

Southern British Columbia Recreational Angler Chinook and Coho Salmon Diet Sampling Pilot Project: *Background and Angler Protocol*

University of Victoria Fisheries Ecology and Marine Conservation Group

Version: 16/02/18

The coastal ocean of Southern British Columbia is an important rearing and foraging area for migratory and resident Chinook and Coho Salmon. These salmon support economically and socially valuable recreational and commercial fisheries and culturally important First Nations harvests. They also play an important role in the ecosystem; for example, as food for the endangered southern resident Killer Whale population. Feeding is critical at all stages of life as salmon grow, recruit to fisheries, and migrate back to their natal streams to spawn. While the diets of juvenile salmon in the marine environment have been extensively studied in recent years, data on adult diets in British Columbia are sparse. Improving understanding of how Chinook and Coho salmon diets vary by region, season and year may help us understand factors limiting growth and survival of these valuable populations. Additionally, trends in salmon diets have the potential to provide us with a novel and powerful perspective on changes in the ecosystem. Such information can contribute to management measures to promote recovery and sustainable use of multiple marine species.

Early attempts to understand regional diet trends and the importance of Pacific Herring to Chinook and Coho Salmon began with the work of Pritchard and Tester (1944). They enlisted the help of recreational and commercial fishermen to obtain stomachs from Coho and Chinook salmon caught throughout British Columbia between 1939 and 1941. Subsequent diet studies have generally relied on catches from commercial fishing vessels, providing only snapshots of diet in particular regions and seasons. No adult Chinook and Coho salmon diet studies have occurred in Southern BC since the late 1980s. Also, there are no published studies on diets during the less productive winter months; representing a significant basic knowledge gap.

The year-round recreational fishery in Southern BC provides an opportunity to address these data gaps. This could include gaining an understanding of winter diets, facilitating comparison between contemporary Chinook and Coho salmon diets and those reported in historical studies; and conducting ongoing ecosystem monitoring from the perspective of the salmon themselves. Long term diet analysis of predators such as harbour seals and seabirds has been used successfully as a tool for monitoring forage fish population dynamics and effects of climate on marine ecosystems. Such predator diet analysis can be an inexpensive and unbiased complement and/or alternative to fishery-independent assessment of prey species and sampling using research vessels. Through the interest and support of the recreational fishing community, we aim to enlist the salmon to provide information on the health and trajectory of the ecosystem on which they depend.

Our specific goals (timelines in parentheses) are to:

1: Collect and publish the first year-round data on Chinook diets in Southern BC and compare contemporary summer diets to those documented in historical studies (Short term 2-3 years);

2. Develop recreational angler-caught Chinook and Coho diets as an ongoing ecosystem monitoring tool (Long term - indefinite); and
3. Develop a new avenue for engagement of recreational fishers in fisheries science (long term - indefinite).

We hope that this program can develop into a long-term project that will yield a unique dataset for understanding trends in the health of the marine ecosystem and its ability to support economically and socially valuable salmon stocks. We are currently enlisting private anglers and guides to collect stomachs and working with derby organizers to conduct sampling at cleaning stations. We are particularly interested in talking with anglers who fish year-round. Anglers who participate in this project will receive updates on results that should be both interesting and informative for their future fishing success.

Our laboratory data collection includes identifying all prey items in the stomach and recording lengths and weights. We also record parasite presence and extract otoliths (ear bones) of prey fish for age and growth rate analyses. In addition, we are analyzing intestinal contents for the presence/absence of common prey groups, allowing data to be collected for fish with empty stomachs. We also archive tissue samples from the salmon stomach itself for possible future genetic (stock identification) and/or stable isotope analyses. We will email an annual summary of data collected to all anglers participating in the program. We will also provide the raw data collected for all fish submitted by a given angler on request.

Protocol

While it may not be possible for you to submit all the Chinook and Coho Salmon stomachs that you capture, please do not select only what appear to be full stomachs. Submit stomachs whether they appear to be full or not (to facilitate analysis of ‘frequency of empty stomachs’). **Decide if you will be submitting the stomach before you clean the fish, then go through with it whether empty or full.**

When cleaning a fish, cut the esophagus as close to the head/gills as possible. Attempt to make the cut from the vent to the collar as shallow as possible to avoid cutting open the digestive tract. **Bag the entire digestive tract (esophagus, stomach, and intestine).** Liver and gonads can be discarded. If prey items are protruding from the mouth or are regurgitated, try to retain them as well. If possible, keep the intestine intact with the rest of the internal organs, we will be examining intestinal contents for presence and absence of hard parts (for example otoliths – the ear bones – of prey fish; squid beaks, fish vertebrae etc..). It would be preferable if the prey was left in the stomach; however, we understand some folks would like to look at the stomach contents themselves as well. If you do open the stomach, ensure that you bag all the contents for submission. If you do empty out the stomach contents, it would be preferable if these are placed in a separate bag (or wrapped in cling wrap) from the rest of the internal organs and then placed together in a larger bag with the label. This prevents the stomach contents from getting mixed up with the rest of the internal organs and intestinal contents. **For each bag include a card with fish-specific information. Freeze stomachs as soon as possible to limit continuing digestion. Where freezing immediately after cleaning is not possible, place bagged stomachs on ice.** If it is not possible to freeze stomachs within 12 hours, please still submit the stomach, but make a note of the time

that elapsed prior to freezing (we can still obtain useful information from stomachs stored on ice for up to 3 days prior to freezing).

Data cards on the final page of this document can be printed on regular paper. If using regular paper, consider wrapping stomachs in cling wrap before bagging to prevent paper from getting soaked. Ensure that you fill out cards with pencil rather than pen (which can wash off). We are also producing waterproof data cards, if you would like a supply of these cards email us your mailing address or pick them up from the freezer at one of our drop-off depots. In the absence of any data card, information can also be written in pencil on scrap paper or with waterproof felt pen on the outside of bags.

Critical information to record includes:

Species, length (Nose to Fork Length - indicate inches or cm in brackets), statistical area and subarea, hatchery (adipose clipped) or wild, and date.

If you are an Avid Angler participant please record your genetic sample number.

If you are submitting the head of a hatchery fish to DFO please record the head tag code.

Helpful additional information to record includes:

Your email, weight (units in brackets), sex, detailed capture location (either the local name {eg. Oak bay flats; Hole in the Wall} or latitude and longitude, hour of the day when the fish was caught (24 hour clock), the depth at which the fish was caught, type of gear (eg. Flasher Hootchy), and any other comments (eg. Krill swarms at surface; Auklets feeding on needlefish; Fish coloured with mature eggs)

If it is not possible to collect any of this information reasonably accurately then either leave the field blank or indicate accuracy issues (eg. State that length was guessed rather than measured or just leave blank).

We can arrange by email to pick up stomachs in the Victoria Area. Alternatively, they can be dropped off at UVic (we can provide lab tours where possible). Drop offs can be arranged by email in advance. A number of stores have generously agreed to act as drop-off locations. Small totes will be available in their freezers for drop-offs. Current locations include: Island Outfitters (Victoria), Tyee Marine (Campbell River), Pacific Net and Twine (Parksville), Eagle-Eye Outfitters (Sooke), Bon Chovy Charters (Granville Island) and Home Hardware in Sidney (this location only). **When dropping off stomachs at a depot please tell staff that the stomach is for the UVic stomach contents program and that there is a tote for them in the main freezer, not all staff at these locations may be familiar with the project.**

Note: all stomachs submitted with complete data in 2018 count as an entry in a draw to win an Islander MR2 Mooching reel. Many thanks to Islander for this donation!

Please spread word of this project – inquiries addressed to wildduguid@hotmail.com; visit us on Facebook at <https://www.facebook.com/Southern-BC-Adult-Salmon-Diet-Program-493763831003993/>

Contact Email	
Date (yy-mm-dd)	
Time (hh:mm)	
Circle:	Chinook or Coho
	Hatchery or Wild
	Male or Female
Nose-to-fork length (units)	
Weight (units)	
Statistical Area – Sub Area	
Capture Lat/Long or Local Name	
Depth (units)	
Gear	
Genetic Sample Code	
Head Recovery Code	
Comments	

Contact Email	
Date (yy-mm-dd)	
Time (hh:mm)	
Circle:	Chinook or Coho
	Hatchery or Wild
	Male or Female
Nose-to-fork length (units)	
Weight (units)	
Statistical Area – Sub Area	
Capture Lat/Long or Local Name	
Depth (units)	
Gear	
Genetic Sample Code	
Head Recovery Code	
Comments	

Contact Email	
Date (yy-mm-dd)	
Time (hh:mm)	
Circle:	Chinook or Coho
	Hatchery or Wild
	Male or Female
Nose-to-fork length (units)	
Weight (units)	
Statistical Area – Sub Area	
Capture Lat/Long or Local Name	
Depth (units)	
Gear	
Genetic Sample Code	
Head Recovery Code	
Comments	

Contact Email	
Date (yy-mm-dd)	
Time (hh:mm)	
Circle:	Chinook or Coho
	Hatchery or Wild
	Male or Female
Nose-to-fork length (units)	
Weight (units)	
Statistical Area – Sub Area	
Capture Lat/Long or Local Name	
Depth (units)	
Gear	
Genetic Sample Code	
Head Recovery Code	
Comments	