0.01 kg, “trace” weight was recorded. Where practical, the number of individuals was recorded. Jellyfish species catch weights include both whole and incomplete pieces, while counts are only inclusive of specimens with intact bells.

2.8 Biological Sampling

Time permitting, all fish species captured were measured for length (nearest mm) and weight (nearest 0.01 g) if the specimen was large enough to be accurately weighed using a benchtop electronic scale (Marel Model M1100, 3 kg capacity) and stomach contents recorded. For each species, a target number of 50 randomly selected specimens per tow were sampled, with 10 random specimens selected for stomach content analyses. If the catch count was less than the target number, all specimens in that tow were sampled. Additional biological sampling occurred for Pacific Salmon, Pacific Herring, Pacific Sardine and Eulachon (*Thaleichthys pacificus*), as outlined below. When collected, tissue for genetic stock identification was stored on Whatman paper. All sharks were sampled as per DFO survey sampling protocol (Appendix D). The bell diameters (nearest mm) of intact jellyfish specimens were recorded.

2.8.1 Pacific Salmon

Biological sampling was done separately for juvenile and adult Pacific Salmon. The target number of juvenile or adult Pacific Salmon specimens per tow was 10, and an additional 20 specimens with only length and weight recorded. Full biological samples included: measuring fork length and weight, collecting otoliths, taking a caudal fin clip for genetic stock identification, noting if the adipose fin was clipped (denoting hatchery released fish), retaining heads if a coded wire tag (CWT) was detected with a CWT wand, analyzing stomach contents, collecting whole body or muscle tissue (as per below).

2.8.2 Pacific Herring

The target number of specimens per tow for biological samples was 10, with up to 140 additional specimens measured for length and weight. The number of samples required for multinomial sampling (length, weight, age) was determined using power analyses (not shown) and guidance from the literature (Gerritsen and McGrath 2007; Hulson, Hanselman, and Shotwell 2017; Pennington, Burmeister, and Hjellvik 2002). Biological samples included: measuring standard

length and weight, analyzing stomach contents, and collecting whole body or muscle tissue (as per below). Scales were collected for age determination in the laboratory. Based on the limited number of herring that could be aged in the laboratory and based upon recommendations in Pennington, Burmeister, and Hjellvik (2002) and Hulson, Hanselman, and Shotwell (2017), a small number of herring scales were collected from as many tows as possible to quantify the age, length, weight characteristics of Pacific Herring. Scales from up to 20 specimens per tow were collected and mounted on glass slides using a diluted glue solution. If there were < 25 individual fish in the sample, 5 scales were collected; if there were 25-49 fish, 10 scales were collected; if there were 50-149 fish, 15 scales were collected; if there were >=150 fish, 20 scales were collected. Scales were collected from the preferred area just posterior to pectoral fin insertion point, skin and mucous was removed by lightly rubbing away (Hamer 1989). Scales with evidence of resorption at the focus were rejected for collection. One scale was collected per specimen, if preferred scales were available.

2.8.3 Pacific Sardine

The target number of specimens per tow was 100. Full biological samples included recording fork length, weight, sex, and maturity stage (Appendix C Table C.1). An additional 100 specimens were to be frozen for laboratory stomach analyses. No stomachs were sampled at sea, therefore if catches of Pacific Sardine were less than the target number, all specimens were to be frozen for laboratory analyses.

2.8.4 Eulachon

The target number of specimens per tow was 50. Full biological sampling included measuring standard length and weight, collecting a caudal fin clip for genetic stock identification, analyzing stomach contents, and collecting whole body or muscle tissue (as per below).

2.8.5 Other fish

For all other species, the target number of specimens per tow was 50. Full biological sampling included measuring length (standard for smelt species, fork or total for other species) and weight, analyzing stomach contents, and collecting whole body or muscle tissue (as per below).

2.9 Stomach Contents Sampling

Stomach contents were analyzed for the first 10 random specimens or for all specimens for catches with fewer than 10 individuals. Stomach content sampling followed the recommended at-sea protocol for DFO Pacific Region surveys (J. King, Boldt, and King 2018):

1. The stomach was removed from the anterior end of the oesophagus to the pyloric sphincter.

2. Empty stomachs were identified and recorded.
3. Any specimens with everted, regurgitated stomachs, or in-net feeding were identified, recorded and rejected for further sampling.
4. The bolus was removed from pyloric and cardiac parts of the stomach to a petri dish and prey taxa were sorted.
5. Prey were identified to lowest taxonomic level that the sampler was comfortable with using their naked eye or a hand lens.
6. The volume of prey categories were measured to the nearest 0.1 cm^3 using a volume measuring tool made of plexiglass (see Figure 5, J. King, Boldt, and King 2018). The tool has a ruler (mm) embedded on one side of a trench that is 1 cm wide and 1 cm deep. Prey items were placed in the trench, and packed such that they filled the trench evenly and did not extend past 1 cm high. Once packed, the volume (cm^3) was measured as the length along the ruler and recorded. Digestion state for each prey category was estimated as Fresh, Partial, or Well digested as per J. King, Boldt, and King (2018).

Once stomach contents were enumerated, the empty stomach was placed back in the fish body. Up to five whole bodies per tow were frozen for future energy density estimation, after which, if there were additional specimens, up to 5 muscle tissue samplers were frozen for future stable isotope analyses.

2.10 Biomass Estimates

Design-based biomass estimates were produced for each juvenile Pacific Salmon species (based on daytime fishing events) and for Pacific Herring (based on nighttime fishing events). The annual biomass estimate (B) is the sum of the product of catch per unit effort densities (CPUE; kg·km^3) and the volume (km^3) of each stratum across m strata:

$$B = \sum_{i=1}^{m} V_i \delta_i$$

where δ_i is the mean CPUE density (kg·km^3) for stratum i

V_i is the volume (km^3) of the upper 30 m of stratum i

and m is the number of strata.

Individual CPUE values were adjusted for catchability, prior to analysis. Catchability for juvenile Pacific Salmon was assumed to be 0.4 (Volvenko 2003) and 1.0 for Pacific Herring. When calculating CPUE, if net opening data were not available, the survey mean width (m) or height (m) at that depth was used instead. Variance of the annual biomass estimate was estimated as per Thompson (1992):

$$\sigma^2 = \sum_{i=1}^{m} V_i \left(V_i - v_i\right) \frac{s^2}{n_i}$$

where V_i is the volume (km^3) of the upper 30 m of stratum i

v_i is the total swept volume (km^3) of tows in stratum i

n_i is the total number of tows in stratum i

s^2 is the sample variance of δ_i from stratum i

and m is the number of strata.

3 RESULTS

3.1 Fishing Operations

The survey was divided into two legs: July 04, 2022 to July 19, 2022; and July 19, 2022 to August 02, 2022. The first and last days were used for loading, unloading and travelling; sampling began on July 5 and ended on August 1. COVID19 impacts and precautions resulted in the loss of 5 fishing days at the start of Leg 1. In total there were 21 sampling days, with 9 during the first leg and 12 during the second leg. A total of 108 tows were completed, of which 107 were useable. As in previous years' IPES, an average of 5 tows per day were completed (Table E.1).

A total of 59 survey blocks were successfully fished during the day, and 48 during the night (Table 1, Figure 2). COVID-19 precaution delays, weather or high densities of marine mammals precluded sampling in some blocks, during both day and nighttime. Sampling effort was proportionally distributed across strata to compensate for logistical impacts; the percentage of successful tows was between 33.3% and 116.7% of each stratum's target blocks (Table 1).

3.1.1 Gear Sensors

Net mensuration data from the Marport trawl sensors and trawleye were collected for mouth opening height, gear depth and doorspread. The doorspread was used to calculate the horizontal net opening width. Vertical net mouth opening dimensions and depth were calculated using data from RBR duet sensors mounted on the headrope and footrope. The footrope sensor failed and was replaced twice during the first leg of the survey. Tows with missing sensor data used tow depth-specific averages when required (i.e., an average height and width of 14.7 m and 45.2 m for surface tows and 11.1 m and 51 m for 15 m target depth tows; Table E.1).

3.2 Acoustic Transects

During non-fishing hours, acoustic backscatter data attributed to coastal pelagic species were collected.

3.3 Oceanographic Data

Oceanographic data from CTD casts, including Niskin bottle samples for nitrate, phosphate, silicate, and chl *a*, were processed, analyzed, and archived in the Ocean Sciences Data Inventory at the Fisheries and Oceans Canada's Institute of Ocean Sciences. CTD casts and Niskin bottle sampling were conducted in 54 blocks (92% of the blocks that were successfully fished either during the day or the night), with depths of CTD casts ranging from 20 to 180 m (Table F.1).

3.4 Zooplankton Samples

Vertical zooplankton tows were conducted in 54 blocks where CTD casts were completed (Table F.1) at depths ranging from 25 to 180 m (Appendix Table F.1). Formalin-preserved zooplankton samples are being enumerated at the Institute of Ocean Sciences and data will be archived in the DFO zooplankton database. Frozen zooplankton samples are being processed at the Pacific Biological Station and results are not reported here.

3.5 Catch Composition

Catch composition for each usable fishing tow was recorded (Table G.1). Sixty-six species or taxonomic groups were identified, of which 49 were vertebrates (Table 2), and 17 were invertebrates (Table 3). The mean catch weight per tow was 398 kg, with species-specific total catch weights ranging from 0 to 37,132 kg per usable tow (Table 2 and 3). The total survey catch weight from usable tows was 42,533 kg (Tables 2 and 3), excluding species for which only count data were collected (e.g., sharks and sunfish).

For each captured species the total count of specimens, total catch weight, maximum and mean catch weight per tow and the number of tows in which the species occurred is reported in Tables 2 & 3. Pacific Herring dominated the catches and represented 87% of the total survey catch weight; there were two very large catches (over 10,000 kg), one catch >1,000 kg, and fourteen catches >200 kg. Pacific Herring were also the most frequently caught vertebrate species overall; they were present in 56% of tows (*Aqueorea* spp. was the most frequently caught animal as it was in 57% of tows). Pacific Herring were caught in 98% of night tows and 22% of daytime tows. North Pacific Spiny Dogfish (*Squalus suckleyi*) had the second highest catch weight (3% of total survey catch weight); however, they were encountered in only 3% of the tows, and the majority of the species' total catch weight was captured in one tow of 1,320 kg (Table 2). In addition to North Pacific Spiny Dogfish, 4 other shark species were encountered during the survey, and included Tope Shark (*Galeorhinus galeus*), Blue Shark (*Prionace glauca*),

Thresher Shark (*Alopias vulpinus*), and Salmon Shark (*Lamna ditropis*) (Table 2 and G.1). After accounting for Pacific Herring and North Pacific Spiny Dogfish, approximately 80% of the remaining catch weight comprised 5 species or groups (in relative order of contribution): Lions Mane (*Cyanea capillata*), Jack Mackerel (*Trachurus symmetricus*), Walleye Pollock (*Gadus chalcogrammus*), Coho Salmon (Adults) (*Oncorhynchus kisutch*), and, Chinook Salmon (Adults) (*Oncorhynchus tshawytscha*); Tables 2-3). Other frequently encountered non-salmonid fish species or groups were Rockfishes (*Sebastes spp.*) (41% of tows), Eulachon (*Thaleichthys pacificus*) (25% of tows) and Flatfishes (*Pleuronectiformes* and *Citharichthys spp.*) (25% of tows) (Table 2).

Pacific Salmon were caught in 78% of usable tows. The dominant species of juvenile Pacific salmon was Pink Salmon (n=254). Chum, Coho and Chinook Salmon were caught in similar numbers (n=68, 66 and 64 respectively), and only 1 juvenile Sockeye Salmon was caught (Table 2). Coho and Chum Salmon were the most dominant adult Pacific Salmon caught (n=340 and 319 respectively), followed by Pink Salmon (n=80) and some Chum and Sockeye Salmon (n=20 and 15) (Table 2). Figures 4-10 provide relative catch per unit effort by tow for Pacific Salmon and Pacific Herring.

The most frequently encountered invertebrate species or groups were Water Jellyfish (*Aequorea* spp.) (57% of tows), Lion's Mane Jellyfish (*Cyanea capillata*) (31% of tows), and then Moon Jellyfish (*Aurelia labiatae*) and Opalescent Inshore Squid (*Doryteuthis opalescens*), both caught in 26% of tows (Table 3). Pink shrimp (*Pandalus jordani*) were caught in three tows, with only 2 tows having large numbers.

3.6 Biological Samples

3.6.1 Samples

Biological samples were collected from 53 species or groups and included 10,777 individual specimens (Table 4). Sample sizes and statistics of length and weight are presented in Table 4 for each species sampled.

3.6.2 Length and Weight

Length frequencies and length-weight relationships were examined for all Pacific Salmon and for species with at least 100 individuals measured (Figures 11-19). Length frequency plots for Pacific Salmon (Figures 11-15), illustrate that this survey encounters both juveniles (<300 mm) and adults, with a higher proportion of juvenile specimens. Pacific Herring standard lengths ranged from 42 to 236 mm, with a mean length of 165 mm (Table 4). Based on lengths, three or four size classes of Pacific Herring are sampled by this survey; however, this does not imply the same number of age classes, since there is overlap in lengths among age classes (Figure 16). Eulachon (*Thaleichthys pacificus*) lengths ranged from 74 to 191 mm, with a mean length of 125 mm (Figure 17). Lengths of Jack Mackerel (*Trachurus symmetricus*) were between 321 to 551 mm (Figure 18). Most Opalescent Inshore Squid (*Doryteuthis opalescens*) mantle lengths were between 70 mm and 110 mm (Figure 19).

3.7 Stomach Content Samples

A total of 1,639 stomach specimens were processed at sea from 26 species (Table 5). Of the stomachs examined, on average 25% were empty (Table 5). Diets were examined in 4-100% of the tows in which they were caught and numbers of fish ranged from 1 to 459. Other species were either released alive (e.g., many shark species) or were too small to have their diets examined at sea. Subsamples of small fish such as young of the year Walleye Pollock and juvenile Rockfishes were frozen for later laboratory analyses.

3.7.1 Diet Summaries

Unidentifiable remains were observed in 24% of non-empty stomachs examined. The most frequently consumed identifiable prey items across predators were Euphausiids, true crabs, and teleosts (Table 6). Most teleost fish prey were unidentifiable to species, but the most frequently occurring species was Pacific Herring, with small amounts of Eulachon (*Thaleichthys pacificus*), Rockfishes (*Sebastes* spp.), Pacific Sandlance (*Ammodytes personatus*), Pacific Saury (*Cololabis saira*) and Smelts (*Osmeridae* spp.) (Table 6). Teleost fish prey, primarily Pacific Herring and Eulachon, contributed the largest average volume to diets, followed by shrimp, cephalopods and then Euphausiids.

3.8 Biomass Estimates

In 2022, biomass estimates of Pacific Herring, juvenile Chinook Salmon and juvenile Pink Salmon were higher than in previous years, juvenile Chum Salmon and juvenile Sockeye Salmon had lower biomass estimates than in previous years, and juvenile Coho Salmon biomass was generally similar (J. King, Boldt, Dennis-Bohm, et al. 2019) (Table 7). Biomass CVs for juvenile Pacific Salmon species and Pacific Herring ranged from 0.24 for Chinook Salmon to 1.0 for Sockeye Salmon (Table 7).

The biomass of Pacific herring was 463,762 t (CV=0.59; Table 7) which is over five times the estimates in 2017 and 2019 (92,175 and 98,217 t respectively), and over 10 times the biomass observed in 2018 (34,562 t).

The highest juvenile salmon biomass estimate in 2022 was for Chinook Salmon with a biomass estimate of 70.7 t, which is higher than in 2017-2019 when it varied between 6 and 9 t (Table 7; J. King, Boldt, Dennis-Bohm, et al. 2019). The 2022 juvenile Coho Salmon biomass estimate was 54.08 t, higher than the estimates of 17.9 t in 2019 and 36.0 t in 2018 (Table 7), but lower than the 79.3 t in 2017 (J. King, Boldt, Dennis-Bohm, et al. 2019). Chum Salmon had the highest daytime juvenile salmon biomass in 2017 and 2019 (128.2 and 25.5 t, respectively), and a lower biomass (11.92 t) in 2018, and 2022 (13.18 t). Biomass estimates of juvenile Pink Salmon were low for all years during 2017-2019 (0-2.32 t), however in 2022 it was much higher at 17.11 t. (Table 7, J. King, Boldt, Dennis-Bohm, et al. 2019). Finally, the juvenile Sockeye Salmon biomass estimate for 2022 was the lowest of the 2022 juvenile salmon, and also lower than Sockeye Salmon estimates from previous years (0.8 - 4.0 t; J. King, Boldt, Dennis-Bohm, et al. 2019).

4 DISCUSSION

The IPES data generated in 2022 cover 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. With a combination of day and night time fishing, the IPES extends long-term time series of relative abundance of juvenile Pacific Salmon, Pacific Herring, and other important pelagic fish species. If Pacific Sardine re-establish high migratory rates into Canadian waters to feed in summer, the IPES will provide documentation and also extend the long-term time series of that species' relative abundance. Acoustic data on Pacific Herring and Pacific Hake distributional patterns have also been reported in the State of the Pacific Ocean report (Boldt et al. 2019). IPES 2017-2019 relative catch rates and condition of juvenile Pacific Salmon have extended a 20-year time series off the west coast of Vancouver Island and have been reported in State of the Pacific Ocean reports (J. King and Tucker 2018; J. King, Anderson, et al. 2019) and in the Fraser River Sockeye Salmon Forecasting Supplement (MacDonald et al. 2019). It is important to maintain the long-term time series of juvenile Pacific Salmon relative abundance along the continental shelf, since linking the IPES results to similar surveys from Oregon north to the Gulf of Alaska and Bering Sea provide indication of broad-scale responses to regional drivers (J. King, Boldt, Burke, et al. 2019). The IPES also provides the opportunity to document unusual occurrences, such as the unprecedented, and broad-scale Pyrosome bloom in 2017, reduced bloom in 2018, an absence of Pyrosomes in 2019 (IPES data reported in Brodeur et al. 2018; Boldt and Chandler 2019) and reoccurrence in 2022. Other interesting results include abundant juvenile Rockfish catches in 2018 and 2019 (Boldt and Chandler 2019). The IPES is conducted annually and is a key platform supporting ecosystem research and empirical-based linkages of climate and ocean variability to fish abundance or community composition, which is fundamental to ecosystem-based fisheries management.

5 REFERENCES

Boldt, J. L., and P. C. Chandler. 2019. “Unusual Events in Canada’s Pacific Marine Waters in 2018.” In *State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2018*, edited by J. L. Boldt, J. Leonard, and P. C. Chandler, 102–6. Can. Tech. Rep. Fish. Aquat. Sci. 3314.

Boldt, J. L., H. Dennis-Bohm, J. King, C. Stanley, E. Anderson, T. Zubkowski, and S. Gauthier. 2019. “Pacific Herring Summer Distribution and Abundance Off the Vancouver Island Continental Shelf.” In *State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2018*, edited by J. L. Boldt, J. Leonard, and P. C. Chandler, 70–74. Can. Tech. Rep. Fish. Aquat. Sci. 3314.

Boldt, J. L., S. Gauthier, M. Thompson, L. Flostrand, V. Hodes, and J. Nephin. 2016. “La Perouse Acoustic-Trawl Survey.” In *State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2015*, edited by P. C. Chandler, S. A. King, and R. I. Perry, 82–86. Can. Tech. Rep. Fish. Aquat. Sci. 3179.

Brodeur, R., I. Perry, L. Flostrand, M. Galbraith, J. King, J. Murphy, K. Sakuma, and A. Thompson. 2018. “An Unusual Gelatinous Plankton Event in the NE Pacific: The Great Pyrosome Bloom of 2017.” *PICES Press* 26 (1): 22–27.

DFO. 2012. “Pacific Sardine 2011 Seasonal Biomass and Migration in British Columbia and Harvest Advice for 2012.” *DFO Can. Sci. Advis. Sec. Sci. Advis. Rep.*, no. 2012/026.

Edwards, A. M., I. G. Taylor, C. J. Grandin, and A. M. Berger. 2018. “Status of the Pacific Hake (Whiting) Stock in U.s. And Canadian Waters in 2018.” *Prepared by the Joint Technical Committee of the U.S. And Canada Pacific Hake/Whiting Agreement, National Marine Fisheries Service and Fisheries and Oceans Canada*, 222.

Flostrand, L., J. L. Boldt, V. Hodes, and S. MacConnachie. 2015. “West Coast of Vancouver Island Pelagic Ecosystem Night Trawl Survey.” In *State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2014*, edited by P. C. Chandler, S. A. King, and R. I. Perry, 93–99. Can. Tech. Rep. Fish. Aquat. Sci. 3131.

Galbraith, M., and K. Young. 2019. “West Coast British Columbia Zooplankton Biomass Anomalies 2018.” In *State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2018*, edited by J. L. Boldt, J. Leonard, and P. C. Chandler, 64–69. Can. Tech. Rep. Fish. Aquat. Sci. 3314.

Gerritsen, Hans D., and David McGrath. 2007. “Precision estimates and suggested sample sizes for length-frequency data.” *Fishery Bulletin* 105 (1): 116–20.

Hamer, L. 1989. *Procedures for collecting and processing British Columbia herring samples*. Department of Fisheries; Oceans, Fisheries Research Branch, Pacifi.

Hulson, Peter John F., Dana H. Hanselman, and S. Kalei Shotwell. 2017. “Investigations into the distribution of sample sizes for determining age composition of multiple species.” *Fishery Bulletin* 115 (3): 326–42. https://doi.org/10.7755/FB.115.3.4.

King, J., E. Anderson, J. L. Boldt, T. Zubkowski, and H. Dennis-Bohm. 2019. “2018 Juvenile Salmon Surveys on the Continental Shelf of Vancouver Island.” In *State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2018*, edited by P. C. Chandler and J. Boldt, 205–9. Can. Tech. Rep. Fish. Aquat. Sci. 3314.

King, J., J. L. Boldt, B. Burke, C. Greene, J. Moss, and C. Neville. 2019. “Northeast Pacific Juvenile Salmon Summer Surveys in 2018.” *PICES Press* 27 (1): 19–26.

King, J., J. L. Boldt, H. Dennis-Bohm, T. Zubkowski, E. Anderson, L. Florstrand, and S. Tucker. 2019. “Integrated Pelagic Ecosystem Surveys on the Vancouver Island Continental Shelf, July 7 - August 2, 2017 and July 5 - July 29, 2018.” *Can. Tech. Rep. Fish. Aquat. Sci* 3318: xi + 115 p.

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.

King, J., and S. Tucker. 2018. “2017 Juvenile Salmon Catch Rates on the Vancouver Island Continental Shelf.” In *State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems in 2017*, edited by P. C. Chandler, S. A. King, and J. Boldt, viii + 245 p. Can. Tech. Rep. Fish. Aquat. Sci. 3266.

MacDonald, B. L., S. C. H. Grant, D. A. Patterson, K. A. Robinson, J. L. Boldt, K. Benner, J. King, et al. 2019. “State of the Salmon: Informing the Survival of Fraser Sockeye Returning in 2019 Through Life Cycle Observations.” *Can. Tech. Rep. Fish. Aquat. Sci.* 3336: V + 60 p.

Pennington, Michael, Liza Maré Burmeister, and Vidar Hjellvik. 2002. “Assessing the precision of frequency distributions estimated from trawl-survey samples.” *Fishery Bulletin* 100 (1): 74–80.

Thompson, S. K. 1992. *Sampling*. John Wiley; Sons, Inc. New York.

Volvenko, I. V. 2003. “GIS and Atlas of Salmons Spatial-Temporal Distribution in the Okhotsk Sea.” *NPAFC Report*, no. 729: 32 p.

Welch, D. W., J. F. T. Morris, T. B. Zubkowski M. E. Thiess, M. C. Jacobs, P. M. Winchell, and H. R. C. Maclean. 2003. “A Summary of Canadian High Seas Salmon Surveys in the Gulf of Alaska, 1995 to 2003.” *NPAFC Report*, no. 712: 68 p.

6 ACKNOWLEDGEMENTS

We would like to acknowledge that we conducted scientific research in the following First Nations territories: Da’naxda’xw-Awaetlala, Gwa’sala-Nakwaxda’xw, Gwawaenuk, Heitsuk, Homalco, K’òmoks, Kitkatla (Gitxaala), Kwakiutl, Laich-Kwil-Tach, Mamalilikulla-Qwe’Qwa’Sot’Em, ’Namgis, Quatsino, Tlatlasikwala, Tlowitsis, Tsawataineuk, Wuikinuxv. We would like to thank Captain Tim Fry, and crew of the *CFV Nordic Pearl*. We appreciate the expertise of the following science staff who participated in the survey: Cameron Freshwater, Colin Bailey, Dylan Glasser, Kelsey Flynn, Lenora Turcotte, Brooke Hackett, and Ryan Uslu. Thank-you to Malcolm Wyeth, Norm Olsen, Schon Acheson and Stéphane Gauthier for helping with various aspects of survey set up and data collection.

7 FIGURES

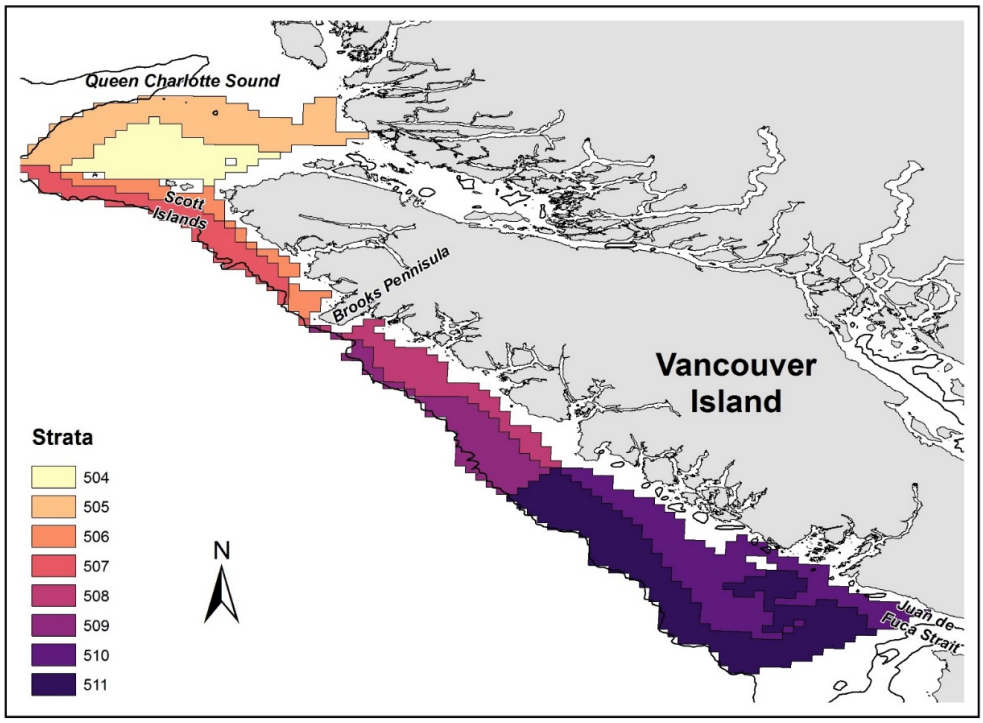


Figure 1. Survey area and strata for the Integrated Pelagic Ecosystem Survey on the Vancouver Island continental shelf.

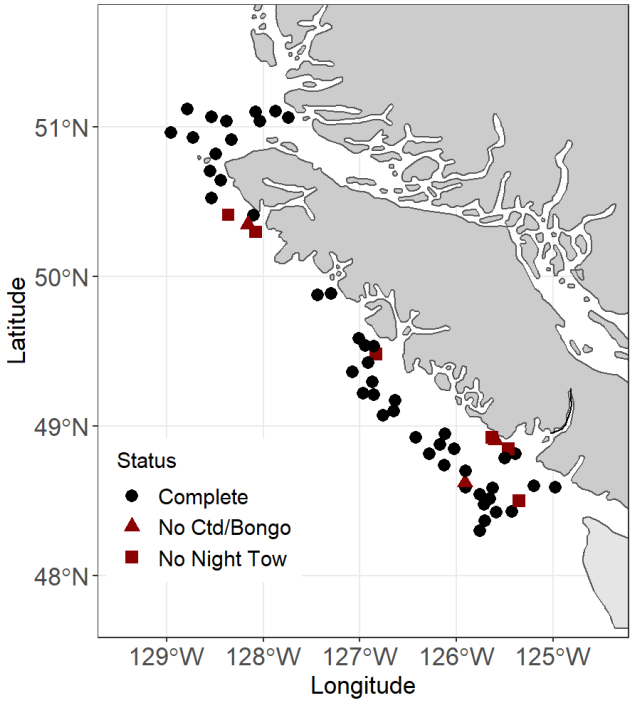


Figure 2. Trawl and oceanographic locations from the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf from July 4 - August 2, 2022 on the *CFV Nordic Pearl*.

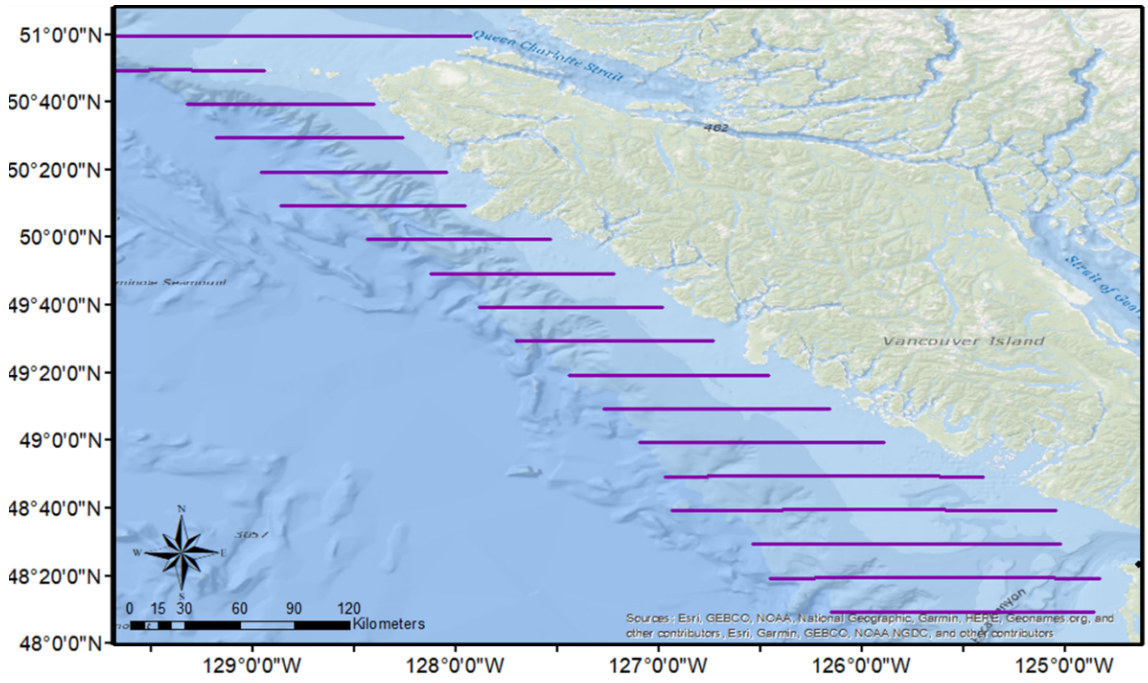


Figure 3. Transects for acoustic data collection during non-fishing hours for the 2022 Integrated Pelagic Ecosystem Survey, based on DFO's Pacific Hake survey acoustic transects.

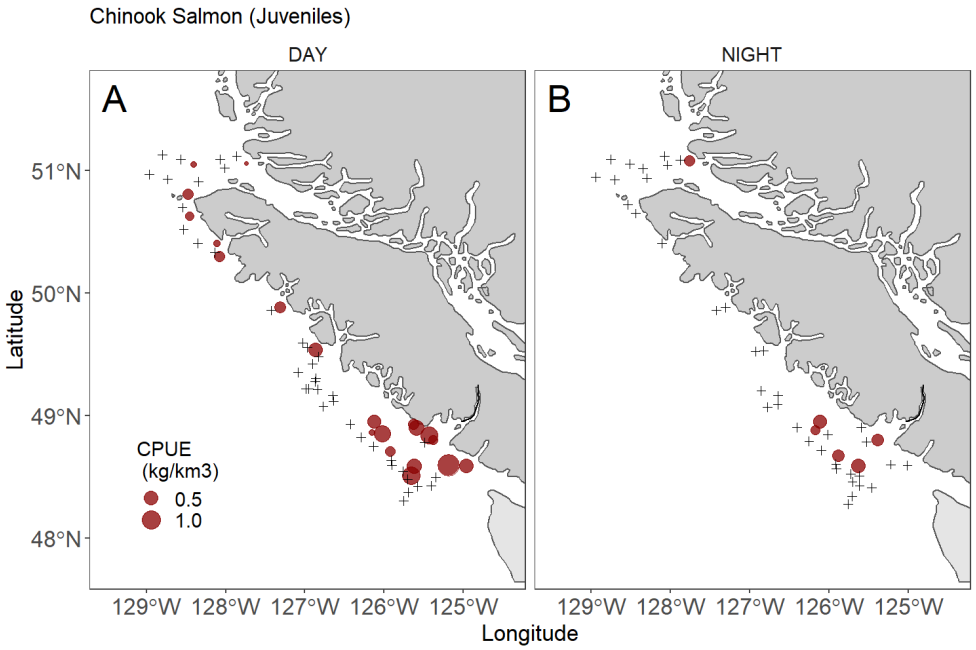


Figure 4. Juvenile Chinook Salmon (*Oncorhynchus tschawytscha*) catch per unit effort (CPUE; kg /km3) during (A) daytime and (B) nighttime tows. Circles are proportional to catch abundance, and zero catches are shown with a cross (+).

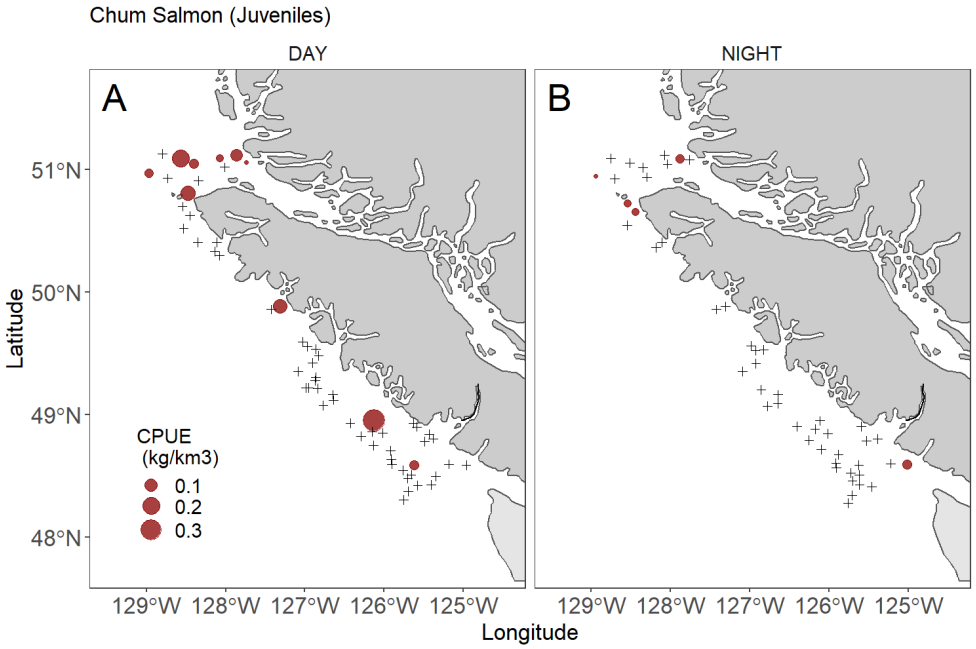


Figure 5. Juvenile Chum Salmon (*Oncorhynchus keta*) catch per unit effort (CPUE; kg /km3) during (A) daytime and (B) nighttime tows. Circles are proportional to catch abundance, and zero catches are shown with a cross (+).

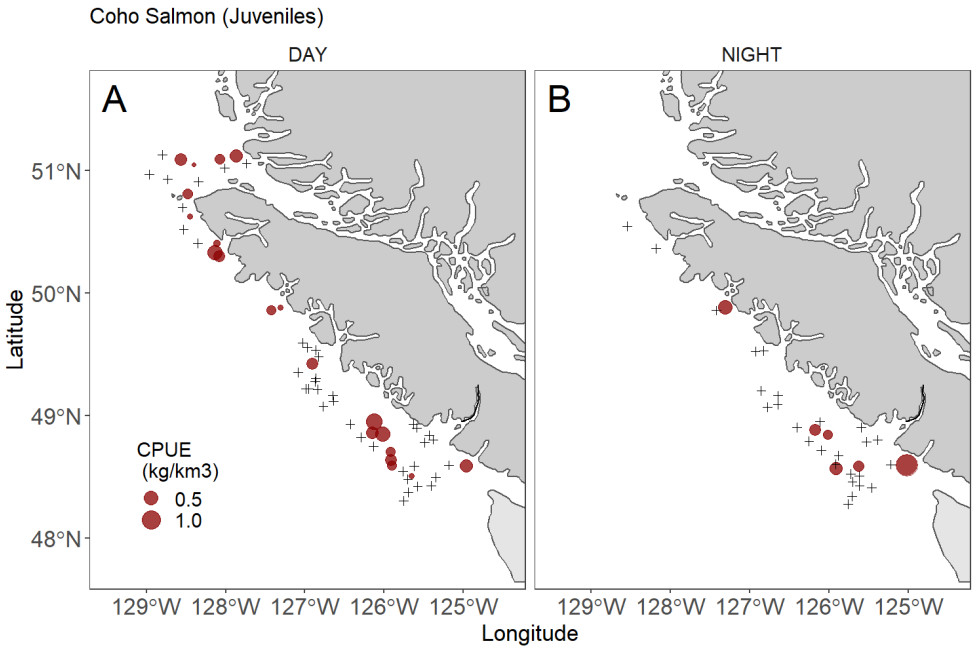


Figure 6. Juvenile Coho Salmon (*Oncorhynchus kitsutch*) catch per unit effort (CPUE; kg /km3) during (A) daytime and (B) nighttime tows. Circles are proportional to catch abundance, and zero catches are shown with a cross (+).

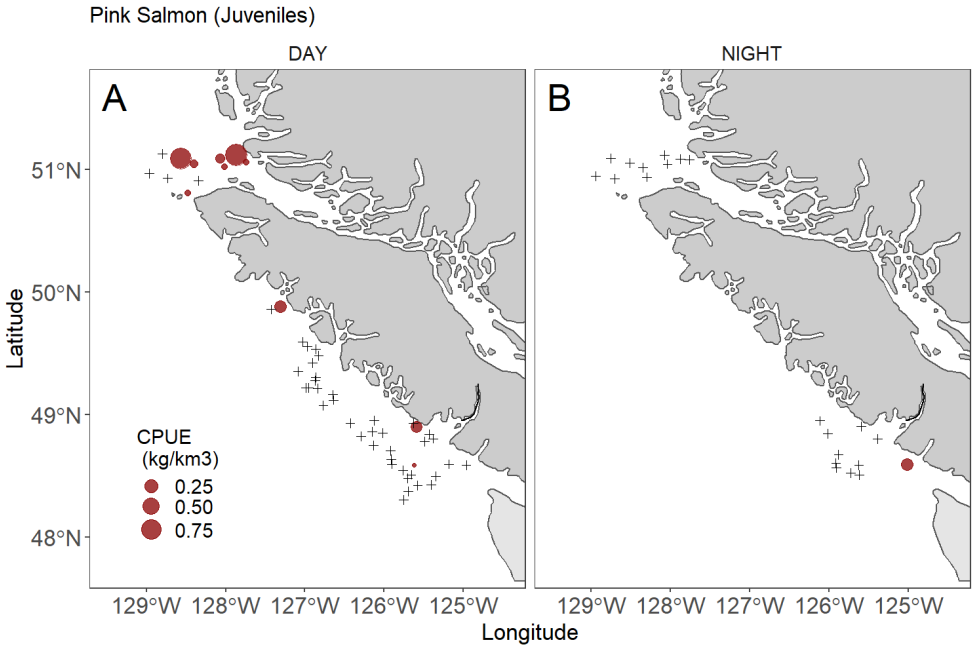


Figure 7. Juvenile Pink Salmon (*Oncorhynchus gorbusha*) catch per unit effort (CPUE; kg /km3) during (A) daytime and (B) nighttime tows. Circles are proportional to catch abundance, and zero catches are shown with a cross (+).

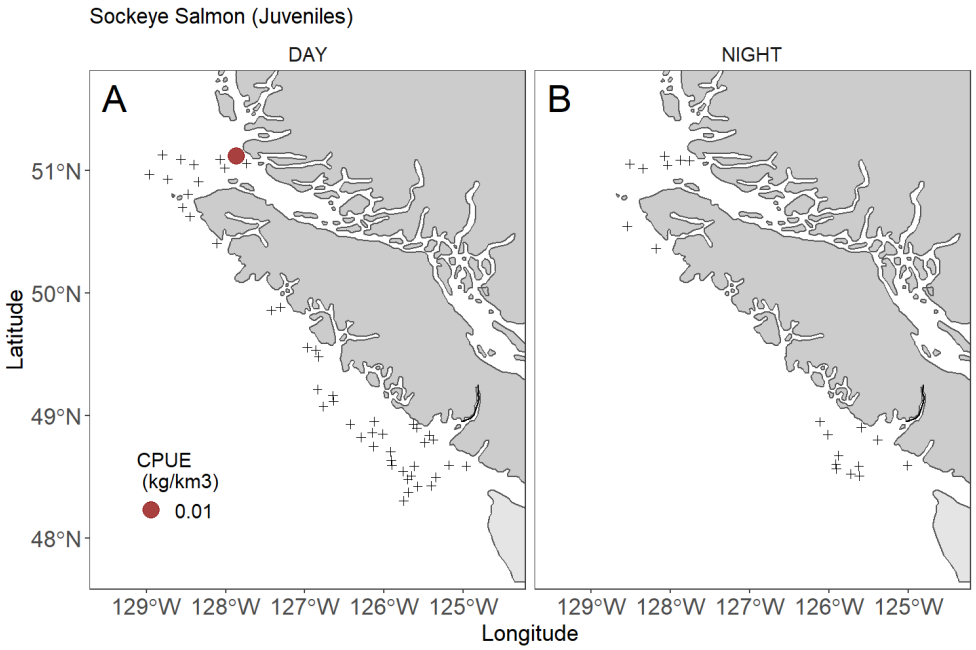


Figure 8. Juvenile Sockeye Salmon (*Oncorhynchus nerka*) catch per unit effort (CPUE; kg /km3) during (A) daytime and (B) nighttime tows. Circles are proportional to catch abundance, and zero catches are shown with a cross (+).

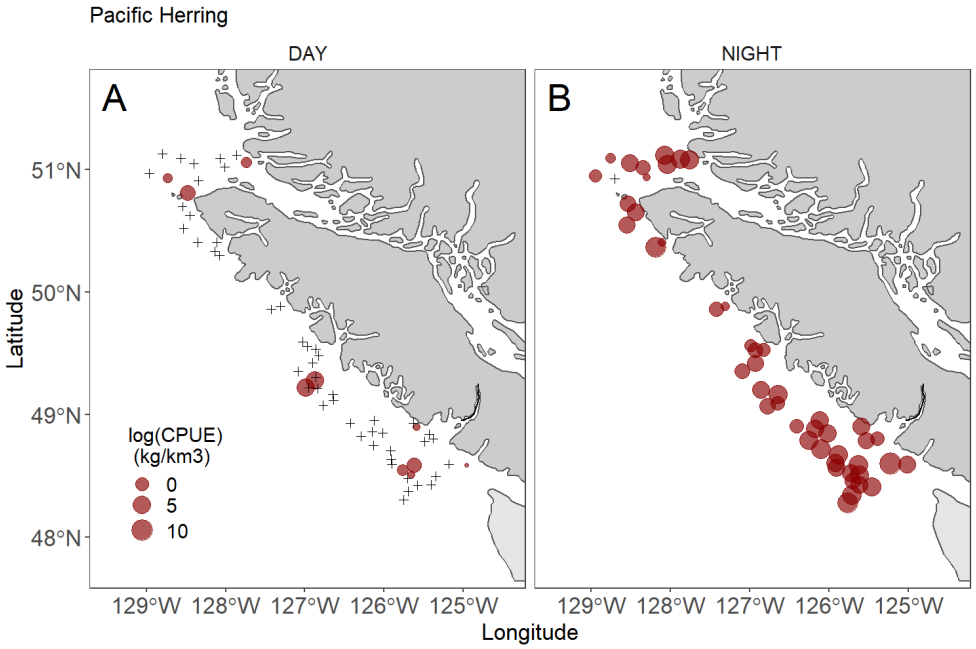


Figure 9. Pacific Herring (*Clupea pallasii*) log(catch per unit effort) (log(CPUE); kg /km3) during (A) daytime and (B) nighttime tows. Circles are proportional to catch abundance, and zero catches are shown with a cross (+).

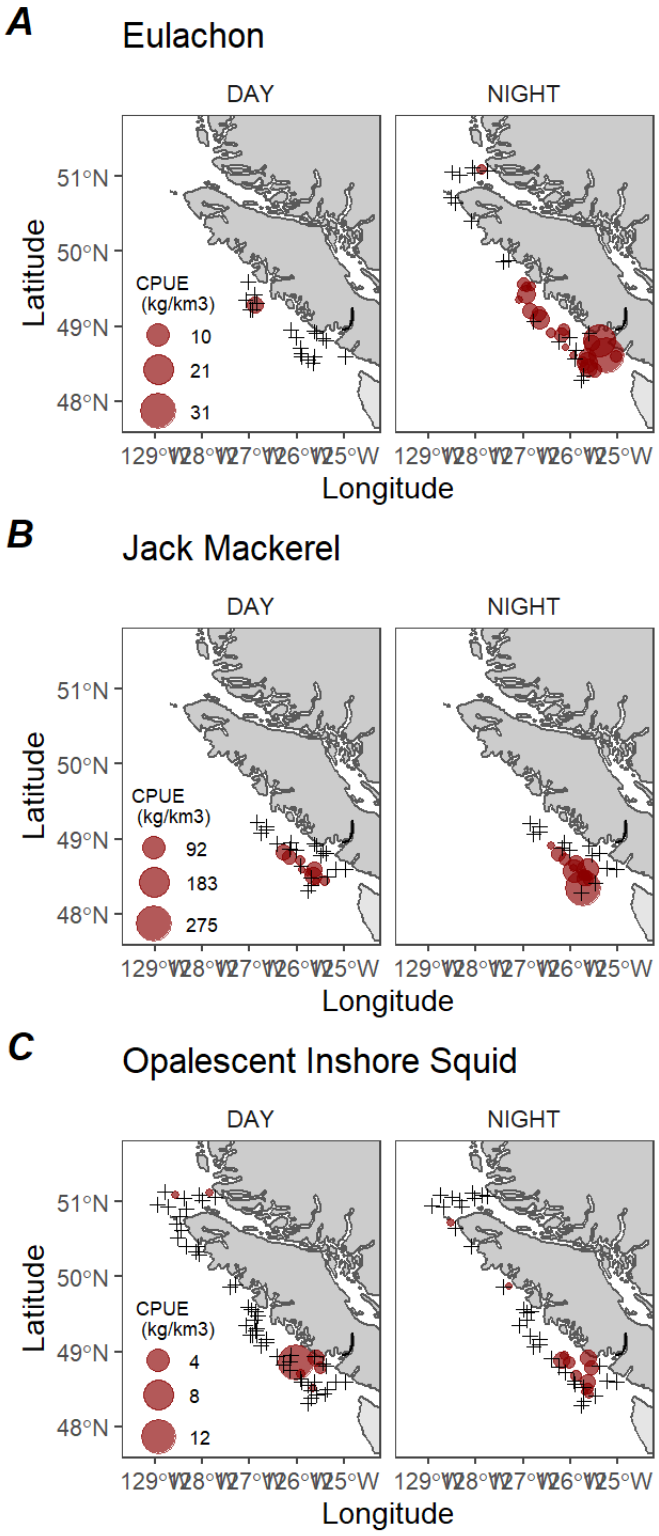


Figure 10. Catch per unit effort (CPUE; kg/km3) for frequently caught, non-salmonid, species: (A) Eulachon (*Thaleichthys pacificus*), (B) Jack Mackerel (*Trachurus symmetricus*), (C) Opalescent Inshore Squid (*Doryteuthis opalescens*). Circles are proportional to CPUE, and zero catches are shown with a cross (+).

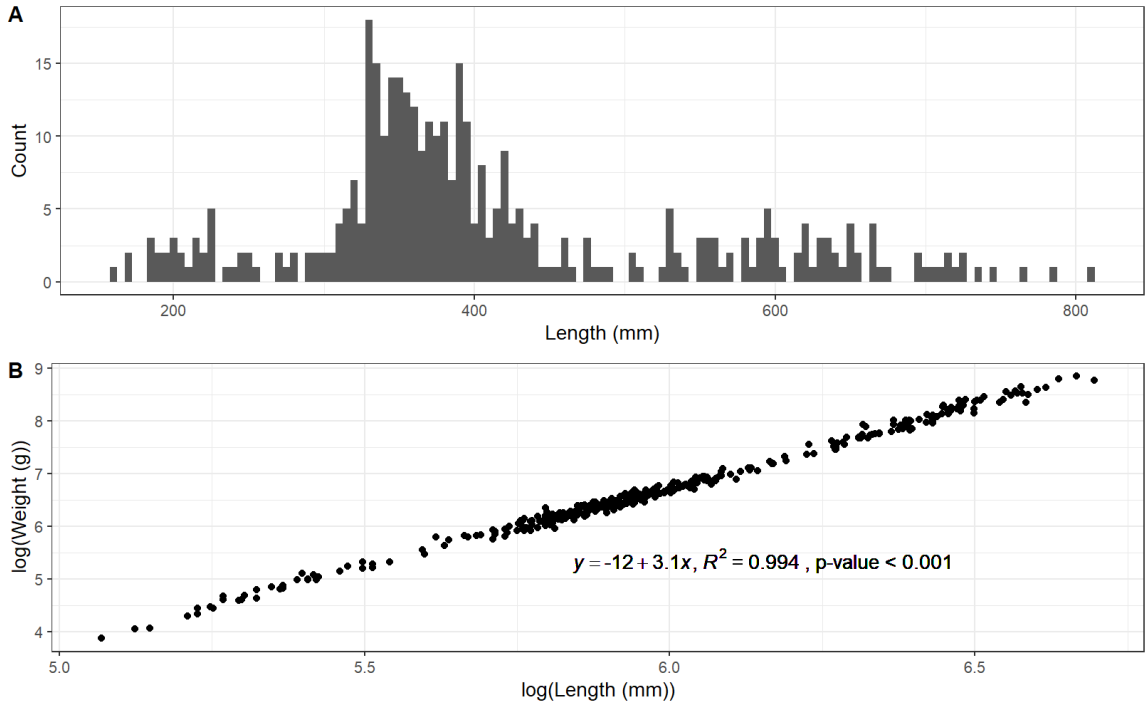


Figure 11. Chinook Salmon (*Oncorhynchus tshawytscha)*) length frequency plot as sampled during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

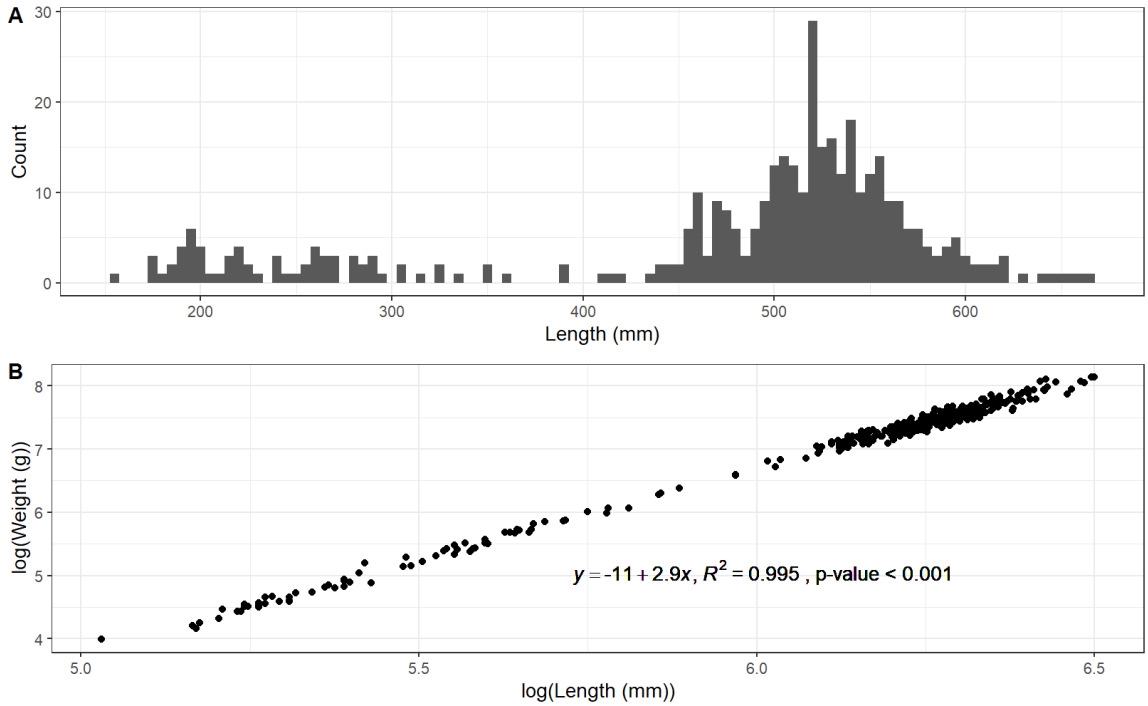


Figure 12. Coho Salmon (*Oncorhynchus kisutch*) length frequency plot as sampled during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

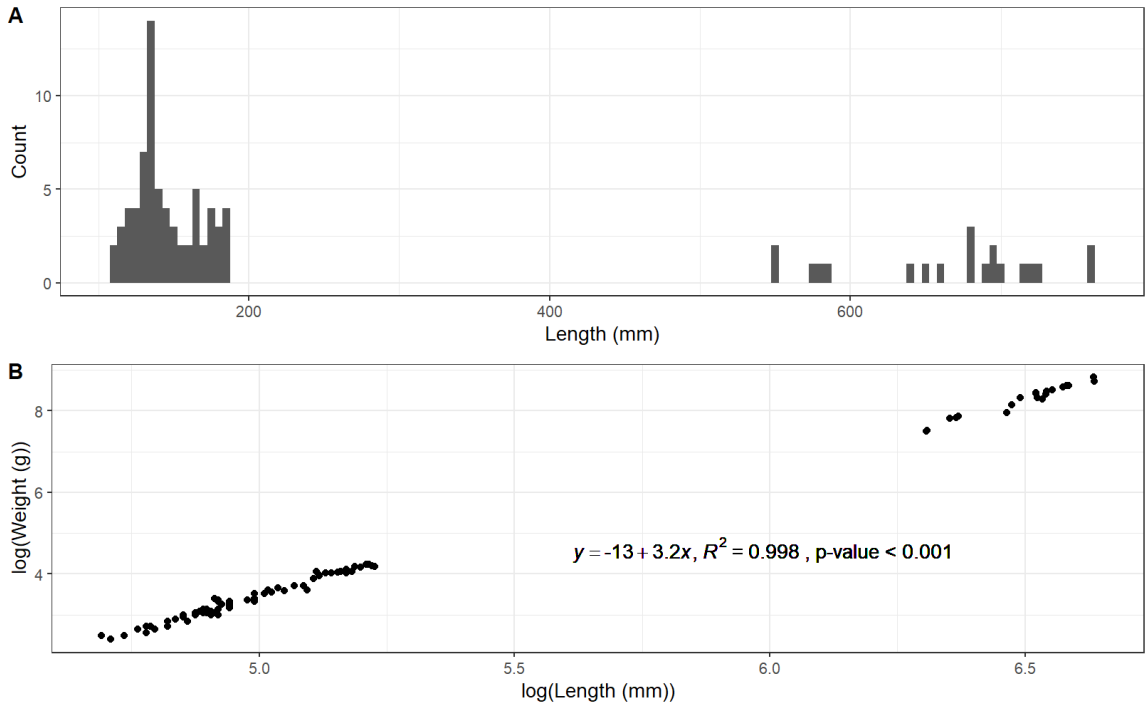


Figure 13. Chum Salmon (*Oncorhynchus keta*) length frequency plot as sampled during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

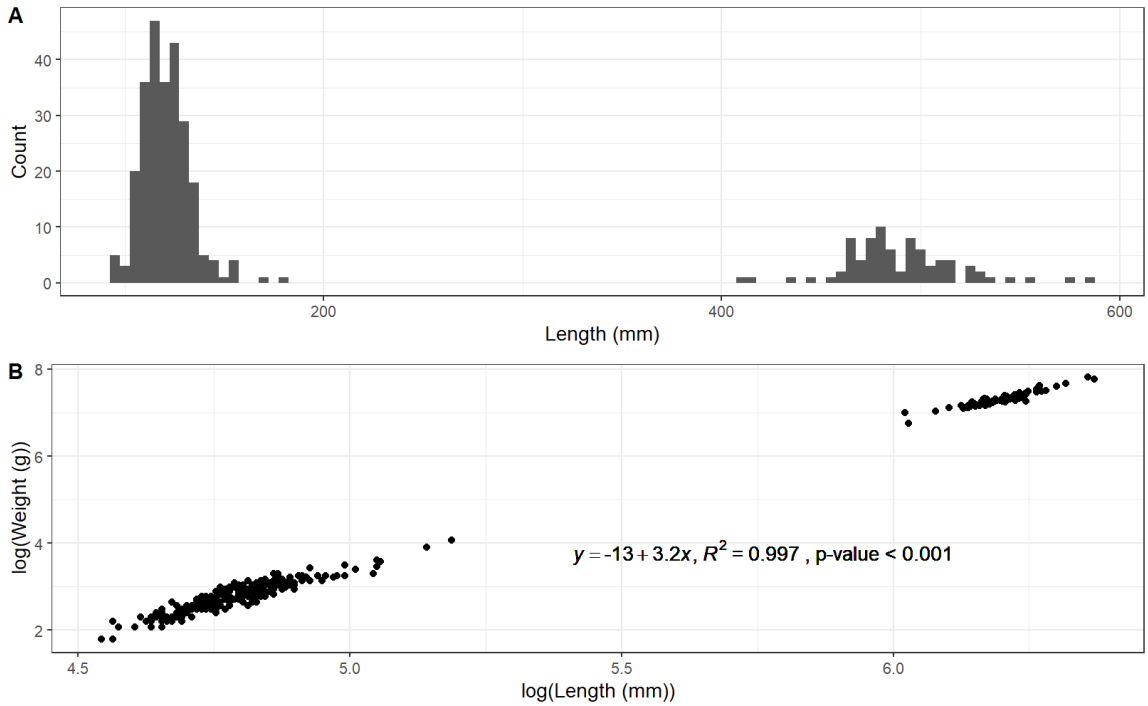


Figure 14. Pink Salmon (*Oncorhynchus gorbusha*) length frequency plot as sampled during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

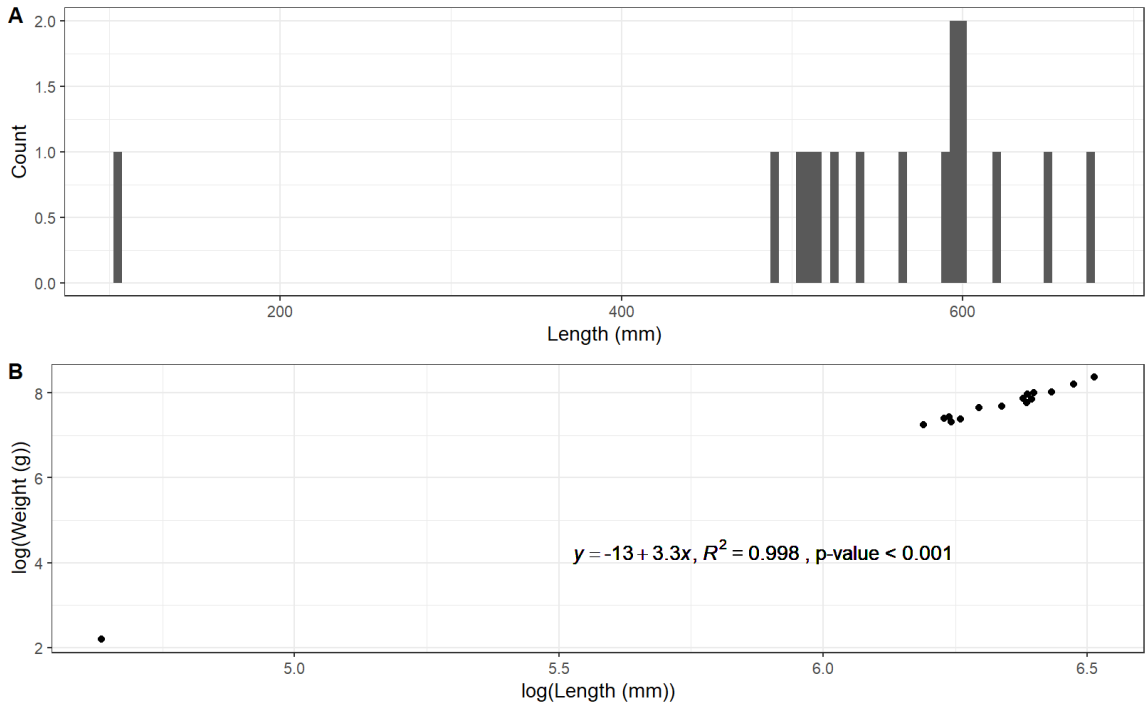


Figure 15. Sockeye Salmon (*Oncorhynchus nerka*) length frequency plot as sampled during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

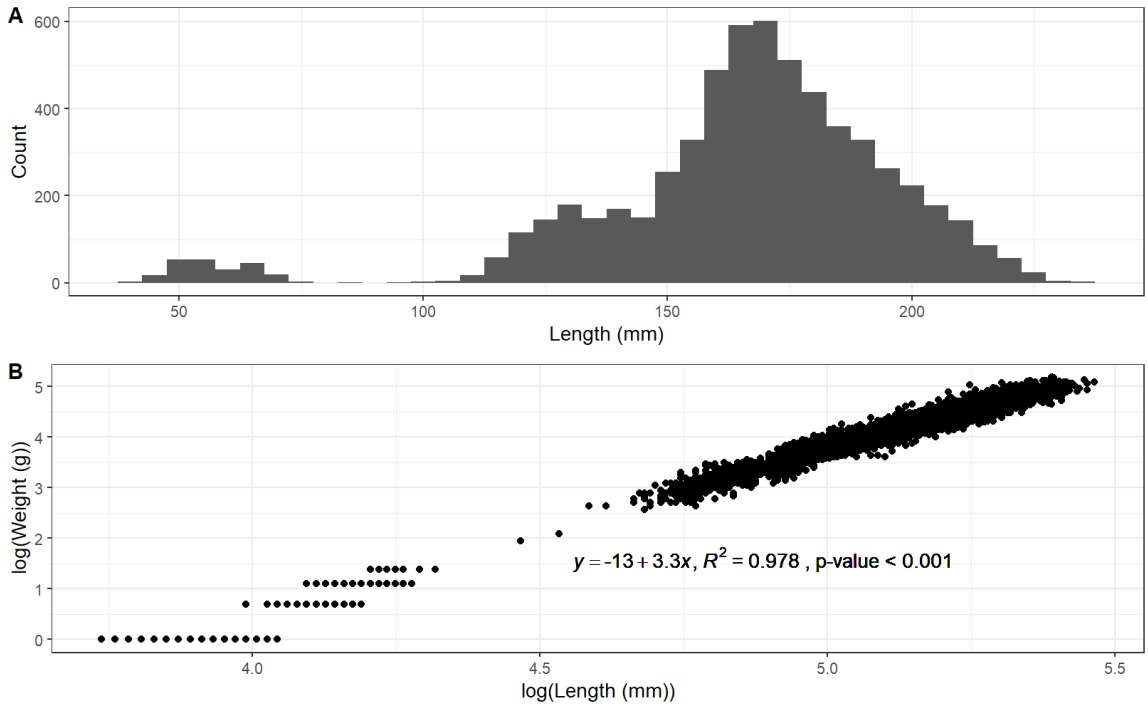


Figure 16. Pacific Herring (*Clupea pallasii*) length frequency plot as sampled during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

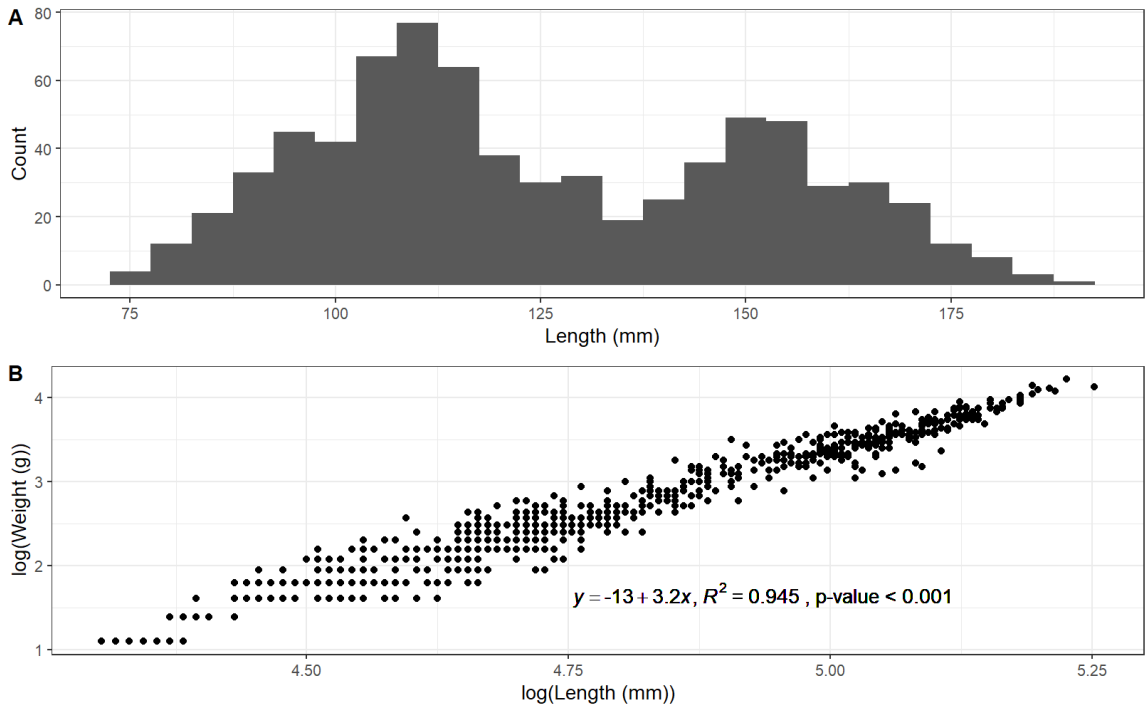


Figure 17. Eulachon (*Thaleichthys pacificus*) length frequency plot as sampled during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

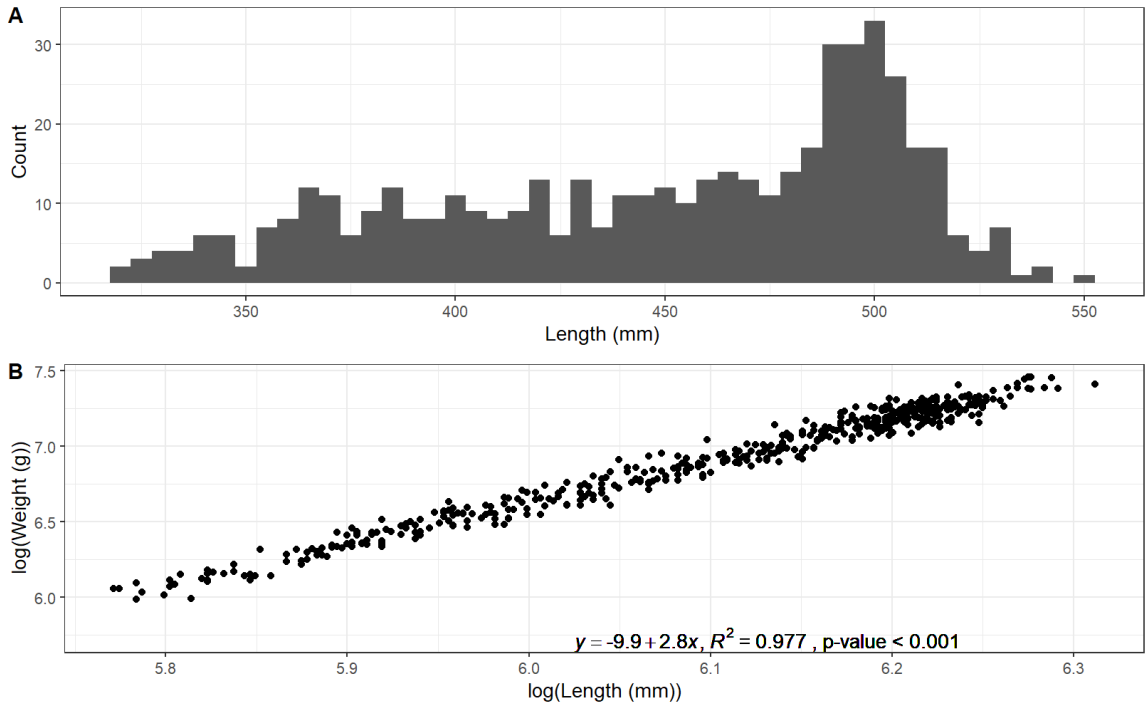


Figure 18. Jack Mackerel (*Trachurus symmetricus*) length frequency plot as sampled during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

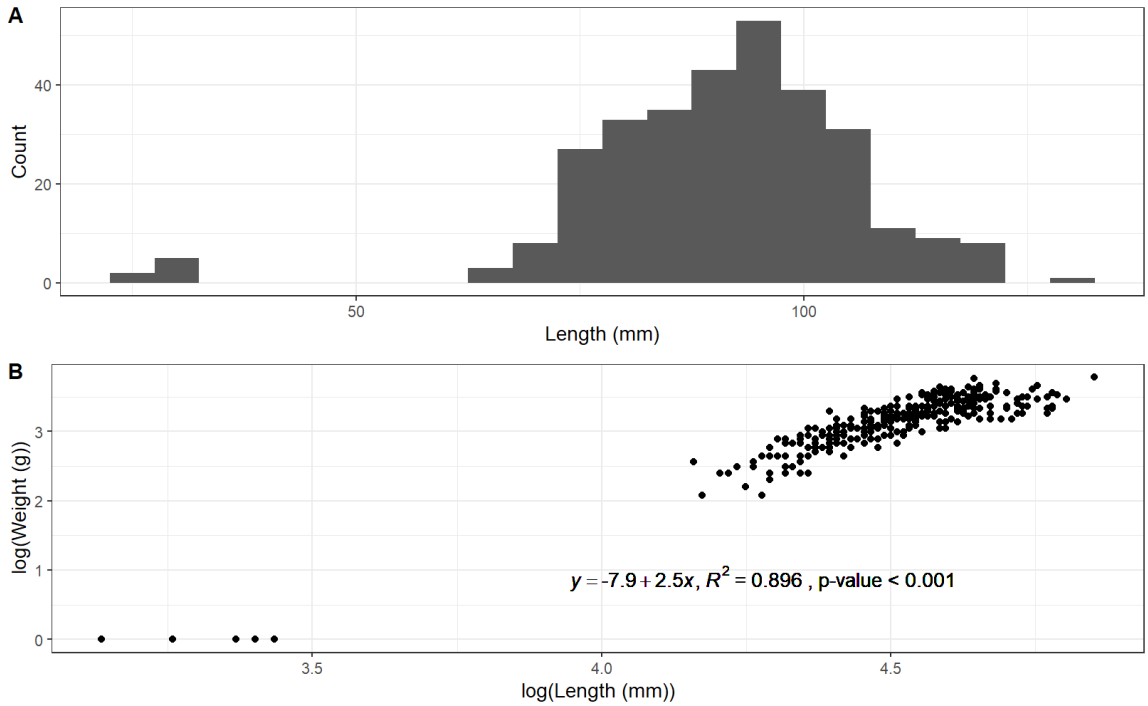


Figure 19. Opalescent Inshore Squid (*Doryteuthis opalescens*) length frequency plot as sampled during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022 (A). Double log-transformed length-weight regression with outliers removed, using a Bonferroni outlier test (B).

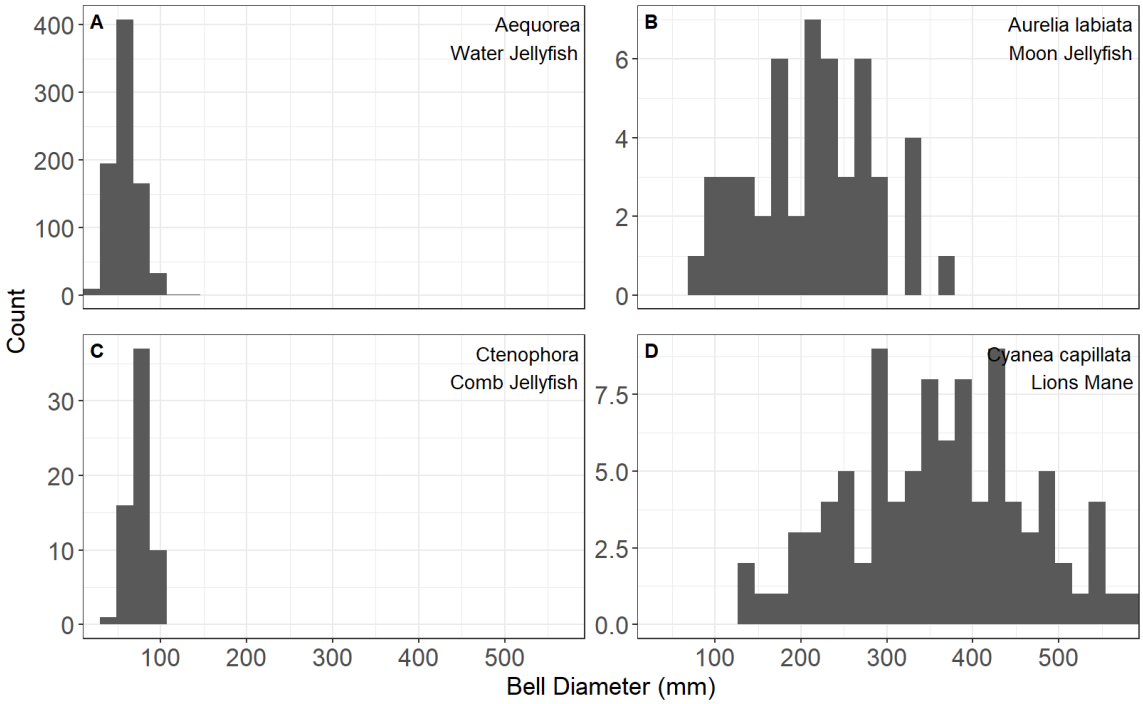


Figure 20. Bell diameter (mm) frequency plots as sampled during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022. (A) Comb Jellyfish (*Ctenophora*), (B) Lions Mane (*Cyanea capillata*), (C) Moon Jellyfish (*Aurelia labiata*), (D) Water Jellyfish (*Aequorea*)

8 TABLES

Table 1. Survey strata, strata sizes, target number of blocks to sample, and actual blocks sampled during the Integrated Pelagic Ecosystem Survey July 4 - August 2, 2022 aboard the CFV Nordic Pearl. Actual bottom depths during the survey may differ from the depth (bathymetry for strata designation) of any given block; actual tow depth during the survey may differ from the targeted depth.

Stratum			Stratum Size		Target No. Blocks			No. Blocks Successfully Fished			
	Location	Bottom Depth Range (m)	Total Blocks	Proportion	0 m	15 m	Total	0 m	15 m	Total	Proportion
2022 Daytime											
504	QCS	50-100	98	0.098	3	3	6	3	2	5	0.085
505	QCS	100-200	153	0.153	5	5	10	4	2	6	0.102
506	NWVI	50-100	52	0.052	2	2	4	1	2	3	0.051
507	NWVI	100-200	84	0.084	3	3	6	2	2	4	0.068
508	CWVI	50-100	79	0.079	3	3	6	3	2	5	0.085
509	CWVI	100-200	93	0.093	3	3	6	3	4	7	0.119
510	SWVI	50-100	190	0.189	7	7	14	7	6	13	0.220
511	SWVI	100-200	254	0.252	9	9	18	7	9	16	0.271
		TOTAL	1003	1.000	35	35	70	30	29	59	1.000
2022 Nightime											
504	QCS	50-100	98	0.098	3	3	6	3	1	4	0.083
505	QCS	100-200	153	0.153	5	5	10	4	2	6	0.125
506	NWVI	50-100	52	0.052	2	2	4	1	2	3	0.062
507	NWVI	100-200	84	0.084	3	3	6	1	1	2	0.042
508	CWVI	50-100	79	0.079	3	3	6	2	2	4	0.083
509	CWVI	100-200	93	0.093	3	3	6	1	2	3	0.062
510	SWVI	50-100	190	0.189	7	7	14	7	4	11	0.229
511	SWVI	100-200	254	0.252	9	9	18	7	8	15	0.312
		TOTAL	1003	1.000	35	35	70	26	22	48	1.000

32

Table 2. All captured vertebrate fish species (or taxonomic groups), ordered by total catch weight, showing number of tows in which the species occurred, count of individuals, total catch weight, maximum catch weight, and mean catch weight per tow for usable tows from the Integrated Pelagic Ecosystem Survey, July 4 - August 2, 2022 aboard the CFV Nordic Pearl. Blank catch weights indicates specimens could not be weighed accurately with Marel platform scale (e.g., larval fish and sharks).

				Catch Weight (kg)		
Scientific Name	**Common Name**	**Tows**	**Count**	**Total**	**Max**	**Mean**
Clupea pallasii	Pacific Herring	60	465925	37132.04	11329.01	651
Squalus suckleyi	North Pacific Spiny Dogfish	3	789	1329.78	1320.55	665
Trachurus symmetricus	Jack Mackerel	21	835	796.98	282.17	38
Gadus chalcogrammus	Walleye Pollock	13	2769	615.20	596.90	154
Oncorhynchus kisutch	Coho Salmon (Adults)	59	340	592.57	127.91	10
Oncorhynchus tshawytscha	Chinook Salmon (Adults)	48	319	442.84	68.70	9
Oncorhynchus gorbuscha	Pink Salmon (Adults)	30	80	120.22	14.53	4
Thaleichthys pacificus	Eulachon	25	14895	112.72	35.38	5
Oncorhynchus keta	Chum Salmon (Adults)	14	20	82.99	18.60	6
Oncorhynchus nerka	Sockeye Salmon (Adults)	8	15	36.99	15.10	5
Merluccius productus	Pacific Hake	4	27	35.45	18.88	9
Oncorhynchus tshawytscha	Chinook Salmon (Juveniles)	26	64	15.27	1.50	1
Oncorhynchus kisutch	Coho Salmon (Juveniles)	26	66	13.06	1.38	1
Citharichthys	Sanddabs	6	41	8.24	4.48	1
Prionace glauca	Blue Shark	4	5	7.01	7.01	7
Citharichthys sordidus	Pacific Sanddab	3	28	5.18	4.57	2
Oncorhynchus gorbuscha	Pink Salmon (Juveniles)	11	254	4.49	1.73	0
Atheresthes stomias	Arrowtooth Flounder, Turbot	4	17	4.10	3.15	1
Sebastes melanops	Black Rockfish	5	6	3.78	1.46	1
Oncorhynchus keta	Chum Salmon (Juveniles)	15	68	2.28	0.72	0
Allosmerus elongatus	Whitebait Smelt	5	222	2.11	2.06	1
Alosa sapidissima	American Shad	3	6	1.78	0.80	1
Platygobio gracilis	Flathead Chub	1	4	1.72	1.72	2
Sebastes jordani	Shortbelly Rockfish	30	852	1.40	0.51	0
Sebastes flavidus	Yellowtail Rockfish	1	1	0.72	0.72	1
Hydrolagus colliei	Spotted Ratfish	1	1	0.47	0.47	0
Sebastes entomelas	Widow Rockfish	1	1	0.44	0.44	0
Anarrhichthys ocellatus	Wolf Eel	27	198	0.38	0.14	0
Sebastes pinniger	Canary Rockfish	17	132	0.22	0.13	0
Microgadus proximus	Pacific Tomcod	17	79	0.18	0.05	0

33

Scientific Name	Common Name	Tows	Count	Total	Max	Mean
Gadidae	Codfishes	17	69	0.11	0.09	0
Cololabis saira	Pacific Saury	2	3	0.11	0.06	0
Porichthys notatus	Plainfin Midshipman	1	2	0.11	0.11	0
Sebastes crameri	Darkblotched Rockfish	3	4	0.06	0.03	0
Beringraja binoculata	Big Skate	1	1	0.04	0.04	0
Zaprora silenus	Prowfish	1	1	0.04	0.04	0
Petromyzontidae	Lampreys	1	1	0.02	0.02	0
Oncorhynchus nerka	Sockeye Salmon (Juveniles)	1	1	0.01	0.01	0
Pleuronectiformes	Flatfishes	16	39			
Larval Fish	Larval Fish	16	303			
Sebastes	Rockfishes	6	50			
Galeorhinus galeus	Tope Shark	5	8			
Alopias vulpinus	Thresher Shark	3	3			
Sebastes caurinus	Copper Rockfish	1	4			
Mola tecta	Hoodwinker Mola	1	1			
Myctophidae	Lanternfishes	1	1			
Ammodytes personatus	Pacific Sand Lance	1	1			
Lamna ditropis	Salmon Shark	1	1			
Gasterosteus aculeatus	Threespine Stickleback	1	3			

34

Table 3. All captured invertebrate species (or taxonomic groups), ordered by total catch weight, showing number of tows in which the species occurred, count of individuals, total catch weight, maximum catch weight, and mean catch weight per tow for usable tows from the usable tows from the Integrated Pelagic Ecosystem Survey, July 4 - August 2, 2022 aboard the CFV Nordic Pearl. Jellyfish weights include all identifiable pieces, but only those with intact bells were included in the counts. Euphausiacea were not counted due to their small size. Blank weights indicate specimens which could not be weighed accurately on the Marel platform scale.

				Catch Weight (kg)		
Scientific **Name**	**Common Name**	**Tows**	**Count**	**Total**	**Max**	**Mean**
Cyanea capillata	Lions Mane	33	18	819.68	117.70	25
Aequorea	Water Jellyfish	61	126	187.50	19.53	3
Aurelia labiata	Moon Jellyfish	28	41	42.89	4.76	2
Doryteuthis opalescens	Opalescent Inshore Squid	28	1543	37.13	25.31	2
Chrysaora fuscescens	Sea Nettle	16	19	27.83	7.11	2
Pandalus jordani	Pink Shrimp (Smooth)	3	3293	20.87	13.14	10
Euphausiacea	Euphausiids	4		13.39	5.21	3
Phacellophora camtschatica	Fried Egg Jellyfish	8	8	4.37	1.80	1
Pyrosoma atlanticum	Pyrosomes	4	39	3.63	2.85	1
Ctenophora	Comb Jellyfish	22	128	2.94	0.80	0
Salpida	Salps	12	14	1.06	0.35	0
Siphonophorae	Siphonophora	2	5	0.20	0.11	0
Scyphozoa	Jellyfish	2		0.15	0.15	0
Bougainvillia	Bougainvillia	2	6			
Hydrozoa	Hydroid	1	1			
Eualus macropthalmus	Large Eyed Eualid	1	1			
Solmissus	Solmissus	1				

Table 4. Lengths and weights for each measured species, ordered by the number of length measurements sampled during the 2022 Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf. (Tows = number of tows, N = number of measurements).

			Length (mm)				Weight (g)			
Scientific Name	**Common Name**	**Tows**	**N**	**Min**	**Max**	**Mean**	**N**	**Min**	**Max**	**Mean**
Clupea pallasii	Pacific Herring	54	6144	42	236	165	6135	1	178	65
Aequorea	Water Jellyfish	25	812	24	138	59				
Thaleichthys pacificus	Eulachon	24	753	74	191	125	751	3	68	20
Trachurus symmetricus	Jack Mackerel	21	485	321	551	449	485	398	1734	1054
Doryteuthis opalescens	Opalescent Inshore Squid	20	342	23	128	90	309	1	44	24
Oncorhynchus tshawytscha	Chinook Salmon (Adults)	48	319	294	809	440	319	335	6940	1380
Oncorhynchus kisutch	Coho Salmon (Adults)	59	318	334	665	525	318	432	3422	1754
Sebastes jordani	Shortbelly Rockfish	11	290	35	82	52				
Oncorhynchus gorbuscha	Pink Salmon (Juveniles)	11	255	94	227	121	255	6	59	17
Sebastes pinniger	Canary Rockfish	4	111	27	54	43				
Cyanea capillata	Lions Mane	22	95	132	588	360				
Oncorhynchus gorbuscha	Pink Salmon (Adults)	30	80	412	584	490	80	853	2481	1497
Gadus chalcogrammus	Walleye Pollock	4	74	67	402	251	74	1	454	187
Oncorhynchus keta	Chum Salmon (Juveniles)	15	68	109	186	145	68	11	69	33
Oncorhynchus kisutch	Coho Salmon (Juveniles)	26	65	153	349	237	65	54	533	191
Ctenophora	Comb Jellyfish	13	64	43	100	76				
Oncorhynchus tshawytscha	Chinook Salmon (Juveniles)	26	60	126	372	254	60	13	637	241
Squalus suckleyi	North Pacific Spiny Dogfish	3	58	478	988	735	56	420	4686	1714
Allosmerus elongatus	Whitebait Smelt	2	52	91	113	105	52	7	15	11
Aurelia labiata	Moon Jellyfish	23	50	87	364	215				
Gadidae	Codfishes	2	33	30	77	50	33	1	1	1
Microgadus proximus	Pacific Tomcod	4	30	28	86	65	30	1	1	1
Citharichthys sordidus	Pacific Sanddab	3	28	80	314	251	28	5	361	183
Merluccius productus	Pacific Hake	4	27	469	596	546	27	806	1720	1288
Citharichthys	Sanddabs	6	22	173	311	250	22	53	340	186
Oncorhynchus keta	Chum Salmon (Adults)	14	20	548	762	665	20	1797	6820	4128
Chrysaora fuscescens	Sea Nettle	8	20	136	452	270				
Pyrosoma atlanticum	Pyrosomes	4	16	35	335	177	4	19	107	57
Oncorhynchus nerka	Sockeye Salmon (Adults)	8	15	488	674	571	15	1401	4320	2443
Atheresthes stomias	Arrowtooth Flounder, Turbot	4	8	86	433	246	8	6	677	218
Galeorhinus galeus	Tope Shark	5	8	1680	1830	1745				

36

Scientific Name	Common Name	Tows	N	Min	Max	Mean	N	Min	Max	Mean
Phacellophora camtschatica	Fried Egg Jellyfish	6	7	96	203	133				
Alosa sapidissima	American Shad	3	6	240	319	276	6	156	408	264
Sebastes melanops	Black Rockfish	5	6	196	401	318	6	107	1051	612
Prionace glauca	Blue Shark	4	5	1310	1450	1374				
Sebastes caurinus	Copper Rockfish	1	4	45	50	48				
Cololabis saira	Pacific Saury	2	3	193	242	215	3	22	52	37
Alopias vulpinus	Thresher Shark	3	3	3420	3770	3555				
Anarrhichthys ocellatus	Wolf Eel	3	3	58	582	309	2	123	133	128
Sebastes crameri	Darkblotched Rockfish	1	2	57	57	57				
Porichthys notatus	Plainfin Midshipman	1	2	177	194	186	2	48	72	60
Salpida	Salps	2	2	26	73	50				
Siphonophorae	Siphonophora	1	2	67	79	73				
Beringraja binoculata	Big Skate	1	1	191	191	191	1	40	40	40
Platygobio gracilis	Flathead Chub	1	1	356	356	356	1	324	324	324
Petromyzontidae	Lampreys	1	1	198	198	198	1	24	24	24
Molidae	Molas	1	1	1950	1950	1950				
Zaprora silenus	Prowfish	1	1	144	144	144	1	41	41	41
Lamna ditropis	Salmon Shark	1	1	1600	1600	1600				
Oncorhynchus nerka	Sockeye Salmon (Juveniles)	1	1	103	103	103	1	9	9	9
Hydrolagus colliei	Spotted Ratfish	1	1	514	514	514	1	474	474	474
Sebastes entomelas	Widow Rockfish	1	1	295	295	295	1	376	376	376
Sebastes flavidus	Yellowtail Rockfish	1	1	374	374	374	1	716	716	716

37

Table 5. Number of tows with stomach samples (Tows), number of stomachs examined (Stomachs), and number of empty stomachs (Empty) for each species, ordered by number of tows, during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022.

Scientific Name	Common Name	Tows	Stomachs	Empty
Oncorhynchus kisutch	Coho Salmon (Adults)	56	219	29
Clupea pallasii	Pacific Herring	49	459	216
Oncorhynchus tshawytscha	Chinook Salmon (Adults)	44	195	29
Oncorhynchus gorbuscha	Pink Salmon (Adults)	30	80	14
Oncorhynchus kisutch	Coho Salmon (Juveniles)	26	65	2
Oncorhynchus tshawytscha	Chinook Salmon (Juveniles)	26	60	6
Thaleichthys pacificus	Eulachon	22	176	86
Trachurus symmetricus	Jack Mackerel	21	139	88
Oncorhynchus keta	Chum Salmon (Juveniles)	15	60	4
Oncorhynchus keta	Chum Salmon (Adults)	13	16	4
Oncorhynchus gorbuscha	Pink Salmon (Juveniles)	11	59	2
Oncorhynchus nerka	Sockeye Salmon (Adults)	8	15	4
Sebastes melanops	Black Rockfish	4	5	0
Alosa sapidissima	American Shad	3	6	0
Merluccius productus	Pacific Hake	3	23	3
Gadus chalcogrammus	Walleye Pollock	3	19	4
Atheresthes stomias	Arrowtooth Flounder, Turbot	3	5	4
Squalus suckleyi	North Pacific Spiny Dogfish	2	12	1
Allosmerus elongatus	Whitebait Smelt	2	7	2
Citharichthys sordidus	Pacific Sanddab	2	12	4
Prionace glauca	Blue Shark	1	1	0
Beringraja binoculata	Big Skate	1	1	1
Hydrolagus colliei	Spotted Ratfish	1	1	1
Oncorhynchus nerka	Sockeye Salmon (Juveniles)	1	1	0
Cololabis saira	Pacific Saury	1	2	0
Anarrhichthys ocellatus	Wolf Eel	1	1	0

Table 6. Prey items (Prey) identified in the stomach contents of predator species (Species) sampled (alphabetical by Species) during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf aboard the *CFV Nordic Pearl*, July 4 - August 2, 2022. Volume is the mean volume in cm^3; frequency of occurrence (FO) is the proportion of non-empty stomachs containing that prey item.

Species	Prey	Volume	FO
American Shad	Euphausiids	6.133	0.500
American Shad	Unidentified Remains	1.603	0.500
Arrowtooth Flounder, Turbot	Euphausiids	0.010	1.000
Black Rockfish	Pacific Herring	30.000	0.200
Black Rockfish	True Crabs	1.033	0.600
Black Rockfish	Unidentified Remains	0.300	0.200
Black Rockfish	Euphausiids	0.300	0.200
Black Rockfish	Copepods	0.010	0.200
Black Rockfish	Pandalid Shrimp	0.010	0.200
Blue Shark	Pacific Herring	96.000	1.000
Blue Shark	Pyrosomes	8.200	1.000
Blue Shark	Unidentified Algae	4.000	1.000
Chinook Salmon (Adults)	Pacific Herring	42.955	0.265
Chinook Salmon (Adults)	Pacific Sand Lance	42.500	0.012
Chinook Salmon (Adults)	Eulachon	17.500	0.012
Chinook Salmon (Adults)	Squid	14.456	0.054
Chinook Salmon (Adults)	Pandalid Shrimp	13.437	0.018
Chinook Salmon (Adults)	Whitebait Smelt	11.000	0.006
Chinook Salmon (Adults)	Unidentified Fishes	7.335	0.434
Chinook Salmon (Adults)	True Crabs	2.793	0.271
Chinook Salmon (Adults)	Shortbelly Rockfish	2.750	0.012
Chinook Salmon (Adults)	Unidentified Remains	2.611	0.054
Chinook Salmon (Adults)	Euphausiids	1.382	0.114
Chinook Salmon (Adults)	Amphipods	0.010	0.012
Chinook Salmon (Juveniles)	Pacific Herring	4.900	0.037
Chinook Salmon (Juveniles)	Squid	3.700	0.093
Chinook Salmon (Juveniles)	Shortbelly Rockfish	3.000	0.019
Chinook Salmon (Juveniles)	Unidentified Fishes	2.655	0.704
Chinook Salmon (Juveniles)	Euphausiids	2.070	0.056
Chinook Salmon (Juveniles)	True Crabs	0.757	0.241
Chinook Salmon (Juveniles)	Unidentified Remains	0.337	0.167
Chinook Salmon (Juveniles)	Pandalid Shrimp	0.100	0.019
Chinook Salmon (Juveniles)	Amphipods	0.010	0.019
Chum Salmon (Adults)	Unidentified Remains	7.978	0.750
Chum Salmon (Adults)	Euphausiids	2.333	0.250
Chum Salmon (Adults)	True Crabs	1.805	0.167
Chum Salmon (Juveniles)	Unidentified Remains	0.347	0.982
Chum Salmon (Juveniles)	True Crabs	0.105	0.036
Chum Salmon (Juveniles)	Segmented Worms	0.100	0.036
Chum Salmon (Juveniles)	Amphipods	0.092	0.107
Chum Salmon (Juveniles)	Euphausiids	0.010	0.018
Chum Salmon (Juveniles)	Pandalid Shrimp	0.010	0.018
Coho Salmon (Adults)	Pacific Herring	31.832	0.200
Coho Salmon (Adults)	Pink Shrimp (Smooth)	27.200	0.005
Coho Salmon (Adults)	Squid	10.000	0.016

Species	Prey	Volume	FO
Coho Salmon (Adults)	Pacific Saury	9.500	0.011
Coho Salmon (Adults)	Unidentified Fishes	6.770	0.353
Coho Salmon (Adults)	Euphausiids	6.647	0.347
Coho Salmon (Adults)	Opalescent Inshore Squid	6.000	0.005
Coho Salmon (Adults)	Shortbelly Rockfish	5.750	0.011
Coho Salmon (Adults)	True Crabs	4.571	0.432
Coho Salmon (Adults)	Rockfishes	3.500	0.005
Coho Salmon (Adults)	Jellyfish	3.000	0.005
Coho Salmon (Adults)	Unidentified Remains	1.986	0.074
Coho Salmon (Adults)	Mysidae	1.600	0.011
Coho Salmon (Adults)	Pandalid Shrimp	1.178	0.021
Coho Salmon (Adults)	Misc. Non-Marine	0.500	0.005
Coho Salmon (Adults)	Amphipods	0.094	0.121
Coho Salmon (Adults)	Segmented Worms	0.010	0.005
Coho Salmon (Juveniles)	Euphausiids	11.325	0.063
Coho Salmon (Juveniles)	Shortbelly Rockfish	7.750	0.032
Coho Salmon (Juveniles)	Pacific Herring	4.500	0.016
Coho Salmon (Juveniles)	Unidentified Fishes	2.629	0.730
Coho Salmon (Juveniles)	True Crabs	2.569	0.492
Coho Salmon (Juveniles)	Pacific Sand Lance	1.300	0.016
Coho Salmon (Juveniles)	Pteropods	0.800	0.016
Coho Salmon (Juveniles)	Unidentified Remains	0.567	0.048
Coho Salmon (Juveniles)	Copepods	0.010	0.016
Coho Salmon (Juveniles)	Amphipods	0.010	0.063
Eulachon	Euphausiids	0.212	0.722
Eulachon	Pandalid Shrimp	0.068	0.056
Eulachon	Unidentified Fishes	0.055	0.022
Eulachon	Unidentified Remains	0.051	0.178
Eulachon	Amphipods	0.010	0.011
Eulachon	True Crabs	0.010	0.022
Jack Mackerel	Pacific Herring	22.000	0.039
Jack Mackerel	Pandalid Shrimp	7.500	0.020
Jack Mackerel	Euphausiids	6.367	0.510
Jack Mackerel	Canary Rockfish	1.300	0.020
Jack Mackerel	Unidentified Remains	0.611	0.196
Jack Mackerel	Unidentified Fishes	0.475	0.078
Jack Mackerel	Jellyfish	0.300	0.039
Jack Mackerel	True Crabs	0.167	0.196
North Pacific Spiny Dogfish	Pacific Herring	140.000	0.182
North Pacific Spiny Dogfish	Unidentified Fishes	40.000	0.182
North Pacific Spiny Dogfish	Euphausiids	39.800	0.455
North Pacific Spiny Dogfish	Eulachon	30.000	0.091
North Pacific Spiny Dogfish	Unidentified Remains	4.900	0.364
North Pacific Spiny Dogfish	Squid	1.000	0.091
Pacific Hake	Unidentified Fishes	81.750	0.200
Pacific Hake	Eulachon	73.333	0.150
Pacific Hake	Pacific Herring	69.000	0.250
Pacific Hake	Euphausiids	4.787	0.400
Pacific Hake	Unidentified Remains	3.725	0.200
Pacific Herring	Euphausiids	1.283	0.543

Species	Prey	Volume	FO
Pacific Herring	Unidentified Remains	0.415	0.399
Pacific Herring	Unidentified Fishes	0.300	0.004
Pacific Herring	True Crabs	0.291	0.041
Pacific Herring	Stones Or Pebbles	0.280	0.016
Pacific Herring	Amphipods	0.155	0.016
Pacific Herring	Copepods	0.140	0.012
Pacific Herring	Squid	0.100	0.004
Pacific Sanddab	Eulachon	5.750	0.250
Pacific Sanddab	Invertebrates	0.655	0.250
Pacific Sanddab	Polychaete Worms	0.337	0.375
Pacific Sanddab	Unidentified Remains	0.010	0.125
Pacific Sanddab	Pandalid Shrimp	0.010	0.125
Pacific Saury	Unidentified Fishes	1.000	0.500
Pacific Saury	Unidentified Remains	0.950	1.000
Pink Salmon (Adults)	Euphausiids	6.527	0.227
Pink Salmon (Adults)	True Crabs	5.932	0.909
Pink Salmon (Adults)	Unidentified Remains	3.650	0.091
Pink Salmon (Adults)	Pteropods	3.625	0.061
Pink Salmon (Adults)	Pacific Herring	2.600	0.015
Pink Salmon (Adults)	Unidentified Fishes	1.653	0.061
Pink Salmon (Adults)	Amphipods	1.094	0.121
Pink Salmon (Adults)	Mysidae	0.255	0.030
Pink Salmon (Adults)	Pandalid Shrimp	0.100	0.015
Pink Salmon (Juveniles)	True Crabs	0.452	0.333
Pink Salmon (Juveniles)	Euphausiids	0.362	0.140
Pink Salmon (Juveniles)	Unidentified Fishes	0.350	0.070
Pink Salmon (Juveniles)	Copepods	0.325	0.175
Pink Salmon (Juveniles)	Unidentified Remains	0.246	0.368
Pink Salmon (Juveniles)	Amphipods	0.068	0.088
Sockeye Salmon (Adults)	Euphausiids	12.567	0.545
Sockeye Salmon (Adults)	Amphipods	4.500	0.091
Sockeye Salmon (Adults)	Unidentified Remains	2.500	0.182
Sockeye Salmon (Adults)	True Crabs	1.130	0.364
Sockeye Salmon (Adults)	Unidentified Fishes	0.200	0.091
Sockeye Salmon (Adults)	Invertebrates	0.010	0.091
Sockeye Salmon (Juveniles)	Unidentified Remains	0.010	1.000
Walleye Pollock	Eulachon	5.500	0.067
Walleye Pollock	Euphausiids	4.101	0.800
Walleye Pollock	Pandalid Shrimp	3.667	0.200
Whitebait Smelt	Euphausiids	0.055	0.400
Whitebait Smelt	Unidentified Remains	0.040	0.600
Wolf Eel	Unidentified Fishes	4.700	1.000
Wolf Eel	Pandalid Shrimp	0.300	1.000
Wolf Eel	True Crabs	0.010	1.000

Table 7. Biomass estimates (tonnes), coefficient of variance (CV), standard error (SE), and 95% confidence intervals (CI) for the upper 30 m pelagic layer for Pacific Salmon (daytime tows only) and Pacific Herring (nightime tows only) during the Integrated Pelagic Ecosystem Survey, July 4 - August 2, 2022, aboard the CFV Nordic Pearl. If estimated lower confidence interval (CI) was negative, it was reported as zero.

Species	Time of Day	Biomass (t)	CV	SE	Lower CI (t)	Upper CI (t)
Pacific Herring	Night	463762.75	0.59	40023.12	0.00	1001556.80
Pink Salmon (Juveniles)	Day	17.11	0.37	2.01	4.65	29.57
Chum Salmon (Juveniles)	Day	13.18	0.42	1.74	2.41	23.94
Coho Salmon (Juveniles)	Day	54.08	0.08	0.94	45.85	62.31
Sockeye Salmon (Juveniles)	Day	0.16	0.00	0.00	0.16	0.16
Chinook Salmon (Juveniles)	Day	70.72	0.48	7.65	3.66	137.79

42

APPENDIX A Net utilized during the 2022 Integrated Pelagic Ecosystem Survey

Table A.1. Net specifications for the LFS 7742 mid-water Trawl Net used during the Integrated Pelagic Ecosystem Survey aboard the CFV Nordic Pearl, July 04 to August 02, 2022.

Part	Size	Material
Rigging		
Doors	4 m^2	Thyboron Type 15
Door Legs	12.2 m (6.67 fm)	1 inch Spectra rope
Bridles	45.72 m (25 fm)	3/4 inch TS2P Spectra Rope
Net Frame		
Head Line	102.83 m (56.2 fm)	5/8 inch coated Spectra Rope
Foot Rope		
Foot Rope	102.83 (56.2 fm)	9/16 inch coasted Spectra rope with 13 mm chain
Web		
Mesh incl. Codend	3.8 cm (1.5 inch)	Knotted nylon
Codend Liner	12.7 mm (0.5 inch)	210/20 knotless liner

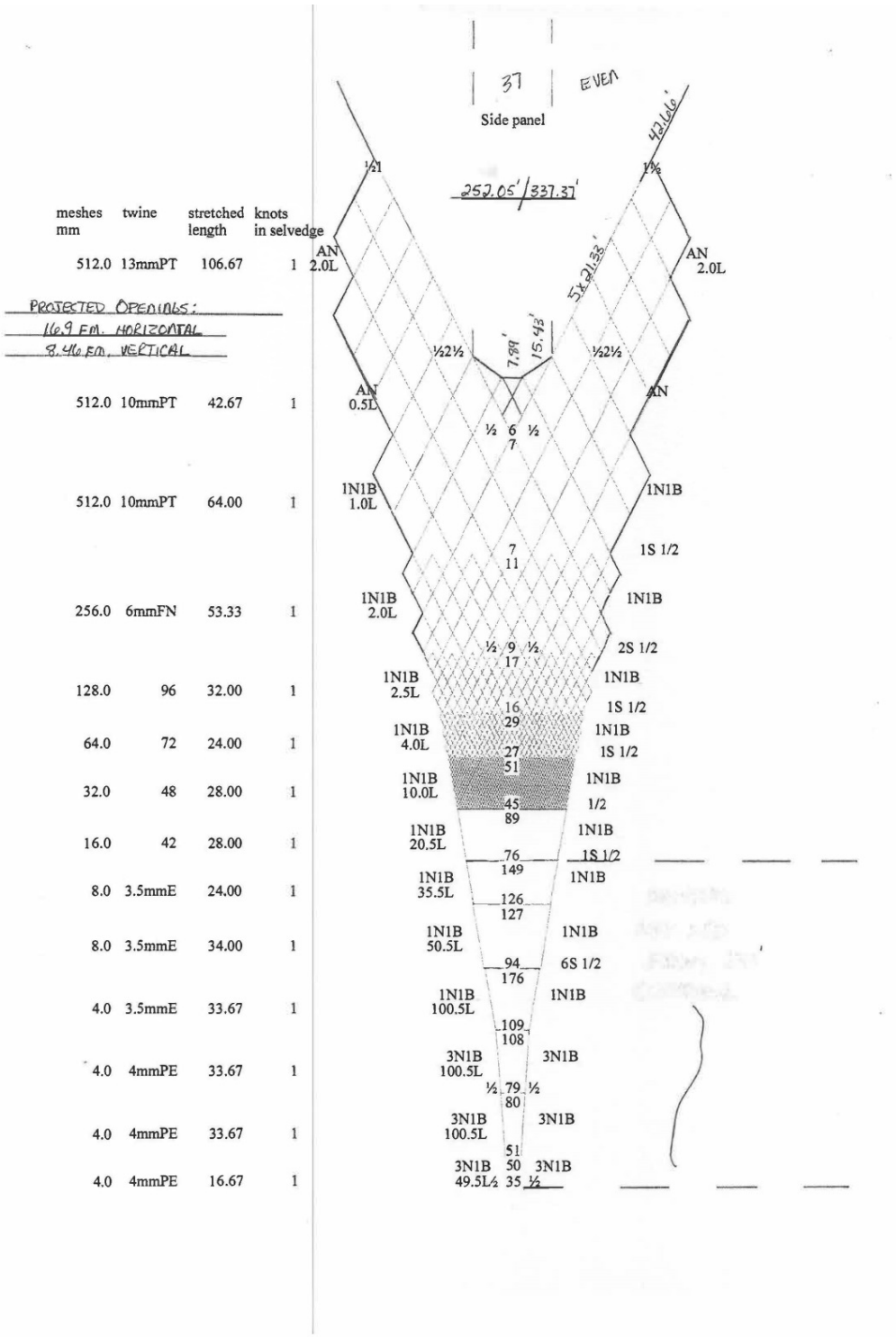


Figure A.1. Diagram of LFS 7742 mid-water Trawl Net used during the Integrated Pelagic Ecosystem Survey, July 04 to August 02, 2022, aboard the CFV Nordic Pearl.

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 Sardine Maturity Convention

Table C.1. Description of maturity stages for Pacific sardine maturity determination.

Code	Appearance	Maturity	Description
1	torpedo-shaped	F - immature	Clearly Immature: oocytes not visible, ovary is very small, translucent/clear, and thin but with rounded edges (torpedo shape).
2	oocytes not visible	F - intermediate	Intermediate: Individual oocytes are not visible to unaided eye (no visible yolk or hydrate oocytes in the ovaries) and ovary is not clearly immature. Includes possible maturing and regressed ovaries.
3	oocytes visible	F - active	Active: Yolked oocytes visible, any size or amount as long as you can see them by the unaided eye in ovaries. This includes the smaller opaque oocytes (around 0.4-0.5 mm) to the large yellowish oocytes (about 0.6-0.8mm). If hydrated oocytes are also present
4	hydrated oocytes	F - mature	Hydrated oocytes present, yolked oocytes may, or not, also be seen; any amount of hydrated oocytes (large and transparent) qualifies for this class from few to many or even if loose or "oozing/running" from ovary.
5	knife-shaped	M - immature	Clearly Immature: testes is very small, knife-shaped, translucent/clear, thin with a flat ventral edge
6	no milt present	M - intermediate	Intermediate: no milt evident and is not clearly immature; includes maturing or regressed testes
7	milt present	M - mature	Milt is present: either oozing from pore, in the duct, or when testes is cut with a knife
8	unknown	unknown	Unknown

APPENDIX D Shark Sampling Protocol for use on DFO Research Surveys

DFO SHARK SAMPLING PROTOCOL

When handling live sharks be careful. They will normally calm down when their eyes are covered.

FOR LIVE OR DEAD SHARKS:

1. TAKE PHOTOS (ONE PER SPECIES PER TOW)

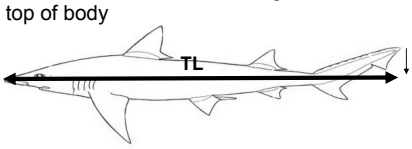
Side views of:
- whole shark alongside measuring tape
- head & gill openings
- tail fin

Ventral views of:
- claspers of males

TO KEEP TRACK OF PHOTOS
Include a piece of paper in the photo with:
- Species
- Tow

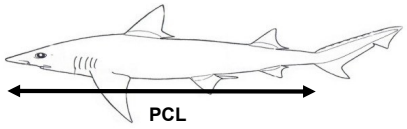
2. RECORD LENGTHS

- Total length: tip of snout to tip of upper lobe of caudal fin with fin in a straight line with top of body



AND

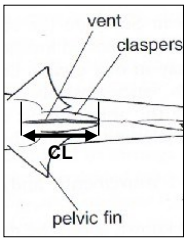
- Pre-caudal length: tip of snout to caudal fin



3. RECORD SEX

- Males have claspers associated with pelvic fin

IF TIME PERMITS ALSO RECORD:
- Clasper length (CL) and note if they are rigid or red



OR

- Females do not have claspers

4. COLLECT DNA TISSUE SAMPLE

- clip 1 cm of tissue from any fin tip
- place in vials with ethanol and record vial number

FOR DEAD SHARKS (Can be subsampled if > 20 sharks in tow):

5. PRESENCE AND SAMPLING OF PUPS

- number of pups

IF TIME PERMITS RECORD OR COLLECT:
- total length (cm) of pups
- muscle tissue from pups (see 7 below)—can be subsampled if there are >10 pups
- Pup numbers can be Mother's fish number + P1, P2, etc.

6. SAMPLE AND RECORD STOMACH CONTENTS

- Sort and identify to lowest taxonomic group you feel confident with
- For each prey group or item measure a) volume (L) and/or length (mm)
- For each prey group or item record digestion state as Fresh, Partial or Well

7. COLLECT MUSCLE TISSUE

- the size of an ice cube (about 1 cm^3)
- freeze in a small ziploc provided and label

LABEL ALL FROZEN SAMPLES
- Species
- Fish number (P1, P2 etc if pups)
- Date collected
- Tow number

APPENDIX E Bridge Data from the 2022 Integrated Pelagic Ecosystem Survey

Table E.1. Bridge log information for trawl tows from the Integrated Ecosystem Pelagic Survey aboard the CFV Nordic Pearl, July 04 to August 02, 2022. Beaufort Scale code for sea state definitions are provided in Table B.1.

Tow Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Event Number	3	4	7	8	11	12	15	16
Stratum	505	505	505	505	505	505	505	505
Block Number	11170	11170	11293	11040	11289	11289	11040	11293
Date (Pacific)	2022-07-05	2022-07-05	2022-07-11	2022-07-11	2022-07-11	2022-07-11	2022-07-12	2022-07-12
Date (UTC)	2022-07-06	2022-07-06	2022-07-12	2022-07-12	2022-07-12	2022-07-12	2022-07-12	2022-07-12
Start Time (Pacific)	19:51	22:42	17:00	19:01	20:47	22:18	00:45	02:24
Start Time (UTC)	02:51	05:42	00:00	02:01	03:47	05:18	07:45	09:24
Day or Night	Day	Night	Day	Day	Day	Night	Night	Night
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	21	21	20	20	20	20	20
Start Latitude	51° 03’ 28" N	51° 04’ 52" N	51° 07’ 08" N	51° 01’ 14" N	51° 05’ 40" N	51° 07’ 10" N	51° 02’ 48" N	51° 05’ 18" N
Start Longitude	127° 44’ 09" W	127° 45’ 51" W	127° 51’ 36" W	128° 00’ 48" W	128° 04’ 19" W	128° 04’ 39" W	128° 02’ 19" W	127° 52’ 46" W
End Latitude	51° 04’ 32" N	51° 04’ 10" N	51° 05’ 42" N	51° 02’ 02" N	51° 07’ 16" N	51° 05’ 39" N	51° 01’ 22" N	51° 06’ 07" N
End Longitude	127° 46’ 03" W	127° 44’ 03" W	127° 50’ 48" W	128° 02’ 50" W	128° 04’ 58" W	128° 04’ 28" W	128° 01’ 38" W	127° 50’ 45" W
Direction of Tow (deg)	311	121	160	301	345	175	163	56
Vessel Speed (km/h)	8.8	7.4	8.2	8.5	8.6	8.7	8.0	8.6
Distance Towed (km)	2.98	2.48	2.79	2.81	3.07	2.82	2.78	2.80
Net Opening Width (m)	51.0	51.9	49.8	49.6	45.5	44.7	45.4	44.5
Net Opening Height (m)			14	11	13	13	10	14
Warp Length (m)	200.0	200.0	165.0	200.0	165.0	200.0	220.0	165.0
Target Headrope Depth (m)	15	15	0	15	0	0	15	0
Median Headrope Depth (m)	18	16	7	16	5	5	14	5
Start Bottom Depth (m)	115	112	118	147	154	143	153	129
End Bottom Depth (m)	98	95	112	151	139	154	155	113
Usable	Y	Y	Y	Y	Y	Y	Y	Y

49

Tow Number	9	10	11	12	13	14	15	16
Event Number	19	20	23	24	27	28	31	32
Stratum	504	505	505	505	505	504	509	508
Block Number	11277	11156	11034	11034	11156	11277	6059	5935
Date (Pacific)	2022-07-12	2022-07-12	2022-07-12	2022-07-12	2022-07-12	2022-07-13	2022-07-13	2022-07-13
Date (UTC)	2022-07-12	2022-07-13	2022-07-13	2022-07-13	2022-07-13	2022-07-13	2022-07-13	2022-07-14
Start Time (Pacific)	16:37	18:22	20:19	22:11	00:05	01:48	16:32	17:33
Start Time (UTC)	23:37	01:22	03:19	05:11	07:05	08:48	23:32	00:33
Day or Night	Day	Day	Day	Night	Night	Night	Day	Day
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	20	20	20	21	20	20	21
Start Latitude	51° 07' 41" N	51° 05' 26" N	51° 03' 03" N	51° 01' 11" N	51° 03' 19" N	51° 05' 38" N	49° 35' 46" N	49° 33' 28" N
Start Longitude	128° 47' 54" W	128° 34' 10" W	128° 23' 54" W	128° 21' 02" W	128° 31' 02" W	128° 45' 16" W	127° 01' 44" W	126° 58' 22" W
End Latitude	51° 06' 34" N	51° 04' 32" N	51° 02' 11" N	51° 01' 43" N	51° 04' 39" N	51° 06' 36" N	49° 34' 38" N	49° 32' 27" N
End Longitude	128° 46' 59" W	128° 32' 22" W	128° 22' 09" W	128° 23' 12" W	128° 31' 57" W	128° 47' 20" W	127° 00' 10" W	126° 56' 39" W
Direction of Tow (deg)	153	128	128	291	336	306	137	130
Vessel Speed (km/h)	7.0	7.9	7.7	8.2	8.1	9.0	8.4	8.2
Distance Towed (km)	2.33	2.67	2.61	2.74	2.70	2.99	2.84	2.81
Net Opening Width (m)	46.6	46.1	45.9	43.7	41.1	50.8	51.9	50.3
Net Opening Height (m)								
Warp Length (m)	220.0	165.0	165.0	165.0	165.0	200.0	220.0	220.0
Target Headrope Depth (m)	15	0	0	0	0	0	15	15
Median Headrope Depth (m)	16	5	5	7	11	16	18	16
Start Bottom Depth (m)	90	122	119	86	123	65	107	103
End Bottom Depth (m)	73	118	119	109	125	78	105	100
Usable	Y	Y	Y	Y	Y	Y	Y	Y

50

Tow Number	17	18	19	20	21	22	23	24
Event Number	35	38	39	40	43	44	47	48
Stratum	508	508	508	509	508	509	509	509
Block Number	5937	5937	5935	6059	5687	5561	5308	5308
Date (Pacific)	2022-07-13	2022-07-13	2022-07-13	2022-07-14	2022-07-14	2022-07-14	2022-07-14	2022-07-14
Date (UTC)	2022-07-14	2022-07-14	2022-07-14	2022-07-14	2022-07-14	2022-07-15	2022-07-15	2022-07-15
Start Time (Pacific)	19:09	22:03	23:30	01:01	16:18	17:32	19:59	21:59
Start Time (UTC)	02:09	05:03	06:30	08:01	23:18	00:32	02:59	04:59
Day or Night	Day	Night	Night	Night	Day	Day	Day	Night
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	21	20	20	20	20	20	20
Start Latitude	49° 32’ 07" N	49° 31’ 47" N	49° 31’ 30" N	49° 33’ 53" N	49° 28’ 55" N	49° 25’ 26" N	49° 21’ 19" N	49° 21’ 15" N
Start Longitude	126° 51’ 52" W	126° 49’ 25" W	126° 55’ 49" W	126° 59’ 00" W	126° 49’ 36" W	126° 54’ 18" W	127° 05’ 21" W	127° 05’ 30" W
End Latitude	49° 31’ 34" N	49° 32’ 35" N	49° 32’ 14" N	49° 34’ 48" N	49° 27’ 47" N	49° 26’ 52" N	49° 22’ 31" N	49° 22’ 14" N
End Longitude	126° 49’ 48" W	126° 51’ 09" W	126° 57’ 22" W	127° 00’ 27" W	126° 51’ 17" W	126° 55’ 17" W	127° 03’ 41" W	127° 03’ 45" W
Direction of Tow (deg)	111	303	305	312	222	334	41	48
Vessel Speed (km/h)	8.0	7.7	6.9	7.2	8.8	9.1	8.8	8.4
Distance Towed (km)	2.70	2.57	2.33	2.43	2.93	2.92	3.02	2.82
Net Opening Width (m)	50.7	54.9	54.4	53.1	47.3	42.8	49.0	51.3
Net Opening Height (m)								
Warp Length (m)	200.0	220.0	220.0	220.0	165.0	165.0	220.0	200.0
Target Headrope Depth (m)	15	15	15	15	0	0	15	15
Median Headrope Depth (m)	18	16	15	16	12	10	18	19
Start Bottom Depth (m)	62	64	105	105	79	120	161	162
End Bottom Depth (m)	64	55	107	106	97	116	157	156
Usable	Y	Y	Y	Y	Y	Y	Y	Y

51

Tow Number	25	26	27	28	29	30	31	32
Event Number	51	54	55	58	59	62	63	66
Stratum	509	509	511	509	509	511	509	511
Block Number	5561	5062	4812	4810	4810	4812	5062	4691
Date (Pacific)	2022-07-14	2022-07-15	2022-07-15	2022-07-15	2022-07-15	2022-07-15	2022-07-16	2022-07-16
Date (UTC)	2022-07-15	2022-07-15	2022-07-16	2022-07-16	2022-07-16	2022-07-16	2022-07-16	2022-07-16
Start Time (Pacific)	23:59	16:35	17:48	19:18	21:43	23:40	00:56	16:24
Start Time (UTC)	06:59	23:35	00:48	02:18	04:43	06:40	07:56	23:24
Day or Night	Night	Day	Day	Day	Day	Night	Day	Day
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	20	19	20	21	20	20	22
Start Latitude	49° 25’ 16" N	49° 18’ 18" N	49° 13’ 02" N	49° 13’ 19" N	49° 13’ 21" N	49° 12’ 17" N	49° 16’ 49" N	49° 09’ 55" N
Start Longitude	126° 55’ 22" W	126° 51’ 40" W	126° 50’ 34" W	126° 57’ 03" W	126° 59’ 16" W	126° 51’ 24" W	126° 52’ 11" W	126° 38’ 43" W
End Latitude	49° 26’ 27" N	49° 16’ 57" N	49° 13’ 26" N	49° 13’ 44" N	49° 12’ 32" N	49° 13’ 31" N	49° 17’ 54" N	49° 11’ 24" N
End Longitude	126° 54’ 02" W	126° 50’ 38" W	126° 52’ 58" W	126° 59’ 27" W	126° 57’ 22" W	126° 52’ 32" W	126° 49’ 57" W	126° 40’ 07" W
Direction of Tow (deg)	34	152	282	283	121	327	52	327
Vessel Speed (km/h)	8.4	8.4	9.5	9.0	8.0	8.3	10.0	8.8
Distance Towed (km)	2.74	2.79	3.00	3.00	2.75	2.65	3.38	3.22
Net Opening Width (m)	48.4	46.9	43.3	46.6	53.7	45.9	43.5	46.7
Net Opening Height (m)		12	13	10	12	14	13	14
Warp Length (m)	165.0	165.0	165.0	200.0	200.0	165.0	165.0	165.0
Target Headrope Depth (m)	0	0	0	15	15	0	0	0
Median Headrope Depth (m)	5	16	12	16	15	8	6	11
Start Bottom Depth (m)	126	139	148	185	200	150	145	127
End Bottom Depth (m)	114	138	157	194	195	154	133	125
Usable	Y	Y	Y	Y	Y	Y	Y	Y

52

Tow Number	33	34	35	36	37	38	39	40
Event Number	67	70	71	74	75	78	79	82
Stratum	511	511	511	511	511	510	511	510
Block Number	4441	4314	4314	4441	4691	3578	3700	3951
Date (Pacific)	2022-07-16	2022-07-16	2022-07-16	2022-07-16	2022-07-17	2022-07-17	2022-07-17	2022-07-17
Date (UTC)	2022-07-17	2022-07-17	2022-07-17	2022-07-17	2022-07-17	2022-07-17	2022-07-18	2022-07-18
Start Time (Pacific)	17:47	19:54	21:43	23:19	00:28	16:29	18:10	19:52
Start Time (UTC)	00:47	02:54	04:43	06:19	07:28	23:29	01:10	02:52
Day or Night	Day	Day	Night	Night	Night	Day	Day	Day
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	21	20	20	21	20	20	20	20
Start Latitude	49° 07' 20" N	49° 04' 30" N	49° 04' 12" N	49° 05' 41" N	49° 09' 56" N	48° 51' 01" N	48° 51' 43" N	48° 57' 07" N
Start Longitude	126° 38' 36" W	126° 46' 07" W	126° 46' 35" W	126° 38' 57" W	126° 38' 32" W	126° 01' 18" W	126° 09' 00" W	126° 07' 33" W
End Latitude	49° 05' 54" N	49° 04' 03" N	49° 04' 23" N	49° 07' 03" N	49° 11' 23" N	48° 51' 26" N	48° 52' 39" N	48° 56' 47" N
End Longitude	126° 37' 24" W	126° 43' 43" W	126° 44' 16" W	126° 39' 31" W	126° 37' 36" W	125° 58' 57" W	126° 10' 50" W	126° 05' 12" W
Direction of Tow (deg)	150	104	81	343	21	73	305	100
Vessel Speed (km/h)	8.3	9.0	8.5	7.7	8.7	8.9	8.5	8.7
Distance Towed (km)	3.03	3.04	2.85	2.62	2.93	2.96	2.81	2.93
Net Opening Width (m)	49.0	52.2	53.1	51.0	45.7	45.9	42.3	47.8
Net Opening Height (m)	10	10	11	11	14	15	15	15
Warp Length (m)	220.0	220.0	220.0	220.0	165.0	165.0	146.0	165.0
Target Headrope Depth (m)	15	15	15	15	0	0	0	0
Median Headrope Depth (m)	17	18	16	20	7	5	8	4
Start Bottom Depth (m)	137	177	185	140	126	87	109	75
End Bottom Depth (m)	137	168	169	140	125	74	114	74
Usable	Y	Y	Y	Y	Y	Y	Y	Y

53

Tow Number	41	42	43	44	45	46	47	48
Event Number	83	86	87	90	93	94	95	98
Stratum	510	511	510	510	511	511	510	504
Block Number	3951	3700	3578	3589	3462	3462	3589	10774
Date (Pacific)	2022-07-17	2022-07-17	2022-07-18	2022-07-18	2022-07-18	2022-07-18	2022-07-18	2022-07-20
Date (UTC)	2022-07-18	2022-07-18	2022-07-18	2022-07-18	2022-07-19	2022-07-19	2022-07-19	2022-07-20
Start Time (Pacific)	21:58	00:16	02:13	16:32	18:36	21:48	23:23	16:17
Start Time (UTC)	04:58	07:16	09:13	23:32	01:36	04:48	06:23	23:17
Day or Night	Night	Night	Night	Day	Day	Night	Night	Day
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	18	16	20	20	20	20	21
Start Latitude	48° 57’ 06" N	48° 53’ 07" N	48° 50’ 50" N	48° 48’ 25" N	48° 46’ 59" N	48° 47’ 13" N	48° 48’ 23" N	50° 58’ 04" N
Start Longitude	126° 07’ 05" W	126° 10’ 41" W	126° 00’ 59" W	125° 23’ 03" W	125° 29’ 37" W	125° 31’ 45" W	125° 23’ 11" W	128° 57’ 47" W
End Latitude	48° 57’ 50" N	48° 52’ 57" N	48° 51’ 19" N	48° 48’ 24" N	48° 47’ 09" N	48° 47’ 11" N	48° 48’ 25" N	50° 57’ 50" N
End Longitude	126° 05’ 06" W	126° 08’ 32" W	125° 59’ 24" W	125° 25’ 24" W	125° 31’ 43" W	125° 29’ 23" W	125° 25’ 24" W	128° 55’ 05" W
Direction of Tow (deg)	58	94	64	267	274	88	269	98
Vessel Speed (km/h)	8.6	8.7	8.5	8.6	7.7	8.6	8.1	9.4
Distance Towed (km)	2.77	2.65	2.13	2.88	2.59	2.91	2.71	3.19
Net Opening Width (m)	42.0	51.0	42.6	51.5	52.2	50.0	46.1	44.9
Net Opening Height (m)	14	15	16	11	11	10	11	16
Warp Length (m)	165.0	165.0	165.0	220.0	220.0	200.0	220.0	164.6
Target Headrope Depth (m)	0	0	0	15	15	15	15	0
Median Headrope Depth (m)	8	5	5	18	15	17	17	5
Start Bottom Depth (m)	79	110	77	93	112	115	92	74
End Bottom Depth (m)	70	100	73	103	112	110	100	69
Usable	Y	Y	Y	Y	Y	Y	Y	Y

54

Tow Number	49	50	51	52	53	54	55	56
Event Number	101	102	103	106	109	112	113	114
Stratum	504	504	504	506	504	504	504	504
Block Number	10653	10653	10774	9906	10282	10660	10660	10282
Date (Pacific)	2022-07-20	2022-07-20	2022-07-20	2022-07-21	2022-07-21	2022-07-21	2022-07-21	2022-07-21
Date (UTC)	2022-07-21	2022-07-21	2022-07-21	2022-07-21	2022-07-22	2022-07-22	2022-07-22	2022-07-22
Start Time (Pacific)	18:12	21:42	23:21	16:06	17:54	20:09	21:53	23:15
Start Time (UTC)	01:12	04:42	06:21	23:06	00:54	03:09	04:53	06:15
Day or Night	Day	Night	Night	Day	Day	Day	Night	Night
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	20	20	15	20	20	20	0
Start Latitude	50° 55’ 47" N	50° 55’ 41" N	50° 56’ 56" N	50° 41’ 59" N	50° 48’ 40" N	50° 54’ 43" N	50° 56’ 23" N	50° 50’ 13" N
Start Longitude	128° 44’ 05" W	128° 42’ 04" W	128° 56’ 48" W	128° 32’ 44" W	128° 28’ 38" W	128° 20’ 27" W	128° 17’ 54" W	128° 28’ 44" W
End Latitude	50° 55’ 44" N	50° 55’ 27" N	50° 58’ 22" N	50° 43’ 04" N	50° 50’ 13" N	50° 55’ 33" N	50° 55’ 05" N	50° 50’ 13" N
End Longitude	128° 41’ 35" W	128° 44’ 41" W	128° 56’ 29" W	128° 33’ 11" W	128° 28’ 44" W	128° 18’ 59" W	128° 20’ 15" W	128° 28’ 44" W
Direction of Tow (deg)	92	262	8	345	357	47	229	198
Vessel Speed (km/h)	8.7	9.3	8.0	7.9	8.7	6.9	10.6	11.8
Distance Towed (km)	2.93	3.11	2.67	2.08	2.87	2.31	3.65	0.00
Net Opening Width (m)	52.7	53.1	43.0	51.9	45.2	43.7	47.4	
Net Opening Height (m)	11	11	15	11	13	16	14	
Warp Length (m)	219.5	201.2	146.3	201.2	140.8	137.2	164.6	
Target Headrope Depth (m)	15	15	0	15	0	0	0	0
Median Headrope Depth (m)	17	17	5	22	4	5	5	
Start Bottom Depth (m)	91	91	79	111	72	63	79	47
End Bottom Depth (m)	90	80	74	101	49	82	65	53
Usable	Y	Y	Y	Y	Y	Y	Y	N

55

Tow Number	57	58	59	60	61	62	63	64
Event Number	115	118	121	122	125	126	129	130
Stratum	506	507	507	506	506	507	507	507
Block Number	9906	8909	9281	9658	9658	9281	8539	8663
Date (Pacific)	2022-07-22	2022-07-22	2022-07-22	2022-07-22	2022-07-22	2022-07-22	2022-07-23	2022-07-23
Date (UTC)	2022-07-22	2022-07-22	2022-07-23	2022-07-23	2022-07-23	2022-07-23	2022-07-23	2022-07-24
Start Time (Pacific)	00:14	16:11	18:20	19:58	22:08	23:55	16:02	17:28
Start Time (UTC)	07:14	23:11	01:20	02:58	05:08	06:55	23:02	00:28
Day or Night	Night	Day	Day	Day	Night	Night	Day	Day
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	21	20	20	20	21	20	20
Start Latitude	50° 43’ 20" N	50° 24’ 29" N	50° 31’ 08" N	50° 37’ 29" N	50° 39’ 06" N	50° 32’ 48" N	50° 17’ 56" N	50° 20’ 03" N
Start Longitude	128° 32’ 25" W	128° 21’ 17" W	128° 31’ 46" W	128° 27’ 04" W	128° 26’ 32" W	128° 32’ 45" W	128° 04’ 53" W	128° 08’ 11" W
End Latitude	50° 41’ 36" N	50° 25’ 27" N	50° 32’ 07" N	50° 38’ 45" N	50° 37’ 23" N	50° 31’ 15" N	50° 19’ 13" N	50° 20’ 53" N
End Longitude	128° 32’ 04" W	128° 22’ 46" W	128° 33’ 09" W	128° 27’ 26" W	128° 27’ 15" W	128° 32’ 34" W	128° 05’ 27" W	128° 09’ 51" W
Direction of Tow (deg)	172	315	317	349	194	176	343	308
Vessel Speed (km/h)	9.7	7.4	7.3	7.1	9.8	8.5	7.5	7.4
Distance Towed (km)	3.24	2.51	2.44	2.39	3.30	2.87	2.50	2.50
Net Opening Width (m)	50.8	50.7	52.0	46.2	46.1	49.3	45.5	39.9
Net Opening Height (m)	11	11	12	16	14	11	16	19
Warp Length (m)	206.7	201.2	201.2	164.6	164.6	219.5	164.6	146.3
Target Headrope Depth (m)	15	15	15	0	0	15	0	0
Median Headrope Depth (m)	20	16	21	6	5	18	9	9
Start Bottom Depth (m)	96	195	190	108	90	189	99	130
End Bottom Depth (m)	113	192	194	98	113	195	98	144
Usable	Y	Y	Y	Y	Y	Y	Y	Y

Tow Number	65	66	67	68	69	70	71	72
Event Number	133	134	135	138	141	142	143	146
Stratum	506	506	507	508	508	508	508	510
Block Number	8914	8914	8663	7051	7054	7054	7051	3080
Date (Pacific)	2022-07-23	2022-07-23	2022-07-23	2022-07-24	2022-07-24	2022-07-24	2022-07-24	2022-07-25
Date (UTC)	2022-07-24	2022-07-24	2022-07-24	2022-07-24	2022-07-25	2022-07-25	2022-07-25	2022-07-25
Start Time (Pacific)	19:17	21:43	22:54	16:25	18:24	21:38	23:07	16:04
Start Time (UTC)	02:17	04:43	05:54	23:25	01:24	04:38	06:07	23:04
Day or Night	Day	Night	Night	Day	Day	Night	Night	Day
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	15	15	20	17	15	15	20	20
Start Latitude	50° 24’ 30" N	50° 24’ 22" N	50° 21’ 58" N	49° 51’ 37" N	49° 53’ 12" N	49° 53’ 07" N	49° 51’ 37" N	48° 42’ 34" N
Start Longitude	128° 06’ 32" W	128° 06’ 29" W	128° 10’ 53" W	127° 25’ 28" W	127° 18’ 31" W	127° 18’ 14" W	127° 25’ 14" W	125° 55’ 19" W
End Latitude	50° 25’ 27" N	50° 25’ 19" N	50° 21’ 30" N	49° 52’ 18" N	49° 53’ 20" N	49° 52’ 59" N	49° 52’ 52" N	48° 41’ 27" N
End Longitude	128° 07’ 18" W	128° 07’ 22" W	128° 08’ 38" W	127° 27’ 32" W	127° 16’ 58" W	127° 16’ 31" W	127° 26’ 59" W	125° 53’ 37" W
Direction of Tow (deg)	332	328	107	296	81	95	317	132
Vessel Speed (km/h)	7.8	8.1	8.7	9.8	7.5	8.2	9.4	8.7
Distance Towed (km)	1.97	2.03	2.81	2.77	1.87	2.08	3.13	2.93
Net Opening Width (m)	53.2	51.5	45.2	40.1	40.6	47.6	43.7	46.6
Net Opening Height (m)	11	11	15	18	17	14	15	16
Warp Length (m)	201.2	201.2	164.6	155.5	164.6	164.6	164.6	164.6
Target Headrope Depth (m)	15	15	0	0	0	0	0	0
Median Headrope Depth (m)	17	16	6	7	5	5	8	5
Start Bottom Depth (m)	80	81	149	70	63	65	74	76
End Bottom Depth (m)	71	76	121	76	56	57	72	76
Usable	Y	Y	Y	Y	Y	Y	Y	Y

Tow Number	73	74	75	76	77	78	79	80
Event Number	147	150	151	152	153	156	159	162
Stratum	510	510	510	510	510	510	510	510
Block Number	2830	2705	2705	2830	3080	2710	2583	2460
Date (Pacific)	2022-07-25	2022-07-25	2022-07-25	2022-07-25	2022-07-26	2022-07-26	2022-07-26	2022-07-26
Date (UTC)	2022-07-26	2022-07-26	2022-07-26	2022-07-26	2022-07-26	2022-07-26	2022-07-27	2022-07-27
Start Time (Pacific)	17:17	18:46	21:31	23:05	00:46	16:09	18:08	19:32
Start Time (UTC)	00:17	01:46	04:31	06:05	07:46	23:09	01:08	02:32
Day or Night	Day	Day	Night	Night	Night	Day	Day	Day
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	21	20	15	20	15	20	20	20
Start Latitude	48° 38' 15" N	48° 35' 53" N	48° 34' 14" N	48° 36' 22" N	48° 40' 37" N	48° 35' 28" N	48° 32' 45" N	48° 30' 45" N
Start Longitude	125° 54' 44" W	125° 54' 27" W	125° 54' 34" W	125° 54' 51" W	125° 52' 51" W	125° 37' 13" W	125° 46' 02" W	125° 39' 39" W
End Latitude	48° 36' 46" N	48° 34' 15" N	48° 35' 16" N	48° 37' 41" N	48° 41' 24" N	48° 33' 50" N	48° 32' 39" N	48° 30' 21" N
End Longitude	125° 54' 43" W	125° 54' 14" W	125° 54' 30" W	125° 54' 48" W	125° 54' 13" W	125° 37' 25" W	125° 43' 45" W	125° 37' 30" W
Direction of Tow (deg)	177	173	360	360	309	182	91	103
Vessel Speed (km/h)	8.2	9.1	7.5	7.3	8.8	9.1	8.4	8.2
Distance Towed (km)	2.76	3.05	1.90	2.44	2.21	3.05	2.82	2.73
Net Opening Width (m)	50.3	43.5	48.4	52.2	42.5	44.5	48.3	51.3
Net Opening Height (m)	11	15	15	11	14	16	12	11
Warp Length (m)	201.2	164.6	164.6	201.2	164.6	164.6	201.2	201.2
Target Headrope Depth (m)	15	0	0	15	0	0	15	15
Median Headrope Depth (m)	18	8	4	14	6	6	18	18
Start Bottom Depth (m)	94	95	88	97	75	71	86	91
End Bottom Depth (m)	95	86	96	96	78	66	85	122
Usable	Y	Y	Y	Y	Y	Y	Y	Y

58

Tow Number	81	82	83	84	85	86	87	88
Event Number	163	164	165	168	169	172	173	176
Stratum	510	510	510	510	510	510	510	511
Block Number	2460	2583	2710	3713	3835	3960	3835	3820
Date (Pacific)	2022-07-26	2022-07-26	2022-07-26	2022-07-27	2022-07-27	2022-07-27	2022-07-27	2022-07-28
Date (UTC)	2022-07-27	2022-07-27	2022-07-27	2022-07-27	2022-07-28	2022-07-28	2022-07-28	2022-07-28
Start Time (Pacific)	21:42	23:01	00:29	16:50	18:13	19:39	21:47	16:15
Start Time (UTC)	04:42	06:01	07:29	23:50	01:13	02:39	04:47	23:15
Day or Night	Night	Night	Night	Day	Day	Day	Night	Day
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	10	13	10	9	20	21	15	20
Start Latitude	48° 30’ 31" N	48° 31’ 41" N	48° 35’ 30" N	48° 50’ 36" N	48° 54’ 10" N	48° 55’ 50" N	48° 54’ 16" N	48° 56’ 04" N
Start Longitude	125° 37’ 20" W	125° 43’ 33" W	125° 37’ 31" W	125° 26’ 13" W	125° 35’ 37" W	125° 38’ 00" W	125° 35’ 47" W	126° 25’ 46" W
End Latitude	48° 30’ 23" N	48° 32’ 18" N	48° 34’ 45" N	48° 50’ 30" N	48° 55’ 03" N	48° 55’ 15" N	48° 54’ 48" N	48° 54’ 28" N
End Longitude	125° 38’ 25" W	125° 44’ 40" W	125° 37’ 25" W	125° 27’ 16" W	125° 37’ 20" W	125° 35’ 52" W	125° 37’ 23" W	126° 25’ 53" W
Direction of Tow (deg)	257	307	173	260	306	110	294	181
Vessel Speed (km/h)	8.2	8.1	8.4	8.1	8.0	8.4	8.7	8.9
Distance Towed (km)	1.36	1.77	1.40	1.30	2.68	2.82	2.17	2.96
Net Opening Width (m)	52.0	46.4	46.6	56.5	46.1	52.5	46.2	51.9
Net Opening Height (m)	12	11	17	12	15	12	14	11
Warp Length (m)	201.2	201.2	164.6	201.2	164.6	201.2	164.6	219.5
Target Headrope Depth (m)	15	15	0	15	0	15	0	15
Median Headrope Depth (m)	21	16	6	16	5	20	6	18
Start Bottom Depth (m)	97	90	72	88	95	95	97	160
End Bottom Depth (m)	109	91	65	94	100	94	100	164
Usable	Y	Y	Y	Y	Y	Y	Y	Y

59

Tow Number	89	90	91	92	93	94	95	96
Event Number	179	182	183	184	185	188	191	194
Stratum	511	511	511	511	511	511	511	511
Block Number	3448	3201	3201	3448	3820	2334	1959	1708
Date (Pacific)	2022-07-28	2022-07-28	2022-07-28	2022-07-28	2022-07-29	2022-07-29	2022-07-29	2022-07-29
Date (UTC)	2022-07-29	2022-07-29	2022-07-29	2022-07-29	2022-07-29	2022-07-29	2022-07-30	2022-07-30
Start Time (Pacific)	18:19	20:04	21:40	23:09	00:54	15:57	17:54	19:33
Start Time (UTC)	01:19	03:04	04:40	06:09	07:54	22:57	00:54	02:33
Day or Night	Day	Day	Night	Night	Night	Day	Day	Day
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	15	15	20	20	20	20	20
Start Latitude	48° 49’ 30" N	48° 45’ 06" N	48° 43’ 08" N	48° 47’ 37" N	48° 54’ 20" N	48° 29’ 05" N	48° 22’ 32" N	48° 18’ 24" N
Start Longitude	126° 17’ 37" W	126° 08’ 17" W	126° 05’ 51" W	126° 15’ 12" W	126° 24’ 33" W	125° 42’ 09" W	125° 42’ 03" W	125° 45’ 30" W
End Latitude	48° 48’ 36" N	48° 44’ 28" N	48° 43’ 54" N	48° 48’ 16" N	48° 55’ 19" N	48° 27’ 40" N	48° 20’ 51" N	48° 16’ 48" N
End Longitude	126° 15’ 28" W	126° 06’ 49" W	126° 07’ 00" W	126° 17’ 04" W	126° 25’ 39" W	125° 41’ 26" W	125° 42’ 00" W	125° 45’ 50" W
Direction of Tow (deg)	121	121	314	296	322	159	176	185
Vessel Speed (km/h)	9.3	8.5	8.0	7.7	6.8	8.4	9.3	8.9
Distance Towed (km)	3.13	2.14	2.01	2.58	2.27	2.77	3.10	2.98
Net Opening Width (m)	45.9	44.3	45.9	41.1	51.9	52.2	47.6	47.6
Net Opening Height (m)	15		15	14	11	12	15	15
Warp Length (m)	164.6	164.6	164.6	164.6	201.2	201.2	164.6	164.6
Target Headrope Depth (m)	0	0	0	0	15	15	0	0
Median Headrope Depth (m)	5		10	8	16	20	6	5
Start Bottom Depth (m)	160	128	121	160	163	101	151	170
End Bottom Depth (m)	155	121	124	167	163	109	145	173
Usable	Y	Y	Y	Y	Y	Y	Y	Y

Tow Number	97	98	99	100	101	102	103	104
Event Number	195	196	197	200	203	206	207	208
Stratum	511	511	511	511	511	511	511	511
Block Number	1708	1959	2334	2465	2214	2211	2211	2214
Date (Pacific)	2022-07-29	2022-07-29	2022-07-29	2022-07-30	2022-07-30	2022-07-30	2022-07-30	2022-07-30
Date (UTC)	2022-07-30	2022-07-30	2022-07-30	2022-07-30	2022-07-31	2022-07-31	2022-07-31	2022-07-31
Start Time (Pacific)	21:43	23:18	00:52	16:01	17:45	19:37	21:44	23:19
Start Time (UTC)	04:43	06:18	07:52	23:01	00:45	02:37	04:44	06:19
Day or Night	Night	Night	Night	Day	Day	Day	Night	Night
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	13	7	20	20	20	21	10	9
Start Latitude	48° 16' 47" N	48° 20' 35" N	48° 27' 41" N	48° 29' 58" N	48° 25' 50" N	48° 25' 23" N	48° 25' 53" N	48° 24' 46" N
Start Longitude	125° 45' 47" W	125° 42' 36" W	125° 42' 26" W	125° 21' 07" W	125° 24' 39" W	125° 34' 42" W	125° 37' 00" W	125° 27' 38" W
End Latitude	48° 17' 48" N	48° 21' 28" N	48° 29' 06" N	48° 29' 34" N	48° 25' 53" N	48° 25' 27" N	48° 25' 39" N	48° 25' 19" N
End Longitude	125° 46' 04" W	125° 42' 20" W	125° 43' 57" W	125° 23' 03" W	125° 26' 46" W	125° 36' 54" W	125° 36' 02" W	125° 27' 14" W
Direction of Tow (deg)	347	9	322	250	269	270	107	23
Vessel Speed (km/h)	8.5	8.2	9.8	7.8	7.9	8.1	7.4	7.4
Distance Towed (km)	1.90	1.65	3.23	2.51	2.61	2.72	1.26	1.15
Net Opening Width (m)	43.5	47.9	51.9	52.4	50.5	50.1	52.4	48.8
Net Opening Height (m)	16	13	10	12	11	11	12	13
Warp Length (m)	164.6	164.6	201.2	201.2	201.2	201.2	201.2	201.2
Target Headrope Depth (m)	0	0	15	15	15	15	15	15
Median Headrope Depth (m)	7	5	18	18	20	18	22	17
Start Bottom Depth (m)	173	147	112	147	158	130	129	130
End Bottom Depth (m)	170	149	104	149	160	129	131	132
Usable	Y	Y	Y	Y	Y	Y	Y	Y

61

Tow Number	105	106	107	108
Event Number	212	215	216	217
Stratum	510	511	511	510
Block Number	2847	2843	2843	2847
Date (Pacific)	2022-07-31	2022-07-31	2022-07-31	2022-07-31
Date (UTC)	2022-07-31	2022-08-01	2022-08-01	2022-08-01
Start Time (Pacific)	16:02	18:10	21:26	23:13
Start Time (UTC)	23:02	01:10	04:26	06:13
Day or Night	Day	Day	Night	Night
Net	LFS 7742	LFS 7742	LFS 7742	LFS 7742
Duration (min)	20	14	5	5
Start Latitude	48° 35’ 24" N	48° 35’ 53" N	48° 36’ 12" N	48° 35’ 40" N
Start Longitude	124° 57’ 58" W	125° 11’ 03" W	125° 13’ 26" W	125° 00’ 48" W
End Latitude	48° 35’ 28" N	48° 35’ 52" N	48° 36’ 17" N	48° 35’ 41" N
End Longitude	125° 00’ 21" W	125° 12’ 41" W	125° 12’ 57" W	125° 00’ 20" W
Direction of Tow (deg)	269	266	73	85
Vessel Speed (km/h)	8.7	8.2	6.9	6.7
Distance Towed (km)	2.93	2.00	0.61	0.57
Net Opening Width (m)	44.7	46.1	52.7	45.9
Net Opening Height (m)	16	11	12	15
Warp Length (m)	164.6	201.2	201.2	164.6
Target Headrope Depth (m)	0	15	15	0
Median Headrope Depth (m)	5	18	19	5
Start Bottom Depth (m)	61	112	105	67
End Bottom Depth (m)	72	112	105	66
Usable	Y	Y	Y	Y

62

APPENDIX F CTD CAST AND ZOOPLANKTON TOW BRIDGE LOG DATA

Table F.1. CTD casts and vertical bongo tow times and depths during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf from July 4 - August 2, 2022 on the *CFV Nordic Pearl*.

Date (Pacific)	Stratum	Block	Latitude	Longitude	CTD			BONGO		
					Start Time (Pacific)	Bottom Depth (m)	Gear Depth (m)	Start Time (Pacific)	Bottom Depth (m)	Gear Depth (m)
2022-07-04	505	11170	51° 03’ 29" N	127° 43’ 59" W	18:54	123	110	19:09	122	115
2022-07-11	505	11293	51° 06’ 52" N	127° 52’ 27" W	16:18	121	110	16:07	120	110
2022-07-11	505	11289	51° 05’ 36" N	128° 04’ 44" W	20:16	157	150	20:06	157	150
2022-07-11	505	11040	51° 02’ 44" N	128° 02’ 20" W	23:58	155	145	23:49	155	145
2022-07-12	504	11277	51° 07’ 38" N	128° 47’ 22" W	16:09	88	75	16:01	86	75
2022-07-12	505	11034	51° 02’ 50" N	128° 23’ 20" W	19:51	122	110	19:41	121	110
2022-07-12	505	11156	51° 03’ 36" N	128° 31’ 46" W	23:38	115	105	23:30	116	105
2022-07-13	509	6059	49° 35’ 20" N	127° 00’ 27" W	15:59	103	95	15:51	102	90
2022-07-13	508	5937	49° 32’ 22" N	126° 51’ 39" W	18:42	65	55	18:35	65	65
2022-07-13	508	5935	49° 32’ 10" N	126° 56’ 23" W	20:31	101	90	20:24	101	90
2022-07-14	508	5687	49° 28’ 55" N	126° 50’ 09" W	15:49	79	70	15:42	80	70
2022-07-14	509	5308	49° 22’ 38" N	127° 03’ 48" W	19:15	157	150	19:06	159	150
2022-07-14	509	5561	49° 25’ 30" N	126° 54’ 47" W	23:27	122	110	23:20	123	110
2022-07-15	509	5062	49° 18’ 03" N	126° 52’ 20" W	16:07	143	130	15:59	143	130
2022-07-15	509	4810	49° 13’ 19" N	126° 57’ 34" W	18:48	187	175	18:40	185	175
2022-07-15	511	4812	49° 12’ 51" N	126° 51’ 34" W	23:09	150	140	23:00	151	140
2022-07-16	511	4691	49° 10’ 39" N	126° 37’ 47" W	15:54	125	115	15:46	126	115
2022-07-16	511	4314	49° 04’ 34" N	126° 44’ 23" W	19:17	169	150	19:09	168	155
2022-07-16	511	4441	49° 05’ 36" N	126° 39’ 10" W	22:51	141	130	22:47	140	130
2022-07-17	510	3578	48° 50’ 58" N	126° 01’ 11" W	16:02	85	75	15:56	84	75
2022-07-17	510	3951	48° 56’ 28" N	126° 07’ 06" W	19:25	84	75	19:19	83	75
2022-07-17	511	3700	48° 52’ 55" N	126° 10’ 09" W	23:43	108	100	23:36	110	100
2022-07-18	510	3589	48° 49’ 18" N	125° 23’ 12" W	16:07	62	50	16:01	70	60
2022-07-18	511	3462	48° 47’ 09" N	125° 29’ 28" W	18:08	112	105	18:01	112	105
2022-07-20	504	10774	50° 58’ 20" N	128° 57’ 20" W	15:49	76	65	15:42	76	65
2022-07-20	504	10653	50° 55’ 41" N	128° 43’ 48" W	17:47	91	80	17:41	91	80
2022-07-21	506	9906	50° 42’ 05" N	128° 33’ 00" W	15:41	111	100	15:34	111	100

Date (Pacific)	Stratum	Block	Latitude	Longitude	CTD			BONGO		
					Start Time (Pacific)	Bottom Depth (m)	Gear Depth (m)	Start Time (Pacific)	Bottom Depth (m)	Gear Depth (m)
2022-07-21	504	10282	50° 48’ 51" N	128° 29’ 58" W	17:21	31	20	17:17	38	25
2022-07-21	504	10660	50° 54’ 32" N	128° 20’ 18" W	19:43	78	65	19:38	78	65
2022-07-22	507	8909	50° 24’ 58" N	128° 21’ 51" W	15:44	192	180	15:37	191	180
2022-07-22	507	9281	50° 31’ 13" N	128° 31’ 45" W	17:53	189	180	17:46	191	180
2022-07-22	506	9658	50° 39’ 06" N	128° 25’ 47" W	21:40	79	70	21:34	80	70
2022-07-23	507	8539	50° 17’ 50" N	128° 04’ 40" W	15:40	95	85	15:33	96	85
2022-07-23	506	8914	50° 24’ 43" N	128° 05’ 39" W	18:53	69	60	18:47	75	65
2022-07-24	508	7051	49° 53’ 24" N	127° 27’ 18" W	15:45	74	60	15:39	73	60
2022-07-24	508	7054	49° 53’ 02" N	127° 17’ 38" W	17:59	58	45	17:53	58	45
2022-07-25	510	3080	48° 42’ 24" N	125° 54’ 24" W	15:37	74	65	15:31	74	65
2022-07-25	510	2705	48° 35’ 58" N	125° 53’ 34" W	18:18	90	80	18:11	91	80
2022-07-26	510	2710	48° 34’ 51" N	125° 37’ 01" W	15:41	64	55	15:34	64	55
2022-07-26	510	2583	48° 32’ 47" N	125° 45’ 52" W	17:46	85	75	17:41	85	75
2022-07-26	510	2460	48° 30’ 56" N	125° 39’ 40" W	19:09	87	75	19:03	87	75
2022-07-27	510	3713	48° 50’ 56" N	125° 28’ 19" W	16:18	85	70	16:13	85	70
2022-07-27	510	3960	48° 55’ 19" N	125° 37’ 46" W	19:08	100	90	19:02	100	90
2022-07-28	511	3820	48° 55’ 35" N	126° 25’ 07" W	15:47	160	150	15:39	160	150
2022-07-28	511	3448	48° 49’ 21" N	126° 17’ 34" W	17:50	160	150	17:42	161	150
2022-07-28	511	3201	48° 44’ 45" N	126° 08’ 10" W	19:39	129	115	19:31	129	115
2022-07-29	511	2334	48° 29’ 04" N	125° 42’ 56" W	15:34	103	90	15:29	103	90
2022-07-29	511	1959	48° 22’ 35" N	125° 42’ 12" W	17:28	150	140	17:20	150	140
2022-07-29	511	1708	48° 18’ 20" N	125° 45’ 20" W	19:06	166	155	18:59	165	155
2022-07-30	511	2465	48° 29’ 59" N	125° 20’ 57" W	15:34	147	135	15:32	147	135
2022-07-30	511	2214	48° 26’ 12" N	125° 24’ 23" W	17:21	159	145	17:13	158	145
2022-07-30	511	2211	48° 25’ 24" N	125° 34’ 27" W	19:10	130	120	19:02	128	120
2022-07-31	510	2847	48° 35’ 26" N	124° 57’ 55" W	15:36	60	50	15:31	60	50
2022-07-31	511	2843	48° 35’ 42" N	125° 11’ 17" W	17:45	113	100	17:39	113	100

APPENDIX G CATCH DATA

Table G.1. Weight (kg) and counts per station of caught species (or taxa) during the Integrated Pelagic Ecosystem Survey on the Vancouver Island Continental Shelf from July 4 - August 2, 2022 on the *CFV Nordic Pearl*. Jellyfish weights include all identified pieces but only counted if bells were intact. Euphausiacea were not counted due to small size. Counts with blank weights indicate catches too big or small to be weighed accurately.

	EVENT NUMBER	3		4		7		8		11		12	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias											0.64	1
Big Skate	Beringraja binoculata			0.04	1								
Black Rockfish	Sebastes melanops					0.24	1						
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger												
Chinook Salmon (Adults)	Oncorhynchus tshawytscha	6.10	9	3.00	7	4.17	5	0.62	1	2.66	1	1.34	1
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha	0.05	1	0.30	1								
Chum Salmon (Adults)	Oncorhynchus keta											7.27	2
Chum Salmon (Juveniles)	Oncorhynchus keta	0.03	1			0.17	10			0.05	2		
Codfishes	Gadidae		1				4		6		1		
Coho Salmon (Adults)	Oncorhynchus kisutch	2.04	1					3.24	1	2.30	1	11.90	4
Coho Salmon (Juveniles)	Oncorhynchus kisutch					0.66	3			0.42	4		
Comb Jellyfish	Ctenophora												
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus												
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes												
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica												
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus												
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish												
Lions Mane	Cyanea capillata							26.94		21.75		34.10	
Moon Jellyfish	Aurelia labiata					0.83	1	1.52					
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens					0.03	2						
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii	0.25	7	438.04	7829							460.31	8550

	EVENT NUMBER	3		4		7		8		11		12	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha									5.33	4	7.67	5
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha	0.04	2			1.73	126	0.03	1	0.17	8		
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida												
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens					2.66							
Shortbelly Rockfish	Sebastes jordani												
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka					0.01	1						
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												3
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea					0.39		7.31		2.71			
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus												
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**8.51**	**22**	**441.38**	**7838**	**10.89**	**153**	**39.66**	**9**	**35.39**	**21**	**523.23**	**8566**

	EVENT NUMBER	15		16		19		20		23		24	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops	1.12	1	0.10	1							1.46	2
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger												
Chinook Salmon (Adults)	Oncorhynchus tshawytscha												
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha									0.08	1		
Chum Salmon (Adults)	Oncorhynchus keta												
Chum Salmon (Juveniles)	Oncorhynchus keta			0.06	4			0.37	15	0.08	3		
Codfishes	Gadidae						4				2		2
Coho Salmon (Adults)	Oncorhynchus kisutch			11.58	5			1.79	1			2.79	1
Coho Salmon (Juveniles)	Oncorhynchus kisutch							0.63	4	0.11	1		
Comb Jellyfish	Ctenophora												
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus			0.76	17								
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes												
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica							0.16	2				
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus												
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish												
Lions Mane	Cyanea capillata	12.08		8.12		27.33		64.68		73.22		46.31	
Moon Jellyfish	Aurelia labiata	0.61	1					0.46	1	4.56	2	1.40	
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens							0.06	3				
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii	334.59	5937	755.11	14502							6.42	147

	EVENT NUMBER	15		16		19		20		23		24	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha							2.03	1	2.07	1	2.36	1
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha							1.71	85	0.08	5		
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida												
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens												
Shortbelly Rockfish	Sebastes jordani												
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea					0.78		1.30				0.64	
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus											0.14	1
Yellowtail Rockfish	Sebastes flavidus					0.72	1						
TOTAL		**348.4**	**5939**	**775.73**	**14529**	**28.83**	**5**	**73.19**	**112**	**80.20**	**15**	**61.52**	**154**

	EVENT NUMBER	27		28		31		32		35		38	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias	3.15	12										
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger												
Chinook Salmon (Adults)	Oncorhynchus tshawytscha											0.60	1
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha									0.76	2		
Chum Salmon (Adults)	Oncorhynchus keta												
Chum Salmon (Juveniles)	Oncorhynchus keta												
Codfishes	Gadidae				2						3		2
Coho Salmon (Adults)	Oncorhynchus kisutch							3.18	2	8.21	5	9.50	5
Coho Salmon (Juveniles)	Oncorhynchus kisutch												
Comb Jellyfish	Ctenophora												
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus											0.30	37
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes						3		6				
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica												
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus												
Jellyfish	Scyphozoa											0.15	
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish								10				
Lions Mane	Cyanea capillata	54.54		19.62						2.26			
Moon Jellyfish	Aurelia labiata									3.21		0.93	2
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens												
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii	77.25	1345	0.22	5							1.41	807

	EVENT NUMBER	27		28		31		32		35		38	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												1
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha					1.42	1	1.51	1			1.39	1
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha												
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida											0.04	
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens												
Shortbelly Rockfish	Sebastes jordani				1				1		1		
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea	1.78		1.46		1.21		1.14		0.21		0.29	
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus												
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**136.72**	**1357**	**21.30**	**8**	**2.63**	**4**	**5.83**	**20**	**14.65**	**11**	**14.61**	**856**

	EVENT NUMBER	39		40		43		44		47		48	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger		3										2
Chinook Salmon (Adults)	Oncorhynchus tshawytscha	0.47	1			0.77	1						
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha												
Chum Salmon (Adults)	Oncorhynchus keta												
Chum Salmon (Juveniles)	Oncorhynchus keta												
Codfishes	Gadidae		1			0.09	19						
Coho Salmon (Adults)	Oncorhynchus kisutch	9.39	5	12.51	7	13.51	7	22.69	12				
Coho Salmon (Juveniles)	Oncorhynchus kisutch							0.56	2				
Comb Jellyfish	Ctenophora									0.08	3		
Copper Rockfish	Sebastes caurinus				4								
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus	0.59	30	2.39	128							0.05	2
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes										2		2
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica							0.24	1				
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus												
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish		3										
Lions Mane	Cyanea capillata												
Moon Jellyfish	Aurelia labiata					4.76							
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens										5		
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii	10.13	175	0.74	11							12.50	172

	EVENT NUMBER	39		40		43		44		47		48	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha					5.90	4						
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha												
Pink Shrimp (Smooth)	Pandalus jordani			7.73									
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum											0.16	3
Rockfishes	Sebastes										3		
Salmon Shark	Lamna ditropis										1		
Salps	Salpida	0.28								0.07	1	0.35	3
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens									5.00			
Shortbelly Rockfish	Sebastes jordani		5		5					0.27	135	0.06	27
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka							1.56	1				
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei					0.47	1						
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea	3.11				3.93		1.74		0.77		0.41	
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus										5		2
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**23.97**	**223**	**23.37**	**155**	**29.43**	**32**	**26.79**	**16**	**6.19**	**155**	**13.53**	**213**

	EVENT NUMBER	51		54		55		58		59		62	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca											7.01	1
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger						2		1				
Chinook Salmon (Adults)	Oncorhynchus tshawytscha												
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha												
Chum Salmon (Adults)	Oncorhynchus keta	5.50	1										
Chum Salmon (Juveniles)	Oncorhynchus keta												
Codfishes	Gadidae												
Coho Salmon (Adults)	Oncorhynchus kisutch												
Coho Salmon (Juveniles)	Oncorhynchus kisutch												
Comb Jellyfish	Ctenophora			0.8	15	0.5	24	0.53	28				
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus	9.93	509									4.55	213
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes						1		4				
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica												
Hoodwinker Mola	Mola tecta		1										
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus												
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish						4		2				
Lions Mane	Cyanea capillata												
Moon Jellyfish	Aurelia labiata												
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens												
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii	65.18	996							153.93	1814	84.72	1099

	EVENT NUMBER	51		54		55		58		59		62	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha												
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha												
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum									0.57	10		
Rockfishes	Sebastes						6		35				
Salmon Shark	Lamna ditropis												
Salps	Salpida								1				
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens					0.29		5.73	5	7.11	6	0.38	
Shortbelly Rockfish	Sebastes jordani					0.51	291	0.04	30	0.03	23		3
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus										1		
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea			3.22		1.34		1.21					
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus						16		3				
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**80.61**	**1507**	**4.02**	**15**	**2.64**	**344**	**7.51**	**109**	**161.64**	**1854**	**96.66**	**1316**

	EVENT NUMBER	63		66		67		70		71		74	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger								1	0.04	18		
Chinook Salmon (Adults)	Oncorhynchus tshawytscha	5.50	1										
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha												
Chum Salmon (Adults)	Oncorhynchus keta												
Chum Salmon (Juveniles)	Oncorhynchus keta												
Codfishes	Gadidae												
Coho Salmon (Adults)	Oncorhynchus kisutch			40.28	20	2.02	1						
Coho Salmon (Juveniles)	Oncorhynchus kisutch												
Comb Jellyfish	Ctenophora							0.08	5	0.04	3		
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri								1				
Eulachon	Thaleichthys pacificus	7.10	751									9.10	950
Euphausiids	Euphausiacea											0.27	
Flatfishes	Pleuronectiformes								1				
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica												
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus												
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish												
Lions Mane	Cyanea capillata												
Moon Jellyfish	Aurelia labiata									0.19	1		
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens								1		18		
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii	173.66	2363							15.76	201	2.18	30

	EVENT NUMBER	63		66		67		70		71		74	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha			1.36	1								
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha												
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum									0.05	2		
Rockfishes	Sebastes								2				
Salmon Shark	Lamna ditropis												
Salps	Salpida									0.14	3		1
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens						1			0.45	1		
Shortbelly Rockfish	Sebastes jordani		2						2	0.30	199		
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus				3								
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea					2.94		1.48		2.13		5.21	
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus						3		12				
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**186.26**	**3117**	**41.64**	**24**	**4.96**	**5**	**1.56**	**25**	**19.10**	**446**	**16.76**	**981**

	EVENT NUMBER	75		78		79		82		83		86	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima											0.48	2
Arrowtooth Flounder, Turbot	Atheresthes stomias							0.28	1				
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca				1								
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger												
Chinook Salmon (Adults)	Oncorhynchus tshawytscha	7.00	1			0.99	2	10.67	12	2.81	4	12.70	9
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha			1.49	8	0.09	1	0.86	6	0.62	7	0.34	1
Chum Salmon (Adults)	Oncorhynchus keta			4.68	1					5.62	1	18.60	4
Chum Salmon (Juveniles)	Oncorhynchus keta							0.72	13				
Codfishes	Gadidae												
Coho Salmon (Adults)	Oncorhynchus kisutch	18.21	10	7.64	4	16.45	11	1.56	1			10.82	6
Coho Salmon (Juveniles)	Oncorhynchus kisutch			1.10	5	0.55	3	1.38	10			0.65	2
Comb Jellyfish	Ctenophora						1	0.04	3				
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus	3.74	214							1.65	124	4.49	192
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes												
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica												
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus												
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish						2		105				
Lions Mane	Cyanea capillata									0.59	1		
Moon Jellyfish	Aurelia labiata			0.30	1			1.24	3	0.33	1		
North Pacific Spiny Dogfish	Squalus suckleyi									9.23	2		
Opalescent Inshore Squid	Doryteuthis opalescens			25.31	1037				2	0.08	2	2.59	110
Pacific Hake	Merluccius productus											1.26	1
Pacific Herring	Clupea pallasii	438.77	7381							140.69	3872	208.70	2423

	EVENT NUMBER	75		78		79		82		83		86	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha	4.84	3									1.74	1
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha												
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes						3						
Salmon Shark	Lamna ditropis												
Salps	Salpida												1
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens							0.21	1				
Shortbelly Rockfish	Sebastes jordani						1		3				
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka					1.45	1	1.72	1				
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus		1										
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea					15.54		2.39					
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus						13						
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**472.56**	**7610**	**40.52**	**1057**	**35.07**	**38**	**21.07**	**161**	**161.62**	**4014**	**262.37**	**2752**

	EVENT NUMBER	87		90		93		94		95		98	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias									0.03	3		
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger												
Chinook Salmon (Adults)	Oncorhynchus tshawytscha	5.67	2	18.30	26	7.67	12	8.40	5	6.40	7		
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha			0.23	3					0.46	2		
Chum Salmon (Adults)	Oncorhynchus keta	12.98	2									2.52	1
Chum Salmon (Juveniles)	Oncorhynchus keta											0.09	3
Codfishes	Gadidae												
Coho Salmon (Adults)	Oncorhynchus kisutch	1.85	1			4.35	3			2.48	2	4.50	2
Coho Salmon (Juveniles)	Oncorhynchus kisutch	0.28	1										
Comb Jellyfish	Ctenophora											0.04	1
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus							4.45		35.38	11057		
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes						1						
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica												
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa						1						
Jack Mackerel	Trachurus symmetricus												
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish				7		6						
Lions Mane	Cyanea capillata											30.64	10
Moon Jellyfish	Aurelia labiata			0.50	1							0.64	1
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens	0.61	24			0.65	30	1.30	64				
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii	250.24	5149					45.20	1063	2.10	89		

	EVENT NUMBER	87		90		93		94		95		98	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus									4.57	25		
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha					1.22	1	1.48	1			10.15	7
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha												
Pink Shrimp (Smooth)	Pandalus jordani									13.14	3289		
Plainfin Midshipman	Porichthys notatus									0.11	2		
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida												
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens					0.16							
Shortbelly Rockfish	Sebastes jordani						1						3
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka					4.22	2						
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus									1.89	8		6
Water Jellyfish	Aequorea					0.89							
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus												
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**271.63**	**5179**	**19.03**	**37**	**19.16**	**57**	**60.83**	**1133**	**66.56**	**14484**	**48.58**	**34**

	EVENT NUMBER	101		102		103		106		109		112	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops									0.86	1		
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger												
Chinook Salmon (Adults)	Oncorhynchus tshawytscha											3.54	1
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha									0.38	2		
Chum Salmon (Adults)	Oncorhynchus keta												
Chum Salmon (Juveniles)	Oncorhynchus keta					0.04	2			0.24	7		
Codfishes	Gadidae				4	0.02	14						
Coho Salmon (Adults)	Oncorhynchus kisutch	1.65	1							2.46	1	9.23	3
Coho Salmon (Juveniles)	Oncorhynchus kisutch									0.35	4		
Comb Jellyfish	Ctenophora	0.04	2	0.02	2					0.48	22		
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus												
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes						1						
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica												
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus												
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish												
Lions Mane	Cyanea capillata	9.70	4	4.35		11.87		5.14		13.73		10.39	
Moon Jellyfish	Aurelia labiata	1.37	1			0.34	1	1.32	1	4.27			
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens						1						
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii	0.10	1			1.21	18			9.40	188		

	EVENT NUMBER	101		102		103		106		109		112	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus			0.27	1	0.34	2						
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus	0.04	2					0.04	13		2	0.02	5
Pink Salmon (Adults)	Oncorhynchus gorbuscha	2.90	2	1.50	1			3.17	2	8.45	6	3.20	2
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha									0.03	1		
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida												
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens												
Shortbelly Rockfish	Sebastes jordani			0.08	4		3						
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka	2.58	1							3.69	1		
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus							0.03	15				1
Water Jellyfish	Aequorea	1.56	62	0.38	16	0.54		0.22	5	0.27	5	0.05	3
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus		5				1						
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**19.94**	**81**	**6.60**	**28**	**14.36**	**43**	**9.92**	**36**	**44.61**	**240**	**26.43**	**15**

	EVENT NUMBER	113		114		115		118		121		122	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger												
Chinook Salmon (Adults)	Oncorhynchus tshawytscha	3.71	4							7.55	3	6.42	1
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha									0.22	2		
Chum Salmon (Adults)	Oncorhynchus keta					4.50	1					4.54	1
Chum Salmon (Juveniles)	Oncorhynchus keta			0.06	1							0.07	1
Codfishes	Gadidae												
Coho Salmon (Adults)	Oncorhynchus kisutch	1.61	1					2.87	1	3.28	1		
Coho Salmon (Juveniles)	Oncorhynchus kisutch									0.12	1		
Comb Jellyfish	Ctenophora					0.06	3	0.04	3	0.03	2		
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus												
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes												
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica	0.25	1			0.09	1						
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus												
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish												
Lions Mane	Cyanea capillata	16.62		2.97	2	38.59		0.76		10.01		1.68	
Moon Jellyfish	Aurelia labiata									3.15	2	2.83	3
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens			0.04	2								
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii	0.08	2	26.75	538							110.70	3144

	EVENT NUMBER	113		114		115		118		121		122	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus		5		3		3	0.01	6	0.05	13		1
Pink Salmon (Adults)	Oncorhynchus gorbuscha	7.47	5	5.81	4							14.53	10
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha												
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida												
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens												
Shortbelly Rockfish	Sebastes jordani				2						9		
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka											6.67	3
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus		4		1								
Water Jellyfish	Aequorea			1.04		0.48		0.75		0.60	23		
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus		1						2				
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**29.74**	**23**	**36.67**	**553**	**43.72**	**8**	**4.43**	**12**	**25.01**	**56**	**147.44**	**3164**

	EVENT NUMBER	125		126		129		130		133		134	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger		1										
Chinook Salmon (Adults)	Oncorhynchus tshawytscha			1.57	3	0.55	1					1.04	1
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha			0.40	3			0.07	1				
Chum Salmon (Adults)	Oncorhynchus keta											4.06	1
Chum Salmon (Juveniles)	Oncorhynchus keta												
Codfishes	Gadidae												
Coho Salmon (Adults)	Oncorhynchus kisutch			16.66	9	6.76	3	7.16	4			2.21	1
Coho Salmon (Juveniles)	Oncorhynchus kisutch			0.53	2	0.97	6	0.10	1				
Comb Jellyfish	Ctenophora					0.05	2	0.09	4				
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus												
Euphausiids	Euphausiacea	3.11											
Flatfishes	Pleuronectiformes												
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica							1.80					
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus												
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus		1										
Larval Fish	Larval Fish												
Lions Mane	Cyanea capillata	33.29		87.27		117.70		14.25		11.31			
Moon Jellyfish	Aurelia labiata			1.49	2			0.82	2			0.52	1
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens												
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii	55.07	580		1					0.04	2	11329.01	128641

	EVENT NUMBER	125		126		129		130		133		134	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus		3		6		1		3	0.02	5		
Pink Salmon (Adults)	Oncorhynchus gorbuscha			2.87	2			9.90	6			3.16	2
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha												
Pink Shrimp (Smooth)	Pandalus jordani		4										
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus			0.04	1								
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida												
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens												
Shortbelly Rockfish	Sebastes jordani		4				1						
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus		2		3		1		6				
Water Jellyfish	Aequorea			1.76		1.60		4.71		1.41			
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus		2										
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**91.47**	**597**	**112.59**	**32**	**127.63**	**15**	**38.90**	**27**	**12.78**	**7**	**11340.00**	**128647**

	EVENT NUMBER	135		138		141		142		143		146	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger						2		6				
Chinook Salmon (Adults)	Oncorhynchus tshawytscha					7.79	3			3.45	1		
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha			0.35	2					0.38	1		
Chum Salmon (Adults)	Oncorhynchus keta												
Chum Salmon (Juveniles)	Oncorhynchus keta			0.16	3								
Codfishes	Gadidae		2										
Coho Salmon (Adults)	Oncorhynchus kisutch	3.81	2			1.64	1			4.14	3	5.38	3
Coho Salmon (Juveniles)	Oncorhynchus kisutch	0.35	1	0.09	1	0.76	4			0.39	1	0.48	1
Comb Jellyfish	Ctenophora		1				1				1		
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus												
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes		3		1		2		4				
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica												
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus									8.12	6		
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish		12		2				20				
Lions Mane	Cyanea capillata												
Moon Jellyfish	Aurelia labiata			1.32	5	3.18	5	0.51	2				
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens				3	0.02	2		1	0.12	8		
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii				5	0.08	35	8.76	197				

	EVENT NUMBER	135		138		141		142		143		146	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus								6				
Pink Salmon (Adults)	Oncorhynchus gorbuscha	1.28	1	1.41	1								
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha			0.28	7								
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes		1										
Salmon Shark	Lamna ditropis												
Salps	Salpida		1										
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens	1.19	2	1.16		0.65	1						
Shortbelly Rockfish	Sebastes jordani				2	0.03	27	0.02	6				
Siphonophora	Siphonophorae					0.11	3	0.09	2				
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus						7						
Water Jellyfish	Aequorea	2.51		2.93		2.52		19.53		15.16		17.45	
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus	0.02	42	0.13	6		4		2		5		3
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**9.16**	**68**	**7.83**	**38**	**16.78**	**97**	**28.91**	**246**	**31.76**	**26**	**23.31**	**7**

	EVENT NUMBER	147		150		151		152		153		156	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima									0.50	1		
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca				2								
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger						1						
Chinook Salmon (Adults)	Oncorhynchus tshawytscha	3.74	1	3.36	1					20.57	9		
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha							0.39	1	1.18	2		
Chum Salmon (Adults)	Oncorhynchus keta	2.93	1										
Chum Salmon (Juveniles)	Oncorhynchus keta									0.12	2		
Codfishes	Gadidae												
Coho Salmon (Adults)	Oncorhynchus kisutch	21.00	11	5.86	3	1.68	1	13.54	6	5.30	3		
Coho Salmon (Juveniles)	Oncorhynchus kisutch	0.33	1	0.53	1								
Comb Jellyfish	Ctenophora												
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus					0.13	3						
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes												1
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica												
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus	1.54	1	121.57	92	1.54	1	31.06	25	53.95	43	1.37	1
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish												7
Lions Mane	Cyanea capillata												
Moon Jellyfish	Aurelia labiata												
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens							0.30	9				
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii			65.10	934	181.02	2589	351.94	5503	7.48	115	0.41	5

	EVENT NUMBER	147		150		151		152		153		156	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha												
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha									0.02	1		
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida												
Sanddabs	Citharichthys					0.72	2	0.99	9				
Sea Nettle	Chrysaora fuscescens												
Shortbelly Rockfish	Sebastes jordani												
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus		2		1								
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea	5.06										0.58	
Whitebait Smelt	Allosmerus elongatus												
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus	0.01	10		1								1
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**34.61**	**27**	**196.42**	**1035**	**185.09**	**2597**	**398.22**	**5553**	**89.12**	**176**	**2.36**	**15**

	EVENT NUMBER	159		162		163		164		165		168	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger												1
Chinook Salmon (Adults)	Oncorhynchus tshawytscha	28.93	21	1.79	2	18.88	10	28.94	15	8.85	12	12.03	17
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha	1.40	3					0.49	2	0.71	2	1.15	4
Chum Salmon (Adults)	Oncorhynchus keta											4.49	2
Chum Salmon (Juveniles)	Oncorhynchus keta												
Codfishes	Gadidae												
Coho Salmon (Adults)	Oncorhynchus kisutch	12.67	9			10.42	6	9.98	9	1.19	1		
Coho Salmon (Juveniles)	Oncorhynchus kisutch	0.11	1					0.25	1				
Comb Jellyfish	Ctenophora												
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus			6.17	214	0.30	6	3.29	101				
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes												
Flathead Chub	Platygobio gracilis							1.72	4				
Fried Egg Jellyfish	Phacellophora camtschatica												
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus	59.92	67	2.88	2	5.92	5	75.04	58				
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish										45		50
Lions Mane	Cyanea capillata												
Moon Jellyfish	Aurelia labiata												
North Pacific Spiny Dogfish	Squalus suckleyi								1				
Opalescent Inshore Squid	Doryteuthis opalescens	0.03	2	0.18	4			1.20	19			2.61	83
Pacific Hake	Merluccius productus							18.88	13				
Pacific Herring	Clupea pallasii	0.05	1	291.05	3431	55.76	888	472.84	9854		2	0.05	2

	EVENT NUMBER	159		162		163		164		165		168	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira									0.05	1		
Pacific Tomcod	Microgadus proximus												2
Pink Salmon (Adults)	Oncorhynchus gorbuscha									1.27	1	2.83	2
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha											0.32	14
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida												
Sanddabs	Citharichthys					1.18	4	4.48	19				
Sea Nettle	Chrysaora fuscescens											1.44	1
Shortbelly Rockfish	Sebastes jordani												
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea											0.59	
Whitebait Smelt	Allosmerus elongatus						1						
Widow Rockfish	Sebastes entomelas			0.44	1								
Wolf Eel	Anarrhichthys ocellatus												
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**103.11**	**104**	**302.51**	**3654**	**92.46**	**920**	**617.11**	**10096**	**12.07**	**64**	**25.51**	**178**

	EVENT NUMBER	169		172		173		176		179		182	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia		3		3								
Canary Rockfish	Sebastes pinniger						1						
Chinook Salmon (Adults)	Oncorhynchus tshawytscha	8.40	11	16.84	10								
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha	0.41	1										
Chum Salmon (Adults)	Oncorhynchus keta												
Chum Salmon (Juveniles)	Oncorhynchus keta												
Codfishes	Gadidae												
Coho Salmon (Adults)	Oncorhynchus kisutch							1.87	1				
Coho Salmon (Juveniles)	Oncorhynchus kisutch												
Comb Jellyfish	Ctenophora												
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus											0.03	2
Euphausiids	Euphausiacea												
Flatfishes	Pleuronectiformes		2				5						
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica			0.32	1	0.98	1						
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus							45.94	34	26.26	39	16.73	30
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish		27								1		
Lions Mane	Cyanea capillata					6.97	1						
Moon Jellyfish	Aurelia labiata												
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens			1.90	90								
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii			78.89	3506							697.52	8422

	EVENT NUMBER	169		172		173		176		179		182	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira							0.06	2				
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha												
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha												
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida												
Sanddabs	Citharichthys			0.32	1								
Sea Nettle	Chrysaora fuscescens												
Shortbelly Rockfish	Sebastes jordani												
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea	0.72				1.76		15.62		3.60			1
Whitebait Smelt	Allosmerus elongatus			2.06	217								
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus	0.02	19			0.06	19				13		
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**9.55**	**63**	**100.33**	**3828**	**9.77**	**27**	**63.49**	**37**	**29.86**	**53**	**714.28**	**8455**

	EVENT NUMBER	183		184		185		188		191		194	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima	0.80	3										
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca										1		
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger				1			0.05	4	0.13	86		
Chinook Salmon (Adults)	Oncorhynchus tshawytscha					7.16	4						
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha												
Chum Salmon (Adults)	Oncorhynchus keta												
Chum Salmon (Juveniles)	Oncorhynchus keta												
Codfishes	Gadidae										2		
Coho Salmon (Adults)	Oncorhynchus kisutch					5.29	3	2.03	1				
Coho Salmon (Juveniles)	Oncorhynchus kisutch												
Comb Jellyfish	Ctenophora										1		
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri			0.03	1					0.03	2		
Eulachon	Thaleichthys pacificus			0.48	14								
Euphausiids	Euphausiacea			5.21									
Flatfishes	Pleuronectiformes												
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica	0.53	1										
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus	26.22	28	1.49	1								
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae												
Lanternfishes	Myctophidae												
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish												
Lions Mane	Cyanea capillata			0.90									
Moon Jellyfish	Aurelia labiata			0.29	1								
North Pacific Spiny Dogfish	Squalus suckleyi												
Opalescent Inshore Squid	Doryteuthis opalescens										1		
Pacific Hake	Merluccius productus												
Pacific Herring	Clupea pallasii	533.48	5475	2.19	24							6801.15	60021

	EVENT NUMBER	183		184		185		188		191		194	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha												
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha												
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum											2.85	24
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida			0.10	1			0.06	1				
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens									1.22			
Shortbelly Rockfish	Sebastes jordani		1					0.01	11	0.05	49		
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus								1		1		
Tope Shark	Galeorhinus galeus												
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea	0.02	2	16.75				1.01		0.77			
Whitebait Smelt	Allosmerus elongatus	0.03	1										
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus								1		6		
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**561.08**	**5511**	**27.44**	**43**	**12.45**	**7**	**3.16**	**19**	**2.20**	**149**	**6804.00**	**60045**

	EVENT NUMBER	195		196		197		200		203		206	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima												
Arrowtooth Flounder, Turbot	Atheresthes stomias												
Big Skate	Beringraja binoculata												
Black Rockfish	Sebastes melanops												
Blue Shark	Prionace glauca												
Bougainvillia	Bougainvillia												
Canary Rockfish	Sebastes pinniger				1								1
Chinook Salmon (Adults)	Oncorhynchus tshawytscha			23.04	9	6.18	3			68.70	33	9.01	4
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha												
Chum Salmon (Adults)	Oncorhynchus keta												
Chum Salmon (Juveniles)	Oncorhynchus keta												
Codfishes	Gadidae												
Coho Salmon (Adults)	Oncorhynchus kisutch			24.00	15	13.00	9			8.24	5	4.60	3
Coho Salmon (Juveniles)	Oncorhynchus kisutch												
Comb Jellyfish	Ctenophora												
Copper Rockfish	Sebastes caurinus												
Darkblotched Rockfish	Sebastes crameri												
Eulachon	Thaleichthys pacificus			0.18	4							3.94	117
Euphausiids	Euphausiacea											4.80	
Flatfishes	Pleuronectiformes												
Flathead Chub	Platygobio gracilis												
Fried Egg Jellyfish	Phacellophora camtschatica												
Hoodwinker Mola	Mola tecta												
Hydroid	Hydrozoa												
Jack Mackerel	Trachurus symmetricus	282.17	369	24.86	21			5.7	7	1.54	2	3.16	3
Jellyfish	Scyphozoa												
Lampreys	Petromyzontidae											0.02	1
Lanternfishes	Myctophidae												1
Large Eyed Eualid	Eualus macropthalmus												
Larval Fish	Larval Fish												
Lions Mane	Cyanea capillata												
Moon Jellyfish	Aurelia labiata												
North Pacific Spiny Dogfish	Squalus suckleyi	1320.55	786										
Opalescent Inshore Squid	Doryteuthis opalescens			0.02	1							0.08	15
Pacific Hake	Merluccius productus			7.74	6							7.57	7
Pacific Herring	Clupea pallasii	665.28	6042	21.11	258							46.97	493

	EVENT NUMBER	195		196		197		200		203		206	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus												
Pacific Sanddab	Citharichthys sordidus												
Pacific Saury	Cololabis saira												
Pacific Tomcod	Microgadus proximus												
Pink Salmon (Adults)	Oncorhynchus gorbuscha												
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha												
Pink Shrimp (Smooth)	Pandalus jordani												
Plainfin Midshipman	Porichthys notatus												
Prowfish	Zaprora silenus												
Pyrosomes	Pyrosoma atlanticum												
Rockfishes	Sebastes												
Salmon Shark	Lamna ditropis												
Salps	Salpida												
Sanddabs	Citharichthys												
Sea Nettle	Chrysaora fuscescens									0.18	1		
Shortbelly Rockfish	Sebastes jordani												
Siphonophora	Siphonophorae												
Sockeye Salmon (Adults)	Oncorhynchus nerka												
Sockeye Salmon (Juveniles)	Oncorhynchus nerka												
Solmissus	Solmissus												
Spotted Ratfish	Hydrolagus colliei												
Threespine Stickleback	Gasterosteus aculeatus												
Thresher Shark	Alopias vulpinus												
Tope Shark	Galeorhinus galeus		1										
Walleye Pollock	Gadus chalcogrammus												
Water Jellyfish	Aequorea								8				
Whitebait Smelt	Allosmerus elongatus				1								
Widow Rockfish	Sebastes entomelas												
Wolf Eel	Anarrhichthys ocellatus												
Yellowtail Rockfish	Sebastes flavidus												
TOTAL		**2268**	**7198**	**100.95**	**316**	**19.18**	**12**	**5.7**	**15**	**78.66**	**41**	**80.15**	**645**

	EVENT NUMBER	207		208		212		215		216	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
American Shad	Alosa sapidissima										
Arrowtooth Flounder, Turbot	Atheresthes stomias										
Big Skate	Beringraja binoculata										
Black Rockfish	Sebastes melanops										
Blue Shark	Prionace glauca										
Bougainvillia	Bougainvillia										
Canary Rockfish	Sebastes pinniger										
Chinook Salmon (Adults)	Oncorhynchus tshawytscha			27.71	24	5.76	4			1.49	3
Chinook Salmon (Juveniles)	Oncorhynchus tshawytscha			0.96	2	1.50	3				
Chum Salmon (Adults)	Oncorhynchus keta			1.80	1					3.50	1
Chum Salmon (Juveniles)	Oncorhynchus keta									0.02	1
Codfishes	Gadidae										
Coho Salmon (Adults)	Oncorhynchus kisutch	9.41	6	127.91	83	4.16	3			16.77	10
Coho Salmon (Juveniles)	Oncorhynchus kisutch			0.77	3					0.59	2
Comb Jellyfish	Ctenophora					0.02	1				
Copper Rockfish	Sebastes caurinus										
Darkblotched Rockfish	Sebastes crameri										
Eulachon	Thaleichthys pacificus	1.65	28					11.70	176	0.37	6
Euphausiids	Euphausiacea										
Flatfishes	Pleuronectiformes										
Flathead Chub	Platygobio gracilis										
Fried Egg Jellyfish	Phacellophora camtschatica										
Hoodwinker Mola	Mola tecta										
Hydroid	Hydrozoa										
Jack Mackerel	Trachurus symmetricus										
Jellyfish	Scyphozoa										
Lampreys	Petromyzontidae										
Lanternfishes	Myctophidae										
Large Eyed Eualid	Eualus macropthalmus										
Larval Fish	Larval Fish										
Lions Mane	Cyanea capillata										
Moon Jellyfish	Aurelia labiata										
North Pacific Spiny Dogfish	Squalus suckleyi										
Opalescent Inshore Squid	Doryteuthis opalescens		4								
Pacific Hake	Merluccius productus										
Pacific Herring	Clupea pallasii	298.70	2778	0.05	2			11311.92	150143	29.78	6118

	EVENT NUMBER	207		208		212		215		216	
Common Name	**Scientific Name**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**	**Weight**	**Count**
Pacific Sand Lance	Ammodytes personatus										
Pacific Sanddab	Citharichthys sordidus										
Pacific Saury	Cololabis saira										
Pacific Tomcod	Microgadus proximus										
Pink Salmon (Adults)	Oncorhynchus gorbuscha										
Pink Salmon (Juveniles)	Oncorhynchus gorbuscha									0.08	4
Pink Shrimp (Smooth)	Pandalus jordani										
Plainfin Midshipman	Porichthys notatus										
Prowfish	Zaprora silenus										
Pyrosomes	Pyrosoma atlanticum										
Rockfishes	Sebastes										
Salmon Shark	Lamna ditropis										
Salps	Salpida					0.02	1				
Sanddabs	Citharichthys	0.55	6								
Sea Nettle	Chrysaora fuscescens										
Shortbelly Rockfish	Sebastes jordani										
Siphonophora	Siphonophorae										
Sockeye Salmon (Adults)	Oncorhynchus nerka			15.1	5						
Sockeye Salmon (Juveniles)	Oncorhynchus nerka										
Solmissus	Solmissus										
Spotted Ratfish	Hydrolagus colliei										
Threespine Stickleback	Gasterosteus aculeatus										
Thresher Shark	Alopias vulpinus										
Tope Shark	Galeorhinus galeus										
Walleye Pollock	Gadus chalcogrammus	596.90	2657					16.38	58		
Water Jellyfish	Aequorea					0.02	1				
Whitebait Smelt	Allosmerus elongatus									0.02	2
Widow Rockfish	Sebastes entomelas										
Wolf Eel	Anarrhichthys ocellatus										
Yellowtail Rockfish	Sebastes flavidus										
TOTAL		**907.21**	**5479**	**174.3**	**120**	**11.48**	**13**	**11340.00**	**150377**	**52.62**	**6147**