

Arctic Salmon data collection procedures and laboratory methods manual

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2026

**Canadian Technical Report of
Fisheries and Aquatic Sciences 3787**



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Canadian Technical Report of Fisheries and Aquatic Sciences

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Canadian Technical Report of
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Cat. No. Fs97-6/3787E-PDF ISBN 978-0-662-32254-2 ISSN 1488-5379

<https://doi.org/10.60825/dyme-9w22>

Correct citation for this publication:

Dunmall, K.M. Andrews, J.N.J., McNicholl, D.G., Christie, L. R., Gully, K., and Gruben, M. 2026. Arctic Salmon Data Collection Procedures and Laboratory Methods Manual. Can. Tech. Rep. Fish. Aquat. Sci. 3787: vii + 79 p. <https://doi.org/10.60825/dyme-9w22>

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Abstract

Dunmall, K.M., Andrews, J.N.J., McNicholl, D.G., Christie, L. R., Gully, K., and Gruben, M. 2026. Arctic Salmon Data Collection Procedures and Laboratory Methods Manual. Can. Tech. Rep. Fish. Aquat. Sci. 3787: vii + 79 p. <https://doi.org/10.60825/dyme-9w22>

The Arctic Salmon program documents the harvest of Pacific salmon species, Atlantic salmon, and other unusual fish with communities and harvesters across the Canadian Arctic. Occurrences are primarily captured incidentally in subsistence fisheries targeting Arctic species; however, they are also occasionally provided opportunistically from other sources (e.g., sport fishing, commercial fishing, research projects). The program is built on partnerships with collaborators, rights-holders, co-management boards, decision-makers, and other organizations who guide and support research and monitoring efforts. This manual provides a comprehensive overview of the three central components to the data collection process within Arctic Salmon: community collaboration, sample collection, and data organization. Recognizing that each community is unique, collaborative approaches are intended only to provide overall guidance and need to be adapted to local best practices. Standardized protocols for sampling whole salmon and salmon heads are included, as are processes for sample storage and data organization. By outlining procedures and laboratory protocols, the manual enhances program transparency, supports high-quality datasets, and facilitates future data sharing and long-term comparisons.

Résumé

Dunmall, K.M., Andrews, J.N.J., McNicholl, D.G., Christie, L. R., Gully, K., and Gruben, M., 2026. Arctic Salmon Data Collection Procedures and Laboratory Methods Manual. Rapp. tech. can. sci. halieut. aquat. 3787: vii + 79 p. <https://doi.org/10.60825/dyme-9w22>

Le programme de l'omble chevalier documente la récolte d'espèces de saumon du Pacifique, de saumons atlantiques et d'autres poissons inhabituels avec l'aide des collectivités et des pêcheurs dans l'ensemble de l'Arctique canadien. Les occurrences sont principalement capturées accidentellement dans le cadre de pêches de subsistance ciblant des espèces de l'Arctique; cependant, elles sont également parfois fournies de manière opportune par d'autres sources (p. ex. pêche sportive, pêche commerciale, projets de recherche). Le programme repose sur des partenariats avec des collaborateurs, des détenteurs de droits, des conseils de cogestion, des décideurs et d'autres organisations qui orientent et soutiennent les efforts de recherche et de surveillance. Le manuel donne un aperçu complet des trois composantes centrales du processus de collecte de données sur l'omble chevalier : la collaboration communautaire, la collecte d'échantillons et l'organisation des données. Reconnaisant que chaque communauté est unique, les approches collaboratives ne visent qu'à fournir une orientation générale et doivent être adaptées aux pratiques exemplaires locales. Des protocoles normalisés pour l'échantillonnage d'ombles entiers et de têtes d'ombles sont inclus, tout comme les processus de stockage des échantillons et d'organisation des données. En décrivant les procédures et les protocoles de laboratoire, le manuel améliore la transparence du programme, soutient des ensembles de données de grande qualité et facilite l'échange futur de données et les comparaisons à long terme.



Introduction

Arctic Salmon Program

Arctic Salmon was initially established in 2000 by the Department of Fisheries and Oceans Canada (DFO) and communities in the western Canadian Arctic. Harvesters were reporting increased incidences of salmon being caught in subsistence nets targeting Arctic species (e.g., Arctic char). From 2000 to 2010, it was called the Pacific Salmon Collection Program. In 2011, it was changed to the Arctic Salmon program, shifting to an increased emphasis on connection with harvesters and communities through outreach, reporting, and collaboration. In addition, it was given a logo for increased recognition and a Facebook page (www.facebook.com/arcticsalmon) to facilitate the distribution of information and interaction with interested individuals. The Arctic Salmon program has now been tracking the harvests of Pacific salmon species *Oncorhynchus spp.*, Atlantic salmon *Salmo salar*, and other unusual fish primarily in subsistence fisheries and in collaboration with communities across the Canadian Arctic for over 25 years. Occasionally, samples are also provided from incidental catches in commercial and sport fisheries, as well as scientific research or monitoring programs. For Arctic Salmon, we use a community-led approach, collaborating with rights-holders, co-management boards, decision-makers, and other organizations, who guide and support the research and monitoring efforts (Dunmall & Reist 2018).

The information and salmon samples provided by harvesters and collaborators are used to monitor the increase in occurrence, geographic spread, and the number of species, as well as to address community-driven questions about salmon ecology and biodiversity change (Dunmall et al. 2013). Salmon are typically not the preferred or targeted fish of subsistence fisheries in the Canadian Arctic (Chila et al. 2022). This leads to questions about why salmon are appearing and what that means for cultural practices and the existing Arctic fish populations and ecosystems. The Arctic Salmon program works with harvesters, communities, and co-management boards, as well as collaborating scientists and organizations, to identify and explore these questions, often developing outcomes together.

Across the Canadian Arctic, reported salmon harvests have now been reported from 34 communities or fishing sites, spanning multiple land claim jurisdictions and regions (Figure 1). The salmon species harvested include *Oncorhynchus keta* (chum salmon), *O. gorbuscha* (pink salmon), *O. nerka* (sockeye salmon), *O. tshawytscha* (Chinook salmon), and *O. kisutch* (coho salmon), as well as Atlantic salmon. More salmon are harvested within the Yukon North Slope and Northwest Territories than in Nunavut, although the relative occurrence and types of salmon harvested among locations are variable year-to-year. Chum salmon is the most common species harvested in the Northwest Territories, and they have a long history of harvest in the Mackenzie River system (Dunmall et al. 2013, 2018, 2021). In Nunavut, salmon harvests are reported less frequently, but chum, sockeye, Chinook, and pink salmon have been reported in western Nunavut, while pink salmon and Atlantic Salmon are occasionally harvested in eastern Nunavut (Dunmall et al. 2021; McNicholl et al. 2021). Other catches of 'unusual' fish species are also reported using the Arctic Salmon program and, when combined with other scientific and local observations, present an opportunity to document further biodiversity change (McNicholl et al. 2021).



Figure 1. Map of the locations along the Mackenzie River and tributaries where at least one salmon was harvested and reported to the Arctic Salmon program from 2000 to 2026. (Credit: J. Andrews)

While increasing in relative abundance, distribution, and species diversity in recent years, the occurrence of adult salmon in the Canadian Arctic is not new. There is a long history of chum salmon harvest in the Mackenzie River delta communities (Chila et al. 2022) and words for chum salmon in several Indigenous languages along the Mackenzie River (DFO 2018). More recently, exceptionally high harvests of chum salmon were reported in the western Canadian Arctic in 2017 and 2019, and higher occurrences of sockeye salmon were also reported in these same years (Dunmall et al. 2021). Pink salmon appeared in coastal subsistence harvests in the western Canadian Arctic over the last 20 years, and harvests have since spread into Nunavut (McNicholl et al. 2021; Dunmall et al. 2025) and upstream in the Mackenzie River (Dunmall et al. 2021). Historical harvests of Atlantic salmon in eastern Nunavut are also reported (summarized in Bilous & Dunmall 2020), and occasional harvests continue to occur.

Through ongoing collaboration with harvesters, communities, and co-management groups across the Canadian Arctic, as well as interested scientists and their organizations, the Arctic Salmon program has been able to address some of the key questions from communities about changing Arctic ecosystems and species.

”Why are salmon being harvested in the western Canadian Arctic in some years but not in other years?” In a wholly collaborative effort, it was identified that these salmon accessed the western Canadian Arctic when two “gates” were

opened: when the Chukchi Sea warmed early, and when the Beaufort Sea was clear of ice for long enough (Dunmall & Langan et al. 2024).

“Are salmon eating the same things as our chars?” In the coastal marine environment, adult chum salmon eat at a lower trophic level (e.g., invertebrates) than Dolly Varden and Arctic char, therefore reducing the chance of competition for food (McNicholl et al. 2025). This question is currently being explored for other salmon species.

“What do salmon eat in the freshwater?” While Pacific salmon are not normally known to eat anything in the fresh water as the adults transition to spawn and then die, adult chum salmon in the Mackenzie River do very occasionally and likely opportunistically consume prey (Dunmall & Wight et al. 2026).

“Can salmon spawn in the Canadian Arctic?” While the Arctic is generally too cold in winter for salmon eggs incubating in rivers, there are places associated with warm groundwater springs that are thermally suitable for chum, pink (Dunmall et al. 2016), and coho (Lindley et al. 2025) salmon spawning and egg development. A juvenile chum salmon caught along the coast near Kaktovik, Alaska, demonstrates that suitable habitats exist (Dunmall et al. 2022); however, no other juvenile salmon have been captured to date. Thermally-suitable habitats are also present for Atlantic salmon in the eastern Canadian Arctic, and overlap with those of Arctic char, suggesting the potential for interaction between these species (Bilous and Dunmall 2020).

By changing distributions and appearing in new places, these salmon are acting as indicators of broader ecosystem changes (Dunmall et al. 2013). The Arctic Salmon program monitors changes in subsistence harvests and incidental catches in other fisheries and research programs to assess biodiversity shifts in fish, which helps us better understand a rapidly changing Arctic environment. Research priorities are guided by questions posed by communities and harvesters, and outcomes are developed collaboratively to ensure the information is relevant and useful to northern decision-makers.

Goal and Objectives

Our goal for this report is to outline the procedures and methods inherent to the Arctic Salmon program to track harvests of and collect samples from unusual fish, which are primarily salmon, caught in fisheries and programs across the Canadian Arctic. By doing so, we highlight the collaborative process required to obtain samples from rare fish across a vast geographic space and help to provide some recognition of the level of effort that is required. Also, we hope to promote collaboration, facilitate data sharing through the application of consistent methods, and to generate new approaches and ideas in order to assist efforts to monitor and assess the distributional change of salmon and other aquatic species. While monitoring has occurred by and with communities across the Canadian Arctic for over 25 years via the Arctic Salmon program, we recognize that distributional changes in salmon within the Pacific and Atlantic oceans is gaining increasing attention (Langan et al. 2024; Dunmall et al. 2025). By sharing developed approaches for community collaboration, as well as protocols for sampling, sample storage, and data organization, we hope to support coordinated efforts that will facilitate comparisons across space and time (Dunmall et al. 2025).

Our objective is to outline the operational structure for data collection within Arctic Salmon, describing our methods surrounding the three central components: community collaboration, sample processing, and data organization. We have organized this manual around those components to describe our process with communities, outline our steps for standardizing sampling and highlight our approach regarding data organization. We intentionally bound the scope of this manual to sample coordination, collection, and outreach, and do not include our collaborative processes related to data analyses and publications. Broadly, however, any Arctic Salmon data are not used or shared without the permission of all communities involved. In addition, co-authorship is invited and encouraged for community leadership groups and/or individuals on any resulting publications. Specific details regarding the collaborative process to address key community questions are included with each publication and are unique to each process (e.g., Dunmall & Langan et al. 2024; Dunmall & Wight et al. 2026). In this manual, we also do not describe how funds are obtained to support this Arctic Salmon program because that process is variable. Broadly, however, we actively seek funding annually to support each of these central components from as many organizations and opportunities as possible, especially in years with more salmon harvests. From these efforts, the communities do not incur any direct financial costs to be involved in Arctic Salmon. We do, however, recognize and highlight that their support requires an investment of time, energy, and resources locally. We are also fortunate to have the collaboration of many organizations, labs, and individuals who donate their time and/or services to provide support to address the community-based research questions.

The term “we” is used throughout this manual. It is imperative to understand that the “we” goes beyond the authorship team, which is comprised of DFO scientists and the Arctic Salmon Community Outreach Coordinator (Michelle Gruben, based in Aklavik, Northwest Territories), and includes the entire Arctic Salmon network. This is wholly a collaborative effort among harvesters, communities, and researchers, and the process described here has been derived iteratively, through ongoing listening and learning by the researchers, and endless patience and effort by the harvesters and communities. During the development of the manual, between August 2025 and March 2026, summary newsletters describing community-specific harvest data from 2000–2025 were sent to 24 communities with an offer for DFO scientists and the Arctic Salmon Community Outreach Coordinator to join a community meeting for feedback and co-interpretation of the information. The development of this manual was described at those community meetings, and also at a presentation to the Gwich’in Renewable Resources Board in March 2026. A completed full draft of the manual was also provided to three co-management boards, the Fisheries Joint Management Committee, the Gwich’in Renewable Resources Board, and ?ehdzo Got’ıne Gots’é Nákedı (Sahtú Renewable Resources Board) for review in March 2026 and any feedback received was incorporated. The entire Arctic Salmon network is instrumental to the success of the Arctic Salmon program and we recognize all contributions as they were essential to its development.

Community Collaboration

It is important to underscore that we are not prescribing an approach to collaboration with Indigenous communities across the Canadian Arctic. Each community is unique, has individual expectations for respectful engagement, with different communication and decision-making processes, and that these may evolve over time. We suggest using the best practices for respectful collaboration and engagement with each community. If in doubt, we have found that simply reaching out to ask how an individual community would prefer to proceed is an effective approach. While we describe how the Arctic Salmon program generally operates, we recognize

the many lessons we have learned and the patience of the communities for their willingness to teach us over the years. We practice and encourage iterative understanding through continued dialogue.

Starting the Program

The Arctic Salmon program starts in individual communities in two different ways: we reach out to the community or the community reaches out to the Arctic Salmon program. If we are made aware of salmon harvests spreading toward a community that is not yet involved, we will reach out with information about the harvests and the Arctic Salmon program. More often in recent years, communities or individual harvesters have heard about the Arctic Salmon program and reached out to us to receive more information. In either case, the following approach is used to initially begin the Arctic Salmon program in a community.

We, the Arctic Salmon program, begin by sending a letter by email or letter mail to the potential community partner organization (Hunters and Trappers Committee (HTC), Hunters and Trappers Association (HTA), Hunters and Trappers Organization (HTO), Renewable Resource Council (RRC), or other similar community office. The letter contains information about the Arctic Salmon program and highlights results from previous years, and is accompanied by posters, reports, newsletters, and outreach materials (see Community Materials section). We then follow up with a phone call to introduce ourselves, provide more information, ask about potential interest in the program, and address any questions. If appropriate, we offer to attend (most often virtually but occasionally in person if the opportunity arises) a regularly scheduled community meeting (HTC, HTO, HTA, RRC, or similar) to explain the Arctic Salmon program and seek support to determine if the community would like to proceed. If we receive support to continue, we ask about the availability of a freezer in the community to store any salmon received from harvesters. We then follow up by sending a Salmon Kit (see Salmon Kit section) within a month of when salmon might appear in the community.

Continuing the Program

All the communities that become involved in Arctic Salmon have continued their involvement in subsequent years. However, we do not assume this will always be the case as it remains an individual decision each year at the community level. Therefore, starting each spring, we reach out to each community that has been involved in Arctic Salmon in past years with a letter, usually delivered via email (see the section The Salmon Collection Process, Community Letters), seeking support for ongoing participation.

We recognize that the level of community involvement may be variable each year because it is related to how many salmon are harvested locally. If there are few or no salmon caught, there is little or no effort needed by each community. If there are more salmon caught, however, more effort is needed by the community to coordinate sample collections, potentially sample salmon in the community, and distribute samples and results. In response to community feedback, the Arctic Salmon program seeks funding annually to provide each community office with the opportunity for increased local administration support and locally-based salmon samplers, if required and of interest.

The Salmon Collection Process

Community Support

At least one month prior to salmon appearing in subsistence harvests (based on timing from previous years), participating communities receive a letter seeking their support for involvement in Arctic Salmon for the upcoming season, tailored to the specific needs of the community and program in that specific year (Appendix A).

Salmon Kits

Following confirmation of community support, “Salmon Kits” consisting of information about receiving samples (Appendix B), posters and sampling materials are sent via letter mail. Salmon kits also include the supplies listed below and explained in the following sections:

- Salmon Harvester Cards
- String (to tie Harvester Cards to salmon and/or to close fish bags),
- Fish bags (42” x 12”, 4 mil polypropylene),
- Gift cards (to cover \$25/head and \$100/whole salmon to a local grocery/supply store),
- Salmon tracking form to help keep track the salmon accepted by the community on behalf of the program (see Figure 4)
- Guide to Identifying Salmon and Char in the Arctic (DFO 2018)
- Outreach materials (e.g., A Salmon Cookbook for the Arctic (DFO 2020), stickers)
- Salmon reward posters
- Shipping labels
- Coolers with ice packs (if required, and are used to ship the contents of the Salmon Kit to communities and to ship out salmon after they have been collected)

Communities participating in the program can request materials, including coolers and ice packs, at any time during the season if needed.

Salmon Harvester Cards

Harvester Cards are printed on waterproof paper and are used to record sample information when a salmon is submitted to the program. They were developed by the Arctic Salmon Program through an iterative process of seeking feedback from community organizations and harvesters about the information that may be possible to obtain from each salmon harvest. At a minimum, the date and location (named fishing spot or nearest community) are needed for each harvest; the rest of the information can be filled out or left blank at the discretion of the harvester and/or community organization. See Appendix C for a printable version.

What kind of salmon? (circle one) Chum / Pink / Coho / Chinook / Sockeye / Atlantic / unknown Date Caught (dd/mm/yyyy): _____ Location Caught (be specific): _____ Nearest Community: _____ Gillnet mesh size: _____ How many hours was the net set? _____ If you squeeze gently, does eggs/milt come out? Y or N How many other fish (all species) were also in the net? _____ (please turn over)	Have you caught salmon before? Y or N How many salmon do you catch / season? _____ Has that increased, decreased or remained the same over time? Have you seen salmon spawning? _____ Where? _____ Name & address: _____ Email or phone: _____ Would you like more information about this project? Y or N Gift card received? Y or N (please turn over)
---	--

Figure 2. Harvester Cards are provided to the community partner organization and completed by harvesters when a fish is submitted to the program.

Species ID Book

The species identification book titled “Guide to Identifying Salmon and Char in the Arctic” (DFO 2018) was created by the Arctic Salmon Program to assist with the identification of salmon and char species. While harvesters recognize when something unusual is in their nets, with the increasing prevalence of salmon in their harvests they requested a guide to help identify salmon to species level. The guide was updated to include Atlantic salmon (second edition) and then also juvenile salmon (third edition). In addition to the species identification information, the guide includes suggestions for taking photographs of fish for species identification and a few Harvester Cards.

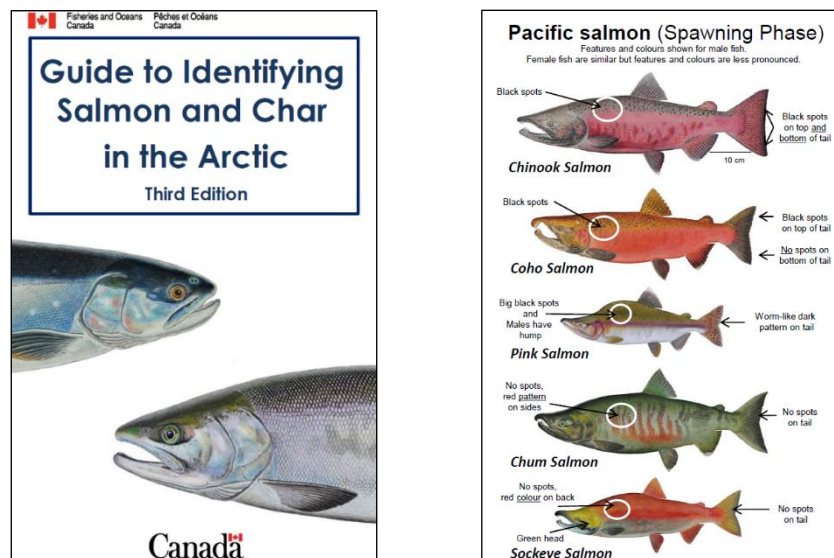


Figure 3. The front cover and an example page of the Pacific salmon spawning phases, from the species identification booklet titled "Guide to Identifying Salmon and Char in the Arctic" (DFO 2018).

Gift Cards

Gift cards are provided to harvesters in exchange for a salmon sample and a Harvester Card with a minimum of the date and location of harvest filled out. The gift card is intended to compensate the harvester for volunteering their harvested fish for sampling by recognizing the

costs (e.g., fuel, fishing gear, boat maintenance) associated with their efforts. The gift cards are for a local grocery store in the community, typically the Northern, Northmart, or local Co-op. Occasionally, gift cards to the local gas station are provided instead, if possible and on the request of an individual community depending on availability of those stores in the area. The program usually purchases gift cards in advance (if for Northern Store or Northmart gift cards, from the NorthWest Company head office, located in Winnipeg, MB). These are shipped in advance as part of the Salmon Kits, so they are available immediately in the community when a harvester brings in a salmon. When purchased in this way, they can be activated by the head office after they are received in the communities, which reduces the risk of losing valuable gift cards in transit. Each gift card is \$25 to reduce confusion that may arise from similar-looking gift cards with different values. That way, every gift card is valued the same, and one or more gift cards can be provided to the harvester depending on the level required. A head or whole fish can be submitted, and the number of gift card corresponds to the value for the type of sample (currently \$25/salmon head; \$100/whole salmon). The value for the type of sample remains consistent for all communities. In response to feedback from harvesters and communities regarding the cost of food, the value for a whole salmon was increased from \$50 to \$100/salmon in 2024. The program typically accepts unlimited heads; however, whole salmon may be limited depending on the number of salmon, funding, freezer space availability, and logistics, as well as the goals of the community and the program. More gift cards can be requested by each community once the current supply has been depleted.

Community Sample Tracking Form

The Community Sample Tracking Form is a management tool to monitor sample intake, sample details, harvester information, and the inventory and distribution of gift cards within partner communities. See Appendix D for a full-size version.

Arctic Salmon Sample Tracking Form						
Office: _____				Year: _____		
Fisher's name	Date submitted	Mailing address and phone number	Head or whole fish?	Gift card amount	Gift card barcode number	Date gift card provided/sent

Figure 4. Arctic Salmon Program sample tracking form used to track reward distribution in each community.

When a Salmon is Caught

It is important to note that the decision to provide any harvested salmon to Arctic Salmon is entirely up to each individual harvester, regardless if there is a partner organization involved in their community. Participation is entirely voluntary; we fully support using salmon for subsistence or any other related purpose. Occasionally, harvesters will report a salmon harvest

by sending photos. Due to the challenges with positively identifying salmon, especially those that are still ocean silver, to species from photos (e.g., Dunmall et al. 2013), we generally do not include photos of harvests as records; we only accept whole salmon or heads into the database. The only exception is for harvests in eastern Nunavut, where 1) occurrences are exceedingly rare; 2) we can definitively identify the salmon to species using distinctive markings or colours (i.e., black spots on operculum for Atlantic salmon or distinctive hump of pink salmon); 3) the salmon has been eaten or is otherwise no longer available to sample; and 4) the date and location of catch is known. In those cases, we accept a photo as a harvest record.

When a harvester catches a salmon in a community with an Arctic Salmon partner organization, the partner organization completes the following steps (also see Appendix B):

- 1) Bags the salmon (head or whole fish) using the provided freezer bags;
- 2) Works with the harvester to complete a Harvester Card with the date and location of harvest;
- 3) Places the completed Harvester Card into the bag with the salmon;
- 4) Ties or staples the bag closed;
- 5) Freezes the salmon immediately;
- 6) Issues the reward to the harvester and records this using the salmon tracking form:
 - \$25 gift card for a salmon head
 - \$100 gift card (or four x \$25 gift cards) for a whole salmon
- 7) Notifies the program if additional gift cards, harvester cards, or support are needed;
- 8) At the end of the harvest season or when the freezer is full, contacts the program via phone, Facebook page, Instagram, or email to arrange transportation to Winnipeg (shipping costs covered by DFO) or to discuss community-based sampling.

Most communities have a partner organization supportive and involved; however, if a harvester wants to provide a salmon in a community that does not have a partner organization involved, the harvester reaches out directly to Arctic Salmon (usually by Facebook) or to their local DFO office. From there, we or our collaborators work directly with that harvester to obtain the needed information and to freeze and ship the salmon for sampling.

In-Community Storage

Salmon provided to the Arctic Salmon program are stored frozen (-20 °C) in the community until the end of the fishing season or until the freezer is full, when the salmon are shipped to DFO in Winnipeg. If no freezer is available, we work with the community to provide one in the community office to facilitate sample collections. We have found that purchasing a freezer locally is the easiest option, as the community representatives can choose which one would fit best. If this is not possible, we work with the community to identify options for where to purchase a freezer, the size dimensions that would be appropriate, and how delivery could be set up in the community.

In-Community Sampling

Occasionally, salmon heads are sampled in the community if interest, capacity, and funding are available. Community-based technicians are trained virtually or in person on how to sample using the sampling protocol for salmon heads (Appendix I). Most often, training occurs virtually among DFO researchers and technicians hired by the local community organization. Occasionally, technicians employed in previous years train new technicians locally. The support of samplers in the community was important during years of high salmon harvest (i.e., 2017 and

2019) to manage the number of fish turned in and minimize the cost associated with shipping them to Winnipeg from remote communities.

Shipping

Frozen salmon (heads or whole fish) are shipped to DFO Winnipeg at the end of the fishing season or when the local freezer is full. Samples are shipped via air cargo, and DFO covers shipping expenses, usually by supplying a shipping account number. A shipping label, cooler, fish bags, and ice packs are needed to ship a salmon from the partner community to the FWI in Winnipeg, which are provided by the program as part of the “Salmon Kits”.

Communication and Outreach

Translations

Many communities operate in local languages, therefore we translate our materials for accessibility. The types of documents that may be translated include letters, reports, publication abstracts, posters, newsletters, and salmon identification guides. The translation process differs for each language and we try to work with local translation companies to translate our documents. We have translated our documents into local languages and dialects, such as Inuktitut, Uummarmiutun, Sallirmiutun, Tetlit Gwich'in, and Gwich'ya Gwich'in.

Contact Information

The Arctic Salmon Program uses multiple platforms to facilitate two-way communication and knowledge sharing with northern communities. The program has an email, phone number, website, as well as Instagram and Facebook pages. The email and phone number act as direct contact points for the public to report harvests and ask questions. Program information and more details about the Arctic Salmon team are featured. The Instagram and Facebook accounts provide updates and an easy point of contact for the program participants. All of these tools make our research and information accessible and transparent.

	Arctic Salmon Contact Information	 Email: info@arcticsalmon.ca  Phone: (431) 277-3221  Website: www.arcticsalmon.ca  Instagram: arctic.salmon  Facebook: arcticsalmon
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Facebook and Instagram Pages

The Arctic Salmon Program has maintained a Facebook page since 2011, and Instagram page since 2020, as public communication platforms that support community-based monitoring and information sharing. Community members can use the pages to report salmon catches and access updates about the program across the Arctic. Each page features contact information for the program, photographs, recent fieldwork, project updates, and links to peer-reviewed publications. The pages are monitored regularly by DFO biologists and updated periodically with any relevant information. The pages act as an outreach tool, facilitating data sharing and making the program more accessible to the public and community partners.



Figure 5. The Arctic Salmon Program Facebook page. www.facebook.com/arcticsalmon

Program Posters

To raise awareness about the Arctic Salmon program within partner communities, informational posters are distributed and displayed in advance of the sampling season (Figure 6). The posters “Caught a salmon? Get a reward!” are customized for different locations and include the regional salmon species. The posters may be also translated into local languages.

Community locations with high foot traffic are targeted for advertisement, such as grocery stores, post offices, community halls, and HTC/HTA/HTO/RRC offices. The posters include a brief identification guide, information on the types and quantity of samples that are being accepted (whole salmon or head) and contact information for the program, including the phone number, email, Facebook page, and website. See full-size posters in Appendix E.



Figure 6. An Arctic Salmon program poster from Nunavut, displayed in English and Inuktitut.

Newsletters

Newsletters are developed approximately annually to provide updated information on the program to participating communities. A newsletter typically summarizes the research conducted, provides updates about salmon presence and harvest data from the target community, and may include upcoming research projects. Newsletters may be compiled for a region (Figure 7, Appendix F) and/or include community-specific information when sufficient data are available (Figure 8, Appendix G). Newsletters may be translated into the local language to support accessibility.

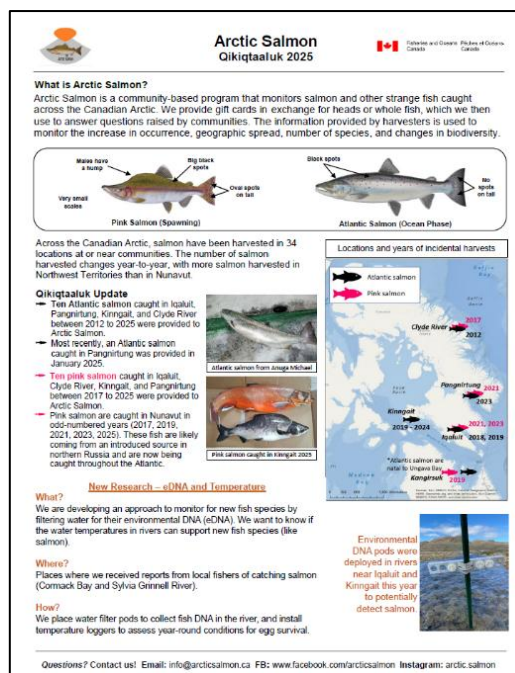


Figure 7. Region-wide newsletter from Baffin Island 2025.

Starting in 2025, newsletters were developed using RStudio (version 4.5.2) in R Markdown (Figure 8). The R Markdown structure made it easily reproducible for multiple communities. A community newsletter template was created, with the term “REPLACE” as a placeholder for the target community name. Using the search and replace function, the community name can be input into the code, and once it is run, the information on the plots is updated to include the data from that community. The plot descriptions can then be updated with the community-specific analyses. See the full-size community-specific newsletter in Appendix G. See the community-specific R script (Andrews 2026) on our Arctic Salmon Program GitHub: <https://github.com/ArcticSalmonProgram/Automated-Newsletter-Code>.

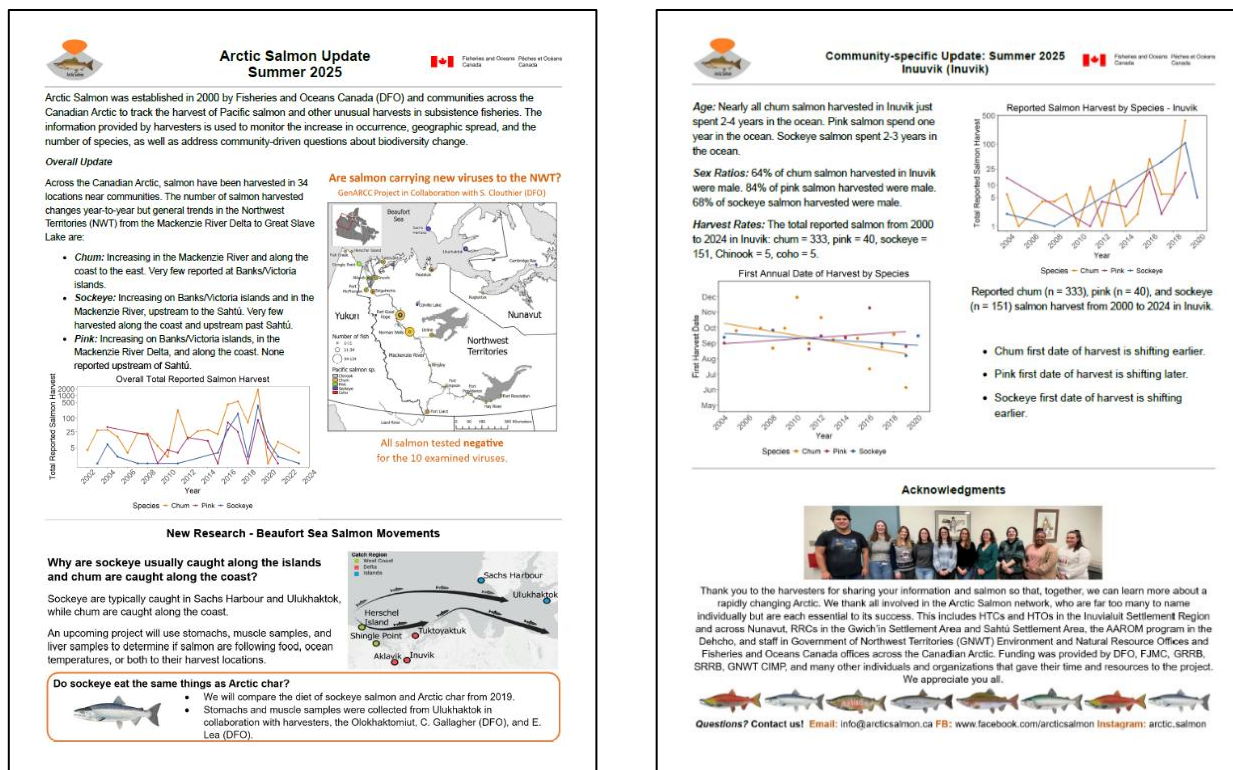


Figure 8. Example of a community-specific newsletter made for Inuvik, Northwest Territories.

Lab Sampling Procedures

Sampling

Sampling primarily takes place in the Fisheries and Oceans Canada lab at the Freshwater Institute (FWI), although it may occasionally take place in a community (see In Community Sampling). There are separate sampling protocols used for a whole salmon (Appendix H) and a salmon head (Appendix I). The same equipment is used for both types of sampling procedures (Appendix J). The whole salmon sampling process results in more samples than the head sampling process due to more tissue types being available.

Whole Salmon Sampling

The whole salmon sampling protocol is described in Appendix H. A whole salmon dissection involves the collection of tissues, pathogen samples, DNA, otoliths, and scale samples, as well as meristic counts and morphometric measurements. Appendix H explains each aspect of sampling, including the laboratory equipment list, sample preparation, a dissection materials checklist, a step-by-step explanation of how to collect each sample type, and what sample storage methods should be used once the dissection is complete. The post-sampling inventory list (Table H1) shows the type and quantity of samples collected, once the dissection is complete, the sample storage, such as the medium (resealable bag, vial, box, Whirl-Pak, envelope, booklet), and the location (-20 °C freezer, -80 °C freezer, room temperature, image database).

Salmon Head Sampling

See the head sampling protocol in Appendix I. Head sampling collects tissue, pathogen samples, DNA, and otoliths, as well as some meristic counts and morphology measurements. Appendix I explains each aspect of sampling, including the laboratory equipment list, sample preparation, a dissection materials checklist, a step-by-step explanation of how to collect each sample type, and what sample storage methods should be used once the dissection is complete. The post-sampling inventory list (Table I1) shows the type and quantity of samples collected once the dissection is complete, as well as the sample storage, such as the medium (Ziploc, vial, box, Whirl-Pak, envelope), and the location (-20 °C freezer, room temperature, image database).

Sample Storage

Salmon are stored frozen at -20 °C until they are processed. After the sampling is complete, all samples are placed in the appropriate vessel (Whirl-Pak, vial, or envelope) and then stored according to protocol (see the post-sampling checklist). The storage options range from the designated freezer (-20 °C and -80 °C), a freeze-dried container, or ethanol at room temperature.

Cardboard Storage Boxes

Large cardboard boxes (36" x 12" x 10") are used to store long-term samples. Each box is labelled with the program name "Arctic Salmon Samples", followed by the box identifier (Arctic Salmon-Year-Box letter), location(s), sample number range(s), and the sample type(s) (Figure 9). In high sample volume years, the boxes are labelled alphabetically from A to Z. (e.g., Box E is the fifth box in a series). In years with fewer samples, the box is labelled "ALL", to indicate that all samples from that year are contained within. If a box is partially full, years may be combined and labelled accordingly (e.g., "AS-2022-2023"). Labels are printed and taped on the narrow ends of the box on both sides so it can be identified regardless of its orientation on the shelf.

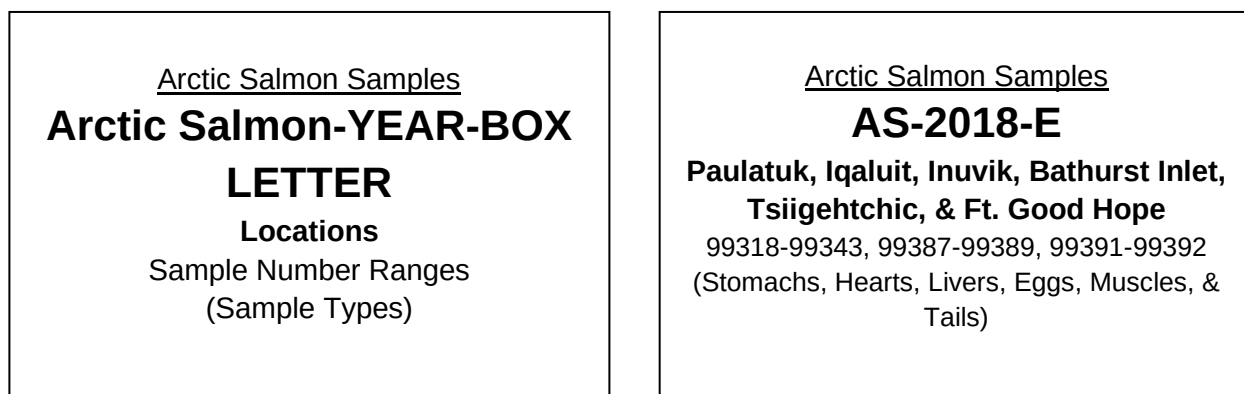


Figure 9. Freezer box label template and example.

Coloured Boxes

Cryogenic vials store kidney, liver, red muscle, and white muscle samples. These vials are stored in colour-coordinated boxes with inserts in the order they were sampled. Each box insert has space for 100 of either 1.5 mL or 2.0 mL tubes. Kidney samples are stored in the blue box,

liver samples are stored in the yellow box, red muscle samples are stored in the red box, and white muscle samples are stored in the white box (Figure 10). When the four boxes are filled with the same range of sample IDs (4 boxes x 100 vials = 400 vials from 100 fish), they are placed in a large storage box together (22.75" x 6.375" x 2.5"). The sample range is written on the exterior of the box using a permanent marker, and they are kept in the -80 °C freezer until analysis.



Figure 10. Coloured Boxes used to store the kidney, liver, red muscle, and white muscle samples.

DNA Vials

DNA vials are stored at room temperature in a clear microtube storage box (100 x 1.5 mL or 2.0 mL tubes, 5.5" x 5.5") until the sampling season has been completed. They are filled with 95% ethanol to preserve the samples, and are transferred to a designated box for all DNA samples in the -20 °C freezer. Although the DNA vials do not need to be frozen, this prevents evaporation of ethanol and the sample from drying out.

Otolith Envelopes

Otoliths are removed from the fish and are cleaned. They can be rinsed carefully with water or warmed with the heat from your hand to remove the frozen fluid around the otolith. After cleaning, both otoliths are placed carefully into an envelope. The envelope is labelled with the species ID number, location, date, and species.

Pathogen Samples

The pathogen samples are stored frozen by our collaborators at the Aquatic Animal Health Program, DFO Winnipeg, according to their protocols.

Photographs

All laboratory photographs are taken on a designated laboratory camera (Fujifilm FinePix XP140). For a salmon head dissection, one photograph is taken of the head. For a whole salmon dissection, seven photographs are taken in total, with one each of the head, tail, whole body, belly interior, gonads, cross-section, and parasites (if applicable). At the end of each dissection, the lab camera's pictures are uploaded to a hard drive where they are labelled. Each image is labelled with the salmon ID number followed by the type of photograph, for example #####-head. If there are multiple pictures of one sample type, they should be labelled with the number and then the sample type and the image number, for example #####-head-1 and #####-head-2. They are placed in a folder labelled with the species ID number. The folder is then placed in the folder of the year that the sample was caught (not the year it was processed, if that is different). This facilitates finding the samples at a later date. The storage location of the images is noted on the lab datasheet and in the electronic master database.

Fish ID

Fish ID numbers are assigned chronologically as samples are processed. This identification method facilitates sample organization following the sequence of ID numbers designated by the Arctic Salmon Program when it was first created. A fish ID card and a metal tag with numbers are prepared before the dissection begins. The fish ID is how the samples are tracked in the lab data sheets and the database. The sample ID number and metal tags are kept in the office until the dissection, and assigned as fish come in to avoid duplication of ID numbers.

Salmon are occasionally recorded in the database when only a photo is provided. These instances are limited to areas where salmon catches are rare (i.e., eastern Canadian Arctic), when the species can be definitively identified using the photo, when the salmon is no longer available for sampling, and when the date and location of harvest are known. For these salmon, the Fish ID is assigned P#, with the number being sequential from the previous salmon recorded using only a photo. Metal Fish ID tags are not used. All available information is entered in the database.

Measurements

Length measurements in the lab are taken with a fish board, ruler, calipers, and a soft measuring tape, depending on the particular aspect of the fish being measured (i.e., whole fish length = measuring board, calipers = gill arch length). Measurements are taken in millimeters (mm). Weight measurements in the lab are taken with a scale and are recorded in grams (g).

Labels

Labels can be created in advance of laboratory sampling using the templates in Appendix K and Appendix L. Each label should correspond to the next sequential set of fish ID numbers. Two types of templates used are labels for cryovials and Whirl-Pak bags.

Whirl-Pak Labels

The Whirl-Pak labels include the archive muscle, muscle for contaminants, stable isotope muscle, head muscle, liver, heart, tail, and stomach. The labels should be printed on waterproof sticker paper. The paper can be purchased from Diversified Biotech, as an example. The labels are printed in 1.75" x 1.25" rectangles with 32 per sheet. See the full label template in *Appendix K*.

Salmon ID: 104100 Date: ____/____/____ Location: _____ Species: _____ Heart	Salmon ID: 104100 Date: ____/____/____ Location: _____ Species: _____ Liver	Salmon ID: 104100 Date: ____/____/____ Location: _____ Species: _____ Stomach	Salmon ID: 104100 Date: ____/____/____ Location: _____ Species: _____ Tail
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Figure 11. Whirl-Pak label template used to label the heart, liver, stomach, and tail sample bags.

Vial Labels

The vial labels are used for red muscle, white muscle, liver, kidney, kidney pathogens, brain, and DNA samples. The labels should be printed on waterproof sticker paper. The labels are pre-cut, peel-off labels sized to fit microcentrifuge tubes and other small containers. The labels are printed in 1.25" x 0.50" rectangles with 85 per sheet. See the full label template in *Appendix L*.

Arctic Salmon – Red Muscle	Arctic Salmon – White Muscle	Arctic Salmon – Liver	Arctic Salmon – Kidney	Arctic Salmon – DNA
Date: _____	Date: _____	Date: _____	Date: _____	Date: _____
Location: _____	Location: _____	Location: _____	Location: _____	Location: _____
Sample ID: 104100	Sample ID: 104100	Sample ID: 104100	Sample ID: 104100	Sample ID: 104100

Figure 12. Vial label template used to label the red muscle, white muscle, liver, kidney, and DNA.

Resealable Bag Labels

Resealable bags that include the labelled samples can be labelled on the outside using a permanent marker. The fish ID, Date of Capture, Location, and Species should be clearly written on the exterior. The resealable bag sizes are either small (6.5 cm x 14.9 cm) or large (26.8 cm x 27.3 cm).

Datasheets

Laboratory datasheets collect information from salmon dissections. They are formatted to easily follow the dissection protocol and record information in a time-efficient manner. Depending on the season and the quantity of fish being dissected, a five-page spreadsheet (Appendix P), which includes the space to record the information for as many as 15 fish, or a one-page one-fish datasheet is available (Appendix Q). This datasheet is then entered into an electronic database. The column headers, which describe the data we gather, are at the top of the spreadsheets in the appendices. For head sampling, as there are multiple head dissections conducted at once, there is not a single page salmon head dissection sheet (Appendix S). Once completed, this datasheet is entered into an electronic database.

Data Organization

Database

The Arctic Salmon Master Database contains data for the program, including all dissection data, SIA, HBI, and image data. It is updated regularly. The column names and purposes are summarized in the Metadata sheet. The Metadata sheet complements the database, as it provides clarification on any questions that researchers, students, and collaborators may have about the content in the database. The column letters, column name in the database, data description, and units for the column are listed. See a full version of the Metadata Sheet in Appendix T.

Lab Sheet Data Entry

After the lab datasheet is completed, the data are entered into a secondary database titled “Recent_ArcticSalmon_Samples.xlsx”. The laboratory datasheet is compared to the entered data and is QA/QC for completeness by a secondary person to verify the information is accurate before being inserted into the Arctic Salmon Master Database, “Arctic_Salmon_Master_date_Year.csv”. The physical lab datasheet is then kept in storage in case information must be verified at a later date.

Adding Data to the Database

An R script was developed using RStudio (version 4.5.2) to simplify adding new data to the existing Master Database. The R script allows numerous columns of data from a CSV file to be entered into the master database at once. The R code also includes transforming blank cells to

N/As to facilitate data handling, and an example of a calculation (GSI and HSI) that is automatically done when entering new data. Once the data is successfully added, the database is verified for Quality Assurance and Quality Control. This QA/QC is completed by manually verifying each data addition from the new data sheet with the “Arctic_Salmon_Master_date_year.csv”. The file is then renamed with the date the changes occurred. See the adding data to the master database R script (Andrews and Friesen 2026) on our Arctic Salmon Program GitHub: <https://github.com/ArcticSalmonProgram/Adding-Data-to-the-Master-Database>).

Tracking Database Changes

When making changes to the master database, it is important to record all the changes and the dates that the changes were made. Adding or deleting data from the database without noting down the modification can lead to inconsistencies within the database, especially when multiple team members are modifying the database within the same timeframe. To monitor the data addition and modification of the master database, a Database Tracker was created. This Database Change Tracker Excel sheet serves as a reference point for future troubleshooting if issues arise. The Database Change Tracker has the following columns: modification, Completed, Date, Comments. Modification explains what changes should be or were made, Completed is a Yes or No box used to track what has been or what still needs to be completed, Date is the date the modification is made, and Comments can include any information worth noting. The database is saved as a new version after each modification is made, with a new date listed in the title, for example, “Arctic_Salmon_Master_Dec23_2025.csv”. If any issue is noted, then the Database Change Tracker can be used to assess where the issue originated.

Acknowledgements

We first want to acknowledge and extend our sincere appreciation to the harvesters for sharing information and contributing salmon to the program. Without their efforts, knowledge, and generosity, the Arctic Salmon program would not exist. We also thank all collaborators who caught salmon in other fishing efforts or research programs and shared information and samples with the Arctic Salmon program. Thank you to all the partner organizations in communities across the Northwest Territories and Nunavut (HTOs, HTAs, HTC's, RRCs, DFO offices, and local ENR offices) and co-management boards across the Canadian Arctic, including, but not limited to, the Fisheries Joint Management Committee (FJMC), the Gwich'in Renewable Resources Board (GRRB), and the ʔehdzo Got'ıne Gots'ę Nákedı (Sahtú Renewable Resources Board, SRRB) that contribute funding, guidance, and support for this program. We also thank our many academic and government collaborators, both within Canada and internationally, for their assistance and collaboration on the Arctic Salmon program. Thanks to our colleagues and collaborators who reviewed versions of this manual and/or protocols and provided excellent suggestions for improvements. This program has been financially supported, both directly and indirectly, by multiple organizations, including Fisheries and Oceans Canada, FJMC, GRRB, SRRB, the Government of Northwest Territories (GNWT) Cumulative Impacts Monitoring Program (CIMP 142), GNWT Environment and Natural Resources, the University of Manitoba, Aboriginal Aquatic Resource and Oceans Management Program (AAROM), among others. We want to highlight the generosity of those contributions. The Arctic Salmon program is the product of an entire network of people working together to address rapid biodiversity change across the Canadian Arctic. We thank you all.

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Appendices: Supporting Documents

Appendix A: Example of Community Letter addressed to the Déljine RRC

August 23, 2023

To the Déljine RRC,

We are preparing for another year of “unusual fish” collections with the Arctic Salmon project. We understand a salmon was recently caught at Shingle Point, and there were a couple more harvested in Sachs Harbour. It seems that the salmon are finally arriving for 2023.

Similar to all other years, participation in Arctic Salmon this year remains the decision of each individual RRC and each harvester. **Please let us know if you support the Arctic Salmon project continuing in your community this year.** If an RRC chooses not to participate, we will develop outreach so that harvesters in that community are aware that salmon will not be accepted in that community. If there is support for the Arctic Salmon project, please let us know if you are in need of any posters or supplies. This year, we will accept **15 whole CHUM SALMON and up to 10 whole salmon of other species (pink, sockeye, Chinook combined).** As usual, we accept **unlimited heads.**

We do not anticipate many salmon this year as they are late arriving. However, if many salmon appear and you are in need of assistance with coordinating salmon collections, we would be happy to discuss options to support salmon collections and sampling.

We are fully aware that the participation of harvesters is essential to monitoring salmon in the Arctic. We hope that harvesters will continue to report their observations of salmon and “unusual fish” throughout the Sahtú.

We sincerely appreciate your assistance and hope for your ongoing participation in the Arctic Salmon project.

Kind Regards,

The Arctic Salmon Team

Laurissa.Christie@dfo-mpo.gc.ca and Karen.Dunmall@dfo-mpo.gc.ca

Appendix B: Arctic Salmon Program Sample Submission Letter

2019

Hello!

Thank you for your help with the Arctic Salmon research project. Through a community-based monitoring effort, we are keeping track of salmon harvests, including places where they are harvested, the numbers being harvested, and the kinds of salmon appearing. The salmon are indicating changes that are occurring in the Arctic, and with your help we can figure out how salmon (and other animals) are getting to the Arctic, where they are coming from, and what this might mean for the fish that are already in the Arctic.

If a salmon is brought in, please:

- 1) Fill out data card using pencil
- 2) Put the data card in the bag with the salmon
- 3) Put salmon in bag
- 4) Tie or staple bag closed
- 5) Freeze salmon
- 6) Give harvester the reward: **\$25 gift card for a salmon head**
- 7) Call or email to arrange transport to Winnipeg (paid by DFO).

Please let us know if you need gift cards, data cards, or anything else!

Please let us know if you receive a salmon! Give us a call, send an email or post on the project Facebook page. www.facebook.com/arcticsalmon

Please call with any questions. Thanks again!

Karen Dunmall and Darcy McNicholl
204-984-2522 or 204-983-5287
www.facebook.com/arcticsalmon
Karen.Dunmall@dfo-mpo.gc.ca
Darcy.McNicholl@dfo-mpo.gc.ca



FOR 2019: We will accept unlimited salmon heads

Appendix C: Harvester Card

What kind of salmon? (circle one)

Chum / Pink / Coho / Chinook / Sockeye / Atlantic / unknown

Date Caught (dd/mm/yyyy): _____

Location Caught (be specific): _____

Nearest Community: _____

Gillnet mesh size: _____

How many hours was the net set? _____

If you squeeze gently, does eggs/milt come out? Y or N

How many other fish (all species) were also in the net? _____

(please turn over)

Have you caught salmon before? Y or N

How many salmon do you catch / season? _____

Has that increased, decreased or remained the same over time?

Have you seen salmon spawning? _____

Where? _____

Name & address: _____

Email or phone: _____

Would you like more information about this project? Y or N

Gift card received? Y or N

(please turn over)

Appendix D: Community Sample Tracking Form

Office: _____

Arctic Salmon Sample Tracking Form

Year: _____

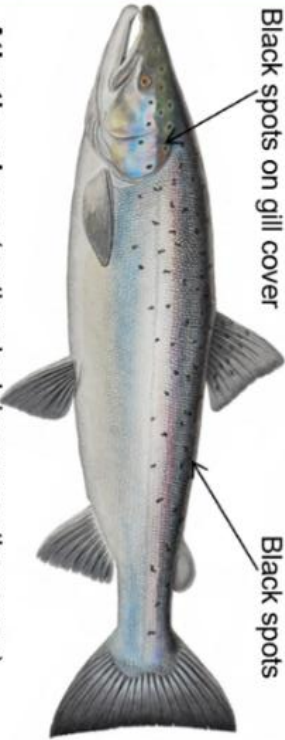
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Arctic Salmon



Caught a **SALMON**? Get a **REWARD**!



Black spots on gill cover

Black spots

Atlantic salmon (as they look in or near the ocean)

changes to



Black spots

Pink salmon (as they look in or near the ocean)

changes to



Bottom lip curls upward

Black spots

Atlantic salmon (getting ready to spawn)

changes to



Upper lip curls over lower lip

Males develop hump

Pink salmon (getting ready to spawn)

Cut here

If you want to turn in the tail, we only need enough of the fin to see the spots (you don't have to turn in any meat)

\$100 Northern Store gift card per whole frozen salmon OR

\$25 Northern Store gift card per frozen salmon head or tail

FREEZE the salmon and contact your local HTO/HTA office, DFO or the project (431-277-3221) for reward information. If you prefer to eat the fish, but would still like to participate, share a photo of your catch and the date you caught it on Facebook.com/arcticsalmon!



Follow the research progress on Facebook

www.facebook.com/arcticsalmon

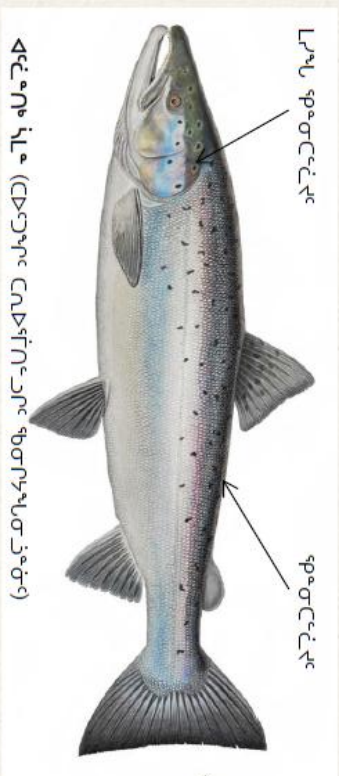
For more information, please visit:

www.arcticsalmon.ca

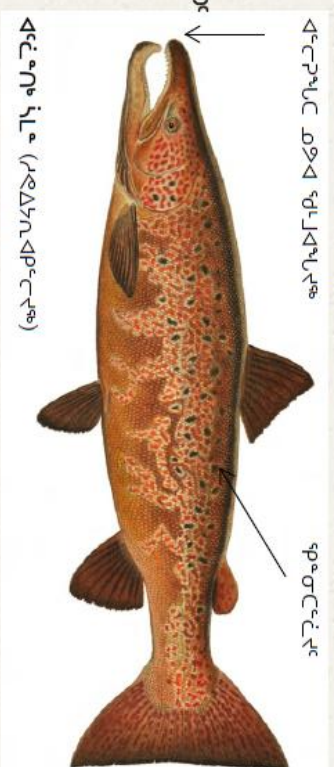


$\Delta\rho_{\text{C}}^{\text{fb}} \Delta\rho_{\text{T}}^{\text{fb}}$

$\Delta^{\epsilon} b \rightarrow \sigma - \bar{q} b p_c$? $\Lambda^+ \rightarrow p \pi^- \rho^0$ $a_{\bar{q} b p_c}$



(3) $\text{C}_2\text{H}_5\text{COCH}_3 + \text{H}_2\text{O} \rightleftharpoons \text{C}_2\text{H}_5\text{C(OH)}_2\text{CH}_3$


$$\Delta C_p^{\circ} = \Delta C_p^{\circ}(\text{cal}) - \Delta C_p^{\circ}(\text{cal})$$


(b) (5) DPP, (b) (7)(C), (b) (7)(D)


$$\Delta \Delta < \gamma \gamma \text{ } ^{\circ} \text{ } _{\circ} \text{ } i L^{\circ} \text{ } (\gamma \Delta \gamma n \Delta p^c c - \gamma s_0)$$

\$500,000

[illegible]

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Facebook-dnJc

PAULY¹ NSERC, CIMP,
DFO, U of Manitoba, SRRB, GLWB

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www.facebook.com/arcticsalmon

www.arcticsalmon.ca

Appendix F: Example of Region-Wide Newsletter: English and Inuktitut



Arctic Salmon

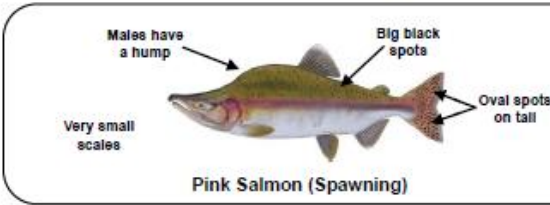
Qikiqtaaluk 2025



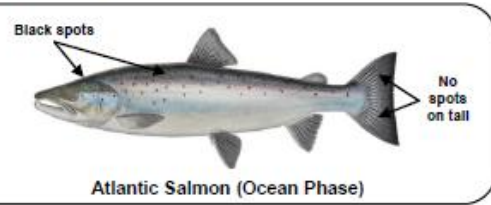
Fisheries and Oceans Canada / Pêches et Océans Canada

What is Arctic Salmon?

Arctic Salmon is a community-based program that monitors salmon and other strange fish caught across the Canadian Arctic. We provide gift cards in exchange for heads or whole fish, which we then use to answer questions raised by communities. The information provided by harvesters is used to monitor the increase in occurrence, geographic spread, number of species, and changes in biodiversity.



Pink Salmon (Spawning)



Atlantic Salmon (Ocean Phase)

Across the Canadian Arctic, salmon have been harvested in 34 locations at or near communities. The number of salmon harvested changes year-to-year, with more salmon harvested in Northwest Territories than in Nunavut.

Qikiqtaaluk Update

- Ten Atlantic salmon caught in Iqaluit, Pangnirtung, Kinngait, and Clyde River between 2012 to 2025 were provided to Arctic Salmon.
- Most recently, an Atlantic salmon caught in Pangnirtung was provided in January 2025.
- Ten pink salmon caught in Iqaluit, Clyde River, Kinngait, and Pangnirtung between 2017 to 2025 were provided to Arctic Salmon.
- Pink salmon are caught in Nunavut in odd-numbered years (2017, 2019, 2021, 2023, 2025). These fish are likely coming from an introduced source in northern Russia and are now being caught throughout the Atlantic.

Locations and years of incidental harvests



Atlantic salmon
Pink salmon

Clyde River 2012, 2017
Pangnirtung 2021, 2023
Kinngait 2019 - 2024
Iqaluit 2018, 2019
Kangirsuk 2019

*Atlantic salmon are natal to Ungava Bay



Atlantic salmon from Anuga Michael



Pink salmon caught in Kinngait 2025

New Research – eDNA and Temperature

What?
 We are developing an approach to monitor for new fish species by filtering water for their environmental DNA (eDNA). We want to know if the water temperatures in rivers can support new fish species (like salmon).

Where?
 Places where we received reports from local fishers of catching salmon (Cornack Bay and Sylvia Grinnell River).

How?
 We place water filter pods to collect fish DNA in the river, and install temperature loggers to assess year-round conditions for egg survival.



Environmental DNA pods were deployed in rivers near Iqaluit and Kinngait this year to potentially detect salmon.

Questions? Contact us! Email: info@arcticsalmon.ca FB: www.facebook.com/arcticsalmon Instagram: [arctic.salmon](https://www.instagram.com/arctic.salmon)



Arctic Salmon Update Summer 2025



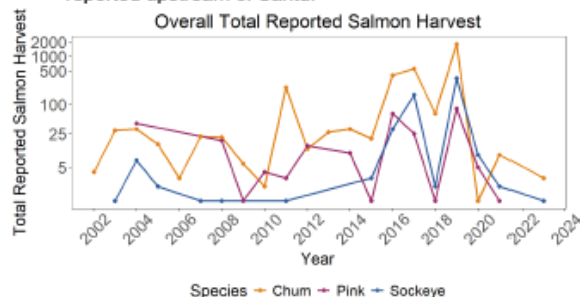
Fisheries and Oceans Canada
Pêches et Océans Canada

Arctic Salmon was established in 2000 by Fisheries and Oceans Canada (DFO) and communities across the Canadian Arctic to track the harvest of Pacific salmon and other unusual harvests in subsistence fisheries. The information provided by harvesters is used to monitor the increase in occurrence, geographic spread, and the number of species, as well as address community-driven questions about biodiversity change.

Overall Update

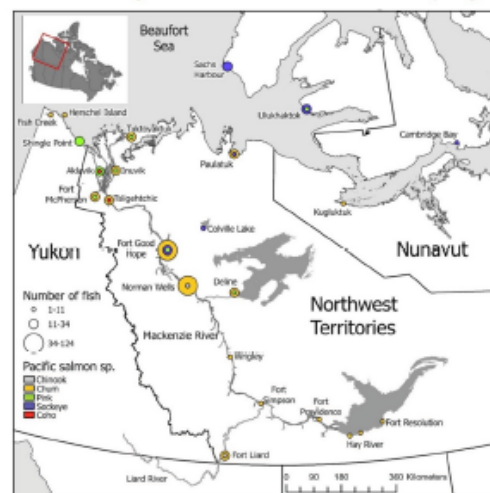
Across the Canadian Arctic, salmon have been harvested in 34 locations near communities. The number of salmon harvested changes year-to-year but general trends in the Northwest Territories (NWT) from the Mackenzie River Delta to Great Slave Lake are:

- **Chum:** Increasing in the Mackenzie River and along the coast to the east. Very few reported at Banks/Victoria islands.
- **Sockeye:** Increasing on Banks/Victoria islands and in the Mackenzie River, upstream to the Sahtú. Very few harvested along the coast and upstream past Sahtú.
- **Pink:** Increasing on Banks/Victoria islands, in the Mackenzie River Delta, and along the coast. None reported upstream of Sahtú.



Are salmon carrying new viruses to the NWT?

GenARCC Project in Collaboration with S. Clouthier (DFO)



All salmon tested **negative** for the 10 examined viruses.

New Research - Beaufort Sea Salmon Movements

Why are sockeye usually caught along the islands and chum are caught along the coast?

Sockeye are typically caught in Sachs Harbour and Ulukhaktok, while chum are caught along the coast.

An upcoming project will use stomachs, muscle samples, and liver samples to determine if salmon are following food, ocean temperatures, or both to their harvest locations.



Do sockeye eat the same things as Arctic char?



- We will compare the diet of sockeye salmon and Arctic char from 2019.
- Stomachs and muscle samples were collected from Ulukhaktok in collaboration with harvesters, the Olokhaktomiut, C. Gallagher (DFO), and E. Lea (DFO).



Community-specific Update: Summer 2025 Inuvik (Inuvik)

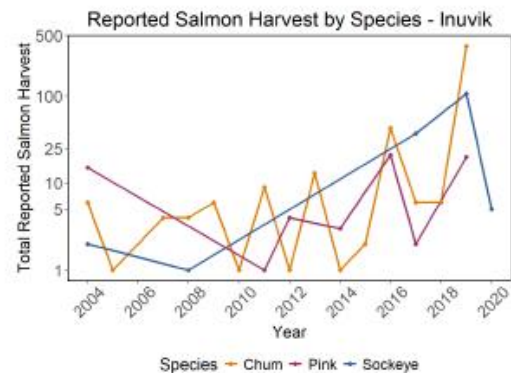


Fisheries and Oceans / Pêches et Océans
Canada

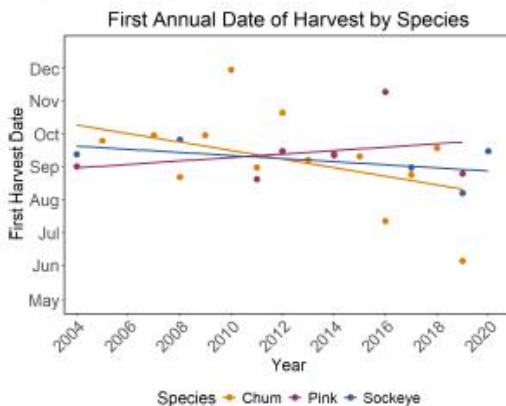
Age: Nearly all chum salmon harvested in Inuvik just spent 2-4 years in the ocean. Pink salmon spend one year in the ocean. Sockeye salmon spent 2-3 years in the ocean.

Sex Ratios: 64% of chum salmon harvested in Inuvik were male. 84% of pink salmon harvested were male. 68% of sockeye salmon harvested were male.

Harvest Rates: The total reported salmon from 2000 to 2024 in Inuvik: chum = 333, pink = 40, sockeye = 151, Chinook = 5, coho = 5.



Reported chum (n = 333), pink (n = 40), and sockeye (n = 151) salmon harvest from 2000 to 2024 in Inuvik.



- Chum first date of harvest is shifting earlier.
- Pink first date of harvest is shifting later.
- Sockeye first date of harvest is shifting earlier.

Acknowledgments



Thank you to the harvesters for sharing your information and salmon so that, together, we can learn more about a rapidly changing Arctic. We thank all involved in the Arctic Salmon network, who are far too many to name individually but are each essential to its success. This includes HTC and HTOs in the Inuvialuit Settlement Region and across Nunavut, RRCs in the Gwich'in Settlement Area and Sahtú Settlement Area, the AAROM program in the Dehcho, and staff in Government of Northwest Territories (GNWT) Environment and Natural Resource Offices and Fisheries and Oceans Canada offices across the Canadian Arctic. Funding was provided by DFO, FJMC, GRRB, SRRB, GNWT CIMP, and many other individuals and organizations that gave their time and resources to the project.

We appreciate you all.



Questions? Contact us! Email: info@arcticsalmon.ca FB: www.facebook.com/arcticsalmon Instagram: [arctic.salmon](https://www.instagram.com/arctic.salmon)

Appendix H: Whole Salmon Sampling Protocol

Laboratory Equipment List

Safety Equipment Safety glasses Gloves Lab coat MSDS sheets for chemicals First aid kit	Specific Sampling Materials Harvester card Waterproof labels Datasheets Aluminum ID tag Fish ID number card Scale book Otolith envelope 2 95% ethanol-filled vials 4 cryovials 6 small (4oz) Whirl-Paks 3 large (18oz) Whirl-Paks 1 small Ziploc 1 large Ziploc
General Equipment Pencils and permanent markers Ziploc bags Camera Cutting board Knife Knife sharpener Forceps Scale Scalpel Fish measuring board Calipers Hole punch 70% ethanol Delicate task wipers	Pathogen Sampling Materials 1 cryovial 1 RNA vial 1 small Whirl-Pak

Preparing for Sampling

An approximate amount of time to dissect a whole fish is 1.5 hours, excluding the time to defrost the fish.

All surfaces and utensils should be clean and sterilized before beginning the sampling process and between each fish. Use a spray bottle containing 70% ethanol to clean the sampling area and dry the utensils with Kimwipes between tissue collections.

Thaw the salmon by removing it from the freezer and placing it in room-temperature water. It takes ~1.5 hours to thaw a whole salmon sufficiently for sampling using this method. It is essential that the salmon is not thawed too far in advance or becomes too warm before sampling, as this affects the quality of the samples and can make the sampling process more difficult. A cold but pliable salmon is ideal.

Prepare all the labels and record the data (Fish ID, Date of Capture, Location, Species) on the datasheets. Ensure all supplies are clean and available. Put the labels on the appropriate vials and Whirl-Paks.

Sampling Materials Checklist

Ensure you have the following materials labelled and accessible. The information in the brackets provides sample details.

Salmon ID Number

- ☐ Fish ID Number Card x 1 (Needed for pictures)
- ☐ Aluminum Tag x 1 (Attach to tail)
- ☐ Otolith Envelope x 1 (2 Otoliths)

Link to Datasheet by Writing Number

- ☐ Scale Card x 1 (10 scales)
- ☐ Pathogen Whirl-Pak (Spleen, Gill Arch, Kidney)
- ☐ Pathogen 2m vial x 2 (Kidney, Brain)

Sample Organization Bags

- ☐ Large Ziploc Bag (-20°C)
- ☐ Small Ziploc Bag (-80°C)

Add Premade Labels

- ☐ 2ml Ethanol Vials x 1 (DNA)
- ☐ 2ml Cryovials x 4 (Liver, Kidney, White Muscle, Red Muscle)
- ☐ 4oz Whirl-Pak x 1 (Pathogen Bag: Kidney, Spleen, Gill Arch)
- ☐ 4oz Whirl-Pak x 6 (Archive Muscle, Stable Isotope Muscle, Liver, Heart, Muscle for Contaminants, Head Muscle SIA)
- ☐ 18oz Whirl-Paks x 2 (Tail, Stomach)
- ☐ 180z Unlabeled Whirl-Pak x 1 (if the salmon is female, the eggs are collected)

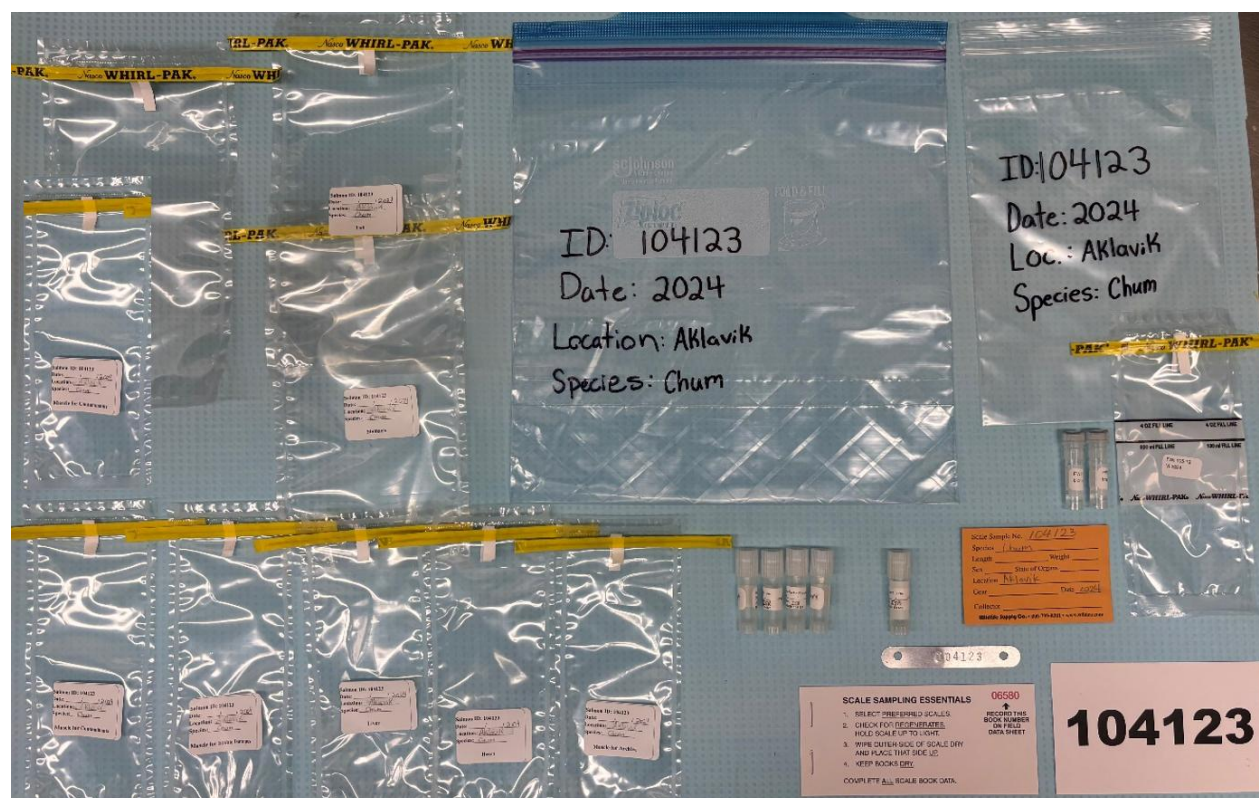


Figure H1. The sample collection materials are prepared in advance of sampling. Including bags, labels, fish ID number, vials, scale booklet, and an otolith envelope.

Sampling Protocol

This dissection method works best with two samplers, one dissecting the fish and one recording the data. Begin processing the fish after all your labels are prepared, and the correct data (fish ID, Date of Capture, Location, Species) is recorded on the datasheets and labels.

1. Fish ID

Assign a unique ID number to the fish, and confirm that it has not been used before on the master data file. Numbers are generally given in the order that samples are processed and are typically done one community at a time (all fish from a received cooler will be processed together), but not necessarily according to the date that the sample was received. Write the fish ID on the otolith envelope and the data sheet.

2. Determine the Species and External Colour

Reference the Salmon Species Quick ID Guide (see Appendix M), or for more in-depth explanations, reference the “Guide to Identifying Salmon and Char in the Arctic” booklet. The salmon received are typically caught as they enter freshwater systems and are often in the spawning phase of their lifecycle; however, they can also be in the transitioning or silver phase.

- a) Determine if the salmon is in the silver, transitioning, or spawning phase based on the appearance. Note the external colour on the datasheet.
 - A spawning salmon will have a greenish or reddish colour with a developed kype (upper jaw/snout).
 - A silver salmon will have a shiny silver hue and small teeth, and an undeveloped kype.
 - A transitioning salmon will have both silver and spawning characteristics.
- b) Examine the characteristics of the sample salmon and compare it to the salmon in the Salmon Species Quick ID Guide or the Identification booklet.
- c) Chum and sockeye salmon can be difficult to differentiate when they are in the silver phase. Count the gill rakers to determine the species. Chum will have 13-15 lower gill rakers. Sockeye will have 15-20 lower gill rakers.
- d) Note the species on the datasheet.

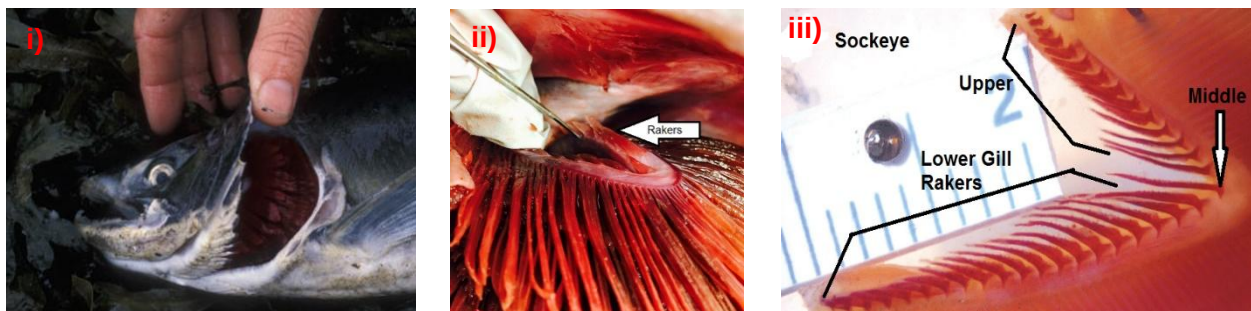


Figure 13. i) Displays how to pull back the gill cover to access the gill rakers. ii) A dental explorer probe is used to count individual gill rakers. iii) Demonstrates the upper gill rakers, lower gill rakers, and middle gill raker of a sockeye salmon (Shedd et al. 2015).

3. Markings or Abnormalities

Examine the sample and note any external markings or scars (i.e., lamprey marks) on the datasheet.

4. Harvester Cards

Each fish arrives with a harvester card included in the fish bag.

- a) Record the date of capture, location, species, fisher information, and any other details from the harvester card onto the laboratory data sheet.
- b) Write the assigned fish ID number on the harvester card. If there is a single card for multiple fish, write the fish ID range in the top-right corner (ex.103000-103001).
- c) Place the harvester card in the designated container to be stored until processing is complete.

102836

What kind of salmon? (circle one)

Chum / Pink / Coho / Chinook / Sockeye / Atlantic / unknown

Date Caught (dd/mm/yyyy): 12/08/2020

Location Caught (be specific): Peel River

Nearest Community: Fort McPherson

Gillnet mesh size: N/A

How many hours was the net set? N/A

If you squeeze gently, does eggs/milt come out? Y or N

How many other fish (all species) were also in the net? _____

(please turn over)

Figure H3. A completed harvester card.

5. Verify Salmon Sample ID

Fill in any remaining information on the labels. Verify that all the following labels/materials match the fish ID number.

- Envelope
- Metal tag
- Harvester card
- Back of scale card
- Whirl-Paks
- Vials
- Ziplocs

6. Weight

Weigh the fish by placing it on the scale (Denver Instrument, model P-403). Record the weight on the datasheet.

7. Take Photos

Each fish has an assigned ID number and an associated ID number card with the numbers written in a large bold font. Include the fish ID number card in all photographs and discard it at the end of sampling.

- a) Place the fish flat on the measuring board, oriented with the head facing to the left (head on the left, tail on the right).
- b) Gently straighten the body if possible to avoid curvature.
- c) Position the camera directly over the fish, not at an angle, to avoid distortion.

- d) Take three digital photographs of the whole fish, the head, and the tail on the measuring board.
- e) Ensure the fish ID number card is clearly visible in each image, as seen in Figure 17. Confirm that the measurement scale on the board is legible in all the images.

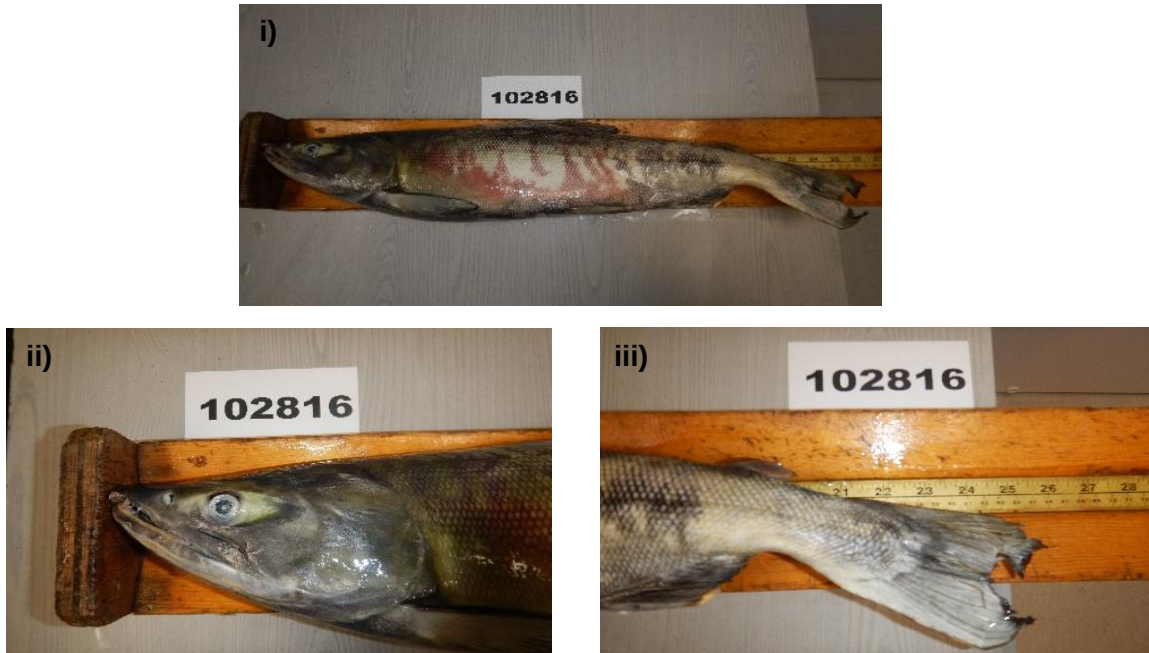


Figure H4. Examples of the images taken before beginning a dissection. Each image includes the fish ID card. i) Whole fish ii) Head iii) Tail.

8. Parasites

- a) Examine the fish for external parasites (i.e. sea lice, flukes, etc.).
- b) Take a picture if parasites are present, ensuring the fish ID number is visible in the image.
- c) Preserve the parasite in an ethanol vial with the fish ID number clearly marked.
- d) Store the vials at room temperature until processing is complete and they are ready for archiving.



Figure H5. Example of a parasite photo of sea lice with a fish ID card.

9. Complete Morphometric Measurements

Take the morphometrics measurements with the fish oriented with the head facing to the left (head on the left, tail on the right). The measurements should be taken with the fish board ruler, following the flat board, not the curve of the fish. For more minuscule measurements, use calipers. A piece of yellow flagging tape can be placed on the fish vertically to facilitate measurements between specific points. The flagging tape will act as a hard line to measure from.

- Place the fish on the measuring board.
- Take all measurements, following the Whole Salmon Morphology Measurement Guide (Appendix N) and the lab datasheet (Appendix P).

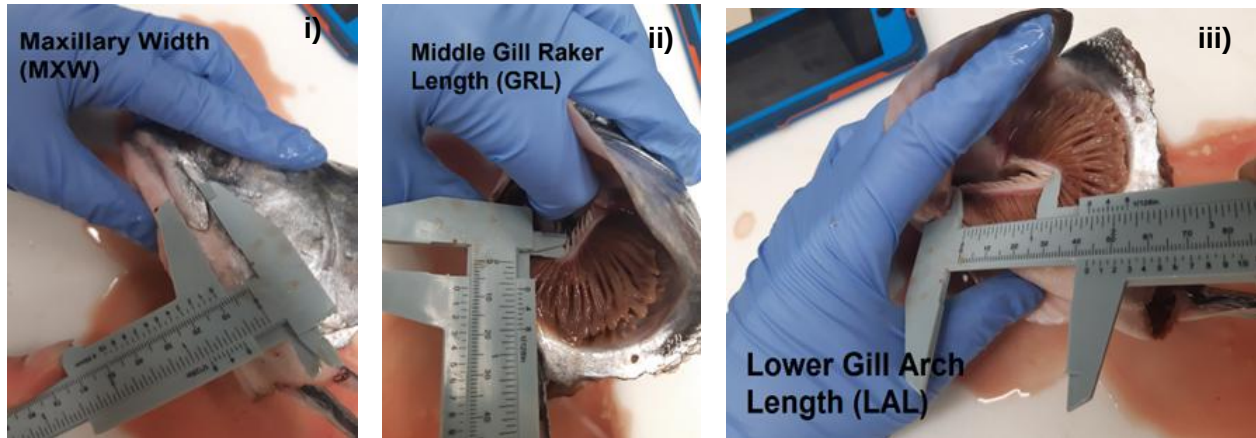


Figure 14. i) Calipers are used to measure the maxillary width. ii) Calipers are used to measure the middle gill raker length. iii) Calipers are used to measure the lower gill arch length.

18. Complete Meristic Measurements

Meristic counts can be taken with assistance from a dental explorer probe, which helps track placement while counting parts.

- Count the gill rakers following the diagram pictured below.

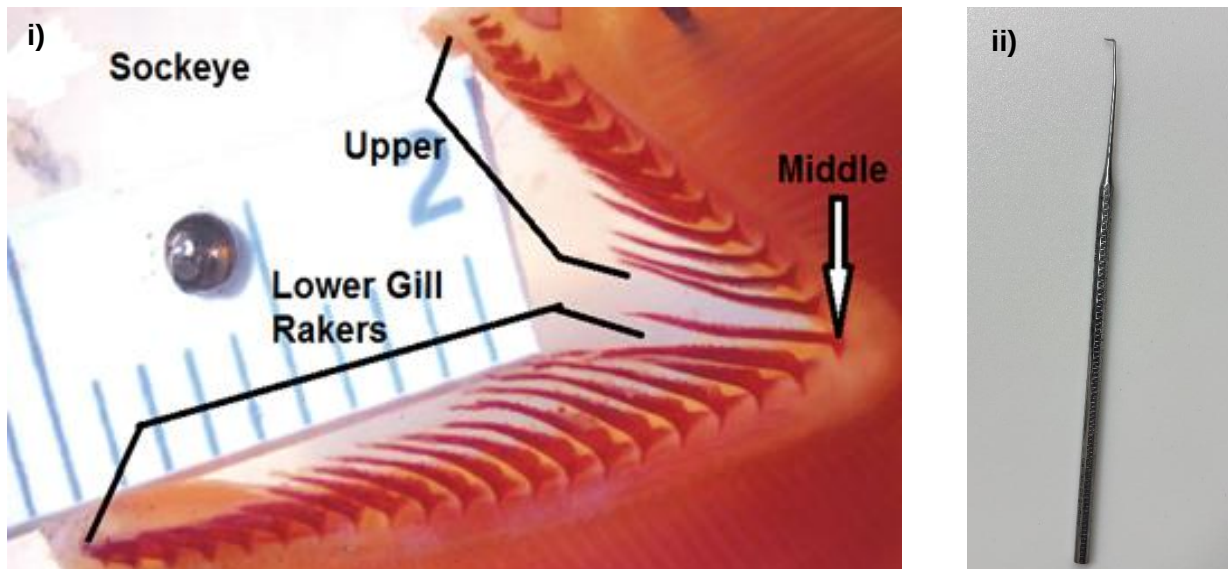


Figure H7. i) Diagram of a sockeye's upper gill raker, lower gill raker, and middle gill raker (Shedd et al. 2015). ii) Dental probe explorer used to facilitate small part counting.

19. Scales

Collect a total of 10 scales from the fish. The scale cards have one row per fish.

- a) Ensure the left side of the fish is accessible.
- b) Remove five scales from the preferred area (region just above the lateral line, behind the dorsal fin) on the left side of the fish. Place them on the scale card with the same side facing upwards, as they were on the fish. If the scales are not sticking to the scale card, mucus from the fish's exterior can be used as a form of glue.
- c) Ensure each scale is fully formed (not a half-grown scale).
- d) Turn the fish so the right side is accessible.
- e) Repeat the same removal procedure on the right side of the fish.
- f) Record the scale card ID on the sampling datasheet.
- g) Keep different species scales in separate books (i.e. only Chum in a book, or only Sockeye in a book). On the back of the scale book write:
 1. Sample ID number
 2. Species
 3. Row (e.g., 1-10)
 4. Location
- h) Store completed scale books on the lab bench until sampling is complete, and the books are ready to be sent for ageing.

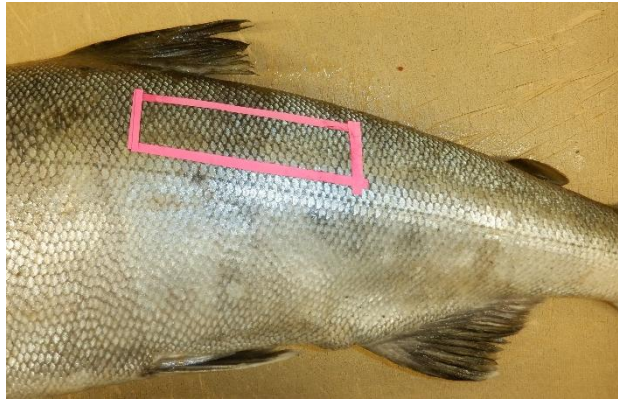


Figure H8. The pink box visualizes the preferred area for scale sampling. The same region is ideal on the right side of the fish.

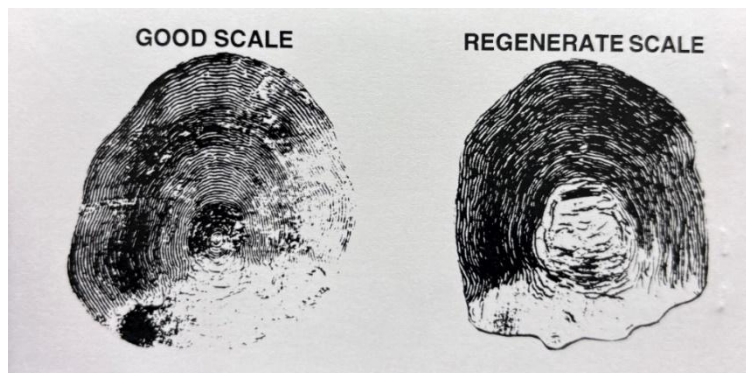


Figure H9. A non-regenerated (left) and regenerated (right) scale. Scales which haven't been regenerated are ideal for fish aging (Nanaimo Aging Lab, DFO).

20. DNA

Collect DNA subsamples using sterilized dissection instruments.

- a) Disinfect the hole punch using 70% ethanol.
- b) Take four punches of operculum tissue to constitute one subsample.
- c) Place each sample (four punches) in a labelled cryovial filled with 95% ethanol.
- d) Store the cryovials in the designated sample box on the lab bench until the end of the processing season.
- e) Verify the vial numbers are in the correct order in the designated sample box.

Decontaminate the hole punch between each fish to prevent cross-contamination. If the hole punch sample becomes contaminated by touching another surface, it should be discarded, and a new operculum punch should be collected to ensure sample integrity.

21. Begin the dissection

- a) Cut the fish open along the belly. Begin the incision at the anus and cut until the throat just past the pectoral fin.
- b) Take a photo of the belly interior with the fish ID number card visible.
- c) Determine the sex by examining the reproductive organs. Males have testes, which are white or pink-coloured paired organs. Females have ovaries, which are granular paired organs. See Appendix O for detailed sexual organ explanations.
- d) Use the Maturity State Code Guide (see Appendix O) to determine the maturity state. The use of standardized codes guarantees consistency across samples and species. Maturity codes are assigned to fish based on the stage of gonadal development and reproductive condition.

Note that no Pacific salmon will be immature or resting. These fish are caught as they enter freshwater systems, therefore they are mature, ripe, or potentially spent. Atlantic salmon may be found in a resting state depending on their date of capture.



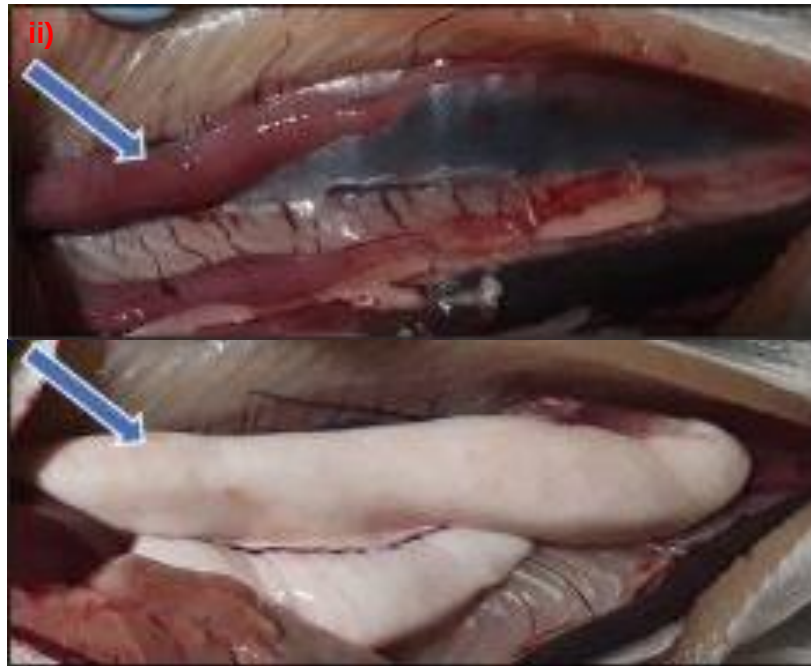


Figure H10. i) An ideal picture of a salmon belly interior with the fish ID card visible. ii) Examples of mature, current-year spawning males. They are considered ripe when the spawning form is complete.

22. Internal Notes

Make note of any internal markings, parasites, or irregularities, if any.

23. Gonads

- Remove the gonads (testes or eggs) from the fish.
- Weigh the gonads and record the weight on the datasheet.
- Take a picture of the gonads with the fish ID card visible.
- If there are eggs, freeze the left side in a Ziploc bag (only necessary to keep half).
Testes are disposed of after weighing.



Male (testes)



Female (eggs)

Figure H11. i) Male testes with a fish ID number card. ii) Female eggs with a fish ID number card.

24. Liver

- Remove the liver from the fish.

- b) Weigh the liver and record the weight on the datasheet.
- c) Take a subsample approximately the size of a pencil eraser (or 22 cartridge) and place it in a labelled cryovial.
- d) Store the cryovial in a yellow box labelled "Liver".
- e) Place the remainder of the liver in a labelled Whirl-Pak.
- f) Freeze the whole liver in the large Ziploc in the -20°C freezer with the other organs.

25. Pathogen Sampling (Whirl-Pak) – Spleen

The spleen is attached to the GI tract.

- a) Remove the spleen.
- b) Take a spleen subsample approximately the size of a pencil eraser (or 22 cartridge) and place it in the Pathogen Bag Whirl-Pak.

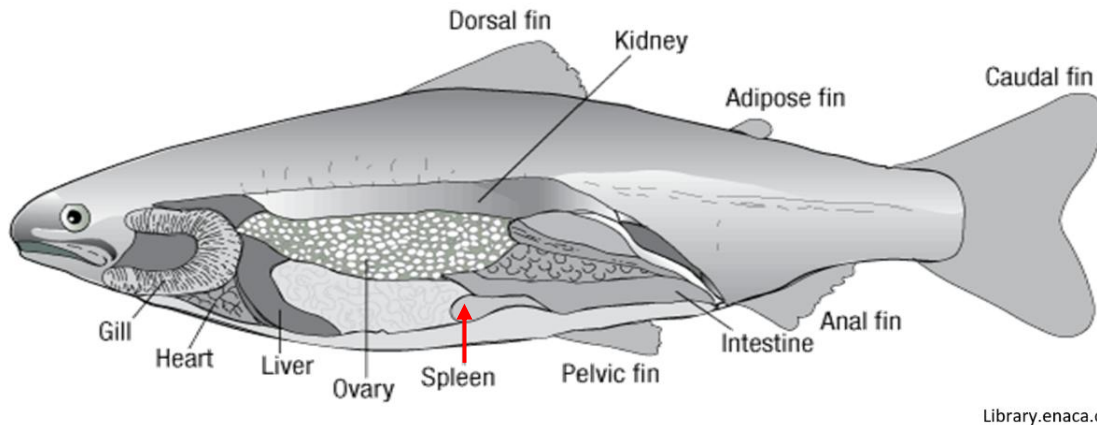


Figure H12. The interior organs of a salmon. The spleen will be dark red and attached to the GI tract.

26. Stomach

- a) Remove the stomach with the pyloric caeca still intact from the fish.
- b) Record its status: full, partial, or empty.
- c) Place the stomach in a labelled Whirl-Pak.
- d) Freeze the stomach in the large Ziploc in the -20°C freezer with the other organs.

27. Heart

- a) Remove the heart.
- b) Snip at the conus and at the atrium (shown below) to take the ventricle exclusively.
- c) Weigh the heart ventricle and record the weight on the datasheet.
- d) Place the heart ventricle in a labelled Whirl-Pak.
- e) Freeze the heart sample in the large Ziploc in the -20°C freezer with the other organs.

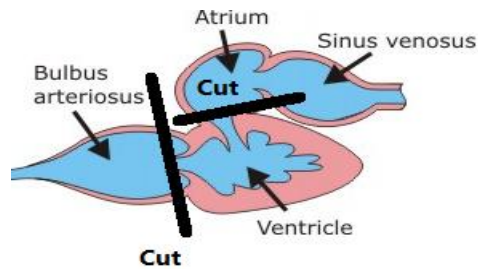


Figure H13. Diagram of a salmon heart. The two black lines demonstrate the two cuts that are made with a scalpel to separate the ventricle from the sinus venosus and bulbus arteriosus. The ventricle is collected.

28. Pathogen Sampling - Kidney Cryovial

Collect the kidney sample for pathogens first, as it is the most sensitive to contamination. If supplies remain, complete the pathogen sampling protocol.

- Using sterilized instruments, cut into the kidney section nearest to the head.
- Remove a subsample approximately the size of a pencil eraser (or 22 cartridge).
- Place the subsample in a cryovial for pathogen analysis.
- Freeze the cryovial at -80 °C in the pathogen sampling bag.

29. Pathogen Sampling - Whirl-Pak (Kidney and Gill Arch)

- Take a second kidney sample (approximately twice the size of the first).
- Place the second kidney sample in the Whirl-Pak with the spleen.
- Cut off a small section (1/2 cm) of the gill arch with the gill filaments attached using a sterile scalpel or scissors.
- Place the gill arch in the Whirl-Pak with the kidney.
- Freeze the completed pathogen Whirl-Pak immediately in the -80°C freezer.

30. Kidney

- Remove the third sample of the kidney.
- Place it in a cryovial.
- Store the cryovial in a blue box labelled "Kidney" in the -80°C freezer.

31. Cross-section

- Make a transverse cut immediately in front of the dorsal fin (the same location must be used for all fish).
- Place the ruler flush with the cut from the tail half of the fish.
- Take a digital photo of the cross-section with the fish ID card visible and with a ruler in the photo. The ruler should be flush with the cut.

The photo of the cross-section must fill the frame of the photo, as the photo will be used to trace and measure the surface area of white and red muscle.

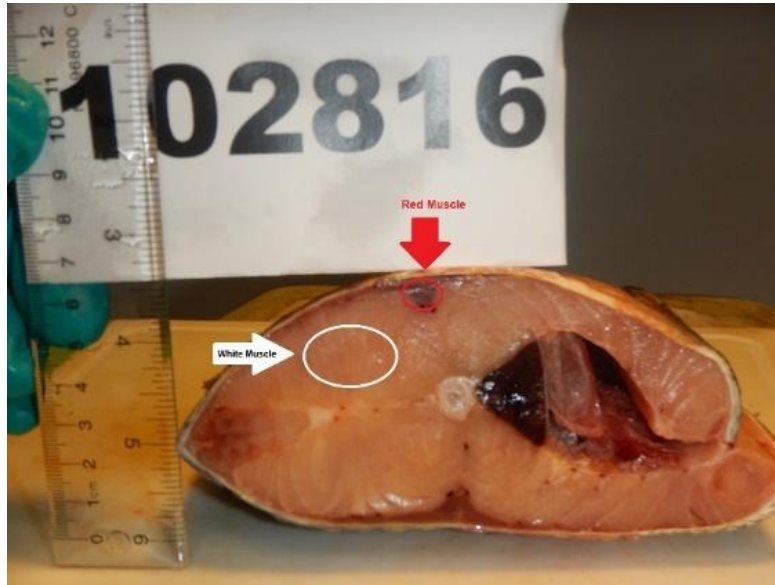


Figure H14. Cross-section muscle photo. A red arrow points to the red muscle, and a white arrow points to the white muscle. Remove the white and red muscle tissues from the designated areas of the cross-section and place them in their respective cryovials.

32. White Muscle

These are different than the muscle samples you will gather for archive, SIA, and contaminants.

- Take a white muscle sample, approximately the size of a pencil eraser, from below the dorsal fin, as highlighted in Figure 26.
- Place the sample in a labelled cryovial.
- Place the sample in the white box labelled "White Muscle" in the -80°C freezer.

33. Red Muscle

- Take a red muscle sample, approximately the size of a pencil eraser, from along the lateral line as highlighted in Figure 26. This piece should be skinless.
- Place the sample in a labelled cryovial.
- Place in the red box labelled "Red Muscle" in the -80 °C freezer.

34. Dorsal Muscle Samples (Archive Muscle, Stable Isotopes Muscle, Muscle for Contaminants)

- Collect three skinless white muscle samples from the left side of the fish, immediately below the dorsal fin and above the lateral line. Each sample should measure approximately 4 x 4 cm and weigh ~15g (grape size).
- Place each sample in an individually labelled Whirl-Pak.
- Store all three samples in the -20 °C freezer in a Ziploc with other organs.

35. Tail

- Cut the tail off the fish at the posterior side of the anal fin using a sharp knife.
- Place the tail in a labelled Whirl-Pak along with the aluminum ID tag.
- Store the Whirl-Pak in the Ziploc with the other organs in the -20 °C freezer.

36. Brain

Before cutting, support the fish by placing your fingers beneath the gill cover to stabilize the head. Always make incisions away from your body and hands to prevent injury.

- Locate the soft cranial region on the top of the fish's head.
- Using a sharp knife, make a vertical incision approximately 2-3cm deep into the cranial cavity where the muscle meets the skull, then tilt the blade towards the top of the eye, cutting along the frontal plane (see diagram below for a cutting guide).
- If the incision does not provide clear access to the brain, make additional cuts until the brain is exposed.
- Using a sterile scalpel, cut the brain in half along the longitudinal midline (see yellow line in diagram below).
- Using sterile forceps, transfer the left hemisphere of the brain into a cryovial labelled "RNAlater". Ensure the entire half of the brain is collected.



Figure H15. i) The ideal knife placement for the initial incision. ii) The ideal knife angle at the midway point of the incision. iii) The completed cut provides clear access to the brain and otoliths.



Figure H16. The yellow line visualizes where to cut the brain in half along the longitudinal midline. Only the left side is collected.

37. Otoliths

Once the brain sample is collected, the other half of the brain can be removed and discarded to increase visibility for otolith retrieval. The otoliths reside beneath the brain in the inner ear canals.

- Remove the brain material to increase visibility.
- Retrieve two otoliths from the small sockets.
- Rinse the otoliths with water or remove the ice with heat from your hand.
- Place the clean otoliths in a labelled envelope.
- Record on the data sheet how many otoliths were successfully removed.



Figure H17. i) Begin with a clear view of the brain. ii) The two yellow circles highlight the sockets where the otoliths are. iii) The otoliths (2) are removed from the sockets. iiij) The otoliths are cleaned, and the membrane is removed before placing them in the assigned envelope.

38. Head Muscle

- Cut another cross-section posterior to the pectoral fins.
- Take a cylindrical white muscle sample with a sharp knife from the left side of the fish.
- Place in a labelled Whirl-Pak with the other organs in the -20°C freezer.

39. Discards

Through a partnership with a zoo, the fish discards are provided as food for the animals.

- Freeze the remainder of the fish in the original fish bag, labelled with the fish ID number.

- b) The collected data will be entered and checked. Once the data is verified, the remains will be provided to the zoo when there are roughly 50 pounds.

40. Clean-up

All sampling equipment (e.g., scissors, knife, tweezers) must be thoroughly cleaned and sanitized between each fish to prevent cross-contamination. Rinse the instruments with water to remove any debris. Use 70% ethanol to sanitize. Clean all the sampling gear with ethanol and Kimtech wipes. Dry instruments between fish dissections. Wipe the measuring board, cutting board, weigh bin, and table with ethanol between fish.

41. Freezer

Place all remaining samples in the freezer. Confirm all freezers are closed properly.

42. Empty Garbage

Post-Sampling Inventory

Table H1. Whole salmon post-sampling inventory list of the sample types and where they are stored.

Inventory List	
Large Ziploc (-20°C Freezer)	
15g Archive Muscle	
15g Contaminants Muscle	
15g Stable Isotope Muscle	
Head Muscle SIA	
Stomach with Pyloric Caeca	
Heart	
Liver	
Fish Tail with Metal Tag	
Left Ovary (If Female)	
Medium Ziploc for Pathogen Samples (-80°C Freezer)	
Kidney Cryovial	
Kidney, Spleen, and Gill Arch Pathogen Bag	
Brain Cryovial	
Coloured Boxes (-80°C Freezer)	
Red Box	Red Muscle Vial
White Box	White Muscle Vial
Yellow Box	Liver Vial
Blue Box	Kidney Vial
Room Temperature	
DNA Vial Box	DNA Cryovial
Otolith Envelope	
Scale Booklet	
Images with Fish Number ID Card	
1. Whole body 2. Head 3. Tail 4. Belly interior 5. Gonads (testes or eggs) 6. Cross-section 7. Parasites (if applicable)	

Appendix I: Head Sampling Protocol

Laboratory Equipment List

Safety Equipment Safety glasses Gloves Lab coat/ protective clothing MSDS sheets for chemicals First aid kit	Specific Sampling Materials Harvester card Waterproof labels Datasheets Aluminum ID tag Fish ID number card Otolith envelope 1 95% ethanol-filled vial 2 small Whirl-Pak
General Equipment Pencils and permanent markers Camera Cutting board Knife Knife sharpener Calipers Forceps Hole punch 70% ethanol Delicate task wipers	

Preparing for Sampling

An approximate amount of time to fully dissect a fish head is 30 minutes, excluding the time to defrost the fish.

All surfaces and utensils must be clean and sterilized before beginning the sampling process and between each fish. Use a spray bottle containing 70% ethanol on the sampling area and dry utensils with Kimwipes between fish sampling.

Thaw the salmon head by removing it from the freezer and leaving it at room temperature for 1.5 hours. Alternatively, the head can be placed in room-temperature water for ~45 minutes to thaw it sufficiently for sampling. The time varies depending on the size of the sample. It is essential that the head is not thawed too far in advance or becomes too warm before sampling, as this affects the quality of the samples and can make the sampling process more difficult. A cold but pliable salmon head is ideal.

Prepare all labels and record the correct data (fish ID, Date of Capture, Location, Species) on the datasheets. Ensure all supplies are clean and available. Put the labels on the appropriate vials and Whirl-Paks.

Sampling Materials Checklist

Ensure you have the following materials labelled and accessible. The information in the brackets provides sample details.

Salmon ID Number

- ☐ Aluminum Tag x 1 (Gill Raker)
- ☐ Otolith Envelope x 1 (2 Otoliths)
- ☐ Fish ID Number Card (unique number)

Add Premade Labels

- ☐ 2ml Ethanol Vials x 1 (DNA)
- ☐ 4oz Whirl-Pak x 2 (Gill Raker, White Muscle)



Figure I1. The sampling collection equipment is prepared in advance of sampling. Includes bags, fish ID number, vials, and an otolith envelope. See the Sample Storage section for details on the Whirl-Pak and cryovial labels.

Sampling Protocol

This dissection method works best with two samplers, one dissecting the fish and one recording the data. Begin processing the fish after all your labels are prepared, and the correct data (fish ID, Date of Capture, Location, Species) is recorded on the datasheets and labels.

1. Fish ID

Assign a unique ID number to the fish. Numbers are given in the order that samples are received. Write the fish ID on the otolith envelope and the data sheet.

2. Determine the Species and External Colour

Reference the Quick Salmon ID Guide (see Appendix M), or for more in-depth explanations, reference the “Guide to Identifying Salmon and Char in the Arctic” booklet. The salmon received are typically caught as they enter freshwater systems and are often in the spawning phase of their lifecycle; however, they can also be in the transitioning or silver phase.

- a) Determine if the salmon is in the silver, transitioning, or spawning phase based on the appearance. Note the external colour on the datasheet.
 - A spawning salmon will have a greenish or reddish colour with a developed kype (upper jaw/snout).
 - A silver salmon will have a shiny silver hue and small teeth, and an undeveloped kype.
 - A transitioning salmon will have both silver and spawning characteristics.
- b) Examine the characteristics of the sample salmon and compare it to the salmon in the Salmon Species Quick ID Guide or the Identification booklet.
- c) Chum and sockeye salmon can be difficult to differentiate when they are in the silver phase. Count the gill rakers to determine the species. Chum will have 13-15 lower gill rakers. Sockeye will have 15-20 lower gill rakers.
- d) Note the species on the datasheet.

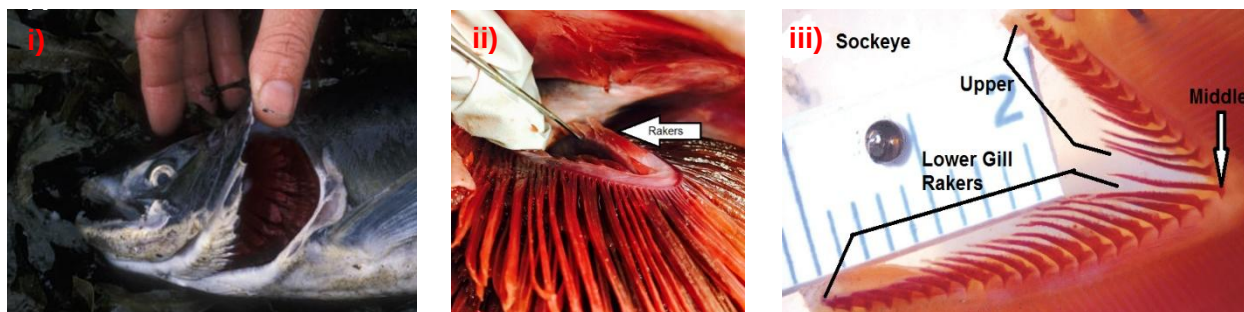


Figure 12. i) Displays how to pull back the gill cover to access the gill rakers. ii) A dental explorer probe is used to count individual gill rakers. iii) Demonstrates the upper gill rakers, lower gill rakers, and middle gill raker of a sockeye salmon (Shedd et al. 2015).

3. Markings or Abnormalities

Examine the sample and note any external markings or scars (i.e., lamprey marks) on the datasheet.

4. Harvester Cards

Each fish should arrive with a harvester card included in the fish bag.

- a) Record the date of capture, location, species, fisher information, and any other details from the harvester card onto the laboratory data sheet.

- b) Write the assigned fish ID number on the harvester card. If there is a single card for multiple fish, write the fish ID range in the top-right corner (ex.103000-103001).
- c) Place the harvester card in the designated container to be stored until processing is complete.

102836

What kind of salmon? (circle one)

Chum / Pink / Coho / Chinook / Sockeye / Atlantic / unknown

Date Caught (dd/mm/yyyy): 12/08/2020

Location Caught (be specific): Peel River

Nearest Community: Fort McPherson

Gillnet mesh size: N/A

How many hours was the net set? N/A

If you squeeze gently, does eggs/milt come out? Y or N

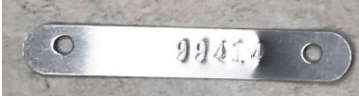
How many other fish (all species) were also in the net? _____

(please turn over)

Figure I3. A completed harvester card.

5. Verify Salmon Sample ID

Fill in any remaining information on the labels. Verify that all the labels/materials match the fish ID number (see below).

Aluminum Tag	DNA Label	Muscle Label	Gill Arch Label
	Sample ID: 99414 Date: _____ 2021 Location: _____ DNA	Sample ID: 99414 Date: _____ 2021 Location: _____ Muscle	Sample ID: 99414 Date: _____ 2021 Location: _____ Gill Arch

6. Take Photos

Each head sample has an assigned ID number and an associated ID number card with the numbers written in a large bold font. Include the fish ID number card in all photographs and discard it at the end of sampling

- a) Place the fish head on the cutting board flat on its side, oriented with the head facing to the left (head on the left, tail on the right).
- b) Place the fish ID number card beside the head.
- c) Place a ruler (cm) below the head for scale.
- d) Position the camera directly over the head, not at an angle, to avoid distortion.
- e) Take a digital photograph of the head.
- f) Ensure the fish ID number card is clearly visible in each image, as seen in Figure 32. Confirm that the measurement scale on the board is legible in all the images.

- g) Dispose of the fish ID number card. If the fish ID card is also the otolith envelope, do not dispose of it.



Figure 14. Ideal photo taken for the image database. Includes the fish ID number card, metal tag, head with the left side visible, and a ruler for scale.

7. External Colour and Markings

Note the external colour of the fish (silver, transitioning, or spawning)(see Appendix M for the Quick Salmon ID Guide), and any external markings or scars (i.e., lamprey marks).

8. Complete Morphometric Measurements

Use calipers to complete the morphometric measurements. All measurements are taken from the left side of the fish. For more minuscule measurements, use calipers.

- Place the fish on a measuring board.
- Take all measurements following the Head Morphology Measurement Guide (see Appendix R) and fill in the corresponding fields in the lab datasheet (Appendix S).

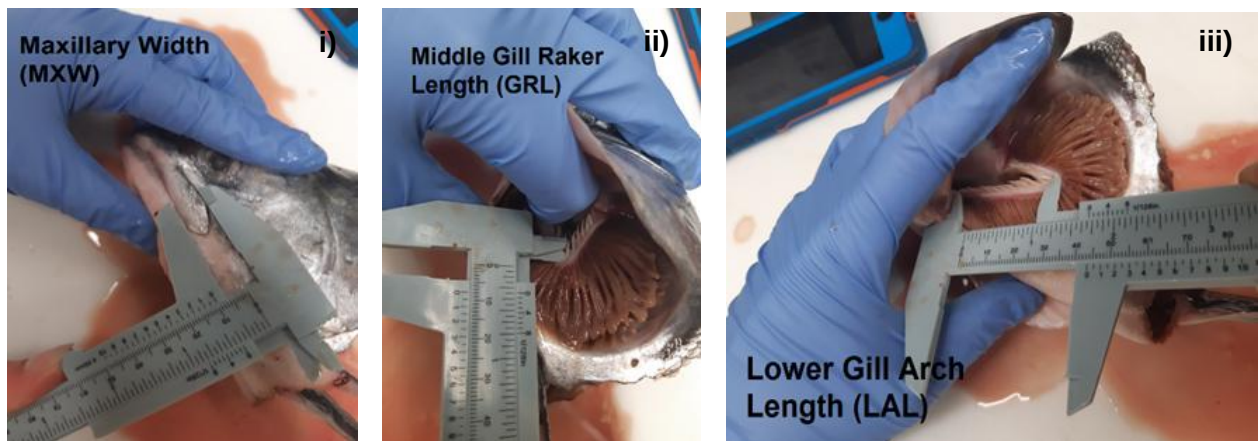


Figure 15. i) Calipers are used to measure the maxillary width. ii) Calipers are used to measure the middle gill raker length. iii) Calipers are used to measure the lower gill arch length.

9. Complete Meristic Measurements

Meristic counts can be taken with assistance from a dental explorer probe, which helps track placement while counting parts.

- a) Count the gill rakers following the diagram pictured below.

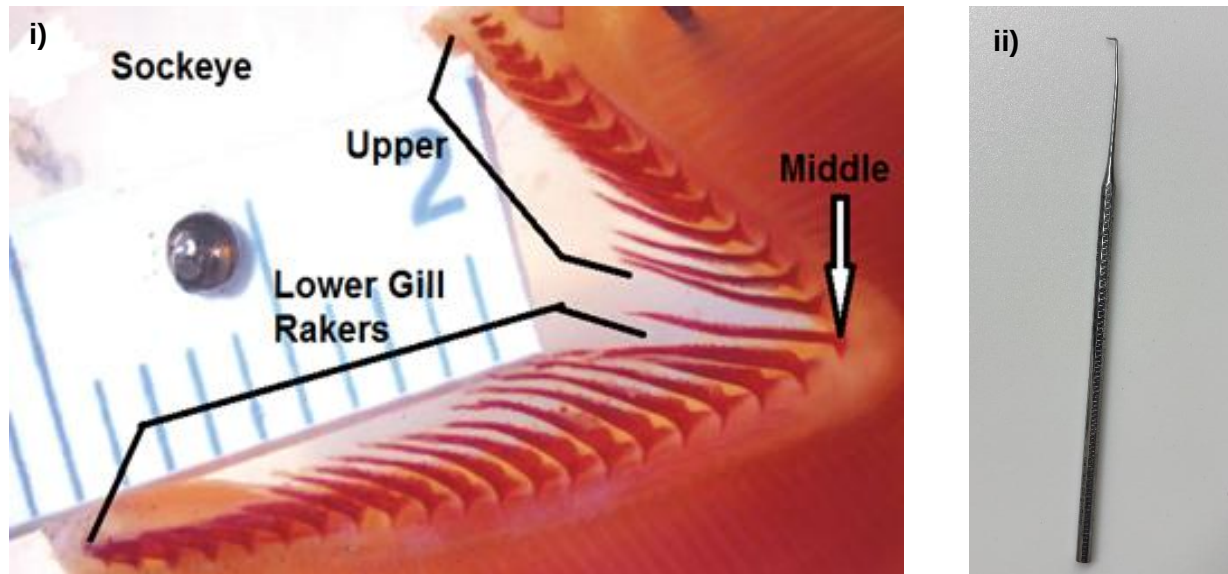


Figure 16. i) Diagram of a sockeye's upper gill raker, lower gill raker, and middle gill raker (Shedd et al. 2015). ii) Dental probe explorer used to facilitate small part counting.

10. DNA

Collect the DNA samples using sterilized dissection instruments.

- a) Disinfect the hole punch using 70% ethanol.
 - b) Using the paper hole punch, take four hole punches of operculum (gill flap) tissue to constitute one subsample. If samples become contaminated, discard and take a new sample.
 - c) Place each sample (four punches) in a labelled cryovial filled with 95% ethanol.
 - d) Store the cryovials in the designated sample box on the lab bench until the end of the processing season.
 - e) Verify the vial numbers are in the correct order in the designated sample box.
- Decontaminate the hole punch between each fish to prevent cross-contamination. If the hole punch sample becomes contaminated by touching another surface, it should be discarded, and a new punch should be collected to ensure sample integrity.

11. Gill Arch

- a) Using disinfected scissors or a sharp knife, cut out a whole gill arch.
- b) Place the gill arch in the labelled Whirl-Pak with the metal tag.
- c) Seal the bag and place it in the larger "Gill Arches" bag.

12. Stable Isotope Muscle

- a) Remove the tissue exposed from the original decapitation with a thin cut, removing any rotten/blood-covered/dry muscle from the head.
- b) If there is enough clean muscle present, take a ~15g sample (grape size) for stable isotopes.
- c) Place the sample in the labelled Whirl-Pak.
- d) If there's not enough muscle, write on the lab sheet that no muscle was collected.

13. Brain

Before cutting, support the fish by placing your fingers beneath the gill cover to stabilize the head. Always make incisions away from your body and hands to prevent injury.

- Locate the soft cranial region on the top of the fish's head.
- Using a sharp knife, make a vertical incision approximately 2-3 cm deep into the cranial cavity where the muscle meets the skull, then tilt the blade towards the top of the eye, cutting along the frontal plane (see diagram below for a cutting guide).
- If the incision does not provide clear access to the brain, make additional cuts until the brain is exposed.
- Using a sterile scalpel, cut the brain in half along the longitudinal midline (see yellow line in diagram below).
- Using sterile forceps, transfer the left hemisphere of the brain into a cryovial labelled "RNAlater". Ensure the entire half of the brain is collected.



Figure 17. i) The ideal knife placement for the initial incision. ii) The ideal knife angle at the midway point of the cut. iii) The completed cut provides clear access to the brain and otoliths.



Figure 18. The yellow line visualizes where to cut the brain in half along the longitudinal midline. The left side is collected.

14. Otoliths

The remaining brain material can be removed and placed to the side temporarily until the otoliths are retrieved. The otoliths reside beneath the brain in the inner ear canals.

- Remove brain material to increase visibility. Place on the side.
- Retrieve two otoliths from the small sockets.
- Remove the otolith membrane by rinsing it gently with water or with heat from your hand.
- Place the clean otoliths in a labelled envelope.
- Record on the data sheet how many otoliths were successfully removed.



Figure 19. i) Begin with a clear view of the brain. ii) The two yellow circles highlight the sockets where the otoliths are. iii) The otoliths (2) are removed from the socket. iiij) The otoliths are cleaned, and the membrane is removed before placing them in an assigned envelope.

15. Discards

Through a partnership with the zoo, the fish discards are provided for the animals.

- Freeze the remainder of the fish in the original fish bag.
- The collected data will be entered and checked. Once the data is verified, the remains will be provided to the zoo when there are roughly 50 pounds.

16. Clean-up

All sampling equipment (e.g. scissors, knife, tweezers) must be thoroughly cleaned and sanitized between each fish to prevent cross-contamination. Rinse the instruments with water to remove any debris. Use 70% ethanol to sanitize them. Clean all the sampling gear with ethanol and Kimtech wipes. Dry the instruments between fish. Wipe the measuring board, cutting board, weigh bin, and table with ethanol between fish.

17. Freezer

Place all samples in the freezer once finished sampling each fish. Ensure all freezers are closed properly.

18. Empty garbage

Salmon Head Post-Sampling Inventory

Table I1. Salmon Head post-sampling inventory list of the sample types and where they are stored.

Inventory List	
-20°C or Lower Freezer	
15g Head Muscle SIA	
Gill Raker with Metal Tag	
Room Temperature	
DNA Vial Box	DNA Cryovial
Otolith Envelope	
Images with Fish ID Number Card	
1. Head 2. External Parasites (if applicable)	

Appendix J: Equipment List

Equipment	Details
Safety Glasses	• Wraparound safety glasses • Antifog
Gloves	• Nitrile examination gloves • 3 mil • Non-sterile • Powder-free • Latex-free • Finger-textured • Ambidextrous
Lab Coat	• Button front • Two side pockets • Durable, washable poly/cotton blend
Camera	• Fujifilm FinePix XP140 • 16.4 million pixels • Waterproof (25m/82ft) • Shockproof (1.8m/5.9ft) • Freezeproof (-10°C/14°C)
Forceps	• General-purpose pinning forceps • 5 inches • Angled, Blunt, Serrated Tips • Grooved handles
Scale	• 400g capacity scale • Readability: 0.001 g (1 mg) • Automated internal calibration (DenverCal) with three user-selectable modes for enhanced calibration accuracy • Stainless steel weighing pan • Sealed, chemical-resistant keypad
Calipers	• Vernier Caliper • Measures outside diameter and inside diameter • Dual reading options in inches and cm • Lock screw for holding the sliding position
Disposable Scalpel	• Stainless steel blade with plastic handle • Wrapped in pull-apart aluminum or plastic • Size #10
Dental Explorer Probe	• Stainless steel • Single ended shepherds hook • 6" long
Fish Measuring Board	• 200cm long • Smooth, nonporous surface • Tapered toward the center to hold fish securely
Ethyl Alcohol (ethanol)	• 95% VOL and diluted 70% VOL • 4L jug
Kimwipes	• Kimwipes Kimtech Science brand • Delicate task wipers

	• 4.4" x 8.2" (11 x 21cm) • LintGuard – Anti-Stat Polyshield
Microtube Tough-Tags	• Pre-cut, peel-off labels sized to fit microcentrifuge tubes and other containers • 1.28" x 0.50"; 2,125/pack • For use with 1.5-2.0 ml tubes • 77520-W White
Aluminum Forestry Tag	• Stamped number from 1-7 digits • 0.020" aluminum, 3" x ½" tag
Otolith Envelope	• Pre-printed manila envelopes • Un-gummed flap • 57 x 89 mm (2.25 x 3.5")
Scale Booklet	• Nanaimo aging lab
Fish Bags	• Clear plastic fish bags, Allied Pioneer Industries Ltd. (API) • 42" x 12", 4mil
Plastic Resealable Bags	• Small: 16.5cm x 14.9cm • Large: 26.8cm x 27.3 cm
Vials	• 2.0ml • Cryogenic Vial • Internally threaded, Self-standing
4oz Whirl-Pak	• Transparent polyethylene bags • Gas sterilized • RNase, DNase, pyrogen and BPH free • 4oz • 18.5 x 7.5 cm, Thickness = 2.25 mil
18oz Whirl-Pak	• Transparent polyethylene bags • Gas sterilized • RNase, DNase, pyrogen and BPH free • 18oz • 23 x 11.5 cm • Thickness = 2.5 mil
Cryo/Freezer Boxes	• 5" x 5" x 2" in. • Tight lid-to-box fit • 100-cell divider • special moisture-repellent coating to protect them from the effects of liquid nitrogen or condensation from refrigerated equipment • Small holes on the bottom allow for safe drainage of liquid nitrogen or water
Microtube Storage Boxes	• Durable, polypropylene boxes • Three-point hinge • Holds 100 x 1.5 mL or 2.0 mL tubes • Box size is 5.5" x 5.5"
Multi-box holding box	• Holds 4 freezer boxes (5 x 5 x 2 in.) • 22.75" x 6.375" x 2.5"
Cardboard Storage Box	• Large cardboard box • Custom-made by Cascades Containerboard Packaging • 36" x 12" x 10"

Appendix K: Whirl-Pak Labels

Salmon ID: 104120 Date: ____/____/____ Location: _____ Species: _____ Heart	Salmon ID: 104120 Date: ____/____/____ Location: _____ Species: _____ Liver	Salmon ID: 104120 Date: ____/____/____ Location: _____ Species: _____ Stomach	Salmon ID: 104120 Date: ____/____/____ Location: _____ Species: _____ Tail
Salmon ID: 104120 Date: ____/____/____ Location: _____ Species: _____ Muscle from head	Salmon ID: 104120 Date: ____/____/____ Location: _____ Species: _____ Muscle for Archive	Salmon ID: 104120 Date: ____/____/____ Location: _____ Species: _____ Muscle for Contaminants	Salmon ID: 104120 Date: ____/____/____ Location: _____ Species: _____ Muscle for Stable Isotopes
Salmon ID: 104121 Date: ____/____/____ Location: _____ Species: _____ Heart	Salmon ID: 104121 Date: ____/____/____ Location: _____ Species: _____ Liver	Salmon ID: 104121 Date: ____/____/____ Location: _____ Species: _____ Stomach	Salmon ID: 104121 Date: ____/____/____ Location: _____ Species: _____ Tail
Salmon ID: 104121 Date: ____/____/____ Location: _____ Species: _____ Muscle from head	Salmon ID: 104121 Date: ____/____/____ Location: _____ Species: _____ Muscle for Archive	Salmon ID: 104121 Date: ____/____/____ Location: _____ Species: _____ Muscle for Contaminants	Salmon ID: 104121 Date: ____/____/____ Location: _____ Species: _____ Muscle for Stable Isotopes
Salmon ID: 104122 Date: ____/____/____ Location: _____ Species: _____ Heart	Salmon ID: 104122 Date: ____/____/____ Location: _____ Species: _____ Liver	Salmon ID: 104122 Date: ____/____/____ Location: _____ Species: _____ Stomach	Salmon ID: 104122 Date: ____/____/____ Location: _____ Species: _____ Tail
Salmon ID: 104122 Date: ____/____/____ Location: _____ Species: _____ Muscle from head	Salmon ID: 104122 Date: ____/____/____ Location: _____ Species: _____ Muscle for Archive	Salmon ID: 104122 Date: ____/____/____ Location: _____ Species: _____ Muscle for Contaminants	Salmon ID: 104122 Date: ____/____/____ Location: _____ Species: _____ Muscle for Stable Isotopes
Salmon ID: 104123 Date: ____/____/____ Location: _____ Species: _____ Heart	Salmon ID: 104123 Date: ____/____/____ Location: _____ Species: _____ Liver	Salmon ID: 104123 Date: ____/____/____ Location: _____ Species: _____ Stomach	Salmon ID: 104123 Date: ____/____/____ Location: _____ Species: _____ Tail

Appendix L: Vial Labels

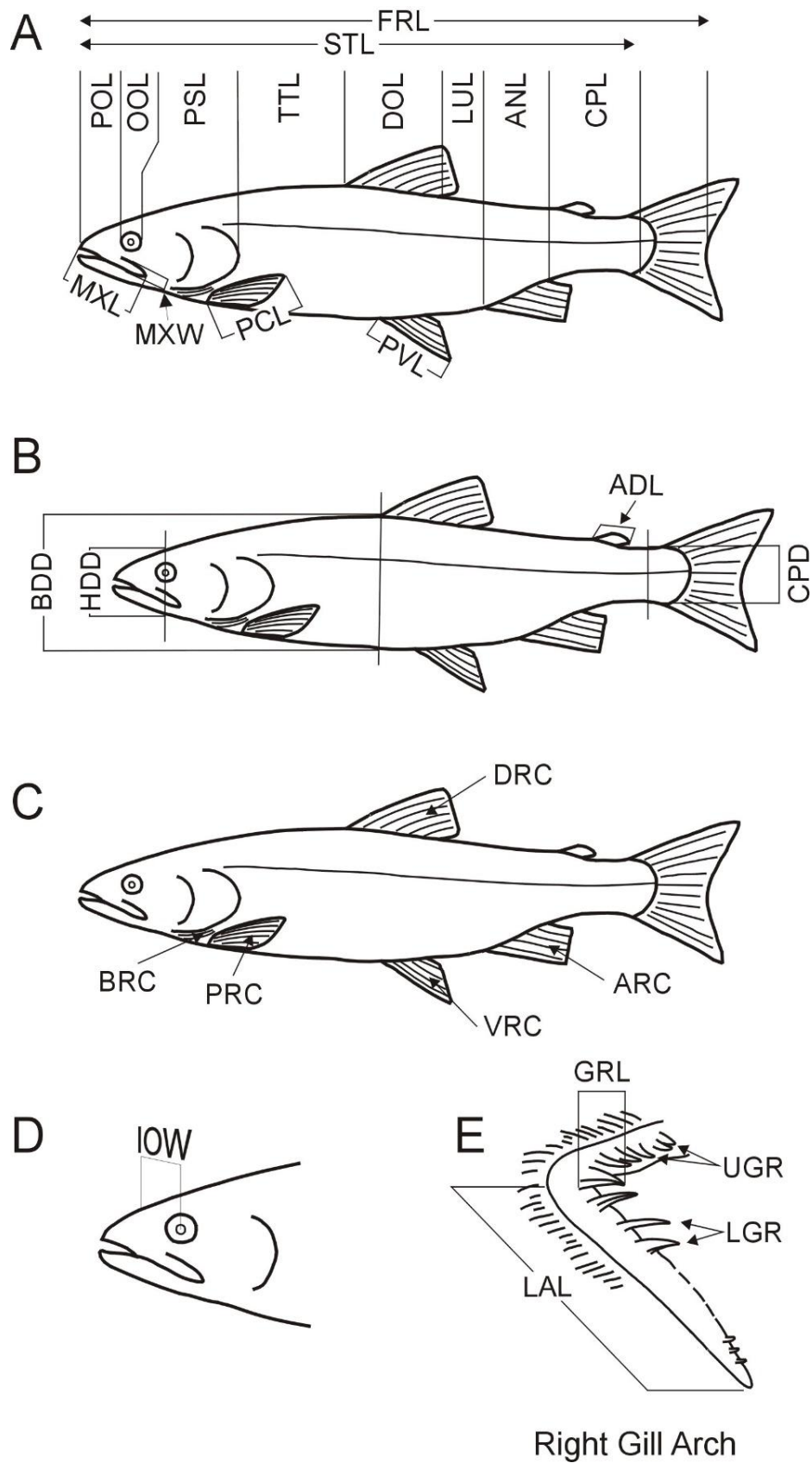
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Appendix M: Quick Salmon ID Guide

Chum Salmon		
- No spots on the head - Will likely be the most common 13-15 lower gill rakers - Silver phase: Blueish silver head - Spawning phase: green/brown head, no spots with large teeth.	 Silver Phase  Spawning Phase	
Pink Salmon		
- Smaller than Chum salmon - Black oval spots on the tail - Long thin mouth - Long thin gill rakers - Very small scales - Spawning phase: large hump forms on the back	 Silver Phase  Spawning Phase	
Sockeye Salmon		
- No spots, blue/silver in colour 15-20 lower gill rakers (thinner than Chum) - Flesh will usually be very red - Spawning phase: green head and red body	 Silver Phase  Spawning Phase	
Chinook Salmon		
- Usually bigger than chum salmon - Larger bodied (wider and longer) - Big dark head, dark mouth, and has black spots all over back and tail - Spawning phase: Large dark head, dark mouth, and dark red body	 Silver Phase  Spawning Phase	
Atlantic Salmon		
- Black spots on the gill cover - Most likely species caught in the eastern Arctic - No spots on the tail	 Silver Phase  Spawning Phase	

Coho Salmon		
• Black spots on the back and top of the tail • No spots on the bottom of the tail • Bright orange/yellow colour when spawning • Thick caudal peduncle		Silver Phase
		Spawning Phase

Appendix N: Whole Salmon Morphology Measurement Guide



Appendix O: Maturity State Code Guide

Maturity State Codes				
Maturity State	Female (2)		Male (1)	
	Code	Description	Code	Description
Immature	1	- Ovaries granular in texture - Hard and triangular in shape - Up to full length of body cavity - Membrane full - Eggs distinguishable	6	- Testes long and thin - Tubular and scalloped shape - Up to full body length - Putty-like firmness
Mature	2	- Current year spawner - Ovary fills body cavity - Eggs near full size but not loose - Eggs not expelled by pressure	7	- Current year spawner - Testes large and lobate - White to purplish color - Centers may be fluid - Milt not expelled by pressure
Ripe	3	- Ovaries fill body cavity - Eggs full size and transparent - Eggs expelled by slight pressure	8	- Testes full size - White and lobate - Milt expelled by slight pressure
Spent	4	- Spawning complete - Ovaries ruptured and flaccid - Developing oocytes visible - Some retained eggs	9	- Spawning complete - Testes flaccid with some milt - Blood vessels obvious - Testes violet-pink in color
Resting	5	- Ovary 40-50% of body cavity - Membrane thin, loose, and semi-transparent - Healed from spawning - Developing oocytes apparent with few atretic eggs - Some eggs may be retained in the body cavity	10	- Testes tubular, less lobate - Healed from spawning - No fluid in center - Usually full length - Mottled and purplish in color
Female or Male				
Unknown	0	- Cannot be sexed - Gonads long or short and thin - Transparent and translucent	11	- Resting fish - Spawning complete, gonads not regenerated - Sexing not possible

Appendix P: Multiple Fish Datasheet – Whole Salmon

DFO Salmon Meristics												1
Fish ID #	Catch Date (MM/DD/YYYY)	Year	Catch Region	Catch Location Broad (Nearest community)	Catch Location (if at a specific river/site)	Species	Fisher Name	Spawning State	Appearance Comment	Scars/Markings/ Parasites	Sampler Name 1	Sampler Name 2

Meristic Variables												Tissues collected								3
Fish ID #	Lower Gill Arch Length	Lateral Line Scales	Scales below the lateral line	Scales above the lateral line	Dorsal Ray Count	Anal Ray Count	Pectoral Ray Count	Pelvic Ray Count	Branchio-stegal Ray Count	Upper Gill Raker Count	Lower Gill Raker Count	Maturity Code	Maturity Comment	Liver Weight (0.1g)	Heart ventricle weight (0.1g)	Testes Weight (0.1g)	Eggs Weight (0.1g)	Scales (10 total)		Stomach Fullness (Empty/ Partial/ Full)
	LAL	LLS	SPS	ULS	DRC	ARC	PRC	VRC	BRC	UGR	LGR							Book #	Row #	

				5
Fish ID #	Pathogen ID	Photo Details	Comments	

Appendix Q: One-Fish Datasheet – Whole Salmon

DFO Arctic Salmon																						
Fish ID#		Catch Date (MM/DD/YYYY)	Year	Catch Region	Catch Location Broad (Nearest community)	Catch Location (if at a specific river/site)	Species	Fisher Name	Spawning State	Appearance Comment	Scars/Markings/ Parasites	Sampler 1	Sampler 2									
Morphometric Variables (to nearest 0.1mm)																						
Weight (g)	Total Length (mm)	Fork Length (mm)	Stand- ard Length (mm)	Mid-eye to Fork Length (mm)	Pre-orbital Length	Orbital Length	Post-orbital Length	Trunk Length	Dorsal Length	Lumbar Length	Anal Length	Caudal Peduncle Length	Head Depth	Body Depth	Caudal Peduncle Depth	Inter-orbital Width	Maxillary Length	Maxillary Width	Pectoral Length	Pelvic Length	Adipose Length	Middle Gill Raker Length
		FRL	STL	MEF	POL	OOL	PSL	TTL	DOL	LUL	ANL	CPL	HDD	BDD	CPD	IOW	MXL	MXW	PCL	PVL	ADL	GRL
Meristic Variables														Tissues Collected								
Lower Gill Arch Length		Lateral Line Scales		Scales below the lateral line	Scales above the lateral line	Dorsal Ray Count	Anal Ray Count	Pectoral Ray Count	Pelvic Ray Count	Branchio-stegal Ray Count	Upper Gill Raker Count	Lower Gill Raker Count	Maturity Code	Maturity Comment	Liver Weight (0.1g)	Heart ventricle weight (0.1g)	Testes Weight (0.1g)	Eggs Weight (0.1g)	Scales (10 total)		Stomach Fullness (Empty/ Partial/ Full)	
LAL		LLS		SPS	ULS	DRC	ARC	PRC	VRC	BRC	UGR	LGR							Book #	Row #		
Tissues Collected - Yes or No (Yes = Y, No = N)																						
Room Temp.				-20										-80				Pathogen Sampling				
Genetics Sample (4 punch)	Scales Taken	Otolith	Otolith # Collected	Stomach Contents	Eggs	Heart	Liver (whole)	Stable Isotope Muscle (dorsal)	Muscle for Contaminants	Archive Muscle	Muscle from Head	Tail	Liver (cryovial)	Kidney (cryovial)	White Muscle (cryovial)	Red Mus. (cryo vial)	Kidney pathogens (cryovial)	Brain for pathogens (cryovial)	Spleen/ kidney/ gill arch for pathogen			
Information																						
Disease ID				Photo Details								Comments										

Pre-Sampling Materials Checklist

Ensure you have the following materials labelled and accessible.

Salmon ID Number

☐ Fish ID Number Card x 1

☐ Aluminum Tag x 1 (Tail)

☐ Otolith Envelope x 1 (2 Otoliths)

Link to Datasheet by Writing Number

☐ Scale Card x 1 (Link to Datasheet)

☐ Pathogen Whirl-Pak (Spleen, Gill Arch, Kidney)

☐ Pathogen 2m vial x 2 (Kidney, Brain)

Sample Organization Bags

☐ Large Ziploc Bag (-20°C)

☐ Small Ziploc Bag (-80°C)

Add Premade Labels

☐ 2ml Ethanol Vials (95%) x 1 (DNA)

☐ 2ml Cryovials x 4 (Liver, Kidney, White Muscle, Red Muscle)

☐ 4oz Whirl-Pak x 1 (Pathogen Bag: Kidney, Spleen, Gill Arch)

☐ 4oz Whirl-Pak x 6 (Archive Muscle, Stable Isotope Muscle, Liver, Heart, Muscle for Contaminants, Head Muscle SIA)

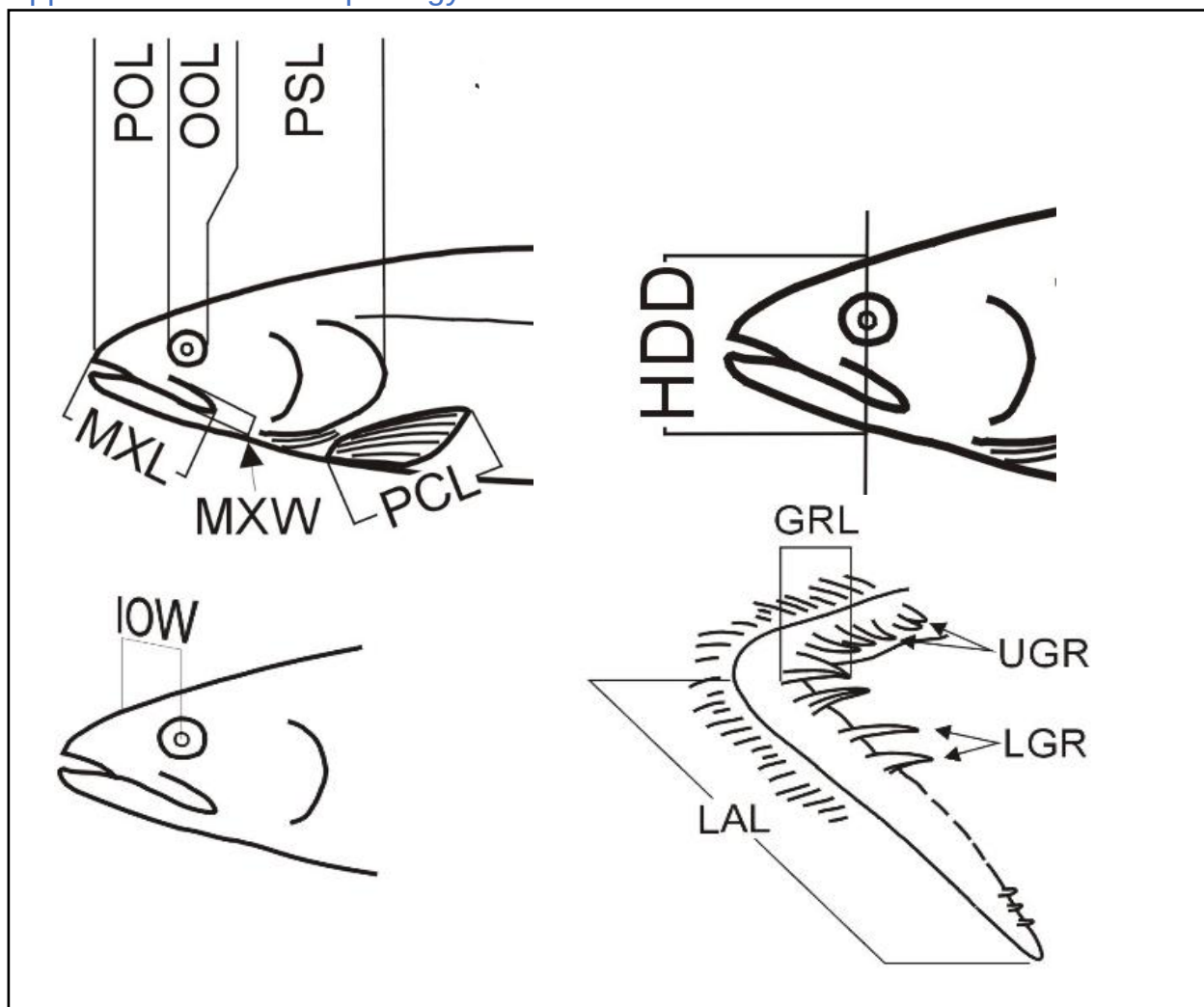
☐ 18oz Whirl-Paks x 2 (Tail, Stomach)

☐ 180z Unlabeled Whirl-Pak x 1 (If female, keep the left ovary)

Post-Sampling Inventory

Inventory List	
Large Ziploc (-20°C Freezer)	
15g Archive Muscle	
15g Contaminants Muscle	
15g Stable Isotope Muscle	
Head Muscle SIA	
Stomach with Pyloric Caeca	
Heart	
Liver	
Fish Tail with Metal Tag	
Eggs (If Present)	
Medium Ziploc for Pathogen Samples (-80°C Freezer)	
Kidney Cryovial	
Kidney, Spleen, and Gill Arch Pathogen Bag	
Brain Cryovial	
Coloured Boxes (-80°C Freezer)	
Red Box	Red Muscle Vial
White Box	White Muscle Vial
Yellow Box	Liver Vial
Blue Box	Kidney Vial
Room Temperature	
DNA Vial Box	DNA Cryovial
Otolith Envelope	
Scale Booklet	
Images with Fish ID Number Card	
1. Whole body 2. Head 3. Tail 4. Belly interior 5. Gonads (testes or eggs) 6. Cross-section 7. Parasites (if applicable)	

Appendix R: Head Morphology Measurement Guide



Appendix S: Head Dissection Lab Sampling Datasheet

DFO Arctic Salmon											
Fish ID#	Catch Date (MM/DD/YYYY)	Year	Catch Region	Catch Location Broad (Nearest community)	Catch Location (if at a specific river/site)	Species	Fisher Name	External Colour	Scars/Markings/Parasites	Sampler 1	Sampler 2

Morphometrics and Meristics

[illegible]

Sampling Materials Checklist

Ensure you have the following materials labelled and accessible.

Salmon ID Number

- ☐ Aluminum Tag x 1 (Gill Raker)
- ☐ Otolith Envelope x 1 (2 Otoliths)
- ☐ Fish ID Number Card

Add Premade Labels

- ☐ 2ml Ethanol Vials x 1 (DNA)
- ☐ 4oz Whirl-Pak x 2 (Gill Raker, White Muscle)

Post Sampling Inventory

Check that you have all of the following after the dissection is complete.

Inventory List	
-20°C or lower Freezer	
15g Head Muscle SIA	
Gill Raker with Metal Tag	
Room Temperature	
DNA Vial Box	DNA Cryovial
Otolith Envelope	
Images with Fish ID Number Card	
1. Head	
2. External Parasites (if applicable)	

Appendix T: Metadata Sheet / Data Dictionary

Column	Name	Description	Units
A	Fish.ID	Unique sample identifier	#####
B	Catch.Date	Date of capture	MM/DD/YYYY
C	Year	Year of capture	YYYY
D	Month	Month of capture	MM
E	Yearday	Date in calendar year (1-365)	###
F	Catch.Region	Region sample was caught	N/A
G	Catch.Location.Broad	Broad community the fish was caught within OR near	N/A
H	Catch.Location	Specific location where the fish was caught (Location caught (be specific) section on Harvester Card)	N/A
I	Community	If the fish was caught inside or outside the community (Catch.Location.Broad) : Yes or No	N/A
J	Lon	Longitude	(°)
K	Lat	Latitude	(°)
L	Species	Fish species	N/A
M	TL	Total Length	mm
N	Wt	Weight of fish	g
O	FW.age	Freshwater age	#
P	OC.age	Ocean age	#
Q	Age.Comment	Comments about the age	N/A
R	Spawning.State	State of spawning: Silver, Transitioning, Spawning, or Unknown	N/A
S	Appearance.Comment	Spawning status and appearance comments	N/A
T	Maturity.Code	Range: 0-11, follow Maturity State guide	N/A
U	Maturity.Comment	Comments about maturity	N/A
V	Sex	Male: "M" or Female: "F" or Unknown: "U"	N/A
W	Fisher.Name	Name of fisher who caught sample	N/A
X	Fisher.Comment	Comments about fisher	N/A
Y	Fisher.Phone	Phone number of fisher	#####
Z	Scars.Markings.Parasites	Notes on scars, marking, parasites	N/A
AA	Sampler	Person who collected sample	N/A
AB	Sampler2	Person who collected sample	N/A
AC	Sampler3	Person who collected sample	N/A
AD	FRL	Fork Length	mm
AE	STL	Standard Length	mm
AF	Calc.MEF	Mid-Eye to Fork of Tail (calculation: FL-(POL+1/2OOL)=MidEye.to.FL)	mm

AG	MEF	Measurement from the Lab (Mid-eye to Fork of Tail) (Started taking in lab in April 2024)	mm
AH	POL	Preorbital Length	mm
AI	EYE	Eye	mm
AJ	OOL	Orbital Length	mm
AK	PSL	Postorbital Length	mm
AL	TTL	Trunk Length	mm
AM	DOL	Dorsal Fin Length	mm
AN	LUL	Lumbar Length	mm
AO	ANL	Anal Length	mm
AP	CPL	Caudal Peduncle Length	mm
AQ	HDD	Head Depth	mm
AR	BDD	Body Depth	mm
AS	CPD	Caudal Peduncle Depth	mm
AT	IOW	Interorbital Width	mm
AU	MXL	Maxillary Length	mm
AV	MXW	Maxillary Width	mm
AW	PCL	Pectoral Length	mm
AX	PVL	Pelvic Length	mm
AY	ADL	Adipose Length	mm
AZ	GRL	Gill Raker Length (middle)	mm
BA	UAL	Upper Arch Length	mm
BB	LAL	Lower Arch Length	mm
BC	LLS	Lateral Line Scales	COUNT
BD	SPS	Supra-Pelvic Scales - Scales below the Lateral Line	COUNT
BE	ULS	Scales above the Lateral Line	COUNT
BF	DRC	Dorsal Ray Count	COUNT
BG	ARC	Anal Ray Count	COUNT
BH	PRC	Pectoral Ray Count	COUNT
BI	VRC	Ventral Ray Count (Pelvic)	COUNT
BJ	BRC	Branchio-stegal Ray Count	COUNT
BK	UGR	Upper Gill Raker Count	COUNT
BL	LGR	Lower Gill Raker Count	COUNT
BM	PYL.Collected	Pyloric Caeca Collected, Yes or No	N/A
BN	PYL	Pyloric Caeca number	COUNT
BO	GSI	Gonadosomatic Index (calculation: (gonad weight/body weight) * 100)	%
BP	HIS	Hepatosomatic Index (calculation: (liver weight/body weight) * 100)	%
BQ	Stomach.Fullness	Status of stomach fullness: Empty or Partial or Full	N/A
BR	Stomach.Contents.Preserved	Stomach contents preserved, Yes or No	N/A

BS	Stomach.Contents. Date.Sent	Date sent, date analyzed, or the name of the raw data file depending on what's available. AAE'd means that the stomach was analyzed by AAE and the data is of little/no use, but can't be reanalyzed.	N/A
BT	Scales.Taken	Scales taken, Yes or No	N/A
BU	Scales.Comment	Comment on scales	N/A
BV	Scale.Book	Book #/Row #	##
BW	Scale.Archive	Box # the scales are archived in	#
BX	Gonad.Wt	Weight of male gonads	g
BY	Eggs	Egg sample taken, Yes or No	N/A
BZ	Eggs.Wt	Weight of ovaries	g
CA	Eggs.Wt.Comment	Comment on egg weight	N/A
CB	Otolith	Otolith sample taken, Yes or No	N/A
CC	Otolith.Comment	Comment on otolith, 1 or 2 otoliths collected	#
CD	Otolith.Archive	Box # and name	#
CE	Genetics.Sample	Genetics, Yes or No	N/A
CF	Genetics.Archive	Doesn't Exist Yet	N/A
CG	Dorsal.Fin	Dorsal fin, Yes or No	N/A
CH	Pectoral.Fin	Pectoral fin, Yes or No	N/A
CI	Adipose.Archive	Doesn't Exist Yet/probably the same as DNA	N/A
CJ	FA.Muscle	Fatty Acid Muscle sample taken, Yes or No	N/A
CK	Stable.Isotope.Muscle	Stable isotope sample, Yes or No	N/A
CL	Mean.Delta.C13	Mean Carbon 13	‰
CM	MassFrac.C13	Mass Carbon 13	‰
CN	Mean.Delta.N15	Mean Nitrogen 15	‰
CO	MassFrac.N15	Mass Nitrogen 15	‰
CP	CN.Ratio	Carbon Nitrogen Ratio	‰
CQ	Date.Sent.SIA	Data sent for Stable Isotope Analysis	season YYYY
CR	Head.Mean.Delta.C13	Mean Carbon 13 from the white head muscle	‰
CS	Head.MassFrac.C13	Mass Carbon 13 from the white head muscle	‰
CT	Head.Mean.Delta.N15	Mean Nitrogen 15 from the white head muscle	‰
CU	Head.MassFrac.N15	Mass Nitrogen 15 from the white head muscle	‰
CV	Head.CN.Ratio	Carbon Nitrogen Ratio from the white head muscle	‰
CW	Head.Date.Sent.SIA	Date sent	MM/DD/YYYY
CX	Dorsal.Mean.Delta.C13	Mean Carbon 13 from the white dorsal muscle	‰
CY	Dorsal.MassFrac.C13	Mass Carbon 13 from the white dorsal muscle	‰

CZ	Dorsal.Mean.Delta.N15	Mean Nitrogen 15 from the white dorsal muscle	‰
DA	Dorsal.MassFrac.N15	Mass Nitrogen 15 from the white dorsal muscle	‰
DB	Dorsal.CN.Ratio	Carbon Nitrogen Ratio from the white dorsal muscle	‰
DC	Dorsal.Date.Sent.SIA	Date sent	MM/DD/YYYY
DD	Contaminants.Muscle	Contaminants muscle sample, Yes or No	N/A
DE	Red.Muscle	Red muscle sample, Yes or No	N/A
DF	Muscle.Archive	Doesn't Exist Yet	N/A
DG	Head.Dorsal.Comparison	Head muscle sample taken for Caitlyn's Project, Yes or No	N/A
DH	Head.Tissue.Archive	Doesn't Exist Yet	N/A
DI	Tissue.Archive	Doesn't Exist Yet	N/A
DJ	Heart	Heart sample taken, Yes or No	N/A
DK	Heart.Wt.Whole	Weight of whole heart	g
DL	Heart.Wt.Ventricle	Weight of heart ventricle	g
DM	Liver.Whirlpak.and.Cryovial	Liver Whirlpak and Cryovial samples taken, Yes or No	N/A
DN	Liver.Wt	Weight of Whole Liver	g
DO	HBI.Wt	Weight of HBI sample	g
DP	Date.Sent.HBI	Date that HBI sample was sent	season YYYY
DQ	IP25	Mono-saturated highly branched isoprenoid IP25 derived from Arctic sea ice diatoms	N/A
DR	Di	Highly branched isoprenoid diene IIb derived from Arctic sea ice diatoms	N/A
DS	Tri	Highly branched isoprenoid trienes IIIa-d derived from planktonic/pelagic diatoms	N/A
DT	H.Print	The ratio of the highly branched isoprenoid contribution from planktonic/pelagic diatoms (Tri) vs sea ice diatoms (IP25 and Di)	N/A
DU	Stable.Isotope.Liver	Stable Isotope Sample, Yes or No	N/A
DV	Liver.Mean.Delta.C13	Mean Carbon 13 from the liver	‰
DW	Liver.MassFrac.C13	Mass Carbon 13 from the liver	‰
DX	Liver.Mean.Delta.N15	Mean Nitrogen 15 from the liver	‰
DY	Liver.MassFrac.N15	Mass Nitrogen 15 from the liver	‰
DZ	Liver.CN.Ratio	Carbon Nitrogen Ratio from the liver	‰

EA	Date.Sent.SIA.Liver	Date sent for analysis	MM/DD/YYYY
EB	Gill.Arch	Gill Arch sample taken, Yes or No	N/A
EC	Spleen	Spleen sample taken, Yes or No	N/A
ED	Kidney	Kidney sample taken , Yes or No (Kidney(cryovial))	N/A
EE	Kidney.Pathogen.Bag	Kidney Pathogen Bag, Yes or No (Spleen, kidney, and gill arch for pathogens)	N/A
EF	Kidney.Pathogen.Vial	Kidney Pathogen Vial sample was collected, Yes or No (Kidney for pathogens (cryovial))	N/A
EG	Pathogen.Vial	Number assigned to kidney pathogen sample (Kidney.pathogen.vial)	FWI ###-#
EH	Brain.Pathogen.Cryovial	Brain collected for pathogens, Yes or No	N/A
EI	Tail	Tail collected, Yes or No	N/A
EJ	Photo.Details	Old method of keeping track of photos	#
EK	Photo.File	Photo file number/pathway	Path/#
EL	Photo.Archive	Photo archive device(ex. HD name, CD name, P Drive name)	N/A
EM	General.Comments	General Comments	N/A