

Iqaluich Niġiñaqtuat, Fish That We Eat



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IQALUICH NIGIÑAQTUAT, FISH THAT WE EAT

Final Report No. FIS02-023

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Chum salmon hanging at Sisualik.

Abstract

This report, *Iqaluich Nigiñaqtuat, Fish That We Eat*, honors the traditional *lñupiaq* fish food wisdom of northwest Alaska. Each fish native to the study area appears along with its *lñupiaq*, English, and Latin names, a sketch, identification details, a brief life history, and associated recipes for gathering, preparation, and use. Each recipe is presented with respect and a genuine appreciation of the food. The directions give as much detail as possible, including background information, enabling readers to continue creating and eating these foods forever. The preparation techniques include raw, boiling, roasting, fermenting, drying, freezing, salting, and pickling. Photos and sketches of fish and processes, plus personal stories, enrich the text, along with *lñupiaq* words commonly used today. The vibrant health and vigor enjoyed by past *lñupiat* came from eating the whole fish, especially the more flavorful and nutrient-dense liver, eggs, and head. These highly nutritious traditional recipes and preservation techniques remain as delicious and well loved today as they have always been.

Key Words: Alaska, cookbook, Eskimo, fish, food, food preservation, health, *lñupiat*, Kotzebue, northwest Alaska, recipes, traditional ecological knowledge.

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CONTENTS

Executive Summary	1	
Preface	4	
Introduction	5	
Methods	10	
Results	12	
I	Saltwater Fish	14
	Pacific herring	15
	Tomcod	25
	Arctic cod	40
	Flounder	43
	Smelt	49
	Bullhead	57
II	Anadromous Fish	60
	Chum salmon	61
	Pink-, king-, red-, silver salmon	92
	Dolly Varden	103
	Arctic char	125
	Lake trout	126
III	Anhpbrous Fish, Whitefish	128
	Sheefish	130
	Humpback whitefish	153
	Least cisco	187
	Bering cisco	194
IV	Freshwater Fish	197
	Broad whitefish	198
	Round whitefish	219
	Mudshark	222
	Arctic grayling	234
	Northern pike	241
	Long nose sucker	257
	Blackfish	263
	Stickleback	266
V	Invertebrates	268
Discussion		276
Conclusions		289
Recommendations		290
Acknowledgements		291

Appendixes	292
Glossary	293
Fish names	302
Traditional <i>Iñupiaq</i> Fish Foods Chart	305
<i>Iñupiaq</i> Fish Anatomy	306
Fish Biology	307
Village View	309
History of <i>Niqipiaq</i> Project	332
Literature Cited	334
Non-Discrimination Statement	337

EXECUTIVE SUMMARY

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Starting with a body of food-data, gathered informally and unofficially over the previous 40 years, this Final Report No. FIS02-023 breaks with the typical protocol of fishery research papers by presenting a unique recipe collection of the traditional food-use of local fish by the *lñupiat* of northwest Alaska. In 1960, the investigator developed a fascination with the local culture, especially their foods, with all the accompanying time and temperature-sensitive complexities necessary to gather, prepare, store and thus have these foods ready to eat throughout the year. That the *lñupiat* ate well in their arctic environment allowed them to survive through the centuries as a healthy, vigorous, intelligent population.

This collective oral food-history of the region was extracted from many notebooks where the memory of conversations or experiences had been recorded through the years. The quotes in this report come mostly from the real experts, the Elders, the masters at survival, who have lived their lifetimes in the area, eating the foods provided by the land and waters. For 23 years, the Investigator and her husband lived in the area and raised their family, following a subsistence lifestyle along with many other local people. They visited, traveled, and camped with the elders, following the foods available at each time of year. The investigator not only learned and recorded the recipes taught by the elders, but these foods became a cherished core of everyday family meals. The recipes in this report are not theoretical. They have been a mainstay of the culture for centuries, and most remain so to this day, still prepared and enjoyed, at least by the elders themselves.

This report presents the traditional, ecological food knowledge of the *lñupiat* peoples living in the Fish and Wildlife Service's Kotzebue Sound Management Region of Alaska during the last half of the 20th century. It addresses the need to document this valuable information while the elders who grew up eating these foods can still teach the old ways. These ancient subsistence details that allowed the *lñupiaq* culture to flourish evolved over many centuries for reasons we may never understand, but they warrant documentation for their historic interest, to maintain culturally relevant food technologies, and as a guide to delicious, healthy eating.

The indigenous recipes in this report are presented by first introducing each fish, because each species of fish is unique, and those characteristics that define these fish determine how they are used and how they are experienced as food. The spiritual and emotional aspects of fish as food in the *lñupiaq* culture do not constitute a part of this report. Nonetheless, for the subsistence person, food is more than a package off the shelf. It is the combination of one's life-long association with that fish: seeking it, catching it, cleaning it, preparing it to eat or store, keeping it safe from theft or spoilage, and finally enjoying it as food. People put a great deal of thought, time, and effort into having fish to eat; they worry about not having fish to eat. They receive their fish with gratitude as a gift from the waters and go to great effort to assure that the spirit of the fish is pleased and not offended, so it will keep allowing fish to be caught.

Included in this report are all 26 species of fish occurring in this study area, although about 12 of those are rare or seldom used for food today. Each species has a separate chapter beginning with its English, *lñupiaq*, and Latin names, along with a map of its range. A sketch accompanies a brief description and life history, including its foods, migrations, spawning patterns, and how it is caught. The bulk of each fish chapter, and of this report, systematically explains all the various traditional ways this fish is processed and eaten. In each chapter, recipes

are listed in the following sequence: roast; boiled; use of the eggs, stomachs and insides; hung to half-dry and dry; fermented; frozen; salted; and pickled.

However, this sequence is only approximately followed because each fish has its own unique properties and uses, and all of these preparation techniques overlap with each other. This can best be seen in the Appendix **Traditional Fish Foods**. It is a general, yet detailed, flow chart of all the possible ways a freshly caught fish might be traditionally used, acknowledging that most but not every fish may be used in each of those ways. Over 200 photos are included, taken by the investigator over the last 40 years, plus a few yet older, borrowed photos, to help the reader visualize the fish and foods. Sketches further help to explain the text, especially several sets showing how different fish are cut to hang or to eat. Many of the sketches include some handwritten explanation, and are presented as ‘notebook pages’. This includes the Traditional Fish Foods and the *lñupiaq* Fish Anatomy pages. All photos and sketches in this report are the work of the author unless otherwise indicated.

Following the fish chapters with their recipes, there is discussion under **Results** of each of the six main processing techniques listed in the chart of Traditional Fish Foods—drying (including smoking), freezing, fermenting, cooking, salting, and pickling. Whereas the average American would usually boil, roast, or grill a fish, the *lñupiat* would more often choose to dry, ferment, or freeze it. Actually, eating fish dried, frozen, or fermented is nutritionally similar to eating it raw, because the proteins have not been denatured by the heat of cooking.

Two main factors which have contributed to the excellent health of the *lñupiat* through the ages are the availability of fresh, naturally fed fish and in *how* they ate their fish, seeking out the fat- and nutrient-dense parts: invariably the eggs and often the liver, head, skin, and edible parts of the stomach and intestines. Another obvious and most interesting aspect of *lñupiaq* fish use is the prevalence of freezing as a preparation technique. Although most indigenous peoples of the world routinely dry and ferment their fish, the practice of eating frozen fish, both frozen when freshly caught, and in its many degrees of fermentation, is unique to the peoples of the Arctic where temperatures remain below freezing for about six or seven months each year and may some months average below 0°F.

Dr. Weston A. Price’s excellent research data [Price 1989], confirms what the investigator observed during this study: that the traditional diet and preservation techniques were adequate and healthy in the broadest sense of the words. The nutritional problems that did trouble the old *lñupiat* arose from periods of starvation when less optimal foods were eaten.

Three safety issues of eating fish today are discussed, also under **Results**:

- 1) Chemical **pollution** is continually worsening, particularly in the arctic, where it tends to accumulate in the food chain. However, the consensus among those studying this problem is that it is still far better to eat the local fish than any available alternative foods which are adulterated and polluted in other ways.
- 2) Worldwide, people who eat raw fish have a higher proportion of medically significant **parasites** than those who don’t. But most of the world inhabits warmer lands. Fortunately, parasitologists agree that freezing a fish for two weeks at –10°F effectively kills all the parasite eggs, cysts, and larvae that might infect humans. This explains the safety of these *lñupiaq* recipes that might seem alarming to the uninformed.
- 3) **Botulism** has always been of concern everywhere, especially in canned or fermented foods. However, it turns out that in this area, using plastic has caused most of the

problems and that traditionally processed foods that are done properly, without plastic, do not generally produce the botulism toxin and are considered safe to eat.

Although there are numerous books containing information about how traditional foods were prepared and used, none specifically addresses the traditional, local, cuisine in this manner—as a cookbook—with enough detail to actually follow and use these recipes.

Some of the *lñupiaq* words that are still locally used are included both in the text with an English translation and in an extensive **Glossary**, which also includes place names, scientific terms and other words requiring explanation. A separate glossary, **Fish Names**, lists each fish under its Latin, common English, and *lñupiaq* names, for easy cross-reference.

Further appendixes include: ***lñupiaq* Fish Anatomy**, listing all the *lñupiaq* and English names for the parts of a fish and **Traditional Fish Foods**, a chart of all the possible ways a fish might be used.

The appendix **Village View** portrays, for a few representative locales, how inhabitants experience harvesting and eating the local fish in the course of a typical season. It elaborates on the ways fish change through the seasons during their feeding and spawning migrations. The same salmon must be handled differently in July in Kotzebue where cool coastal breezes allow it to be dried, than in Ambler in August where the inland calm, hot temperatures may instead allow it to rot. Similarly, one would not assume that the same procedure of fermenting smelt used at Elephant Point would be safe to employ in Kiana, where the temperatures could be much warmer. This appendix also includes more extensive descriptions of certain fishery methods, including the under-ice fishery and the mudshark trap.

In conclusion, the traditional *lñupiaq* fish foods of northwest Alaska have been and remain the healthiest fish foods available, and their processing techniques of drying, freezing and fermenting remain an especially healthy way to use them.

PREFACE

In northwest Alaska, one of the harshest climates of the world, *Iñupiaq* people have created a unique, sophisticated food science including the traditional techniques of drying, freezing, fermenting, and eating food raw. They have preserved fish through summer heat, dealt with hordes of insects and all kinds of weather, and not only survived vigorously but ate delicious foods higher in nutritional value than many of our modern, processed, enriched, store-bought products.

The present report presents the ‘fish food’ information originally gathered for a comprehensive manual of traditional food knowledge of the region covered by the Northwest Arctic Native Association Corporation. This manual is the second in a series collectively called *Niqipiaq*, which is the *Iñupiaq* word for “real food,” the food from the land, which has kept the *Iñupiaq* people strong and healthy for countless generations. The first manual published, *Nauriat Nigiñaquat, Plants that We Eat* [Jones 1983], detailed the identification and preparation of local food plants. Further manuals about the sea mammals, land mammals, and birds will complete this documentation of *Niqipiaq*.

The main purpose for creating these manuals is to respectfully preserve the food wisdom of the elders of this region. The secondary purpose is to present the *Iñupiaq* recipes in ways that can be used by succeeding generations, who might not otherwise be exposed to this valuable knowledge. As this is a book written for the people of the region, commonly understood words and concepts are used, and are only explained in detail in the **Glossary**.

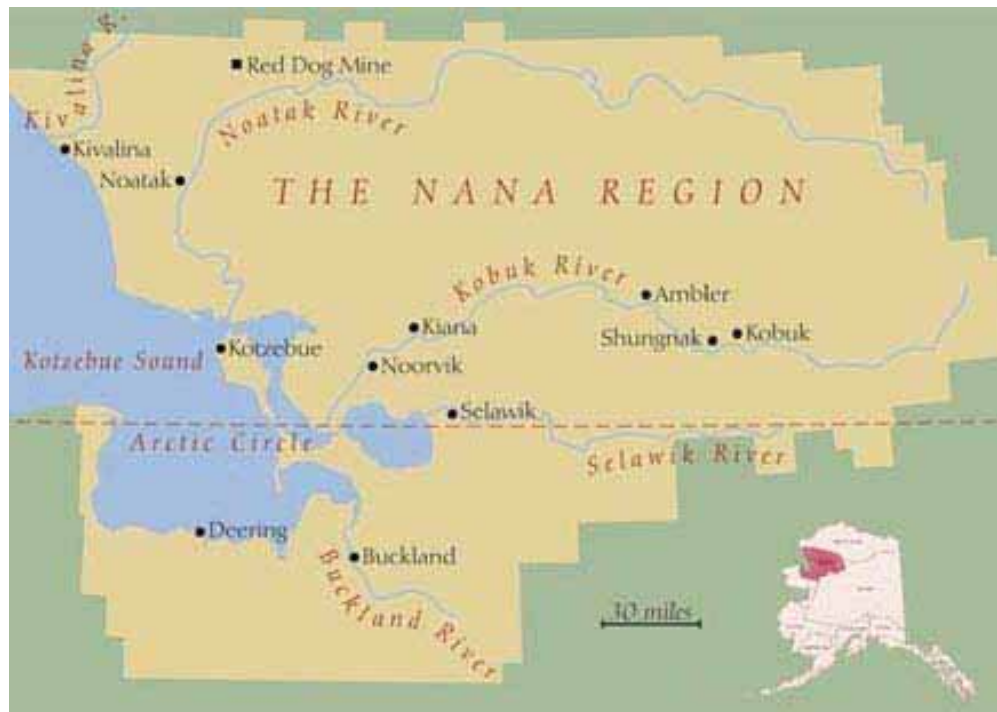
Fish are a very important food to the people of northwest Alaska, because they are almost constantly available. Fish have been a part of every season, every household, and, for most, a part of meals every day. Sometimes fish were the only food old-timers had to eat for periods of time when starvation threatened.

The *Iñupiaq* culture includes an exacting and refined culinary science expressing variety and ingenuity in the use of fish.

INTRODUCTION

The importance of this study to Federal Subsistence Fishery Management personnel, is in having this traditional ecological knowledge organized in one place, in a user-friendly format, that is easily accessible for researching answers to questions. By understanding how and when local people use fish, and by realizing how exceptionally healthy these traditional preservation techniques actually are (especially the drying, freezing, and fermenting), management personnel will be equipped to create the best decisions when balancing fish preservation with subsistence, commercial and sport use.

The area of study includes the eleven villages in northwest Alaska governed by the Northwest Arctic Native Association. Historically, this area has been a meeting and trading place, bringing together the Siberian peoples, *Yupik* Eskimos, more northern *Inuits* from Barrow and across Canada, Athabascan Indians, and eventually white peoples from many different cultures. Therefore, these ‘traditional *lñupiaq*’ recipes automatically incorporate some of the food-use practices from all of these other cultures and include a much wider area.



Much oral information has been distilled to produce this report of traditional ecological knowledge of fish-use in the study area. Apparently, no other exhaustive and comprehensive collection of traditional fish recipes exists for this area, or any other region of Alaska, making this *Iqaluich* report unique. Except for a few fermenting techniques, the majority of foods discussed in this report continue to be eaten today in this area. Although this report contains most of the local recipes, it by no means exhausts the local fish wisdom. More may yet be recorded, but much has already been lost.

Review of Relevant Literature

Most of the data collected was oral, and was personally gathered and tested, beginning from 1960 and continuing to 2003. Some further information was extracted and organized from written sources. The Public Health Service's *Alaska Dietary Survey* (1956–1961) [Heller 1967] first fascinated the investigator in the 1960s and focused her interests toward the study of these indigenous foods while she lived in the area. During this contract, Nita Towarak's unpublished manuscript, *Aqaluich–Fish*, 1988, was reviewed. It includes much information, most of which is not included in this work, and deserves to become a book in its own right. That information was taken, in part, from the Elder's tapes in the Bilingual Office of the Northwest Arctic Borough School District in Kotzebue. Insight into the old traditions was also found in the turn-of-the-century journals of Cantwell [1885] and Stoney [1899] and in Louis Giddings' several, excellent books of first-hand information [Giddings 1956, 1961].

There are several other sources of earlier information which were only briefly consulted during this report, but which have interesting and pertinent information on this topic, including Don Foote's work [unpublished], much unpublished, as well as that of Ernst Burch [1985] and Dick Nelson [unpublished]. The National Park Service studies hold much information about the resources in this region including Uhl's *Tagjumsiñaaqmiit, Ocean Beach Dwellers of Cape Krusenstern Area: Subsistence Patterns* [Uhl 1977] and Anderson's *Kuuvanmiut Subsistence, Traditional Eskimo Life in the Latter Twentieth Century* [Anderson 1998]. These have more detailed information about the various fishing techniques than are included in this report, although they were also part of the investigator's experience in the region.

The investigator's research is corroborated by that of Price [1989], although his work was not known to the investigator until around 1998. Dr. Weston A. Price was a dentist in the 1920s who took his office staff each summer to study a different group of people who had never left their native diet back through the centuries. In his search for perfect health, he studied twelve isolated populations, including meat-eating Canadian *Inuit*, African vegetarians, Swiss dairy farmers, native American peoples, and South Sea Islanders living on coconuts. In each group, he found whole populations of perfectly healthy people with few to no cavities and none of the modern diseases plaguing the world today. His research showed that traditional diets and food processing methods created healthy foods that in turn created generations of healthy people. From these widely different diets, he distilled common denominators necessary for perfect health. Sally Fallon's cookbook, *Nourishing Traditions* [Fallon 1999], beautifully explains how and why these traditional foods are superior to processed foods for creating and maintaining health, generation after generation.

Steinkraus' *Handbook of Indigenous Fermented Foods* [Steinkraus 1983] further confirms that indigenous peoples around the world fermented much of their grains, vegetables, fruits, dairy, meats, and fishes to create delicious flavors and enzyme-rich, partially predigested foods that supported superior health.

Zona Spray [Spray 2001] has found that the traditional *Inupiaq* foods, as a whole concept, are comparable to the other cuisines of the world in all of the criteria that define a cuisine:

1. Indigenous foodstuffs—the local sea and land mammals, fish and birds.
2. Unique cooking methods and preservation technique—boiling with hot rocks; and drying, fermenting and especially freezing.

3. Specialized implements and preserving equipment—*ulu*, pokes, cold storage, drying racks.
4. A specific heat source—blubber, wood, and tundra plants.
5. A distinctive flavoring or spice giving all foods a unified flavor—seal oil.

Use of *lñupiaq* words

The *lñupiaq* words used in the text are still commonly used today in this area. Many, but not all, of their spellings were corrected by Ruth Sampson in the Bilingual Office of the Northwest Arctic Borough School District, by Minnie Gray of Ambler, and by several others. *lñupiaq* spellings were further referenced from the *Kobuk lñupiat Junior Dictionary* [Pulu 1979]. For purposes of this report, English names are put first in the text, with the *lñupiaq* word following in italics. Each fish chapter begins with three names of that fish, English, in regular bold type; *lñupiaq* in a special *lñupiaq* font; and Latin in italic. This same differentiation is also used in the **Glossary of Fish Names**.

There are two separate glossaries in the Appendix. All of the *lñupiaq* words in this report (except the fish names) are translated in the Glossary, usually under both the English and the *lñupiaq* heading for ease in looking them up. The place names, fish anatomy, and any other words needing a definition are also in this glossary. The second glossary has the three names of each fish: listed separately under the English, *lñupiaq*, and Latin name. Although great care has been taken to assure that these spellings are accurate, they are not presented as an absolutely authoritative standard of *lñupiaq*. An *lñupiat* bi-lingual person or qualified linguist should be consulted for positively accurate spellings and translations.

Graphics

All of the photos were taken by the author (between 1960 and 2003) with a few exceptions, as noted. The fish sketches used as descriptive of the species, which are printed below the range maps, were from several sources. The author drew many from life and sketched others from the excellent illustrations in Mecklenberg [2002]. The sketches that show scales were reprinted from the Alaska Department of Fish and Game's Wildlife Notebook Series [Hull 2002]. They include one descriptive sketch of round whitefish and a page with sketches of all five whitefish shown together for comparison. Otherwise, all of the sketches in the report were made by the author.

The range maps were created by coloring a blank Alaska map with the information found on the range maps in Mecklenberg [2002]. In order to include some of Canada and Siberia, information from range maps in both Morrow [1980] and Scott [1998] was added. Although generally consistent, where the three sources showed minor variations, the author arbitrarily compromised, marking the ranges based on logic, and emended a fish range based on firsthand observation. In light of this method of compiling the range maps, readers requiring authoritative fish range distributions should consult Mecklenberg, Morrow, and Scott.

Organization of the Fish Chapters

Every possible system considered for organizing this material had some inconsistencies and problems. The method used in this report, presenting the fish by ecosystem, was chosen in an attempt to portray the feeling one has about these fish foods from an insider's viewpoint—from the viewpoint of the subsistence person, searching out these fish, catching, killing, gutting, and processing thousands of each fish over the years, and eating them daily. Each type of fish has its own unique character, composed of their shape, color and smell, all of which are constantly changing as those fish follow their life cycle through the differing ecosystems of their habitat. Likewise, each recipe is not an isolated entry in a cook book, but rather a complex of all of the above fish characteristics as influenced by the weather, temperature, geographic location, time of season, individual preferences of the person, and many other factors influencing that particular day and place. Included herein are some of the people's attitudes, based on their lifetime of association, toward each fish. These complexities of factors influencing how a fish may be used are not easily reduced to the printed page, but the chart in the Appendix called Traditional Fish Foods gives some idea of the possibilities.

Besides presenting each fish's 'personality' and lifecycle with the recipes for their use, the fish are organized by their four main ecosystems with the following exceptions: trout are lumped together because they are used similarly, albeit the lake trout and Arctic char are strictly freshwater and not anadromous. Two flounders are listed together because they are each minor and are used similarly. There are so many possible bullheads in the study area that no range map was included and no effort made to key out the common species, since they are used the same way and are of minor significance. In contrast, the six whitefish are listed consecutively while also spanning both the anphibrous and freshwater ecosystems. Whitefish as a group are of major importance, and they have numerous similarities in use.

Village View

An appendix, Village View, lists the fish sought and prepared during the seasonal cycle of a year in several different villages. This treats the same information by geographic locality instead of by fish. Each Village View is presented as if told by one who has fished there for many complete years and is in tune with that particular place with all its uniqueness. This helps the reader to understand some of the following variables:

Weather patterns differ between the cooler, windy coast and inland, where temperatures are much hotter and there is little wind. The drying process in the interior village of Shungnak is different from that in Kivalina, and their dried fish tastes different.

Fish usually change through their seasonal cycle in response to their growth, a changing food supply and as they migrate to spawning grounds or overwintering places.

The geography of each village varies between a freshwater river (the six Noatak and Kobuk River villages) and the ocean plus a lagoon between a river and the sea (Kivalina, Sisualik, Kotzebue, and Deering). Buckland lies along a river but is also close to the salt water, while Selawik is surrounded by a vast complex of fresh and brackish water lakes and sloughs, fed by both freshwater rivers as well as by salt water.

In these sketches of each local seasonal fishing activity, the different use of, and attitude toward, the same fish can be seen.

Principal Hypothesis

The principle hypothesis of this study is two-fold: that the *lñupiat* have a rich culinary expertise, intricately balanced with their environment; and that these traditional *lñupiaq* foods are not only delicious but also nutritionally superior to anything else available.

METHODS

For the 41 years prior to this contract, the investigator had been gathering data from local people, mostly the elders, both *Iñupiat* and Caucasian. For 23 of those years she lived in the area and raised her family, harvesting, preparing and eating the local foods. This knowledge was absorbed through informal association with friends through the seasons and the years. The investigator kept notes, took some photos and made some sketches while visiting, traveling and camping with the people who knew the old ways. By sharing the gathering, preparation and enjoyment of these foods, on a daily basis, for many complete seasons, a far deeper understanding of the foods was learned than could ever have been achieved with the typically briefer types of research.

Perhaps less than one percent came from books, and what literary data was used, was tested in the context of what had been learned from local people.

The techniques used were mostly listening, practicing what was learned, and keeping a journal, as time and conditions permitted, which was sporadic at best due to the demands of that lifestyle. Photos were taken of fish, processes and foods, and a few sketches were made, although the immediate work of processing food to eat often precluded documenting the interesting details. This information was communicated orally, as well as by example and lesson, while talking and working together, in an informal manner.

What was learned, was practiced and incorporated into the investigator's lifestyle, which generated more questions, and the need to listen for deeper levels of understanding. Along with the recipes, or directions on how to handle each food, came a wide spectrum of variables to integrate into the total picture.

The equipment used was mostly notebooks and pens or pencils, plus quite a few different single-lens reflex cameras over the years. Most photos were slides, plus a few monochrome and color prints. Within the last four years, a Canon Power Shot G1 digital camera with 3.3 megapixels was used.

The other equipment used to gather most of this data included everything necessary to live a subsistence lifestyle in the study area in 1960s, including a boat, motors, kayaks, many different gill nets, a share in a seine, *ulus*, many containers, fish racks, tarps, cutting boards, tubs, wooden oil barrels, sleds, dog team and harnesses, sno-machine, tents, camp kitchen, proper clothing for cold weather as well as for rain and wind, etc.

After acquiring this comprehensive understanding about the ways fish are eaten, this contract with the U.S. Fish and Wildlife Service began, with the purpose of extracting the information out of the notebooks and organizing it into this report.

The methods used during this study were a continuation of the previous 41 years mentioned above, plus formal interviews, sometimes with a tape recorder, which were later transcribed by the Investigator. Being able to fly to those villages which had not been previously visited allowed conversations with several new friends there, demonstrating how the geography influenced their fishing, confirming what fish they had, and elucidating how they handled them. This also allowed a check on the accuracy of what had already been learned and written, plus the opportunity to ask key questions about points that were confusing and to pick up some of the subtle local variations in technique.

During this contract, the following equipment was used to produce this report: a Macintosh Powerbook G4 laptop computer, an Epson Perfection 2400 Photo scanner, and an

Epson Stylus Color 740 printer, plus several small tape recorders, a digital camera, telephone, pencils, notebooks, and sketching equipment. Some of the information is included in a 'notebook' style with sketches and hand printing on a page. These were scanned and placed in the text along with the other sketches, photographic prints and slides.

RESULTS

The results of this study are presented in the following 29 chapters. Each chapter identifies a different fish common in the study region, and details all the traditional ways that fish were used in the older *lñupiaq* culture during the last half of the last century. Most of these recipes are still commonly used today.

These fish are further organized into a combination of the four habitat groups plus listing similar species together. The six saltwater fish require ocean water the year around although the smelt and some flounder and bullheads go briefly into brackish and even fresh water. Salmon and trout are the anadromous fish, which spawn in fresh water, then after feeding and growing in the ocean, return to their freshwater stream to spawn. However, the three trout are listed together even though the lake trout and the arctic char are freshwater and not anadromous. Amphibious fish migrate between their freshwater spawning areas to feed in brackish water, then return. These four amphibious fish plus the freshwater broad and round whitefish are listed consecutively as the six whitefish in this area and have similarities of their own. The eight freshwater fish require freshwater throughout their life, although floodwaters occasionally carry a few into the brackish and salt waters where they do not thrive well.



Laura Smith cutting fish at fish camp near Selawik, 2002

PART I

SALTWATER FISH

- **PACIFIC HERRING**
- **TOMCOD**
- **ARCTIC COD**
- **FLOUNDERS**
- **RAINBOW SMELT**
- **BULLHEADS**

As a group these fish require salt water throughout their lives and do poorly when the salinity drops too much. However, some species of flounder and bullhead travel into and even live in brackish waters. The smelt is a marine fish which travels up freshwater rivers to spawn, but must get back to the salt water within a few days.

When herring and smelt become available during spawning, they are harvested briefly by those living close by. Tomcod are available year round but are usually only fat and good to eat in late fall. The herring, tomcod, smelt, and Arctic cod also provide vast quantities of food for many fish, birds, and mammals. Most people consider flounders and bullheads a trash fish, useless to people and a great bother in fishnets. However, they do have a culinary value, not only for variety, but in their own right, when they are fat.



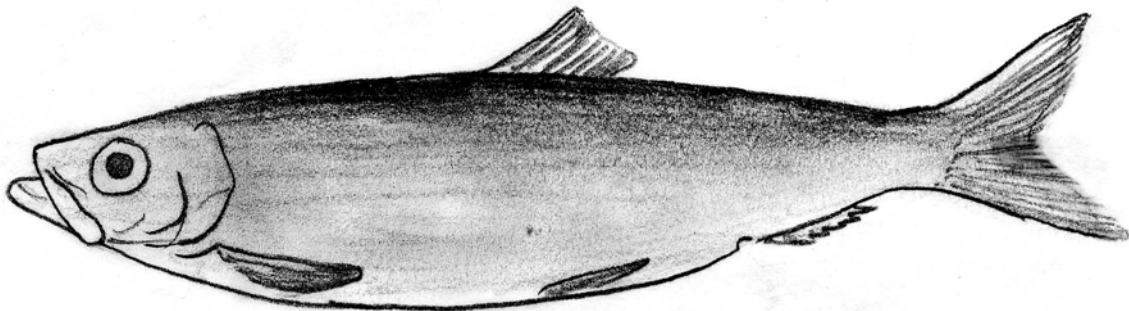
Bob and Carrie Uhl, Sisualik, 1987

PACIFIC HERRING
UQSRUQTUUQ
CLUPEA HARENGUS



Description

- Herring are dark blue-green on top, silvery/pale blue sides, and silvery underneath.
- They have large, thin, silvery scales that come off easily.
- Their mouth is large, with no teeth on their jaws but fine teeth on the roof of their mouth.
- Herring have a large eye, no adipose fin, no black spots on side and no lateral line at all.
- The lower jaw slightly projects beyond the upper.
- There is a small, finlike structure at base of pelvic fin[AJ16].



- Herring average 10” (25cm) in length, but some reach 17” (43cm). They mature sexually at 3 to 4 years, live to be around 9 years old, and some reach 18 years in the Bering Sea.
- Eggs range in size between 1.2 and 1.7mm, and they are adhesive. Eggs are pale tan, semi-translucent, and turn white when cooked.

Seasonal Feeding and Spawning Movements

Herring move offshore to feed in the summer and in-shore to overwinter where fresh waters meet salt waters. This area includes from the channel mouth southwest of Kotzebue, all along the beach front past Kotzebue, up the channels to the Little Noatak sloughs and into Kobuk Lake. Their local presence most or all winter long provides an important food source for sheefish and seals. Herring eat zooplankton, including tiny fish and white shrimp.

Herring are extremely fat in the fall and somewhat less so in the spring. They spawn in this area in the springtime, although their eggs have not been observed in any quantity, stuck to things underwater as they are seen stuck to seaweed in Bristol Bay. Since no seaweed grows locally, it is presumed they would spawn on anything under the water, like willows, roots, or abandoned fishnets.

The four herring in Figure I-1 were caught in autumn at Sisualik with a one-inch gill net.



Figure I-1.

The following quote from Bob Uhl shows some details of possible spawning activity in the lagoon behind Sisualik:

“Herring are a salt-water fish that can’t tolerate much brackish water before going into a type of freshwater shock. So, to spawn here they have to swim into cold, brackish water, spawn, and then get out before the water gets warm enough for their eggs to hatch in the next 14 days. Sometimes when they can’t get out in time, they may die, which may be why they have occasionally been found dead along the shores of Krusenstern Lake.

The lagoon behind Sisualik often builds up a lot of overflow ice, which takes a long time to thaw. This lowers the water temperature and possibly prevents herring from spawning there on some years. Some years we have caught herring there in springtime with a one-inch gill net, other years we have caught nothing.”

Harvest

Most herring are caught by seine in spring at Elephant Point, and in autumn off the beaches of Kotzebue, Deering and rarely Kivalina. Some are also caught with one-inch gill nets, in all these places. Herring are also caught by jigging with small, barb-less, single hooks all along the Kotzebue waterfront around breakup time. They are also caught on sports gear.

Use / Recipes

Herring are so fat in the fall they are cigar-shaped, almost round, and their flesh is soft and mushy. Because they are so fat, herring are never firm like other fish, unless they are salted or pickled. The best ways to eat herring are to bake them fresh, salt them down for pickling, or ferment them in sacks for *quaq* (frozen fish).

In autumn, one might presume that dried herring could be frozen and kept well. However, they are so fat that drying is completely out of the question since they become rancid so easily.

In the spring, herring have a large roe sack that makes up half or more of their weight, and much of their food value. These eggs are always saved and eaten along with the fish, and sometimes, only the eggs are eaten.

Nutritionally, herring are unique because they are the only fish in the study area that has vitamin D not only in their oils, but in their meat as well. Thus, eating herring provides vitamin D, necessary for the utilization of calcium, and phosphorus.

Fresh Baked, *Argiq*

- The best way to eat herring is baked or fried up crisp the same day they are caught:
- Scale and gut your catch of herring, then rinse them well.
 - Select as many fish as you want to eat (or that fit your baking pan).
 - Cross-slash the flesh along each side to let oil and moisture escape.
 - Put the pan into a hot oven, (400°F), and bake until they are crisp. This may take 15 to 30 minutes, depending on your situation. The secret is to take them out, just short of burning. At first, the moisture in the meat keeps them from burning, but towards the end, you have to watch them very carefully because 15 seconds too long and they will begin to burn. Never let the oil smoke but leave them long enough to crisp all but the deep inside bones. A coat of flour can keep them from sticking, but is not necessary.
 - As soon as you take them from the oven, pour off the rendered oil, so it won't soak back into the fish.



Figure I-2.

Note in Figure I-2 how the flesh has been cross-slashed to allow more oil and moisture to escape. This technique does two things: it renders out as much extra oil as possible, and in the process, the fins, head, and most of the bones become so crisp that you can eat them along with the meat, like chips. You just chew up the crispy bones, fins and much of the whole head along with the meat. If some bones are too hard, just spit them out as you chew. These not only taste good, and have an enjoyable texture, but they are an excellent source of readily available calcium. The oil that renders out is good to use as long as it isn't burnt. Use it anywhere a fishy taste is welcome, such as with fish *paniqtuq*, (dried fish).

Dry fish, *paniqtuq*

In the spring, herring are as lean as they will ever be. This is the only time they might possibly be dried for people in perfect, cool, windy weather, as may occur along the coast in June when the herring spawn. The large amounts that used to be dried were mostly for the many dogs during the days of dog teams, and it didn't matter if many were dried too hot, had maggots, or were otherwise not fit for people to eat. Few are prepared that way in this area any more. Today, people usually try to get just enough to eat fresh, salted or pickled. However, perfectly dried herring are a good food, if stored in the freezer, eaten soon, and if they are not allowed to become rancid.

When drying for human consumption, lay or hang the eggs separately. As both eggs and fish are drying, they are losing varying degrees of moisture each day, which changes their consistency. Therefore, their flavor and texture will change each of the first few days as some are roasted crisp in the oven, or frozen for *quaq*.

Hannah Stalker talks about how her family fished and dried herring when she was a girl living in Buckland:

“At Elephant Point in June, the herring come in to spawn along the beach by the thousands. They are full of rich eggs. We catch them by seine and pile them on the shore, then in tubs to divide. Then we start to work them. We use a board

with a nail sticking up on one end. We put the herring eye on that nail to hold the fish. Then we take a knife and slit open one side. We even leave the guts and eggs in because they are mostly for dogs.

Then us kids laid them out on the grass, we just covered the grass with the fish. After three days, we stirred them around with sticks so they could dry on the underside for three more days. We made a needle, put string on it and ran it through one eye of each half-dry herring. We hung the strings up on the cache to let them keep drying.

Then after they were all the way dry, we piled them up and stored them. We ate the ones that dried well, just the good parts. We ate them dried with oil.”

Fermented un-frozen fish, *tipliaqtaaq uilaaq*

The second best way to eat herring, (after baked), is to put them away in sacks in the shade until they are about a week old, and then eat them uncooked and unfrozen as *uilaaq*, (raw, fermented fish). See **Broad whitefish, *Qausiluk***, for more information. You can only do this when the weather is cool, in late September around Kotzebue. Herring ferment well, and are exceptionally delicious prepared this way.

To eat *uilaaq*:

- Take as many as you want to eat right then, out of the sack.
- Gently rinse off any scum and oxidized juices. (Rinsing is optional.)
- Pull bite-sized pieces of flesh off the bones with your fingers to eat. They are much softer than when fresh so you can just eat them with your fingers. You may need a knife to cut the skin. The longer they ferment, the more they change, becoming softer, stronger smelling, and more delicious in taste. At some point, which is different for each person, the fish become too strong to eat, and then they are dog food. (See warning in **Discussion** about botulism.) This fermenting was also done in early spring around Buckland, when the weather was still cool.

Below, Beulah Ballot, now a Buckland Elder, talks about fermenting herring in camp when she was a girl:

“As soon as we catch herring at Elephant Point, we dig a hole about a foot square, or a little more, and line it well with grass. We put whole herring in a gunnysack and put the sack down in the hole. We cover the sack with more grass and then pack clay and dirt tightly over it, about eight inches to a foot of soil. We can tell when they are ready by when we smell them.

We take out as much as we want to eat that day and cover them up again. They are very strong so we don’t eat a lot but they are so good. We can’t wait until they are ready to eat. That’s why we hurry to start them fermenting, so we can eat them up, before we move away to our berry picking camp.

We really like the herring eggs, and pop them out of fresh fish to eat any time we are hungry. When we want many eggs to eat, or dry up separately, we hook them

out of many herring, by sticking our finger into the body cavity just back of the pectoral fin (on the side) and pulling them out.

We also like the eyes fresh and hook them out with a sharpened point of a reindeer horn. On the dried, and half-dried, herring, we like to pull off the hanging-down-eyes to eat. Sometimes I cut and hang the herring like whitefish and cut the meat lengthwise to let the oil run out.”

Fermented, frozen fish, *tipliaqtaaq quaq*,

Every region has its typical food and in autumn, Kotzebue used to have sacks of herring in every entryway, fermenting for *tipliaqtaaq quaq*. That’s almost a ‘food of the past’ now. That herring *quaq* was very good. Although herring are very fat they ferment well, and the fermented food is less apt to cause diarrhea, than is fat trout.

To eat:

- Cut off the head and tail and a strip down the length both top and bottom.
- Peel off the skin,
- Eat the fish meat frozen as *quaq*.
- Cut away any yellow, oxidized areas from each side, which have a disagreeable, rancid taste. Any part of the fish is good to eat if it isn’t yellow, even the green parts, which have a taste of their own. This green color is not a sign of spoilage but rather a curious aspect of herring *quaq*.

Extra herring, to be frozen for later, will keep better if they are fermented, and even then should be used up before two months because their high oil content will cause them to become rancid. Bob Uhl tells about freezing fresh herring:

“Fresh herring don’t keep well frozen. We froze some in plastic and along about the middle of winter we remembered how delicious those fresh baked fall herring had been, so we baked them. They were yellow and terrible tasting, they’d gotten so rancid.”

Salted Herring,

Salting seems to be the best way to preserve fat herring because it arrests the oxidation better than does freezing. You want to slightly over-salt them to err on the side of too much salt rather than too little, so you are certain they don’t spoil. Salting “cooks” the fish, which toughens it so it has a firm, durable texture, like a fresh fish. Salting also begins to break the tissues down so they will absorb the vinegar when pickled. However, herring are so fat they don’t absorb much salt and don’t take long to freshen. Two changes of water in a 24-hour period are enough.

(There is more information about salting fish in **Salmon**.)

Pickled Herring



Figure I-3.

Pickled herring (Figure I-3) are a favorite food everywhere. The large roe sacs are especially delicious. They are crunchy to eat, because the firm, pickled eggs pop between your teeth. Although not as fat as fall herring, those caught in spring with eggs are still fat enough to pickle.

This recipe, (which may be used for any fat fish), starts out for freshly caught herring:

- Use only firm, fat fish, and take off their scales.
- Slit up the belly and pull the insides out, saving only the eggs.
- Trim away the tail and head, and every bit of blood, then rinse well
- Cut both the fish and the egg sacs into pieces all the same size, about one inch thick and one to two inches long. About 3 quarts of herring pieces can be pickled in a gallon jar.
- Soak the pieces of herring for one day in a brine of 2 cups salt per gallon of water. (For a less salty taste, soak for only half a day).
- Stir occasionally, and be sure that the pieces of fish are floating loosely in the brine and not packed tightly together.
- Pour the brine off the herring and rinse the pieces in fresh water, then let them drain very well.

(From this point on, you could also use herring that has been salted and only partially freshened).

- Prepare a vinegar solution by boiling a half-cup of pickling spices in 3 cups of water for 5 minutes.

- After this has cooled, strain out the spices, then, mix this water with an equal amount of 5% vinegar.
- Cut up a small, raw onion, and maybe a few cloves of garlic, or a quarter cup of diced celery. Hot red peppers brighten up the taste and appearance, yet all are optional, as are the quantities.
- Put the herring pieces mixed with the vegetables, into a gallon jar, crock, or enamel container. Do not use any type of metal.
- Pour the pickle solution over the fish to fill the jar to a half-inch from the top, or to cover all the fish well. If you don't have enough solution, dilute enough 5% vinegar with an equal amount of water, and add it to cover the fish.
- Adjust the quantity of herring and solution so the fish are not packed tightly and can be gently stirred.
- Use a wood, stone or ceramic weight to hold the top pieces of fish beneath the pickle. Never let the pickle solution touch metal.
- Lay a loose lid over the top of the jar, or tie a cloth over it.
- Store in the refrigerator, or a cool place in the house. The warmer they are, the faster they will cure, but they should stay under 40°F.
- Stir gently each day, for the first four to 6 days, to be sure that the pieces pickle evenly. As soon as the center is pickled, they are ready to eat. To check for doneness, cut a piece and look to see how far the pickle has penetrated. You can see the change in texture, from translucent, raw fish, to slightly opaque. You can taste the difference too. It won't hurt you to eat some before they are completely pickled, while the inside is still raw, because it has already been cured by the salt.

Stories

Bob Uhl remembers when the fall herring would come to shore:

“Herring come on those cold nights in the last half of September, when the ocean is calm. They stay a ways off shore—just enough so if you get your Kuvrachak, (gill net), a net-length again further out you can catch mostly herring and avoid the bits of debris, floating near shore, as well as a net full of too-small tom cod, good only for dog food. You can see them coming—flipping in the water, making a soft, whirring sound. It looks like a strong offshore wind ruffling the calm water but it's only herring by the thousands.

They don't spawn in the fall but come in to spend the winter. There is evidence of herring remaining around for at least the first half of the winter because they are found by the thousands frozen into the overflow ice, where they were carried up from the saltwater. They also fill the stomachs of seals taken in December and January.”

A Kivalina resident comments on herring:

“There are herring around Kivalina all right, but we don't go after them because we have better food. Last time someone seined herring, the net was so full and

heavy that they had to turn one end loose and let them all go. It was too heavy to pull in."

This is a story by *Paiyiq*, now a Kotzebue Elder, when she had just moved to Kotzebue from Noatak.

"When I was a young woman with my year old daughter, Daphne, I was spending the fall alone in a tent down below Kotzebue, while my husband was away working. Every morning a man would walk way down the beach by my tent. At first, I was scared of him, and I kept real quiet until he left by mid-morning. I would hold my baby's mouth shut so she couldn't cry.

Finally, I got tired of being scared, so the next morning when he walked by, I just got up and started pumping the Coleman stove to make coffee. I was tough enough. When he heard me, he came up and called out,

"Hi Bunning! I'm your uncle. May I come in?"

I was so surprised, and happy to see him. I made him coffee and breakfast and we had a good visit. I felt foolish for being scared for so long.

He came every morning, at daylight, even though it was a long walk and cold, sometimes windy, with ice along the shore. Every morning he stopped for coffee and breakfast and warmed up, but his eyes were always on the ocean, watching for the herring to come.

Then, one morning he saw them, the calm water ruffled by their fins breaking the surface. Then more and more came, and it was as though the wind grew strong, as they came by the thousands, flipping out of the water, making a soft whirring sound. Yes, the herring had come in to shore, and he didn't even come in but hurried back to town to tell his friends and get ready to seine.

*When they came back to seine, I *amaq* (carried on my back) my baby down to the beach to watch them, since I had never seen people from Kotzebue seine, only in Noatak, where I was from. They were all old people, both men and women, who had done this for years. They had just set out the seine, and were now pulling it in as I approached. I could see right away that there were too many herring! and the people were too old and weak to finish pulling the seine all the way to shore. They all had on low mukluks and didn't want to get them wet. I could see that they needed help.*

My uncle was on the far end and the man on this end was the one who had always teased me. All my life he had made me miserable ever since I was a little girl. He also used to pull on the parky hood of my little brother who was a slow runner and pull him along with his hood to help him run faster in races. My brother had hated when he did that, even though he had won the race. I was remembering all this as I walked down to the beach, sat down and began taking off my mukluks.

"If you watch my baby," I told the oldest woman, "I'll pull on the seine."

So I lay my baby down beside her, and instead of grabbing the rope to pull, I grabbed that man's hood and pulled it hard, like to pull the seine from his hood.

“No! No!, baby, Nooooo!” he yelled real loud at me as his hood choked him. I just kept on pulling him and the seine hard, as he yelled at me. The other people burst into uncontrollable laughter, because they also remembered how he had teased us when we were young. They laughed so hard they got weak, and we almost lost everything.

But, I finally let him go, and waded right out in to that cold water, up past my knees, with herring all around me. I stepped on the bottom line so herring couldn't keep escaping underneath, and lifted up on the top line that was sinking, and pulled with all my strength right in the middle of the seine. I was big, and strong, and young, and I pulled it in for those old people. They were still laughing too hard to be strong anyway.

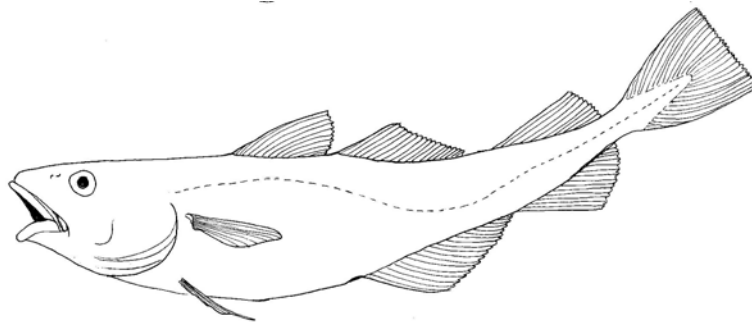
So many fish! Now we were all shouting and happy to have so many herring. We put all of them in to sacks. Everyone had to have a share, and we divided the sacks for our shares. I just gave my share away because I didn't know what to do with herring. I wasn't used to eating them. Later, my husband sure scolded me, because herring are so good for quaq.”

Tomcod
Uuaq
Eleginus gracilis



Description

- Tomcod are mottled brownish grey-green on top, yellow to white underneath, with an overall yellow wash.
- Their upper jaw sticks out farther than lower jaw, hence, their mouth is not terminal.
- The lateral line is continuous for almost the first half then it is interrupted to the tail.
- Their barbel is as long as their pupil diameter.



- Tomcod reach 20” (51cm) in length, although they are much smaller in our area, like 12”. They reach sexual maturity around 7 years of age and may live to be 13 years. Eggs are tiny, in bright orange sacks, which turn pale yellow when boiled.

Seasonal Feeding and Spawning Movements

The following quote from Bob Uhl shows the importance of tomcod in this area.

“A sub-arctic species, tomcod have sustained life in this area more than any other single species down through the ages. Pre-1900s, in late winter of some very poor years, summer stored foods were used up and there were no other animals or fish or birds around to be caught. Then the local Iñupiat people often faced starvation. However, they could always go out and hook tomcod through the ice.”

They have always been there. Seals are another sustaining food of people in this area, and seals depend on tomcod.”

All winter, along the coast, tomcod can be found where fresh water meets marine waters in places like Kivalina, Deering, and Buckland. Around Kotzebue, this habitat is roughly from Little Noatak and Pipe’s Spit, east into Kobuk Lake, then all along the Kotzebue shoreline, to the channel mouth, out in the ocean. Tomcod are scavengers, and eat what they can find off the bottom, sometimes including other fish’s *anuk*, (excrement). As winter progresses, these other fish grow hungry, their *anuk* becomes poor with few nutrients, and consequently, the diet of the tomcod declines. Then, as their flesh loses protein, and their liver loses fat, tomcod grow skinny, making them taste poorly and provide little strength.

Some old stories tell of lean years when...

“Tomcod caught after Christmas, were so hungry and skinny, that dogs fed all they could eat actually starved to death. People could live on them only when they had enough seal oil to eat with the lean fish flesh.”

With breakup, tomcod go out to the ocean for the summer where they feast on shrimp, crabs, and the remains of other creatures killed by storms. They grow healthy, with fat livers and delicious meat. When they come back into Kotzebue Sound in the fall, on their way to spawn, they are fat, with big egg sacs. Then they taste very good, because of the high-class diet they have been eating.

Bob Uhl comments on tomcod feeding:

“They follow the tide line right with the brown water where it meets the clear salt water, living close to the bottom where they scavenge food”.

“Those tomcod are surf feeders and primarily scavengers as evidenced by the interesting assortment in their bellies: bullhead, eel bleny, shrimp, putuguqsiugayuk, six-inch sea squirt, and large clams, even with their shells. The one found, was a cockle type but more smooth, not the usual cockle. In fact, the tomcod often don’t show up here until after the first storms when they come along feeding in the surf. They also are found in every lagoon up the coast, and when trapped inside become thinner and weaker all winter, as fresh water dilutes the salty water.”

Harvest

Small, barb-less hooks are used to jig for tomcod, and some are caught in small to medium sized gill nets set for other fish.

Traditionally, tomcod are hooked all fall through the ice out in front of Kotzebue, Kivalina, Buckland, and Deering, as well as in the lagoons. In Buckland, people can hook them in front of town all the way down to Igloo Point. They keep only the larger ones, which are fatter, and throw back the smaller, skinny ones. Let them get bigger. It’s the same when caught in gill nets, only the very biggest, and best ones, are kept.

Although the tomcod are around all winter, there is a point of diminishing return when the ice is too thick, the weather too cold, and the days too short to be worth the effort of hooking for them. Actually, the old style hooks required a certain amount of light for the fish to see them beneath the ice and snow. Today, with power drills, easy transportation, and flashy lures, fish can be caught much later in the fall and earlier in the spring in dimmer light. Although they are poorest in flesh then, some larger fish may still be good enough to eat or hang for drying.

Figure I-4 shows 11 freshly caught tomcod on the cutting board, ready to be cut to hang and dry.



Figure I-4

Use / Recipes

Fresh, tomcod are most often served boiled, but they could be baked. Hung for one day, they are best baked in the oven because they are still moist and baking tends to dry them out more. After the second and third day of hanging, they are too dry to bake, and are better boiled as *iyamaagtuk*. After that, they are allowed to continue drying completely for *paniqtuq*. They also are eaten as fresh-frozen *qauq* but never fermented because their digestive juices cause them to ferment too fast and in an undesirable way.

Cod typically store their oil or fat in their liver and their flesh is always lean. Although their flesh has a grayish green cast when raw, it cooks up white, with a gentle firmness that tends to separate into chunks. Tomcod have a distinctive, strong flavor, which is exceptionally delicious when they are healthy and are eating good food, but can be unpleasant when they are

starving. Tomcod are especially loved by those who grew up eating them, and often very elderly people will still have a hunger for tomcod long after they have lost their appetite for other fish.

Baked, *Argiq*

Tomcod can be baked fresh but usually aren't, because baking works best with fish that have oils in their flesh, whereas tomcod have all their oils in their liver. The best way to bake tomcod is the first day after they are hung to dry, when they are still moist. Then baking them in the oven tends to dry them out a bit and they are quite good.

Boiled, *Igaapiaq*



Figure I-5.

This is a common way to eat tomcod, as shown in Figure I-5:

- Take out the stomach and intestines of the freshly caught fish.
- Remove the gall bladder from the liver.
- Save the liver to boil with the fish, or save it to make *tiñaulik*.
- Leave the eggs in, and discard the milt.
- Cut the whole fish into two or three pieces, or cut as shown to hang, or leave whole.
- Bring water to a boil. Salt water may be used, or fresh water may be salted, or left unsalted.
- Drop the pieces of tomcod into this rapidly boiling water.
- Cook 15 to 25 minutes, or until thoroughly cooked through, but not so long that the pieces break apart.
- Drain away the water, or lift the pieces of fish out of the water to a serving plate.
- Eat hot or cold with the livers, and/or with seal oil.

Tomcod livers, *Uukkat tijuich*

A comment from Bob Uhl:

*“As I cut open the tomcod, and prepare the livers, I cannot fail to marvel at the beauty of the gall bladder. It’s no wonder the *lñupiaq* name for the first Russian trade beads was *sunaqnaurak*, named after the tomcod’s gall bladder. They truly look like gems, catching the light with ever varying rich colors”*

Sometimes parts or all of their liver is green—even bright green. It is quite a contrast with the usual pale pink or creamy tan color of other fat fish livers. The green is safe to eat and apparently doesn’t affect the use, or taste, of that fish and liver.

Tomcod liver is excellent, but only in the fall when they are eating well. It is delicious cooked with the fish, and is a second best choice for *tijaulik* after the trout are gone. (See trout for *tijaulik* recipe).

Tomcod livers are richer than trout livers and go further in *tijaulik*, and are unique in that when taken freshly out of the fish (within a few hours or half a day), they make a thicker paste, which coats the blackberries like *akutuk*. Older livers are less firm and more slimy and make a thinner paste that separates from the berries a bit, but are still good to use and eat.

To prepare livers:

- They must be dropped into boiling water and not brought up to a boil from cold water.
- Cook just until they are thoroughly done.
- It is important to never mix water with tomcod livers when making the paste for *tijaulik*, (as with trout livers). They are good eaten while hot with a meal.
- Let them cool. Now they are ready to store, eat, or mash for *tijaulik*.
- Mash them up after they cool, so the oil doesn’t separate out. If mashed while still hot, a lot of oil will separate out.



Figure I-6. Boiled Tomcod Livers.

There are two schools of thought in the study area: traditionally, during periods of food shortage, every drop of this liver oil was saved because it is exceptionally high in the fat-soluble vitamins A, E, and especially D, which are stored in the body and are crucial for maintaining good health through the long winter. The old *lñupiat* didn't name the vitamins but they knew intuitively that fish livers were important for health. Today, people have been eating the milder flavored trout livers for the past month, and seek to lessen the more fishy taste of tomcod livers by not using this extra oil. Actually, every liver may be used in the beginning of the season each fall, when tomcod first show up. However, later, when many are caught by net and then by hooking through the ice, there is no way all the livers can be used, so just the best are saved.

Liver and Berries, *Tiñaulik*



Figure I-7. Liver and Berries.

Tiñaulik (Figure I-7) remains an all-time favorite food, prepared and enjoyed in exactly the same way as they have been for centuries. Only cooked livers and raw berries are used, and the combination is excellent. See Trout for the *tiñaulik* recipe.

There are two important differences when making *tiñaulik* from the trout recipe:

1. Wait until the livers are cool before you mash them, and,
2. Don't add water when you make a paste of the livers.

If you have more livers than you can use right away, they will keep best if boiled up and kept dry, cool/cold, and open to the air. This is better than saving them raw. Whether cooked or raw, livers will keep better exposed to the air, and not closed up with a lid and especially not in plastic. (See trout)

Whipped fat dessert/spread, *Akutuq*

Please first read about making *akutuq* under **Sheefish**.

From Deering comes this recipe that came from Shishmaref and further south:

- Boil 1 cup of tomcod livers, (after removing the bile).
- Drain the livers, let them cool, and mash them well.
- Chop, dice, and pound 2–4 cups of reindeer fat. (Proportions may vary).
- Slowly melt the fat until it just becomes liquid, then mix in the liver paste.
- Stir this fat and liver mix until it has expanded with air bubbles and is light colored and fluffy.
- Fold in the fluffed tomcod meat, which has been boiled, de-boned, partially dried and fluffed up.
- Fold in room-temperature blackberries, even a little, or up to as many as the fat will hold.

This recipe can also be made without the half-dried, fluffed fish to be more of a dessert, and less of a complete food.

To cut and hang for *paniqtuq* and *iyamaagluk*

Tomcod are excellent for drying because when they are fat, their fat is stored in their liver and not in their flesh, and their flesh is healthy and full of nourishment. To dry, they are cut differently than most other fish. See Figures I-8 through I-12, a series of five notebook pages showing the cutting technique.

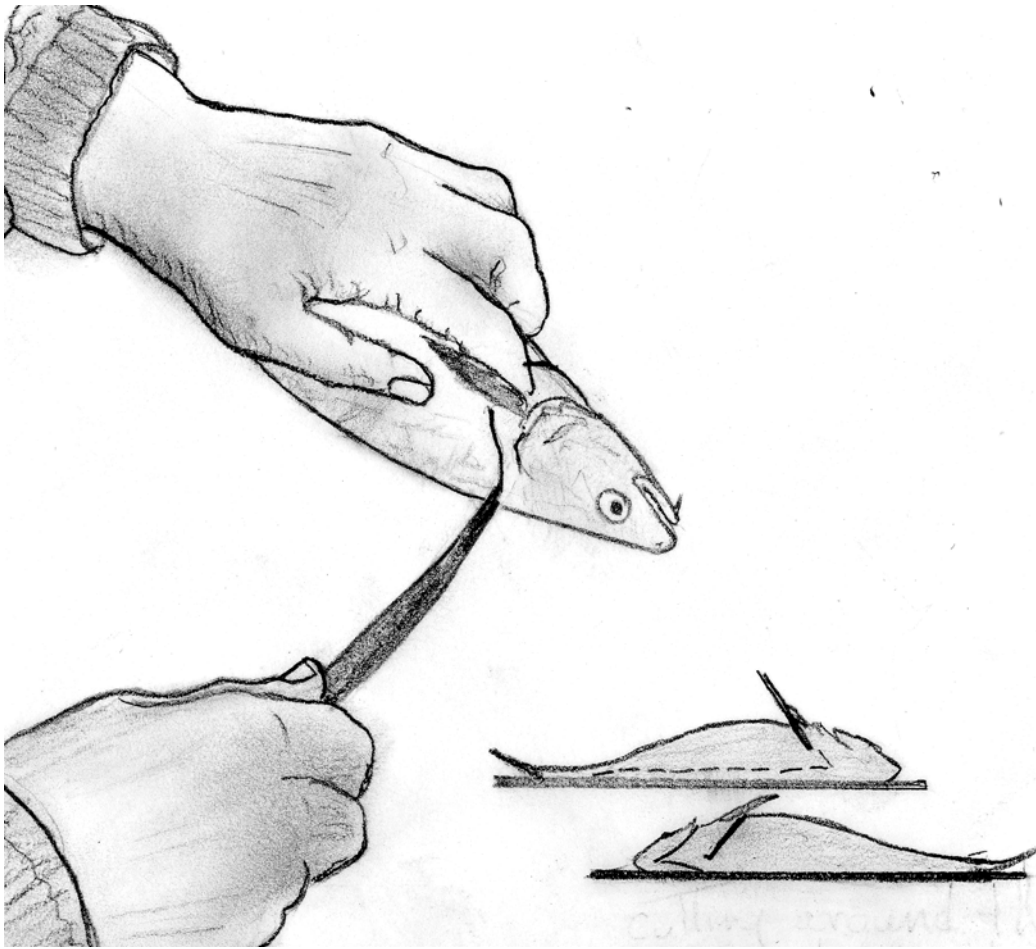


Figure I-8.

- Cut under the pectoral fin on one side, just to, but not through, the bone.

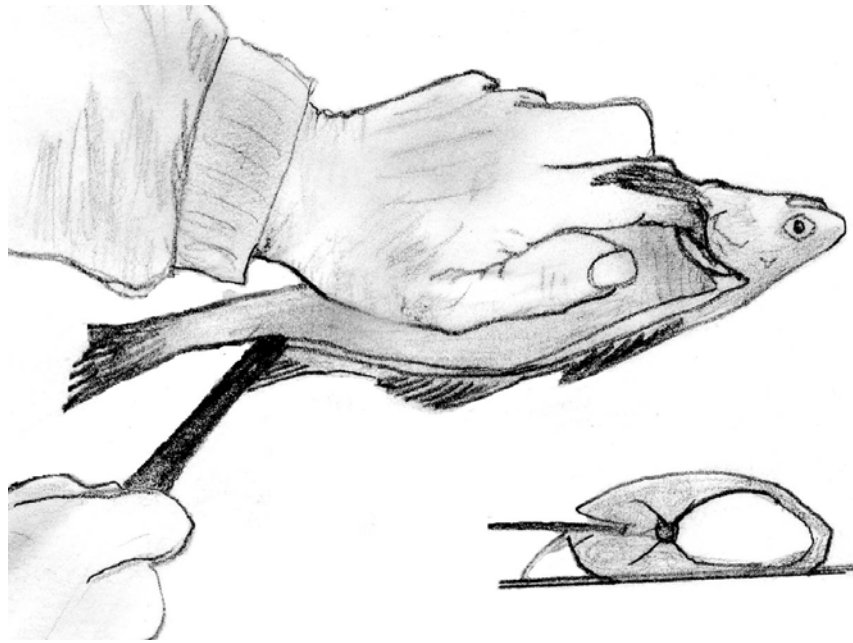


Figure I-9.

- Cut through the skin about a half inch along one side, from the first cut, along the back bone to the tail.

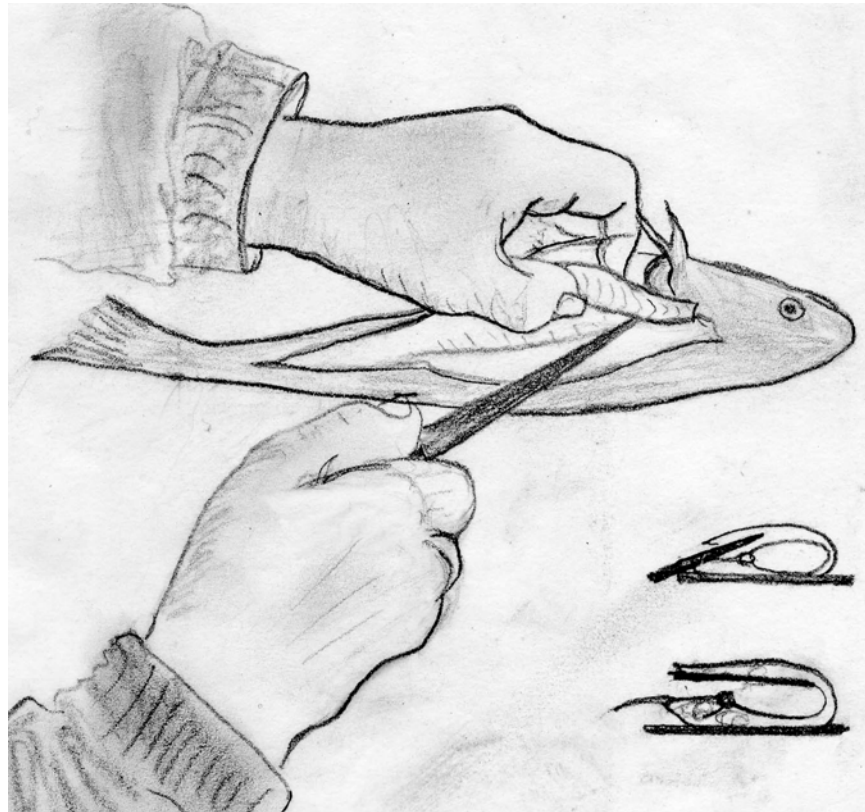


Figure I-10.

- Repeat that cut going an inch deeper all along and at a slightly flatter angle.

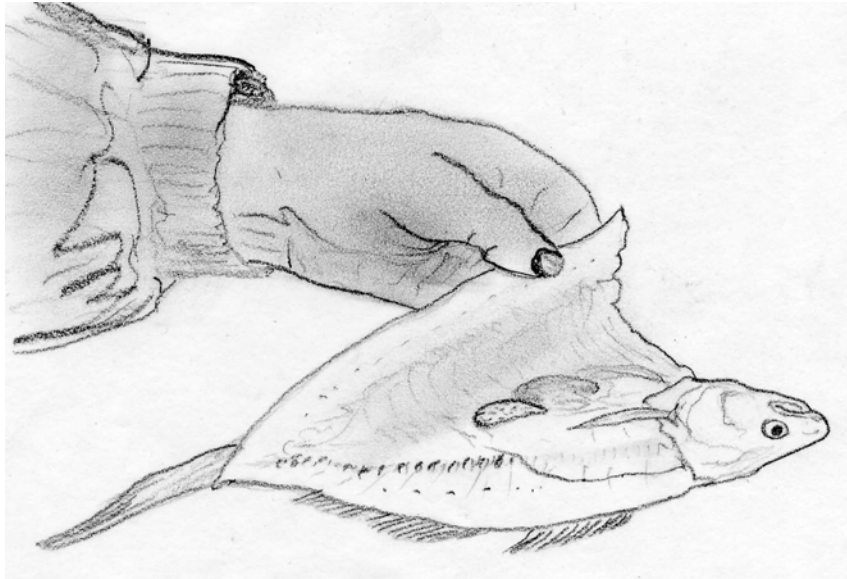


Figure I-11.

- Cut into the body cavity and along the backbone back to the tail, laying open one side of flesh and the stomach cavity.

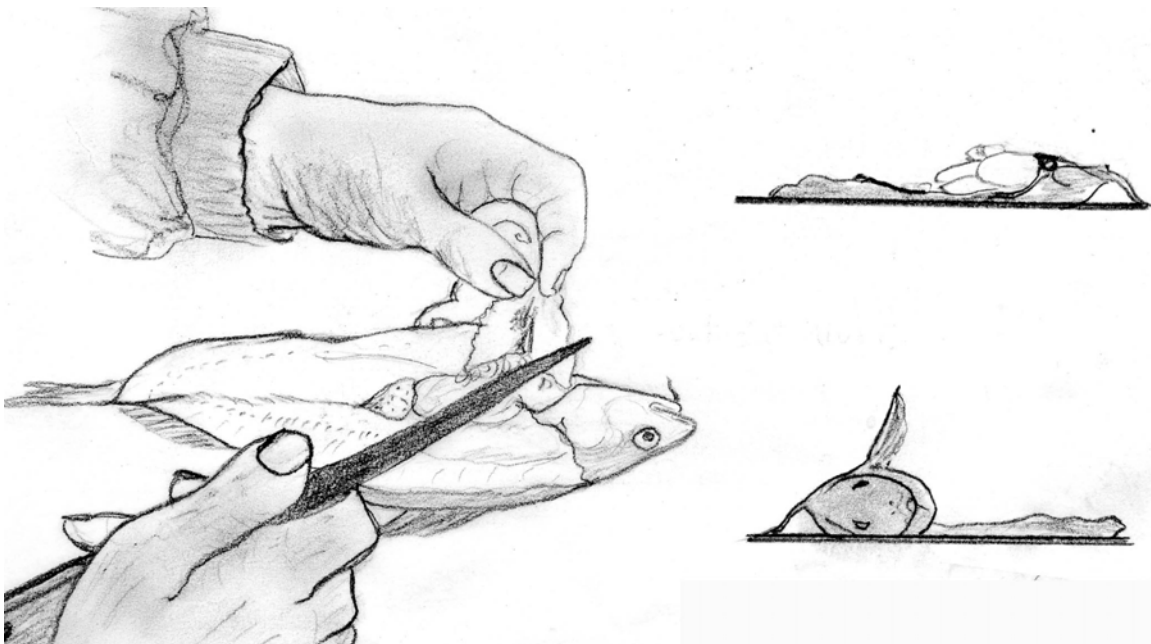


Figure I-12.

- Some people take out the gills, some leave them in.
- Leave the eggs in, and take all the guts and liver out. Save the liver.
- Push a stick or string in through the mouth and out the gills of each fish, then hang the string or stick, holding the tomcod, up to dry. Figure I-13 shows the same eleven tomcod from Figure I-4 after they have been cut and hung up on a string to dry. Notice their bright orange eggs hanging with the flesh.



Figure I-13.

Half-dry fish, *Iyamaagfuk*

The second and third day after tomcod are hung to dry, they can be cooked for a meal as *iyamaagfuk*, which is prepared as follows:

- Take down as many as necessary for the meal.
- Cut off their heads and tails, or leave them on.
- Put them in a big pot.
- Pour boiling water over them until they are well covered.
- Boil until well done, but not until they fall apart.
- Drain off (and throw) the water.
- Serve with oil and/or livers that were boiled up the day they were cleaned. Since they have many bones, prepare a lot of them and just pick out the eggs and best meat to eat, and throw the rest for dogs.

Hung for one day, they are best baked in the oven because they are still moist, and baking tends to dry them out more. Hung for two and three days, they are just right boiled and too dry to bake. After that, they are getting too dry for *iyamaagfuk* and are best dried up completely for *paniqtuq*.

Dry fish, *Paniqtut*

Since tomcod flesh is lean, it becomes quite hard when dry. Old timers with poor teeth took these dry tomcod and carefully pulverized them, small bones included. They threw out big bones that wouldn't break up. Then they put the powder in oil for a treat. Today, this may be done individually, as dried tomcod are eaten. Take a strong chopping block or plank to pound on and a good hammer or wooden club. Sometimes it helps to put the fish in a canvas sack to keep the little pieces from flying around. After pulverizing, either eat the powdered fish with oil, or store it in oil to eat later.

Tomcod won't dry correctly when the weather is warm, but if cool, they will dry up crispy. Never hang tomcod until after the blowflies are gone, and there is frost at night, because they are cut with folds on one side and the roe sack is still in the meat. Tomcod don't hang straight and flat, so they definitely need cool weather to dry properly.

Rosie Hadley of Buckland describes how she remembers preparing last fall's tomcod to dry the following spring when the nights are cold:

*In early spring we hung the tomcod left over from jigging in the fall, hung them up by their heads. We cut the intestines loose by the vent and cut a hole in the throat. Through this slit, we could jiggle out the **tinuk** (liver), stomach and intestines. We threw them away. We left the eggs in. I grew up doing tomcod this way.*

Bob Uhl explains the procedure for handling fall-caught fish in the days of big dog teams:

*"This is one of those situations when people could get into trouble by following an old proven **lñupiaq** way, but at the wrong temperatures, and poison themselves. The way **lñupiat** handle fish this time of year, when the flies are gone and the nights are freezing, is to cut and hang each day, whatever may be caught that we don't eat or bury for **quaq**. We bundle up these **aanaalik** (dried salmon with eggs), tomcod, flounders, etc., when dry, and put them away in the cache. After they have been frozen for a while, around Thanksgiving, we get them out and check through them to see what we have got. Those that don't have maggots in them and that look and smell properly are probably good to check out for eating. They probably are very good, but once again, each individual fish is critically scrutinized as we eat it, and any fish or parts of fish that don't look, smell, and taste good, aren't eaten. Instead we cut off the spoiled parts, or whole fish, and save them for the dog pot."*

Frozen fish, *Quaq*



Figure I-14.

Tomcod caught through the ice on hooks in late fall (Figure I-14) make fine *quaq*. They are allowed to freeze first, then stored in sacks. Tomcod are never fermented because the extra strong digestive juices and powerful liver would cause them to deteriorate before they fermented properly. The livers are especially good *quaq* but they can get old and stale when stored more than a few months. The eggs are also exceptionally good *quaq*, and they don't become old-tasting as fast. The meat along the back and the tail from the vent on back, is all that is usually eaten on a tomcod, but fins, bones, tail, skin, and all but the belly meat are edible, so what's eaten depends on how hungry you are. The belly meat is the first to taste bad because it is close to the strong acids and enzymes of the intestines. Many people also like the head—the nose, eyes, brain, skin, cartilage, and fat. Everything except the teeth and hard bones may be eaten. It all has a very strong tomcod taste.

To eat tomcod *quaq*:

- Place some frozen tomcod on the table. If convenient, rinse them in water first. If they are colder than 10°F, let them wait and warm until they are as soft as you prefer, yet still frozen.
- Take a knife or *ulu* (woman's knife) and cut off the fins and a bit of skin along the top and bottom line.
- Chop off the tail, then peel the skin off both sides.
- Start at the tail and cut off chunks of meat from either side of the backbone.
- The eggs are delicious but may be ever-so-slightly bitter.
- The liver is the real prize. It has the texture of avocado, tan in color, with maybe a touch of green, or green spots, of various sizes (The green is safe to eat). It is very fat, smooth and mild, that is, if you are sure to get all of the bile out before you eat it.

Sometimes only the eggs, liver, and a few bites of meat are eaten, while at other times, almost the entire fish may be eaten.

Tomcod *quaq* has a most distinctive taste.

Stories

Some people are allergic to tomcod, so if your lips start itching you'll know that you better stop eating them.

Mark Cleveland, told this story in 1977 in Ambler.

*"Some people, when they eat tomcod for the first time, get a swollen, itchy mouth. They start itching. Start from the top of the head and get to itching all the way down to their feet. After a day, or so, they get good again and they can eat tomcod after that. It only happens once. This may happen with *paniqtuq* tomcod, or with fresh-cooked fish. Sometimes it happens with whitefish if that person has never eaten it before."*

Land-locked tomcod fed to dogs give them a nervous disorder that makes them 'go crazy'. Apparently, the tomcod can't tolerate fresh water for too long and get sick. When tomcod aren't healthy, whatever eats them can't be healthy either, same as for people.

As one champion dog-musher commented:

"Tomcod are bum dog food. When they thaw out, even the worms thaw out and crawl around. They have the most worms in their intestines and flesh of all our fish."

This is an important reason to cook these fish well, not eat them freshly raw, and be sure they are frozen at least two weeks at 0°F before eating them as *quaq*. Apparently drying also kills their worms, worm larvae, cysts, and eggs.

Miscellaneous.

Tomcod in fall are brilliantly phosphorescent. They have an eerie bright glow at night as they hang from the racks:

"One night Bob Uhl called us out of the tent to see how bright his hanging fish were in the dark. The string of tomcod was especially bright, bright enough so the light from them shone off my hand. Bob has always noticed it in the fall but never to such an extent as now."

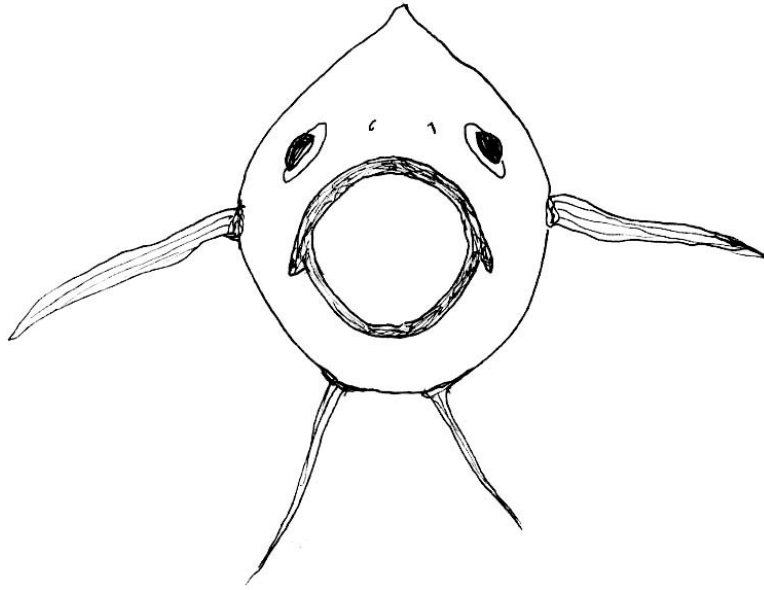


Figure I-15.

Arctic cod, Blue cod

Qaluaq

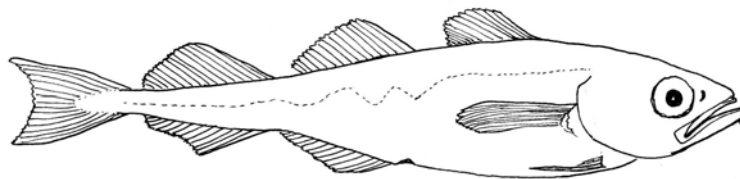
Aqaluaq (Kivalina)

Boreogadus saida



Description

- Arctic cod are blue on their back, yellowish along their sides and lighter beneath.
- They have a very short barbell and a deeply forked tail.
- Their mouth is either terminal, or their lower jaw is slightly longer than upper.
- Their scales are very small, circular, and embedded in the skin. They have bony tubercles giving the skin the texture of coarse sandpaper
- The lateral line is interrupted the whole way, with three sets of deep curves in the middle third.



- The Arctic cod is the smallest cod in this area, measuring 6" (14 cm) and averaging 1.5 lb (0.75 kg). They mature sexually at 2 or 3 years and then spawn yearly. Their average old age is 7 years, although they may live as long as 13 years.

Seasonal Feeding and Spawning Movements

Arctic cod are a high-arctic species that only shows up in our area late in the fall. It is more common around Barrow and east. This is the fish of largest biomass in the Arctic Ocean, feeding countless other mammals, fish and birds. They move out to deeper water to feed all summer on small crustaceans, like shrimp and amphipods, as well as worms and small fishes. Apparently, Arctic cod feed all winter on the algae growing on the bottom sides of the sea ice. These are desmereal fish, meaning they are associated with some kind of surface, either the ocean bottom or the

underside of ice packs. Their distribution is closely related to the presence of ice and /or reduced salinity.

They are the last fish to come into the brackish waters in the fall, with their bellies full of good food and in prime, fat condition. Bob Uhl remembers a year with abundant blue cod along the Sisualik beach:

“ There is a small Arctic cod that comes in the fall and is much less common around here. It is different from other cod, because its flesh is also fat, and its liver is really fat and so big it takes up half of its insides. This liver is exceptionally choice, as are the egg skeins, which fill up the insides in late October and November.

One fall a storm killed many Arctic cod and herring, then washed them ashore in long windrows. The sea was covered with oil from these fish they were so fat and so many. People walked along the shore, picking up the best fish. They filled all the sacks they had for quaq for both people and dogs.”

Harvest

Arctic cod are caught when people hook for tomcod through the ice. They also may be picked up along the shore where they are sometimes deposited by waves just at freeze-up time.

Some years they are abundant and common, and other years they may not even be seen or available. Thus, they are not a resource to be sought or counted on for food. Rather, they are a gift, given whenever the seasonal timing of tides and temperatures presents them, and whenever people are around to gather them.

Bob Uhl shares memories of Arctic cod off Sisualik beach:

“In late fall, just before the ocean is completely frozen over, you can stand on the shelf ice and look down into the clear salt water to see lots of these fish traveling in the space between shelf ice and the sea ice that is a bit offshore. At certain times, the wind and waves are just right to wash some of these fish up, over and into the berm back of the shelf ice. They freeze and can be used immediately or stored for later.

Often, they seem to have just enough strength to jump up through the slush, but not enough to get back into the water again”.

Use / Recipes

In the study area, the small Arctic cod is much less common than the tomcod. It is different from other codfish in that its flesh also has fat, not too much fat, like fat trout, Bering ciscoes (*tipuk*) or herring, but just the right amount to eat. The choice liver can be as much as 50% oil. The males don't have much to eat on them, but the females have those good egg sacks and a liver much larger than the male's.

To cook,

- Scale and gut your catch of Arctic cod, then rinse them well.
- Take the head off, being careful to save the liver, which may try to stay with the head.
- Remove the gall bladder from the liver.
- Fry or bake the fish and livers as you would smelts or herring.
- Boil like Bering ciscoes (*tipuk*) or whitefish. See humpback whitefish (*qaalgig*)
Although these fish are small, if you cut the head off, and boil the rest, you can get a good meal. You just need a lot of them.

Frozen fish, *Quaq*

As you walk along the frozen shore:

- Pick up an Arctic cod,
- Cut the head off,
- Chew up the whole, frozen fish.

Their bones are cartilaginous and you can, literally, just eat the whole fish, including the insides, especially liver and eggs, but also even the stomach, and intestines, which are now empty because they are spawning. Their liver is supremely fine food, but remove the gall bladder with the bile, unless you like a bit of that bitter taste or your aging digestion needs a boost. Their delicious eggs are two little sacks each about half as long as a cigarette.

Joy Koenig, of Kivalina, remembers eating Arctic cod as a girl:

“There used to be lots more aqalaq here some years. There are less of them these days. We would eat them raw, and as quaq with oil. We’d take the head and tail off, we don’t eat those parts because they have too many bones. We ate the stomach. We cleaned it well. The stomach was like the worms we used to eat from the ocean.”

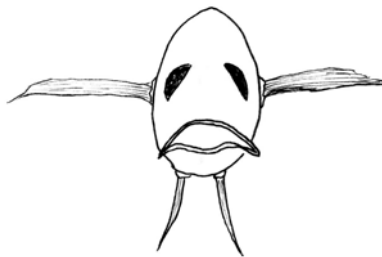


Figure I-16.

Rough skinned, starry flounder

Nataagnaq

Platichthys stellatus



Description

- Starry flounders are dark brown on top and white on their bottom side.
- They have rough, scattered, star-like plates on their body;
- Both their eyes and dark coloration are on either right or left side.
- Their fins are striped in bands of black and white to orange.
- Usually they are larger than smooth skinned flounders.



Figure I-17.

- Large fat flounders can be 16" (40.6cm) in the study area (see Figure I-17). This same species can reach 20 lb (9.1kg.) and 36" (91cm.) in other locales.
- Most abundant flounder of the study area, found throughout Kotzebue Sound and Kobuk-Selawik Lakes, in any place with tidal influence, including lagoons, sloughs, estuaries, and marshes.

Smooth-skinned flounder, Alaska plaice

Ipkaknaylik

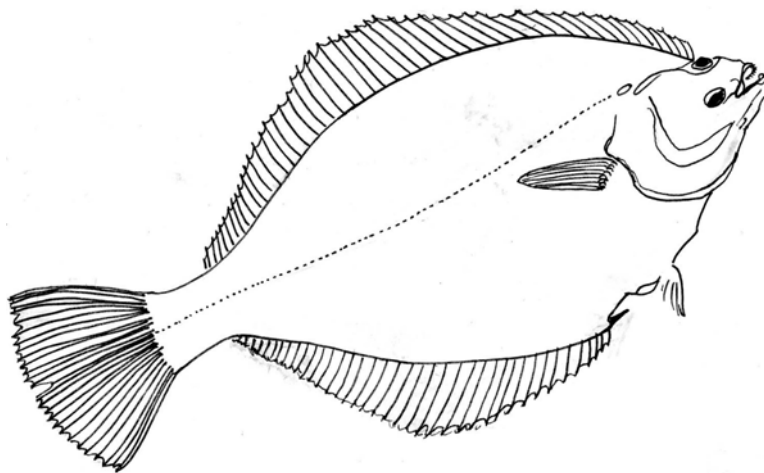
Ipkignailuk

Pleuronectus quadritubularculatis



Description

- Their top is greenish grey to nearly black and their bottom is yellow color.
- They have smooth skin of a uniform, grey, sandy color.
- Their postocular ridge has 4–7 bony knobs.



- This smaller flounder averages 8" (20cm) but can reach 12" (30.5cm). It is found in the shallow brackish waters of Kotzebue Sound and Kobuk-Selawik Lakes. Sometimes this flounder goes up rivers for a ways.
- **Arctic flounder**, *Pleuronectus glacialis* is similar to above but the bottom is white to lime green.

Seasonal Feeding and Spawning Movements

The life cycle of flounder is somewhat the same as tomcod. Most of the time, flounder are an unwelcome ‘trash fish’ but in September the big ones are welcomed to eat, when they have been eating good foods and their flesh is full. You can tell by size and how ‘thick’ they feel, how good they will taste. They are scavengers, and in cleaning up the bottom, they may eat some *anak* (excrement), especially from whitefish. In fall the whitefish are so fat that even their *anak* has extra nourishment—hence the flounders get fat too. In winter they get skinny and bad tasting while living on poor food.

Bob Uhl remembers flounders from early years camping at Sealing Point:

“This small flounder is a favorite quaq fish of those beach dwellers on Krusenstern beaches. They are taken in numbers from the gravel ditch traps at Akulak and Anigaaq Lagoons.”

Harvest

Flounder are inadvertently caught in gill nets along with, or instead of, more desirable fish. Then they are a real nuisance and fishermen always try to get them back into the water alive so they can swim elsewhere, instead of lying dead on the bottom, attracting more flounder to come eat them.

They always follow the main fish runs, the salmon, trout, sheefish, and whitefish. Thus, when nets are catching many fish, they get few flounder and vice versa. By September 1, some of the flounder have become fat, and by September 15 most are fat.

Although flounder are good to eat in their own right and there are usually a few days each summer when nothing else is available fresh, they are still low down on the list of preferred foods. However, they are always good for variety.

They have a sharp, anal spine behind their vent that is wise to avoid when handling and cleaning. This projection of a curved bone sticks out a quarter of an inch, is very sharp, and can give a painful poke.

Use/Recipes

Both flounder are good to eat. Traditionally, they were welcomed when nothing else fresh was available that day, and always welcomed for variety. The smooth skinned flounder are the best in flavor and are always a little fatter, even in the spring, but they never get as large. One foot long is about their maximum size. In autumn all flounder have eggs, at least all the large ones that are chosen to cut and eat. Perhaps the males are smaller or elsewhere.

Boiled flounder, *Igaapiaq*



Figure I-18.

Figure I-18 shows a plate of boiled flounder, drained and ready to eat.

- Choose only the biggest and fattest flounder.
- Cut off their heads while they are still alive. Then they will bleed well and not get as mushy when cooked.
- Take all the guts out, because the bile is strong and the guts have undesirable, strong flavors. The liver is good to eat after the gall bladder is removed.
- Leave the eggs in. They are in orange colored sacks and up to two inches long.
- Boil as many flounder as you want for a meal in plenty of salted or sea water.
- Drain while hot and serve a whole flounder on each person's big plate.

To eat:

- Carefully peel the skin off the top,
- Pick the meat, fat, and eggs off the bones.
- Turn it over and repeat the same on the other side. There are many bones but they all lie in one plane making it easy to pick the meat off. There is a surprising amount of mild, fine-flavored fat along the fins. The flesh has a delicate and delicious taste. The eggs are also tasty with a fine grain almost like that of a chicken egg. Livers are good but not nearly as large or fat as trout and tomcod.

Fried, *Siqaniqtaq*

- Take the head and fins off and fry slowly.
- Peel off the skin and eat as for boiled flounder.

Dried flounder, *Paniqtuq*

Flounder make good *paniqtuq*, but the oil fairly drips out of them as they dry. The weather is cool by the time the flounder are fat, so they don't get too rancid if eaten right away.

To dry:



Figure I-19.

See Figure I-19.

- Take out all of the insides, stomach, liver, intestines, milt, and leave the eggs attached.
- Leave the head on.
- Slice a fillet, starting along the back, through to the belly, where it is left attached and hangs down (similar to tomcod).
- Push or thread a string through each head, in through the mouth and out the gills.
- Hang the string up to dry, stretched tightly between two posts. Another way is to push each head onto sharp nails pounded into a pole.

Flounder are never hung to dry until after the blowflies are gone and there is frost at night. The expedient, *lñupiaq* way to cut and hang them doesn't keep the flesh straight and flat. Rather it hangs in folds and on one side the roe sack is still in the meat. People have become ill from eating them when hung too early when the weather is yet warm. (See **Tomcod**.)

To eat:

There are two ways to eat dried flounder: One is to quickly eat off the main dried meat and throw the rest to the dogs; and the other is to make it a lengthy, gourmet experience, carefully cleaning off all the meat and fat from the bones. This includes some delicious flavors, and takes plenty of time.

Frozen flounder, *quaq*

Flounder is eaten as *quaq* when it is frozen fresh, but they are never fermented.

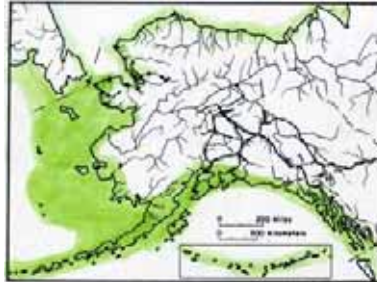
Miscellaneous

Dogs love flounder, even preferring them to other fish at times. They eat them just as they come out of the water, fresh or a few days old. They also can be laid out on the grass to dry up for dog food later. It's no good to leave them around on the beach because they attract many flies and sand fleas that only make more food to bring in more flounders.

Rainbow smelt, Arctic smelt

l'huagñiq

Osmerus mordax



Description

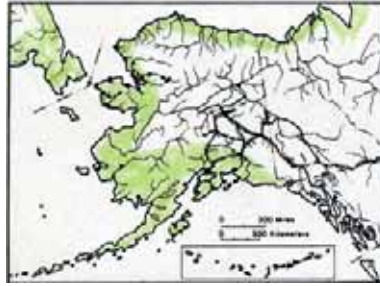
- Rainbow smelt have a pale green to olive back, silver underneath, with a bright, metallic silver band along the sides, often with blue, pink, or purple iridescence.
- Breeding males have bumps (tubercles) on their head, body and fins.
- Their fins are colorless, or they have a faint speckling.
- Their lateral line goes less than half way to their tail.
- They have large canine teeth and medium sized scales.



- The average length of smelt is around 8" (19 cm.) with some reaching up to 13.5" (35.6 cm).
- Smelt are sexually mature at 2 to 3 years, and their maximum age may be around 6 years.

There also is a smaller Pond smelt shown to be in this area from the distribution map below, but there has been no distinction made between the two in this report, nor in the stories collected herein.

Pond smelt



Seasonal Feeding and Spawning Movements

Little is known of Alaskan smelt habits, but in the Great Lakes area in northeastern America, the larger and older rainbow smelt spawn first, as younger and smaller fish keep joining the spawning school. Many of the spawned-out fish die, especially males, but those that survive, spawn again. This is mentioned only for interest, since our smelt may or may not behave similarly.

The following is the traditional *lñupiaq* story about smelt behavior in Kiana:

“There is an outcrop of chalky rock a ways below Kiana, where the smelt visit each year. That’s how far they come up the Kobuk River after breakup to spawn. They rub their nose on the chalk and take a bit of it back to their grandmother so she can scrape hides with it. For the few days of spawning, smelt are so thick that we dip out tubs-full, all that we can get. The smelt are very fat. They have their own very strong characteristic odor. We fry and bake them when they are fresh, but we only can eat so many fresh. Long ago drying was the main way we kept them for winter.”

Figure I-20 shows dried smelt ready to eat.



Figure I-20.

Harvest

Most smelt are caught in Kiana and Buckland where they go to spawn. A few are caught in Noorvik or Deering as they pass by on their way to their spawning grounds. Smelt are caught any possible way, mostly by seines, dip nets, brailing cans, and gill nets.

Figure I-21 shows Buckland people laying each smelt out on the beach to dry in the sun.



Figure I-21. Beulah Ballot, Buckland, year unknown. Source: Beulah Ballot.

Use / Recipes

Smelt are a fat and tasty fish with firm, white flesh that are always enjoyed during the short time that they are available.

Boiled smelt, *Igaapiaq*

Hannah Stalker remembers enjoying boiled smelt as a child:

*“Mom would always boil the fresh smelt, and we drank the broth. We ate them with fresh *sura* (willow leaves) and oil.”*

Baked, *Argiq*

Lay fresh smelts on a baking tray and bake in the oven. Using the whole fish is easiest and quickest, and then the crispy fins, tail and head can be eaten. The eggs are delicious. The stomach and intestines, being empty while they are spawning, are insignificant. When more meat is desired for the size of pan, gut the fish first, cut off the head and tail, and add the eggs (even extra eggs from other fish), before baking.

Fried, *Siqaniqtaq*

These are fixed the same as for baking. Today, a few people roll them in flour or cornmeal.

A Buckland mother comments on her appreciation of smelt:

“I love to eat the smallest ones, they are so crisp and tasty. My brother would chew up the whole fish. Some people eat them and leave a tiny pile of bones on their plate. Others are so clumsy that they leave a big pile of stuff. Some people don’t eat the insides because they get too strong. I could sit there and eat them no matter how strong they made the house smell.”

Dried Fish, *Paniqtuq*

This is the main way smelt are preserved to eat all year before people had electric freezers. Each day, as they dry, people kept eating them baked or boiled. As they continued to dry, people started eating them dried with oil. Figure I-22 shows two dry smelt, ready to eat. They are conveniently packaged in their skin, to throw in a boat, car or pack, always ready for an instant, delicious snack.



Figure I-22.

A fisherman explains how Kiana people dry smelt:

“We dry smelt whole by stringing a few dozen at a time on a willow stick. We cut last year’s length of willow and poke the big end through their gills. Then tie the small end of the stick around the large end to form a hoop that we hang up to dry on the drying racks or anywhere. We turn and move them around each day so they dry faster and more evenly. They get a little stinky too, which only makes them better.”

Of course, the best fish are the females with the eggs still in. Right after break up, people were always watching the river each day as they checked their nets to know when the smelt first arrived. The sooner we dipped our tubs full of smelt, the more fish still had their eggs, so it paid to be alert and quick to catch them.”



Figure I-23. Source: Lorrie and Nellie Schuerch.



Figure I-24.

The following is a common story from the people of Buckland. It was told by a woman remembering her childhood:

“One week after the ice is gone in Buckland, we start waiting for the smelt to come. We have our boats and seines and gear all ready, food prepared for us to eat while we work, gas cans filled, everything. Smelts run only one night. They come on a flood tide, and there are so many fish they bring the high water up river with them. We can smell them coming; they have such a strong odor. They seem to always come with the fog and West wind, but the next day is usually sunny and beautiful.

It’s real exciting when we see them coming. We jump into our boats, go to our seining beaches where the smelt spawn, and start fishing. Some people dip them out with nets and put them in big tubs to haul up on the beach. We seine them and it takes a dozen or more people to pull in the seine. Then we put all the smelt into tubs and dump each tub out in a pile on the beach about 15 feet away from the last pile. We allow enough room to spread that many fish out to dry. We may get 50 or more tubs full, for us and our dogs.

We fish all night; fish until the smelt finish spawning and swim back down the river. We sure have lots of fun. Then we go home and sleep. Next day us kids have to spread each fish out on the clean rocks to dry, whole fish, one by one, next to each other, side by side, side by side, so many fish! When we are finished, the whole beach is covered. We let them dry for three days. Then we go with sticks and stir them around, turn them over, so they will dry for three more days. Then we pick them up, pile them in the boat and haul them to our cache to store for winter”.

To Eat Dried Smelt, *Paniqtuq*

There are different ways to eat dried smelt:

The most basic way is to bite the strip of meat on each side of the backbone, and pull it off. Dip it into seal oil and eat. Then pick out the delicious eggs to eat, and dog-feed the rest.

One woman in Deering likes to eat smelt like this:

- First cut or bite off the head and tail fin.
- Then pinch off all the other fins with fingernails or a knife.
- Peel off all the skin, it is just a convenient wrapper.
- Bite off the flesh on either side of the backbone, right back of the head and peel it off all the way to the tail on each side. Fingernails also work well to dig out this meat.
- Check for any eggs inside the ribs, and save them to eat.
- Save the belly flap meat.
- After preparing enough, 4 to 10 smelt, wrap some of the eggs and strips of meat in a belly flap, cut tiny cross-wise slices, and dip in seal oil to eat.
- Throw the rest for the dogs.

Her daughter learned how to eat smelt from her Dad. They take off the head and crunch up the rest of the fish—fins, skin, insides, everything. It all is tasty and nutritious food.

Moldy smelt *paniqtuq*, can still be good to eat. Just wipe off the mould and eat it as usual. The first smelt are so fat that they dry up soft and tend to mold more than the later ones. When smelt get rancid and burn the throat, they're no longer considered edible.

Frozen smelt, *Quaq*

Frozen smelt is not traditional, because the fish are harvested in spring after the freezing temperatures and ice have gone. With freezers today, eating smelt frozen is possible. Freeze them in plastic bags with a few cups of water inside the bag with the fish, and press out all the air. Once frozen for at least two weeks, they may be eaten as *quaq*, or may be baked or fried.

“The Barrow people also quaq smelt as well as fry them. Their smelt are bigger up there but are the same rainbow smelt that we have here.” Bob Uhl

A modern *lñupiaq* grandmother from Deering told this story:

“One night my daughter was taking her kids to a movie in Anchorage. As she went out the door, she grabbed a big hand full of smelt and put them into her calico pocket.

I protested, ‘People will smell you eating that. You shouldn’t take those fish now.’

Her reply, as she left, with her kids and the smelt, was, “We like our food, and it doesn’t smell as much as that popcorn everyone eats.”

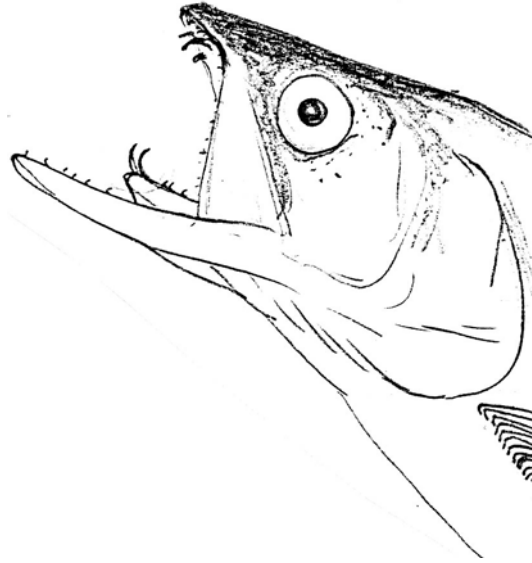


Figure I-25.

Bullhead

Kanayuk

Myoxocephalus (Fourhorn sculpin)

Cottus aleuticus (Coastrange sculpin)

Description

- The **fourhorn sculpin** is dark gray on top, paler beneath.
- The head is wider than it is deep.
- They have protuberances behind the eyes on top of the head, which have a rough, wart-like surface in some individuals.
- Usually they are about 28 cm long.
- The **coastrange sculpin** is dark brown, green or gray on top, white beneath, with darker blotches on the sides.
- Spawning males have an orange-red first dorsal fin.
- Their lateral line is complete, continuing to caudal fin.
- Their dorsal fins are touching.
- They are usually less than 11.5 cm long.

The Figure I-26 shows the top- and bottom sides of some representative bullheads at *Sisualik*, although the species is unknown.



Figure I-26.

The range maps in Mecklenburg [2002] show twelve species of sculpin that could be found along the shores of Kotzebue Sound, including the two common ones listed above. No range maps or descriptions are included with this report.

Seasonal Feeding and Spawning Movements

Fourhorn sculpins are found circumpolar, in saltwater, brackish water and in freshwater to depths of 20m. They travel up rivers too, sometimes as far as 100 km.

Coastrange sculpins live in fresh and brackish waters, usually in swift, gravel-bed streams. They are also found in mud-bottomed lakes, in estuaries and close to shore in coastal waters. There is an isolated population in the lower Kobuk River and delta area.

Harvest

Any of the bullheads are caught by hook when jigging for tomcod, and in the gill nets when fishing for other fish.

A *Sisualik* person told of catching them in the spring:

“We used to spear large, saltwater sculpins in the cracks, which open up between the shore-fast ice and the ocean ice in the spring time. We would eat them if we had no other food and they were always good for dog food, but mostly, it was fun. It was a good feeling to catch something in the spring time from the ocean, after it had been frozen all winter.”

Use / Recipes

Kanayuk means ‘sea robin’, and whatever species occur are locally known as bullheads. They are about the spiniest, boniest, biggest-headed, smallest-fleshed fish imaginable, yet large, fat, bullheads are good to eat in the fall when they have been eating good food and are firm fleshed. They are most welcome when there is nothing else to eat that day, or for variety, when they are caught in the net incidentally to other fish. They are most often eaten for their good eggs and large liver, which has a texture different from that of other fish livers.

Boiled, *Igaapiaq*

- Take the heads off freshly caught bullheads.
- Take out the intestines, saving the liver, and leaving the eggs with the fish.
- Boil,
- Drain,
- Eat hot with seal oil, much like flounders, even at the same meal.

They become good to eat after the fat flounders come, with medium liver and large eggs, both of which are tasty, plus a tiny piece of meat with crescent-shaped bones in it. Cook up several apiece for a meal because most of each bullhead is not eaten.

This old story explains one way to clean a bullhead:

“One man’s wife remembered a long time ago when she was a young girl, hooking through the ice in front of Kotzebue. The other women hooking there were old. One lady had caught a very large bullhead and jumped on it in such a

way that the stomach had popped out through its mouth, emptying the contents. Simultaneously, it had filled, up from the inside with the eggs and liver. When boiled and drained it had made a neat dish without ever having been cleaned. This wife had tried for years to do that same trick. Finally, one day she jumped on a big bullhead and got the stomach to pop out. She cooked and served it proudly to her husband, who ate it, and commented, “It was OK—but, the only problem, besides the unfortunate fact that it had no eggs to go into the stomach, was that the bile was still in the liver which made it all taste very bitter.”

Insulted, she snapped back, ‘I never heard those old women complain about the bile taste!’”

(Did they somehow remove the bile first? or was bile an accepted taste long ago, when The *Iñupiat* lived entirely off the land and sea?)

Typical *Sisualik* meal in fall time—Boiled flounders, tomcods, bullheads and whitefish; a bowl of seal oil; with a separate dish of boiled livers, eggs, and whitefish stomachs from the fish that were cut to hang that day. Finish off with leftover duck soup, tea, crackers, and, fermented sourdock greens (*qauḡaq*).

PART II

ANADROMOUS FISH

- CHUM SALMON
- PINK-, KING-, RED-, SILVER SALMON
- DOLLY VARDEN
- ARCTIC CHAR (freshwater)
- LAKE TROUT (freshwater)

These anadromous fish hatch in fresh water, spend varying amounts of time growing in fresh water as they travel to the ocean, where they feed and grow to sexual maturity. Then they migrate along the coast to enter the same river they came from to spawn. The salmon die after spawning but trout spawn for many years, although often in alternate years. Although the arctic char and lake trout are freshwater species, they are listed in this part of the report, to keep the trout together. The anadromous species bring important marine minerals to the inland villagers and entire ecosystem, wherever they are harvested or may die.

Salmon are locally important in the Noatak, Kivalina, Kobuk, Selawik, Deering, and Buckland rivers, while trout are most important in the Kivalina and Noatak area, but are caught in all the waters to some degree. These are large fish and provide many pounds of food both fresh and, especially, dried and frozen.



Lydia Douglas, Shugnak, ca. 1960. Source: Doreen Schiro.

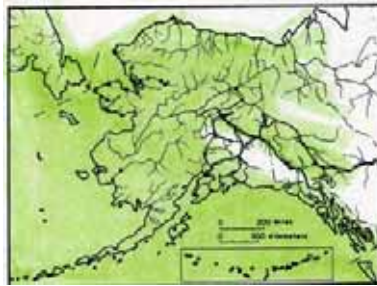
Chum or Dog Salmon

Qalugruaq (Kotzebue and up the Kobuk River)

Aqalugruaq (Noatak, Buckland, Deering)

Aqalukruaq (Kivalina)

Oncorhynchus keta



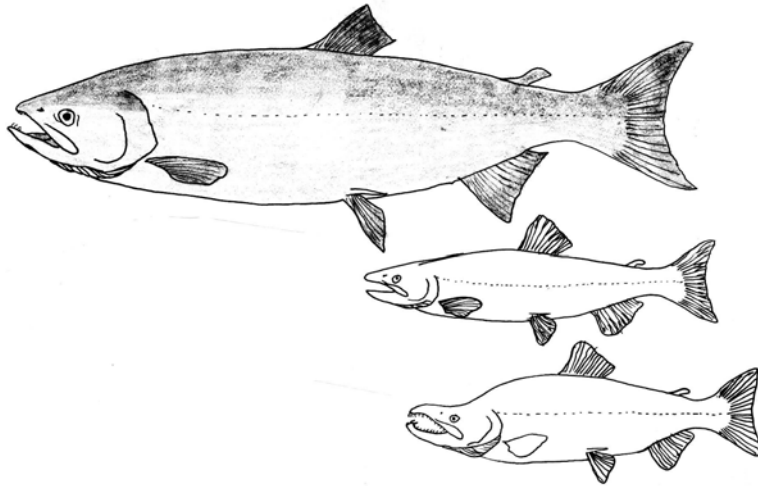
Description

Color when fresh from the ocean:

- Chum salmon are dark, metallic blue dorsally with bright silver on sides and belly.
- They have no distinct black spots, but may have fine speckling.
- Their dorsal and anal fins and tail are edged with black.
- A silver shafting extends onto the center of their tail.
- Their scales are very small, although large for salmon.
- They have a slender tail base relative to other salmon.

Breeding color and shape:

- They change to a dull red on their sides, pale below, with irregular purple-red, (and to a lesser extent, green and yellow), bands on their sides.
- The breeding coloration is more pronounced on males, which also develop a kype, or extended, enlarged jaw with big front teeth.



Chum salmon weigh from 7 to 18 pounds (3–8kg) and are between 24”and 32”(61–81cm.) long. Their eggs are 4mm to 6mm in diameter, a brilliant reddish-orange in color, and held in two large sacs that fill the body cavity as spawning approaches. When dried or frozen they retain this translucent color, but when cooked they turn a pale white-orange.

Seasonal Feeding and Spawning Movements

Chum salmon run out to the saltwater as soon as they loose their egg sack (in about 2 to 3 months). After spending several months close to shore, they head out to the open sea for 3 to 5 years, feeding mostly on plankton, and growing to adult size, before returning to spawn in the same river where they started. They die a few days after spawning. The chum summer run begins in Kotzebue in early July, and an autumn run (presumably with larger, older, and more fertile fish) occurs under the fresh ice in certain places along the Noatak River system.

Harvest

Traditionally salmon were speared, harpooned, seined, and caught in traps, or in gill nets to some extent. Today, most salmon are caught in gill nets, seines and a few by sports tackle.

They stop feeding when first entering the freshwater systems of Kotzebue Sound, and only bite hooks once they are up the rivers a ways. Then they can be caught on sport fishing tackle, but it is not because they are feeding, but rather a reflex action that makes them strike the hook.

Figure II-1 shows a bright chum salmon caught at Sisualik in August, frozen and thawed.



Figure II-1.

Use / Recipes

Chum salmon are an excellent fish to eat in every way. They reach their peak of perfection in this area: a Kotzebue-caught chum will have better taste and texture than one caught in Juneau, Canada, or California. Their flesh is usually a salmon or red color, but may be paler in some fish, depending on what they have been eating. You can't tell until you cut into the fish what color it will be.

Bright silver chums, fresh from the ocean, have the most fat, best taste, and firmest flesh. As they move up the rivers, they use up some fat, making them easier to dry, and slightly less delicious when cooked fresh.

During spawning, they use up most all their fat, and after they have spawned, their flesh begins to deteriorate, eventually becoming inedible, except as food for dogs and other creatures and, finally, they distribute rich ocean minerals far inland where they decompose.

Chum are mostly eaten well cooked, and dried as *paniqtuq*. They are never eaten freshly caught and raw, nor even as freshly frozen *quaq*, although salmon are a favorite as fermented (or *tipliaqtaa*) *quaq*, especially in Noatak. They also are enjoyed salted and pickled.

A Kotzebue old-timer comments on the general knowledge that raw salmon shouldn't be eaten:

"We never eat raw salmon freshly caught from the ocean. Sometimes it will make us sick for a long time, and we won't be able to eat anything raw for a while. When someone does eat salmon raw or too rare, we feed them blueberries to help their stomach. Even dogs fed fresh raw salmon will have to throw it up several times before they can keep it down, if they eat it at all. Dogs can eat any other fish fresh and raw, but raw salmon isn't good for people or dogs."

Figure II-2, of three cross-sections sawn from a frozen salmon, shows how the bones vary in the different parts of the fish. The left section is through the ribs back of the pectoral fins; the center section was before the vent where the ribs are ending; the right section was behind the vent. Studying fish in this photo and in many other ways helps one to learn where the bones are

and how to avoid them as well as how to cut each part of the fish to best get what you want to eat with the least bones.



Figure II-2.

Boiled salmon, *Igaapiaq*

The first salmon of the season is a big treat and often the whole fish including the head and eggs will be boiled. The liver, stomach, intestines, gills, and milt are for the dogs.

To boil salmon:

- Clean the insides out of the fish, and save only the egg sacs.
- Cut off the head, take out their gills.
- Cut the body into one or two inch sections.
- Boil water; seawater, fresh water, or salted fresh water.
- Put the head and pieces of meat into the rapidly boiling water to cover, or, pour boiling water over the fish.
- Bring the pot back to a boil.
- Turn down to a simmer for 20 to 30 minutes, or until the pieces are well cooked but don't fall apart.
- Turn off the heat and carefully lift the pieces out of the broth to drain, or,
- Hold the lid on as you pour the broth off into a container to drink.

Fish broth, *Qaluum imigaṇa*

This broth from the boiled fresh fish was a traditional drink of choice for all the older *Iñupiat*, and it remains a fine drink today, providing excellent nourishment.

Someone asked Beulah Ballot how come she was still out fishing and so lively at her age. She replied,

“Because I was raised drinking broth, and I still do to this day. I can’t drink that soda pop. Broth is way better for my health than pop.”

Variations of the boiled salmon recipe include:

Boiled salmon with eggs, *Igaapiaq* with *suvaich*.



Figure II-3.

Just five minutes before turning the heat off in the boiled salmon recipe, drop in the salmon eggs as whole skeins or cut into a few pieces. The goal is to heat them to be hot all the way through and about half-cooked, (half way opaque), with the inside eggs still translucent in appearance. They will continue to cook a bit in the hot broth after the heat is turned off, so adjust the timing to get them perfectly done according to your individual preference. Err on the underdone side, because salmon eggs are fine to eat raw, but over cooking makes them tough, chewy and dry, although some people do enjoy them that way. Figure II-3 shows cooking salmon eggs in a pot with the rest of the salmon.

Salmon-vegetable soup.

Add noodles and/or vegetables to the boiling water in any of the boiled salmon recipes, including onions, potatoes, celery, tomatoes, or garlic.

This following version, from the Aleutians, also works well in this area:

The local wild onions, (*patitaaq*, *Allium schoenoprasum*) and sea lovage, (*tukkaayuich*, *Ligusticum scoticum*) are particularly good in salmon soup. Add these greens

part way through the cooking time to adjust how well cooked they will be, depending on their toughness and how you want to eat them.

Flour soup, *Mukkaaligauraq*

There are several ways to make any of the above variations into flour soup.

- Shake equal parts of flour and water in a jar until smooth.
- Pour it into the boiling broth as you stir.
- When the broth is almost as thick as you want,
- Stop adding the flour/water mixture. (Pour the extra into the sourdough pot.)
- Stir and cook for at least three more minutes before turning off the heat.
- Serve.

You can add the flour while the pieces of salmon are in the broth, but even if you stir very gently, some salmon will still get broken into pieces, (which some like and some don't). To keep the pieces of salmon whole, take them out carefully, then bring the pot back to boiling and add the flour-water mixture. This way you can boil and stir the soup just right, and the fish will also be perfectly done. Add salt when you use flour.

Boiled Fish Heads.

When many salmon are cut at one time, a whole meal can be made of boiled salmon heads. Use from a half a head per person, up to four heads per person or more, depending on how big the heads are, how hungry the people are, what else is available to eat, and especially, how skilled your diners are at eating heads.

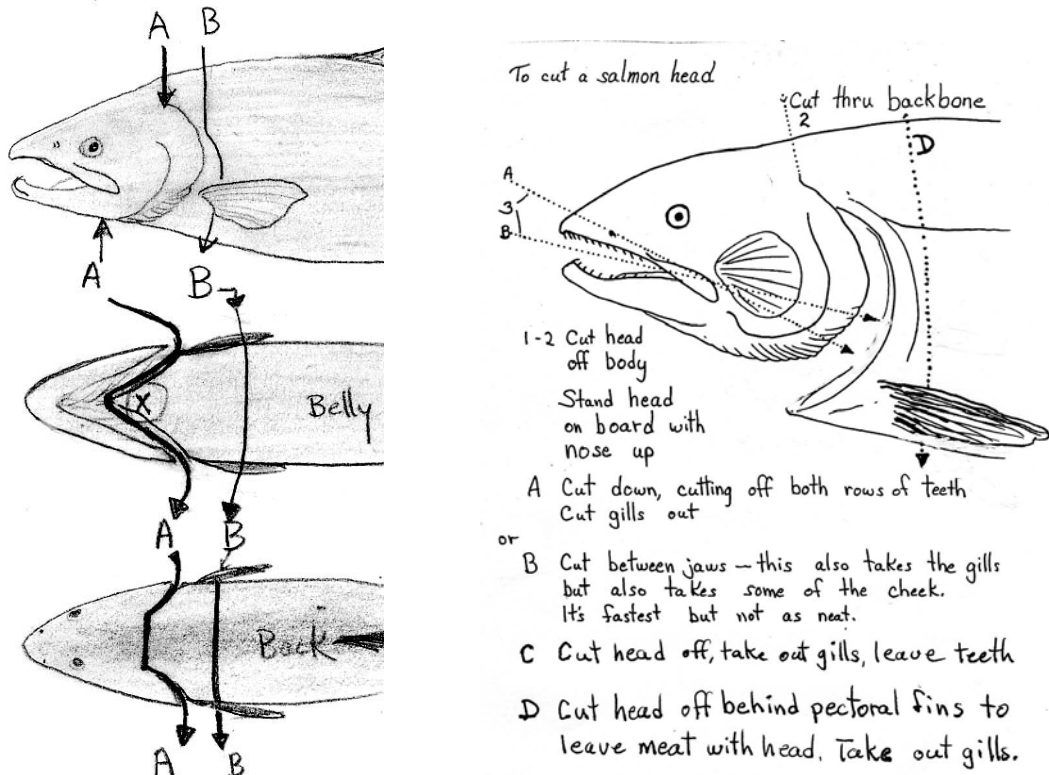


Figure II-4.

To prepare salmon heads for boiling, there are several variations:

- Cut off the whole head behind the pectoral fins, leaving as much meat as you want to eat with the head (Figure II-4, marked “B”).
- Cut the gills loose from their attachment by the front of the lower jaw.
- Cut or tear them loose from the top of the head.
Or—
- Cut the head off in front of the pectoral girdle, leaving just the head and no extra meat (Figure II-4, marked “A”).
- Take out the gills.
- Cut off the lower jaw. This takes off half of the bothersome teeth, as well as some of the delicious cheek muscle. You can remove the gills with the same cut. This is a fast way.
Or—
- Cut off both upper and lower teeth, leave the cheek muscle, and cut the gills out with some extra cuts. Leave the pectoral fins on, or not.

With any of the above preparations, you can also cut the head in half, bottom to top, to let it cook faster, or to be a smaller portion.

To cook:

- Put the heads in a pot.
- Pour boiling water over them to cover (or put the heads into boiling water).
- Keep them simmering until the skin on the nose comes off easily when rubbed with a spoon, about a half an hour.
- Drain by carefully lifting each piece out of the water on to a platter.
- Carefully drain the platter, and serve.
- A quicker way is to hold the lid on and pour off the water, but this tends to break up the heads a bit.
- This broth is delicious to drink along with the meal.

To eat:

- Take a head on to your plate and begin picking off pieces to eat.
- Most obviously—take the large cheek muscles, and the fatty part behind the ball of the eyes.
- Then remove each bone, one at a time, suck the juice out, chew up the soft parts and lick it clean. Each bone has a slightly different and delicious taste, unusually rich with healthy oils, which tempts you to keep trying the next bone to get a new flavor.
- After you chew the soft parts, sucking juice and oils out of each mouthful, spit out the hard part of the bones plus whatever else you don’t want to eat, including the teeth.
- The skin is all gelatinous and good tasting, and the whole nose is both gelatinous and cartilaginous with an interesting texture, and special flavors.
- The main part of the head is mostly harder cartilage. Within it are some round half-inch balls of soft bone that can be chewed up and have their own oily, rich flavor. They have the appearance of coral. The small brain barely fills half of its cavity. Hidden deep within the head is a white, irregularly flat, smooth, asymmetrically shaped “rock”. Actually, it resembles a piece of seashell in texture, thin on one end and about a half inch long.

The following is a typical story of novices learning to eat salmon heads:

Carrie scolded, "Well! I guess they aren't eating those good parts we cooked for them!"

I looked at what the kids were eating—nothing, just messing around because they had no idea how to eat heads. Since I didn't know much more, I asked, "What do you mean?"

"That nose part is especially good." Explained Bob, "After we have each eaten three heads apiece, Carrie can go on eating that and I can eat more of the skin."

I noticed that the pile of bones on their plate was very small compared to mine. Taking another head, I ate the cheeks and eyes, then began tasting the different flavors and textures in the rest of the head—the soft, smooth skin all over the outside, like gelatin; the nose cartilage—soft in places and crunchy in others yet all edible. The head bones came apart like a puzzle, and as I chewed on each one, a rich fluid came out along with most of the soft bone. When I had swallowed all the good flavors, there wasn't much left to spit out, and the pile on my plate was also small.

Roast salmon, *Argiq*

Roast salmon remains as delicious from the modern oven or grill as it has always been back through the ages. Use any variation of the following methods of holding the cleaned fish, or parts of it, over the coals, at the edge of a fire or in the oven:

- Poke a sharpened stick through the whole fish, prop it up beside the fire.
- Weave a grill of willows to hold the fish over the fire. (Lay it on a BBQ grate.)
- Cut the fish into strips and hang each piece on a stick over the fire. (Use skewers on a BBQ.)
- Fillet the fish and support each fillet with a mesh or grill of green willow sticks over the coals or beside a hotter fire. (Lay fillets on a baking pan in the oven.)
- Prop it on and against hot rocks by the fire. (Lay a whole fish on a pan in the oven.)
- Bury a fish on hot rocks with a fire on top.

These recipes require that someone carefully tend the fire and turn the fish. (See whitefish for more about roasting fish over the fire). Figure II-5 shows two pieces of fish baked in the oven, with the skin peeled off and now ready to eat. The fish tail on the right is a chum salmon and the fish tail on the left is a trout.



Figure II-5.

Fried salmon, *Siqaniqtaq*

Fresh salmon has a firm flesh, and just the right amount of fat to make it excellent as a fried meal.

Iñupiat today enjoy using the many recipes for salmon found in any fish cookbook; we do not repeat those recipes in this report.

Salmon eggs, *Suvaich*

Salmon eggs are eaten half or fully cooked, boiled, roast, dried, frozen, fermented; in every possible way. They have always been saved as a treat because of their good taste as well as their superior nutrition. Each egg could be compared to a mini-vitamin pill. Today, with so many good foods always available to us, these eggs are often wasted or fed to the dogs. In the old days, nothing was wasted because the people never knew when some disaster might cause a food shortage and starvation. Figure II-6 shows some perfectly cooked salmon eggs that were partly dried for a day first.



Figure II-6.

Caviar: Raw salmon eggs, lightly salted and fermented.

Beulah Ballot served eggs this way, which were delicious. The Investigator had always wanted to eat salmon eggs uncooked, but hadn't the courage to try. Now, she never passes an opportunity to fix salmon eggs this way, using both fresh and frozen eggs.

- Lay one or more fresh salmon egg skeins on a plate.
- Sprinkle with salt.
- Leave in a very cool place like the *sigluaq* or refrigerator.
- Another way is to put them in a jar without any lid, and stir them around to break the eggs loose from their skein membranes and mix in a little salt.
- They are good to start eating after at least one day. People don't eat them fresh. The eggs continue to gently ferment and are good as long as they stay cool, open to the air, and don't give you diarrhea. Some people may get diarrhea from eggs this way sooner than others.

To eat:

- Add a little more salt if you want.
- Pinch or cut off a bite-sized portion of the egg skein and lift it to your mouth with one hand while you hold the other hand beneath to catch any drips or eggs that may fall. In your mouth, the eggs feel cool and smooth, and pop as you chew, releasing their rich, satisfying flavor. You can also eat the tissue that holds the eggs in their skein, or separate it out to discard.

This is a great snack, addition to a meal, or a meal in itself. Even a few bites are satisfying because eggs are such a concentrated, nutritious food, made even richer and more bio-available with each additional day of fermentation.

To store salmon eggs in oil:

Although salmon eggs aren't usually stored in seal oil, they can be. If people have a lot of oil but are short of meat or berries to store in that oil, they could put in eggs. During starvation times, people often had oil but nothing to eat with it.

- Dry them at least half-dry.
- Boil, and drain while hot.
- Roast in the oven, or by a fire to thoroughly re-dry them.
- Cool, and put into oil.

Some say that they can become a sticky, gooey, mess in the oil if they aren't dry enough. They also may absorb moisture from the oil itself, or from greens or other partially dry food also stored in that oil. There is a delicate balance involved, because eggs with just the right amount of moisture will ferment into a gourmet food with marvelous flavors and a wonderful consistency.

Dried salmon eggs.

Hang the sacks of salmon roe on an old net hung under the cache or fish racks, or across any pole to dry. They dry up hard, almost crystalline, to skeins of bright, red-orange balls, that shine like jewels when backlit in the sun. Keep eating them as they dry, either boiled or along

with dry meat (*paniqtuq*) and seal oil. They keep changing each day in flavor and texture until they are completely dry.

Be forewarned, that nothing can stick to teeth worse than these dried eggs. They can take days to come off. Even spruce pitch is less sticky to chew into chewing gum than dried salmon eggs. However, when chewed with *tinnich*, these berries keep the salmon eggs from being sticky, allowing people to enjoy eating this fine food. *Tinnich* are dull orange berries from the Kinnickinnick shrub, *Arctostaphylos uva-ursi*. They are picked in autumn and stored in bear fat, fish oil, or seal oil. During storage, the oil softens their mealy texture and very hard seeds, making them better with time. Simultaneously, vitamins from the berries go into the oil, helping the oil to keep well. Later in the winter and spring, the berries, oil and salmon eggs are eaten together, letting the berries neutralize the stickiness of the salmon eggs. The oil also helps to decrease the stickiness.

Mothers with a particularly noisy child might give it some dried salmon eggs to chew. It would quiet him, as much from temporarily sticking his mouth shut as from solving his problem, unless, of course, his problem had been hunger.

Eggs hung early in the season may ferment and become too strong for us but continue to be good dog food. Eggs hung later may freeze before they finish drying to be eaten as *quaq*. The roe from salmon just about to lay their eggs is considered a delicacy. It has a chewy texture, while the roe from salmon caught earlier, like those just entering the river from the ocean, is watery or juicy and is rated second best.

As a food, salmon eggs are durable and hard to spoil. The Investigator has never heard of properly handled fish eggs hurting anyone. (However, sealed in plastic and unfrozen they could develop botulism.)

Salmon eggs to patch berry baskets.

Salmon eggs are chewed to make a paste to patch leaks in birch bark berry picking baskets during berry season. Pinch the paste on from both sides and smooth it over. That kind of patch lasts a long time. It is better than pitch, which leaves a taste on the berries.

Salmon eggs as bait.

Every fall in Noatak, people gather a few ripe salmon eggs to freeze and use later as bait. After freeze-up, they go up the river and choose a place to *tuuq* (chip) a hole through the ice. After the ice chips are scooped out of the hole, they squirt in a few eggs and lower their hook to jig for trout. If they don't catch much, they try somewhere else. If the fish are biting, they may stay a long time and catch up to a 100-lb bag of trout and whitefish, maybe more.

Dried salmon, *Paniqtuq*



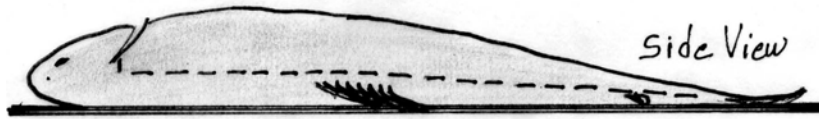
Figure II-7.

Figure II-7 shows Pauline Schuerch cutting salmon on the Kiana beach in the 1950s.

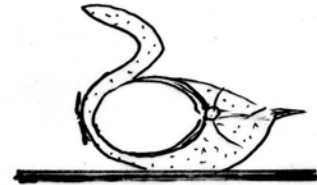
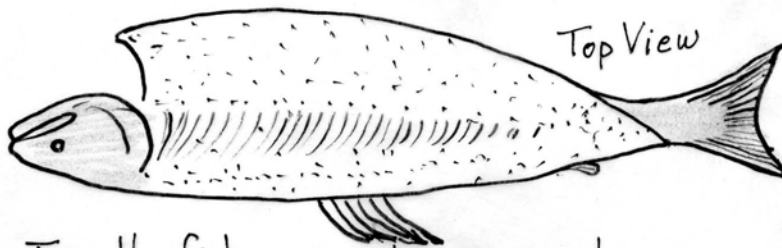
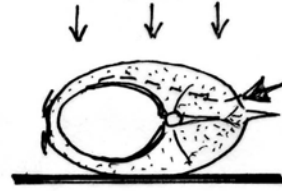
Soon the salmon come in large numbers, in nets-full, and the main way to handle so many is to dry them. They are a durable, delicious fish, used extensively for people and dog food, as well as for a cash crop. Once dried, salmon are eaten with seal oil, usually with other dried meats and *quaq*. With a nice amount of oil in their meat, they can also make a meal all by themselves. They are a good traveling food, being durable and lightweight. Figure II-8 shows a series of steps to cut salmon to dry. The drawings in Trout also apply to salmon, with the main difference being that salmon are usually cross-slashed to open up more area of flesh to dry. (See **Discussion** for more information on drying fish.)

To Cut Salmon

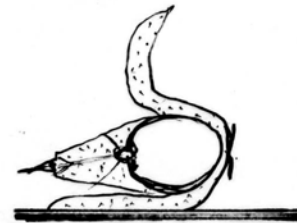
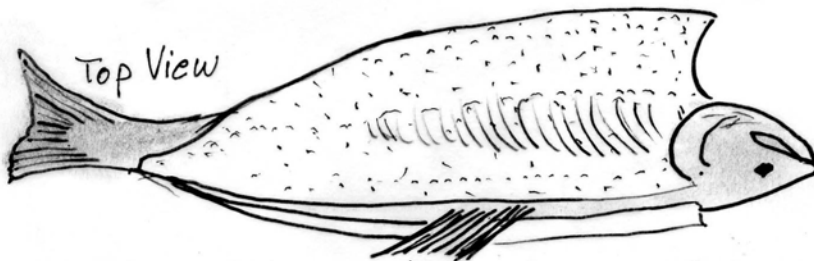
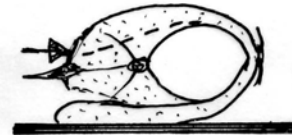
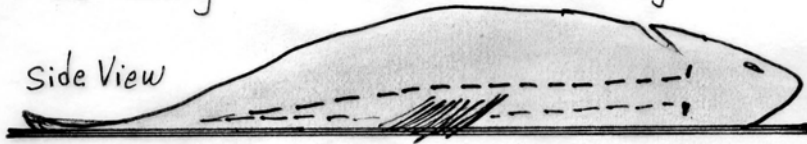
You are on the left, looking down on the fish. Cut along the back and side.



Cross-Sections



Turn the fish over and reverse ends. Cut along the other side the same way.



Pull the back bone with insides away from the two sides. They will separate along the rib ends. Remove the insides.

Cut along the center of the belly, shown by the dashed line to separate the sides.

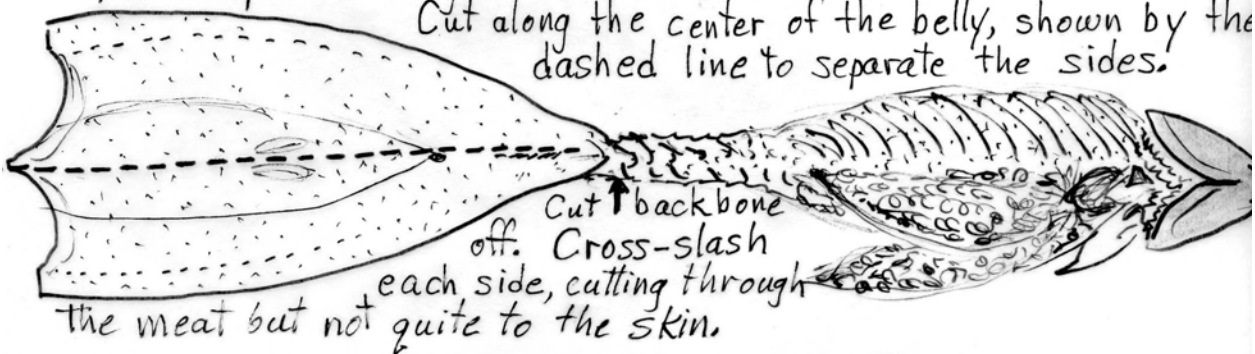


Figure II-8.

Boiled, half-dried salmon, *Iyamaagluk*

Once salmon have been hung, you can take one down each day to boil for *Iyamaagluk*.

- Take a salmon off the drying rack, one to four days after it was hung.
- Cut off the head and tail for dog feed.
- Cut the meat and backbone into 2”–4” pieces.
- Drop into boiling water and boil 30 min.
- Drain the cooking water into the dog pot.
- Serve hot or cold with seal oil.

Figure II-9 shows boiled, half-dry salmon, ready to eat.



Figure II-9.

As salmon hang to dry, they change in the following ways:

1st day—the flesh begins to get a crust. Even hanging a half a day makes a difference, giving it a slightly different texture.

2nd day—there is more of a change, making it a different food from freshly boiled fish. The eggs are best hung for at least two days. At this stage, boil, roast, or freeze to eat later, both the meat and eggs.

3rd and 4th days—it is better to boil the eggs and meat, and the best time to freeze them to boil later.

5th day on—the salmon is well on its way to *paniqtuq*, which could still be boiled, but usually isn't. It also can be frozen at any stage to be eaten as *quaq*.

Salmon are always safe for *Iyamaagluk* for three days after they are hung, and probably four. After that, if it has been hot August weather, some people will get diarrhea or upset stomach from eating them, more so the longer the fish are hung. This applies to properly cared for, fat, salmon, hung flesh-out. If they are hung flesh-in, they will cook and spoil in the warm weather much faster. Some people insist that any amount of sun (even 10 min. or half an hour), shining on hanging salmon will spoil the meat, making them dangerous to eat and fit only for

dog food. This precaution needs to be taken seriously, because even one person poisoned is not acceptable. Figure II-10 shows salmon hanging in Kivalina with the typical tarp covering the drying rack to keep the sun off as they dry.



Figure II-10.

Roast *iyamaagluk*

This is always a treat. It takes only a short time to bake, either freshly off the drying rack or out of the freezer. Cut to fit the oven tray, roast at 400–500°F until the flesh is cooked and the edges are crisp, then eat, skin and all. Figure II-11 shows half-dry salmon, taken from the freezer, baked, and ready to eat in half an hour.



Figure II-11.

Some stories of salmon recipes:

“Ramona took a hard frozen iyamaagluk salmon out of the freezer and lay it on the table. In the warm air it turned frosty with condensation as it began to warm while she turned on the oven and got out the roasting pan. She took an ulu, and with strong hands, cut it into two pieces and cut the tail off to fit, laid the frozen pieces in the pan, sprinkled them with salt, and slipped it into the oven at 500°F. In 15 minutes it was beautifully crisped on top and along the edges with pools of oil in the hollows. Four of us ate the whole fish, skin and all.” From Nooorvik

“We mix boiled iyamaagluk with a bit of seal oil and berries. Any kind of berries go well with oil and cooked fish.” Agnes Smith from Kiana

“We held the 3/4 dried sides of salmon over the low camp fire and let the skin be the frying pan. The skin on fish this dry is rigid so we controlled the amount of heat as we moved it around to roast it evenly. It doesn’t take long to cook, and the skin is crispy.” From Buckland

Half-dried salmon stored in blueberries, *Itchiak*

This is in an unbelievably beautiful and delicious way to prepare salmon. Take the sides of drying salmon down when they are still soft in the center but have a good strong crust. This recipe makes an excellent treat, which preserves the salmon better than either drying or freezing because the berries keep the air from oxidizing the flesh. (See Trout, for details of preparation and eating.)

Half-dried and dry salmon stored in seal oil, *Pauqmiitaaq*

This recipe also preserves the salmon better than when it is only dried or frozen. Fish put away in oil will keep for later in the winter, and aren’t watched as closely as are *itchiak*. Therefore, it is important to have them dry enough so they don’t ferment too much, which they will do in the oil if they are too moist. As it is stored, the moisture in half-dry fish will slowly equalize until the wet part becomes drier, and the dry crust softens, creating a uniform texture similar to medium-soft licorice candy, which is just a bit chewy but mostly firm. Any moisture allows fermentation, which creates some amazingly wonderful and varied flavors when it is done just right. Controlling the fermentation to your own preference creates an exceptionally fine food, but there are many ways that could allow this preservation process to not turn out as you would wish, although they may still be good food.

To prepare:

- Choose half-dry salmon, dryer than you would for *itchiak*, see **Trout**.
- Trim off the fins, tail, and every bit that is slightly rancid, or possibly spoiled.
- Cut into uniformly sized pieces, from serving sized pieces to whole sides of salmon.
- Pack the pieces into a sealskin poke, wooden barrel, or plastic bucket. They can be packed in fairly tightly.
- Pour seal oil over to cover.
- Jiggle the barrel to dislodge all air bubbles.
- Tie a cloth over the top and cover with a wood lid.
- Leave the container in as cold a place as possible and let it freeze.

This will keep as long as the salmon and oil remains cold or frozen, and can be used any time during the winter and all next year.

To eat:

- Take a container to where the barrel of salmon is stored and uncover the top.
- Use your fingers, a long fork or hook, to lift pieces of salmon out of the oil.
- Take out only as much as you want to eat at that meal.
- Pour some oil from the bowl back into the barrel, and keep just what you need to eat with the salmon.
- Put the bowl of salmon on the table.
- Let everyone take out what they want on to their plate to eat along with the oil, dry meat, and other food.

Warning:

To keep fish safe to eat:

- Never keep the fish too warm, never above 40°F, and preferably much colder.
- Never put it in a plastic bag.
- Never cover it tightly, like with a plastic lid on a plastic bucket.

To be safe:

- Keep the fish cold / frozen,
- Never use plastic,
- Only cover loosely, not airtight.

Flora Green told this story from *Sisualik*:

“When we were children, my sisters and I would play under the fish racks and reach up to pull off the drying salmon hearts to eat. When Mom cut the fish she let the hearts hang down to dry. She would dry up the guts too, for dogs. She saved as much as possible. She laid the backbones out on poles to dry up for iyamaagluk, and then they further dried up for dog feed.”

Dried salmon with seal oil, *Paniqtuq*

This is the most common way to eat dried salmon, usually along with numerous other meats and fish prepared in many different ways, and other foods besides:

- Cut or break off bite-sized pieces of dry salmon.
- Dip each piece in seal oil and eat.

In Figure II-12, Minnie Grey is cutting dried salmon that was as hard as wood with her *ulu*. By shaving hard dry fish into thin pieces, or pounding it to break apart the fibers, this durable food becomes readily available for a delicious meal.



Figure II-12. Minnie Gray, Ambler, 2002.

Salmon dried with eggs inside, *Aanaalik*

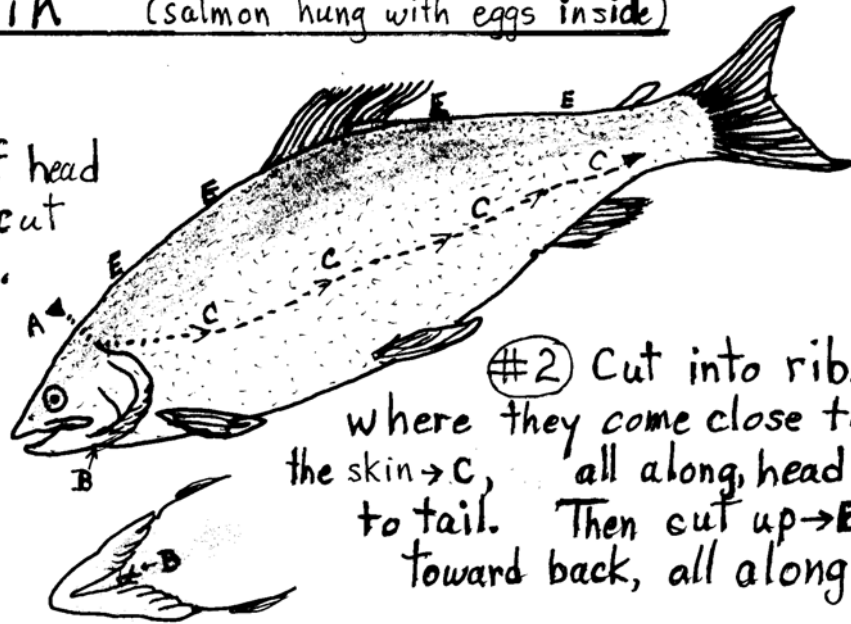
In September, people start cutting the female salmon differently for *aanaalik*. They cut it so there is no break into the gut cavity and all the eggs hang there to dry and age as the fish dries up for *paniqtuq*. At this time of year the fish are not eating and have empty bellies, while their roe sacks are enormous, nearly filling up the body cavity. Figure II-13 of notebook pages, shows how to cut salmon to dry as *aanaalik*.

Aanaalik (salmon hung with eggs inside)

#1 Cut off head

A → B and cut behind gills.

Some leave the head attached but take the gills out.



#2 Cut into ribs

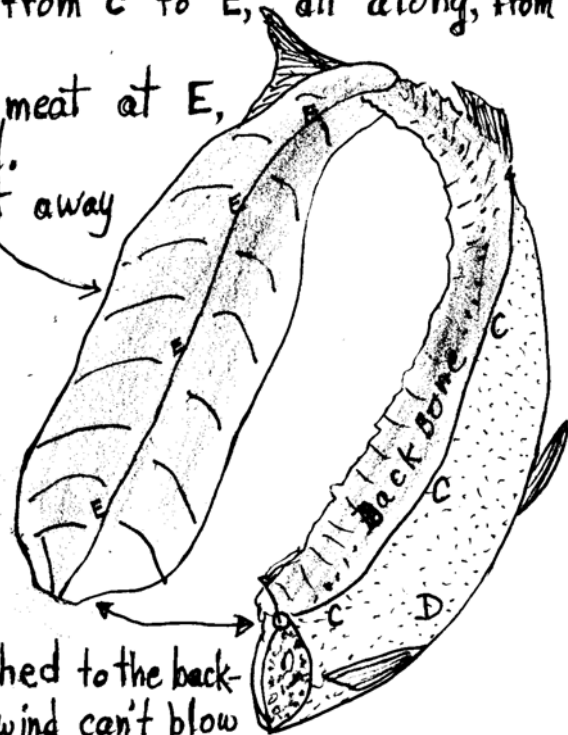
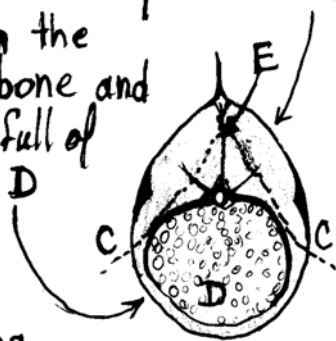
where they come close to the skin → C, all along, head to tail. Then cut up → E toward back, all along.

#3 When both sides are cut from C to E, all along, from head to tail,

Cut through the back meat at E, all along, from head to tail.

Pull strip of back meat away

from the backbone and belly full of eggs. D



#4 Hang to dry.

Some leave the back meat attached to the backbone, forming a loop, which the wind can't blow off the racks, no matter how stormy.

Figure II-13.

The first fish cut this way each season, have the strongest tasting eggs, because they have more days and more warmth to ferment before freezing stabilizes them. Each successive drying

day, the fish and eggs have a slightly milder and different flavor. In the winter these *anaalik* are eaten as both *quaq* and *paniqtuq*, providing a wide variety of rich flavors. *Aanaalik* that are made at freeze-up don't have a chance to ferment, and are eaten as relatively fresh *quaq/paniqtuq*. *Aanaalik* can be eaten even after they have hung for only one day and any time after that. Figure II-14 shows a sketch of two *anaalik* hanging to dry.



Figure II-14.

Figure II-15 shows a bundle of dry fish from Noatak with a big *anaaliq*.



Figure II-15.

Wendel Booth of Noatak tells how Noatak people like their salmon:

*“When the eggs are loose and ready to spawn and we hang them; we call it **muptulituk**. These late eggs are extra good. We dry them, let the eggs ferment as they dry and become **tipliaqtaa**.”*

Soaked, dried salmon

Another way to eat dried fish for variety, or if the fish is too hard to chew, is to soak it first in water. Squeeze it out and soak it again a few times. Then eat it raw. It has a different texture and flavor for variety. Mark Cleveland from Ambler had some. It is an especially good way to eat old *paniqtuq* with mold and stuff you want to wash off the outside.

Peter and Mary Garfield, from Noorvik explain this recipe further:

“You can eat dried salmon that is even two years old if you soak it overnight, or one, two or three days. Soak it real well and eat it that way. Cut it and eat it like salted salmon. You can even cook it then.”

Warning:

Once soaked, it will spoil faster than a fresh fish, so it must be used up right away or kept cold, and never kept in plastic or a tightly closed container while it soaks or afterwards. This is important whether it is stored in the refrigerator or the *sigluaq*.

Smoked

Any time the fish is hanging, it can be smoked by building a smoke fire under the drying racks. The more moisture in the fish the more smoke it will absorb. Even a few hours will give it a nice taste. Continuous cool smoke on hanging, salted, salmon strips make the traditional Athabaskan “squaw candy”. Although it keeps well and is delicious, one can’t make complete meals on such strongly smoked and salted fish. *lñupiat* traditionally did not use salt and only enough smoke to keep the flies off, which produced food you could eat day after day.

Today, everyone loves to have some smoked and salted dried fish as a delicious accompaniment to the typical and frequent *quaq* and *paniqtuq* meals. Figure II-16 shows salmon hanging in a Noorvik smokehouse.

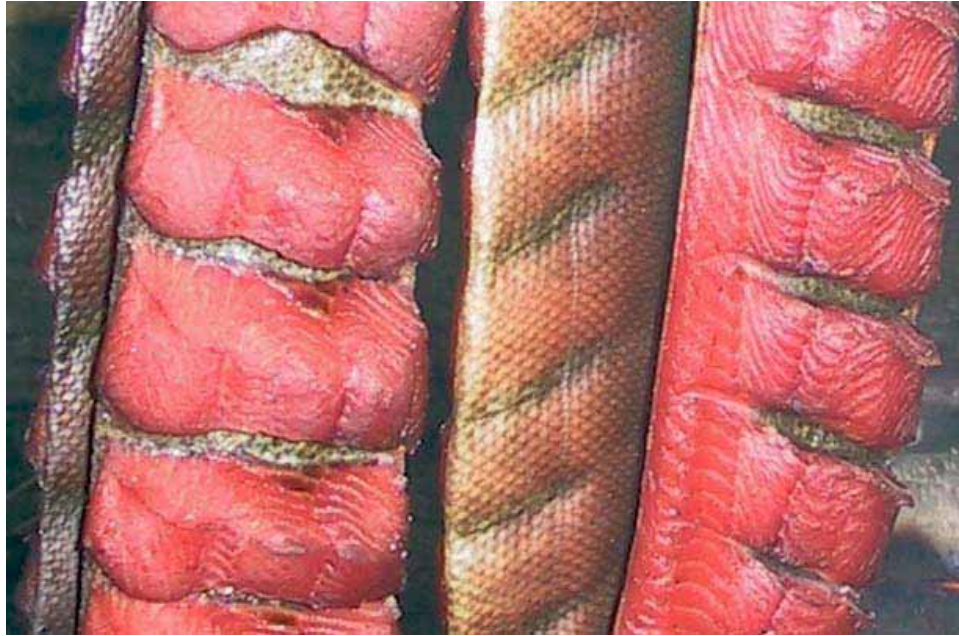


Figure II-16.

With few dogs in most households today, more people set their nets a few times when the weather is good, to catch and dry only what fish they need for the year. This allows time to take extra good care of a few fish, to cut, clean and dry them perfectly, then package and store them in the freezer to prevent any oxidation. Along with this trend, more people are cutting them differently to maximize the best parts, and make them easier to package. Figure II-17 shows many different kinds of dried and smoked fish from Kivalina.



Figure II-17.

Dog food

Dry salmon is very good for dog food. It is easy to feed and rich in oil.

- To dry for dogs you either leave the head on or cut it off.
- Cut the flesh off the backbone, close, on one side, leaving the ribs on the meat.
- Slit the length of the belly.
- Cut the meat off close from the other side of the backbone.
- Cut the backbone off by the tail.
- Score both sides of the flesh, deeply and evenly.

This hangs well and under perfect drying conditions, might be used for people for three days. After that, it is just for dog feed because the flesh is too thick to dry properly and may have some spoilage in the thick places that would make a person ill or sick. To dry salmon for people, it must be cut thinner and the drying conditions must be good.

From the oral history of Kotzebue comes the following stories:

“After the meat is hung, we take care of the backbones which now have practically no meat on them. Scrape out the kidney, take out all the insides and hang them up to dry or cook them for dog food.”

“The only part we save from the insides are the eggs. We hang them on a net or over thin poles to dry. They are good food for us, and what we don’t eat are for the dogs.

“We lay the backbones out to dry. Seagulls can’t even eat them. They try to swallow those backbones but they can’t. They make good fuel for a fire because they are so fat. They burn like resinous wood. Although the oils give good heat, they give a terrible smell.”

“In the old days, when the dog food salmon were completely dry, 25 fish were tied into a bundle that weighed about 50 lb., and sold for around \$5.00, \$10.00, \$15.00 depending on the year and supply.”

One year, there was a big storm that rolled some nets up like a rope. That damaged the salmon so they couldn’t be sold, so they were cut to dry, all 200 plus. While cutting and hanging them at *Sisualik*, Flora Green told this story:

“They used to hang the whole salmon to dry, everything. Only thing they couldn’t dry was the liver. In the old days, people would make use of everything. They would cover the salmon and let them rest over night before cutting them. Other times they’d even wait for one day and one night, it depended on the temperature and what else was happening.”

“Waiting made them easier to cut and hang. There were two ways to hang the fish: 1) All the meat on one side of the pole and the back bone with some meat on it and the head on the other side; or 2) Cut as above, then cut off the back bone and head. Cut down the belly so half the meat and skin hangs on each side of the pole.”

Wendel Booth, of Noatak, also tells about letting the salmon wait before cutting them:

“After seining salmon in Noatak we string 5 salmon at a time on a willow, or length of rope, and tie all of the fish in the river over night, or for a whole day.

This makes them easier to cut after their flesh relaxes, and distributes the work over two days”

When salmon are dried in late September and October, when the temperatures are cool in the day and freezing at night, they have a different, softer, spongy texture and they are light colored and far less rancid than summer dried fish. Fish hung late in the season usually freeze before they are completely dry, and are eaten frozen as *quaq* along with the other frozen and dried fish and meats. Although perhaps half or mostly dry, they must be kept frozen because otherwise they would quickly mold and spoil if stored above freezing with the fully dried meats.

More stories from the Kotzebue area:

“When we hang salmon to dry, we split open the head and push the eyeballs out of their sockets from the inside so they hang down and dry. When they are partly or all dried, we cut them off and eat them as a treat as we are working.”

“In September, we took the contents of the entire gut cavity out, eggs and all, and hung them to freeze. This was for dog food, but if they dried and froze well, without flies, the eggs were good for people. When they were frozen, we sliced off pieces of eggs to eat with paniqtuq.”

Frozen salmon, *Quaq*

Salmon aren't eaten as *quaq* unless they are first fermented a bit and often partly dried.

Fermented, frozen, and then thawed, *Uilaaq*

Although this is raw in that it has not been heated, the processes of fermenting and freezing have changed the proteins to make it edible, eaten “raw”. Same with salmon that has been dried, pickled, or salted. It still is “raw” in that it hasn't been cooked, but those processes have changed the proteins enough to make it a good food for us to eat, whereas fresh, raw salmon is not good. Besides making the raw salmon edible, these processes of fermenting freezing and drying change both the flavor and texture in highly desirable ways, sought as an end in itself.

Fermented salmon *quaq* from Noatak, *Qaqlik*

Only old salmon is called this, salmon close to spawning. Some people can't even eat this at all. Hang salmon for *qaqlik* in late fall, the ones with a thin body. This is a favorite food in Noatak where *qaqlik* is made.

How late in the spawning process a salmon can be eaten seems to be a matter of personal preference. Everyone eats a silver-colored salmon. Some do not eat salmon with a hooked jaw and colored sides, and others do. Others will eat near-spawning salmon as *qaqlik* because of a preference for the taste and texture. Certainly, dogs, bears and other animals continue to eat salmon as they spawn and after they die and decay, but they have a different digestion system than humans. The flesh of these fish as they approach and pass through the spawning process goes through dramatic changes. The condition when they are no longer good food for people is when that which gives life and vitality to the fish is gone. Many factors enter these decisions,

such as the need for food at that moment, and personal preferences based on past eating history, and cultural taboos.

Wendel Booth explains further with several stories:

“We use the salmon until they start to spawn, then we leave them alone. We don’t use salmon that have white patches on their skin or the ones with scars. They are good for dogs.”

*“Salmon caught in August and early September get **tipliaqtaaq** and are good to feed to dogs as **quaq**. It is called **quaqlik**, that **tipliaqtaaq** salmon. I really love that food. Just like you love your favorite food, I like **quaqlik**. I was raised on it, that **uilaq** **tipliaqtaaq** salmon. Fresh salmon we cook. We can’t eat fresh salmon raw.”*

“In Noatak we don’t put salmon heads away to ferment as they do along the Kobuk.”

“One year I was working in Kotzebue when the Noatak River froze up early, so I had to fly home with my family. Dad said, ‘You got no dog food for the winter.’ Usually I would be home early enough to seine lots of salmon. He told me where to go, back on the sloughs, where there were so many salmon spawning that they kept the water open with their fins. I crossed the river ice with my dog team, and went where my Dad had told me. Sure enough. I looked out over all those salmon and I just couldn’t believe it. I had taken two salmon nets with ropes, so I went across to the other side with hip boots and set the nets across, and went home. The next day when we checked the nets and cleaned the fish, there was already snow on the ground. We stayed down there until 6:00 o’clock and got 200 salmon. They were colored, but some were silver that must have just come up the river under the ice.

Next day we went down again with dog team and took more food and our tent and cooking gear and stove. We stayed about a week, my wife and I. I never told anyone in town where I was going. I never said, “I’m getting lots of fish down there,” to the peoples. I never say nothing, because we need to get our fish first. We put them in a big pile. It was shoulder high, and 8 feet wide, and 15 or 20 feet long. We just stacked them there and they froze, 2,600 dog salmon. Then, I told my brothers and some other guys, and I go help them down there. They each get about 700 to 800 salmon. There were still lots of salmon left.

*Every year the salmon do this. I had dog feed enough for all winter but I had to do a lot of cooking for my dogs. We can’t feed the dogs that kind of fresh **quaq** salmon, so I had to cook it for them.”*

Fermented fish, *Tipliaqtaaq*

Iñupiat have exact rules of how to ferment fish so they will be safe to eat. Sometimes they shudder at how others from warmer cultures accomplish it. The important message in this regard is: ferment foods only when you know what you are doing, do it exactly right, and keep

good track of the temperatures at all times. Most important: do not use plastic nor exclude air in any part of the process.

Read the discussion of fermented fish in Discussion.

Fermented salmon heads, *Aurak*

The main rules are to keep them cool–cold, not in plastic, and not sealed up tightly. The following is Lydia Douglas’s upper Kobuk recipe:

- Dig a hole two and a half to three feet deep and line it with grass.
- Use fresh, clean salmon heads.
- Lay the salmon heads in the grass.
- Cover them well with more grass along the sides and over the top.
- Cover it all with dirt.

In about a week, the heads will be ready to dig up and eat, maybe sooner if the weather has been hot. In hot weather, the hole should be in a shady place.

*“ You won’t get hungry for a long time after eating *aurak*, they are so rich and satisfying. Sometimes ‘*aurak*’ means rotten, too strong for people to eat, and other times it can mean these fermented salmon heads which are strong alright but still an edible food.”*

Fermented salmon heads, *Nakaurak*

This is Mamie Beaver’s recipe from Kotzebue:

- Line a two-foot deep hole with green grass, somewhere that the sun won’t shine on that ground.
- Wash the salmon heads well, get all the blood and scum off.
- Leave the gills in.
- Put the heads in a flour sack and put the sack in the grass hole.
- Cover it with a few inches of grass, then cover with sand, and then with a board so people won’t step on it.
- Let it stay until the smell is a little strong and the nose skin slips off, or can be easily broken.

That skin on the nose is the best part, like soft rubber. Don’t let it get too strong. Never eat these stinky heads the same day you eat any fruit, candy, or medicines. This is a general precaution when eating any strongly fermented fish. (See ‘botulism’ in Discussion.)

Conversation in Noorvik:

“We dig a hole down a ways, line it with grass, put in the heads and white milt, cover with grass and then dirt. I like to eat them when they are green and slimy, but I learned that when I was in Bethel.”

“ I can’t eat them that strong. When they start to get green and slimy, I have to feed them to the dogs.”

“It seems well documented that most enzymes necessary for fermentation come from the tissues and especially from the gut”. From Handbook of Indigenous Fermented Foods, page 488

Salted salmon heads and bellies.

Salt is the best way to preserve the fattest parts of the salmon, especially on the coast where the salmon are freshest. In warm weather, the back meat may dry, but the bellies and heads are too fat and would only get rancid. Properly salted, and stored cold, they may keep for two to three years, although the quality decreases with time.

The following four details are important to watch as you prepare salted and pickled fish:

- 1) Use only very fresh fish, thoroughly cleaned of blood, and well soaked and drained.
- 2) Have everything you use clean.
- 3) Store the salted fish between 36 and 38°F. Below 36°F the salt penetrates more slowly, above 38°F the chances of spoilage increase geometrically with each degree rise in temperature.
- 4) Use only food grade salt and not table salt or iodized salt, which have many additives. Look for Pure Pickling Salt, Kosher salt, or Dairy salt.

A 2 1/2% salt solution encourages good fermentation.

A 5% salt solution reduces the growth of most bacteria and allows some good fermentation. To make a 5% salt solution, use 1 lb (1 1/2 cups) salt for 19 pints (9 1/2 quarts, or 2 gallons, 1 pint) water.

A 10% salt solution prevents the growth of most bacteria and is the strongest solution used in home pickling. To make a 10% salt solution, use 1 lb salt for 9 pints water.

A 20% salt solution controls the growth of even the salt-tolerant bacteria.

To salt down a barrel of salmon heads and bellies:

- Cut the bellies and heads off the salmon and let them soak in cold water while preparing the rest of the fish. The soaking helps to loosen the blood, which must all be removed from the fish.
- Scrape every bit of blood and darkness out of the pieces, including from the veins in the bellies. Remove the gills from the heads and discard, split each head in half, and rinse and rub out any blood.
- Take the fish out of the water and let them drain for several hours. Figure II-18 shows split salmon heads that have been soaked and are draining.



Figure II-18.

- Dry each piece with a rag and let them air dry for a day in a cool place, turning a few times.
- Choose a clean wooden barrel that will hold half again as much as the amount of fish.
- Layer in a half inch of salt all over the bottom, then lay in pieces of head, to cover the bottom.
- Cover these pieces of salmon with salt.
- Lay pieces of belly in to make the next layer.
- Cover with salt.
- Continue to alternate layers of salt, heads, salt, bellies, salt, etc., until all the fish are used or the barrel is a few inches from the top.
- Finish with a thicker layer of salt. As the barrel sits, the fish will make its own brine.
- Place a wooden disk or plate on top of the fish and salt, which fits inside of the barrel, and weigh it down with a 10 lb-plus rock. This is to keep all pieces of fish under the salt brine. If fish are above the brine, they will spoil and may cause the whole barrel to spoil.
- Tie a piece of cloth over the top, and then cover it with a larger wooden lid. Set this barrel in a cool place like a *siglaq*, or storm shed, or dug down in the ground and covered. These fish can stay there for a long time if kept cold.

To eat salt salmon:

Take the lids off the barrel, take out, into a bowl, as much as you want to eat that day, and cover the barrel again, being certain that all the fish are still under the brine. Rinse the salt off the pieces in the bowl. Now, there are several ways to prepare and eat the salt salmon. You can eat them just like that, fresh, or boil or fry them, but they will taste very briney. To taste more like fresh fish, soak the pieces for a few hours or overnight, in one or more changes of water, and then eat them raw, boiled or fried. Salted fish are delicious all these ways, and with experience,

you will learn how to get just the right amount of salt out for your taste. However, a salted fish that has had all the salt soaked out will spoil faster than will a fresh fish.

All salted foods have mainly lactic acid fermentation. If too little salt is used, the fish may turn soft. Probably it is not poisonous because the lactic acid preserves it. Check to see if it is acidic, if not it may be wise to not eat it.

When too much salt is used, a pink fungus may develop, which is not poisonous [Steinkraus 1983].

Pickled fish

There are many variations of this recipe. See **Herring** for one version.

- Rinse off salted salmon bellies, and soak them for a few hours.
- Cut into uniform pieces, perhaps one inch wide.
- Place in a glass jar, crock, or wooden barrel.
- Pour the following mixture over to cover the fish by at least a good inch:
- For a gallon jar of fish, boil together for 5 minutes and cool:
 - 1–2 cups vinegar
 - 2 cups water
 - 1/2 cup sugar (optional)
 - 1/2 cup pickling spices (optional)
- Slice and add your choice of these other optional spices: onion, garlic, celery, red pepper.
- Adjust the volume so the pieces of fish are not packed in tightly and can be gently stirred in the pickle solution.
- Cover with a loose lid to keep out dust and insects.
- Stir the fish every day to be sure they pickle evenly. The fish must always stay under the pickling juice.

They are ready to eat when the pieces are pickled all the way through, or three to five days. You can tell by cutting a piece in half and noticing the opaqueness where it is pickled.

Dried, roasted salmon skin, *Amigaatchiaq*

Mamie Beaver raved about dried salmon skin roasted on top of a wood stove until it's crisp, then eaten right away. Other fish skins are good too, but none as good as salmon, because their skins are thicker and more oily. (However, they taste terrible if the skin oils have become rancid and are then not considered edible.)

To fix *amigaatchiaq*:

- Cut a side of dried salmon into strips one or two inches wide. This can be lengthwise or cross ways.
- Eat all the dried salmon meat off the skin.
- Hold each piece of skin over the hot surface of a stove, or lay it briefly on top of the stove, or near a fire, and keep turning it until the oils bubble and the skin puffs up and becomes crispy all over.
- Eat as soon as it is barely cool enough, and it melts in your mouth.

Ella Jones and the investigator ate smoked salmon and, after eating off the delicious meat, we ate the strips of skin, too, they were so good. Her Mom told her that it was good to eat

the long strings of sinew and fish skin to help clean out the insides of the stomach and intestines, not all the time, just now and then, and not too long of a stringy food. These strips were a quarter inch wide and about eight inches long. Same with the scales; salmon scales are fine to eat but the pike (*siulik*) scales are too sharp and abrasive internally.

Miscellaneous

String for snares

Take a whole side of dried salmon and eat all the meat off without cutting the skin. This is easily done by bending the skin to break the dry meat away. When the skin is clean, carefully cut it into strips about a quarter inch to 3/16th inches wide. Pull each strip and it will lengthen and become narrower, and the tiny scales will lift up. Carefully scrape the scales off. Now you have good string and you have what the old people used to make ptarmigan snares. Figure II-19 shows the process of making snare string from dried salmon skins.



Figure II-19.

Mamie Beaver tells about using old salmon skin to make mukluks.

“When salmon are half dead, those old, spawning salmon, their skins are tough. We make water boots from this tough salmon skin.”

Omega-3 fatty acids

When *lñupiat* were eating their traditional diet, they had few heart attacks and degenerative diseases. Research has shown that a diet high in salmon seems to retard and reverse whatever causes heart diseases. Salmon oil is very high in the Omega-3 fatty acids so necessary for good health.



Figure II-20. One *anaalik* hanging.

Pink Salmon, Humpback

Amaqtuq

Oncorhynchus gorbuscha



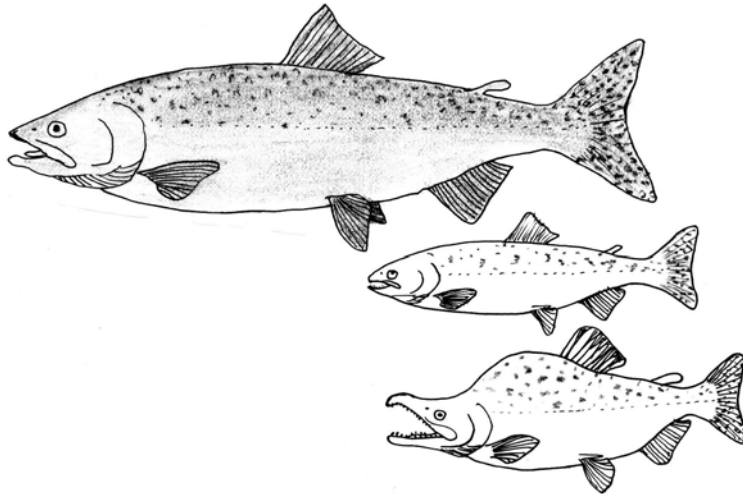
Description

Color when fresh from the ocean:

- The pink salmon has metallic blue to blue-green on top, silver on the sides, and white on belly.
- Large oval black spots are on the top third of body and tail.
- They have light gums, small scales, and are the smallest of the Pacific salmon.

Breeding color and shape:

- Males are dark on their backs, with greenish brown blotches on their red sides. Females are similarly colored but less bright.
- Males develop a large hump on their back, their jaws grow longer and become hooked.



Seasonal Feeding and Spawning Movements

Pink salmon weigh 3.5 to 4 pounds (9 to 20kg) and average 15” to 24” (38 cm to 61cm). Their eggs are smaller than the chum salmon but otherwise similar.

In early May, they come out from the gravel and go right on out to sea. There, they hang around close to shore until they are about 3” long, then move out into the ocean to feed and grow to maturity. A year and a half later, they return to spawn in their home stream, and die soon afterwards. They generally do not spawn far up stream, and frequently spawn in lower tidal areas. Pink salmon are the most likely of all the salmon to spawn in a different stream from where they were hatched.

Harvest

Pink salmon are caught in both seines and gill nets along with the other salmon. Sometimes they come in runs of mostly pinks.

Use / Recipes

Fresh-run from the ocean, pink salmon are fat and good to eat. Although they may be the least preferred of the five salmon caught in the study region, they are still a good fish in their own right. They are cooked and eaten in much the same ways as the other salmon.

Dried fish, *Paniqtuq*

They are a preferred fish to dry during the heat of the summer because they have less oil than the other salmon. They also dry up with a slightly salty taste. Their meat has more water and less fat than other salmon so it shrinks a lot as it dries, and doesn't get rancid as quickly. Because of all this, it also dries hard, like pike. (See pike for ways to eat hard *paniqtuq*.)

Dried fish stored in seal oil, *Pauqmiituk*

Dried, or half-dried, they are especially good stored in oil.

Cut pink salmon to hang without backbone, head, or anal fin. Then take off the rest of the fins when putting them in oil.

Frozen fish, *Quaq*

Pink salmon are never eaten frozen as *quaq*.

King salmon

Iqalsugruuk

Tagayukpuk (Deering)

Oncorhynchus tshawytscha



Description

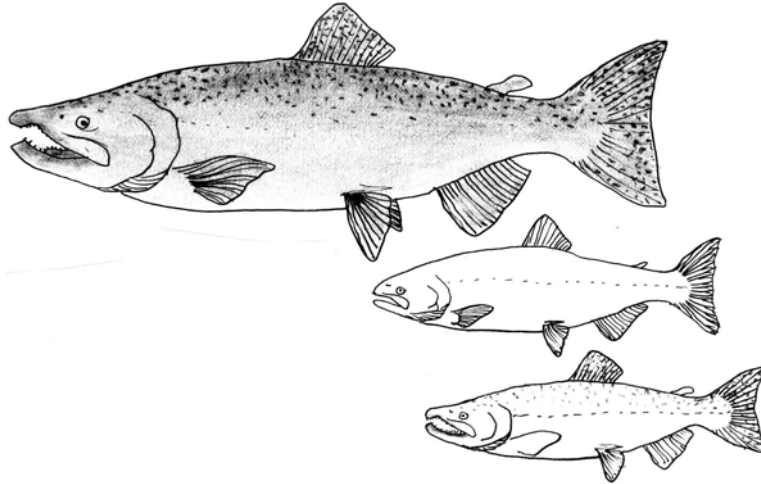
Sea-run color:

- King salmon are metallic dark green to blue-black on back, silvery sides, and white underneath.
- Small black spots are on their back and on both tail lobes.
- Their gums are black at the base of their teeth on their lower jaw.
- A dark tongue is a good distinguishing characteristic.
- Their scales are tiny, but larger than other salmon.

Spawning shape and color:

- The change to olive brown, red, or purplish is more dramatic in the males.
- Their jaws grow longer, both top and bottom become hooked, and their front teeth get big.

King salmon weigh up to 40 pounds (9 to 20kg) and measure 30” to 50” (76cm to 127cm). They are the largest of all the salmon, but sometimes a younger one is caught, more the size of a chum. Their eggs are a brilliant red orange when raw and turn a pale orange when cooked. The size of the eggs depends on the size of the fish, averaging around 4mm to 6mm.



Seasonal Feeding and Spawning Movements

On the average, they spend about a year feeding on various invertebrates in fresh water before they run out to the sea. There some may stay near shore, while others travel long distances in the ocean eating a wide variety of fish. They grow rapidly, especially their last year. After 1 to 5 years at sea, they return to their home streams to spawn, and die soon afterwards. They spawn from near tidewater to far up big rivers.

‘Jack salmon’ are male king salmon which are small sized, around 6 to 8 pounds, that are sexually mature yet still small.

Harvest

Traditionally the king were harpooned because they were so big. They were also caught in traps as well as in gill nets and by seine.

Today they are caught along with chum salmon, in gill nets, by seine, and on sport gear, although they can grow so large that nets and line need to be extra strong. Sports fishermen love their fighting ability and vigor. Although few in number are caught in our area, they do spawn from Pt. Hope, south to the Ventura River in California. There seem to be more in Deering, Buckland and Selawik than the rest of the region, and they seem to spawn in the Selawik and Buckland rivers, where they are found way up-stream with ripe eggs.

Use / Recipes

King salmon are the most prized salmon in this area. Their high quality fat and huge size make them an exceptional fish, with superb eating qualities and a high amount of excellent oil.

They are best half dried. Fresh they never seems to cook up firm, even a fresh, fat, good fish is always a bit paik (mushy) probably because of their rich amount of oil.

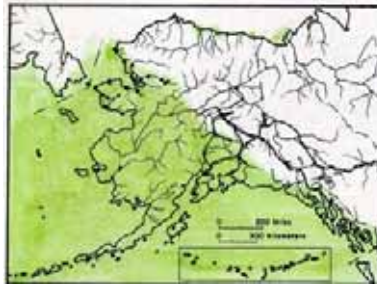
King Salmon are used much the same as the chum salmon, although, being fatter, they are harder to dry, and become rancid more easily.



Figure II-21. King salmon head.

Red Salmon, Sockeye Salmon

Oncorhynchus nerka



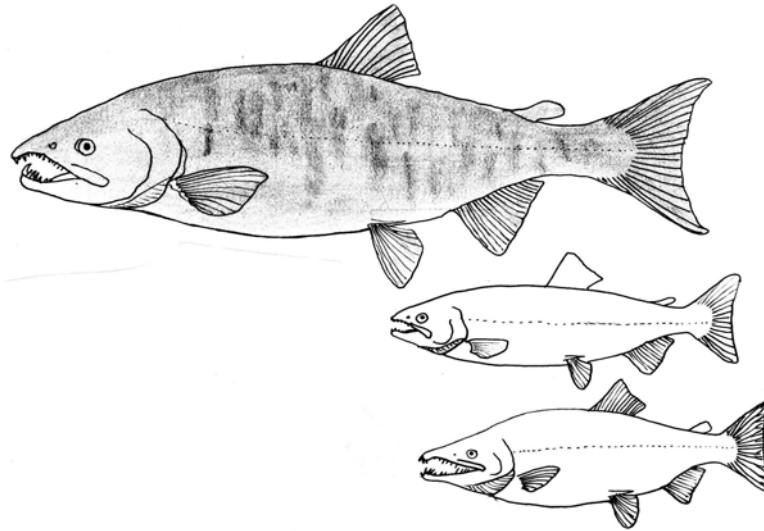
Description

Ocean color:

- Red salmon are bright silver, dark blue/greenish blue on head and back, white/silver on their belly.
- The absence of large, dark spots on their back or tail distinguish them from other salmon.
- Their dorsal and anal fins and tail are not edged with black.
- They have larger scales than chum salmon, but they are still too small to take off.

Breeding color and shape:

- Males and females both turn bright red to dark red on their back and sides, with olive green on their head and upper jaw and a white lower jaw.
- Males develop a humped back, and an elongated upper jaw of sharp teeth.
- Red salmon weigh between 4 and 8 pounds (1.8 to 3.6kg) and measure 18 “ to 24” (46 cm to 61 cm). Their eggs are similar to chum salmon eggs.



Seasonal Feeding and Spawning Movements

The anadromous populations spend one to two years in lakes before running out to the oceans to grow awhile close to shore before spreading out across the North Pacific Ocean for one to four years. Then they return to their natal streams to spawn and die.

Few are caught in our area, although red salmon spawn from Pt. Hope to the Columbia River, and are abundant in the Bristol Bay and Fraser River systems. They are the salmon most likely to spawn in spring-fed lakes, such as one off the Kelly River, which is mentioned as a spawning place.

Some populations are strictly freshwater known as Kokanee, and are smaller than the sea run reds.

Harvest

A few red salmon are caught along with chums in gill nets and seines.

Use / Recipes

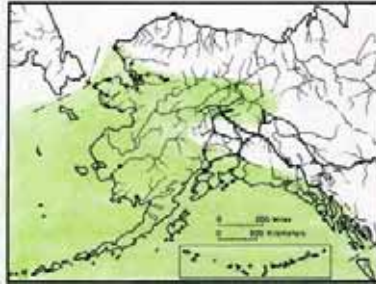
Red salmon are so intensely red, they are a joy to cut and eat. In the study area of this report, they are not as fat as the silver or king and are therefore a good dried fish. They are reasonably good eating but are less commonly caught than the king. They are eaten in all the same ways that chum salmon are eaten. Figure II-22 shows a tail section of red salmon on the left, chum salmon in the middle and trout on the right ready to go into the oven to bake. Note the intensely red color of the red salmon as compared to the other two fish.



Figure II-22.

Silver Salmon, Coho Salmon

Oncorhynchus kisutch



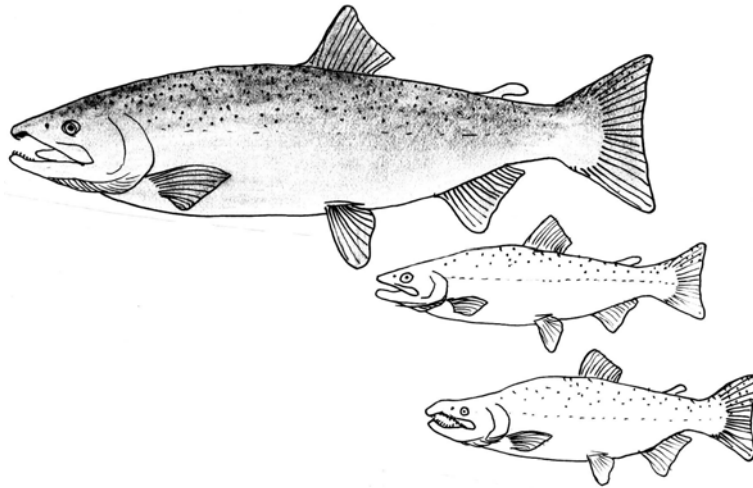
Description

- Silver salmon are metallic blue on top, silver on the sides and white underneath.
- There are dark spots on the back and upper tail lobe only.
- The lower tail lobe has no spots and their gums are light.
- Their scales are tiny, although large compared to the chum.

Breeding color and shape:

- Breeding males have a dusky green head and back, dark brick red side, and black belly.
- Females have pink to bronze-red sides.
- The males have a slight hump and both jaws grow longer and become strongly hooked on the ends.

In the study area, silver salmon are about the same size or smaller as the chum, averaging around 9 pounds. Elsewhere they can reach 108cm. and 17.7 kg.



Seasonal Feeding and Spawning Movements

Silver salmon are even more rare in the study area than red salmon, although they are an established population from the Kukpuk River, Alaska, south to Monterey Bay, California. They remain 1 to 4 years in freshwater pools before they run out to the sea where they move offshore to travel the major currents for 2 to 3 more years of feeding. They usually spawn in short coastal streams, and die soon afterwards.

Harvest

Silver salmon are caught along with other salmon in gill nets or in seines, as well as on sports tackle.

Use / Recipes

They are a fat and delicious fish, used the same as the king salmon. In general, they are fatter than chum and have a finer taste.

Trout, Dolly Varden

Qalukpik (Selawik, Kobuk)

Agalukpiq (Kotzebue, Kivalina, Noatak)

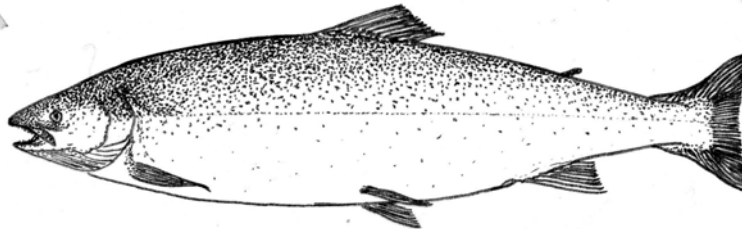
Salvelinus malma



Description

The Dolly Varden are far more predominant than Arctic char in this area. Both are locally called 'trout' and will be referred to as trout in this report. (See the research of Ken Alt for more detailed information on trout.)

Trout are extremely variable in looks (as well as life style), depending on the following factors: their age, if they are breeding, their latitude, which species, and whether they are the smaller, land-locked lake populations (possibly Arctic char), the stream dwellers, or the larger sea run trout. Trout harvested around Kotzebue Sound are predominately the anadromous, stream-dwelling, northern form of Dolly Varden.



Ocean color:

- Generally, trout are dark on top, with silvery sides, and sprinkled with pale, pink, or orange spots.
- Their teeth are well developed on both jaws, but few teeth are inside their mouth.
- Their upper jaw reaches back well past their eye.
- Their mouth is large, terminal with a rounded snout.
- Scales are too small to scale off.

Spawning appearance:

- Breeding males are dark green on their back and bright orange to red on their lower sides and belly.
- The lower fins usually have white on their leading edges followed by a black or red line.
- Females are less brilliant of the same color.
- Sea run males develop a pronounced kype, which returns to normal around November.

In the study area, trout can weigh up to 20 pounds (9kg) and up to 100 cm long. Trout of all smaller sizes are caught and used, averaging more like 6 to 12 pounds. Eggs of the sea run females are around .45 to .6 cm in diameter, while the eggs of the smaller trout reach .4 cm. Trout eggs are a translucent orange color when raw, turning to opaque pale orange when cooked.

Seasonal Feeding and Spawning Movements



Figure II-23.

Spawning takes place between August and November, with the main activity during September and October. The eggs may take from 2 to 8 months to hatch and then up to 2 more months to absorb the yolk, before the smolt begin feeding on insects and their larvae. Young trout grow up in fresh water for their first 2 to 5 years, before going to sea. During this time, they move up stream and go into all available habitats, eating many insects at different stages, mollusks, worms, and some salmon eggs. Once they go out into the ocean, all their feeding is in salt water for the rest of their life. This includes live fish like tomcod and salmon young, shrimp, and invertebrates. A northern trout may double its weight in 5 months of ocean feeding. Most spawners are around 8 to 9 years old, and one northern trout was recorded at 18+ years of age. Spawning activity is similar to that of salmon, although the trout usually live after spawning.

The trout around Kotzebue spawn in many coastal streams in small numbers, but the major spawning areas are in the Kivalina, and Wulik Rivers, and the Kelly, Kugururok, and Nimiuktuk rivers in the Noatak system some as far as 400 miles up. They also spawn in lesser

numbers in many smaller Kobuk tributary streams. Most of the fish that spawn in a given river remain there all summer, possibly as the ‘rainbow trout’ referred to by people from Kivalina and Noatak. These are long, very skinny, brightly colored, spawned-out trout called *paigaluk*, meaning “One that stays behind”. If they spent the previous winter in that drainage, they will not go to sea that summer, instead, they will go upstream from wintering areas to spawning areas, spawn in August, then move downstream and spend another winter before going back to sea the following spring. They do all of this without feeding very much. The fish going past Sisualik in the spring, from the Noatak, are mostly skinny because they spawned the previous summer and haven’t eaten for about 20 months!

Trout return to their home river to spawn, but do not necessarily return to their home river to overwinter. The Wulik, Kivalina, and Noatak are the main overwintering rivers, and most trout move into them in the fall to spend the winter around the springs. Trout in their home river that are going to spawn that season, do not migrate to sea in the spring, but go upstream to spawning areas. Those that are not going to spawn that year go to the ocean in spring to feed, and those that are going to spawn somewhere else, migrate out in June, then travel directly to their home river. These latter fish are those fat fish that are caught at Sisualik moving toward the Noatak in early July. They are Noatak stock pre-spawners that spent the previous winter in the Wulik or Kivalina rivers.



FigureII-24.

Trout return to fresh water each winter because they cannot osmo-regulate at sea for extended periods of time. This also gets them out of areas of sub-freezing sea temperatures which can occur in areas of high salinity. Since they do almost all of their feeding in salt water, they conserve energy all winter by seeking the coldest parts of the liquid water in each stream, (which is different from hibernating). This overwintering is always by springs, which is also where they do all of their spawning. These year-round springs are the single most important aspect of their environment.

Sexual maturity is reached at 7 to 9 years and they spawn every second or third year after that.

These arctic trout grow faster than their more southern relatives.

Around the Kotzebue area, they come south from a summer of feeding around the brackish waters close to the sea ice and enter the rivers to spawn and overwinter where springs

keep the water from freezing. These fall trout are incredibly fat, and without feeding much, remain fat all winter. Often this fat will last them up to one and one half years living in the river systems and essentially eating nothing.

According to those who camp at Sealing Point:

“When we want fat fish to eat, we push our nets out when the trout are coming down from the north, from Kivalina. When we want skinny fish to dry, we push our nets out when we see them coming from the East, from Kotzebue and the Noatak.”

“The same length of trout that would get caught in a 5” net when fat, will go right through a 3” net when skinny”

“You can tell a fall trout from a spring trout because they are so fat. Like a fat person, they have a swollen belly and no neck.”

Harvest

Traditionally, trout were caught by spear, hook, trap, and by hand when in a shallow place. Today, they are mostly caught in gill nets, seine, and hook, both with sports gear and by jigging through the ice where trout overwinter at springs and deep places on the Noatak, Buckland, Wulik and Kivalina Rivers. They will strike a lure by reflex, and not because they are feeding. Trout fight even more than sheefish when caught on a hook.



Figure II-25. Fresh trout.

Use / Recipes

Trout can get very fat. This is what makes them so delicious; the fatter the better. The two best ways to enjoy this fatness is to roast them, or eat them as *quaq*. This fatness also makes them difficult to preserve and market commercially, because their flesh bruises easily and quickly becomes soft. Another reason trout are harder to commercially use is because their bones are extra hard and don't soften when canned like salmon and herring. However, when pickled in sourdock, even their bones soften.

Trout have an excellent flavor, good tasting skin with no detectable scales, and they may be eaten raw. Their flesh can be white, or shades of pink darkening to red, but there is no way to tell what color they will be inside until you cut into them. Usually, their flesh is a definite orange-pink color. See Figure II-22 in Red Salmon for a comparison of trout and salmon raw. The trout on the right has typically softer flesh than the salmon.

Boiled fish, *Igaapiaq*

Lean to medium fat trout can be boiled like salmon, but roasting the fatter fish is definitely better.

To boil:

- Cut trout into equal-sized sections.
- Boil for 20 minutes or until cooked through.
- Drain and eat.

Trout Flour Soup.

(For directions, see salmon, for details.)

The many variations possible with flour soup adapt it to meals of abundance, scarcity, or unexpected guests. That each flour soup meal may differ from the last provides variety when trout may be the constant day after day. Some people seek a smooth soup, while others may like flour lumps for texture. Some like it thick and others like it thin, yet each likes the reverse occasionally. When there is only one medium trout and ten hungry people, boil the trout in lots of water and make the soup thick, adding everything else available. Other times, with excess trout, barely thicken it, (if at all), so more of the meal is fish.

Actually, any fish can be made into flour soup, but fish with the largest and least bones are definitely to be preferred, like trout, sheefish and salmon.

Roast, *Argiq*

Fat trout are superb roasted, and the fatter they are, the more they need to be cross-slashed the same as *tipuk* and herring as shown in Figure II-26 of a trout roasted with potatoes and ready to eat.



Figure II-26.

Figure II-27 shows (top) a whole, fresh trout laid across a baking tray ready to push into the 500°F oven, and (bottom) after 15 to 20 minutes, ready for the table. Fifteen minutes will cook it just barely done and quite moist, 20 minutes will cook it well done, drier and more flaky, with more crispness around the skin, fins, and tail. You may adjust the time and temperature to achieve your preferred degree of doneness. However, do not use a temperature below about 200°F, because at too low a temperature the fish could just spoil instead of cook.



Figure II-27.

Fry like salmon.

See Salmon, *Qalugruaq*.

Trout livers with blackberries, *Tijaulik*

(‘Blackberries’ is the local name for Crowberries, *Empetrum nigrum*).

An ancient treat that remains a favorite today whenever the blackberries are ripe and you have fresh, fat, trout livers.

To remove the livers:

- Cut open the trout belly,
- Pull down from the front, outer, rounder end of the liver (*tijuk*). The liver should pull away from the gall and the rest of the guts in a very fat fish. If not, carefully cut the green or yellowish sack, the gall bladder, out of the liver. Try not to let yellow bile spill on anything you plan to eat. It won’t hurt you, and probably helps your digestion, but it has a bitter taste that most people aren’t used to. Any yellow color where the liver has been resting next to the bile, or any spilled bile may be rinsed off, soaked out, cut off, or eaten.
- As you remove each liver, put it into a pan of cool water so it won’t dry out. Proportions of liver to berries vary according to what you like or have on hand to use, but about 4

large livers will cover a gallon of berries. If you make *tinaulik* later, it is better to save the livers after they are boiled and cooled, than to save them raw.

To boil the livers:

- Put the livers in a pot.
- Cover with boiling water. (Livers could spoil if you put them into cold water and left them on a wood stove that wasn't hot enough to quickly boil them.)
- Simmer for 10 to 20 minutes until they are well cooked but not mushy.
- Drain while hot, and save the liquid.

To make the *tinaulik*:

- Mash the livers thoroughly with your fingers or a fork.
- Slowly mix in small amounts of the cooking water to make a soft paste about the consistency of store-bought mustard.
- Mix with a large amount of full-sized, ripe blackberries until each berry is well coated with the liver paste, and it is ready to enjoy.

This is the traditional way, which uses all of the healthy oils and maximizes the good trout flavor. However, some modern tastes prefer to not use any of the oil or cooking water from boiling the livers, and instead use fresh water. *Tinaulik* made this way has a slightly less fishy flavor which, for them, better compliments the berries.

Tinaulik is eaten for any meal of the day, even in large quantities. It may be a whole meal in itself, or a dessert, or just a spoonful carefully apportioned out with the rest of the meal. It keeps several days if cold and well covered so the top doesn't dry out. After the trout run is over, tomcod livers make good *tinaulik*, and up the rivers, mud shark livers are used. In **Tomcod**, Figure I-7 shows a bowl of *tingaulik*.

Dried Fish, *Paniqtuq*



Figure II-28.

There are problems with drying trout, mainly the fat ones.

Very fat trout can't be dried for human consumption because the oils just get rancid. These fish are best eaten fresh, frozen into *quaq*, or given away. There is no point in cutting the meat thin to help it dry faster as is done with salmon. Instead, cut it full thickness, without any slashes in the flesh, because the slashes only allow the meat to fall off the skin. Dried trout always makes fine dog food.

Medium fat trout is extremely difficult to hang at best, and not even worth trying, unless the weather is perfect. As it hangs in warm weather, the skin "cooks" and the fat layer just beneath the skin spoils, the skin softens, and the now rotting fish falls off the rack. To prevent this, only hang medium fat trout in dry, cool, windy weather.

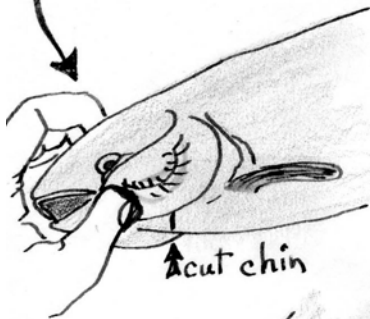
Lean trout will dry very well, for *iyamaagluq*, *paniqtuq*, *iitchiaq*, and *paugmiituq*. In between these extremes of fatness, one must make numerous judgment calls to decide what to do with fresh trout, based on the following factors: the season, the temperature and weather, how fat the fish are, what you want to eat, your time, and technology available. In general, the fatter a trout is, the colder the temperature must be, the lower the humidity must be, and the more windy the weather must be to have that trout dry well.

Besides fatness, another problem with drying trout is to get them to stay hanging long enough to dry the skin. It takes drying to toughen the skin enough to keep the fish hanging until the flesh is dry. Therefore, don't wash any trout that you hang, as you would whitefish. Trout, being fat, tend to fall apart and when you wash them, they get even softer and very slippery. Even though they are carefully balanced, the least wind may blow them down. Hang skin-side out the first day, so the skin can dry as much as possible while there is still moisture in the meat, which helps to keep the temperature lower. Then, before they get warm the next day, turn them flesh out to continue drying. (See **Discussion** for more information about drying.) Figures II-29 through II-33 show a way to cut trout to hang; it is similar to the way that salmon are cut, except without the cross-slashes.

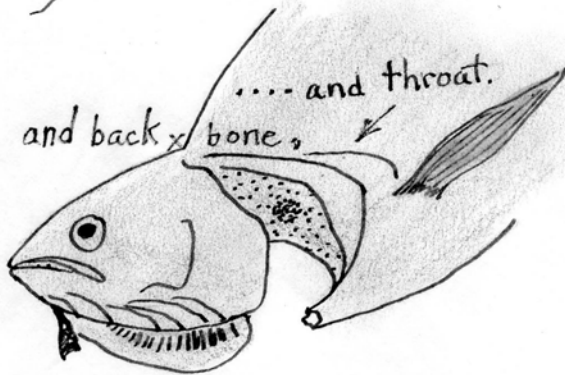
To Cut Fall Trout - 1

Cut off the head

Hold the gill cover up while you cut chin....



and back bone, and throat.



Another view to cut off the head.

Hold fish on back. Bend head back + cut gills loose. Break head back + chop off.

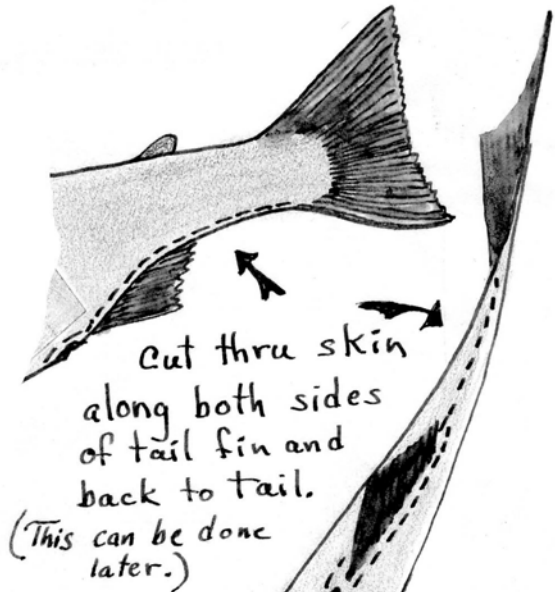
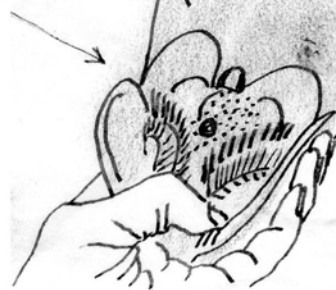
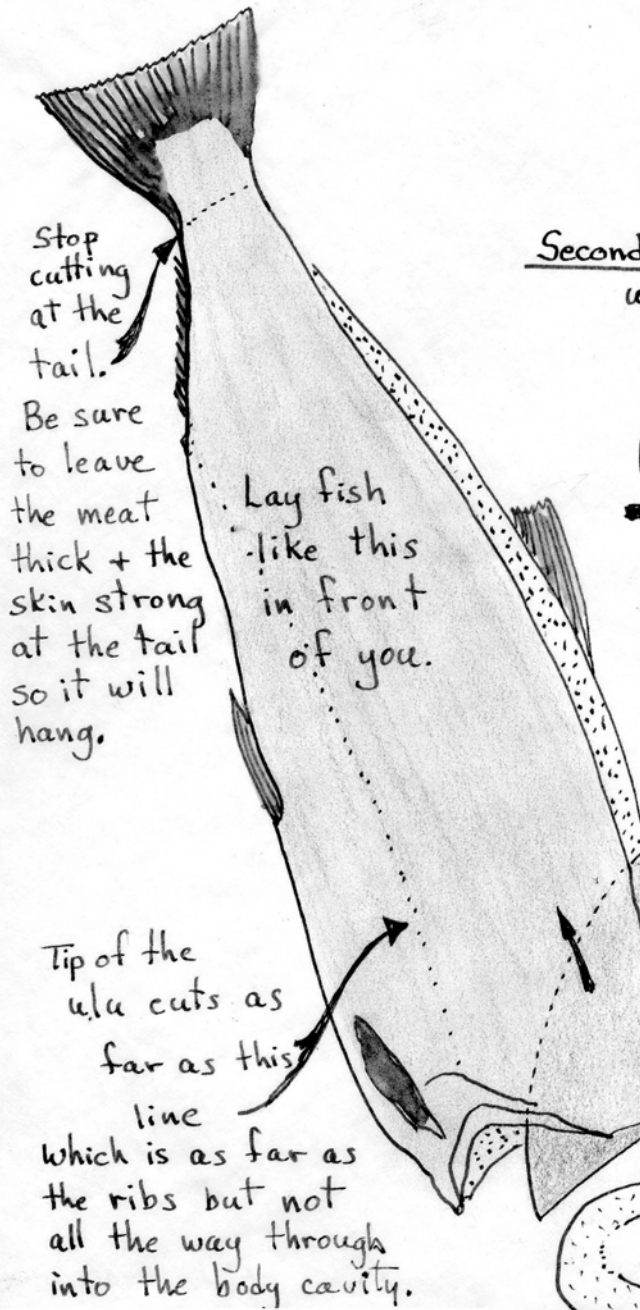
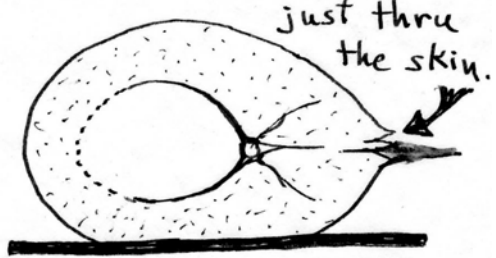


Figure II-29.

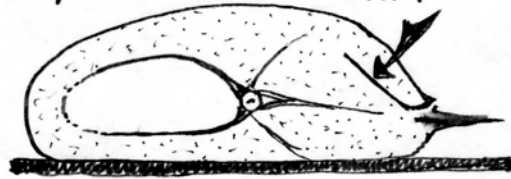
To Cut Fall Trout - 2



First cut from head to tail



Second cut from head to tail upwards at an angle parallel to the skin.



Third, cut a slice of even thickness the whole length of the fish.

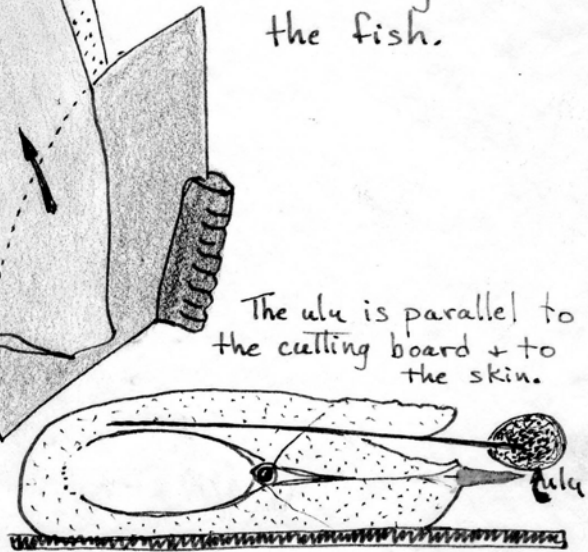


Figure II-30.

To Cut Fall Trout - 3

To cut the second side:
Grab the tail and flip the fish
end-for-end, so the cut
side is on the board
like this ---->

Repeat the same
cuts on the
second side,
cutting just to
the ends of
the ribs.

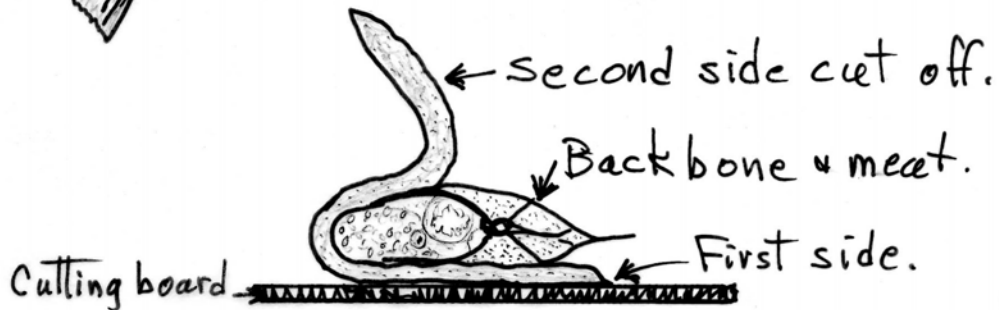
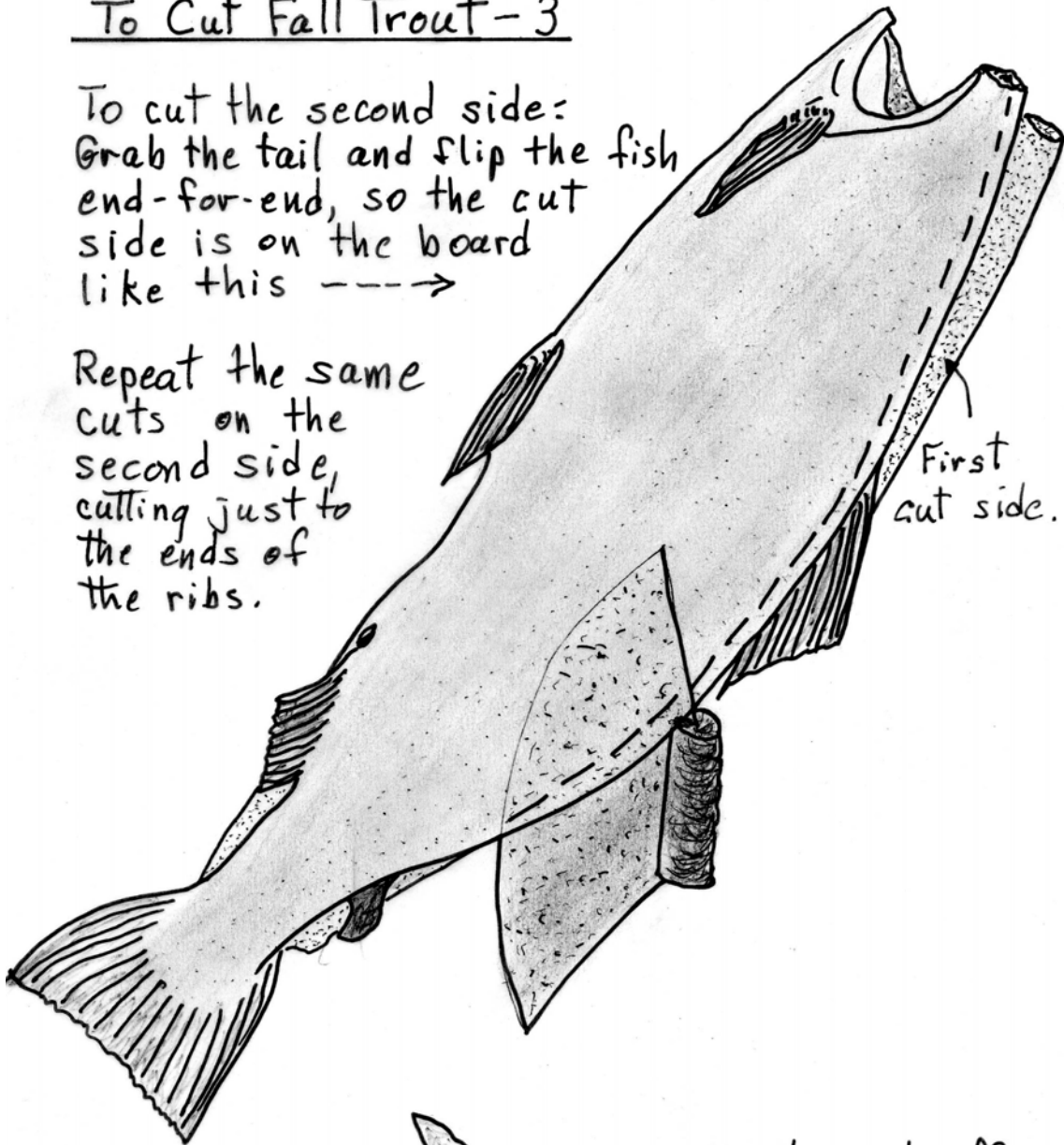


Figure II-31.

To Cut Fall Trout - 4

Pull the flesh sides off the backbone and insides. They will separate along the ends of the ribs as shown by 'x's.

Cut the back bone off just before the tail.

Cut the two sides apart along the belly, as shown by a dashed line.

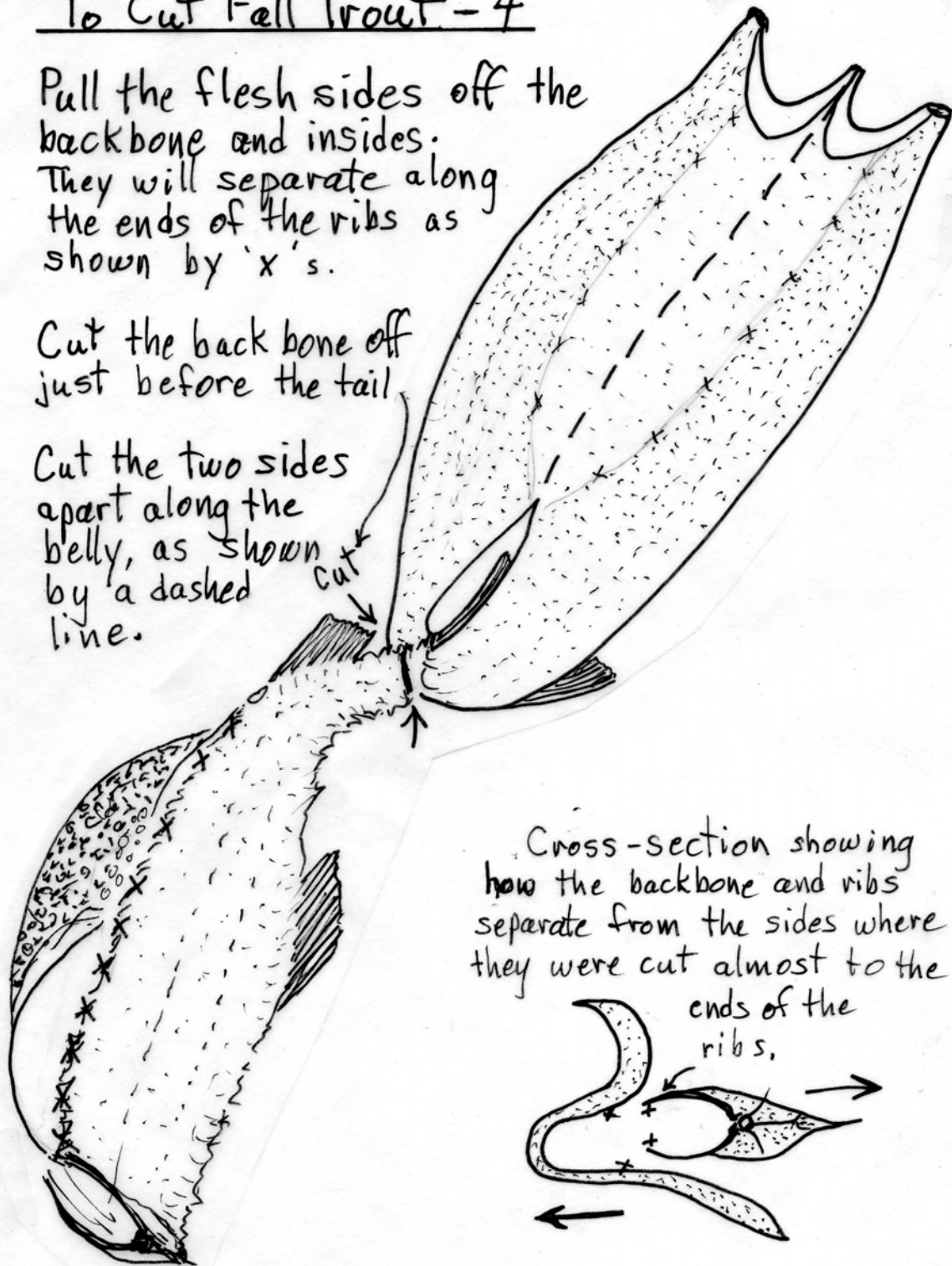
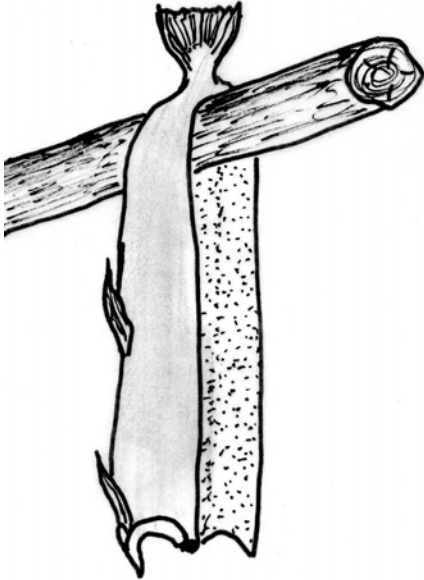


Figure II-32.

To Cut Fall Trout - 5

Hang skin-out the first day.

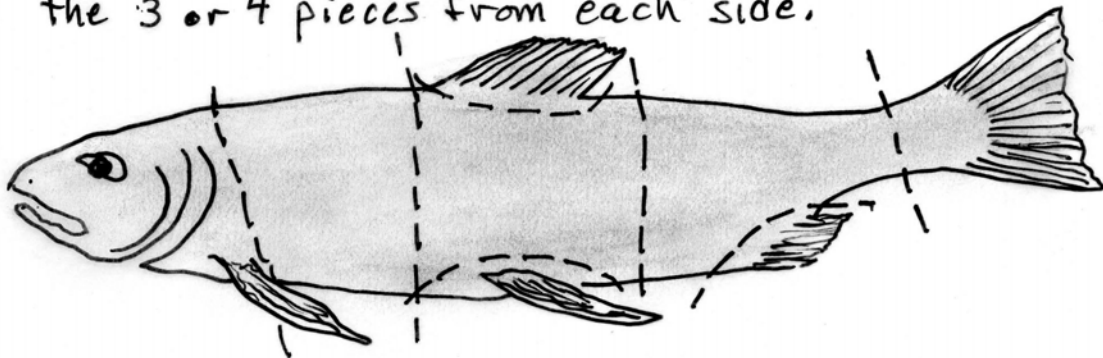


Turn them over and hang 3-4 days with the skin in.



Trout is not usually cross-slashed like salmon. It could be in fine drying weather.

Small, half-dried trout are cut like this to put into blueberries or sourdock to ferment and pickle. Discard head, tail, fins and put in the 3 or 4 pieces from each side.



Drawn by Mamie Beaver, 1969

Figure II-33. Bottom drawing, source: Mamie Beaver.

Half-dried fish, *Iyamaagtuk*

In late fall, when the weather is cold and windy, the fat fall trout make good *Iyamaagtuk*. Cut and hang them the same way as for drying described above.

- Let the fish hang from one to four days.
- Take as many off the rack as you want to eat each day.
- Cut them into pieces 2" by 3"-4".
- Drop into boiling water and simmer for 20 to 30 minutes.
- Drain well, and eat with seal oil, (today some also use mustard, salad dressing, and pickles.)
- Take some down, wrap and freeze them, to boil later as *Iyamaagtuk*, or to eat as *Quaq*.

Figure II-34 shows a half-dry trout from the drying rack cut into serving portions (top) ready to boil and (bottom) after boiling, served to be eaten with oil and the rest of the meal. Note that this trout was dried in early spring with good drying temperatures and was cross-slashed like salmon, although trout is often not cross-slashed.



Figure II-34.

Half-dry fish stored in seal oil, *Paugmiituaq*

In spring, when the lean trout are first running out of the Noatak River past *Sisualik*, as many trout may be caught as one wants to handle. Medium to smaller trout are best to dry for this but any size may be used.

- Cut and hang the trout as for *paniqtuq*, for 4 to 5 days.
- Take them down, trim off fins, bad spots, and thick areas.
- Cut them into equally sized pieces.
- Pack them into a seal skin poke or wooden barrel.
- Pour this year's new seal oil over to cover.
- Store in as cold a place as possible.

Now this *Sisualik* specialty is available to be eaten any time during the following year. It is an instant meal in itself, great for traveling, or eaten as part of the typically more complex meals.



Figure II-35.

Trout pickled in blueberries, *Itchiak*

To prepare:

- Take small fresh trout.
- Clean each thoroughly.
- Cut as shown in Figure II-35.
- Hang for two or three days, to toughen the outside.
- Take the fish off the rack.
- Cut off the fins and tail.
- Divide each side into uniformly sized pieces, approximately 4" long and an inch and a half wide.
- Cut out any areas with fly eggs, or that might be spoiled, or that were too thick.
- Have blueberries in a container of wood, glass, un-chipped enamel, seal skin poke, or plastic, but not metal. They can be berries from last year or fresh berries that are mashed and juicy, but be certain that each piece of trout can swim around freely in the berries as you gently stir them. Too many pieces of trout packed in to the berry juice, might spoil before the acid in the berries had a chance to pickle them all the way through.
- Cover loosely, not airtight, but to keep out insects and dirt, perhaps with a piece of cloth tied around the top, and/or a plywood lid.
- Store in the refrigerator, or *sigluaq*, or in a hole down in the ground—anywhere to keep it as cool as possible yet above freezing, and convenient to check.
- Stir the container very gently morning and evening to be sure that each piece of fish has fresh berry juice all around it, and to check that it is staying clean and cool.
- After several days, cut a piece in half to see and taste how far the purple juice has gone into the fish.
- When the fish is purple all the way through, it is ready to eat. Since trout is eaten raw, you may continue to sample it before it is completely pickled.

To eat:

- Eat the berries with the trout. This is the most beautiful fish food imaginable, and just as delicious as it is attractive. Some people add sugar to eat it more like a dessert, and it is an excellent pickle just as is.

While the berry juice is coloring and pickling the trout, the fish is also gently fermenting to acquire a variety of incredibly delicious flavors, impossible to describe. Not only does the intensity of the purple color vary with different parts of the fish, but the flavors also vary from piece to piece and from one part of the fish to another. The fish will be preserved to eat for as long and as well as the berries will keep. Which means, the colder they are stored, the longer they will keep as you eat them, before they must be stabilized by freezing.

This food is so delicious that you may be tempted to ration it, to make it last a long time. **Don't wait, or save them!** As they age, they reach a peak of perfection, after which they gradually become less delicious until finally the berries and / or trout become too fermented to enjoy. The only way to save some and stop the fermentation process is to freeze it. Once frozen, they 'go flat', and although very good, are never again quite as delicious. Freezing destroys that effervescence typical of fermented foods.

Time is of the essence, because those blueberries won't wait! They just keep right on fermenting, given any warmth, and the fish keeps right on ageing, but more slowly as it becomes more pickled. Another variable is the dryness of the fish, because the more moisture in the fish, the faster it will ferment before it pickles.

The ideal way to handle a gallon jar or small barrel of *itchiaq*, is to start eating them as soon as the purple has penetrated all the fish. Notice how the flavors change each day, growing better and better. When it is perfect, eat a lot, and invite friends over. As soon as you notice a change downward from perfect, when most of the sugars have turned acidic, and there is less effervescence, divide it into portions and freeze what is left, to stop the fermentation.

A *Sisualik* story:

“One year we had rack full of trout nicely drying, the weather had been cool and dry, and we were picking many blueberries. Suddenly a warm, wet storm blew in and it looked as though all our trout would spoil. When I checked the sigluaq, (cold storage sod house) I noticed that the barrel of blueberries was fermenting and beginning to foam up, threatening to spill over the top. We quickly took the half-dry trout down, cut and trimmed them and pushed them into those blueberries. That saved the trout from getting wet and rotting, and also slowed the berries' fermenting, plus made our favorite treat besides.”

Frozen fish, *Quaq*

Trout *quaq* can be so fat that you don't even need to eat it with seal oil. The liver is especially good to eat raw and frozen, in fact, the only parts of trout not eaten as *quaq* are the teeth, hard bones, and the guts and milt. Figure II-36 shows a box made to hold trout-hooking gear in Kivalina. Figure II-37 shows some of the trout hooked through the ice with that gear. The small trout that are approximately less than twelve inches are called *saamaayiq* and are possibly the young trout before they first go out to the ocean. In this picture there are three grayling, also great for *quaq*, mixed in with these trout.



Figure II-36.



Figure II-37.

Figure II-38, shows sawing a fresh-frozen trout into sections with a bow saw in preparation for cooking or to eat as *quaq*.



Figure II-38.

Fermented *Quaq*, *Tipliaqtaaq*

Fresh trout *quaq* is delicious enough, but the aged, or fermented, *quaq*, in all of its variations and differing strengths, is legendary as a gourmet food. It is a staple still enjoyed today, as it has been for centuries, by many people, especially along the coast and up the Noatak River. People usually start to make *tipliaqtaaq* on October 12, if the weather is cool; or the 15th if it has been extra warm. Understandably, this timing is very important and may vary widely according to each particular year. The tricky part is that when you start to prepare your fermented trout, you have no guarantee that the next weeks' temperature and rain will be normal and predictable, to create the food you desire—or radically different, to spoil it. The traditional wisdom gained by a lifetime of paying attention to these details is necessary to assess what the weather is doing and to respond accordingly. Furthermore, this expertise has been compiled by centuries of many people's fermenting experience, constantly comparing notes about regional variations and personal ingenuity in responding to weather challenges and then *remembering* this information to apply it.

To prepare trout to ferment:

- Catch fresh trout, put them in to gunnysacks, and sew the full sacks closed. Some people use cardboard boxes, and some people make a pile of their fish, but then they can't turn them every day. (See sheefish for more about how to ferment fish in a pile.)
- Lay the sacks on the rocks by the river, or on willow or spruce branches, in a place where the sun never shines on them.
- Cover the sacks with a board or canvas or more branches or cut grass.
- Turn them over every day, so the juices that may drip out, instead drip back into the fish, and all the fish age evenly.

By turning them every day you will notice if any mice, or dogs, or raven are starting to chew on the sacks, and you also can keep a close check on their temperature and how well they are covered.

If the weather warms drastically, you would cover them more, or dig them down into the ground to keep them cooler, so they don't get too strong before they freeze. Conversely, when the air cools down, you would bring them up from the ground, which then holds heat, whereas in the summer heat the ground was a reservoir of coolness.

- Once they are strong enough for your preference, let them freeze as soon as possible. (If they had been down in the ground, this means you would bring them up to let the freezing air stop their fermenting.)

Once frozen and stabilized, the trout are ready to be eaten all winter as *quaq*.

Trout head *quaq*.

Trout heads are a Kivalina treat. Eat them raw, after they have been well frozen. Freezing stretches the tissues and allows the oil to come out. Trout heads have even more oil in them than the meat and are good to eat after the rest of the *quaq* meal when the head is more thawed.

To eat trout head *quaq*:

Cut off a piece of the head, and chew awhile, sucking out the delicious oils and juices. The soft bones and cartilaginous tissues of the nose and skull are delicious and have an intriguing texture. If you chew long enough, there will be little to spit out. However, you can develop your own style about how much of the head you eat, and spit out the bones and cartilage any time you get tired of chewing. The whole head is excellent food, the cheeks, skin, bones, eyes, brain, each with a different and delicious flavor. Don't eat the teeth, and hard bones. Few people eat the gills, but some do.

Trout fat is sensitive to fermentation. If trout and humpback whitefish are put away at the same time and allowed to properly ferment, the whitefish will still be good after the trout is too strong. The trout will age more rapidly and reach its peak of perfection before the whitefish. If a particular trout *quaq* is too strong for you, you will experience some degree of diarrhea and digestive discomfort and know to not eat any more of that fish, and/or to not eat trout *quaq* that strongly fermented. Each person is different, each fish has minor variations, and other factors can influence how you personally handle fermented fish. The main warning when eating very strongly fermented food is to not eat any fruits, sweets or medicines at the same meal, or even the same day. Not over-eating probably helps too, so your digestive juices have room to work.

However, mild to moderately fermented fish seem to be eaten freely—it depends on each individual.

Bob Uhl, of *Sisualik*, offers this advice on how to tell whether a fermented trout is OK to eat or is too strong for you:

*“The only way to tell if the trout **tipliaqtaa**q is good for you to eat, or too strong, is to cut a big fish and carve off a bit of the inside meat and try it. If it tastes fine, eat a bit more, put the rest out to freeze again, and wait a day. If you don’t get any diarrhea in a day, it’s OK, and you can eat all you want and finish the fish.”*

Trout skin

Besides being eaten, trout skin is dried and used as decorations in sewing mukluks and bags.

Trout, Arctic Char

Igalukpiq (Kivalina, Noatak, Kotzebue)

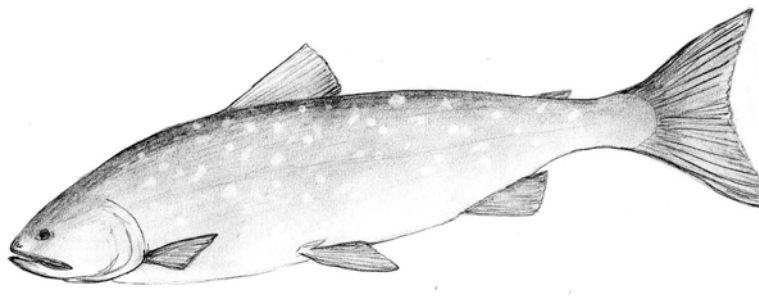
Qalukpik (Selawik, Kobuk River)

Salvelinus alpinus



Description

- Arctic char are brownish green on top, lighter beneath, with pink to red spots on their back and sides.
- Overall, they have a pale blue/ silvery color.
- Their largest spots are usually larger than their pupil.
- The leading edge of their pectoral and pelvic fins is white.
- Their maxillae extend only to the posterior edge of their eye, or slightly beyond.
- Spawning adults, especially males, are orange to red beneath, including fins.
- They have little or no kype.



Arctic char are a high arctic fish rarely found in our region, and then only in a few lakes, living as freshwater residents. However, they are the most common fish across Northern Canada. The arctic char is essentially the same size, shape, and color as the Dolly Varden, to which it is closely related.

They look almost identical, and are difficult to tell apart. Both are called ‘trout’ in this region, although they are both technically a ‘char’. The Arctic char is eaten and used the same way as the Dolly Varden in all the preceding trout recipes.

Lake Trout

Kanaak

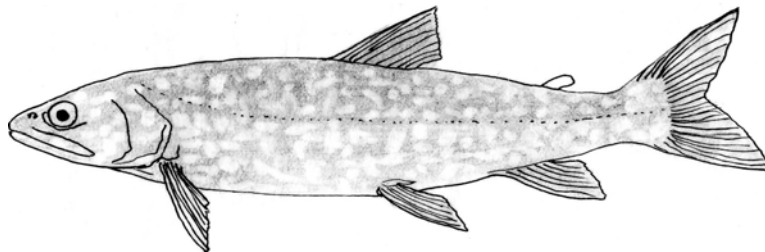
Akmaġuk

Salvelinus namaycush



Description

- Lake trout are dark green on their back and sides.
- Profuse, irregularly shaped yellow to white spots are all over.
- Lake trout are the largest of our trout, the record being 49" (126cm), and 101.8 pounds (46.3kg).
- Usually they are smaller, more like the Dolly Varden size.



They are found in interior Alaska, east of our region, but a few occasionally come down into the upper rivers. Once every few years perhaps, one was caught in the Kobuk river nets at Ambler, but they were skinny and poor eating. Figure II-39 shows one of those caught in Ambler during the summer. They may be more common along the upper Noatak.

In their normal range, they take a hook and are good eating.



Figure II-39.

PART III

ANPHIBROUS FISH

- **SHEEFISH**
- **HUMPBACK WHITEFISH**
- **LEAST CISCO**
- **BERING CISCO**

Anfibrous fish overwinter in brackish water and migrate up freshwater rivers to spawn. The sheefish are not found in Noatak (except in the lower part), and Kivalina (except recently a few have shown up). Bering ciscoes are not believed to be in Selawik and are not common anywhere.

These fish, plus the broad and round whitefish, include all six of the whitefish found in the northwest Alaska, which is known for its whitefish, in comparison with the Yukon and Kuskokwim drainages and most of the rest of southern and western Alaska. As a group, they are the most important fish to the peoples of the study area, because of their large numbers year after year and wide ecological distribution. They are found in every habitat, either as residents or seasonally as migrants. Thus, they have always been, and remain today, available to every one in this area. These species, especially the humpback whitefish and sheefish, become extremely important to interior villages during their summer and fall upstream and downstream spawning migrations. Wintering and feeding grounds of these fish generally are in brackish water closer to the coast.

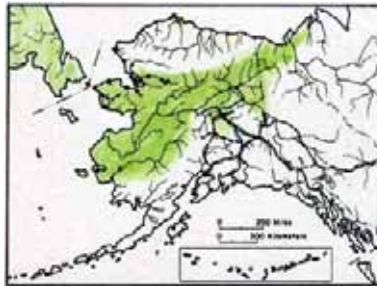


Louise Woods, Kobuk, ca. 1970. Source: Dorene Schiro.

Sheefish

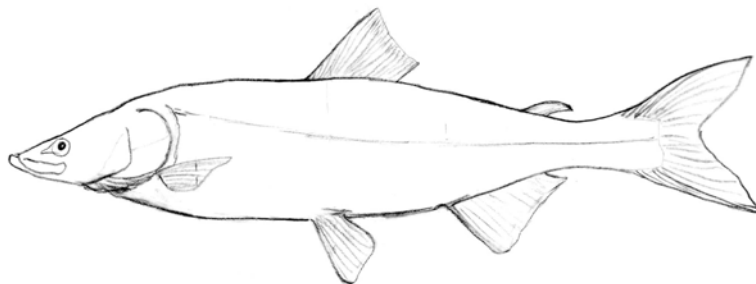
Sii

Stenodus leucichthys



Description

- Sheefish are an iridescent silver color all over, changing from a darker blue-green or brown-silver on their back to more white-silver on their belly.
- Sheefish scales are silver, the size of dimes, and they come off easily.
- Their mouth is large, and wide, especially when open.
- The lower jaw extends beyond the upper jaw.
- There are no sharp teeth in their mouth.
- Their eyes are large and round.



In the study area, sheefish weigh up to 60 pounds (27kg), with the longest one at 46” (119cm) and the oldest 20 years.

Seasonal Feeding and Spawning Movements

Sheefish are only found in cool, pure, unpolluted rivers across arctic and sub-arctic North America and Siberia. One of the five Alaskan populations lives in this region, wintering in Hotham Inlet, known locally as Kobuk Lake, having salt, brackish and fresh waters and in the Selawik Lakes, having brackish and fresh waters. After breakup, the fish that will spawn this year begin their upstream migration, over 80% arriving above Kobuk Village at the *Paa* River and Old Kalla to spawn in late September and early October. The other sheefish spawn up the Selawik River, with each group always returning to where they hatched.

Although they don't feed much past Kiana during this migration, they arrive in good condition, living off excess intestinal fat. Most males spawn every year but most females spawn every second or third year and may carry two stages of egg growth simultaneously. Unlike salmon, the sheefish spawn many times in their lifetime, their flesh becomes *paik* (mushy) briefly during spawning, before returning to good condition. After spawning, they travel rapidly down river to start feeding in the brackish waters on least ciscoes, and any small fish, including their own young, plus shrimp and some insects at various stages. Some say they reach their prime condition near the salt water where they grow the fattest and best tasting.

The young hatch in April, and are flushed downstream, at ice break up, to the brackish waters where they feed first on plankton, then insects, and then live fish by around two years old. They grow more slowly than sheefish further south, but end up larger because they live longer in this region. However, few sheefish younger than four years have been found in this area and it remains a mystery where they live as they grow past 12 inches.

These fish are like rabbits in that their numbers fluctuate, varying from lots everywhere in their habitat, to years when even a single one is hard to find. This may be partly due to their technique of 'broadcast spawning', which may be negatively affected by the environment in some years.

Harvest

Sheefish were harvested traditionally by spear, hook, gill net, and seine.

They have always been caught on homemade hooks jigged through the ice of Kobuk and Selawik Lakes during February through May, as well as in the open water of rivers as they migrate up river to spawn. Those old *lñupiaq* hooks were a work of art, carefully designed to have just the right action to attract the fish, just enough hold to get them out of the water and still ease of getting the hook out to go after the next fish. This latter design feature might be useful for today's 'catch -and-release' fisher-folk, so they would injure the fish less than happens with the typical barbed hooks.

Today, sheefish are caught many different ways depending on the season, geographic area, and type of fisherman. They are caught with gill nets set in rivers all over their area during open water from June through October. This begins in the delta areas and continues as they migrate up the Kobuk and Selawik Rivers to their spawning grounds. Figure III-1 shows two big sheefish caught in Ambler in early July.



Figure III-1.

The larger sheefish seem to give up when caught in a gill net, even when they are barely caught. Be careful when checking the net so you don't lose them; they can just fall out and sink down to the bottom. Figure III-2 shows such a sheefish in a net in Ambler. They also may start to struggle just as the net is pulled up close to the boat, and get away.



Figure III-2.

From November to January, sheefish are caught in gill nets set under the ice in the Kobuk and Selawik Lakes. This net fishery may continue all winter but usually gives way to hooking through holes, as the ice gets thick. Not all ice has sheefish underneath but they are most likely found where there are little fish to eat. The little fish are usually where their food is, often where fresh and salt water mix. This under-ice fishing supports a small commercial fishery as well as the widespread subsistence use.

Sheefish are being caught on sports tackle for subsistence harvest more frequently each year as people with routine wage-jobs choose to catch a few on a weekend instead of going to the bother of setting a net. All over their area during open water, shee fishing for sport has become a commercial guiding venture as they travel up the rivers to spawn. When caught on a hook, they really jump, and are admirable fighters, exciting for rod fishermen. Today, some sports fishermen even catch them on fly tackle for a real thrill.

Use / Recipes

Large sheefish meat is sweet, white, mild, large-grained, and deliciously flavored by a good amount of fat. It has a few large bones, and is easy to scale, gill and cut. They are eaten in every way a fish can be eaten; baked, grilled, boiled, steamed, fried, dried, half-dried, frozen (*quaq*), fermented (*tipliaqtaaq*), salted, pickled, and deep-fried, with and without batter. The bones can be removed from baked or boiled sheefish so the flesh can be used in *akutuq*, or to make a wide variety of fish salads, or creamed and casserole dishes. (For these non-traditional recipes using fish meat, see any other good fish cookbook.)

The size and fatness of the fish, and the weather determine how one chooses to eat and preserve it. Smaller fish tend to be more lean and are not quite as good for general eating, but make better dried fish (*paniqtuq*), where as the medium-sized fish, (15 to 25 pounds), are too fat to dry but excellent for all eating, freezing and fermenting. The fattest, largest fish, (30 to 60 pounds), are perfect roasted, as *quaq*, and especially famous as the gourmet *tipliaqtaaq quaq*.

Sheefish typically have a delicate flesh that quickly softens with time and warm weather. The flesh will soften on a fish that has spent a hot day, dead in the net, or one that has been stored three or four days in the refrigerator or down in the ground-cooler. When the flesh softens enough, pull the raw meat off the bones, chop, and have a fish equivalent of hamburger, to make patties, loafs, or casseroles.

The whole fish may be eaten. The only parts not eaten are the liver and the scales, although some people from other cultures and areas do eat the liver, so it isn't poisonous. The bones are especially large and strong and some people enjoy chewing on the inter-vertebral discs, the soft part in between each vertebrae, while a few enjoy some of the bones crisped. Sheefish are one of the fish that may be eaten raw and partially cooked.

Sheefish are "so good to eat" because of their size, diet, and bone structure, plus a life cycle that 'fattens up' to a peak in physical perfection and health for their spawning run, same as do the salmon. A fish that stuffs itself day after day through the winter with live smelt, herring and whitefish is bound to be tasty.

Figure III-3 shows Oscar Henry, an old timer from Kiana, holding up a large sheefish probably caught during the 1950's. [Photo courtesy of Lorrie and Nellie Schuerch of Kiana.]



Figure III-3. Oscar Henry, Kiana, ca. 1950. Source: Lorrie and Nellie Schuerch.

Roast fish, *Argiq*

Boiled fish, *Igaapiaq*

Raw eggs and blueberries, *Asirriugaq*

Boiled cranberries, fish eggs, meat, and blubber, *Kinutuk*

Raw cranberries and fish eggs, *Ittukpalak*

Stomach, eggs and liver in rhubarb, *Tijutchialik*,

See **Broad whitefish, *qausriluk***, or **Humpback whitefish, *qaalgig***, for the above recipes, also made with sheefish.

Eggs, *Suvaich*

The eggs are delicious as they grow all summer toward spawning. Fish that are caught further down toward the delta, (consequently earlier in the spring), will have smaller roe sacs of

eggs, which can be prepared more like the whitefish eggs; dried, roasted in the oven, then stored in oil. (See **humpback whitefish, qaalgiq**).

The eggs are good eaten every way the fish is eaten and good at all stages of development and at all times of year. Figure III-4 shows a sketch of the insides of a sheefish.

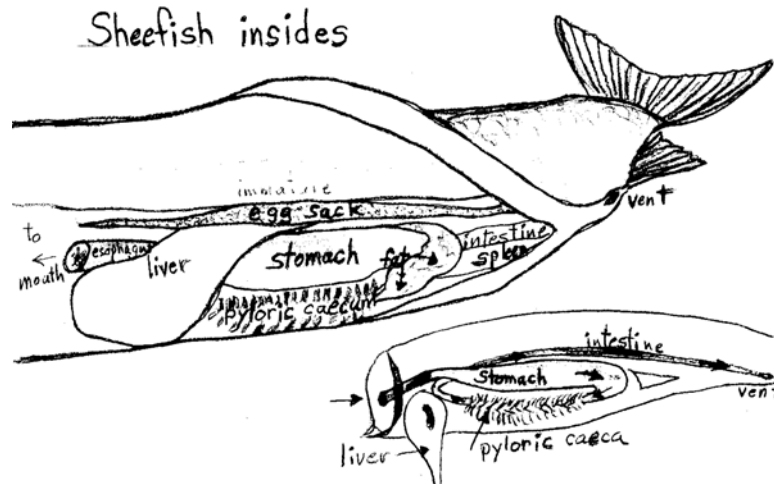


Figure III-4.

Swim Bladder, *Avatauraq*

The sheefish swim bladder is tougher than a whitefish's and can be carefully removed. It may tear slightly in the middle of one side where it was attached, but that is where you turn it inside out, carefully including the fat around it. In to each end of the sacks gently stuff as much extra fat from around the stomach and intestines as the sac will hold. Try not to make any holes in either end because they are like little sacks that hold the fat when you lay them over a small pole to dry, with each end hanging down. Figure III-5 shows some of these sheefish swim bladders hanging to dry in Ambler. Once dry, simmer them slightly, (not long and not hard), drain to let the steam leave, then allow the surface to dry completely. Put them into fish oil to store, along with the dried and roasted fish eggs. (Don't put them into seal oil: that would not taste right!)



Figure III-5.

Fish Oil, *Qaluum uqsruq*

Sheefish oil is lighter than whitefish oil and very good. It is the up-river equivalent of the coastal sea-mammal oils so important in *lñupiaq* culture and diet. It also keeps well, and will even keep for two summers when kept cold enough.

To make sheefish oil:

- Save all the insides when cleaning fish right after catching them, the stomachs, intestines, eggs, and milt—especially from the bigger, fatter fish. Figure III-6 shows a bowl of sheefish insides ready to heat for oil.



Figure III-6.

- Clean any stomachs that have food inside. These will be from those fish caught in sloughs, but not those caught in the rivers.
- The liver and eggs are not put into the oil-making pot.
- Put all the rest of the insides into hot water in a large roaster.
- Heat gently, stirring occasionally, but don't actually boil.
- Heat just until the water starts to turn over and keep it just under a boil for an hour or more. (More oil will come out if you don't boil it, because that extra heat toughens the tissues that hold the oil.)
- Never use any salt.
- You know it is done when the stomach muscle is soft and well cooked.
- Turn off the heat.
- Slowly pour in one cup of cold water, spreading it around.
- Let it sit for five minutes or more.
- Scrape away the thin, brown, crusty scum.

- Ladle off the clear, slightly yellowish oil into a jar, taking only as much oil as you can get easily and cleanly without any broth. Figure III-7 shows Clara Lee of Ambler ladling the oil off the top of the broth.
- Dip out the entire top oily layer into a different container that is tall and slim.
- Let it settle for a while, and then once again, carefully dip off the pure oil into the jar.
- Store this oil in as cold and dark a place as possible, or freeze.



Figure III-7. Clara Lee, Ambler, 2003.

To eat sheefish stomachs, Sii aqaiġutchiak

- After all the oil has been skimmed off the broth, dip the stomachs out of the liquid onto a platter to drain.
- Serve one on to each person's plate.
- Cut off the large, white stomach part and slit it open lengthwise.
- Some people first cut off an inch or inch and a half of the throat part of the stomach because inside there is a pale yellowish-white, custard material that is delicious.

- Eat the white, muscular stomach dipped in fish oil. These stomachs are good cold too, if you drain them while they are still hot.
- The hearts are good to eat.
- Some people also eat the intestine part when there aren't enough stomachs.



Figure III-8.

For dessert

- Take a spleen on to your plate, (which is a dark, brown-red, ball, about an inch in diameter or less, that is dry when you mash it).
- Take a milt on to your plate, (which is white, much larger, and creamy).
- Mash them well, mixing together with your fingers, or a fork.
- Add blueberries (either fresh or frozen), and mash with the milt and spleen, using a little more berries than fish. This is a fine dessert, and feels just right after this meal of stomach.

When stomachs aren't used for fish oil, as above, they may be used in other ways as in the following recipe from Mamie Beaver of Kotzebue:

Stomachs, *Aqaiġutchiak*

- Clean the insides out of *Sii* stomach and caecum.
- Hang to half-dry while you make oil from the rest of the guts and visceral fat.
- Cut the half-dry stomach into strips,
- Boil, drain, let the surface air dry,
- Put into the cooled fish oil. Don't use the guts in this recipe.

Stomachs in Rhubarb, *Tiġutġhialik*

Boil sheefish stomachs and put them into rhubarb (*kaushimak*) or sourdock (*qaugak*) as explained in Broad whitefish, *Qausiġluk*.

The sheefish stomachs and guts have an interesting criss-cross musculature giving it a different and enjoyable texture to chew.

Blueberries with fish oil, Asriavik qaluun

Berries alone are very good eaten with fish oil. First put blueberries into your bowl, then mix in sugar, and wet it with fish oil. Mix the berries with your fingers and eat.

Other foods that are stored in fish oil, (similar to foods stored in seal oil), include: roots of *Hedysarum alpinum* (*masru*), red berries of *Arctostaphylos uva-ursi* (*tinniich*) and dried roasted fish eggs (*suvatchiaq*). These foods each have a symbiotic relationship with the oil, in which each helps the other to keep and each improve the other. The oil seals the foods away from oxygen in the air, which would deteriorate their quality and flavor, while some of the vitamins from the foods leach out into the oil. The oil is eaten along with the stored foods.

Bones, Saungich

Sheefish have large vertebral bones with good juice inside which is to be sucked out. The tendons and connective tissues around the bones are also good to nibble, as well as the cartilaginous material. Especially good are the gelatinous disks in between each vertebra. These are good on freshly cooked fish as well as frozen fish (*quaq*) and even the backbones of dried fish.

Figure III-9 shows where the bones and inside organs are of the sheefish. Studying these makes it easier to avoid the bones when cleaning and eating the fish, and also makes it easier to clean and save the right parts.

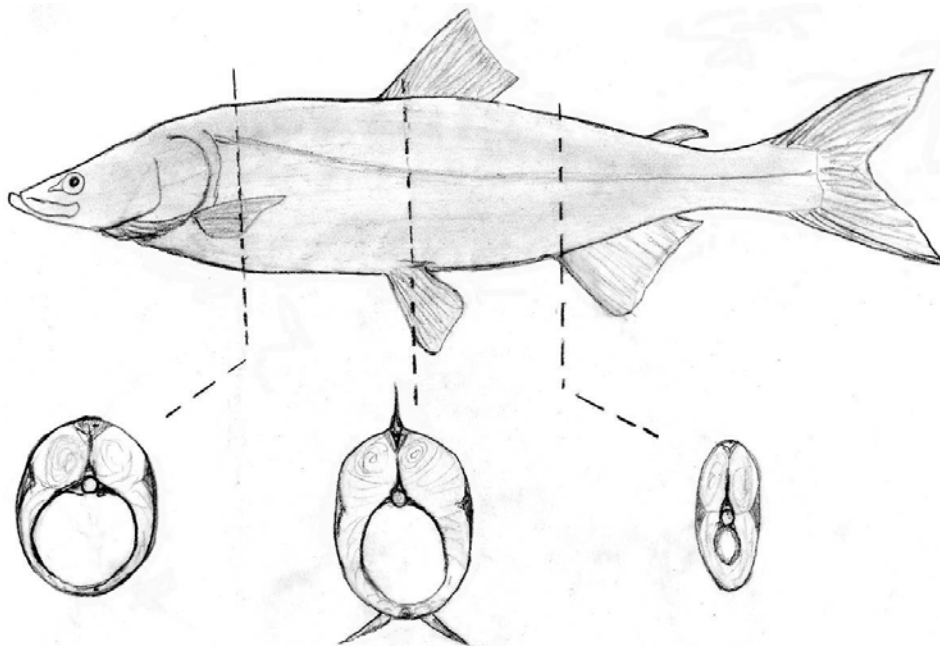


Figure III-9.

Dried fish, *Paniqtuq*

Drying sheefish works best on the leanest fish, which tend to be the younger, smaller ones. Such *paniqtuq* has an excellent flavor. The less fat in the fish, the harder the meat is when dried, and the better it will keep. Sheefish are cut the same as trout or salmon.

During very cold, windy weather, larger, fatter fish can be dried without the fat becoming rancid. Without such conditions, don't dry fat sheefish.



Figure III-10.

Ginny Sours of Kotzebue told this story:

“When the water gets warm, you can tell. The fish will spoil quickly. They will get soft if you don't get them out of the net and home right away. They are fresh when their gills are bright red and the meat is firm. Then they are good. When their gills are pink and their meat is soft, they aren't so good.

Sii, get soft especially fast. Then they are like a book. The flakes of flesh separate. You take your ulu and press the pages shut so they will dry. They aren't good then. They just hang there with a long, sad face on the drying rack.”

All summer long as these beautiful fish are caught while migrating up the Kobuk River, they are too fat, and the weather far too hot, to even think about drying them. Even on their spawning grounds when the weather is cooler, the many fish caught and hung usually turn dark yellow with rancid oils dripping out, only making a poor grade of dog food at best.

Close to freeze-up, when the days are cool and the nights freezing, you may be able to dry the medium size for human use. After spawning, they aren't quite as fat as before, although the sheefish seem to keep more of their fat during spawning than do whitefish or salmon.

Freeze-dried, *paniqtuq*

When the sheefish hooked under the ice are cut and hung in March and April, the cold temperatures not only keep the delicious fat from getting rancid, but freeze-drying gives the flesh a soft, spongy texture that is easy to eat.

Cut and hang the sheefish as usual and let it dry over several weeks. It can be eaten any time as *quaq*, and as half-dried/half-frozen, or boiled as half-dry sheefish. If it hangs long enough, it will become completely dry. Every one of these variations makes an excellent and different meal.

Half-dried, *lyamaagluk*

After the cut fish are hung;

- Take one down anytime during the next three days.
- Cut into pieces, one to three inches wide.
- Boil them in lots of water,
- Drain the water off and throw it away.
- Eat hot or cold.

The water from boiling half-dry fish or meat is not saved other than for dog food because it often washes off insects, dust and rancid oils, and will not taste as good as broth from fresh fish. The colder the weather the longer a window of opportunity there is to eat *lyamaagluk* from fish hung to dry. *lyamaagluk* is also excellent baked in an oven or roasted over a campfire.

Half-dried fat fish or fish bellies may also be put into berries or fermenting greens to become pickled. The partial drying toughens them so they don't fall apart. For details, see **Trout pickled in blue berries, *Itchiaq***.

Kaṅarauq

This is any sheefish or pike that is cut and hung to dry just at freeze-up. It's half dry, half-raw and frozen. Either roast or boil it, or eat it as *quaq*.

Frozen, fresh, fish, *Quaq*

Sheefish make excellent *quaq*. When fresh frozen, it has a creamy smooth texture like ice cream. Figure III-11 shows sawed chunks of a sheefish that was frozen while fresh. These pieces are now ready to be eaten as *quaq* (or cooked in any way). As this *quaq* is stored through the winter, in the outside, 'natural-air' freezer, it warms and freezes with the changing air temperatures, allowing ice crystals (up to one inch long) to develop in the meat. Thus, the creamy texture changes into a different and delicious chewy texture: the cycles of freezing and thawing burst the cells, allowing moisture to leak out to form ice crystals within the meat, thereby drying out the flesh, which acquires a gummy consistency. This process increases toward spring, giving the *quaq* a good, unique flavor and texture that is best around breakup when you are eating *uiḷaaq*. (See thawed *quaq* below.)



Figure III-11.

Fermented, Frozen, thawed sheefish, *Uiḷaaq*

In the spring, as the weather warms, carefully watch the fish as they thaw out from under the snow, and keep the biggest, best ones carefully covered. These are choice for *uiḷaaq*. Even while still under the snow, they may become thawed and soft and must be eaten at their peak of perfection before they get too old.

To eat *ui!aaq*

- Choose a fish and wipe off any scum with the crystalline, partially melted snow. Another option is to wash it well in water.
- Lay it on a board, large tray, or piece of clean cardboard where people will eat.
- Cut the skin open with a knife. The skin is the only part that must be cut.
- Then everyone uses their fingers to pull pieces of fish off the bones to eat.
- Each person usually has a bowl with seal oil to dip the fish into before eating, but the *ui!aaq* from a fat fish is also quite good without that.

The fermented and thawed fish flesh is soft, cold, smooth-textured and incredibly flavorful. Depending on how strongly it has fermented, it will also be quite smelly in a curious way that is delicious to those who are eating, and repulsive to those who aren't. This food is a great favorite. It feels especially good to eat on a hot day when busy with the many long, hard jobs common during the 24 hours of light in the springtime. Figure III-12 shows Lulu Grey preparing a sheefish for *ui!aaq* by scraping off the scales and cleaning the scum off the fish with the snow.



Figure III-12.

Investigator's comments while eating sheefish *quaq* with Mark Cleveland on Thanksgiving 1977:

“The quaq was not creamy anymore and had small ice crystals beginning to form with just a bit of flavor. It had lots of eggs that were also slightly tipliaqtaa. The eggs were gummy and stuck to our teeth as we chewed, not a lot as would have dried eggs, but just a little, enough to tell that those fish were caught a while before they would spawn and the eggs were not fully formed and watery. Such immature eggs make the best ittukpalak, whether from whitefish or sheefish in the fall time, or sucker and pike in the spring. When the eggs are mature and ready to spawn, they are somewhat watery and their shell is tougher.”

Kapukaġvik Tipliaqtaaq Quaq

This is a story of Jones' fermented fish pile 20 miles below Ambler Village in 1975:

*“For several years, we kept a **quaq** pile at **Kapukaġvik** following the directions of the old timers exactly. We began on twelvth of September if it was cool weather or on the fifteenth if it was still warm. Each day we checked our gill nets, and brought the fish to the beach. We put the big, fat ones away for **quaq**, the sheefish, whitefish, and trout. Smaller, leaner fish we hung to dry along with any female salmon, which we cut and hung for **aanaalik**. The leanest, smallest fish and the guts went into the dog pot.*

*The **quaq** pile was in a shady place, and each day we lay those big, beautiful fish there, and covered them well with dried grass to keep them cool. The sun must never touch them. We did not cut these **quaq** fish open along the belly because the meat would oxidize and taste bad where cut. Instead only the liver and bile were removed by making a cut behind the gills on the left side, just big enough to slip in one finger and hook out the liver with the bile attached.*

As the weather cooled down they fermented more slowly, thus the top layer of fish was freshest. On these, it wasn't as important to get the liver out and we stopped doing that, just as freezing temperatures made it difficult to do with painfully numb fingers. Then we just lay the whole fish on the pile. The liver and bile ferments faster and differently than the rest of the fish and spoils more of an area around it the longer they ferment.

*Once freeze-up came, and the ice began running, we hauled out our nets. With no more fish to pile, we covered the **quaq** pile extra well with grass and some sticks to hold the grass, (never use plastic or metal, but canvas, wood, and cardboard are OK).*

After the snows came and the air stayed below freezing, we dug up the pile, loosened the bottom from the ground and separated the fish so each could freeze all the way. (If this isn't done, they keep on fermenting for weeks until the ground freezes and would become too strong.) Once frozen, the fermentation is stopped and the fish just wait all winter, ready to eat.

*Experience is the best teacher, to know when a **quaq** pile has aged long enough for one's own taste. However, a strong smell is a good indication that they are ready. Furthermore, as we eat these fish, we are continually judging what fish or part of a fish we want to eat and which parts are too strong, good only for the dogs.*

*To prepare a **tipliaqtaaq** fish for eating, take an axe and knock one loose. Shave and knock most of the ice and scummy stuff off the outside at the chopping block. Stand it on its head, shave off the fins and perhaps a strip of skin along the back and belly. Then chop off the tail and maybe the head, and chop or saw it into chunks, (3"–8" wide), or leave it whole. [Figure III-13 shows pieces of fermented and frozen sheefish that have been sawed into pieces to eat as **quaq**. Notice how*

the process of fermentation has caused the belly part of the fish to flow into a different shape as determined by the pressures in the *quaq* pile.]



Figure III-13.

One typical time for a tipliaqtaaq quaq meal comes after we have spent the long winter evening hours inside, and we eat before going to sleep. It could be anytime, usually between 11:00 PM and 2:00 A.M. Those were wonderful evenings, lasting up to 8 hours sometimes—sewing, reading, building sleds or snowshoes or tending trapped furs, visiting with friends, singing or playing music, kids playing around amongst us all.

‘I’m hungry!’ So, I put my work away, and step quickly outside, to bring in the quaq fish that were brought up earlier during the brief daylight, plus the seal oil and a box of assorted dried meats. I put all of this on some opened-out cardboard box on the floor along with the salt, and soy sauce. If the weather is not much above 0°F, we start to eat right away. The colder the fish is below zero, the longer we might wait to let it warm up before starting to eat. It’s just right when the cold doesn’t burn your hands as you hold the fish, and you can easily shave off frozen slices to eat, yet it is still cold enough that it feels frozen cold as you swallow it, like hard ice cream.

To eat, we cut up some fish into bite-sized pieces then dip each piece into seal or fish oil before popping it into our mouth to chew and swallow. (Olive oil would also work.) Alternate with bites of dry meats, in the oil. Some people add salt or soy sauce to their oil. Usually you also have some fresh-frozen grayling and some whitefish too, for variety and for those who don’t like their fish as fermented.

*The special part of eating this **tipliaqtaa**q fish is that it lets you sleep extra soundly, something about the chemical make-up of how the flesh ages. The flavors in that **qua**q pile ranged from close to fresh but with just a bit more richness, to fish so strong that we decided it was only good for dog food. (The dogs are as crazy for it as we are!) The flesh of the older, earliest-caught fish changed to a cheese-like texture with no resemblance to the texture of fish flesh. An older fish from the bottom of the pile with more weight pressing down on it, would be flattened from an original thickness of perhaps five inches to one inch and all squashed out of fish shape*

*The smell of this fermented fish was so strong that if you weren't eating it, you were repulsed, like being around people enjoying Limburger cheese or garlic, except many degrees stronger. Those eating the **tipliaqtaa**q **qua**q would be commenting about how delicious it was while others would have left the room, complaining of the bad smell. One analogy of the difference between fresh and **tipliaqtaa**q **qua**q is the difference between drinking fresh water and drinking a rich salty soup, or a strong, sweet wine. There just are so many more flavors—rich, complex, always differing, flavors—in the **tipliaqtaa**q **qua**q.”*

Pickled fish

Bob Uhl soaks very freshly caught and cut fat fish in brine for two days (2 cups salt/gallon), rinses in fresh cold water, and soaks 4 to 6 days in vinegar in a big barrel. Then he packs it in jars, not too tightly, covered with the pickle solution. It is well preserved and very firm and good, top quality. In a way it is not unlike the old *lñupiaq* way of cutting the fat bellies out of drying fish (or whole, fat, half-dried fish), and putting them in berries and/or fermenting greens which are probably at least as acidic as 5% vinegar diluted with equal amounts of water. (Apple cider vinegar is always a better choice, nutritionally, than white distilled vinegar.) Fish pickled traditionally keep very well, just like vinegar-pickled fish of today.

Pickled Sheefish bellies:

- Clean off all blood, and cut into evenly sized pieces.
- Make a brine with 2 cups salt per gallon of water.
- Soak fresh fish pieces for two days in this brine.
- Rinse in fresh water.
- Measure the amount of water that will amply cover your amount of fish.
- Save one half to one third of this water, pour off the rest and let the fish drain.
- Boil pickling spices (and sugar, optional) in this water.
- Cool and add an equal amount of vinegar, or up to twice as much.
- Put the pieces of drained fish into the vinegar for at least 2 days. They can stay there for about 6 days but they begin to taste more like vinegar the longer they stay.

A small amount of fresh onions, garlic, red peppers, dill, or celery may be added for color and good flavors. Adjust the amount of vinegar to water to suit your taste. Two parts vinegar to one of water is too acidic to eat much at one time, unless some sugar is added. Half vinegar and half water is usually a good choice. One-inch strips are the best size, and they must rest together

loosely so the vinegar and salt can penetrate all sides. Stir gently for the first four to six days so they cure evenly.

For pickling sheefish bellies, the full strength vinegar softened with a little sugar (4-1, or 6-1) was better than vinegar diluted by half with water. In addition, boiling the vinegar and sugar was better than just mixing them. This kept the sheefish bellies much nicer than did salt. (See herring, for more about pickling).

Salt fish

Sheefish bellies and heads are delicious salted. They keep well and can be freshened later to either boil, fry for breakfast, or pickle. (See **Salmon** for more on salting.)

This is an old *lñupiaq* story from Kotzebue. *Kutvuk* had a story about it:

“Inside its throat is a little boy—no, it’s a bone. They forgot to put akutuq on that pregnant woman’s upper lip so her baby boy began eating her from the breast. That boy ate other people after he ate his mother. He started from where Bullock’s is and chased a man all the way to the lagoon. That man turned a bridge over and let that baby drown. A sheefish ate him and that’s what is inside the sheefish’s throat—that boy.”

Figure III-14 shows sheefish hooked through the ice of Kobuk Lake in the early spring.



Figure III-14.

Hooking *Sii* on Kobuk Lake, told by Bob and Carrie Uhl:

“100 and more years ago, the people wintering in the area around Kobuk Lake would move from their winter camp, out on to the ice to camp and hook Sii. This was before motors and big dog teams, when the people had to haul the loads themselves or with the help of a few dogs.

They would tend to eat up all the food they had stored before they moved, meanwhile letting the days grow longer and warmer. By then, some would be close to starvation and how soon they found the schools of Sii beneath the vast ice of Kobuk Lake, was a matter of life or death.

It was like a game of chess each year, to find where the schools of Sii were, and the stakes were high. This was in the days of dog sleds and camping on the lake ice when we used a tuuk to chisel each hole out by hand. Traditionally ivory, antler, or stone was used on the end of a pole for the tuuk, but later metal was used. Without today's power augers, it took considerable time and energy to tuuk each hole and jig a while to find where the school of fish was, where the middle of the school was, and then which way it was moving.

Sii travel in schools, and they are constantly on the move, looking for the small fish that are their food. They also are segregated somewhat by size, so you may have a school of all delicious, big fish, called aulukslaliq in Selawik, or all smaller, lean fish called mayauyuk and not so good for keeping. There are also many other fish with the Sii, and some are the little fish that they eat.

When you want to catch Sii, you have to start somewhere, so you put down a 10" hole and start jigging. If you catch 3 per hour, you may be near a school, and if you are watching you can see the fish come take the bait and will know which way it is traveling. Then someone puts down another hole a ways away and starts jigging, while someone else puts down a hole in a different direction. If you have enough people, you can figure out where the fish are.

Once, we tracked a school of Sii for 14 days. There were 15 different camps, each with many people. The trails of moving camps and fishing holes moved across the lake from the northeast side to Pipe's Spit. That school was probably getting small after those two weeks. There is a whole lot of ice out there that has no fish under it.

Carrie's record for number of fish caught in one hole was 400 Sii, on Feb.12th."

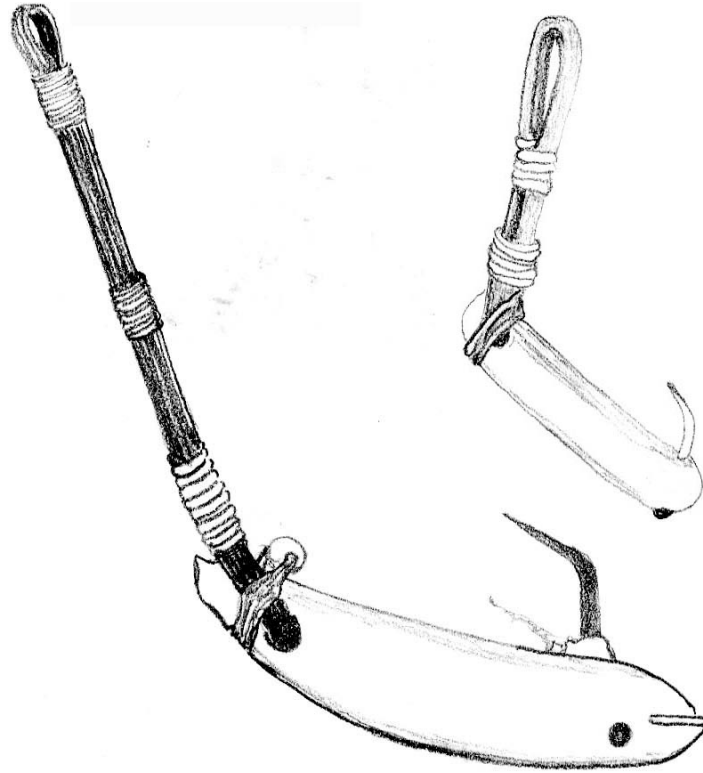


Figure III-15.

“People used homemade ivory lures[Figure III-15] with a nail set in the lure at just the proper angle to stay embedded in the fish’s head and also to give it the right action. Modern flashy lures can be seen by the fish from a much greater distance but are harder to get out of the fish’s mouth, especially with cold hands. Using the old-style hooks, we keep steady pressure on the fish, haul it out on the ice, flip the lure out, and go after the next fish.

People used to stay hundreds of yards apart when they put down each new hole; it was the accepted way to do it. Now there is no such gentlemanly agreement about a respectful distance apart, and people may put holes all around a person who is catching many fish. Then the direction the school is traveling is lost.

No one complained about snow machines scaring the fish, but when a plane landed on the ice near the fishing, it scared the fish away”.

Figure III-16 shows three sheefish hooked through the ice of Kobuk Lake.



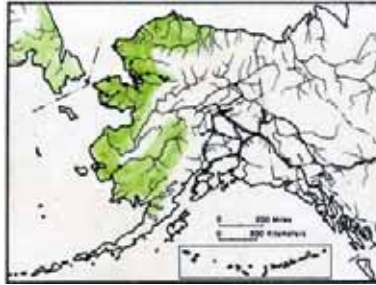
Figure III-16.

Humpback whitefish

Qaalgiq

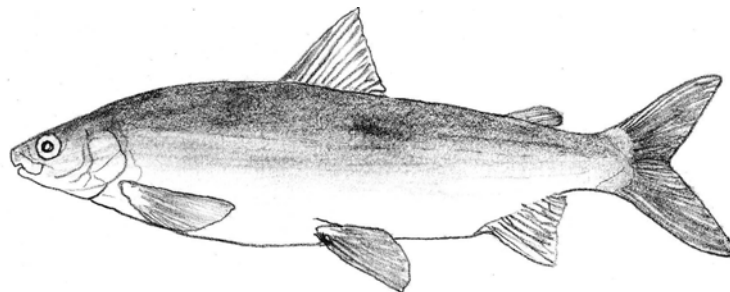
Ikkuiyiq (Selawik)

Coregonus pidschian



Description

- Although their color may be variable, they are usually dark brown to midnight blue above, fading to silver on their sides and white on their belly.
- Their dorsal profile shows a distinct concavity behind their eyes, rising to a prominent nuchal hump.
- Their mouth is small with upper jaw overhanging the lower jaw.
- Their scales are fairly large and firm, yet readily removed.
- Breeding males have pronounced bumps (pearl organs/nuptial tubercles), on their side scales, which are less developed on females.
- They have a small eye.
- No parr marks in the young.
- Their eggs are pale yellow, a little more orange-colored than the broad whitefish.



Humpback whitefish average 1 to 2 1/2 pounds (0.45 to 1.12kg) with 9.5 pounds (4.28kg) being a record from the Selawik area. They measure up to 13.5" (34.7cm) and can reach 18" (46cm). They reach sexual maturity around 4 to 6 years and may live to be 10 years.

Seasonal Feeding and Spawning Movements

Humpback whitefish in this region are quite variable, apparently able to somewhat adjust their color, size and habits to various environments. Fish are darker in lakes and more silvery from brackish waters. Selawik humpback whitefish are larger and fatter than elsewhere, presumably due to the abundance of good food. Some from Selawik are as large as Kobuk River broad whitefish, and hard to scale. Figure III-17 of five whitefish from Selawik netted in late August shows some of the variability in form. Compare with Figure III-18 below of whitefish from Paul's Slough north of Kotzebue that are much smaller. (See Georgette [2005] for much more detailed information.) Some populations are land-locked as may happen some years in coastal lagoons and in lakes. *Anigaaq* whitefish are smaller, and go thru salt water to coastal lagoons like Krusenstern to feed, then return, presumably, to Fish River above Selawik to spawn.



Figure III-17.

Qaalgiq migrate all over the region in many various patterns, usually known locally, but not in totality. They rush out of their wintering lakes in early spring, then at least some go back into lakes with the spring flood waters, and some come out during the summer and some come out in the fall full of eggs. However, it is not known what each individual fish is doing. They do travel up rivers to spawn in late September and October, after the sheefish, and earlier in the fall

than the broad whitefish. This can be before freeze-up above Kobuk. A few are caught with the early broad whitefish under the ice in Ambler.

The young hatch in late winter, and feed mostly on zooplankton as they move downstream. They feed in lakes, streams, rivers and estuaries. Adults are both scavengers and predators on other living creatures small enough to get into their mouths, such as little clams, crustaceans, little fishes, and chironomid larvae. Fish further north grow more slowly, and growth rates vary depending on the food available.



Figure III-18.

Harvest

Traditionally, humpback whitefish were caught mostly in traps, or with gill nets and spears. Today, they are mainly caught by gill net and seine when they become available, and almost the year around in Selawik. They are picked up by hand from the ditch-traps (*qargisaq*) at *Anigaaq*. Ken Alt catches them with a fly rod in the upper Kobuk River. (Spears are used for sport fishing near Fairbanks.)

Use / Recipes

Humpback whitefish have white, flakey, mild-tasting flesh, which is eaten in all the typical recipes, including raw, half-cooked, boiled, roast, dried, frozen and fermented. They are similar to broad whitefish (*qausiluk*), and are prepared and used in all the same ways. The recipes for both of these whitefish are divided between them, so you will see a recipe name and with it, the recipe, or a reference to see that recipe with the other whitefish.

To scale, clean and cut whitefish

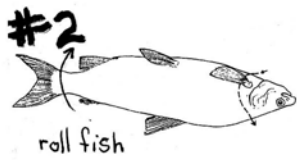


Figure III-19. Fannie Mendenhall, Sisualik, 2000.

Figure III-19 shows Fannie Mendenhall scaling humpback whitefish caught at Sisualik. Scraping then rinsing the scales off is the first step in processing any fish with scales. When cooking the fish right away, the next step is to clean it, or take out the insides. That is the last step when the fish is cut to hang because it is easier to cut both sides uniformly when the insides are left intact within the belly until last. Figures III-20 and III-21 are notebook pages showing the details of cutting whitefish to hang for both half-dry- or dry fish.

How to Cut Whitefish

#1 This first cut is optional on larger, fatter fish to save this especially good bite of throat.



Cut through the skin and meat, but **not the backbone.**



Cut all the way around the head.

#3



#3 and #4 are optional cuts used on larger, fatter fish, to help this especially good top part ~~dry~~ well. Cut through the skin and flesh, but not through the bottom skin.

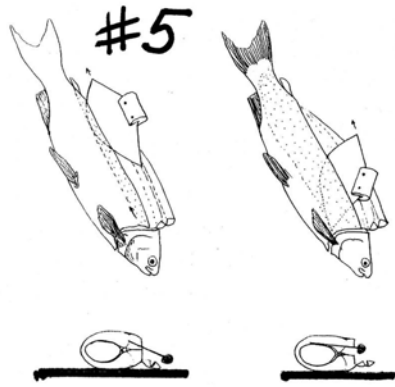


Cut the flesh but not the skin along the midline, + next to the bones of the dorsal fin.

#4

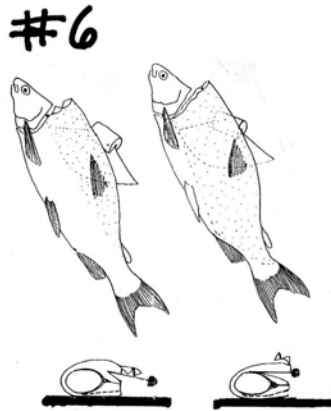


Figure III-20.



Use a series of cuts with the ulu to cut an even layer of meat off the ribs and backbone.

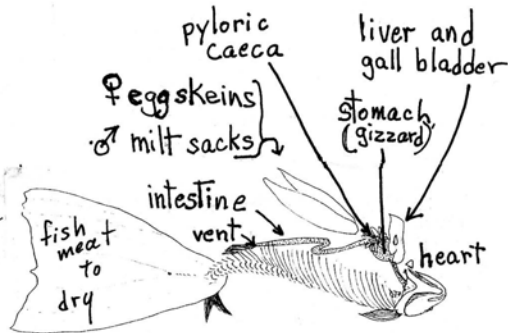
The first cut here, is at a steeper angle. It takes several cuts to separate the meat from the tips of the ribs, ventral fin and tail. Don't cut into the body cavity until #6.



Flip the fish, end to end, which turns it over. Cut the meat off this second side, as in step #5 above. This is easier when the body cavity is still closed.



Pull head and back bone apart from the layer of meat.
Pull out all the insides.



Ready to hang →



Figure III-21.

Figure III-22 shows the insides of a whitefish cut to hang, with the flesh pulled off the body cavity. In this photo, the egg skein lies on the left. Just above the green, gloved finger is the liver. The dark blue-grey sack of the gall bladder lies along the top of the liver. This sack holds the bile and must be carefully removed from the liver. To the upper left of the gall bladder are the little fingers of pyloric caeca joining the stomach, or gizzard, which is firm, round and muscular. This stomach is a very light grey just right of the top of the eggs. Above the cheek are the dark red gills to be removed and above those is the red heart.



Figure III-22.

Boiled Fish, *Igaapiaq*

Bob and Carrie Uhl of *Sisaulik* comment on eating the humpback whitefish:

“Freshly caught, boiled fish are one food we can eat meal after meal. Then after enjoying a baked or a fried fish, we often keep eating boiled fish.”

This is their traditional *Sisaulik* way to cut whitefish to boil fresh. It works best for the smaller humpback whitefish, plus small trout and Bering cisco.

- Scale the fish and rinse it.
- Cut the belly open.
- Cut the intestine between the pyloric caeca and the stomach.
- Cut the other end of intestine off at the anus and throw.
- Carefully lift the liver up, cut out the bile and throw the bile away.
- (Since the egg sacks are attached at their forward end, they stay with the liver and stomach.)
- Cut the whole fish into three pieces, head (with liver, stomach, and eggs attached), the mid section, and the tail. Each piece is one third of the fish and just the right size to cook and serve.

Bob and Carrie Uhl describe eating humpback whitefish in the springtime at *Sisaulik*:

“To properly boil fish, use only very fresh fish, and drop the pieces into rapidly boiling water, and keep it simmering until done (about 20 minutes), then drain off the water right away. This gives it the best, firmest texture. This broth is also a good food.”

*“In the spring time, **qaalgijq** come out of the lakes, or wherever they overwintered, and move around with the breakup high water. Usually skinny and hungry, they eat the little clams that have fallen onto the muddy bottom from where they were frozen into ice that floated from somewhere else. On such good food, they quickly become fat. When boiled, they taste just like the clams, which is delicious. In some places, there are no clams or anything else tasty, so they are eating something else in the mud and their flesh tastes just like the mud they were*

eating, which is sometimes terrible. Occasionally, in Sisualik, we get a net full of whitefish that have come from different areas. Some will taste exceptionally delicious, and others will taste like bad mud. Sometimes we can tell which ones will be bad by their smell as we clean them and sometimes we can tell by what's in their stomachs. However, there are those times we don't know until they are on our plates!"

Agnes Smith of Kiana tells us:

"Slough-caught whitefish have much more flavor than those caught in the river in spring."

Freshly caught fish roasted whole over the fire, *Qairuk*

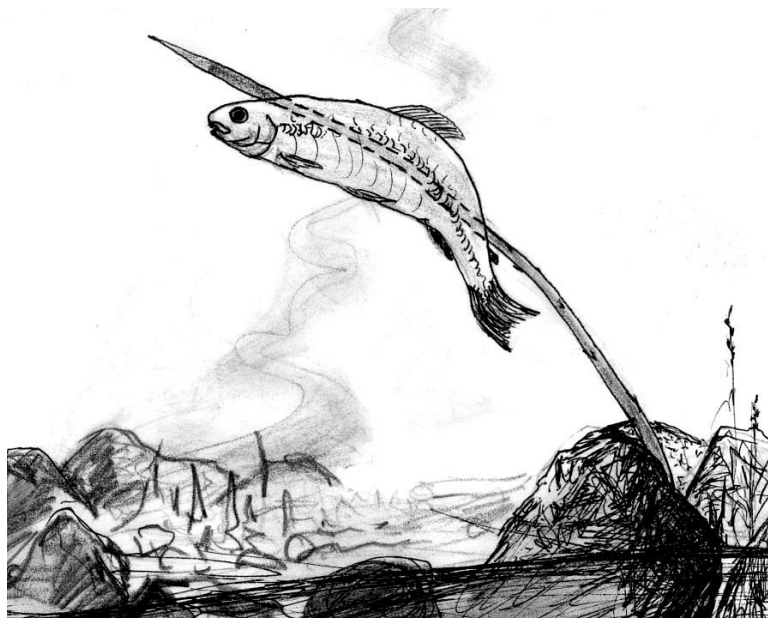


Figure III-23.

See **Broad whitefish, *qausiluk***.

Baked fish, *Argiq*

Fish caught under the ice are always fresh because they freeze quickly, and are excellent to cook. Since these fish don't eat while they are spawning, their stomachs and intestines are empty.

To cook:

- Pick up a frozen fish from outside in the winter, or from your freezer.
- If convenient, rinse it off, but this isn't necessary.
- Lay it in a covered roaster for the stovetop, or on a tray for the oven.
- Cook it, whole, just like that. This is one of the wonderful *lñupiaq* Quick Foods. Use a medium hot oven, between 250°F and 400°F, or keep it simmering. It is done when the

flesh is white, flaky and pulls away from the bone easily. Once cooked, (and drained if it was boiled), the fish is ready to eat.

To serve:

- Pull off the top scales and skin in one piece (dog feed).
- Lift off the top layer of meat to a serving plate. It will come off in one slab when cooked right.
- Take the liver, stomach, eggs and intestines out from between the ribs (dog feed the intestines and save the rest).
- Lift off the head, backbone, ribs, and tail (dog feed).
- Finally, take the bottom layer of meat off the skin and scales. The meat goes on the serving plate; skin and scales go in the dog pot. Only a small area of meat must be removed from near the gall bladder in the liver, unless you happen to like the taste of bile. It won't hurt you and probably aids digestion.

This quick, easy way to prepare fish is delicious eaten immediately or cooled to use later, and requires no additional seasoning. Of course, salt is the commonest addition, and you might add any seasoning you chose, for variety. Traditionally this fish is eaten with seal or fish oil and is a complete meal or part of a more complex feast. Today it may also be eaten in anyway other fish is served, anywhere around the world.

An alternative way to serve the above baked fish:

- Lift the hot baking pan holding the fish straight to the table on a trivet.
- Let everyone serve themselves whatever part they wish. Experienced fish eaters know just how to do that. This option is preferred by experienced fish-eaters because they like to suck the juice and fat off the bones, and they always prefer to know which part of the fish they are eating.

‘Gizzards’ (stomachs), roast over the fire, *Aqaiġutchiak*

The local term for the hard, roundish stomach of the whitefish is ‘gizzard’, presumably due to its resemblance to a bird gizzard. Although the fish ‘gizzard’ sometimes has grit inside, it is not used for grinding as birds do, but rather a consequence of what they are eating.

Mamie Beaver tells this story from her childhood:

“When I was a girl, my sister and I used to take a sharp stick and poke the guts of whitefish and hold them over the fire to cook. We’d do this with qausriġuk, qaalġik, sii, or siulik guts.

- *First, cut the gizzards (round, muscular stomach) open and clean them real good.*
- *Leave the fat on—all of it.*
- *Put 6 or 7 gizzards on a sharp, peeled willow stick by running the stick through the esophagus, [Figure III-24]. You run the stick through the throat part.*

- *As they roast over the fire, the oil drips out.*
- *Take your hand and catch that oil, (it won't burn you).*
- *Eat it. Lick it off your hand.*
- *Squeeze the fat and stomachs a little bit with your hand and lick off the oil.*

When the fish gizzards are cooked, we'd eat them too. Mom used to get real mad at us for 'wasting' what she was using to make fish oil –wasting the guts."

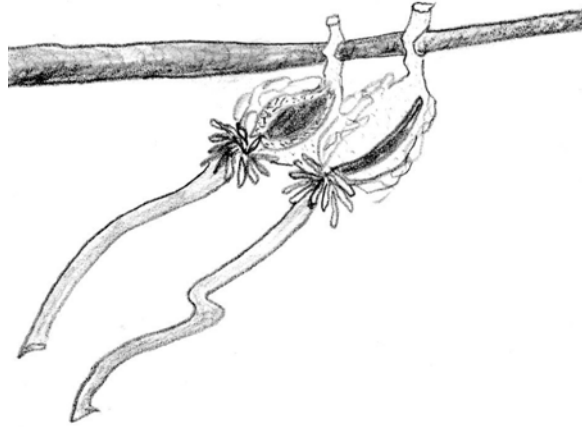


Figure III-24.

Minnie Gray tells about the Black River fish:

"The cleanest gizzards are from those fish from down river that are coming up, caught by net or seine: their stomachs are empty. The fish from the lakes and sloughs usually have rocks or sand in their stomachs. I can't eat the stomachs from the Black River fish. They are black inside from what they are eating off the bottom of the lakes. They are edible but not as good. They are fat all right, but just different. Black River fish are different. They smell like from the nuna (land) and they taste like from the lakes. Some are real strong all right, but we eat them."

Cooked fish with raw berries, *Qaaqtaq qalulik*

- Boil, cool, and pick out the bones of fresh whitefish, sheefish, or pike.
- Mash ripe cranberries in your hand to let the juice run out.
- Mix the fish, juice, and cranberries together.
- Add a little sugar to taste.
- Eat with seal oil, unless the fish is very fat.

This is a good meal or dessert.

Fish stomachs, eggs, and blubber, mixed with cranberries and rhubarb in the springtime, *Kinufuk*.

See **Broad whitefish, *qaalgıq***, for recipe. Figure III-25 shows all these fish parts boiled and ready to use.



Figure III-25.

Fish stomach, liver, and eggs, cooked and mixed with rhubarb, *Tıñutçhialik*

See **Broad whitefish, *qaalgıq***.

Fish Eggs, *Suvaich*

Eggs are always cherished and saved. They are eaten fresh raw, boiled and baked, dried, frozen, fermented, stored in oil—in every way possible. They are eaten because people love them, and incidentally, they also happen to be extremely nutritious. (See **Broad whitefish, *qaalgıq***)

Raw blueberries and fish eggs, *Asrıriugaq*

- In August put blueberries in a bowl.
- Add raw, fresh fish eggs from any fish except salmon.
- Squeeze the eggs and berries together with your hand for a while. This mashes the berries and separates the eggs—most of the individual eggs don't mash.
- Take out the stringy membranes from around the eggs only if you want to.

- Use any proportion of berries to eggs that you like, starting with mostly blueberries. They aren't whipped, just mixed, and the eggs get purple colored as they become pickled. Each food nicely complements the other.
- Eat them just as they are, raw and freshly prepared, or after they have sat for a while.

This is a variation of *asrirriugaq* that is enjoyed in July and August when people are picking berries and gathering fish.

- Save the eggs and stomachs from whitefish.
 - Boil, drain, cool, and chop them. The eggs are about half-grown and remain mostly in their roe sacks.
 - Mix in fresh blueberries with your fingers, mashing the berries and breaking up the eggs. Use any proportions that you like and that you have available.
 - Mix in some seal oil and sugar (optional) to taste, and eat.
- This recipe can be a complete meal, just right for a lunch, or it can be served as a dessert. Figure III-25 shows boiled liver, stomach, and eggs from whitefish, ready to use in this and other recipes. Two livers are in the lower right; some eggs are along the upper right edge; a heart is just left of a liver along the bottom; and four stomachs are along the left-top part of the photo. All of these good foods would be used in *tinutchialik*, but only the eggs and stomachs would be used in *asrirriugaq*. In fact, the photo shows the full-sized eggs of September, rather than those of July.

Whipped raw fish eggs with cranberries, *Ittukpalak*.

This is a favorite dessert, little changed through the centuries:

- Use about equal amounts of raw eggs and berries, like two cups fresh fish eggs and one or two cups cranberries.
- Mash the eggs in a flat wooden bowl with a wooden masher or a cup with a flat bottom, and remove the stringy membranes. They don't all mash, but some do, and the more you get mashed, the fluffier it will be.
- Add and mash the cranberries.
- Mix and whip them together using your hand, a fork, egg beater, or an electric mixer.
- When it gets frothy it is done and ready to eat right away.

Many people eat this the real *lñupiaq* way, without sugar, especially when some sweet blueberries are added. Others stir in varying amounts of sugar just before eating.

This pink dessert doesn't keep, so eat it up. After several hours, it 'falls', and the air in the foam oxidizes the eggs, giving it an old taste.

This dessert is a favorite, and loved by many. There are numerous variations, and different preferred proportions. A few people add canned milk, which curdles from the acidic berries giving the dessert a thick and creamy consistency. Others freeze it before eating, which makes an ice cream. Some people make it before the evening meal, set it out to chill / freeze, and eat it for dessert.

Flora Green made *Ittukpalak* with the whites of two hen eggs, beat stiff with a mixer, and one cup of cranberries. She added sugar to taste, gently folded in other berries, and served immediately for dessert.

Dried fish eggs in fish oil, *Suvatchiaq*.

Mamie Beaver tells about her childhood:

*“Umaġ’auchiaq, this is the little willow rafts we build to hold fish eggs. ‘Umaġ’uak’ means rafting. Selawik people do this every spring. We pile wood on the raft, and all our belongings and float from Selawik down to the coast. We eat rhubarb and wild celery, pick last year’s cranberries, and make **suragnak** (willow leaves stored in oil). Sometimes we get storm bound for days, even one month, when the wind blows. Then we have to **iyuktuk** with a boat, which means to row or paddle a boat and tow the heavy raft to keep it in the current and off shore. I used to do that growing up as a kid. We raft after breakup, after muskrat season.”*

*“The fish eggs raft comes from this idea. Make a raft out of willow sticks, approximately 18” by 12” and lay the **qalushrak suvaich** (fish eggs) on it to dry. When dry, roast the rack by a fire or in the oven. When cool, put in **agautaurak** with oil, and freeze.”*

Fish eggs on a raft.

This was a favorite way to store eggs in the old days.

To prepare summer whitefish eggs to put in oil:

- Cut 10 to 16 willows, (one summer-length of growth long, however long that is, 16” to 30”).
 - Tie them together along each end to make a rack.
 - Lay fresh eggs on the rack and leave the rack where it will dry. The eggs are in their sacks so they are discrete bundles that will stick to the rack as they dry.
 - Hang the rack by the fire, with the stick side to the fire first, to cook the eggs.
 - Then turn and cook the eggs side.
 - Cook them slowly but be certain that they are hot enough to cook and not just get warm.
 - When cooked and cool, twist the rack back and forth to make all the eggs pop loose and fall onto a cloth.
 - Put these into a poke of oil to store. A jar works well.
- This recipe is also used with the small-sized roe sacks of any fish, except salmon.

Another way is to hang the egg sacks on an old fish net spread under the cache or drying racks.



Figure III-26.

Figure JJK shows whitefish eggs hanging on an old fish net to dry.

- Hang each egg sack separately on the meshes.
- When they are dry, take each egg sack off the mesh.
- Bake them well in the oven.
- Cool and store them in fish oil.

They will keep as long as the oil is kept cold and dark.

These are gourmet treats as well as ‘multi-vitamin pills’ of good nutrition. Children love their crispy, crunchy texture and rich, roasted flavor. If un-watched, they will finish the jar at one meal, that jar which was intended to last for weeks. Figure III-27 shows whitefish eggs that have been dried and roasted and are now ready to store in fish oil. Figure III-28 shows these eggs stored in a jar of fish oil just taken from the freezer, where it keeps the best. (Tape or wrap glass jars to help keep them from breaking in the freezer.)



Figure III-27.



Figure III-28.

Fish Oil, *Qaluum uqsruq*.

To make whitefish oil, see **Sheefish, *sii***.

The fish from the river have clean stomachs (no gravel and sand), but the fish caught in the sloughs have lots of grit (from clams and the insect larvae cases made from sand, etc.), so clean those stomachs out before you cook them. To do that, either squeeze out the sand and foods, or slit each stomach open and rinse it out. The stomachs are called “gizzards” because of their chewy texture, a welcome difference from the soft texture of fish flesh. As you clean them, leave all the fat attached to the inside of the fish and intestines, both when preparing them to eat and when preparing them to render for oil. All the insides from whitefish and sheefish can be mixed together to make oil, but they are usually rendered separately, if there is a large enough quantity of each to do so.

Dry fish, *Paniqtuq*

Humpback whitefish are excellent drying fish and one of the commonest *paniqtuq*. They are cut the same way as broad whitefish (*qausri!uk*). The first fish caught in the springtime are the ones preferred for drying because they haven't yet become fat. They are leanest at breakup and grow fatter all summer, reaching their peak of fatness at spawning time. At that time, they have acquired their maximum amount of stored energy, to last them through the rigors of spawning plus 6 more months under the ice with little or no feed. Figure III-29

shows freshly hung whitefish in Ambler. Figure III-30 shows Selawik whitefish hanging to dry in late August after they have hung for about three days. Figure III-31 shows a fish drying rack made the traditional way out of poles with notches from the branches hooked together to hold up the tripod ends. Drying racks may be made many different ways, as long as they hold the fish.

Figure III-32 shows Selawik whitefish hanging in the rain under a good roof. Rain is a real bad problem for drying fish, but only one or two days won't ruin it under a roof. It helps a lot to build a fire underneath the drying fish to keep the air moving, the flies away and to give the fish a nice smoked flavor. Today people more often will cover their drying racks well and even put an electric fan up to get their fish dry in damp weather.



Figure III-29.



Figure III-30.

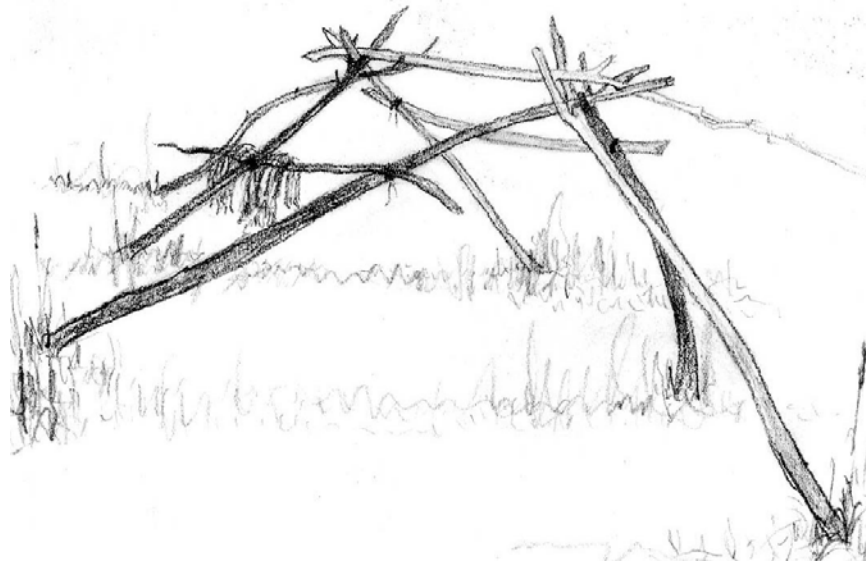


Figure III-31.



Figure III-32.

Half-dried, *Iyamaagfuk*,

Eaten boiled or roasted. When boiled, discard the water, because it has rinsed off any rancid oil, flies or dust.

Any fish hanging to dry may be taken down during the first three days, and boiled or roasted for half-dry fish (*Iyamaagfuk*).

People will tell you:

“We roasted fat, half-dried whitefish in the oven until they were golden brown and crispy. Then we crunched up the fins, head, skin, and a few bones while they were still hot, then ate the rest of the meat with seal oil.”

Half-dried fish in seal oil, *Paugmiitaaq*

Half or fully dried fish keeps best when stored in seal oil because the seal oil minimizes oxidation. When kept cold or frozen, it will keep up to a year to provide an instant and ever ready meal. Although a complete meal in itself, dried fish in oil is most often eaten along with an assortment of other meats, fishes and other foods. The amount of moisture left in the fish is important because any moisture will continue to ferment unless frozen. This creates very desirable changes in the flavor, but too much overdoes a good thing and could actually cause the fish to spoil. One general guideline is to let the fish hang for at least three good drying days and preferably four. The dryer the fish is before being put into oil the less it will ferment. Besides fermentation, any moisture in the fish will equalize so the dryer parts become softer and the moister parts firm up. With experience one gets to know just how dry they like their fish to be when they go into oil so they will be perfect when eaten. Figure III-33 shows whitefish that has been stored in seal oil and is now served on the table.



Figure III-33.

- Take half-dry fish off the rack after 3 or 4 days.
- Cut off all the fins, tails, heads and backbones.
- Cut the sides of fish into uniform pieces, or not.
- Pack the fish into a container, preferably a poke or barrel, but a plastic bucket will work.
- Pour seal oil over to cover and weight down or tie shut to keep all air off the oil and fish. If you use a plastic bucket, do not put a plastic lid on tight. Instead, cover the oil with wood or tie cloth over it to keep it clean, then lay a piece of plywood over the top. A poke or wooden barrel can be closed up tightly because they are made out of semi-permeable materials, where as a glass jar or plastic bucket should not be closed tightly.

Eight dried whitefish, strung together, four to a side, *Uyurat*

Both broad (*qausiluk*) and humpback (*qaalgiq*) whitefish plus pike (*siilik*) are made into strings as they dry. This was a convenient way to handle and sell fish. It also conserved space on the drying racks, allowing the strings to continue drying while fresh fish were hung.



Figure III-34.

To make a string,

- Cut a U-shaped hole in one whitefish, just in front of the ventral fin.
- Thread the backbone and tail of another fish through that hole letting the tail be a toggle to hold them together. One of the middle fish has two holes in it, where the fish reverse direction. This allows the four fish on each side of the pole to hang head down, skin out, which will shed water.

Figure III-35 shows a sketch of part of a string of whitefish.

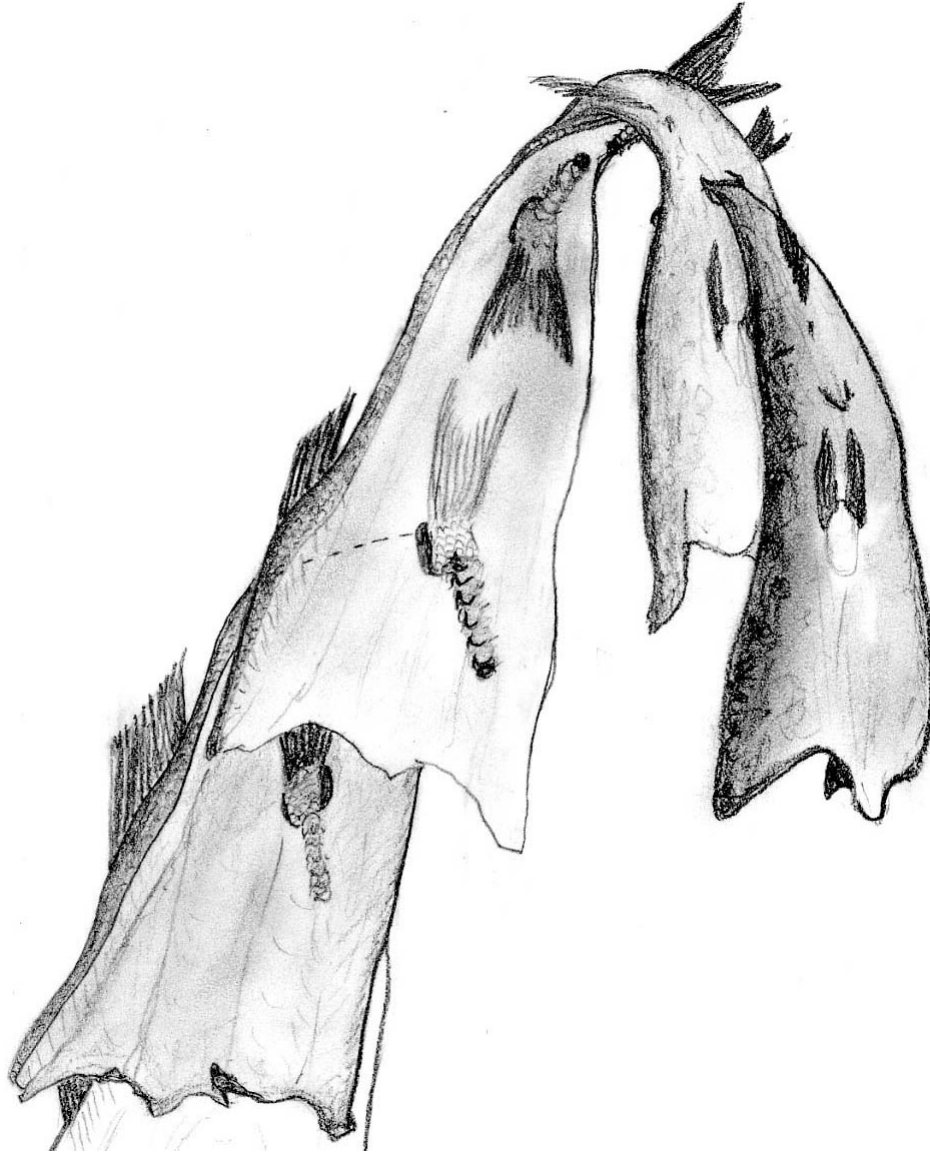


Figure III-35.

Whitefish cut to hang, in late fall, so that the eggs dry and ferment in the intact body cavity, *Amatchiaq*.

See Broad whitefish, *qausiluk* for details. Figure III-36 shows Minnie Gray's hands cutting open an *amatchiaq* with an *ulu* or woman's knife, in preparation to eating it for lunch. In Figure III-37 that same fish is opened up to show the slightly fermented eggs inside ready to eat with seal oil. The sketch, Figure III-38, is of four whitefish cut to hang as *amatchiaq*.



Figure III-36. Minnie Gray, Ambler, 2003.



Figure III-37.



Figure III-38.

Dried fish skin roasted, *Amigaatchiaq*

Skins are delicious, like chips or crackers.

- After the dried meat is eaten off the fish skin, carefully roast the skin over a stove or fire until the oils come out and the skins are crispy enough to eat.

Dora Johnson was hooking grayling through the ice in Ambler as we checked our ice net.

“In Selawik, they dry these humpback whitefish (qaa!ǰiq) right now. They cut them inside the house, where it is warm, leave the scales on, then hang them outside. They freeze-dry, and they eat them as quaq / paniqtuq. They sure like them that way. I do too.”

Some Kiana people and Lena Saterlie from Pipe's Spit have mentioned a liking for *paniqtuq* from mushy fish, which has a different texture and taste. Fish get 'mushy' when they stay too long in the net, or stored, in warm weather. Mushy-fish is also enjoyed cooked by some people. This preference is usually in the minority and is opposite from the *Sisualik* ideal of a firm-textured, cooked fish.

Frozen, *Quaq*

Qaalgiq are excellent *quaq*, both fresh, and *tipliaqtaa*. Traditionally, the fish caught late in the fall, as the night air begins to freeze, are the fattest and the best for *quaq*, and are especially good fermented. Store them in sacks or pile them on the ground in a cool place, well covered with grass or canvas. If possible, pile all the *qaalgiq* together, in one place, or put only *qaalgiq* into a sack. If you don't have enough of one kind of whitefish, then you could mix them together, or even mix them with other *quaq* fish. (See *quaq*)

Figure III-39 shows Wendell Booth standing beside his sacks of whitefish fermenting for *quaq* on the Noatak beach. Behind lies the sein that caught the whitefish and behind that are the drying racks for drying fish.



Figure III-39. Wendell Booth, Noatak, 2002.

Broad whitefish egg ice cream, *Uḡni*

Mark Cleveland of Ambler teaches how to make *uḡni*:

*“Short-nose whitefish have big eggs at freeze up time in the fall. Then we put nets under the ice. That’s why we have fresh fish all year round. When we are hauling the net, we have to make **uḡni** on top of the ice. Clear away some snow and squeeze out eggs on to the ice. Mash with your hands even though it’s cold. Mash the eggs well, then add a little fresh snow as you mix. Add snow a few times as you mash and mix. It gets big. When it turns white, eat it. If you can’t eat it all, take it home, since it’s real frozen. Store it in the cache and eat it later.”*

Some people use a flat piece of ice to mash the eggs and mix them with the snow, but there may be some beneficial effect from the warmth of one’s fingers.

Anigaaq humpback whitefish (*qaalḡiq*) are a smaller variation of humpback whitefish that are found in the large Krusenstern Lagoon system of lakes and sloughs which empty through

the *Anigaaq* slough, 25 miles west of Kotzebue. This area is similar to the many other lagoon systems all along the coast. The unique combination of geography, weather, ocean currents, and fish biology combine to make one of the world's most simple and efficient fisheries.

Here is briefly how it works: humpback whitefish from elsewhere flush out of their river systems with the spring freshwater flood and are carried out into the ocean. These are the lean fish, called *aniraaq*, which are good to dry. They follow along the coastlines, and go into these lagoons, which have been opened by the spring run-off. There, they feast on the abundant summer insect hatch and grow fat. As their eggs and milt swell, they want to get out in the fall to find their proper river in which to spawn, and then find a deep place to overwinter. These are the very fat fish, called *kivanaktauq*, which make good *quaq*. If the *paa* (slough or lagoon opening) is still open, they travel east back to their rivers. However, the *paa* has usually been closed by the fall storms, and the fish are trapped.

Families still move there to camp in the fall, as they have for centuries, to catch fish for *quaq* when it looks like many are trapped. They dig a *qargisaaq* (ditch for a fish trap) from the fresh-water side, almost but not quite to the edge of the gravel. They carefully grade it so the current flows out toward the ocean, seeping through the gravel at the end. The stronger the current, the more fish will be caught. The fish sense the current, then turn and allow it to carry them along the ditch only to become stranded as the water seeps through the gravel and disappears. The fishermen tending the *qargisaaq* keep picking them up to store in gunnysacks, which are then sewn shut.

Figure III-40 shows a fish trap or *qargisaaq*, that is being put away, or stopped from working, so the fisher folk can go home. Bob and Carrie Uhl are on the left and Keith and Arunya Jones on the right. Figure III-41 is a shot of the same place from 90° to the right showing the long lagoon and the fish that were caught and left on the sand. Bob is shoveling sand across the ditch and Keith is placing a beam across to stop the flow of water which brought the fish to be caught.



Figure III-40. Bob and Carrie Uhl, Keith and Arunya Jones, *Anigaaq*, ca. 1982.



Figure III-41. Carrie Uhl, Arunya Jones, Keith Jones, Bob Uhl, Willow Jones, Anigaaq, ca. 1982

Before gunnysacks became available, the local grasses that grow by the lakes were quickly woven into many baskets to hold the fish for *quaq*. They were called *kukulhaun*, and were perhaps about 16” long and high, and 10” wide. The weave was an open, twined style, as near as anyone can remember. When today’s elders were kids, they remember seeing the older women making those baskets. They recalled how people would cut those frozen baskets of *tipliaqtaa* fish apart during the winter each time they ate *quaq*. Apparently, there are no longer any elders left who know how to make them. They do recall that the *quaq* from those

baskets definitely tasted better than fish stored any other way. Figure III-42 shows models of the approximate weave and shape of the old *quaq* baskets woven out of local grass. People say they used a grass from the lakes and not the local wild rye grasses so common along the beaches that are used by the Aleuts for their basketry. These models were made from the wild rye beach grasses.



Figure III-42.

When there were no sacks or containers to hold the fish, pits were dug, called *auruun*, and the fish were piled in, covered with grass, then with gravel or sod to keep them safe from animals. Some pits were dug along the beach gravel where people camped, and many were dug up on the bluff above the slough, especially for dog food. The pits along the beach ridge were easier to fill with fish, but they also might be destroyed if a big storm came and flooded out the camp. It took much more work to haul fish up to those pits on the bluff, but they would be easier to dig out next spring.

As the fish in pits fermented, the smell escaped, giving the whole area its characteristic odor. If they fermented too much, as the ones caught the earliest might do, they would be used to feed the many dogs, and if any fish were just right, they could be eaten by people. (See a more detailed discussion of this fishery in Uhl [1977] and Georgette [2005]).

Fish may also become stranded (like these in the *qargisaq*) as a natural phenomena, both at dammed slough mouths, or where a river braids into many streams, some of which sink into the sand. It is obvious where these areas are by the many birds and animals that come there to feed. People can also pick up fresh fish there to eat.

The treat of the fall *qargisaq* fishing, a ‘Quick Food’, happens like this:

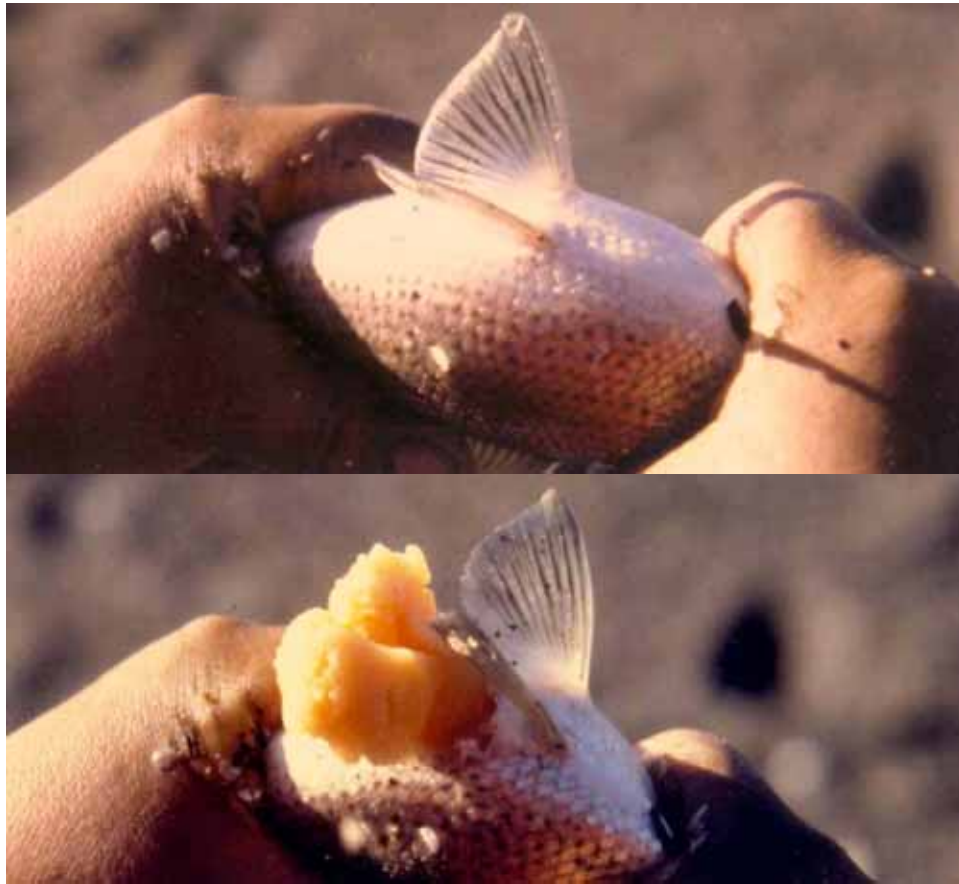


Figure III-43.

- Pick up a freshly killed female fish, fat with eggs as in Figure III-43.
 - Grab it in both hands, belly up.
 - Break it open.
 - This pops the eggs out, to be easily eaten on the spot.
 - Suck out the eggs,
 - Toss the fish into the dog food pile.
- This treat is a delicious and satisfying instant snack both for kids and all the people working the *qargisaq*.

Figure III-44, reproduced from Hull [2002], shows the five different whitefish of this chapter, not counting the sheefish.

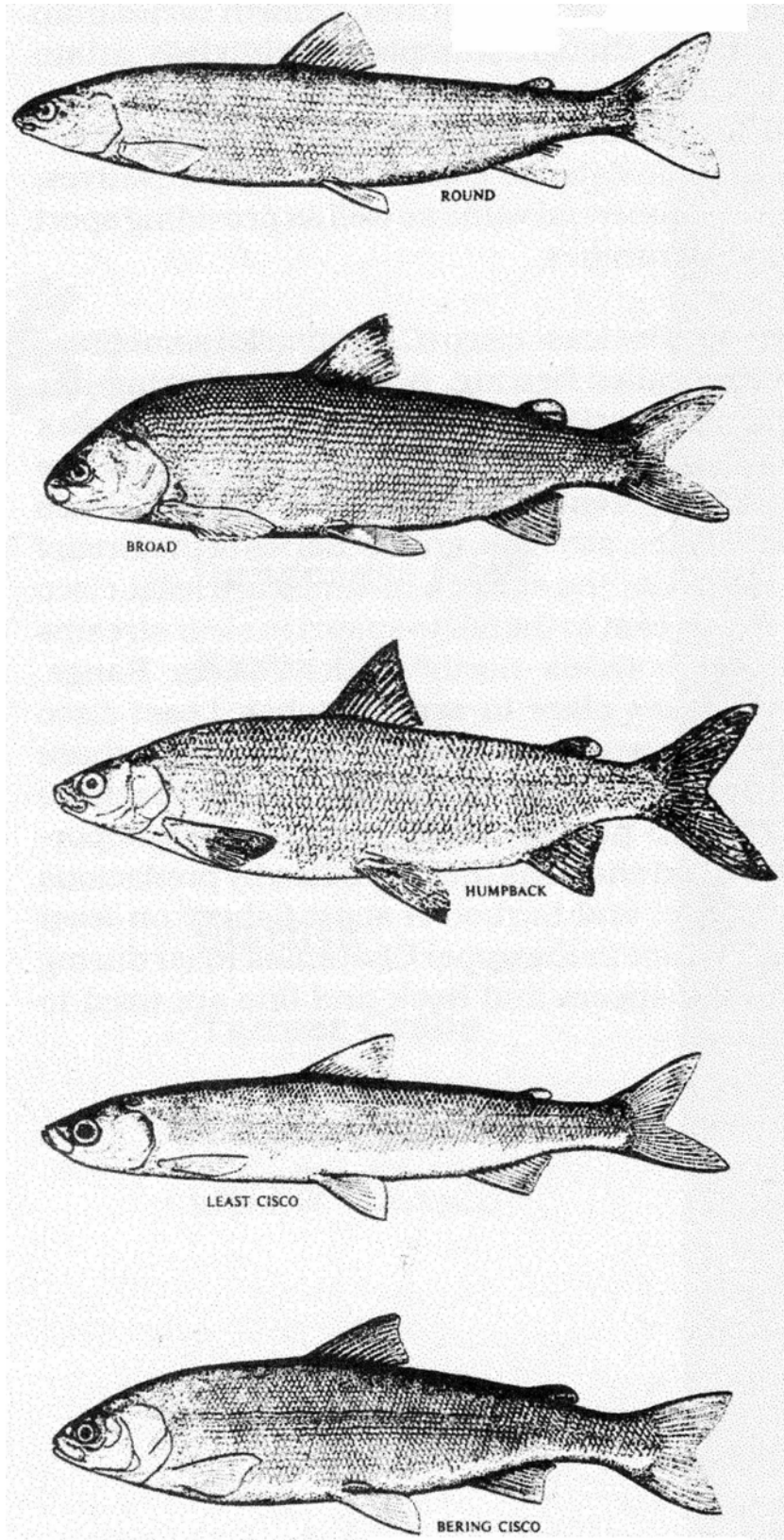


Figure III-44.

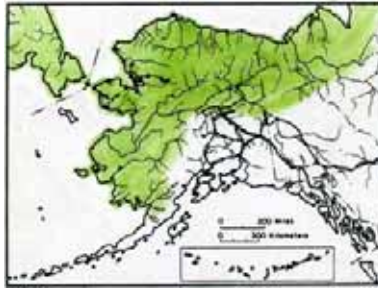
Least Cisco

Qalusraaq (Kobuk)

Iqalusaaq (Coast)

Qalutchiaq (Selawik)

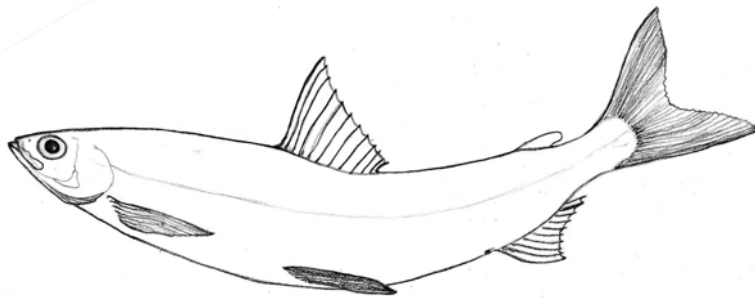
Coregonus sardinella



Description

- Least ciscoes are brownish to dark greenish above, and silvery below.
- Their pectoral and pelvic fins are dusky to black on fish over 7" long.
- Their lower jaw is weak and slender, projecting beyond the tip of their upper jaw (mouth closed).
- Their eye is round and large.
- They look like a herring, except they have small scales.

Least ciscoes weigh up to 1.5 pounds (.5kg) in Siberia and reach a length of 16" (41cm) in Interior Alaska, but in the study area they weight less and are smaller. They live about 8 to 11 years.



Seasonal Feeding and Spawning Movements

The least cisco is one of the most abundant freshwater fishes of Alaska. However, because of its migratory habits, the abundance is seasonal. They overwinter in the Kobuk Lake area, then travel up the Noatak, Kobuk, Selawik, and Buckland Rivers to spawn in late

September and early October. Different schools seem to spawn in all tributaries along these rivers.

They eat various types of zooplankton, and the adults and larvae of numerous insects. They also eat plant material and plankton, especially near the coast. In turn, they are eaten by many predators, including eagle, hawk, kingfisher, pike, sheefish, lake trout, mud shark, seal, and probably what ever can catch it. In fact, the least cisco is probably the most important single fish food item of the study area.

Harvest

Traditionally, these fish have been seined, speared, trapped, and even grabbed by hand when they are coming out of the streams that braid and go dry.

Today, they are seined in great numbers in autumn, just before the ice runs, as they travel up rivers to spawn. They also are caught in nets or traps along with other fish; see Figures III-45 and III-46.



Figure III-45.



Figure III-46.

Use / Recipes

In the fall they are fat and full of eggs, with firm, tasty flesh. They are eaten fresh, baked, and fried like herring, although they are not as overly fat as the herring. However, most least ciscoes go into sacks to ferment for *quaq*, or pits to freeze for both humans and dogs.

Baked

Like herring or smelt, these little ciscoes are good baked in the oven, usually cross-slashed, and crisped well done; see Figure III-47.



Figure III-47.

Eggs, Suvaich.

Laura Smith, of Selawik talks about how she uses *qalutchiaq*:

*“Although the **qalutchiaq** are small, we catch lots for their eggs. We dry the eggs on a willow frame, then bake them and put them into fish oil. After we take out their eggs, we use them for dog food.”*

*“Push your thumb through the fish’s side, right under the pectoral fin, to open it and get the eggs out to eat fresh and raw. Just squeeze and hook the eggs out. These **qalusraaq** are not so good to dry or cook, but we get them for their eggs.”*

Frozen fish, Quaq

Bob Uhl talks about a preference for *qalutchiaq*:

*“**Qalusraaq** make excellent **tipliaqtaa** **quaq** since they are real fat and so full of eggs.*

*They are the best tasting fall **quaq** fish here on the coast, and when they have been properly aged, we tend to eat them until they are gone.”*

A story about our *quaq* pile near Ambler:

*“One year we had lots of **qalusraaq** from seining, but no sacks, so we made an enclosure with willow branches behind the line of river willows along the shore, and just piled the little fish in. It was a mound about three feet wide by eight feet long. The weather was close to freeze-up and snowing, so soon they were covered*

with a foot of snow and forgotten. That was mid October. More snow came down, then, in late November, we needed dog food and began digging around, trying to find our quaq pile.

We smelled it long before we actually broke through the icy crust to the fish. They were still thawed! They were cooking away there under the snow in air temperatures down to minus 30°F, apparently kept thawed by the heat produced from the fermentation process. As we opened it, the steam poured out against the late, low, sunlight, already dimmed by ice fog.

The odor was incredibly strong! At first it was repulsive, like rot, but as we dug away the snow, we got used to the smell, which began to translate more and more as delicious, as is typical of highly fermented fish. We ate the fish on top, and a few layers of fish down, which were aged just right for us as quaq. The rest were gourmet dog food, and they went positively wild over the gooey, smelly fish.

We got most of the fish from under the snow, but we'll never know what we missed, because long before those snow drifts melted away next spring, the breakup waters had scoured the beach clean, and deposited a fresh layer of silt.”
[See Figure III-48]



Figure III-48.

Dried for dog food.

Any least cisco left over after the winter that aren't too fermented are dried for dog food in the early spring when they just begin to melt out of the snow and before the temperatures get too warm. Figure III-49 shows some drying in Ambler.

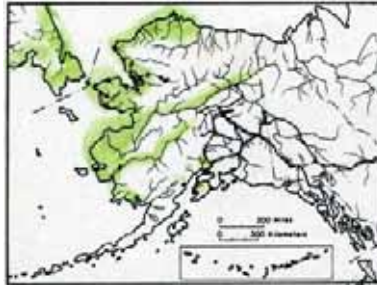


Figure III-49.

Bering Cisco

Tipuk

Coregonus laurettae



Description

- Bering ciscoes are brownish to dark green on the back, silvery on lower sides and belly.
- Their pectoral, pelvic, and anal fins are pale, almost colorless, with dusky tail and dorsal fins.
- Their body is torpedo shaped, round and trout-like in cross-section.
- Their mouth is terminal and their eyes are small.

Bering ciscoes average around one pound (0.45kg) but have been recorded at 4 pounds (1.8kg) in the Yukon. The average length of an adult is about 12" (30cm) and the largest one recorded was 18" (48cm). They mature at 4 to 6 years of age and can live to be around 10 years old.



Seasonal Feeding and Spawning Movements

Bering ciscoes are an enigma. Little is known of their biology, yet they seem to be the most perfectly adapted fish. They are very tolerant to salt water and can overwinter in salt water or brackish lagoons. They have a low oxygen tolerance enabling them to survive in the brackish lagoons, which can become oxygen deficient.

Spawning runs begin in the spring, and spawning probably takes place in the fall, but where and how they spawn in this area is unknown. Some people have speculated that a few might spawn in the ocean when they couldn't get into their chosen lagoon, and others presume they go into the river deltas.

They are always fat and healthy, yet surprisingly never very abundant in the Kotzebue Sound area. *Tipuk* eat invertebrates and a lot of plankton. Their stomach contents are a mass of amphipods, microscopic life forms with tiny eyes.

Bob Uhl shares his experiences:

“Hybrids between sheefish and Bering ciscoes have been caught in Russia, and we have caught what we believe to be hybrids here in the Noatak Delta. There should be more of them because they are extremely delicious. They combine the best features of both fishes, the flakiness of the sheefish, with the fatness and oil content of the Bering ciscoes.”

Harvest

Today, Bering ciscoes are caught mostly by gill net along with other fish, although seldom in abundance. A few are caught in seine or trap set mostly for other fish. Some say a few are in Selawik, most say they are not. They are caught in the beach gill nets off *Sisualik*, under the ice in Kobuk Lake, and occasionally along the Kobuk River, always with other fish.



Figure III-50.

Use / Recipes

The distinguishing feature of Bering ciscoes is that they are typically exceptionally fat; fatter even than herring (see Figure III-50). This means that they are excellent eating, but must be cooked properly to have a good taste and texture. Because of their fatness, they are best eaten frozen as fresh *quaq* or very well roasted, the same as herring. They might be eaten raw when salted or pickled but that hasn't been personally tested. They are not dried or fermented.

Roast fish, *Argiq*

Bob Uhl's preferred way to eat Bering ciscoes is to bake them as follows:

- Scale and gut very freshly caught fish.

- Cut off the heads and tails to fit a deep roasting pan.
- Cut deep slices across each fish, (to the backbone), about an inch apart on both sides.
- Lay them in the pan and bake thoroughly, about 400°F, until the top is well crusted. The intent is to bake out as much oil as possible from the meat, which then crisps on the outside and becomes delicious.
- As soon as you take it out of the oven, pour the rendered oil off before it can soak back into the fish. Sometimes, the amount of oil that renders out seems to be half the volume of fish. This oil is good fish oil and could be used in all the usual ways fish or seal oil are used, but it is not traditionally saved on the coast because the sea mammal oils are preferred and are more abundant.

Boiled fish, *Igaapiaq*

Bering ciscoes usually are *paik*, or mushy, when boiled. However, if you do it just right they are a good meal. Use freshly caught fish, (within half an hour from the water), drop the pieces into rapidly boiling water, keep simmering until done, and drain right away. Fixed this way, they have a smooth, creamy texture, and a delicious, mild taste. If they aren't fresh, they will boil up *paik* anyway, like a skinny fish, and tend to disintegrate into mush. Cut them to boil like **humpback whitefish (*qaalgiaq*)**.

The eggs and guts of Bering ciscoes are used similarly to those of the other whitefish.

Dried fish, *Paniqtuq*

Bering ciscoes are too fat to dry. However, they may be half-dried for 3 or 4 days, but no longer. This is because their oil gets a rancid taste from the first day they are hung, which only gets worse with time.

Frozen *tipuk*, *Quaq*

They make superior *quaq* when fresh and the temperatures are -20 to -30°F. Although they are so fat, they are *not* fermented as one might suspect because they tend to get too strong in a way that could cause diarrhea. They aren't poisonous or bad, just not the best fish to ferment. See trout and sheefish for more about making good *quaq*. Figure III-51 shows two *tipuk* that were frozen in a sack and now have been broken apart. They will have their fins shaved off along with the scummy juices that dripped out as they froze, then be chopped or sawn into pieces and brought inside to eat as *quaq*.

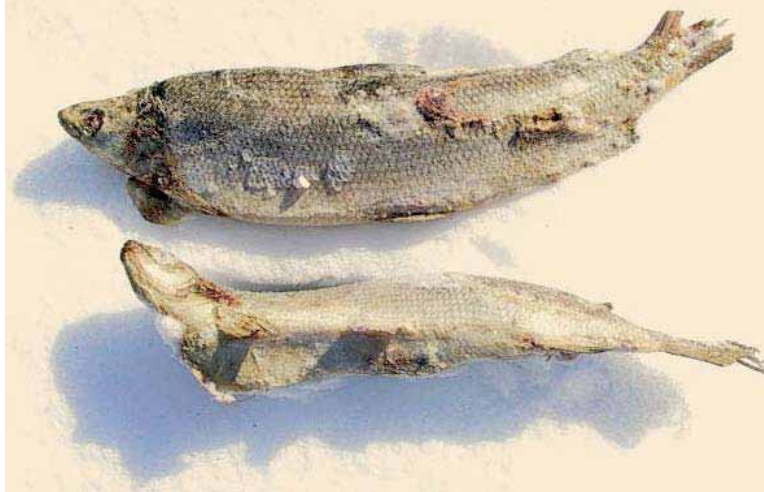


Figure III-51.

Bob Uhl shares old stories about Bering cisco:

“Tipuk are the only fish in the Krusenstern Lagoon system that can be hooked through the ice in the springtime. This was very important during times of starvation. Even when people have taken many fish from the qargisaq in the fall time, there have been years when there were too many fish left in the lagoon to survive the winter. The limiting factor is often lack of oxygen more than lack of sufficient food. Where there are up-welling springs that stay ice-free all winter, there can be so many fish packed together, that they seem to boil, as they compete for oxygen.”

PART IV

FRESHWATER FISH

- BROAD WHITEFISH
- ROUND WHITEFISH
- MUDSHARK
- ARCTIC GRAYLING
- NORTHERN PIKE
- LONGNOSE SUCKER
- ALASKA BLACKFISH
- STICKLEBACK

These fish occupy most of the lakes and rivers in the study area. They require fresh water throughout their life cycle, consequently the few flushed out with high water into brackish and even salt waters will do poorly or die unless they can return to fresh water soon enough.

The four main freshwater resident species harvested in this area are broad whitefish, pike, mudshark, and grayling. The sucker, blackfish, lake trout, and round whitefish are used to a much lesser extent, and are less generally available and much less sought after.



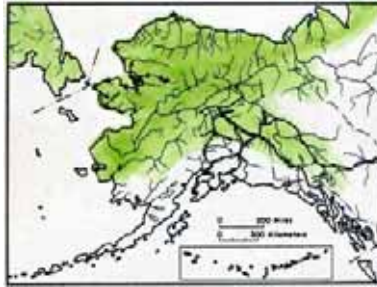
Jacob and Dora Johnson, Ambler, ca. 1970.

Broad Whitefish

Qausiluk, Siigulīaq (Coastal)

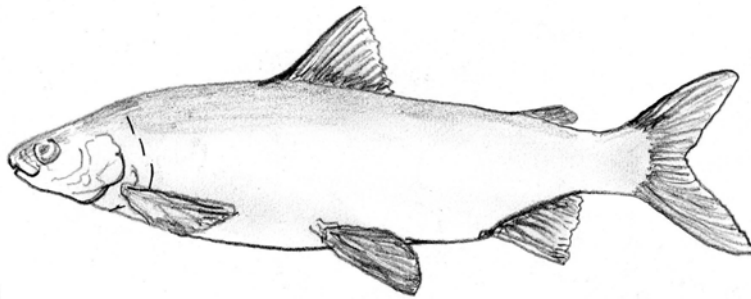
Qausriḷuk (Kobuk)

Coregonus nasus



Description

- Olive-brown to nearly black on top.
- Sides silver, often with a grayish cast.
- Belly white to pale yellowish.
- Mouth is small, with the upper jaw overhanging the lower jaw.
- No teeth, except a small patch of weak teeth on base of tongue.
- Scales large, firm, and easily scaled off.
- Males have large bumps, (breeding tubercles), on their scales along their side during breeding, females have smaller.



Broadnose whitefish average around 4 lb (2kg) with the larger *siigulīaq* more like 11 lb (5kg). There is a record of a giant fish from Siberia weighing 35 lb (16kg). In length they range from 15" (40cm) to 20" (53cm). An Alaskan record from Umiat measured 26.4" (67cm).

The females mature at 5 years and the males a little younger. Their maximum recorded age is 15 years. Their eggs are 0.4 cm in diameter, and a pale yellow to milky white.

Seasonal Feeding and Spawning Movements

These are the largest of the five whitefish in our area (not including the Sheefish), yet little is known of their biology in this area. They are a freshwater fish and usually don't go into brackish waters. However, a few are found around *Sisualik* and as far away as Krusentstern Lagoon, presumably carried there by freshwater floods. From June onward, they begin their upstream spawning run, and spawn over a gravel bottom around October. Different groups spawn all along the Kobuk River from Noorvik up past Kobuk Village, and along rivers around Selawik and up the Noatak River. In this region they spawn under the ice in October.

They overwinter in the deep-water areas of lakes and rivers. The young hatch in springtime. Growth is slow, especially further north. Broad whitefish are mainly bottom feeders, eating insects in various stages (including mosquito larvae), snails, bivalve mollusks, and crustaceans.

Harvest

Historically they were mostly caught in traps, plus by spear, and a few by gill nets and seines. These traps were ingeniously designed to fit the varying circumstances of each situation. Often a small stream was blocked to stop fish from leaving a lake until people could come back later to dip out all they wanted. Other times a channel was blocked with sticks leaving a hole where a funnel trap and holding net collected the fish as they passed. This type needed to be checked regularly to remove the fish as they accumulated. Figure IV-1 shows a large fish trap built near Kiana with a wing of trees under the ice to funnel the fish into the long net supported by the poles sticking up that can be seen in the picture. The men are taking the fish out, and part of the net and hoop that supports it can be seen. The net was over 20 feet long.



Figure IV-1. Unknown persons, Kiana, ca. 1950. Source: Lorrie and Nellie Schuerch.
In Figure IV-2 several Kiana ladies are checking the trap.



Figure IV-2. Unknown persons, Kiana, ca. 1950. Source: Lorrie and Nellie Schuerch

Figure IV-3 shows how the fish caught in this trap were strung on large willow sticks, allowed to freeze, then each clump of fish was stacked in a huge pile seen behind the boys, Lorry and Vince Schuerch.



Figure IV-3. Unknown persons, Kiana, ca. 1950. Source: Lorrie and Nellie Schuerch.

Figures IV-1, IV-2, and IV-3 appear courtesy of Lorrie and Nellie Schuerch, from Pauline Schuerch's collection.

Today *qausrijuk* are mainly caught with gill nets set all over the area from breakup until after freeze-up. Large numbers are caught in under ice gill nets where they gather to spawn. They are also caught in quantity by seine before freeze up as they travel in large numbers along the upper rivers to their spawning places. In Selawik, whitefish are caught year round in gill nets set in the water and under the ice. Because they are bottom feeders, they can be taken with baited hook on the bottom. Figure IV-4 shows a Selawik broad whitefish caught by net during August.



Figure IV-4.

Use / Recipes

Broad whitefish, *qausiluk*, have delicious, white, flaky, mild-tasting flesh. They can be eaten in a wide variety of ways, depending on how fat they are, including the following: raw, half dried, and dried; cooked rare or well done, both fresh and half-dried; cooked in most every fish recipe; and eaten frozen both fresh and in many degrees of fermentation, then thawed as *uilaaq*. The recipes for both the humpback and broadnose whitefish are interchangeable, they all may be used with either fish, and either fish may be used in any whitefish recipe when available at the right time of year. Some of the whitefish recipes are to be found in **Humpback whitefish, *qaalgig***, and some are given in this chapter.

Whitefish are scaled as soon as practical after they are caught, usually with a table knife, but a part of a caribou's shoulder blade bone was traditionally used, as shown in Figure IV-5.



Figure IV-5.

Freshly caught whitefish roasted whole over the fire, *Qairuk*

- Today they would grill it over coals.
- Leave the scales on. You could take the scales off for the grill.
- Take the guts and gills out.
- Poke a sharpened, green, stick from the tail through the back, coming out the head.
- Anchor the other, larger end firmly into the dirt or sand.
- The two critical parts are to get the stick propped firmly at just the right angle, and to manage the fire and coals just right.
- It takes a slow fire for close to an hour.
- To tell if it's done, move the head back and forth. If the backbone breaks off easily, then it's done.
- Lay the fish carefully on a clean space, a rock, board or platter,
- Remove the stick,
- Peel off the skin and eat.

Often the scales and skin will be so crisp that you can chew them up like chips. When you have done a perfect job of roasting the fish, the skin is delicious. Fish roasted and grilled over the open fire tastes better than fish cooked in tin foil. The smoke helps.

Gizzards, *Aqaiqutchiak* (stomachs), roasted over the fire

See **Humpback whitefish, *Qaalgiq***.

Baked fish, *Argiq*

This is the modern version of *qairuk*, and is a commonly enjoyed Quick Food.

Do this with fresh fish, frozen fish, and thawed fish, the only difference is that a frozen fish takes longer to bake.

- Rinse off the fish if necessary or possible.
- Scale it or leave the scales on depending on how much time you have and how you want it to turn out. Even a frozen fish can be scaled (but usually isn't,) just cut the scales off in slices, cutting against the lay.
- Take the guts and gills out (or, leave them in),
- Lay the fish on a baking pan and put it in the oven. Especially leave the guts and gills in if it is frozen, just lay the whole, frozen, fish on the baking pan.
- Bake between 250°F and 450°F, depending on how soon you want to eat, or how hot you can keep your fire. Sometimes people cover it with foil or a lid, but then it steams more than bakes and finishes more moist.
- To tell if its done, stick a fork into the thick part above the backbone and pry open to see if it is white and dry all the way to the bone. Another way is to lift up the head and see if the backbone lifts off the meat below, or comes off the head.

Some people want to cook it just until it is done, so it will be juicy, but most people want to cook it much longer, so it is dried out and the meat has a tougher texture and the skin (with or without the scales) is crispy (or anywhere in between).

Some like best to eat the fish from the baking pan, on the table, hot or cold, with everyone pulling off what they want. That way, each person can eat their favorite parts, like the fat meat off the fins and tail, the head, skin, belly. Otherwise, these parts of the fish may be thrown away.

Other times people prepare the fish for the table ahead of time like this:

- Peel off the top layer of skin/scales and set it aside. Someone may want to eat the crispy skin, otherwise put it in the dog pot.
- Lift off the top layer of meat and set it on a serving plate. Most of the bones will stay behind, check to see if you may have to remove some along the back.
- Lift off the head, and backbone, with the guts inside the rib bones. When done well, they will all lift off together along with the tail to be set aside.
- The eggs are delicious and go on the serving plate.
- The stomach is also a favorite but may need to be cleaned.
- The liver is good after you take out the bile and remove the area around the bile, possibly including some of the meat below it. (The old timers ate some bile anyway; it won't hurt you.)
- Then lift the bottom side of meat onto the serving plate.

You can tell if all the bones are out of it by looking at the bones that came off.

Figure IV-6 showing the cross-sections helps visualize where to locate all the bones as follows: The backbone is obvious, connecting the head and tail. The row of ribs along the first two thirds of the backbone are continuous, so if some are missing you can find them still in the meat part. Bones associated with each fin are separate. The hardest bones to get out are the row of small bones quartering up and out from the backbone all along above where the ribs go down. By

noticing how many of these little bones remain on the skeleton you have pulled off of each side of meat, you can easily locate and remove those left in the meat.

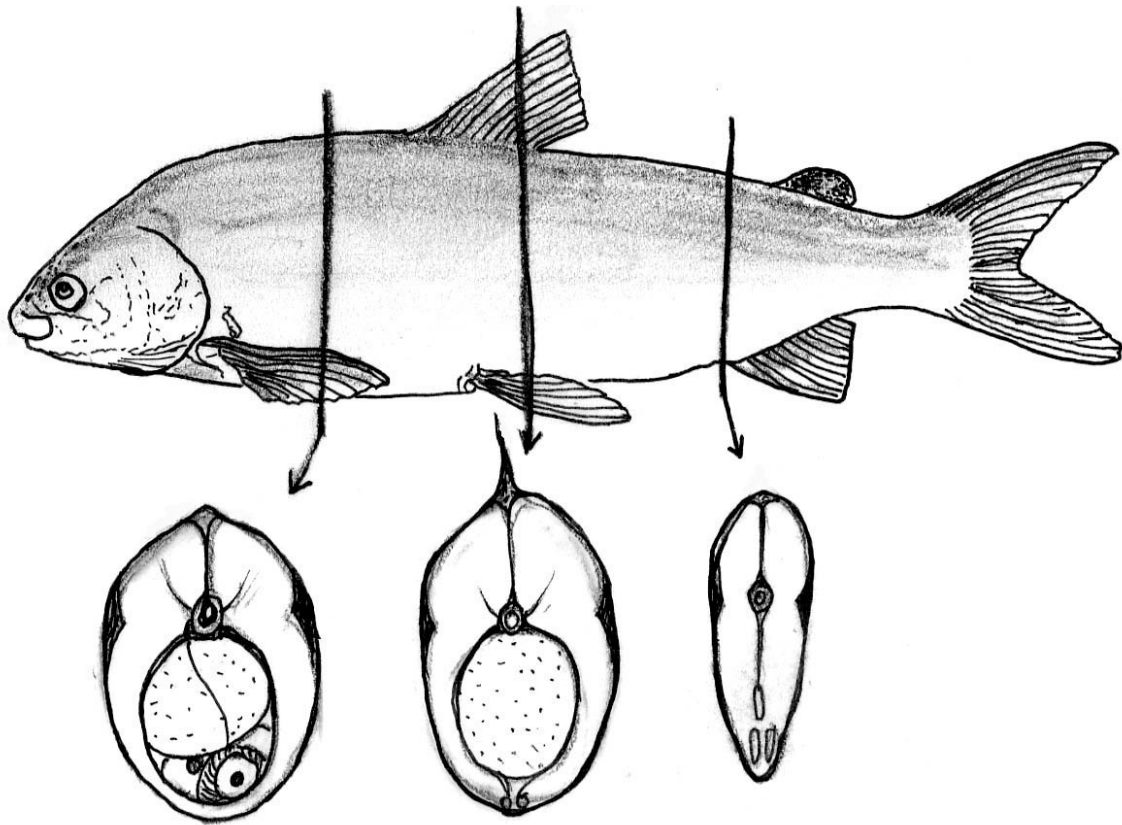


Figure IV-6.

Eat hot, or later cold, with oil, or use in other recipes, (*akutuq*, fish salad, casserole, fish cakes).

There are three ways you can mess up this recipe:

- Bake it on too low a fire so it rots instead of cooks,
- Take it out too soon so it is partly raw, or
- Leave it in so long and hot that it burns.

In between these extremes you can't go wrong with the any possible variations.

Figure IV-7 shows a typical main dish, a tray of baked broad whitefish. In this picture it has been partially eaten and the remainder will probably be eaten cold as a snack or for the next meal.



Figure IV-7.

Boiled fish, *Igaapiaq*

See **Humpback whitefish, *Qaalgiq***.

Eggs, *Suvaich*

See **Humpback whitefish, *Qaalgiq***, Raft story.

Boiled fish eggs and stomachs, and blubber, pickled in cranberries and rhubarb, *Kinutuk*

This is a variation of the *tinutchialik* made after breakup with fresh fish. *Kinutuk* is made before breakup in the springtime with fish caught the preceding fall under the ice, and stored frozen all winter. As these fish thaw out with warm weather, they are cut to hang so they will dry up for *paniqtuq* for people or the dogs. As they are cut, the stomachs and eggs are saved, (but not the livers or intestines) to prepare for *kinutuk* as follows:

- Boil stomachs and eggs in plenty of water.
- Drain the water off into the dog pot, and cool the stomachs and eggs.
- Bring cranberries to a brief boil in a little water, and cool.
- Cut old blubber into one-inch sections.
- Boil the blubber until it is barely as soft as you want it.
- Drain the water off, and cool.

If the blubber is not strong, especially if it is fresh, you can save some cooking time by boiling it with the stomachs then adding the eggs to cook at the end.

- Mix the cooled cranberries, stomachs, eggs, and blubber together.
- Mix in cooked wild rhubarb that has been stored all winter.
- Let this stay in a cool place for two to six days to pickle.

Some people include fresh fish meat in this. It gets better with time because it pickles further each day, giving it a subtly different taste each time it is eaten. However, it can become over pickled, so enjoy it and finish it off. When this recipe is made, in the early spring, the fresh rhubarb has not begun to grow. Although all the proportions are variable, depending on what one has to use and what one likes, at least half or more of the total amount must be the rhubarb/cranberry mixture. This is important because there must be enough acid to properly pickle the fish parts.

Stomach, eggs, and liver in rhubarb, *Tijutchialik*

This is a good food for June when the rhubarb is growing and the first fresh fish are caught.

- While cleaning the fish, remove and discard the gall bladder from the liver, and save the liver along with the eggs and stomachs.
- Boil in a little water until the stomachs are cooked, then lift them all out to cool.
- Fill that same water up with wild rhubarb that has been cleaned and chopped.
- Boil until it turns to mush.
- Cool, then mix in the stomachs, livers, and eggs. There should be as much or more rhubarb as total amount of fish, to be sure the fish gets pickled from the acid.
- Eat right away with fish oil or seal oil, and sugar. However, by waiting to eat this, it gets even better.

Actually, the rhubarb pickles the fish, improving the flavor and texture for several days, but becomes over-pickled if left too long.

- Keep *tijutchialik* in the refrigerator or *siglauq*.

There are many variations to this basic recipe, like sometimes fish meat is also included to become pickled. *Tijutchialik* is good with any whitefish, shee, or pike, the fatter the better.

Fish oil, *Qaluum uqsruq*

Oil made from *qausiluk* guts is mild and good. (See **Sheefish, sii** for directions.) It is used like lard in hotcake batter, or as butter on top, or as seal oil with *paniqtuq* and other foods. Most people never use it in *akutuq* because it gives it a fishy taste. However, if there is no seal oil, fish oil would be fine with lots of fluffed up fish meat. (See *akutuq* recipe in **Sheefish, sii**.)

Dried fish, *Paniqtuq*

Qausriluk make excellent *paniqtuq*. When these fish are caught and rinsed in fresh water, they have the very best taste and texture, if eaten freshly dried in good drying temperatures, before the oils become the least bit rancid. The freshwater rinse gives them a different flavor and texture from those fish rinsed in salt water. Figure IV-8 shows Dora and Jacob Johnson's whitefish freshly cut and hanging in Ambler.

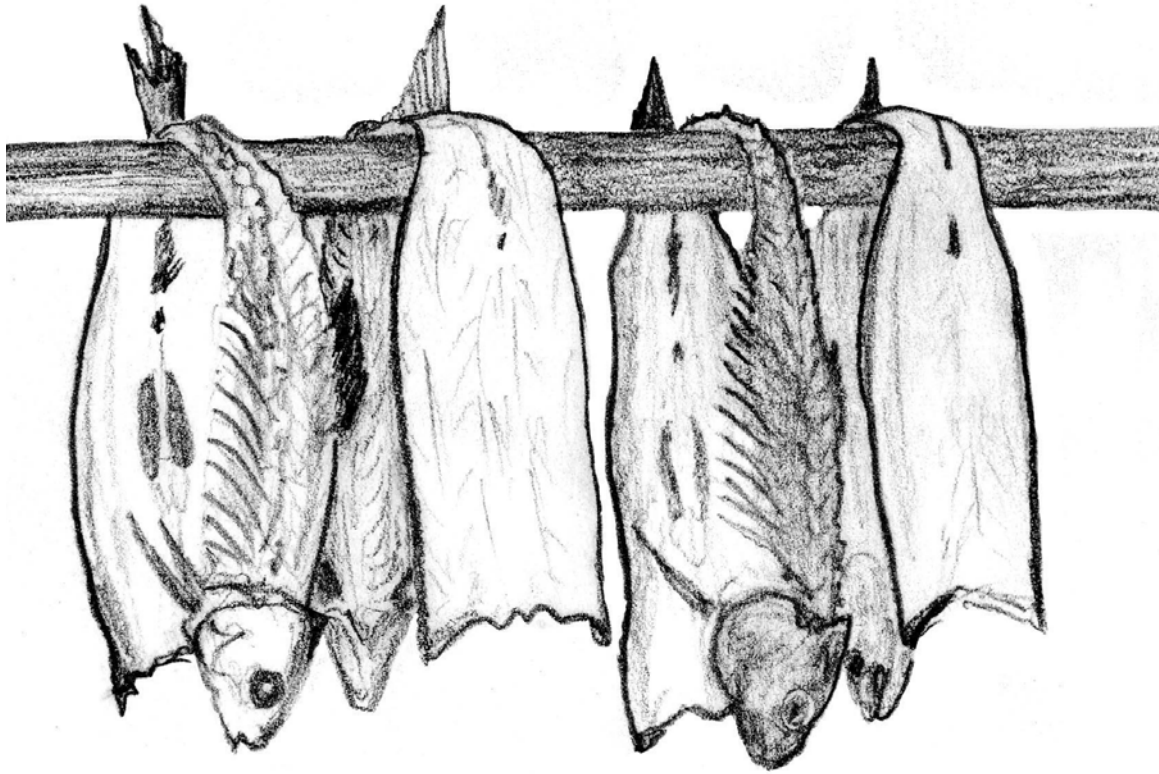


Figure IV-8.

Cut to hang like this:

Figure IV-6 of three cross-sections of a broad whitefish shows the relative placement of the bones and inside organs to help locate them when cleaning and eating the fish. (See **Baked**, above.)

Figure IV-9 shows broad whitefish hanging in Selawik during August. Notice that some have a yellow-brown appearance from oxidized oils, which is more common when fish are hung in hot weather.



Figure IV-9.

Half-dried then boiled, *lyamaagluk*

See **Humpback whitefish.**

Figure IV-10 shows how poles are cut with natural crotches that hook together to make the tripods that support about five poles of the traditional drying racks. However, any way of hanging fish so they are exposed to air and breezes while protected from sun and rain will work.

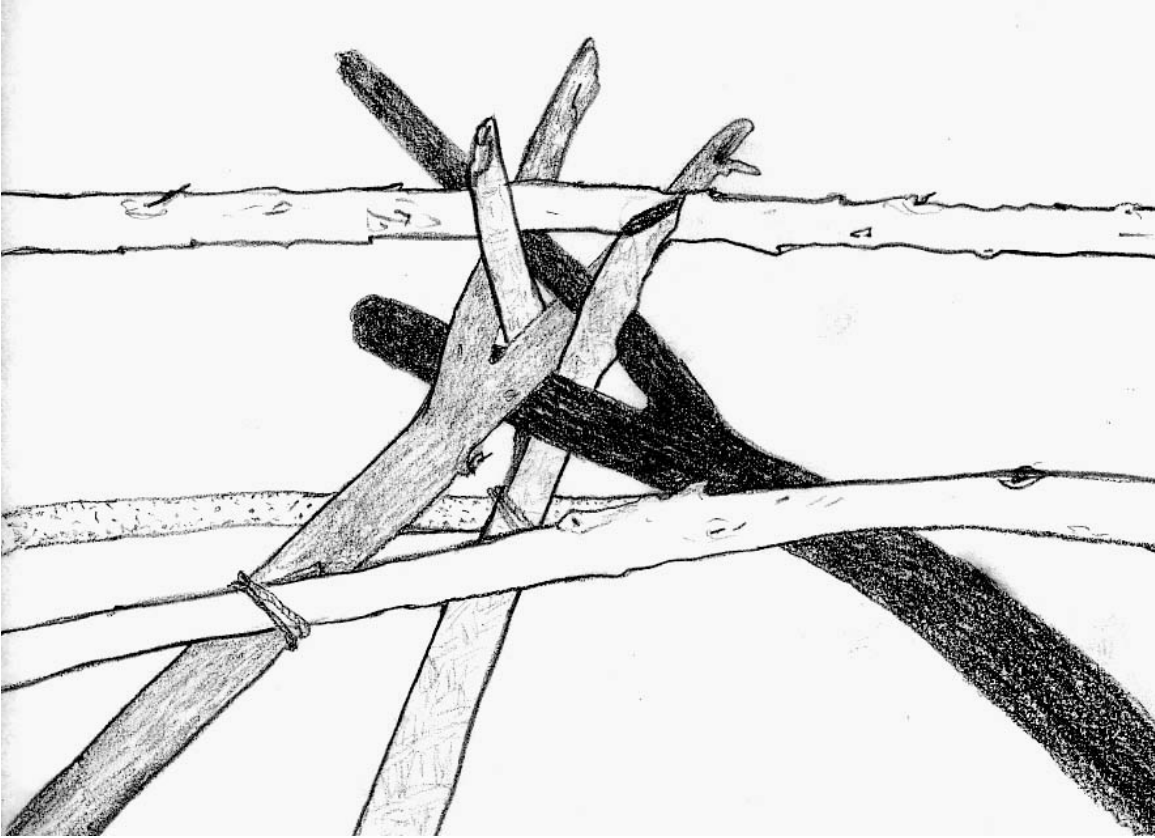


Figure IV-10.

Half-dried, roasted fish, *Qairuk iyamaagfuk*

- This is a much easier, faster way to roast fish over an open fire (today, to grill it).
- Take a fish off the drying rack that was cut one, two, or three days ago.
- Poke a forked stick through it, and prop the stick securely in the ground over a fire (lay on a grill over coals) and roast it slowly. The half-dry fish is much thinner so it cooks faster and is tougher so it is easier to hold on the stick.

Fish are easiest to roast this way. They are easy to transport, they cook rapidly, and they are easy to eat and share when out camping, berry-picking, hunting, etc., as is shown in Figure IV-11, where a half-dry whitefish is roasting over a quick campfire.



Figure IV-11.

String-of-eight whitefish, *Uyurat*

Half the fish are hanging one way and half the other, so when they hang on a rack, both sides hang down, with the skins out to protect them from weather.

Uyurat are also a convenient way to keep them from blowing off the drying rack, to maximize drying rack space, to store them, and to sell them.

- Cut and hang fish flesh side up.
- Turn them over the next day.
- On the third day, make them into strings while they are still moist (dry fish can't be made into strings). Hanging the fish in strings will allow them to continue to dry.

See **Humpback whitefish, *Qaalgiq*** for more details.

Dried in autumn with the large egg sacks left inside, *Amatchiaq* (Kobuk R.), *Suvalik* (Coastal)

These fish are cut a different way to hold the eggs, which ferment as they dry, making a delicious dried fish (*paniqtuq*). They are only cut this way after the flies are gone in the cool fall weather, when the eggs sacks are large and nearly ready to spawn. The fish are not eating then, so most of the gut cavity is filled with the eggs, plus the liver and empty intestines. If they freeze before they completely dry, both the fish and the eggs can be eaten as a *quaq*.

There are several different ways to cut and hang *amatchiaq*:

- 1) Leave the head on the belly. Then one side hangs too heavily because the backbone has all the eggs with, it as well as the head.
- 2) Leave the head on the meat, and it balances better.
- 3) Cut the head off. Cut it right behind the gill covers so the body cavity is still intact and the eggs won't fall out. This way the meat almost balances the belly/backbone.

- 4) Also cut off the head as in 3), but leave some of the flesh still attached at the head end so it makes a closed loop and it can't fall off the rack even if the wind blows it around, as is common in autumn. Then it doesn't matter how it balances.

To cut *amatchiaq* properly, do not make any hole into the body cavity as you cut the fish, otherwise mold, or fly larvae may develop. In either case, the rest of the eggs and dry fish will still be good to eat after cutting off the part touched by mold or maggots.

Fish skin, *Amigaatchiaq*

After eating the dried fish off of the skin, roast the skin over a fire, carefully turning it to roast it evenly. It makes a delicious crispy cracker.

Ice fishing

Huge numbers of broad whitefish are gill-netted under the ice during October and November all along the Kobuk River, and also in the Selawik River. This produced a supply of fresh-frozen fish to cook or dog-feed all winter, and any left over could be dried up in the springtime. Figure IV-12 shows Jacob Johnson ice fishing by Ambler during the 1960s.



Figure IV-12. Unknown person, Jacob Johnson, Ambler, ca. 1970.

As the fish are taken out of the net, they freeze, to be stacked on the ice as in Figure IV-13. They are next hauled home by sled to a more permanent place where birds and animals can't eat them, like a large wood box on legs or inside a fish cache.



Figure IV-13.

The Quick Food while ice fishing:

- Take a fat female fish out of the net.
- Hold it firmly, upsidedown.
- Squeeze out a stream of eggs.
- Catch them in your mouth held a few inches away from the fish.

The eggs come out easily since the fish are actively spawning at this time, and provide instant, healthy, satisfying, and tasty nourishment to the hard-working fisherfolk as well as their children playing amongst the activity. Figure IV-14 shows a happy child enjoying a healthy meal while her parents check the net.



Figure IV-14. Cindy Williams, Ambler, ca. 1967.

Fish egg ice cream on the ice, Ugni

- This treat is made and eaten while out ice fishing.
- Squeeze eggs onto clean, smooth ice.
- Mash with another piece of ice.
- Mash, and mix, and stir.
- Mix in a little fresh snow.
- The snow volume is less than the eggs, half or less.
- The best is a quarter snow.
- Old snow is no good.
- Use ice shavings if there is no snow.
- Mix well, the longer the better.
- It gets white and a little frothy.
- It makes a good tasting ice cream.

Frozen Fish, *Quaq*

Qausiluk are excellent to eat while they are frozen, with seal oil. Just be certain to wait at least two weeks after they freeze hard before eating fresh fish as *quaq*. This destroys any possible parasite eggs and cysts. (See **Sheefish, Sii** for more details about frozen fish.) Old timers prefer their *quaq* with a range of different degrees of fermentation, especially when eating a lot of *quaq*, but those less experienced in eating *quaq* may prefer these fresh-frozen fish which have a creamy smooth texture and bland to barely sweet taste.

Any fish left over as spring approaches, that haven't been eaten by either dogs or people, or given away, are then cut to dry as they thaw out. They cut best while some ice is still in the flesh, although most of the fish is thawed, yet cold. Leave the scales on. The insides are for dog food, although the eggs and stomachs can be saved if they are in good condition and boiled to use in several recipes. They also are good *uilaaq*. When taken good care of, these fish make fine *paniqtuq* that have a different taste and texture from the same fish dried in the summer or fall. Any that aren't perfect for people make dog food. Figure IV-15 shows a rack full of these fish drying in the early spring, as the snow is beginning to melt.



Figure IV-15.

Fermented fish, *Tipliaqtaa*

Somehow, when whitefish and sheefish ferment, they are not nearly as likely to cause digestive upsets, as are trout and salmon. You can hang whitefish for several days, and if they begin to sour, put them into oil to keep and you have slightly sour, medium soft, dried fish in oil (*paugmiutaq*). Thus, you have more leeway in time and somewhat in temperature when fermenting whitefish.

They are excellent *tipliaqtaa*, either slightly fermented, continuing on to become very strong. For the best *tipliaqtaa quaq* put the freshly caught fish into sacks to age, and turn

them over every day. This lets the juices that might drip out, drip back into the sack to keep the fish moist longer, as well as to keep air out from between the fish, and to let them all ferment evenly. They also ferment well when laid on the ground and covered with grass, or placed in a wooden box built up in the air on poles so the dogs and animals won't chew them.

Fermented, frozen, thawed fish, *Uiġaaq*

The following quote was while eating a giant, *uiġaaq* whitefish, with Dora Johnson in Ambler. It had fermented before freeze-up, been frozen all winter, and now was completely thawed yet still cold. She had just dug it out from under the snow and was happy to introduce the investigator to this gourmet food. Eating this fish was a memorable experience because it was so delicious, with indescribably rich flavors and a smooth, pleasant texture. The best part of eating *tipliġtaaq uiġaaq*, is how good it feels in your stomach, a light, energized feeling from the many good enzymes that help digestion.

“Fat ones are best. Let them stay on the ground, in the ground, after they are caught, ones that are caught before freeze up. This one had two weeks to get flavor. Keep it covered all winter, covered with snow, so the scales never dry and can come off easily. The skin is good to eat along with the meat. It is the only part we need an ulu to cut. The rest we just eat with our fingers, just pull it off the bones. If the skin looks dried anywhere, watch out. Maybe it got too hot from the sun, maybe not covered right. Maybe we eat it anyway, we have to remember how we kept this fish all winter. Maybe it just got dried by cold air. Then it's all right.”

Figure IV-16 shows broad whitefish *uiġaaq* being eaten.



Figure IV-16.

Half-dry/frozen, *Quaq iyamaagluk*

Agnes Smith from Kiana had whitefish, caught in autumn under the ice, that were starting to thaw out in the early spring. She scaled them, cut off the heads, cleaned out their bellies, tied two fish together by their tails, and hung them up to dry. There was a whole rack full. The belly flaps became *paniqtuq* and there was a tacky layer underneath the skin, while the rest was aged, half-dry meat. Before the weather became warm, she froze them for *quaq* in the freezer. It made a unique and different meal that was excellent, as *quaq*, boiled as *iyamaagluk*, and as *uilaaq*, too.

Only prepare fish this way in early spring (perhaps in March and April) with cool windy weather. Hang them under good shade, since during most of April the sun can get hot, even before the snow is gone, and could cook the meat where it is thick inside the skin.

A Selawik resident shared their version of dried fish/ frozen fish:

*“In Selawik we dry these whitefish in October and November, while we are ice fishing. We take them out of our net, take them home where it is warm inside, leave the scales on and cut them to hang outside to freeze dry. They dry very slowly, and each day that we want some we take them down to eat as *quaq/paniqtuq*. After awhile, we take them all down and store them in our cache as we keep using them. We boil or bake them too. We use them up before warm weather, but if we didn’t, we would store them in our freezer because they aren’t really dried all the way.”*

Oil, Salt, Pickle,

The big fat *qausriluk* could probably be preserved in all of these ways, although people seldom do, perhaps because trout, salmon, and herring are better fish to salt and pickle. Along the coast, some *qausiluk* are dried and put down in oil, and in Kivalina people also smoke the whitefish.

Some *qausriluk* are extra large, called *siyuifaq*. These salmon-sized *qausriluk* are found in the Noatak River and delta sloughs as well as in Selawik. There also is a lake out from Noatak a ways with extra big *suilik* and *tittaalik* as well as these *siyuifaq*. They are real fat and full of eggs in autumn, making them exceptionally delicious. The occasional *siyuifaq*, caught in the Kobuk, is thinner than those in the Noatak. Figure IV-17 shows one of those extra large fish caught in the Kobuk River near Ambler village. It doesn’t even fit on a standard 15-inch baking tray.

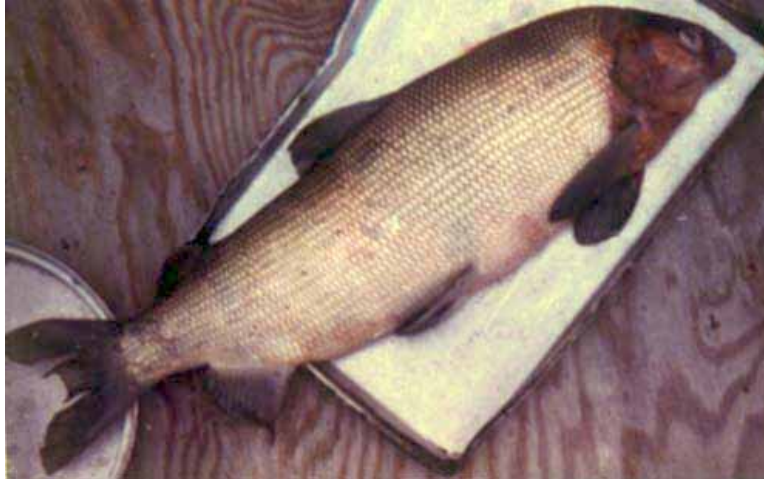


Figure IV-17.

Mark and Olive Cleveland, from Ambler talk about using fish broth to tan caribou skins:

“We take dried whitefish with some eggs, head, backbone, meat, and boil it all up together. When cool, we use the water to wet the heavy bull caribou skin to tan for socks. Don’t use straight eggs; it would make the socks so slippery you couldn’t stand up”.

Round Whitefish

Quptik (Kobuk)

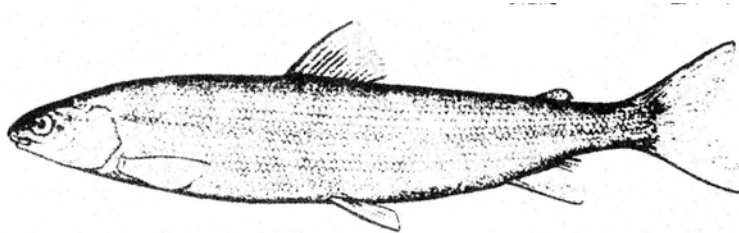
Savaigutnik (Noatak)

Prosipium cylindraceum



Description

- Round whitefish are brown to bronze on their back with silvery sides and a white belly.
- Juveniles have parr marks (the only whitefish of the study area that does).
- Their small, sub-terminal mouth has the upper jaw overhanging their lower jaw and a narrow, pointed snout.
- Round in cross-section, they have a flat top. Actually, it is square on top.
- Their scales are cycloid, medium large with nuptial tubercles prominent on the sides of breeding males.



The round whitefish averages about one pound (0.45kg) and some may reach three pounds (1.35kg). They reach 16" in length (40.6cm) and the maximum length was 20" (50.8cm), although 12" would be average. They live about 16 years.

Seasonal Feeding and Spawning Movements

This is a strictly freshwater whitefish that lives in the lakes and streams of interior Alaska, including the Noatak, Kobuk and Selawik Rivers. They are found more in the upper reaches of these rivers, and only occasionally get further down. Round whitefish are bottom feeders, eating insect larvae, especially *Diptera* and *Tricoptera*, adult *Tricoptera*, *Daphnia*, fish eggs, mollusks, and small fish. They have a reputation for eating rotting salmon, and when they are feeding on the dying salmon, they taste especially bad.

Except for spawning, they don't seem to migrate. The round whitefish spawns in late September–October, having reached sexual maturity at 6 to 8 years of age. During spawning they have a distinctive orange color, and are locally known as 'orange whitefish'. They have an extra-tough skin along the sides but thin skin along the top where the skin is usually the thickest on a whitefish. A few are caught by seine around Ambler in autumn, but a great many are caught up the Ambler River in late fall where they are spawning. Sometimes that was almost all that was caught in a seine.

Harvest

Round whitefish are caught mostly by seining and in gill nets along with other whitefish. Figure IV-18 shows a round whitefish caught in a seine near Ambler Village in late fall.



Figure IV-18.

Use / Recipes

Round whitefish are exceptionally fat, hence they make good frozen fish, *qauq*. They are never dried. This fish can go for 8 to 9 months without eating and live from its stored fat. This means that it would taste its best when it was the fattest, and if caught when it hadn't eaten for a long time, it probably wouldn't be desirable food. Since it is the fattest just before spawning, in autumn, it is then at its best for eating. Fortunately, this is about the only time people catch this fish, but, unfortunately, that is also just when it may be eating rotten salmon.

Minnie Gray of Ambler shares her opinion of round whitefish:

*"We can't eat the fish because it has a bad smell. We can eat the eggs, and we can eat the fish as *quaq*. It smells like *nuna*, like the land."*

Frozen, *Quaq*

This fish must be stored separately. It will spoil the fish near it in the *quaq* sack or pile. This fish makes good *quaq* for people all right, but it is just different somehow. When taking round whitefish out of a net or when seining, be certain to put all of them together in one sack that is only for round whitefish, and store them that way.

Mudshark

Tittaaliq

Tiktaaliq (Kiana, Selawik)

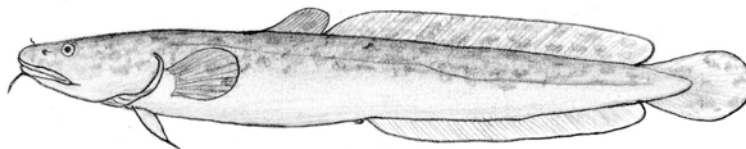
Tittaliq (Deering)

Lota lota



Description

- Mudshark colors are yellow, to brown, to dark olive green on top and sides, with dark brown or black mottling. They are pale yellow to white on the bottom.
- Their color varies a bit in different environments.
- Their second dorsal fin is six times as long as the first dorsal fin.
- Their minute scales are embedded in their skin, so they appear as slimy and scale-less.
- They have a long, wide, flattened head.
- Their large jaws have many tiny teeth.
- They have a prominent, single, barbel under their chin.
- Their mouth is terminal.



Mudshark can weigh up to 22 pounds (10kg), with the record being 75 pounds (34kg) set in 1886, Alaska. The average length caught is around 24" to 30" (30.5cm to 76cm) and that record (1886) fish was 59" (152.4cm). They mature sexually at 6 to 7 years and can live up to 15 years, and occasionally to 24 years.

Seasonal Feeding and Spawning Movements

Mudshark are freshwater fish found all over our area, Alaska, and circumpolar.

They are generally sedentary, living in deep water, but they move into shallow waters to feed and to spawn. In late fall they begin working their way up the rivers beneath the ice to spawn, feeding as they go, and taking their time. They spawn over a period of months starting

around December–January up the rivers, through to March down in the delta and lower rivers. Their pale yellow eggs are around .07 cm.

Mudshark eat any fish that is lively, such as small whitefish up the rivers, and herring, and smelt in the coastal delta. They hang out on the bottom as they move upstream and let those little fish swim into their mouths, as well as go after them. They use smell, or perhaps vibrations, to locate their food instead of sight because they feed on the bottom of the rivers in the night. The small projection called a barbell that hangs down under their chin is covered with taste buds. They also eat insects, mollusks, fish eggs, even mice or birds, and their own young.

Harvest

Mudshark are caught occasionally by gill net all over the region, but in quantity all winter in large traps set under the ice. Figure IV-19 shows the throat part of a mudshark trap.



Figure IV-19.

During their spawning migration, they can be caught anywhere along the whole river in traps, by jigging through the fall ice, or on set hooks beneath the fall ice. In February and March they come back down river more quickly with the current, but can still be caught because they play around and feed in the eddies. Figure IV-20 shows how to bait a piece of fish for a mudshark setline under the ice.

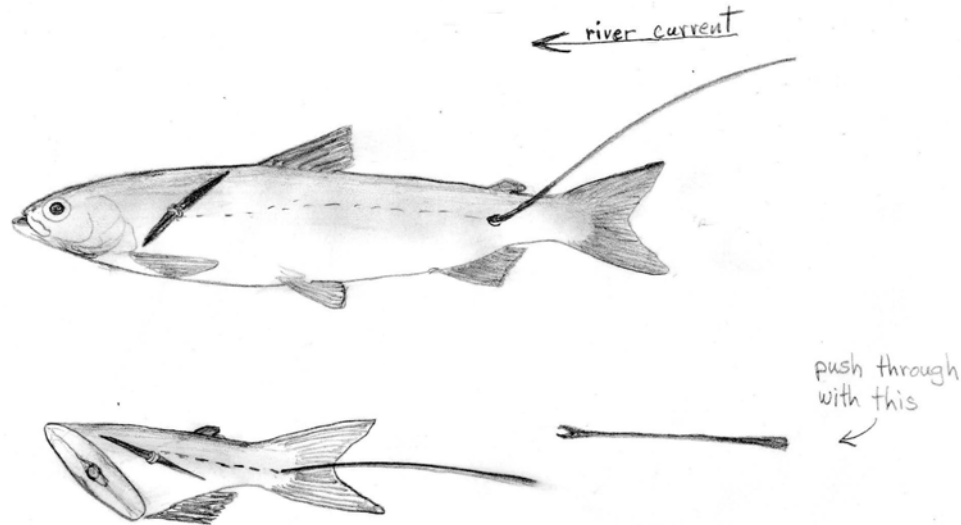


Figure IV-20.

Use / Recipes

Mudshark are a freshwater cod, and like all cod they store fat in their liver and not in their lean, firm, white flesh. Of all our fish, they have the firmest texture, even when boiled. The way the meat separates, in big chips (flakes), it resembles scallops more than fish. Every way the meat is cooked, it is good. They have few bones, and what they have are mostly large and easily removed.

Mudshark are one of the few fish that are not eaten raw: it should be well cooked to destroy any parasites. Although most fish parasites go unnoticed, along with the problems they cause, there have been parasites of medical importance found in some people along the Kobuk River, that were attributed to eating mudshark too rare. This can easily be avoided by cooking all mudshark well done. When eating it as *quaq*, be sure that it has first been frozen, at 0°F, for at least two weeks, which should kill any parasite eggs, cysts, and larvae.

Older *lñupiat* from up the rivers will tell you:

“Traditionally, we took the insides out of a tittaalik, cut the whole fish up, including the skin, fins and head, and boiled it along with the eggs and liver. We grew up eating those fish, and we learned to love that distinctive taste. Sometimes, we yearn for it yet.”

However, for those who didn’t grow up eating *tittaalik*, that taste and smell may be strong and disagreeable, bad enough to not even want to eat the fish.

Although every type of fish has its own unique smell, this extra strong mudshark smell comes mostly from the intestines and the skin.

Therefore, to have the mildest tasting fish:

- Clean it as soon as it is caught. Get the guts out as fast as possible before the strong digestive juices flavor the meat.

- Skin it. Cut the skin along each side of the backbone, around the head and down the belly.
- With pliers pinching the skin by the head, pull it off from each side.
- Cut off the belly meat.
- Bone out the back and tail meat.
- Rinse well.
- Chill.
- If all that isn't enough to eliminate the strong smell, soak the meat in some salty water, then marinate.

Prepared these ways, mudshark is a mild, delicious fish, ready to use in any recipe, for anyone. However, for most people, just taking the insides out before cooking it is enough to make it good. If you aren't going to skin the fish, scraping off the slime will lessen the strong taste.

Boiled fish, *Igaapiaq*

This is the main way to eat these fish, all winter long and whenever they are caught.

- Take it home freshly caught.
- Take out the guts.
- Cut the whole fish into sections, about 3", including the head whole.
- Put the pieces into a roaster along with the eggs and liver (with gall removed).
- Cover with boiling water and boil until well done.
- Drain and eat with seal oil and/or a few extra livers from other mudshark.

Figure IV-21 shows cross-sections of a Mudshark, which help locate the bones in order to avoid them. The top section was sawed across the back of the head where you can see the tips of the gills and the tail of a fish that was swallowed still in the esophagus. The bottom section is cut further back and the fish in the stomach is cut closer to its middle.

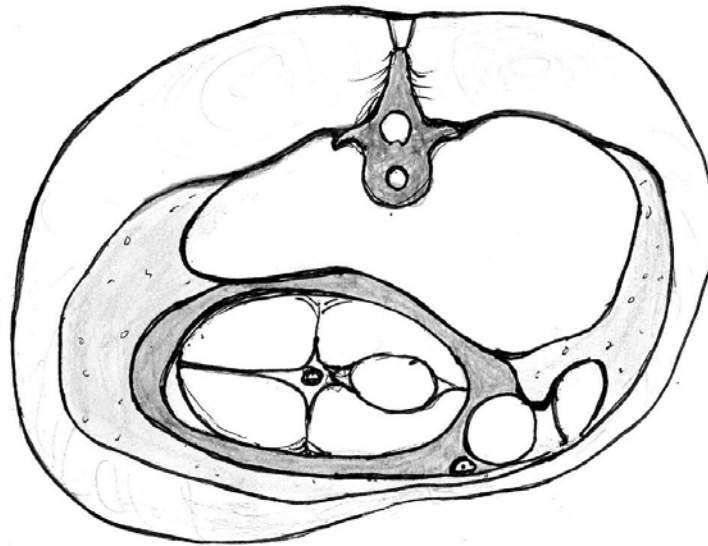
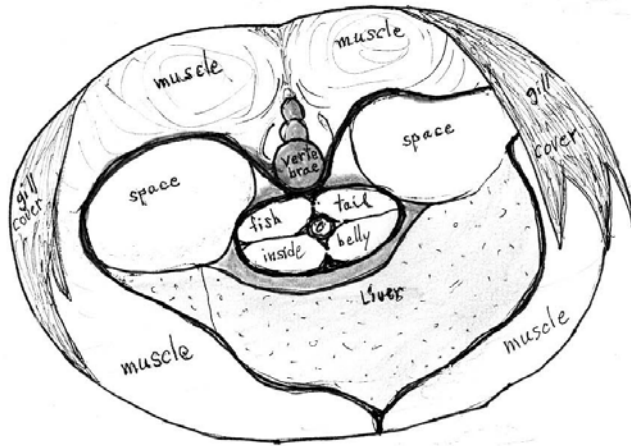


Figure IV-21.

Carpenter Fish.

This recipe is exactly the same as above, except with a frozen fish:

- Saw a frozen mudshark into 2" or 3" pieces, the whole fish.
- Take a hammer and knock out the insides.
- Knock the pieces of liver and eggs apart from the intestines.
- Put meat, liver, and eggs into a pot.
- Pour boiling water over and keep boiling until well done.
- Drain and eat with oil.

It is only called a carpenter fish because a saw and a hammer are used to prepare it for cooking. Figure IV-22 shows sections sawed from a frozen Mudshark, ready to knock the insides out. The eggs are a bright orange.



Figure IV-22.

Boiled, it is good both hot and cold. Ideally, you need two or three livers and sets of roe to go with the flesh of one fish—then you might eat less oil with it—but fish don't come that way, so you use what you have, always saving all the eggs and livers, and perhaps dog-feeding the extra meat. Of course, the dogs want the liver and eggs too, but they get good nutrition because they are continually fed all the guts and the rest of the parts people don't eat from all the other fish and animals.

Comments on a typical, late-winter/early spring meal up river:

“The smell slowly filled up the house, changing odors as last fall’s tittaaliq began to boil on the wood stove. At first it smelled like fresh caribou boiling and ended up with only an “old boiled fish smell.”

When they were well boiled and drained, we sat down to eat. That tittaalik smell was mild now, but still there. These fish had been stored through the winter—frozen, but with spring’s increasing warmth, they had warmed more each day, slightly ageing as the season progressed. During this process, the fish that never get much above freezing and keep away from the sun, are still good to eat.

The liver, of course, spoils and is thrown, but the eggs, and flesh remain edible. Although they may smell “off”, or “bad”, we can tell by their texture when they are still good to eat—a firm texture is O.K., but a mushy texture is not good. It was a good meal with seal oil and some raw onion, carrots and garlic.”

Baked mudshark, Argiq

Prepare the same as either of the above, from either fresh or frozen fish, except only cut as much off the tail as necessary to fit your oven pan, leaving the fish as whole as possible. Include as many eggs and livers as you have and bake until well done. It is easier to remove the bones from a whole fish than from fish that was cut into sections which cuts some bones into little pieces.

Once boiled or baked, the bones are easy to remove, leaving firm, white fish meat ready for many different recipes.

Flour soup, *Mukkaaligauraq*

- Clean and chop vegetables so they will all cook in about half an hour. Use whatever you want, or have, like onions, garlic, potatoes, carrots, celery, even dried vegetables and mushrooms.
- Clean and wash the mudshark, saving the liver and eggs.
- Take out the gall bladder and throw.
- Cut the fish into 2” steaks.
- Pour boiling water over the fish and vegetables.
- Boil for 25 minutes, or until it is well done.
- Slowly pour a mix of half flour and water in to the boiling pot as you gently stir, until it is as thick as you like.
- Add salt and pepper.
- Continue to gently stir the boiling soup for several more minutes to cook the flour.
- Then take off the heat and serve.

Liver, *Tijuk*

The best part of the mudshark is the large, creamy tan colored liver, mild tasting and very oily which is why it is good. The liver tastes delicious any way you fix it, and is extremely nutritious, not only in Vitamin A but also in Vitamin D, which is critical to health, growth and utilization of calcium. Vitamin D is the sunshine-vitamin made by our skin when the sun shines on it. However, during the long Arctic winter, when the sunshine gets weak, it is very important to get foods high in Vitamin D. As if in answer to this need, mudshark are available and delicious all winter just when their livers are most needed. However, today, people are less inclined to build traps to get these fish, even with all the modern conveniences of machinery to help—ice augers, sno-gos, chainsaws—which make building a trap so much easier than it used to be. It was the mudshark trap that made these fresh fish available all winter. (See **Ambler Village View** in Appendix for details of building a Mudshark trap.) Figure IV-23 shows a tub of mudsharks with the bellies cut open to remove the liver and eggs.



Figure IV-23.

Mudshark Salad, *Tijjiuk*

- Use livers, eggs, and stomachs from one or two mudshark. See Figure IV-23 above.
- Clean out the stomach and the caecum next to the stomach, by slitting it open and rinsing.
- Don't use the intestines.
- Take the gall bladder out of each liver, then, boil the livers, eggs and stomachs, until they are well done.
- Never use salt or sugar.
- Drain them and when cool enough to handle,
- Cut them up into small pieces, maybe half inch, maybe an inch, up to you.
- Now whip them up with your hand, which breaks up the eggs and mashes the liver to coat the other ingredients.
- Eat as a meal in itself, or along with any other meal.
If you don't finish it all right away, you can cover the dish, store in a cool place, and eat it tomorrow.

Liver and berries, *Tinniugaq*

Mudshark livers are good with any kind of berries .

This is the upriver version of *tijaulik*. (See trout)

- Boil the eggs, livers, and sometimes milt.
- Drain, cool, and chop them all into quarter-inch pieces.
- Mix with berries. (Cranberries and /or blueberries, or any combination of berries).

Variations of this recipe are made the same way but include boiled, chopped mudshark meat with the liver and eggs. If this is made without berries, it can be eaten hot as well as cold, but when berries are mixed in, it is usually eaten cold.

Eggs, *Suvaich*

Tittaaliq eggs are tiny. The egg sacks, and to a lesser extent the milt or sperm, are delicious any time of the year although they are small in the summer. By January, they are enormous sacks taking up most of the room in the belly. The egg sacks, filled with very tiny eggs, are so mild that when boiled, cooled and sliced they somewhat resemble the yolk of a hard-boiled chicken egg.

Dried fish, *Paniqtuq*

Mudshark are usually not dried, and when they are it may be just to save food from spoiling that will surely be good for dogs, but if they dry well, and people are hungry, then they, too, can eat them.

Half-dry fish, *Kaunjarauq*

This includes any fish that are cut and hung just at freeze-up. It's half dry, half raw *quaq*. Cook it well, or eat it frozen as *quaq* (ensure that it has been frozen at 0°F or colder for over two weeks). In the fall mudshark are dried for *iyamaaluk* by gutting, then hanging them up by their head and slashing the meat along each side.

Frozen fish, *Quaq*

Some people eat it this way, but lean fish aren't as good as fat fish.

They aren't aged for *tipliaqtaq quaq* because those delicious livers get rancid, and the strong taste and smell of their skin and guts gives the meat wierd flavors.

Since the skin has no scales, it is prone to drying out in the winter which lets the meat become old tasting faster than with other fish. As the winter wears on, these fish have an old taste when boiled up, and aren't nearly as good as when fresh. Then is the time to try eating *tittaaliq* as *quaq*. The meat next to the skin is half dried in texture and is a nice meal for a change, along with other *quaq* and *paniqtuq*, for those who are used to the strong taste of *tittaaliq*.

Hooking mudshark through the ice.

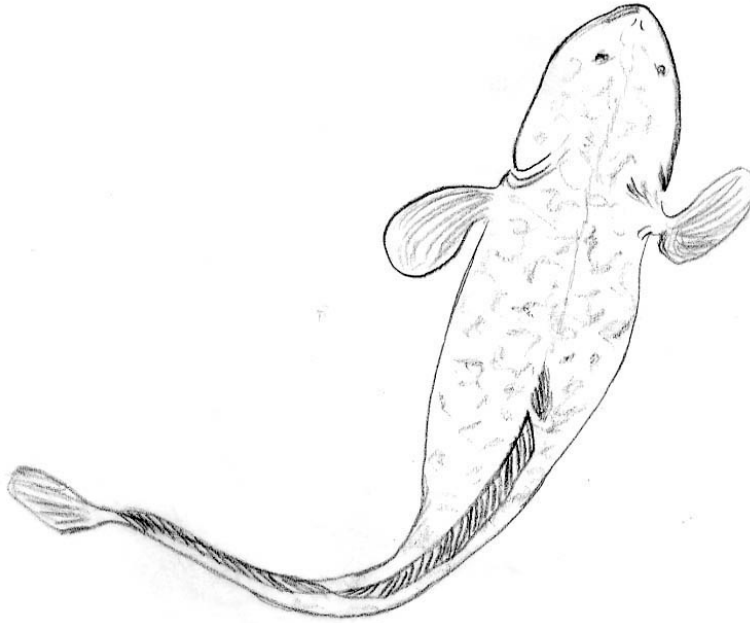


Figure IV-24.

A Noatak lady tells this story about when she was young:

“When I was a teenager, my family took me hooking up the Noatak River, above town. They woke me real early, long before daylight. I pulled on warm clothes because it would be cold riding in the sled behind the four-wheeler.

After making holes, we started jigging. I was still half asleep, sitting there on the ice, when a big tittaalik grabbed my hook. It startled me and I began pulling it up as fast as I could. It came up out of the hole, into the air, right at me, with its huge mouth wide open, looking terribly ugly and scary. I screamed, and ran to get away from it, but it followed me, and I screamed again, “Get that thing away from me!” and kept running.

People yelled at me, ‘Drop your niksik’, (hook and line), because I was pulling it after me as I ran! Man, that was so scary. I sure let people laugh at me!”

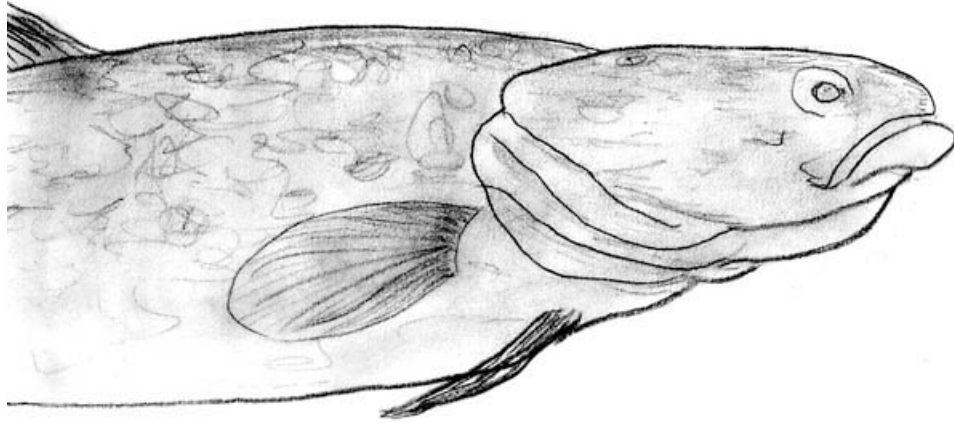
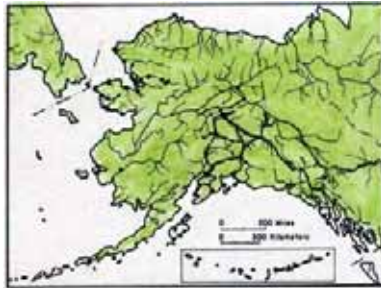


Figure IV-25.

Skin.

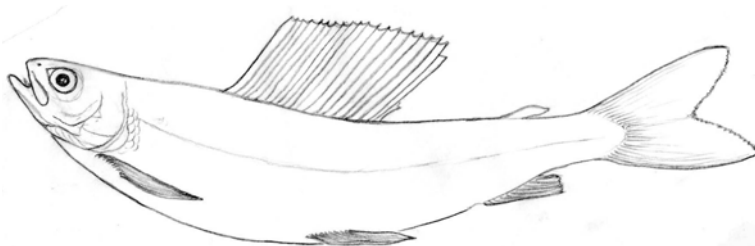
Some people cut the skin off each side of a mudshark and tan it to put around the top of mukluks. They cut a fringe for decoration.

Arctic Grayling
Suluqpaugaq
Thymallus arcticus



Description

- Grayling colors include black, blue, green, turquoise, pink, purple and silver.
- Their body is an iridescent violet grey and silver, sprinkled with small black spots.
- They have an enormous dorsal fin, brilliantly colored and speckled with spots, which can be a wide range of colors in different fish, ranging from light to dark. The sketch below, drawn from life, may depict a young fish, because its dorsal fin is not full size.
- Pelvic fins have distinct light streaks.
- Their scales are medium large, tough and firmly anchored.
- They have a small, terminal mouth, with small teeth on the top and bottom jaw and tongue.
- The grayling genera received the name *Thymallus*, because when they are fresh, they smell faintly like the herb Thyme.



Grayling weigh from one to three pounds (0.45 to 1.35kg) with the record almost 6 pounds (7.2kg), from Canada. They average 8” to 16” (20cm to 51cm) with that record fish measuring 29.6” (75.9 cm). They reach sexual maturity between three and eight years, and may live as long as 22 years.

Grayling are slow growing and are late to mature in colder areas, yet fast growing where there is good feed. The young of a year, described as “two eyeballs on a thread”, can reach 4” by the 1st of September.

Seasonal Feeding and Spawning Movements

Grayling travel a ways up river to their spawning areas, and spawn just after the ice goes out. Then they continue up side streams and into lakes for the summer. They return downstream in September to overwinter in deep areas. How an individual fish may move is complex and variable, some staying essentially in one area and others traveling up to 100 miles between spawning, feeding and overwintering areas each year, (information from other areas).

Almost their entire diet is insects, including the larvae, pupae, and adults. They also eat salmon eggs and fry, sticklebacks, and occasionally a water shrew. They are surface-feeders mostly, down to mid-depth, and only bottom feed when no other food is available. They thrive in clear, cold, unpolluted lakes and rivers of all sizes across Alaska, Canada, and Russia. The arctic grayling is well adapted to cold waters but is extremely sensitive to pollution and any disturbance of its environment.

They are found in all the freshwater areas of this region.

Harvest

Most grayling are hooked through the ice in fall time, with a single, barb-less hook so they can be pulled up and quickly flipped off. They also find nets (two to three inch size) set in their territory for other fish. They are quick to take wet or dry flies, nymphs, small spinning lures, and natural bait, including salmon and whitefish eggs. Figure IV-26 shows a grayling caught on a fly up the Squirrel River. (Photo courtesy of Lorrie and Nellie Schuerch of Kiana.) Figures IV-26 and IV-28 both illustrate the large dorsal fin so characteristic of adult grayling.



Figure IV-26.

Grayling are considered an emergency food by summer hunters walking the mountains because they can easily be taken with a small bait hook, even with a spear, or by hand, under certain situations.

Use / Recipes

Excellent, flaky white flesh, lightly oily. Grayling have a pleasant yet distinctive smell and taste, and a moderate amount of fine bones. They are most often eaten as *quaq*, both fresh and *tipliaqtaa*, and also dried and cooked in all the many ways.

Fried, *Siqaniqtaq*

- Scale the grayling as soon as it is caught.
- Cut down the belly and take out the guts.
- Save any eggs to cook with the meat.
- Cut off the head and tail, (or leave on.)
- Fry in fat or oil, with or without rolling in flour or cornmeal.

Boiled Grayling, *Igaapiaq*

Roast Grayling, *Argiq*

Roast gizzards, *Aqiagutchiaq*

Half-boiled, *Uipasalauq*

Fix these recipes the same as **Humpback whitefish**

Dried fish, *Paniqtuq*

These are excellent dried, being fairly lean usually, but they can get very fat under certain conditions, like up the Noatak River, for one. Grayling have a curious quality of drying up dark colored, looking as though they are rancid when they are perfectly good. Without understanding this aspect of grayling, one might throw out this excellent food. Usually scaled but sometimes not, they are cut and hung similar to the whitefish.

Frozen fish, *Quaq*

Grayling are most often eaten as *quaq*, especially as *tipliaqtaa quaq*, not strong, but with a definite taste. When frozen fresh, they are creamy smooth like ice cream with an excellent flavor. Their bright orange eggs are wonderful frozen even though they are small because they don't spawn until springtime.

When putting grayling away for *quaq*, they must be put into their own sack and not with other *quaq* fish, because their stomachs tend to become too strong more quickly than the stomachs of other fish, which would spoil the fish around them. Perhaps it is what is in their stomachs that changes how they ferment in a less desirable way.

Figure IV-27 shows Dora Johnson of Ambler, jigging for grayling through the ice of the fishing eddy. These fish freeze soon after being caught giving them a smooth texture and sweetish flavor when eaten as *quaq*.



Figure IV-27. Dora Johnson, Ambler, ca. 1970.

To eat *quaq* grayling:

- Go outside and pick out some frozen grayling, either big or small. (Or choose some from the freezer.)
- Chop off the head and tail outside on the chopping block with your axe. This also knocks off any snow or ice. Stand the fish up, nose end down, and shave the fins off, plus a thin strip of skin from the top and belly of the fish, cutting from tail to head. Then hold the fish belly down, and pound gently all along the top until both sides of meat pop loose from the backbone. This works best when it is hard frozen so the meat shatters into pieces and becomes easy to eat.
- Bring the pieces inside.
If you have no axe or block, let the grayling warm inside just barely enough so you can cut off the head and tail with your *ulu* or big knife on a cutting board. Shave a thin strip of skin off the top and bottom, and cut off the fins. Sometimes today, we rinse it quickly under the faucet.
- Lay it on some cardboard or a wooden cutting board. (A plastic plate will work.)
- Pull the shattered chips of meat off the skin and eat them with seal oil.

- If the fish meat wasn't shattered, peel the skin off each side. Use your teeth, if necessary, to pull the skin. You could use pliers to hold it instead of your teeth.
- Stand the fish on its head end, and with your knife or *ulu*, slice pieces of meat off both sides until the bones get in the way.
- Eat these frozen pieces with seal oil or any blubber, or fish oil. (Today we may use olive oil with soy sauce, and maybe carrots and onions.)
- Then chew more meat from the backbone (like eating corn off the cob), pulling the meat away from the bones with your teeth, leaving the rows of bones intact.

This is a perfect, instant meal, easy to prepare, to eat, and to clean up. It provides excellent nutrition, and best of all, it feels so good inside, giving fine energy and heat.

Although the larger grayling get caught in gill nets, and rod fishermen love their sport, the main way of catching grayling in northwest Alaska is with a hook and line, jigging through the ice. It's the 'thing to do' all during October and into November, all along the Kobuk, Noatak, Selawik, Buckland, Kivalina, and Wulik rivers during ice-fishing time. Figure IV-28 shows two of these grayling hooked through the fall ice in Ambler.



Figure IV-28.

An Ambler resident talks about hooking for grayling:

"We go out on the ice at dawn, to stand or sit, hooking grayling for several hours, watching the day unfold. Its peaceful there, hooking. This time gives us a way to keep in tune with the weather, how the ice is forming, what the birds and animals are doing, and time to think our own thoughts. When grayling are biting well, we bring them up one after the other, shake them off the single barb hook onto the ice where they twist and flop for a while before freezing into graceful shapes. Some people knock them on the head to quickly kill them, which causes their large, beautiful, dorsal fin to extend. Later we pile them up, perhaps a hundred or more from one morning, to haul later to the safety of the fish cache for winter quaq.

After awhile, perhaps when our fishing partner comes, or we get cold, we stop hooking, and chop out the whitefish net hole, to check the net. If we lie down on

the ice we can look into the cold, dark, green water and see dozens of grayling swimming around, eating whitefish eggs.

That's what they are feeding heavily on this time of year, so they gather where whitefish spawn, right here, where we have our nets set. As female whitefish struggle to get loose from the meshes, some of their eggs squirt out for grayling to swallow. Then more eggs squirt out as we untangle the big silvery whitefish from the slippery meshes. After checking our net and re-setting it, we hook for several more hours right in the net hole.

Often, we watch the grayling take our hook, and when they are too full to bite eggs or the best lure, we still watch them milling around, and slip a dip net down to keep pulling up more fish. Sometimes they are not biting and still so thick that we snag them with a weighted, three-barb hook. Since grayling are predatory on whitefish eggs, the custom of catching large numbers in the fall may help to keep the numbers of whitefish high."

Figures IV-29 and IV-30 are sketches of grayling.

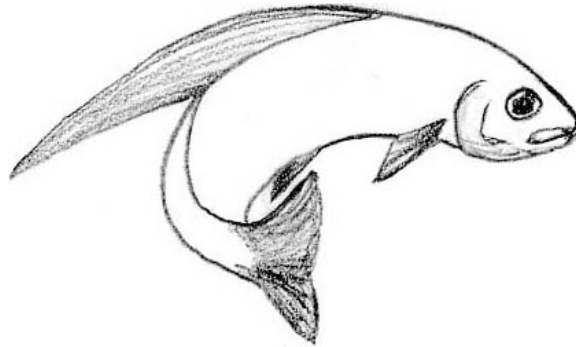


Figure IV-29.

Skin.

When scaled, their skins are good to eat the same as the whitefish, both when cooked and after the dried meat is eaten off, and they are roasted. For *quaq* we usually peel the skin off.

Medicine

To help a tooth ache, chew hard with the sore tooth on a dried piece of grayling dorsal fin. After doing this for a while, the pain goes away. At least a few grayling are dried each year so their dorsal fins are handy in case someone has a toothache.

Bob Uhl talks about grayling:

"Grayling are common in both the large and small mountain creeks of the Krusenstern area drained by the Tuqruq River. Several large sacks of grayling have been taken after freeze-up in a deep eddy on the smaller Kungauyaaq Canyon of the Tuqruq."

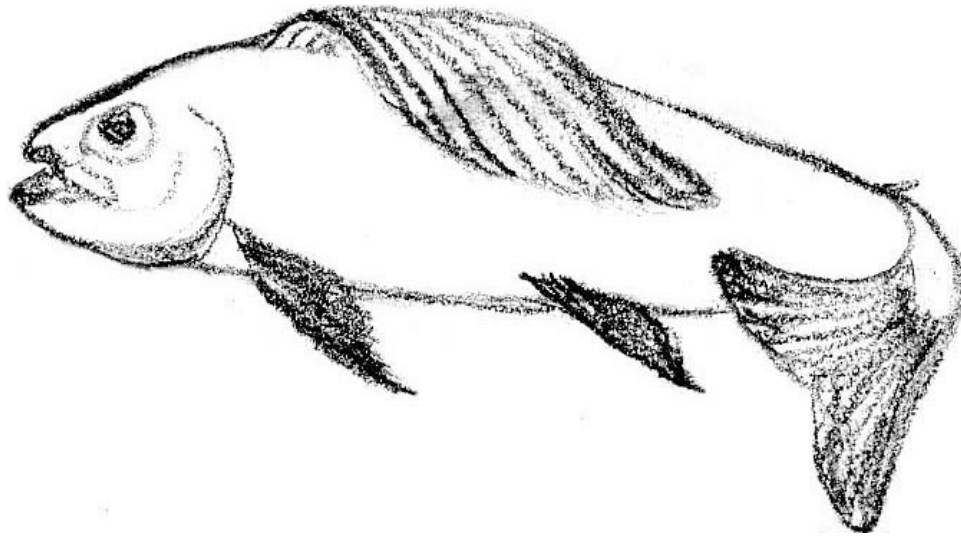


Figure IV-30.

Northern Pike

Siulik (Kivalina, Kobuk)

Siilik

Esox lucius



Description

- Pike have their back and sides colored dark grey to greenish to brown, with many irregular yellow spots arranged in lines along the sides.
- Their belly is creamy white.
- Their median fins are green, yellow, orange or red with dark blotches.
- They have many large, sharp canine teeth, even extending back by the gills.
- Their large, long, flattened snout is distinctive.

Pike average six to fifteen pounds (2.7 to 6.75kg) with a record from Circle, Alaska, of 45 pounds (20kg). They have been known reach 52" (133cm) in length, but are usually much shorter. They mature around three to four years and have been known to live as long as 21 years, although usually less.





Figure IV-31.

Seasonal Feeding and Spawning Movements

Pike are solitary and live in freshwater, in quiet, clear, vegetated lakes, pools, sloughs, streams and rivers. They overwinter in deep areas and migrate short distances upstream in the spring to shallow spawning areas with a vegetated bottom. Females carry their ripe eggs as well as immature eggs for next year at the same time. Young pike grow very rapidly some reaching 17” their first year, but more average growth would be 12” in three years. They require less food for maintenance than other fish, so more energy can go toward growth. They also can endure long periods of starvation because they use lipid and glycogen reserves, which conserve body protein.

Pike are voracious carnivores, eating everything that moves in the water. Any fish, bird, or animal small enough to get in their mouth will be eaten. They have been caught with young ducks, or muskrats in their stomach and partly sticking out of their mouth, because they were too big to swallow all the way down. After the first part digests, they finish swallowing the rest down.

Beware of their teeth! Never get your hand near their mouth.

Always hold a pike by sticking a thumb and finger into each eye-socket: that way you won’t get cut on their sharp teeth. Their eyes are their only good handle. Don’t hold them by the gills either, as you would any other fish, because you would get cut from teeth there, too. Apparently, these sharp teeth are deciduous and are constantly being replaced. Figure IV-32 shows a pike head.



Figure IV-32.

To hunt, they line themselves up with their prey, sneak forward, and when they are close enough, they make one mighty lunge and open their mouth just before they reach, so they suck their prey in as well as grab it. Then they turn it around and swallow it head-first.

Pike are the cleanest fish, with the least worms.

Harvest

Traditionally pike were caught in traps as well as by hook and line. Today, pike are caught by hook through the ice, on sports gear, and by gill nets.

Use / Recipes

Pike have delicious white, firm, flaky meat that is full bodied yet lean, because they store fat in their liver and intestines. They are good cooked well in all the ways, as dried fish (*paniqtuq*), and as fresh frozen (*quaq*). Although larger fish may be fatter, they never accumulate excessive amounts of fat like some of the whitefish, sheefish, salmon, and trout, which have longer spawning migrations.

Pike, being so aggressive, have thick, tough skin, with scales like armor that are hard to scrape off when fresh. Leave pike at least overnight before scaling and cutting them. In cool weather, people leave them a day or two before working them, because otherwise they are too tough. Wrap them in a wet gunnysack and leave them where they will be cool and stay wet. After they rest overnight, the scales come off more easily and the meat dries up softer. Because

they are difficult to scale, they are sometimes dried with their scales left on, but it is best to take scales off whenever possible. The fish dry better and faster without scales and then the skins can be toasted to eat, or used for sewing.

Fish roasted whole over the fire, *Qairuk*

- Leave the scales on and take the guts out.
- Cut a stick strong enough to hold the fish, about 4 feet long and sharpen both ends.
- Push the small end through the fish from the tail first, then along the back.
- Push the other end of the stick into the ground so the fish will be the right distance from the size of fire you have.
- Keep a small fire and cook it slowly but keep it cooking.
- Roast the sides first, then the back and cook the belly last.
- To tell if it is done, move the head back and forth carefully. If the backbone breaks off easily then it is done.
- Take the fish down; lay it on a board or platter.
- Peel the skin off and eat the meat.

This tastes better than roasted in tin foil, partly because of the smoke, but foil is another option:

- Wrap it in foil and lay it beside the fire.
- Turn gently until it feels done,
- or bury it under the coals,
- or roast it in the oven.

Boiled fish, *Igaapiaq*

Figure IV-33 shows pike that were hooked through the spring ice of Anewetut Lake, in the Kobuk Valley. Pike in the lower left have been scaled in preparation to being boiled. In this case, they were not let sit overnight before being scaled as is usually done because out in this early spring camp everything freezes at night which would make them even harder to scale.



Figure IV-33.

- Scale and rinse the pike.
- Cut off the head.
- Take all guts out, saving the liver and eggs.
- Remove the bile sack from the liver.
- Cut the fish into pieces, 2” to 4” long.
- Boil meat, liver and eggs until done.
- Drain and eat with oil.
- Drink the broth along with the meal.

The bile in the gall bladder of the pike liver is eaten as a digestive aid, and has been a good medicine for those with no appetite, who are weak, losing weight and feeling poorly. To use, boil fish and the liver without removing the gall bladder and then eat the bitter liver where the bile has spilled. Eat as much as you feel like you need along with the meat. Don't eat the bile on an empty stomach.

Minnie Gray explains this medicine:

“After I ate that, I start to get my appetite back and I started getting stronger.”

For several recipes, fish meat with the bones taken out is necessary, and the easiest way is to cook the fish as whole as possible, or in large pieces by boiling or baking. Then it is easier to pull the cooked meat off the bones by observing carefully where the bones are and removing them. The side bones of pike come off the vertebrae easily and they are forked, both of which make de-boning pike more challenging. See Figure IV-34, which shows three cross-sections through a pike and where the bones are.

Mash and squeeze the meat with your hands to further check for bones and remove them. Recipes that use meat prepared this way include: *akutuq*, *kinuŕuk*, and *qaataq qaluliq*.

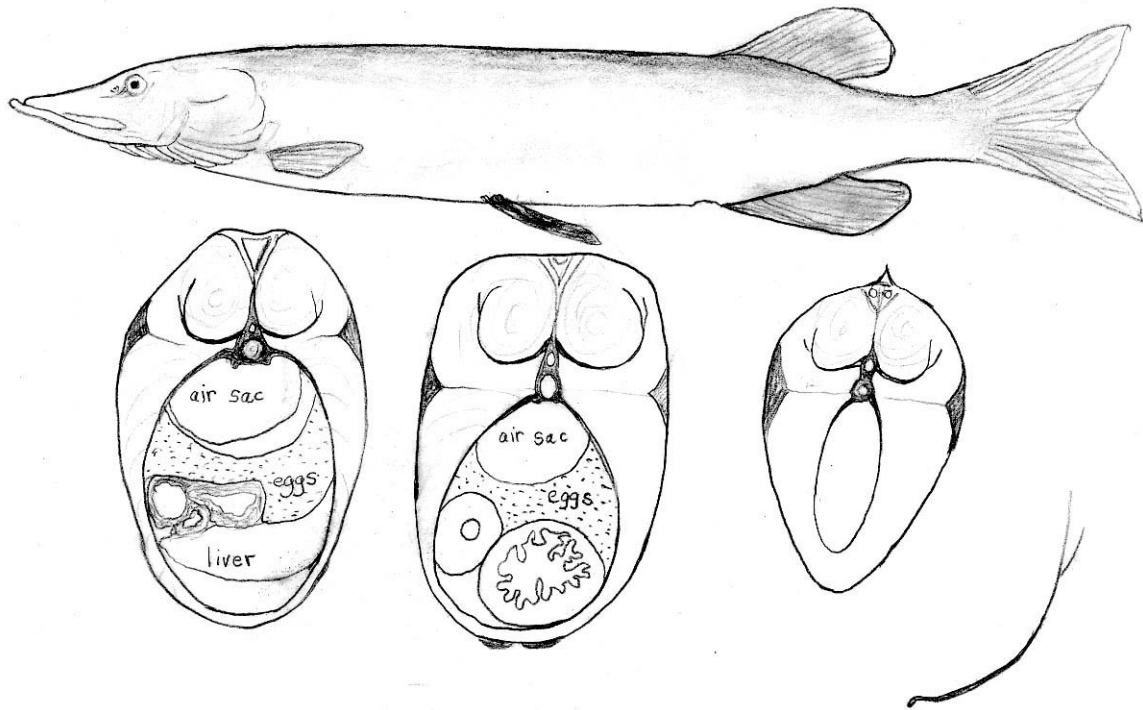


Figure IV-34.

Fried fish, *Siqaniqtaq*

Pike are excellent fried as steaks or fillets; just watch out for the bones.

Stomach salad, *Sililik*

Scale and clean the largest fresh pike.

- Save the eggs, and liver, take out the gall bladder.
- Save the stomach and intestines, and clean them out well by squeezing out the contents. If you want to be certain that they are clean, cut them open their whole length and rinse them out.
- Boil liver, eggs, stomach, intestines and fat from around the intestines, all together about 20 minutes or until well done.
- Drain right away so they can dry as the steam escapes.
- Cool, chop them up and mix all of it together, along with any oil skimmed off the top of the broth.
- Eat hot or cold as either a salad or a main meal.

The guts shrink up and turn white when cooked, and have a bland flavor and a good texture which can be soft if cooked a long time or chewy to all most crisp when cooked less, suit yourself and you teeth. The liver and fat provide oil, which makes a creamy dressing, especially when mixed a lot. The eggs always provide a good texture and flavor.

This is the original, old-style recipe, delicious just as it is. However, today some cooks vary it with as many other salad ingredients as desired, like greens, onions, garlic, cooked or raw vegetables, dressings, vinegar, lemon, spices, and cranberries. Don't use small, skinny, sick, or wormy fish, because they won't have good livers and guts to make this recipe.

One version of a salad: Chop up boiled intestines, stomachs, livers and eggs from a sheefish, mudshark and/or pike, adding salt, pepper, lemon and green onion.

Figure IV-35 shows the insides of a pike that has been cut to hang. From the head on the right the liver stretches back along the top and under the right part lies the dark purple-blue gall bladder. Beneath that the stomach stretches from the esophagus back to the spleen. Then, as the intestine, it returns to the head end and back to the vent. The orange egg sacs lie along beneath the intestine and above the backbone in this photo.



Figure IV-35.

Bob Uhl talks about pike:

“Pike guts are like a lynx’s—straight. Neither stores much fat, and both eat a constant diet of fresh meat. Pike are one of the few fish with no pyloric caeca. That must mean that they handle that aspect of digestion in a different and simpler way. Pyloric caeca have got to be involved in digestion for two reasons: they are located right around the gut below the stomach, and they become colored with whatever the fish eat that is colorful, such as blueberries.”

Cranberries with fish eggs, *Ituqpaluk*

- Spring pike eggs are the best for this treat because they fluff up more than whitefish eggs.
 - Save the eggs from the biggest pike caught each day by hooking through the ice in the springtime.
 - In a flat-bottomed bowl, mash them well with a flat-bottomed wooden masher or cup. Mash them until they are fluffy and remove the stringy membranes.
 - Mix and mash in cranberries from last fall, either stored or picked fresh from the tundra.
 - Whip this with your hand, or a beater, until it is fluffy.
- Use about half and half berries and eggs, or more berries, or whatever you have to use, or the ratio you prefer.
- Eat right away while it is fluffy as a meal, treat or dessert.
 - Sometimes blueberries are added for a sweeter treat, and some people add sugar.

Boiled fish and cranberries, *Qaaqtaq qalulik*

- Pick the bones out of fresh boiled or baked pike.

- Mash ripe cranberries in your hand to let the juice run out.
- Mix the fish meat with the juice and cranberries.
- Add sugar if you want.
- Eat with seal oil or some kind of oil.

Boiled pike, eggs, cranberries and blubber, *Kinutuk*

Use these ingredients in whatever amounts you have or like.

- Boil pike meat and eggs.
- Let cool, and de-bone.
- Boil the blubber and cranberries. Use the blubber from seal, *ugruk* or whale that has been stored, and is already partially rendered.
- When cooked well enough, drain and allow to cool.
- Mix with the eggs and boneless fish meat and eat.
- Some people add sugar today.

This is a good recipe to use the blubber and cranberries left over from winter with the pike freshly hooked through the ice.

Whipped fat, fish and berries, *Akutuq*

One of the more famous *lñupiaq* foods, *akutuq* has many variations in technique and especially ingredients. It may be a trail ration, dessert, festive or ceremonial dish, regular food and/or butter-like spread.

***Agautaurak*, (one type of akutuk with fish meat and eggs)**

Have the following approximate amounts of ingredients ready and at room temperature:

- 2 cups back fat or kidney fat from moose or caribou.
- Up to 2 cups seal oil.
- 1 to 6 cups of berries, drained.
- About 2 cups of berry juice or water. (You won't use all of this.)
- 2 to 6 cups of cooked, de-boned, fluffed and partially dried fish meat.

To fluff cooked fish meat:

- Squeeze out any moisture from cooked fish.
- Rub the fish between your hands to break the fibers apart.
- Spread on a tray in the room for several hours and rub the fibers loose several times, as their surface partially dries.
- Some people also dry it out in a warm oven.
- Remove small bones as you work the fibers. The fibers aren't fully dried rather they are leathery with part of their moisture removed so they separate out.

Now begin the process:

- Dice fat of caribou or moose.
- Pound well with a rock.

- Place in a large metal bowl over low to medium heat and stir constantly with your hand as it melts to be sure it doesn't get hotter than you can stand.
- Stir and break up the fat.
- When it is melted, take the big bowl off the heat and place in some towels held between your knees and get comfortable.
- Start to stir and whip as it slowly cools. This takes a long time and the room temperature must remain constant. Always stir in one direction and don't lick your fingers.
- As it begins to thicken start adding bits of oil and juice (or water) and keep whipping as much air as possible in to the fat as it cools. Only experience will tell you how much of each to add and how fast to add them without reversing your whipping efforts. If you change temperatures or add the oil or liquid too fast, you will lose air instead of gain it. Not all of the above amounts may be used, you must judge how much as you go along.
- When you have gained as much fluff as possible and the fat is white but not yet completely stiff, fold in as much of the fish meat and berries as it will hold or as you want and set it out to cool or freeze.

Dried pike, *Paniqtuq*

Pike excel as a dried fish, partly because of their excellent flavor but also because they store fat in their liver and guts and not in their flesh so they don't get rancid as they dry. At any time of year, they are good to cut and hang, first as *iyamaagluk* when they are partly dry then as *paniqtuq* as they hang longer. They are especially prized in warm weather since their lean flesh doesn't turn rancid and will dry up well when fatter fish will only spoil. Figure IV-36 shows pike hanging to dry during August in a Selawik fish camp.



Figure IV-36.

To string dried pike:

To make dry pike into strings, take them down from the drying rack the second or third day of hanging when the flesh is still pliable and soft inside. Cut the backbone with head off each fish, leaving two inches of vertebrae to stick out for a toggle. Cut a one-inch slit by the tail of one, and stick the tail-toggle of another fish through it and hang them on the rack. Next, cut a slit just in front of the pectoral fins of each fish and toggle another fish through it. Since pike are larger than whitefish they usually have only six per string but you can put as many as fits your system. Figure IV-37 shows a photo of two strings of pike along with a drawing illustrating how the fish tails are used to toggle each fish to another, so they hang as a string.



Figure IV-37.

To soften dried pike:

The only trouble with dried pike, *siilik panuqtuq*, is that without fat in the meat it dries so hard that some people have trouble eating it. It can be as hard as a piece of wood, with sharp splinters where you break it. There are four ways to address the problem and enjoy this delicious food:

- 1) Always leave pike one day in hot weather and up to two days in cooler weather when you cut the day's catch of fish. Instead of cutting them, rap them in wet gunnysack or cover well with grass or willows to keep the sun off and keep them wet, and let them wait. This allows the flesh to start to break down and soften. Treated this way, they never dry as hard and brittle as when they are cut fresh. (It's just the opposite of trout and sheefish which you want to cut and hang soon before the flesh gets any softer.) The exception would be a pike that has been a long time in the net and is already soft.
- 2) Work the pieces of pike as they hang, by stretching out the skin straight and flat several times, and bending the meat as it dries. This softens the texture as well as makes it dry better and store more easily. It's good to do this to any drying meat when you have enough time to fuss with it.
- 3) Hang and dry pike while the weather is freezing. The ice crystals form in the flesh as it freezes before it fully dries to make it wonderfully soft and delicious. It takes much longer of course, but that is why pike caught under the ice in spring and hung during those freezing cold nights are especially delicious.
- 4) If you want to eat pike *panuqtuq* and it is too hard, or if you have no teeth, just pound it with a rock, or hammer, or back of a knife, or a piece of wood. Pound it on something strong, that won't be damaged, like a rock or plank, until it is soft enough for your eating enjoyment, even until it is powder. Take out the bones that don't become powder. It helps to

put the pieces of fish into a canvas sack to keep the splinters from flying and to save all the good powdered fish.

Eat it with seal oil, or whale blubber, or fish oil, or something oily and fat, like butter.

Dried fish skin, *Amigaatchiaq*

Without scales, you can eat the skin after you've eaten the dry meat off. The skin is especially good slow-roasted over the fire or on a medium-hot stove, until it is crisp all over and it crumbles as you chew it. Like chips or crackers, once you start eating the skins you won't want to quit. Don't eat pike scales; they are too big and sharp.

Frozen fish, *Quaq*

Pike are excellent to dry in the fall. Hang them and let them freeze. They make good *iyamaagluk* and/or *paniqtuq* and *quaq*, either way they turn out. As mentioned above, pike hung during freezing weather causes ice crystals to form in the flesh as they dry which makes them dry much softer, almost fluffy and much easier to eat. Freeze-drying also gives them a distinctive and delicious taste, free of the flavors developed during warm weather drying. Figure IV-38 shows Mamie Beaver of Kotzebue hanging some enormous pike caught in March in the lakes east of Kotzebue. These fish will freeze dry completely where they are thin and crust over where they are thick and will be eaten either as half *quaq*, half dried meat, or cooked as *iyamaagluk*. If hung long enough in the cold spring, the pike will dry completely, which makes a very fine food. Otherwise, pike are not usually eaten as *quaq*, and they are not fermented.



Figure IV-38. Mamie Beaver, Kotzebue, ca. 1960. Source: Howard Kantner.

Pike sewing skin or leather:

- When eating pike *quaq*, cut each half of the skin loose along the top fin and belly.
- Peel the skin off each side.
- Dry each piece of skin flat and smooth.
- Scrape and work with the hands to soften.

This is tough enough to sew into sacks and mukluk tops. Pike skin leather may also be used as decoration because of its color-contrast with the other skins. This pike skin is also used in sewing as the welt between two pieces of leather.

***Siulik* skin bag.**

Traditionally, a large pike skin was made into a poke or bag to hold fish oil because the skin is tough and the fish can get very large. Females full of eggs were especially good for pokes because they had a swollen belly, which would hold more oil. Trout or salmon skins were also tough enough to use for pokes.

- Choose the biggest pike from the net.
- Put it in a gunnysack that has soaked in water so it is wet and put in a cool place for 24 to 48 hours (depending on temperature) to soften the flesh. Pike is too tough to cut fresh. (One person said to scale it but most people said to leave the scales on).
- Cut the neck off behind the pectoral girdle. (Some people leave these bones on the skin.)
- Use a table knife or similarly shaped bone to separate the meat from the skin.
- Carefully peel the skin off the meat and bones.
- Gently separate around the fins, anus and tail.

- Cut off the gut one and a half inches from the end.
- Leave one and a half inches of the tail vertebrae on the tail and cut the rest off.
- While it is inside out, scrape all the flesh off the skin and fins with a spoon or smooth, rounded bone.
- Turn the skin back again and blow it up looking like a pike and tie it tightly with sinew or string so it will hold air.
- Hang it to dry.
- When ready to use, soak the neck-end in water until you can untie the string.
- Fill with whatever foods you want to store in oil including dried summer whitefish and sheefish eggs, *tinnich* (*Arctostaphylos uvaursi*), blackberries (*Empetrum nigrum*), or *masru* (*Hedysarum alpinum*).
- Pour fish oil over the food until the bag is nearly full, (maybe 3/4 full) and tie shut so that there is no air trapped inside.
- Store carefully in a cold place, lying on its side in a fold of caribou skin.
- To use while thawed, prop the bag upright, untie the string, carefully take out some of the oil and food then re-tie and store.
- In winter, when the temperatures are well below 0°F, people would cut off as much of the poke, including the solid oil stored in it, as they wanted to eat each night. Long ago, it was cold in the winters and that was possible, but lately it has been too warm.
- When traveling with this poke, people would have it only 3/4 full or less full, and secured in a folded caribou skin to cushion and protect it from accidentally getting broken open or leaking.

Stories

How *Siulik* and *Kaviqsuaq* fought.

Kaviqsuaq is the upper Kobuk name for the sucker because of its reddish (orange) color. Coast people call it *Milugiaq* because it sucks its food up off the bottom. In an old, traditional story:

“They were fighting with bow and arrows, going round and round, shooting many arrows at each other. Siulik got a great many arrows stuck all along its body part because it was too slow. Kaviqsuaq was faster, and the only arrows it got were in its tail, but it got way too many arrows stuck all over there. That’s why the sucker has such a large number of bones in its tail.

Its tail has so many bones that most people never even eat it. They just suck on the meat to get the juices out, then spit out the meat and bones.

Likewise, that is how siulik got so many bones along its side. Some people get confused and can’t figure out how to get the bones out of that siulik meat and don’t like to eat Siulik”.

Investigator's journal notes from Aniwitut Lake 1979:

“May 7th—Saw a newborn caribou fawn yesterday. The water is rushing into the lake today. John caught four whitefish; I caught three. I slept in the sled. This country is so vast and silent. Something about the tundra that absorbs sound. You can see farther than you can hear, although I just heard a plane take off in Ambler, 20 miles away. I'm sitting on a cache can, jigging with my left hand and writing. The kids are flying kites. Such a lovely open space for kites, level, hard ice, needled and sharp on top.

Good things to bring here for ice fishing include—cache can and sleeping pads to sit on. Very warm clothes. On the tundra today it was hot enough for bare skin, then while fishing, a breeze sprung up and it was cold enough to need clothes for 0°F. Hip boots, water mukluks, winter parky, panuqtut and oil, coffee and tea, one-burner Coleman stove to cook out on the ice, right by the fishing. Tie the dogs on the tundra to the few birches and bring the sled on the ice to hold stuff, to sit on, sleep in, etc. Have 11 long, spruce poles stacked somewhere to set up a drying rack on the ice to cut and hang fish each day of jigging. Anything on the ice gets wet immediately and melts down into the ice right away, there is so much heat from the sun. Jigging gear is simple black or dark nylon line, wire leader with snap and swivels and lures with hooks on them. Daredevils are best. A jigging stick helps to hold the line and gear but isn't necessary. The only sound is of rushing waters and an occasional raven, seagull, goose, or crane”

“It is April and May, before breakup. We are hungry for something fresh to eat, so we go to those certain lakes way out on the tundra where fish overwinter. Just when the land is stingy to give us any other food, we go to those deep lakes that have always given us fish. We set up our tents on the tundra, and dig holes through the deep, winter ice, sometimes up to six feet deep. The surface of the ice is just beginning to melt.

We cluster the holes around the outlet where it is the deepest and let our lines down, jigging for siilik. Which hole will find the first fish? Did any fish survive the winter in this lake? Will we find them under the ice? Will they be fat, or skinny and sick? In the brilliant sunlight, a cold wind blows across the hard, snow-sculptured tundra, requiring both sunglasses and our warm winter clothes to survive.

It's a deadly world without food, but a contented, safe place with food for us and our dogs. What a joy to pull the first siilik out of the hole! Then fish after fish, sometimes whitefish too, some fat and some skinny depending on how their winter has been, locked here under the ice. We are so very thankful to be given fish! Our hearts overflow with gratitude and songs.

It looks like we are going to get plenty of fish, so we prepare to camp here tonight (instead of moving to some other lake). We boil a big pike for our first meal. Scale it, take the bile out of the liver, clean out the guts, and boil it all up with the meat. We also start a dog food pot for the dogs, with the smallest fish.

Life is good. Tomorrow, if we keep catching fish, we'll put up drying racks and cut fish to dry. We'll cook for the dogs with guts, backbones and heads."

Large Pike

Siilik live in both fresh and brackish water, and can grow to enormous size. They can get so big that stories are told of *siilik* as big as a *qayaq*. Other stories are of *siilik* so long that "it drug on the ground as I carried it, with its head at my shoulder." The largest officially recorded *siilik* was over 60 lb, caught in Russia. One story in Morrow [1980] tells of a pike caught in 1765 that was estimated to weigh 170 lb. That would indeed be as large as a *qayaq*!

The point is, they can get huge. In *lñupiaq* culture, every story someone tells of what he saw in nature is respected, even though we haven't seen it ourselves, because we in turn may see something that no one else has ever seen, and we would expect others to believe us, too!

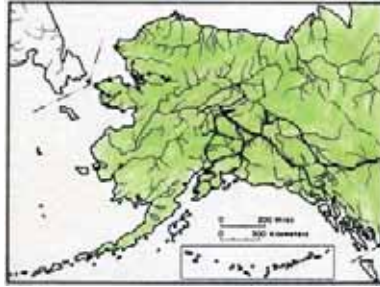
Alaktunjak is a large lake in Noatak Flats with very large fish. The old *lñupiaq* story of a *siilik* as big as a *qayaq* comes from there. Fannie remembers muskrat hunting there and seeing giant *siilik* bones of a huge fish that had died. Fannie and Lee Foster lived there for 25 years, as long as his parents were alive. Others have told their own versions of this story, of resting their *qayaq* on a bit of a sand bar among the floating foam and weeds, only to have it suddenly jerk away, almost tipping them over in what was actually deep water.

Longnose Sucker

Kaviqsuaq (Kobuk, Shungnak, Ambler, Kivalina, Noorvik)

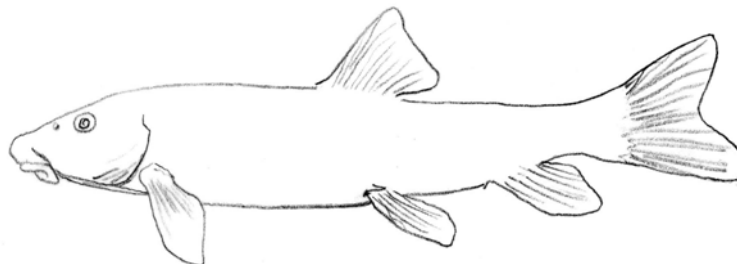
Milugiaq (Selawik, Buckland)

Catostomus catostomus



Description

- Suckers are mostly orange colored, fading to white on the belly and sometimes dark brownish or greenish on the top.
- Their mouth is a muscular, circular, sucker-lip, protruding down from beneath their large fleshy nose.
- They have tiny scales and no teeth.



Seasonal Feeding and Spawning Movements

Suckers are freshwater fish that mostly wander around locally, except they move at breakup to shallow gravelly areas of streams to spawn and back into deep pools or lakes further down river to overwinter. Spawning starts when water temperature reaches 5°C and peaks at 10°C, only in daylight, and only where the current and bottom are just right. The eggs are .3cm in diameter and are yellow colored.

Suckers swim slowly along with their extendable sucker lips gently touching the bottom, sucking up any food they sense, including algae, plants, insect larvae and nymphs, crustaceans, mollusks, and fish eggs. Large adult suckers have been observed feeding upsidedown on insects floating on the surface of eddies.

Harvest

Suckers are caught in the gill nets set for other fish. The sucker shown in Figure IV-39 was caught in an ice fishing net in Ambler. You can see the sucker mouth as it lies on its back. Most suckers are caught in nets set in early springtime, at least around Ambler.



Figure IV-39.

Use / Recipes

Suckers are among the first fresh fish caught right after ice breakup, usually along with some grayling, whitefish, pike, and mudshark. When food has been short, these first fresh fish are most welcome. Suckers are built differently in the following ways: the inside of their body cavity and their guts are dark-grey/black colored; they have no proper, well-differentiated stomach, and no pyloric caeca; their liver is spread along their intestines in a different shape; and their swim bladder is tough and white, and comes out whole. Suckers are among the least desirable fish, primarily because they have a great many bones, mostly toward the tail. They must be cooked well done even though the insides are eaten raw as well as cooked.

Boiled, *Igaapiaq*

The whole sucker may be boiled, head and all. Some people especially like the head. The eggs, swim bladder, and intestines, after being cleaned, are also cooked with the fish. Because there are so many fine bones in the tail, some people eat the meat where there are few bones and then just suck the juice out of the rest and spit out the bones and meat.

Baked, *Argiq*

Sucker are good baked, and then it is easier to take the bones out, because the fish is whole and with care the meat may be lifted off of most of the bones. The bones may also be lifted out whole, except for the tail.

They are never fried because they have too many bones.

Eggs, *Suvaich*

The best part of eating sucker right after breakup is their eggs, if you catch them before they spawn. Then the roe sacks are swollen big with many tiny eggs, good raw or boiled, or prepared any way. People eat these eggs raw as they clean the fish for a fast energy treat. They taste rich, cool, and sweetish like most raw fish eggs.

Minnie Gray advises:

“Beatrice Mouse knows that the liver and the fat are good medicine when you have stomach trouble, but you have to eat them fresh and raw as you cut and prepare the fish. Then it will help you.”

Sucker swim bladder, *Avataurak*

Their swim bladder is extra thick, white, partially separated into two lobes, and comes out whole (with a little care) as a balloon. Kids love to play with these balloons, both fresh and after they are dried. They also are eaten fresh and raw as people clean the fish. Both eggs and swim bladders are a convenient quick food. They have a refreshing, sweetish taste and a neat texture to chew. Eating them is a tiny bit like chewing bubble gum, only edible and better. These swim bladders are also dried, whole or broken, then put into oil along with the dried eggs. This swim bladder is also good cooked the same way you cook the fish.

Figure IV-40 shows the insides of a sucker as it is cleaned and how the swim bladder lies in the fish. Notice the dark color to the intestines and inside of the body cavity and the radically different shape of the intestines. Figure IV-41 shows a child holding the swim bladder, ready to either eat or play with it, as the needs of the moment may dictate.



Figure IV-40.



Figure IV-41.

“The kids are playing around while their moms cut fish. When they get hungry before its time to go home and eat, they stop by to see if mama has saved a treat for them. Everybody enjoys the eggs and bladder fresh and raw as lñupiaq Quick Food.”

Intestines, *lñalaut*

The intestines are eaten (but not the stomach) fresh and raw along with the eggs and swim bladder. When these fish are spawning, they have little in their bellies and intestines anyway. In Figure IV-40 you can see the coils of intestines and the blackish cast to the stomach lining.

To eat:

- Strip the contents out of a section of intestine.
- Start at the anus and clean about 8” at a time.
- Break the cleaned section of intestine off and eat it.
- Continue to strip/clean out sections of intestine and eat them along with the eggs.
- The intestine could be slit open and washed out if you wanted to get it cleaner.

Boiled briefly, *Uipasalauq*

- Clean the intestines as above.
- Drop them into boiling water.
- Flip them over. They puff up a bit.
- Take them out.
- They only cook for less than a minute, but they are cooked enough.
- Let them cool slightly, and eat with oil.

Dried fish, *Paniqtuq*

They are quite good dried, with a good flavor and a dark color. Most of the larger bones flake out while the meat is eaten and the smaller ones may be eaten along with the meat.

Cut them like small whitefish, but take out the backbone so each half hangs over the pole. Some people cross slash them 1/4" apart before they dry, to dice the bones.

When dry, put them in a sack and pound them well. After that, you can't find any bones because they are powdered with the meat. This is the ideal way to eat suckers: let the problem become a nutritional asset.

In Buckland some people cut and hang them differently:

- Cut to hang, leaving both sides of flesh attached along the belly.
- Cut off the backbone.
- Toggle the tails together and hang two fish over a pole, one on each side.

Frozen fish, *Quaq*

Sucker are not fermented or frozen for *quaq*.

Stories

"Some teen-agers went up the Noatak and set a net in Paul's Slough. They boated around, and late in the evening when it was almost dark they came back to check the net. As they pulled the net into their boat to check, they saw lots of large, strange, pale fish that looked very ugly, with a wierd sucking mouth that reminded them of giant maggots. One boy began kicking them away from him. They didn't recall ever seeing them before, and were so scared that they left the net and fish and went home in a panic to tell their parents.

The People sure laughed at them."

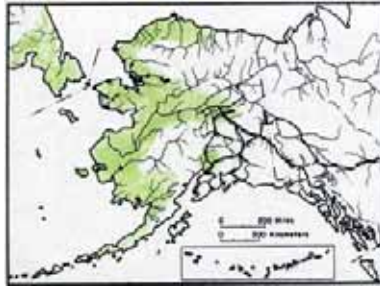
Why does the sucker have so many bones in his tail? See **Story in Northern pike**.

Blackfish

Iluuqiñiq (Kobuk, Noorvik)

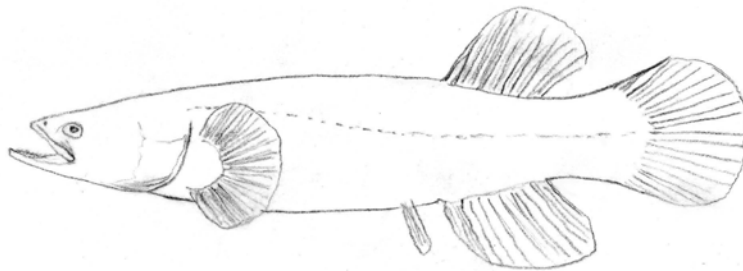
Iluiqiñiq (Noatak, Shungnak, Ambler, Kotzebue)

Dallia pectoralis



Description

- Blackfish are dark green or brown on top, pale beneath, with darker, irregular bars or blotches on their side.
- Their body and fins have dark brown speckling.
- Their lower jaw extends up, well beyond their short upper jaw.



Seasonal Feeding and Spawning Movements

Blackfish live all over our region in the fresh waters of tundra lakes, sloughs, swamps, and in some rivers, wherever there is a lot of vegetation. They grow to be about 8” (20cm). Their eggs are nearly transparent and 0.2cm when spawned, and very sticky. Before spawning they are yellow and opaque.

They feed on small invertebrates, shifting to insects and small fishes as they grow. Blackfish are extremely hardy, being able to tolerate crowding and low-oxygen situations. According to Morrow [1980], “Blackfish can withstand complete absence of oxygen for up to 24 hours if the temperature is 0[Centius].”

They are most famous for being able to freeze as their water freezes and then return to life when the water thaws out. However, according to Morrow, “Complete freezing results in death.” This implies that they have a way of ‘not completely freezing’, when left out overnight

at -40°F, after which they swim around when their tub of water thaws out, as is claimed by some Selawik residents.

Selawik residents tell about blackfish in their area:

“There are a great many blackfish, around the Selawik valley. They live in the lakes. There can be so many fish moving around that they seem to boil in the water. Muskrats have push-ups on the lakes where they come up to breath. The blackfish keep that water open, keep the ice thin when there are so many, ‘boiling’ in the water. This can be dangerous to snow machines. If you see overflow around muskrat push-ups, don’t go near there. The ice may be thin, even it may be mostly snow.”

In Selawik, they tell about:

“... a little slough by the fuel project store that has lots of blackfish in it when they are going out in the fall time. The kids make a brailer. They punch the bottom of a tin can with many nail holes, then fasten it to a stick. When the fish are going out, they dip the brailer into the water and catch blackfish.”

Mamie Beaver, of Kotzebue comments:

“In one lake they will be very good, and in another lake they may be poor, depending on the conditions in each lake. Maybe one lake has better food.”

Harvest

Roy and Laura Smith of Selawik talk about catching blackfish:

“People would catch them in their gunnysack or willow traps, and dump them into a barrel to keep until they needed them. If the barrel froze, they would keep until it thawed out. If they wanted them to eat while they were frozen, they would bring the barrel inside to thaw and the blackfish would thaw out and start swimming around again.”

“Once, someone lost a snow machine through the ice. After four days, as they were raising the machine up out of the water, the blackfish poured out of it. They had gone into all the little spaces. That’s how they catch blackfish: they build a trap for them out of willow and gunny sacks. They put it down in about a foot of water, and the blackfish go in. Overnight the sack is full.”

Use / Recipes

An elder Selawik fisherman, Roy Smith, tells some stories about blackfish:

“We don’t eat them today because we have better food. If we were hungry, we would eat them. We boil them good and eat them, bones and all. Some people take out the guts and some leave them in. They have very good livers and eggs.”

*“They aren’t real fat, but fat enough to be good. When we boil them well, or eat them as **quaq**, we eat up most of the bones with the meat.”*

Wendell Booth, of Noatak, talks about blackfish:

*“I always cook them. I don’t like to eat them as **quaq** because they just might come alive in my stomach. I never hear people say, ‘I ate blackfish **quaq**, and now I feel them swimming around in my stomach.’ No one says that; however that’s how I think.*

Mink and otter eat a lot of blackfish, and they are also excellent dog food.

My grandma was raised eating blackfish. She would eat the eggs and livers raw and cook the rest of the fish.”

Ninespine Stickleback

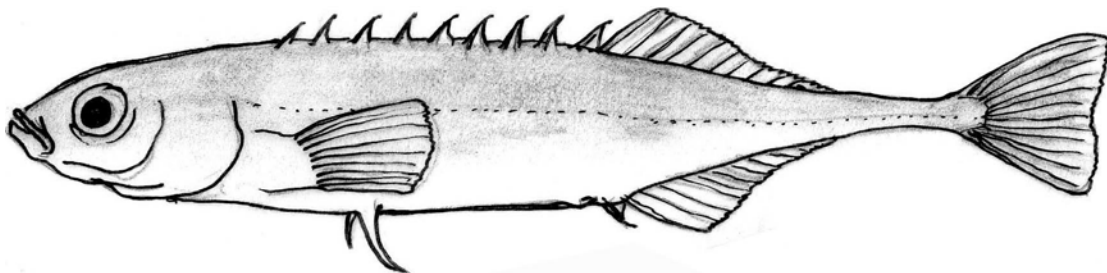
Kakilniuk

Pungitius pungitius



Description

- The ninespine stickleback is dull olive to light brown on top, darker blotches along the side, and yellow to silvery white on the bottom. In breeding, the colors are variable but the male turns black on the chin and belly.
- They have 7 to 12 sharp spines on back in front of dorsal fin.
- They have no scales but 0 to 15 small bony plates along front part of the lateral line.
- Their length averages 6.5 cm, with a maximum of 9 cm.

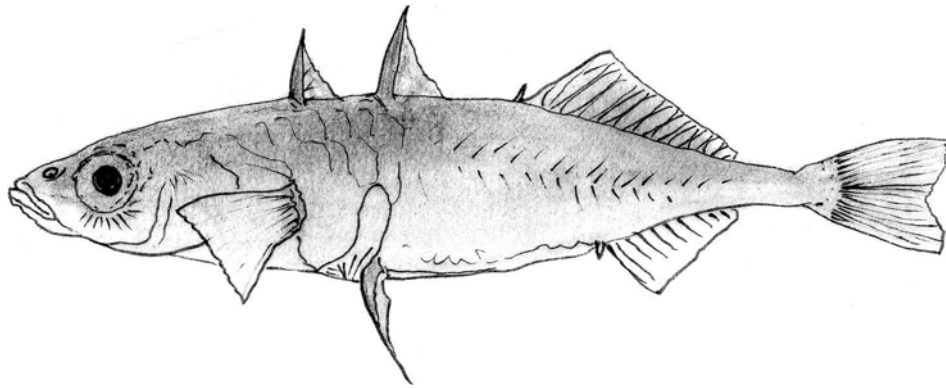


Threespine Stickleback

Gasterosteus aculeatus

Description

- The threespine stickleback is mottled brown or greenish in freshwater fish.
- Anadromous fish are silvery green to bluish black and white, yellow or silver beneath.
- Breeding males become brilliant green or blue, with bright blue eyes and red or orange belly and throat.
- They have three sharp, free spines in front of the dorsal fin.
- They have no scales but elongate bony plates along the sides.
- Their length averages 7.5 cm, up to a maximum of 10 cm.



Seasonal Feeding and Spawning Movements

The ninespine stickleback is the predominant one in this area, but the threespine stickleback has also been seen in the lagoon back of *Sisualik*.

Stickleback have been widely studied because they are taxonomically challenging, plus they have interesting behavior. They build a nest for their eggs, then the male guards the eggs and young fish. They are one fish that does well when captured and kept as a house pet.

In this area, they are an important part of our food chain, feeding other fish, birds, and mammals. People eat them in times of need or catch them for dog food when nothing bigger is available. They are very fat, so as they cook the oil rises to the top and looks good enough to eat. They can be dipped out in quantity at certain times in some places.

Sometimes they have been found in windrows at *Anigaaq*, when many were killed and washed ashore, available food for many creatures. The Pacific Loon builds its nest in tundra lakes where this fish also lives, then conveniently feeds its young with them. The Red Throated Loon builds its nest in lakes too shallow to nourish these fish, then must fly to the ocean to find food for its young and in the process often gets killed in gill nets.

PART V

Invertebrates

- MUSSEL
- CLAM
- SNAIL
- SCALLOP
- CRAB
- SHRIMP
- BIG-TOE BITER, *PUTUGUQSIUGAYUK*

Iñupiat, being superbly practical people, have always enjoyed a good meal or snack of whatever shellfish became available; whether it was clams from a walrus' stomach, shrimp from a beluga's stomach, or the ridges of clam, mussel, or crab tossed up by storm waves.

All these shellfish and invertebrates come only as a gift, from somewhere under the ocean, and are not available to "decide to go get". Thus, no effort is spent in looking for these foods, and the amount eaten depends on what else is available. Usually they are eaten immediately, whenever they become available, enjoyed for variety during that brief window of time before they spoil.

In the study area, there are good shellfish, but they are not gathered by digging. Instead one must wait until a sufficiently big storm washes them out of the bottom where they live, carries them to shore, and piles them up in sufficient quantity to be worth collecting. Storms usually bring the little blue mussel, white clam, snail, and crab to eat, along with many other fascinating ocean creatures seldom seen. Because they have been violently collected and carried, they come ashore somewhat exhausted, but fresh. When the best ones from the beach are picked up promptly and eaten right away, they are excellent food. This includes both big and small and whatever the sea brings in, so there is no issue about only taking a legal size, because what isn't eaten feeds countless other creatures and eventually dies anyway.

Since these storms usually come in the spring or autumn, when the weather is cool, there is little chance of the paralytic shellfish poisoning, which is strongest during the hot months and more common further south. Nonetheless, be aware that shellfish can accumulate a powerful toxin (poison), probably from certain types of plankton they may feed on. Some people who eat these shellfish become poisoned, and there is no known antidote or treatment. The symptoms begin with a tingling and numbness of the lips and tongue, which progress to the tips of the toes and fingers. In serious cases, this may continue to progress to loss of voluntary movement, inability to breath, paralysis, and death.

At the first signs of poisoning, one should purge all the shellfish out of the intestines by creating strong vomiting and diarrhea, and get to a hospital. This is mentioned here, not to scare people, but because our weather seems to be changing more rapidly each year. Since other fish and animals have been moving north this century, paralytic shellfish poisoning could eventually become a problem.

Since there has never yet been a case of paralytic shellfish poisoning in this area, any shellfish washed ashore are considered good to eat as long as they are still alive when they are actually cooked. This is an important rule that applies to all mussel, clam, snail, and crab everywhere. If a crab moves by it self, it is alive. If a shellfish is clamped tightly shut or if they

are slightly open but shut quickly when touched, they are alive. Check as you pick them up from the beach, and again just before dropping them into boiling water.

A *Sisualik* resident remembers a particularly good harvest of shellfish:

“At Nuvuuraq, the mussels were piled one foot deep all along the beach, and the crab were big, 4” to 6” across and also abundant. The white clams were up to 4” long, more flat than round, rather oblong, and wide, with rough, thin, irregular shells.”

Mussels

The favorite way to cook mussels:

- Place them individually on top of a hot stove.
- A half-minute or less, after each one opens, take it off and eat it straight from the shell. It has become delicately poached-to-perfection in its own juice.

Clams

People used to gather clams, the fat, white, storm-brought clams, and cook them like mussels on top of the stove, or boil them, but seldom eat many because they were so full of sand from being washed in the breakers. However, when boiled until they just open, then washed off in their own broth while still hot, they are quite edible, small and large ones alike. One person can eat a gallon of them.

Original *Sisualik* clam dip.

- Gather clams from the beach.
- Sort out the dead clams from the live ones, as you pick them up.
- Dump the live clams into boiling seawater.
- Continue boiling for 2 to 3 minutes (longer for a larger quantity of clams), but not long enough to come back up to a boil.
- Take them off the heat and let them sit a few minutes more to be certain they are all opened up.
- Pick out each open clamshell, swish gently in the cooking water.
- Pull the meat from the shell,
- Eat the stomach because it usually has little sand, and tends to fall off in the dip water any way.
- Peel the dark brown, tough, neck casing off the neck, along with a strip of dark brown along the mantle edges.
- Holding the neck, dip and wash off the sand in the water in which they were boiled.
- Eat, fresh and hot.

After they are thus washed of sand, we sometimes dip them into various dips such as seal oil, or eat them with tiny pieces of blubber. Clams are so delicious this way they don't need any other seasoning or flavored dip.

The stomachs are the first part to spoil, and you can tell if they are starting to spoil by a softer-than-normal texture. Of course, any clam or bite of clam, with any other flavor than ‘good clam’ taste, is cause to discard and not eat that bite. One must eat consciously.

Bob Uhl tells of testing to see if clams would clean themselves as they do when dug from a clam beach:

“We left some clams in sea water in a cold place, almost a week with changes of sea water twice daily, and most stayed alive and got rid of their sand but their flavor wasn’t nearly as good as those eaten freshly storm tossed. They even loose flavor the next day, but are still good.

I tried cornmeal in water for the clams to eat so they would spit out their sand but these storm clams seem exhausted by their rough ride ashore and weren’t always vigorous enough. They don’t like all that extra sand inside anymore than we do.”

The storm waves seem to dig up any clams living where it is shallow enough for wave action to reach, then wash them ashore. They are often deposited along *Kaisitak* and *Nuvuuraq* in great piles in and out of the water. After a big storm, they can often be kicked out of the water with rubber boots all the rest of the season. They must bury in the mud and start living again in this new home. Although they may live there the rest of the summer, they either freeze or are washed away by ice action in autumn.

As archeologists reconstructed the old *lñupiaq* life style and food habits by digging along the beach ridges of Cape Krusenstern, they were puzzled to have found no clam shells. They concluded that those people ate no shellfish, until they learned of the taboo against leaving any shell on land: after eating shellfish, all shells must be dumped back into the ocean.

Crab

In the study area, we have mostly tanner crabs, although they are small (see Figure V-1). King crabs are also to be found, and they are becoming more numerous as the water temperatures become progressively warmer. We know they are out there, because we see their legs and the occasional body washed up on the beach, and sometimes after a storm we get them fresh enough to eat. Figure V-2 shows part of a boiled King crab, ready to eat. Sometimes crabs are caught on a net or anchor pulled up from the ocean, and more recently, people put out crab traps to catch an abundance of nice big crabs. Buckland people catch big crab with traps set through the ice, out a ways in the saltwater. Although they are good to eat, they are not usually worth a hunter’s time and safety to seek out the good places and to set and check the traps.



Figure V-1.



Figure V-2.

A *Sisaulik* resident talks about cooking the smaller crabs picked up off the beach, probably red king crabs and helmet crabs:

“The small crabs are worth eating too, along with the big ones. They all smell and taste just like good crab. The soft legs on the small crabs can be pinched to squeeze the meat out. It takes about two pinches per leg. Their ‘crab butter’ and insides are also delicious. The extensions of each leg muscle inside the body can be chewed up and the horny parts spit out.”

“We dropped the live crabs into boiling sea water, and after they came back to a boil, boiled them ten minutes which was OK for the large ones but much too long for the smaller, delicate crabs. However, they tasted fine and were easy to eat. Even some of the smaller crabs had eggs, which were an extra treat, although they were grainy in texture.”

Snails, genus *Buccinum* and *Neptunea*

Figure V-3 shows a small snail that was picked up along the stormy beach, boiled, pulled out of its shell and now is ready to eat.



Figure V-3.

The large snails are the single exception to the rule that every live creature brought in by the storm waves is safe to eat. From this large snail you have to remove the dark green stomach, or soft parts near the top of the shell, before eating it, or “you get dizzy and have trouble seeing.” (This sounds as though it could be a mild type of shellfish poisoning, or something potentially dangerous.) Confirming this old wisdom, the Japanese also remove this same part as they commercially harvest this snail with their factory ships.

The Inupiaq name for this snail is ‘*nakunuk*,’ and ‘*naku*’ means cross-eyed.

Carrie Uhl tells a story about her father:

*“Dad ate some of these snails, the whole snail, and was beginning to be cross-eyed and dizzy. People picked *paungnaq*, (blackberries) for him to eat and he recovered. These berries are considered a cure and antidote for *nakunuk* poisoning.”*

Scallops

Scallops grow off *Anigaaq* and Sealing Point on the wide, submerged, building shelf, and are also found among the clams and mussels along the beaches after being dislodged by storm waves.

Shrimp

Traditionally they were enjoyed whenever a quantity were found in a sea mammal's stomach. They were taken out of the stomach when the animal was butchered, then sorted, boiled, and eaten along with seal oil. Letting an animal harvest your shrimp has the advantage in that they often select only the best, largest shrimp. However, this is not always the way it happens, especially with younger or weaker animals, which might take whatever they can get. In any case, sort out the stomach contents and only eat what you know is good.

Shrimp are caught today in shrimp traps. Figure V-4 shows six storm tossed and cooked shrimp.



Figure V-4.

Putuguqsiugayuk

These are conspicuous bugs along the ocean shoreline, 2 to 3 inches long and cute, but mysterious. They are scavengers, and eat anything dead on the bottom of the ocean. They are a part of the force that keeps the shoreline clean and fresh. Even the fins of fish that die in the net and aren't taken out soon enough are nibbled off, sometimes within hours of being caught.

Putuguqsiugayuk are not eaten. Figure V-5 shows two on the sand at *Sisualik*.



Figure V-5.

This is an old story:

“Mothers, with too much work and too little time to hang out watching their kids play in the waves, would scare them by saying, ‘Don’t go near the water! The putuguqsiugayut will eat your big toe!’ This solved the immediate need to keep children from drowning, and in certain situations, was so successful that some kids grew up still afraid of the water and unable to swim.”

DISCUSSION

Chart of Traditional *Iñupiaq* Fish Foods

Iñupiaq cuisine is characterized by a simple expediency, a unique ability to harvest sustenance from nature, as directly to the mouth as possible. The typically beautiful and artful appearance, and delicious flavors, smells and textures were achieved more by default than by extra effort. This “eating close to the earth” achieves a superior nutrition, gained through freshness, localness, and lack of adulteration by machining and additives.

The chart, **Traditional Fish Foods**, found in the Appendix, diagrams most all of the *Iñupiaq* ways fish are eaten. It shows the inter-relatedness of the basic traditional techniques used to process, preserve and consume fish. Also apparent is the complexity of some recipes with multiple techniques required such as partially drying trout, then storing them in blueberries to both ferment and pickle. Often a variation in timing of one process produces a different result, such as in drying where each day or two of moisture loss creates a different texture and taste. Many recipes are both season and temperature sensitive, meaning that they can only be created at certain times of the year when the conditions are proper. For instance, salmon dried with the eggs inside (*aanaalik*) must be cut differently, and hung in the cool fall air to ferment before they freeze, and stored as a perishable, frozen food to be eaten as *quaq*. The processes of drying, fermenting and pickling all have a continuum of influence that is changing the food, determined mostly by time and temperature, and thus different recipes are created. People learn exactly how they like their food and create it that way, while others may prefer it differently. This means that often there is no absolute standard of how to create a certain recipe. The main preservation and preparation techniques are discussed below

Raw

Raw fish is a definite part of *Iñupiaq* cuisine, and may be classified various ways. Fresh raw would be any eggs (except salmon) and the sucker swim bladder, eaten directly from the fish as it is cleaned after being caught, or the inside of barely-cooked fish. However, ‘raw’ also means fish that has not been cooked. This includes fish that has been fermented, frozen, dried, or salted, in any combination, but has not been heated. Thus, when these preparation techniques are included, most of the fish consumed by *Iñupiat* used to be eaten raw, and a large proportion of fish are still consumed in these ‘raw’ states.

Cooked.

Fish are cooked by either roasting or boiling, and often in combination with these other preservation techniques.

Most of the favorite ways fish are enjoyed today in our Western culture are included under the ‘cook’ section in this chart—baking, frying, grilling, and boiling. Not too much needs to be explained in this connection since these methods are familiar to all and appear in many other cookbooks. A few centuries ago, any cooking was done over and beside a wood fire, or buried with hot rocks, or by boiling with hot rocks in pots made of clay, bent spruce wood or birch bark. The main way to boil food was in birch bark baskets, made so tightly that they held water.

To boil fish, water was put into a birch basket, spruce wood box, or clay pot. Then hot rocks, about fist size, were put in with tongs. Once the water was hot, those rocks were taken out, fresh hot rocks were put in and the fish added. It took about three changes of hot rocks to boil a container of fish, depending on the sizes of rocks, container, and other factors. Traditionally, a few clay pots were made, and traded, mostly around Buckland where there was good clay. Spruce wood boxes and birch bark baskets were always readily available.

Dried

Fish are typically air dried without any additives such as salt, smoke or seasonings. This is possible due to the cooler temperatures in this area than are found in most of the rest of the world where salting is necessary. Their natural fish flavor continues to be greatly enjoyed today. Furthermore, when dried this way, people can make many meals on dried fish with only the addition of some oil, which improves the palatability but mostly is necessary to complement the digestion and metabolism of the protein. The amount of oil necessary varies with the fatness of the fish.

To use, cut dried fish into bite-sized pieces and/or peel off the skin, dip into oil (butter works well), and eat as a complete meal in itself, or along with a wide variety of other foods. Dried fish are easy to carry, store and use when traveling and camping and provide a high energy, convenient, and satisfying meal.

The basic drying technique requires the fish to be cut to as uniform a thickness as possible, and in a way that will hang flat so it all dries evenly. All the details to accomplish this have been worked out over the centuries so that the traditional systems used are difficult to improve upon. The basic way *lñupiat* cut fish to dry is to cut along the backbone on each side so both sides of fish flesh hang flat and the insides are removed. The head and or backbone may be left on to hang on one side and balance the flesh side, or it may be cut off and the flesh cut along the belly so each half hangs on one side of the pole. The thickness of the pole holds the two sides apart. Smaller fish, including the whitefish and grayling are cut one way as shown by drawings with Humpback whitefish, while the larger fish like salmon, sheefish and trout are cut as shown in Salmon and Trout. The basic techniques are modified according to how good the drying conditions are, how much or little of the fish one wants to save, if one needs dog food or not, different village customs and personal whim or preference. Today, some people are cutting their fish differently, to only use the very best parts and in a form that is easiest to package and store in the freezer to keep it at its peak of perfection without becoming rancid. Tomcod and flounder are cut in their own style where they don't hang flat, but they are also only hung later in the fall when the flies are gone and the weather is cooler so the folds of flesh still dry adequately.

Fish are hung to dry with the skin out the first day, then they are turned daily, flattened, checked for maggots or spoilage and put away as soon as they are completely dry. Whitefish and pike are put into strings when only half dry to save space on the racks as they finish drying. Strings are also a convenient way to handle, transport and sell them.

At all times the hanging fish must be kept from the sun, birds and animals, and flies must be controlled with a smoke. During the first three or four days of drying, fish may be used to bake, boil or to freeze for later.

Smoking was only done traditionally to the extent that it kept away the flies. The more moist the fish the more smoke flavor it will absorb, and when the fish are first hung is when the flies are the biggest problem. After a certain point they are too dry to be bothered by flies, because their odor changes and there is not enough moisture to support the growth of the

maggot. The smoke flavor has always been a delight when eaten with other dried meats (*paniqitut*) and frozen meats (*quaq*), but only recently has fish been heavily smoked and usually also salted. Both the smoke and salt are 'preservatives' that allow fish to be dried and kept at warmer temperatures than would otherwise be possible. Perhaps this is an inevitable evolution of techniques as the general climate warms up. Although delicious, one cannot make whole meals of smoked fish, day after day, as is possible on plain, air-dried fish.

Fermented

The definite preference for fermented frozen fish among the *Iñupiat* raised several questions, such as 'Were these foods safe to eat?', 'Were fish fermented because there wasn't adequate refrigeration, sort of as a second class food?', 'How could anything that smelled so repulsive, be either safe or desirable?' The strong smell of highly fermented fish gave that food and those who ate it a negative connotation in the minds of those who didn't enjoy it. Since the investigator had learned to eat fermented fish in 1960, she was able to perceive its gourmet food value in spite of the odors. Since fermentation is in danger of becoming a lost art, it will be discussed in correspondingly greater detail.

In the old days, fermentation used to be a primary way of preserving most all foods. Any excess of fish, that couldn't be handled any other way, was buried in the ground as a preservation technique. There, protected from predators, insects and the sun's heat, it slowly fermented. If people came to dig it up soon enough, it was good to eat. If left longer, it fermented more, and became too strong for people, but good for dog food.

Besides being a good preservative, most fermentation was done to increase the flavor as a highly desirable culinary technique comparable to the science behind fine wines and cheeses. The fermented version of a fish is incomparably more delicious and satisfying than the fresh fish. Furthermore, it gains an ever-richer bouquet of smells, as well as flavors, as it ferments. The increasing degrees of fermentation are accompanied by a geometric increase in obnoxious smells, which translate positively to those eating it, and negatively to those who aren't.

Eating fermented fish is more satisfying than eating fresh fish because fermentation increases the nutritive value by increasing the enzymes, and beginning the digestion of proteins making nutrients more readily available to the body. Eating fermented fish enhances our own digestive flora and contributes extra enzymes to our digestive organs.

A slight degree of fermentation begins as fish hangs to dry, but the usual way fermentation is achieved is by letting fish slowly freeze over many days. The length of time allowed controls the degree of fermentation. However, no fermentation occurs when fish is quick-frozen or salted. Only whole fish are fermented because cutting the skin allows other spoilage organisms to enter that produce undesirable flavors. It also allows oxidation, which destroys that part for human food. Sometimes, a tiny cut is made so the liver and bile can be hooked out, because they ferment faster and destroy an area around them. Fish close to spawning are best, because they have the least digestive activity, usually empty guts, and the body cavity of the females are swollen full of delicious eggs, which ferment well and are highly desirable. Fat fish are also better than lean fish because the fats ferment well.

Many foods were fermented in every culture around the world to preserve excesses for periods of scarcity. Since fermenting develops intensely rich and varied flavors, these foods became favorites, such as aged cheeses, wines, cured meats, and soy and fish sauces. Pickles used to be made by closing fruits or vegetables up in a solution of water, a little whey to start the favorable lacto-bacillus culture, and a little salt to prevent the wrong bacteria from growing until

the lactic acid became strong enough. Thus prepared, the food made its own vinegar and pickled itself, such as does traditional sour kraut. Pickles made this way today win the taste test with the store variety made in white vinegar. Interestingly, most dairy products and grains were originally fermented before they were eaten.

Iñupiat have exact rules of how to ferment fish so they will be safe to eat. Sometimes they shudder at how others do it from warmer cultures. The important message here is: Only ferment foods when you know what you are doing, when you do it exactly right, and keep good track of the temperatures at all times. Most important—do not use plastic or exclude air, in any part of the process.

Overview of fermentation

To better understand the full story of fermented foods, several authors were consulted, including Mollison [1993] and Steinkraus [1983]. They have documented that fish have been fermented in most all cultures of the world back through time. They were fermented as much for their desirable rich flavors and enhanced digestibility as for preservation benefits, which are exactly the same reasons the *Iñupiat* ferment their fish. In fact, the *Iñupiaq* techniques of fermentation are unique in that they do not rely on salt to prevent harmful bacteria from growing, before the beneficial bacteria have a chance to takeover, as is the case in most fermentation around the warmer parts of the world. Instead of salt, the *Iñupiat* rely on three factors to control and direct the fermentation process:

1. the typically cool temperatures,
2. the moderating coolness of the earth,
3. a timed sequence of beginning fermentation just long enough before the freezing temperatures occur to be able to stop the fermentation process at the proper time.

Fermentation techniques use microbes to transform fish into a more useful product by:

- prolonging the edible life of the fish by preserving the perishable fish protein;
- increasing the digestibility of the fish by increasing the amount of enzymes and by partial pre-digestion;
- blocking harmful micro-organisms with beneficial ones;
- increasing the richness, variety and intensity of flavors, which is welcome in a bland or monotonous diet; and
- conserving the Vitamin C and sometimes synthesizing Vitamins B and K.

The microorganisms used in fermentation are essentially fungi (which category includes yeasts, and molds, and bacteria). Usually there is a symbiotic combination of both at work.

As Mollison states,

“Recently-caught fish undergo a rapid change as enzymes within the body are released; these enzymes are usually located within the livers and guts of fish, which is the reason many fish are gutted and cleaned as soon as they are caught (in order to keep them fresh). Also the almost neutral pH of fish muscle is attractive to microbes which waste no time in attacking and reducing the fish to a strongly-flavored substance. With too much heat, this also creates a dangerous substance.”

In *Iñupiaq* fish fermentation, the enzymes found in the intestines and liver cause the desirable process to proceed. Since fermentation requires the proper temperature, the proper inoculant and sanitary conditions, these are met by taking freshly caught fish, late in the fall when the temperatures are of the right coolness, laying them in a cool place in a pile, or box or

bag, where they will be protected from the sun and heat. The enzymes are already present and not contaminated, and fermentation proceeds until it is stopped.

In this case, freezing temperatures are what prevent the fermentation from proceeding too far. One can tell by the increasingly stronger smell, when to stop fermentation and this is done by laying the fish out in the now-freezing air so that each individual fish will freeze and remain at that desired degree of fermentation all winter, ready to eat. There is a considerable amount of heat generated by a pile of fermenting fish, which will keep them thawed long after the ground is frozen if they aren't lifted out into the freezing air. When fish are packed in gunnysacks or boxes, they can be more easily moved in units to a warmer or colder position to ferment to the desired degree then exposed to freezing to stop the fermenting. Each individual situation is unique, and the only possible way to do this with any confidence is to do it exactly as it has been done for centuries. It is assumed that some adjustment must also be made today for the fact that the climate seems to be getting warmer.

Remember: The factor of vital importance in proper fermentation is to not use any plastics or metal. Only use the traditional materials, which apparently have enough of a semi-permeable membrane to allow the exchange of gasses, or, of some other apparently vital process or factor.

Frozen

Eating fish raw and frozen is practically unheard of in the rest of the world's indigenous diets, most likely because of the temperatures required to store fish frozen. In northwest Alaska, the temperatures are continuously below freezing for about six or seven months of the year, and are adequate to store fish frozen. Fish are caught and just piled up. Nothing has to be 'done' to them to preserve them for future use, except to keep other birds and animals from helping themselves. To eat this fish frozen is a natural choice, especially during those times when fuel is scarce or non-existent, or when traveling and away from home and the usual cooking provisions.

Fish frozen right after being caught has a light taste, comparable to drinking cool water. Various degrees of fermentation give fish richer, more complex flavors, comparable to drinking wines, or soups or juices. Even a few days or a week of fermentation noticeably alters the flavor for the better while only slightly increasing the smell. Most experienced *quaq* eaters appreciate at least some fermentation, on most of their *quaq*, especially a range of strengths to choose from.

However, aside from any necessity, *quaq*—frozen fish, both fresh and fermented—is a marvelous food in its own right. Perhaps the fact that it is a raw protein is what makes it feel so good and light inside after being eaten. With few foods has the investigator felt such a conscious feeling of satisfaction in the stomach as after eating a meal of frozen fish. When eaten while traveling in cold temperatures, one gains a definite warmth, which is not experienced after drinking cold water, or eating a frozen energy bar. The fact that the fish is frozen makes it quite acceptable to eat raw, because the texture is like hard ice cream that you have to chew, and when you swallow, you feel the coldness going down. The taste is delicious, gentle and light, not at all what one might expect of 'raw fish'. Each different fish has its own unique flavor, and all but the fattest fish are usually eaten after being dipped into seal oil, which today, is often salted or flavored with soy sauce, etc.

Olive and sesame oil are acceptable to use now, since many can't get, and aren't used to, the flavor of seal oil. The important part to remember is that protein requires oil to be properly metabolized, and the more protein eaten the more oil is required. For a person not used to

consuming much oil, it will be necessary to increase the amount in the diet slowly, to allow the gall bladder to adjust, but a healthy person can benefit from a surprisingly large quantity of oil.

Today, with freezers, anyone may enjoy frozen fish at any time of the year. *Quaq* out of a freezer isn't exactly the same, or quite as good, as *quaq* stored traditionally in the arctic air which varies in temperature all winter. However, when the winter temperatures average too warm, the frozen fish from a freezer may be better and less rancid. The modern deep freezer certainly provides a welcome food year round. The important point to remember is that fish should be frozen at 0°F for at least two weeks to be confident of killing all the parasite eggs and cysts. If your freezer isn't as cold as 0°F—and most refrigerator freezers are not—you cannot be assured of killing the parasites this way.

Salted or pickled

Salting is a commonly used technique around the world, but is not originally an *lñupiaq* technique, other than the use of ocean water to boil fish, and seawater used to rinse cut fish before they are hung to dry. Since salt has come into this area, some fat fish have been salted, and the tradition has been incorporated into the local *lñupiaq* diet. The fish usually salted are herring, salmon heads and bellies, sheefish, and trout, all of which will keep better salted than handled any other way during the heat of the summer. Pickling in vinegar likewise was not originally *lñupiat*, since vinegar, like salt, was only brought into the area in the last century. However, some of the fine local fish foods today are the salted and pickled fat fish, especially the herring.

Nutritional Considerations

Health of traditional fish

What became apparent, as the recipes in this report were gathered, was how healthy the traditional use of fish actually was. This was supported by Fallon [1999], which shows how superior the traditional preservation techniques of freezing, drying and fermenting are and, in fermentation, how they may actually enhance nutritional value.

Health considerations were further magnified by observing how nutritionally inadequate much of the store food has become today, especially foods chosen by the youth. Although health is not the subject of this study, the need for better nutrition in the region has become an urgent concern today. Thus, information in this report gains value not only as a recipe book and historical document, but also as a way for local residents to regain some of their health through eating more traditionally.

Benefits of Fish Oils

It was noted that, (except when drying), people often sought the fattest fish and sought them when they were at their fattest phase of their seasonal cycle, hence in their best health. Furthermore, on the lean to medium fat fish, they often chose to eat the fattest parts, such as the head, skin, liver, and belly part. This was because the fish oils have the best, richest flavor, and satisfy one's hunger the most. Whether or not the oils were sought for health benefits, either instinctively or by default, is un-provable, but we do know from scientific studies that fish oils are exceptionally healthy to eat, especially those from the sea-run salmon and trout. Schmid mentions that Indians chose the fat around the eyeballs to heal vision problems, and subsequent

scientific studies have shown that the highest concentration of Vitamin A in a fish was found in the fish's eye fat. Such examples of innate wisdom cause us to look more closely at other traditional practices. Another observation during this study was the large amount of fat consumed in this high protein diet, which is necessary to properly utilize the protein. Indeed, Stefanson [1943] documented what the indigenous people have always known, that, during times of starvation, one can die more quickly from eating very lean meat than from fasting. It is called 'protein poisoning' when there is not enough dietary fat to properly utilize the protein consumed and to help eliminate the wastes from metabolizing protein.

That fish oils are good for us is now common knowledge. Oils from ocean fish are especially valuable due to their abundance of minerals from feeding on sea life. Even more important, these fish have high amounts of essential fatty acids known as Omega-3 or ALA, EPA, and DHA. Such substances are not produced in our bodies and must be supplied by foods such as the sea mammal oils and fat fish which are abundant in *lñupiaq* diets. This may explain why 'Eskimos' have been known for their happy disposition, clever eye-hand co-ordination, and the creative ingenuity to survive in their challenging environment. Hibbeln [2006] has found that children receiving the most Omega-3 in their diets are more intelligent, have better fine motor-skills plus have more pleasant social behavior than those receiving the least. Although these were the same foods with high mercury accumulation, it was found that having abundant Omega-3 in the diet was much more important than avoiding the mercury. Fish oils are also high in the Vitamins A, E, and D, all essential for good health.

It became apparent working with these recipes that the older, more traditional people intentionally sought out the nutrient-dense parts of the fish, especially the eggs and livers, and even the bones, skin, head, stomach, and intestines. This was definitely not because they were starving. These parts were normally included in the diet, mostly because they were delicious, but also as a welcome variety from the texture and taste of the muscle mass. By comparison, Americans choose to eat the fillets, and discard the bones, head, skin, eggs, liver, and intestines. The eggs were always coveted and used, and sometimes they were the only part that was used. It appears that old-time people instinctively knew which foods provided necessary vitamins and minerals for health and especially for the nerves of developing babies and growing children. Weston A. Price found that traditional diets contained ten times the amounts of vitamins A and D as the modern American diet, and that such high amounts of these fat-soluble vitamins were necessary for the perfect health he documented among the indigenous peoples who had never left their native diets. Interestingly, the most nutrient-dense parts of the fish were also often the fattest and tastiest.

Benefits of Raw Protein

The benefits of eating (all, or parts of) fish raw include the following:

- More vitamins, especially the B vitamins and Vitamin C.
- More enzymes.
- Easier to digest and absorb the nutrients.
- Preference for the flavor or texture.
- Expediency: there may be no possible way to do otherwise.

The only drawback from eating raw fish is the possibility of getting parasites. Not all fish have parasites, so knowing which fish to eat helps. Trout, sheefish, whitefish, and grayling are eaten raw, while salmon, tomcod, mudshark, and pike are not. A healthy person with strong hydrochloric acid and healthy digestion will have fewer problems with parasites than would a

weaker person. Drying fish destroys parasites, as does freezing fish below 0°F for at least two weeks. Presumably, salting and fermenting also kills all infectious stages of parasites.

The bulk of fish traditionally eaten by *Iñupiat* are processed by drying, freezing, or fermenting. These processing techniques do not denature the proteins with heat. Schmid [1997] discusses the benefits of eating proteins in the uncooked form, such as proper calcium metabolism. This, in turn, reduces tooth and skeletal problems, gall and kidney stones, atherosclerosis and strokes, and arthritis, all of which have abnormal calcium deposition as a common denominator. Another benefit from including some raw proteins is enhanced digestion. To quote from Schmid, page 41,

Raw food consists mostly of hydrophilic colloids. Hydrophilic means water-loving, and a colloid is a suspension of solid particles in a gel-like fluid. Eaten uncooked, these colloids absorb large quantities of digestive juices, forming a gelatinous mass that maintains the mucosa of the stomach and digestive tract in a healthy state.

The heat of cooking precipitates out colloids, making them hydrophobic (water-repelling); the hydration capacity of the colloids is decreased, and they become less able to absorb digestive juices...

...for the fully functioning human digestive tract, all but the grains are most easily digested raw or lightly cooked. This is particularly true of animal proteins [including those from fish].

One exception to this dictum would be the gelatin broth made by boiling bones. Such a broth is also a hydrophilic colloid, beneficial to good digestion.

Another benefit attributable in part to including some raw protein in the diet (found by Price, Schmid and other researchers) is that the modern degenerative diseases did not occur among those populations who had never left their traditional native diets.

Dr. Joseph Romig told Weston A. Price that modernized Eskimos and Indians with tuberculosis usually recovered when returned to their native villages and native diets. [Schmid 1997, 41–42].

These ‘traditional native diets’ included fish and their organs, often eaten raw or lightly cooked as has been shown in this report on the *Iñupiat* use of fish.

Schmid continues:

There are two considerations about the safety of eating raw or lightly cooked animal-source foods: the health of the source animal and the health of the individual eating the food. Both healthy people and healthy animals are highly resistant to disease. Fish growing in a healthy ecosystem, will be healthy and so will the people eating them, which is why some of the fish can be safely eaten raw.

...traditional people everywhere ate animal life without fear of infection. The animals were, by and large, healthy, but the first line of defense was the superior resistance of the people. That this resistance was in part the result of eating the animal life—much of it lightly cooked, some of it raw—completed the circle of cause and effect.

This healthy condition was only possible when adequate trace minerals were available to the fish, and hence available to those people eating them. Thus, freezing, drying and fermenting fish grown in a naturally healthy ecosystem provided these minerals and they were preserved without loss.

Safety of Traditional Foods

Botulism

Botulism spores are common in the soil and beaches of this area (and around the world), so it can be assumed that some of the fish caught and processed in this area, especially along the coast, are potentially contaminated. Botulism spores require an oxygen-free (anaerobic) environment to grow, plus the proper moisture and temperature. As they grow, they produce one of the most toxic substances known to man. These botulism toxins are colorless, odorless, and tasteless, so there is absolutely no way to tell if a fermented food has developed botulism or is safe to eat, other than knowing that every step of the process was done properly. Interestingly, the safe and desirable *Lactobacillus* culture also prefers an anaerobic environment.

It is by controlling the temperatures and the handling and packaging details that the growth of this deadly *Clostridium botulinum* culture is prevented. “Careless primary preparation in hot weather” can allow botulism to develop, which means letting the fish get too warm at any stage in the process. Of equal importance, using plastic bags or containers can also allow botulism to grow, as shown by the following story told to the investigator when she phoned the Center for Disease Control to learn about preventing botulism:

In Canada and Alaska there were a few people dying every year from botulism, and the numbers seemed to be increasing. It was usually from people preparing and eating their traditional native foods, usually those that were fermented. So we designed and funded a set of experiments to study what people were doing that was killing them. The presumption being, that we would then have a reason to advise against certain traditional ways of preparing food. We took four batches each, of the main foods where botulism was found—fish heads, seal flippers and beaver tail. Two batches were prepared the proper traditional way, and two were prepared as some people have been doing lately, using plastic bags or buckets. One of each batch we inoculated with botulism; the other was left natural [was not inoculated]. After the fermentation process was complete, we tested them. To our surprise, those batches of foods prepared the traditional way had no trace of the botulism toxin, not even in the foods that were inoculated with botulism spores. On the other hand, both batches [the one inoculated with botulism spores and the one not inoculated] of foods prepared in plastic tested positive for botulism. The advise that came out of that experiment was—‘keep on fermenting your food, but never use plastic bags or buckets, and be certain that you do it the traditional native way without any short cuts or changes.’

It is strongly advised that anyone preparing traditional fermented foods educate themselves about botulism and take every precaution to avoid it. Information is available from libraries and on Internet websites.

Phone numbers for public inquiry are (404) 639-3534, and (800) 311-3435 in the year 2003.

Centers for Disease Control and Prevention, 1600 Clifton Rd., Atlanta, Georgia, 30333 (+1 404 639-3311).

A useful website is www.phppo.cdc.gov/phtn/botulism/default/default.asp

Pollution

Although today there is still a vibrantly healthy ecosystem, in this region, probably the first and biggest threat to the fish and ultimately the people is the increase in many types of pollution coming from the air, ground activities, and motor gas and oil in the water. Although certain salmon are known to swim through some polluted water to reach their natal streams, it is the more sensitive grayling and sheefish that need to be monitored. Local fisher folk are concerned when they find sick or unusual fish, and they rightly worry about what various types of pollution may be harming their food supply. This concern was noticed in the entire region, but especially in Kivalina, where more problems were reported and assumed to come from the Red Dog Mine upstream. These traditional people are finely tuned to their environment and food chain, and they know when something is wrong.

Unfortunately, the steady increase this last century, of manufactured chemicals (77,000 made in N. America), inevitably escape into our environment, and are compromising the overall healthiness of traditional diets. Fortunately, the local ecosystems seem to be yet relatively clean and healthy. Locally, the toxic oils from the Army base, which were once used to oil the roads of Kotzebue, continually become air born as dust that eventually falls on to the land and waters.

The biggest problem comes from the airborne contamination carried up into the atmosphere from eastern European cities, which then circle half way around the earth to fall out over this part of the Arctic. Although this area is far from the polluting factories, it receives serious problems. Persistent organic pollutants that are volatile continually rise up from the ground in the heat of the day and circle around the earth to fall out farther north until the land becomes too cool, and there they accumulate. Unfortunately, the pristine, unpopulated arctic is becoming one of the most highly polluted places on earth as these man-made chemicals enter the food chains and become ever more concentrated.

The logical assumption from this is that the safest fish to eat are the younger (smaller) ones, before they accumulate a long lifetime of pollution. The vegetarian fish, such as the whitefish, that eat plants instead of other fish would also be less polluted. The next safest fish would be the ones that eat the vegetarian fish, although most fish-eating fish eat a variety of other fish. However, before proceeding too far on these assumptions, much more needs to be learned about how these pollutants travel in the food chain, because many other factors could outweigh these considerations, like, what settles to the bottom where the tomcods and suckers are feeding? Which insects accumulate pollution (since plant-eaters often also eat insects)?

Parasites

World wide, people that eat raw fish have a higher proportion of medically significant parasites than those people who don't. This is difficult to document because the problem comes to attention long after the meals that caused it are forgotten, and testing for parasites is not usually done. People are usually not aware that they have parasites until some serious problem develops, months or years later.

However, raw fish in the frozen form of *quaq*, is so central to the *lñupiat* diet, and so delicious and healthy for all to eat, that it is worth dealing with the parasite problem by freezing any fish to be eaten raw for at least two weeks at 0°F before eating it. That should be sufficient

to avoid all problems. Further precautions would be to also eat onions, garlic, salt and horseradish along with your meal, and drink wine and beer, all of which help to kill worm eggs and cysts. Mostly, keep yourself healthy, as did the old timers so your body can handle any problem.

Gittleman [2001] recommends the following guidelines (paraphrased here) to avoid parasite problems with cooked fish:

To insure 100% parasite free food:

When using a conventional oven, always set the oven for at least 325°F. At 400°F, 10 minutes per every inch of thickness is a guide.

Use a meat thermometer, and check the temperature in several places. Fish should be at least 140°F for 5 minutes or more.

Besides these guides and recipes, always check for doneness by observing the white and flaky texture of the cooked flesh.

Use cookware by Royal Prestige. Food is cooked by the minimum moisture method at 180°F—the temperature that kills germs, bacteria, and parasites, but not vitamins and minerals. (Available through Uni Key, at +1 (800) 888-4353.)

Maintain a balanced diet, and include lots of garlic, both raw and cooked. Snack on pumpkin seeds, which help expel worms.

Remember that parasites thrive on sweets and simple carbohydrates, so limit even natural sources of sugar from fruit and fruit juice.

There is a safety hotline sponsored by the Alliance for Food and Fibers for Food Safety Information. Call +1 (800) 266-0200 with your questions.

Modern trends

Traditional use of fish for food continues to be very important in this region, although today, no people depend on fish to the extent that they did in the past. Whereas there are a lot more people now, each person eats less fish, which somewhat balances out the numbers of fish caught. There are also fewer dogs to feed than there were in the 1900's, which probably means that there are less fish caught now than in the past. Witness the huge amounts of fish hanging on racks in the old photos, when most people fished several nets all summer long, drying as much as possible. All the food now brought into the country for both dogs and people further would indicate that less fish are caught and eaten now.

Today, many of the people who do still fish, only put out a net to catch target types and amounts of fish, pull the net, and process the fish carefully for personal consumption. Such people usually have wage-jobs and are less able to spend time fishing, yet they still want and need to have fish to eat. Likewise, the ecosystem, as long as it remains healthy, is capable of producing a large quantity of fish, and probably benefits from continued fishing.

A few people still spend their summer fishing to prepare subsistence food in quantities beyond their personal needs, which then becomes available to trade or sell. Fortunately, there remains a strong, cultural pride in continuing the traditional trading process. This means that many of the people who work hard at fishing and preparing *paniqtuq* (dried fish), will only

give them away, trusting that the recipient will voluntarily return something of comparable value to the fisherman. This worked well in the former closed and traditional society, but cheats the fisherman today because so many people wanting fresh fish and *paniqtuq* don't know these rules, or are transient, gone before they can repay the favor, or don't appreciate the truly high cost and value of the quality food. Allowing the sale of processed fish food products, as a part of subsistence activities, would probably be a logical adjustment to current trends.

Unanswered Questions—Topics for Further Research

The following are some of the many unanswered questions regarding the biology of the fish in this area that would be worthy of further research:

- Where do the young sheefish live as they grow to 14”?
- Why are sheefish traveling up the coast more often?
- Where does the local Bering cisco spawn?
- What limits its population in northwest Alaska?
- Which populations of herring occur in northwest Alaska?
- Where, when and on what do herring spawn?
- Why are herring carried on top of the ice by up-welling currents in winter?

The following questions concern the nutrition, metabolism, physiology and chemistry of fish as foods.

- How do the oils from each fish compare and differ from each other?
- How do the oils from different parts of the fish differ?
- How does the quantity of vitamin A and D compare in different fish livers?
- Which fish oils keep the best and how do they compare to the more commonly used sea mammal oils, and other healthy oils like olive oil, butter, coconut oil, etc.?
- Why are the livers, stomachs, or intestines used on certain fish but not others?
- How do the eggs of each fish vary in nutritional composition?
- What synergistic qualities do some of these recipes have, for instance trout livers and blackberries in *tiṅaulik*? and salmon eggs with bear berries?
- How do rancid fish oils affect us?
- How is rancidity in frozen fish different from rancidity in dried fish?
- How does fish stored outside in a cache all winter differ from fish stored in a freezer, and fish stored under the snow, when eaten frozen or cooked?
- How are uncooked proteins digested differently than cooked proteins?
- What are the differences in health and metabolism of eating the different forms of raw proteins—fresh, dried, frozen, fermented, salted and pickled?
- How do the fish in this area compare to fish from other areas and with farmed fish in nutrition and flavor?
- How does fermenting fish increase its digestibility?
- Why does a meal of strongly fermented fish give one an extra sound, good sleep?
- What effect does the high amount of enzymes in fermented fish have on our health and wellbeing?
- What exactly happens during fermentation, and how is it different from spoilage?
- How can we continue to ferment fish today and be positive that they are safe to eat?

- What quality of the round whitefish causes other fish to spoil when stored together frozen, for *quaq*?
- What might be learned about a grayling fin that could help a toothache?
- What effect does the increase of oil and gas from boat motors have on the fish and on their foods?
- What are the present levels of pollutants already in our different species of fish and in fish from different areas in the study area?

CONCLUSIONS

The fish harvested in the study area seem exceptionally healthy, and when prepared the proper traditional way, appear to provide foods far healthier than anything available elsewhere. This belief is confirmed by the research of Dr. Weston Price [Price 1989] as condensed and explained in Fallon [1999].

It is believed that the benefits of eating the traditional diet, when done properly, far outweigh the negative challenges presented by the problems of pollution, parasites, and food safety.

Although local fish may have some contamination from the environment, the alternative foods imported into the region are also potentially polluted in the following ways:

- Where they are grown,
- By packaging,
- With some of the 10,000 chemical solvents, emulsifiers, and preservatives in common use in food processing.

In comparison, traditional foods are adequately processed and packaged without the chemicals, plus they are fresher and organic.

Parasites are apparently killed by heavy salting and cooking to a temperature of 140°F for five minutes. The techniques of drying, and of freezing at 0°F for two weeks are considered adequate to render uncooked fish safe from parasite eggs and cysts. Fermented fish is typically frozen first and then eaten frozen, or eaten thawed after it has been frozen.

Food safety is strictly determined by the people processing the fish, who are usually those who will eat it. To be confident of safe food one must ascertain the following:

- 1) Strictly monitor the temperatures at all stages of all processes;
- 2) Keep the sun off fresh fish and during processing;
- 3) Follow the traditional procedures exactly;
- 4) Use no plastic materials such as plastic bags, buckets or cutting boards; and,
- 5) Eat foods consciously, so any off flavor, smell, or texture is noticed and discarded.

RECOMMENDATIONS

- 1) It is strongly recommend to do everything possible to facilitate the continuing subsistence harvest and use of these fish for the following reasons: health of people, health of the fish populations, and psychological strength of the people of this region
- 2) It is equally important to do everything possible to keep the waters clean and healthy, and likewise the land. Ultimately, the greatest threat to the continued healthy abundance of these fish will most likely be from the many forms of pollution, which are increasingly insulting the environment.
- 3) Every effort should be made to allow and reinforce the local, ancient tradition of trading subsistence goods, which has strong cultural ethics and is a well-established manner of distributing seasonal wealth. Demand for the alternative, the sale of traditional fish foods, needs to be addressed and incorporated into the local, legal economy as an extension of subsistence, to ensure that it remains local and responsive to both the needs of the fish and the people.
- 4) Try these recipes: you'll like them!

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APPENDICES

GLOSSARY

FISH NAMES

TRADITIONAL *IÑUPIAQ* FISH FOODS CHART

***IÑUPIAQ* FISH ANATOMY**

FISH BIOLOGY

VILLAGE VIEW

HISTORY OF *NIQPIAQ* PROJECT

GLOSSARY

This glossary lists the *Iñupiat* words, most place names, fish parts and other words. For all three names of each fish, please see the following separate glossary called **Fish Names Glossary**.

Aanaalik—female salmon full of eggs, cut to hang so the meat dries and the eggs ferment in the body cavity, to be eaten as *quaq/paniqtuq*.

Aanaġluuk—kidney.

Aanaksraq—cooked, shredded, fluffed, and partially dried fish meat prepared to put in *akutuq*.

Adipos fin— a small, fleshy fin, without rays, on the top, median line of the body, just in front of the tail.

Aġanuugauraq—adipos fin.

Aġuun—one fin.

Aġuutit—two+ fins.

Agautaurak—one type of *akutuq* with fish and fish eggs in it.

Aiparuq, -ruk, -rut—fresh, raw, uncooked.

Aiparuq—any kind of fresh fish.

Akutuq—“Eskimo ice cream”, rather, a mixture of oils and melted hard fats stirred until cool and foamy, with different mixtures of berries, leaves, roots and/or meats added.

Alaktuġak—large lake in Noatak flats where extra big fish were found.

Amaq—to carry a baby on one’s back, in side the parka, held up with a band tied around the waist.

Amatchiaq—small female whitefish dried so the eggs hang inside to ferment.

Ambler— *Iñupiat* city 132 miles east of Kotzebue along the Kobuk River.

Amiġaatchiaq—salmon skin crisped over the fire.

Anadromous—fish that migrate from feeding in the sea, back to spawn in fresh water.

Anak—feces or excrement.

Anakġlut—vent or anus.

Aniġaaq—place of going out (entrance to inland waterway); a place name, where Krusentern Lagoon empties into the ocean and people camp to fish with ditches and/or nets.

Aniraaq paugmiituq—general term for trout and/or whitefish dried and stored in oil.

Aniraaq—lean fish leaving *Anigaaq Paa* to go spawn.

Aniwitut—lake south of the Kobuk River and west of Ambler.

Aniyaak—(Ambler) a general term for a place of going out, as of a river.

Anphibrous—fish that migrate from fresh water spawning areas to brackish water over wintering and feeding areas.

Aqaigutchiak—sheefish or whitefish stomachs.

Aqaiguuraq—stomach.

Aqalulik or **Qalulik**—*akutuq* made with dried fish.

Argiq—to bake, roast on a campfire or cook in the oven.

Asriavik qaluun—blueberries with fish oil.

Asirriugaq (K), or **asirriugaq** (C)—raw fish eggs and blueberries.

Ataa—ventral.

Athabaskan—of, or belonging to, the Indian tribes of central Alaska.

Augaitchiak—*red organ*.

Aulukslaliq—big shee fish.

Auraq—strongly fermented food, as fish heads, or, referring to fish that has rotted and good only for dogs.

Auruun—pit dug into the ground to store fish to ferment and/or save for dog food. Used at *Anigaaq*.

Avatauraq—sheefish swim bladder. Also any fish swim bladder.

Back part or top of fish—*tulimak tuunaa*.

Backbone, spinal column—*kiyipigaq, -pikkak, -pikkat*.

Barbel—fleshy protuberance hanging down from the chin of mudshark and cod.

Belly—*aqaik*. (K)

Bile—*sunaaq*.

Bones—*quyapigaurimi*.

Brown meat on side of fish—*qaluun nigivruᅇa*.

Buckland—*Iᅇupiat* city 75 miles southeast of Kotzebue.

Caecum—appendages in the form of a blind sack. **Caeca** is plural.

Cape Krusenstern—High bluff and general beach area where the north shore of Kotzebue Sound turns north from west.

Collarbone—*kutumuk* (C). *Qutuumak* (K).

Deering—*lñupiat* village on the south shore of Kotzebue Sound, 50 miles from Kotzebue.

Desmeral—being associated with some surface, as the bottom of the ocean, the shore or underneath the ice pack.

Dorsal fin—*suluun*, *-uutik*, *-uutitt*; *Suluutaa* (K).

Dorsal—*qaana*.

Esophagus, gullet—*ikauraaq*, *-aak*, *-aat*.

Eye—*iri*, *irrak*, *irit*.

Ferment—*siigñaqsii-*, *siigñaqsirriq*.

Fish eggs—*suvak*, *-vaak*, *-vaich*.

Fish gills—*masrik*, *-riik*, *-riich*.

Fish hook—*niksik*, *-siik*, *-siich*.

Fish in general—*qaaluk*, *qalluk*, *qaluich*.

Fish scale—*kavisiq*, *-vitchik*, *-vitchich*.

Fish scaler—*kavisiiqsin*, *-sisik*, *-sisit*.

Fish skin—*amiq*, *ammik*, *ammich*.

Fish tail—*sipik*, *sippak*, *sipkich*.

Front—*siiguuq*.

Gall bladder—*sunak* (*Bile and gall bladder have the same name.*)

Gill rakers, Cheek—*uulaᅇa* (C), *uulaunᅇa* (K).

Gills—*masik*.

Guts, insides—*illu*, *illuk*, *ilut*.

Head—*niaquq*, *-aqquk*, *-aqqut*.

Heart—*uumman*.

Hook—*niksik*, *-siik*, *-siich*.

lᅇri—milt, white sperm of male fish.

lñupiat—is plural and used to refer to the race of people.

lñupiaq—is singular. It is used as an adjective, and to refer to the language, culture, foods, clothing, etc.

lñuqqaat—real, old-time Eskimo person.

lñalaut—intestines.

lgaapiaq—boiled fish or meat.

ltchiaq—half-dry fish fermented in blueberries, or anything colored by blueberries.

lmigaaq, -miqqak, -miqqat (C), ***lmigauraq*** (K)—broth, water from boiling fish that is good to drink.

Intestine—*lñaluaq* or *lñaluaq*.

Intestine—*lglutchiak*.

lqaluich—Coastal general term for many fish.

lqaluich Nigiñaaqtuat, *Fish That We Eat*, title of this Report—FIS02-023.

lqłak, łaaak, łat—multi-pronged fishhook.

lraguq—net gauge.

lri—eye.

ltiqsraq—a pit dug in the ground to store food.

litti—vent or anus.

littukpalak—a dessert made of fresh fish eggs and cranberries, mashed and stirred together, sometimes with sugar and milk, and sometimes with fish liver and oil.

lyamaagłuk (C), ***igamaagłuk*** (K)—fish that has been partially dried, then roast or boiled.

lyuktuk—to row or paddle, to pull a raft against the wind or back to the current.

Jigging stick—*aulasraun, -autik, -autut*.

Kaisitak—a building shoal south of the tip of Sisualik peninsula.

Kakaruksaak—mudshark hooks for a setline under the ice, made of spruce limb toggles.

Kallruch—Shelters around fishing holes.

Kaluñ nakauk, or ***niaquq***—fish head.

Kanik—mouth.

Kauñarauq—any fish cut and hung at freeze-up. It is half dried, half frozen, to be eaten boiled, roast, or as *quaq*. (Selawik)

Kaushimak—sourdock leaves that are boiled and fermented.

Kavisiiqsi—scaling fish.

Kayak* or *qayaq—small, light, double ended boat that can be carried around for hunting.

Kidney— *taqtu, -tuk, -tut*.

Kimagʻuk—half cooked.

Kinufuk—a recipe for boiled cranberries, fish eggs and meat and seal blubber, also a recipe for old rhubarb and fish.

Kivanʻaktuaq (C)—fat fish leaving *Anigaaq Paa* to spawn.

Kivalina—*lñupiat* village 79 miles northwest of Kotzebue, north of Cape Krusenstern, along the shore of northern Kotzebue Sound.

Kivvigun—net sinker, larger, usually of rock.

Kobuk—*lñupiat* village along the Kobuk River, 157 miles east of Kotzebue.

Kotzebue—Largest city in northwest Alaska and in this study region, located on a peninsula protruding north along the east edge of Kotzebue Sound.

Kugachiak—mouths of little creeks and rivers.

Kugarauk—common place name meaning a certain size of stream.

Kulkulhaun (C)—the baskets that were woven from lake grasses that held fish to be frozen for *quaq*.

Kupuḡaavik—‘place to spear fish’. A place name, one bend above Hunt River along the north shore of Kobuk River.

Kuuvanʻmiut—People of the Kobuk River.

Kuviqsuḡaq (C)—a pit dug in the ground to store food, or a hole or depression in the ground.

Kuvrachak—*Sisualik* beach net.

Kuvraq, -rak, -rat—net.

Liver— *tijuk*.

Lower jaw— *agliguk* (K).

Maniilaq—Turn-of-the-century *lñupiat* genius who foretold the future and defied the old shamanistic rules.

Masik—gills.

Masru—yellow, edible roots of the *Hedysarum alpinum* plant.

Maxilla— *niksigagvik*.

Mayauyuk—small shee fish.

Mouth— *kanik*.

Mukkaaligauraq—flour soup.

Muptulituk—salmon close to spawning that is fermented or hung to dry.

Nakaurak—fermented salmon heads.

Naku (C), **Nakunaruq** (K)—cross-eyed.

Nakunuk—large snail found off the shore of Cape Krusenstern.

Nalauǵmiutaq—white peoples' food, referring to non-traditional foods brought into the area.

Nalauǵmi—white people.

Nauriat Nigiñaqtuat, Plants That We Eat, a book [Jones 1983] similar to this report, detailing traditional use of food plants in northwest Alaska.

Nigiñaqtuat—foods that we eat.

Nigiruq, -ruk, -rut—is eating.

Niksiksuq—to hook for fish.

Niqi, niqik, niqit—meat, flesh, food.

Niqipiaq, -at,—*lñupiaq* foods.

Noatak—*lñupiat* town on the Noatak River, 50 miles north of Kotzebue.

Noorvik—*lñupiat* town on the Kobuk River, 43 miles east of Kotzebue.

Nostril—*qinḡak*.

Nuchal hump—large hump just back of the neck as on humpback whitefish.

Nuguvaurak, Nuvuuraq—Sisualik Point where Noatak people camp in the spring and summer to hunt sea mammals and to fish.

Nuvillaun—net needle.

Osmo-regulate—the physiological adjustment of maintaining the proper cellular salinity when going into waters of differing salinity.

Paigaaḡuk—‘one that stays behind’. These are called ‘rainbow trout’ meaning those brightly colored Dolly Varden that are spawned out and very skinny.

Paniqtuq, -tuk, -tut—dried fish.

Paniyauraq—Investigator's *lñupiaq* name.

Parr marks—dark marks along the sides of pre-smolt salmon.

Parr—a young, pre-smolt salmon, before it migrates to the sea.

Paugmiitak—half-dry and dry meats and fish stored in seal oil.

Paungnaq—blackberries, *Empetrum nigrum*.

Pilunuk—grass from the lakes used to make fish baskets.

Puptaun—net float.

Putuguqsiugayuk—shrimp like creature that lives along the seashore and eats dead things in the water.

Putyuun—crab.

Puugmiituk—many different kinds of dried fish and meats stored in seal oil.

Pyloric caeca—*nivgitchiak*. part of fish digestion and intestines.

Qaaktuun, -uutik, -uutit; qargun, -gutit—seine.

Qaaqtaq qalulik—recipe for cooked fish and raw cranberries.

Qaatchiaq—mattress of caribou skins.

Qairuk (C), quaraq (K)—fish roasted whole over the fire.

Qalu, qaluk, qalut—dipnet.

Qalunniaq—to fish.

Qaluich—Kobuk general term for many fish.

Qalukpiich iitchiat—pickled trout.

Qaluun nigivranja—brown meat along each side of fish under the skin and lateral line.

Qaluum uqsruq—oil made from fish.

Qaniq, -nak, -ngich—mouth.

Qargisaq—ditch dug in coastal lagoon mouths to form a natural fish trap.

Qauqfaq—fermented salmon, a favorite food in Noatak.

Qauraq—cooking fish.

Quaq—frozen meat or fish which is eaten while still frozen, may be fresh or fermented to varying degrees.

Quaqlik—fermented, frozen salmon.

Red Dog Mine—Lead and zinc mine southeast of Kivalina just back from the coast.

Red organ—*augaitchiak*, spleen.

Saamaayiq—small trout, less than 12”.

Saatqun—net sinker of bone or antler.

Samuunnaaq (C), Argiq (K)—bake.

Saunig, pl.-saunigich—bones.

Scales—*kavisiq, kavitsich*.

Selawik—*lñupiat* town on the Selawik River, 75 miles southeast of Kotzebue.

Shismaref—*lñupiat* town along the coast 110 miles southwest of Kotzebue.

Shungnak—*lñupiat* city 150 miles east of Kotzebue on the Kobuk River.

Sigluaq—a small sod house buried all or partially under ground, used to keep food cool.

Siku matak—gill nets set under the ice. (Selawik, *sikum ataaqqtuq*).

Sirvik—stove to cook on.

Sisualik—Place of white whales. Long peninsula 12 miles west of Kotzebue.

Siqaniqtaq—fried fish.

Slime—*niviiguk* (C), *nivuq* (K).

Stomach—*aqaiġuuraq*.

Stomach—*aqiaġuq*, *-iaqquk*, *-iaqqut*.

Sunġaq—gall bladder and/or bile.

Sunġaqaurak—*lñupiaq* name for the first Russian trade beads.

Suluun or **qalun suluk**—dorsal fin.

Suragñak (C)—gathering willow leaves to store in seal oil.

Suvaich—fish eggs.

Suvatchiaq—dried fish eggs in seal oil.

Tagiumsiñaagmiit—ocean beach dwellers of the Cape Krusenstern area.

Tail—*sipik* (Kobuk), *pappirauk* (Coastal).

Taqtu—kidney (Ambler).

Throat—*manau*.

Tinniich—red berries of the plant, *Arctostaphylos uvva-ursi*.

Tinġaulik (C), **tinġulik** (K)—recipe made with trout or tomcod livers, and blackberries.

Tinġiuk—Mudshark salad from up river.

Tinġuk, **-nġuk**, **-nġuich**—liver.

Tinġutchialik—recipe made in springtime with boiled rhubarb and fish eggs, liver and stomach.

Tinniugaq—recipe for cranberries, with mudshark eggs, livers, and stomachs.

Tipliaqtaaq—fermented and frozen fish.

Tipliqsaq—already fermented.

Tipliqsiq—to make fermented.

To boil food— *iga-*, *igaruq*; *qalat-*, *qalattuq*.

To cook— *niqniaqtuq* (K).

To fish for tomcod— *manaqtuq*.

To fish with a net— *kuvraqtuq*.

To fish— *qaluṅniaq*.

To hook for fish— *niksiksiq*.

To jig for mudshark— *iqḷaktuq*.

Tooth— *kigun*, *-gutik*, *-gutit*.

Tukḷumaagruk—large lake south of Selawik.

Tuqruq River—empties into the east part of Lake Krusenstern through narrow canyons.

Tuqruq—refers to the door of the sod house which was made so narrow that only one person could squeeze through at a time to prevent attackers from overwhelming the occupants.

Tuuq—long-handled ice chisel, for making holes through the ice.

Uḡni—fresh whitefish eggs mashed and whipped with snow.

Uiḷaaq—fermented fish that has been frozen, then is eaten after it thaws out all or most of the way.

Uiḷaq—anything raw, like eating raw fish.

Ulu—*lṅupiat* woman's knife, having a curved blade.

Umaglauchiaq—little rafts made of willow sticks on which small fish eggs are dried and roasted.

Umagluak (C), **iṅisuarraq** (K)—to go rafting down the current with logs and all your camping gear, often dogs too.

Uqsruqmatuk—Buckland dry fish in seal oil.

Uqsruq—seal oil or any kind of oil.

Uukkat tinguich (K)—tomcod livers.

Uumman—heart.

Uupasufaaq—cooked rare, under cooked so the inner portion is still raw, yet warm.

Uuyurat—string of eight dried whitefish.

Vent—anus.

Ventral fin—single fin between the vent and lower tail lobe.

FISH NAMES

Each fish is listed by its *taxonomic* (Latin), *lñupiaq*, and **common English** names.

Agalukpiq, qalukpik—*Salvelinus malma*—**trout, Dolly Varden**

Alaska Blackfish—*lñuuqiñiq*—*Dallia pectoralis*

Amaqtuq—**pink, humpback salmon**—*Oncorhynchus gorbuscha*

Aqaluaq, qaluaq—*Boreogadus saida*— **Arctic cod, blue cod**

Arctic cod, blue cod—*aqaluaq, qaluaq*—*Boreogadus saida*

Arctic grayling—*suluqpaugaq*—*Thymallus arcticus*

Bering cisco—*tipuk*—*Coregonus laurettae*

Boreogadus saida—**Arctic cod, blue cod**—*aqualaq, qaluaq*

Broad whitefish—*Coregonus nasus*—*qausriñuk*

Catostomus catostomus—**longnose sucker**—*kaviqsuaq, milugiaq*

Chum, dog salmon—*qalugruaq, aqalugruaq*—*Oncorhynchus keta*

Clupea harengus—**Pacific herring**—*uqsruqtuuq*

Coregonus laurettae—**Bering cisco**—*tipuk*

Coregonus nasus—*qausriñuk*—**broad whitefish**

Coregonus pidschian—**humpback whitefish**—*qaalgiaq*

Coregonus sardinella—**least cisco**—*qalusraaq, iqalusaaq, qalutchiaq*

Eleginus gracilis—**tomcod, saffron cod**—*uugaq*

Esox lucius—**northern pike**—*siulik, siilik*

Humpback whitefish—*Coregonus pidschian*—*qaalgiaq*

lñhuañiq—*Osmerus mordax*—**rainbow smelt**

lñuuqiñiq—**Alaska blackfish**—*Dallia pectoralis*

lñkaylik, ipkignailuk—*Liopsetta glacialis*—**smooth skinned, Arctic flounder**

lñalsugruuk, tagayukpuk—**King, chinook salmon**—*Oncorhynchus tshawytscha*

Kanak—**Lake trout**—*Salvelinus namaycush*

Kaviqsuaq, milugiaq—*Catostomus catostomus*—**longnose sucker**

King, Chinook salmon—*Oncorhynchus tshawytscha*—*lñalsugruuk, tagayukpuk*

Lake trout—*Salvelinus namaycush*—*kanak*

Least cisco—*qalusraaq, iqalusaaq, qalutchiaq*—*Coregonus sardinella*
Liopsetta glacialis—**smooth skinned, Arctic flounder**—*ipkaknaylik, ipkignailuk*
Longnose sucker—*kaviqsuaq, milugiaq*—*Catostomus catostomus*
Lota lota—**mudshark, burbot**—*tittaaliq, tiktaaliq, tittaliq*
Mudshark, burbot—*tittaaliq, tiktaaliq, tittaliq*—*Lota lota*
Nataagnaq—*Platichthys stellatus*—**starry flounder**
Northern pike—*siulik, siilik*—*Esox lucius*
Oncorhynchus gorbuscha—*amaqtuq*—**pink, humpback salmon**
Oncorhynchus keta—**chum, dog salmon**—*qalugruaq, Aqalugruaq*
Oncorhynchus kisutch—**silver, coho salmon**
Oncorhynchus nerka—**red, sockeye salmon**
Oncorhynchus tshawytscha—*iqalsugruuk, tagayukpuk*—**King, chinook salmon**
Osmerus mordus—**rainbow smelt**—*ifhuaḡniq*
Pacific herring—*uqsruqtuuq*—*Clupea harengus*
Pink, humpback salmon—*Oncorhynchus gorbuscha*—*amaqtuq*
Platichthys stellatus—**starry flounder**—*nataagnaq*
Prosipium cylindraceum—**round whitefish**—*quptik*
Qaalḡiq—**humpback whitefish**—*Coregonus pidschian*
Qalugruaq, aqalugruaq—*Oncorhynchus keta*—**chum, dog salmon**
Qalusraaq, iqalusaaq, qalutchiaq—*Coregonus sardinella*—**least cisco**
Qausriḷuk—**broad whitefish**—*Coregonus nasus*
Quptik—*Prosipium cylindraceum*—**round whitefish**
Rainbow smelt—*ifhuaḡniq*—*Osmerus mordax*
Red, sockeye salmon—*Oncorhynchus nerka*
Round whitefish—*Prosipium cylindraceum*—*Quptik*
Salvelinus malma—**trout, dolly varden**—*agalukpiq, qalukpik*
Salvelinus namaycush—**lake trout**—*kanak*
Sheefish—*Sii*—*Stenodus leucichthys*
Sii—*Stenodus leucichthys*—**sheefish**
Silver, coho salmon—*Oncorhynchus kisutch*

Siulik, siilik—*Esox lucius*—**Northern pike**

Smooth skinned, Arctic flounder—*ipkaknaylik, ipkignailuk*—*Liopsetta glacialis*

Starry flounder—*nataagnaq*—*Platichthys stellatus*

Stenodus leucichthys—**sheefish**—*sii*

Suluqpaugaq—*Thymallus arcticus*—**Arctic grayling**

Thymallus arcticus—**Arctic grayling**—*suluqpaugaq*

Tipuk—*Coregonus laurettae*—**Bering cisco**

Tittaaliq, tiktaaliq, tittaliq—*Lota lota*—**mudshark, burbot**

Tomcod, saffron cod—*uugaq*—*Eleginus gracilis*

Trout, Dolly Varden—*agalukpiq, qalukpik*—*Salvelinus malma*

Uqsruqtuuq—*Clupea harengus*—**Pacific herring**

Uugaq—*Eleginus gracilis*—**tomcod, saffron cod**

Traditional Fish Foods

leaner fish ←

→ fatter fish



DRY

Smoke →
Half dry iyamaaglug
one day no crust

two days slight crust
roast
boil
freeze

three days med. crust
four days half crust
pickled in berries
freeze
store in oil

five days panigtug
mostly hard, store frozen

six days plus
eat with oil

Fully dried panigtug
may be stored unfrozen

once dried
never ferment except
when stored in oil or pickle

COOK

Roast, Grill, Bake
eat hot or cold
de-bone for many recipes

Boil

Briefly, drain
eat hot, drink broth

Well done, drain
eat hot or cold, drink broth
de-bone for many recipes

Soup, flour and or
vegetable

Pickle in rhubarb or
blueberries or cranberries

Air dry surface
store in oil

Fluff, half dry for aqutug

once cooked
never ferment or salt

FREEZE

Eat frozen
quag

Cook while frozen
Boil
Roast

Thaw and Cook
Boil
Bake
Fry-all recipes

Thaw and dry
Half dry
boil eat hot or cold

Dry
eat with oil

once frozen
never ferment
or salt

FERMENT

Eat raw
uilaag

Freeze
Eat frozen
quag

Thaw and eat
uilaag

Cook
Very briefly, drain
eat hot,
throw broth

Well done, drain
eat hot or cold
throw broth

once fermented
never dry

SALT

Eat Raw
Freshen
Eat Raw
Cook

Boil
Fire
Roast

Well done, drain
eat hot or cold, drink broth
de-bone for many recipes

Soup, flour and or
vegetable

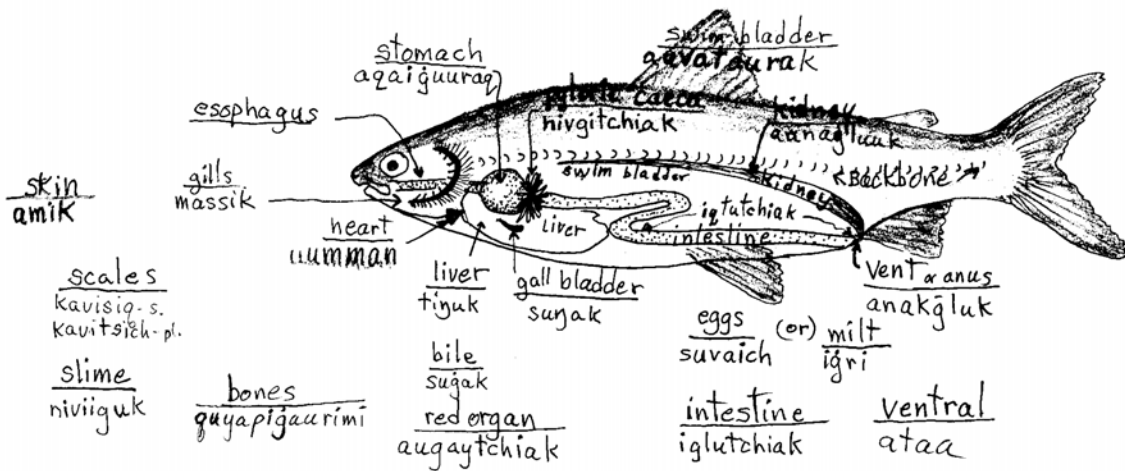
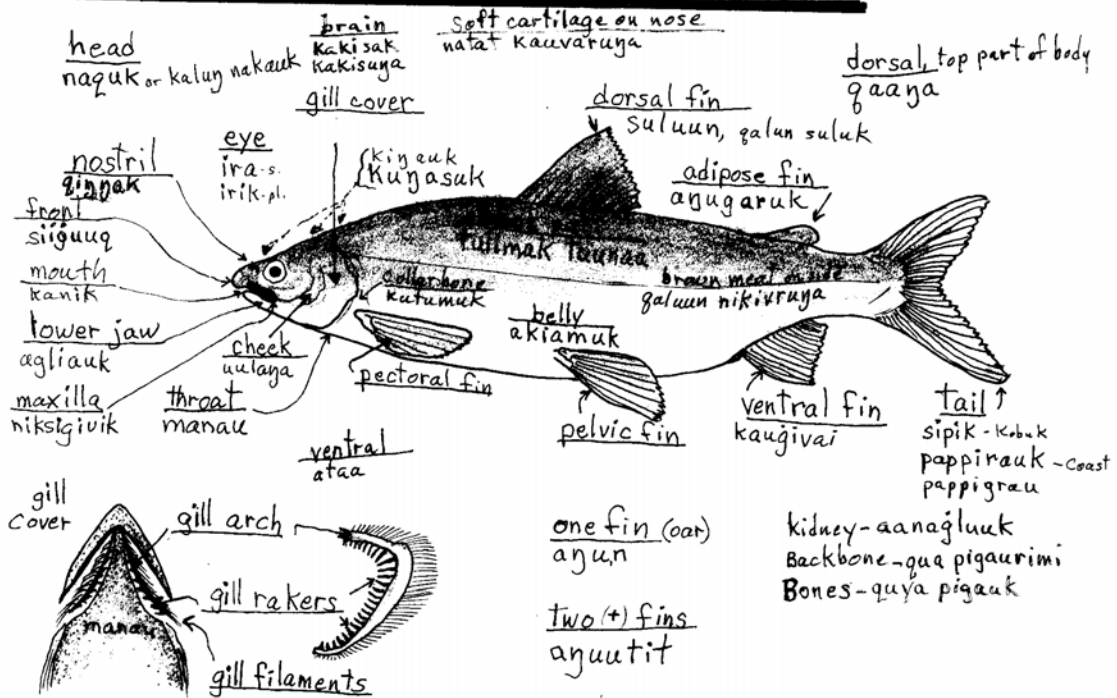
Pickle in rhubarb or
blueberries or cranberries

Air dry surface
store in oil

Fluff, half dry for aqutug

once cooked
never ferment or salt

INUPIAT FISH ANATOMY



FISH BIOLOGY

Excretion. The kidneys are a pair of dark red elongate organs directly under the vertebrae, that look like dark blood stuck up into the hollows between the vertebrae.

Fish that can be **eaten raw**—trout, the whitefish, grayling,

Fish that must not be **eaten raw**—all the salmon, mudshark, tomcod.

Fish with **fat liver and lean flesh**—tomcod, mudshark,

Fish oil. Fish oil has always been an especially valuable nutritive factor supplying high doses of Vitamins A, D, E and Omega-3.

Fish without **scales**—mudshark, tomcod, bullhead,

Fish with **scales not to be eaten**—pike, sheefish, grayling.

Fish with **scales too small to take off**—salmon, trout, sucker, flounder.

Fish skin contains sense organs, numerous glands like the mucous glands which produce slime, and color cells that are responsible for the intricate and often gaudy coloration. The skin also acts as a depository for a waste product "...known as guanin, which has the power of reflecting light and thus produces a white, silvery, or, on occasion, iridescent look."

Head stone. All but one of our fish has a stone in its head, a piece of material harder than bone, almost like shell. The mudshark has two stones, "...so it can make a fire as it travels..."

Heart. Fish have a single auricle and ventricle as compared to mammals which have a double of each.

Nervous system of fish—poorly developed: the brain is extremely small in proportion to the body, even insufficient to fill the cranial cavity. The lack of gray matter is especially manifest in the bony fishes (herring), wherein the cerebrum (traditional center of thought and reason) is almost totally lacking. The lack of development extends also to the peripheral nerves, which are relatively few.

Reproduction. Mudshark may have 28 million eggs and a herring only 21,000 to 47,000. Some fish spawn every year, while others spawn every other year or even every third year. Some carry two stages of eggs at a time.

Respiration occurs entirely through gills. Each of the gill filaments, which are attached to the outer curve of the gill arches, is richly supplied with blood vessels. As water passes over the gills, carbon dioxide (CO₂) and other wastes are discharged from the blood, and oxygen dissolved in the water is absorbed into the blood stream through the delicate membranes of the filament.

Scales vary in size or are absent. Age can be determined by annules, or annual growth rings in the scales.

Sense of sight. The fish's lens is round, spherical, and focuses by movement of the lens rather than by changing the lens's shape.

Sense of smell. The olfactory organs consist of deep pits lined with special sensitive tissue. The size and position of these organs on the head vary widely in different fish.

Swim bladders. Sacks of 'air', present in most fish, but not all fish have a swim bladder. It serves primarily as an organ for maintenance of hydrostatic equilibrium between the fish and its environment.

VILLAGE VIEW

Seasonal Fishing Cycle in Eight Villages

- **AMBLER**
- **BUCKLAND**
- **DEERING**
- **KIVALINA**
- **NOATAK**
- **NOORVIK**
- **SELAWIK**
- **SISUALIK**

In this section the sequence of fishing activities throughout one year are presented for different villages. The information is similar to that in the preceding recipes of fish-use except it is presented in a different context to honor how the different geography subtly alters how fish are used (inland or coastal, fresh- or saltwater). The interplay between geography and each fish's lifecycle governs what fish will be present at any given time in each village, how fat it will be, and how it will be used. The geography also determines the weather differences that influence how each fish will be used. In general, it is calmer and warmer inland and more windy and cooler on the coast. These subtle differences in temperature, wind, humidity, plus personal preferences, often dictate differences in the basic fish recipes. Furthermore, fish of the same species in each village may be used a bit differently due to their varying fatness as determined by food available and their spawning cycle. These details are important to notice when following traditional recipes because in certain cases they may make the difference between good foods and foods not safe to eat.

Village View is written from the perspective of a traditional elder in order to share the feeling of being a subsistence person dependent on local fish for one's food. This section is a summation of taped interviews with several Elders in each village as compiled by the investigator and comprises the information originally titled Elder's Review Project.

AMBLER SEASONAL FISHING CYCLE

Ambler lies along the banks of the Kobuk River just below where the Ambler River joins the Kobuk. All of the freshwater fish are there both those from the mountains and those from the lakes. The fishing cycle in Ambler is similar to that of Shungnak and Kobuk further up river, as well as Kiana down river.

Winter—December, January, February

Those with mudshark traps are checking their traps daily all through the dark, cold winter and into early spring as long as they keep catching mudshark.

Early spring—March and April

We go to certain deep lakes way out on the tundra to hook for pike and a few whitefish. In the days of dog team travel, we took our tent, wood stove, cooking gear, bedding and caribou skins for mattresses. We put our camp on the tundra, then spent the days making holes through the ice and hooking for pike. It took a lot of work to make a hole with a *tuuq*, sometimes there could be up to 6 feet of ice. It helps to have many people making holes to find where the fish are, but usually they are where water is running into or out of the lake and it is deep enough to have water under the ice.

Sometimes we haul poles there and put up drying racks to cut and dry the pike as we catch them. We cut them during the heat of a sunny day, behind a windbreak, because the temperatures can still drop to around 0°F. These freeze-dried fish are especially delicious because they dry soft and spongy. Today with fast snow machines we may go out to hook for the day and return at night with our pike to cut and hang at home.

Breakup—May

During breakup, we dry the fish left over from our fall ice fishing as they thaw out of the snow. *Qalushraq* are laid out whole to dry, on any surface, like the ground, a boat, or willows. The big *qasr!luq* we cut and hang to dry for dog food, or perhaps us, if they dry well. From those we save the stomachs and eggs to eat.

Early summer—June

Right after breakup, we put our gill nets in to catch sucker, grayling, whitefish, and occasionally mudshark. We eat them fresh and dry them in the early spring and all summer long. The weather is usually the best to dry fish now. If we get our nets in early the sucker will still have their eggs, which are a treat eaten raw along with the swim bladder and sometimes their intestines. The grayling are also spawning in the springtime, but just a bit earlier, so it is harder to catch them with eggs, unless you hook them where they spawn, back on the sloughs during high water, flooding from breakup.

Summer—July, August

The *sii* have reached Ambler and are about half way along in their journey up river to spawn. Likewise, their roe sacks are about half size, which on a big fish is already enormous. They are incredibly fat. We eat them fresh, freeze them, or salt them down to later put into vinegar to pickle. There is no way to dry them.

They are the most delicious of all the fishes, but they come in bunches and are so big that we must put most away for later. Of course we give as much as possible away to share with others. This takes extra time and work to get the fish to people who can use them. Freezing is ideal, but we can only hold so much in our freezer. We can salt down a barrel from one net-check to pickle and freshen later

The old people would dig a hole down into the permafrost ice and lay these large fat sheefish down there and cover them over with grass then dirt to keep them as cold as possible. They must be dug up just after freeze-up to freeze in the air in order to stop their fermenting, because the ground holds heat long after the air freezes. These might be good as *tipliaqtaa* *quaq*, but they probably will get too strong for people, but certainly be good for dog food.

Although most of the sheefish pass by in July, we catch a welcome few all season in our whitefish nets. Likewise, we catch a few pike, trout and grayling all season, but our main catch is humpback and broad whitefish.

In mid July and August, we change gill nets and fish for salmon to dry. By the time they reach Ambler they have lost some of their fat and are a bit easier to dry but we have to shade the racks well, and put them where they will get the most wind. We seine the salmon when they travel by in big schools, and eat them cooked, half-dried and dried mostly. Some people salt some down, and a few people ferment the heads in the ground.

Early fall—September

Each day the nets must be checked both the sheefish nets and the smaller whitefish nets. We get tubs of fish to untangle from the thin meshes, with hands either painfully cold, or frustratingly clumsy with rubber gloves. Nothing save enduring the intense pain of bare hands in freezing water can toughen them to endure the cold of ice fishing. The pain goes all through one's body, through one's bones, and makes one incredibly cranky. Then when the blood learns to surge extra fast through one's fingers to keep them warm, one has that easy feeling of hot hands, grabbing fish out of the icy water, nimbly untangling them from the net, mindless of the cold wind.

We are catching more whitefish again and less salmon and they are becoming colored as they approach spawning. As the weather cools and the flies leave, we start cutting the fish differently, to hold their eggs inside the body cavity to ferment as they dry. The whitefish are cut as *amatchiaq*, and the salmon as *aanaalik*. By September 12 to 15 we begin piling the big, fat, whitefish, trout, and sheefish for *tiplaiqtaa* *quaq*. The smaller fish are for dog food.

When the *qalushraq* come, we seine them and pile or sack them for *quaq*, for us and mostly for dogs. One October 4 we went seining and got 6 and a half gunnysacks full, with the ends sewn shut instead of tied so they held more, all that two people could move. To fill the sacks, two people held the sack open and two other people lifted the seine with fish in it and

poured them into the sack. It takes good co-ordination but is fast and efficient. Another year we got 23 sacks.

Freeze-up—early to mid October

Just before the river starts running ice we pull our summer gillnets and put them away for the winter. The edges of the rivers have been freezing for a while now so it isn't long before we can hook for grayling.

Early winter—October, November

Ice Fishing

All over this region, when the rivers and lakes freeze three or four inches, strong enough to support our weight, it is time to put in the ice fishing nets. There are local variations in each area, but the following description is taken from Ambler where there is a large, deep-water eddy just above town. A brief overview of the process includes first finding where to set the net, then chopping holes to string a rope under the ice, and pulling the net under the ice to set it.

To decide where we want it, we chop one small hole, (perhaps 10"x10"), big enough to drop a 2-plus lb rock tied to a long rope down to test the depth. It must be the depth of the net (4 to 8 feet), plus about three or four feet that the ice may settle during the month we are fishing, plus a bit more just to be sure our net doesn't freeze up to the bottom of the ice. There is no problem if it is deeper, but if it isn't deep enough, we move a ways and keep chopping holes and testing the depth until we find the right place.

Then we chop the hole out larger (about 10"x24") and while one person is chopping, the other watches the ice chips moving under the ice to trace the direction of the current and marks the direction on the ice. We want the net to be set in line with the current so it won't catch sticks and leaves, etc. or slush ice from open water further up river. From the big hole we stretch out our net in the direction the current is flowing, to get the length, and chop another hole at the end about two feet longer than the stretched net. If that is also deep enough, we can continue, otherwise we have to start all over somewhere else.

Our tools include two of the longest, thinnest poles we can find, one with a caribou antler hook lashed to the small end, and the other with a forked branch or antler lashed on the thin end. If each pole is about 12 to 14 feet long then we can cut the next hole about 16 feet away, 8 inches wide and about two feet long, and check for depth. We start from the up-current hole, drop the rope with a rock tied to it down and one person pushes the rope toward the next hole with the forked stick. The other person catches that rope with the hooked stick and pulls it on up through the hole. If that works OK, then we can go ahead and cut enough holes 16 feet apart to cover the distance, and hook the rope from one hole to the next.

Now we have a rope stretched under the ice and we tie each end to a block of ice frozen down, or to a stick or sled, anything to be sure we don't lose either end under the ice. We have brought two, eight foot Spruce poles, which we freeze into the ice about a foot away from the edge of each end hole at an angle over the hole to hang the net from. These nets are bought as under-ice nets, hung to sink, but we make sure that they will stay on the bottom, and not just at the ends, but all along the length of the net by tying heavy rocks (10–20 lb) to each end and smaller rocks (2–5 lb) along the length of the bottom line. We tie one end of the fish net (at the

big, or up-current, hole) to our rope under the ice, and straighten the rest of the net out so we can pull it under the ice without it tangling or twisting over itself. The end of the net by the big hole will end up set at the little, end hole. One person pulls the rope to pull the net under while the other person fixes any tangles as it slips into the water. Once the net is in, each end is tied up to the pole leaning over the hole so that most of the weight of the rock is on the bottom but some is keeping tension in the line to keep it taught up and down with a slight angle away from each other.

If it doesn't come out just right, we keep adjusting the pole with chunks of ice. The rope goes down through the middle of the hole so we can chop it free each day without cutting the rope. The rope we pulled the net under with, is left tied permanently to the far end of the net so there is no way one end can get loose. Setting an under-ice net is very easy if the ice is thin and clear, but it gets more challenging as the snows come and/or the ice thickens.

Most all the fish we catch under the ice are humpback whitefish (*qaalgich*) and broad whitefish (*qausri!uk*). These fish have gathered to spawn, so they are full of eggs and are not eating anything. When the fish are thick we check the net twice a day, then as the season slacks off we check it once a day until near the end when we may let a day or two go by in between checks before we finally pull it out.

To check net we go out with a pull sled, dog team, or sno-go, bringing our axe, *tuuk* and shovel. If there is fresh snow we shovel it away, then chop out both end holes, being careful not to cut the net ropes. As the ice gets thicker, we use a *tuuk* more, and smooth the edge of the hole so there is no jagged ice to catch the net. We check to be sure the rope is tied to the far end of the net, then start pulling the net out. It's a hard pull when it's full of fish and it has to be against the current or it will bunch up. First, the anchor rock is lifted up and set aside on the ice, then we pull the net out a ways and start taking the fish out. They are big, beautiful, silvery fish vibrant with life and thrashing frantically to get loose. We grab them with bare hands and slip, pull, squish, them out of the net, and throw them to one side in a pile. There they flop and arch until they freeze. Section by section we pull the net, then take the fish out, until the end.

To re-set the net, one person goes to the far end and pulls the rope to pull it back under the ice. The other person loosens the net, which has frozen to the ice, and untangles it so it will go in straight. If we wear gloves, we need a tool to hook the slippery mesh off the fish's gills, since we can't use our fingernails. It is made from a stick or antler with a nail in one end with the head half filed off. It has to be big enough to hold with awkward gloves.

If no ravens or fox are bothering the fish, we can pile them right there on the ice like firewood, until we start hauling them home with a sled after the snows make a good trail. Otherwise, we have to haul our fish home each day.

Hooking mudshark through the ice

After freeze-up, when the whitefish gill nets are set under the ice, we begin hooking for mudshark. A favorite sport for young and old alike is to spend a few hours each evening hooking, trying to catch more than the next person. Usually we chop out the hole sometime during the day and select fresh bait from our net check then return just after dusk with baited *niksik* (hook) and a light push sled to sit on until we haul our fish home. It can get very cold sitting there so we use warm clothes. It's a good way to become accustomed to the coming winter temperatures. To be more comfortable, if it is a good hole, we may build a windbreak shelter of some kind, a snow or ice wall, or a willow teepee covered with canvas, or put up a tent,

and make it a real nice place in which to spend time. Then fox can't steal any fish left there overnight when we catch more than we can haul home.

The best hooking places are along the shallow edges next to swift current or around the ice fishing nets where mudshark are attracted by the struggling whitefish.

Single, un-barbed hooks work the best because they are easiest to get out of the mudshark's mouth, in the dark, with cold fingers. Actually, sharpened coat hanger wire makes a good hook, strong enough, yet when we catch a fish, we just put our foot on the fish and pull the hook out by straightening the wire. Then we re-bend the wire into hook shape, bait it, and go after the next fish.

Sometimes, when we are checking our whitefish net we look down into the hole after hauling up a bunch of fish, and see a mudshark or two swimming lazily right there in the hole. If we are quick enough, we just scoop one out with a shovel, or snag one with the gaff hook.

Set hooks for mudshark

This also is the season for set hooks, which is another way of catching mudshark. Again, coat hanger wire works best, or use any large, single, hook. You make your gear first, either a long line with a weight and line to the top on each end, and pairs of hooks on one foot lines coming off the main line every three feet, or pairs of baited hooks tied to a pole stuck through the ice.

Mudshark Trap

Making and managing a mudshark trap is a highly sophisticated example of an ancient technology designed precisely around the biology and behavior of the local mudshark. It takes a huge investment in organization and hard labor to build a good trap, which is richly repaid in abundant fish all winter. Success on this scale demonstrates some brilliant inspiration in the past as well as many hours of keen observation over many lifetimes, and unknown amounts of hard labor building traps that failed or worked poorly, to achieve this high a level of success catching fish that move at night, under the ice, on the bottom of the river. To fully appreciate this, stand on the Kobuk River in December with a very hungry belly, and think how you will find food for your family.

Mudshark travel upstream all fall and winter along the edges in shallow water, feeding as they go, taking their time. Up to 100 or so may be taken each night from the trap, continuing in lesser amounts all winter long through December, January, and February. The catch tapers off considerably toward spring, when the fish are coming back down river more quickly in the current, after spawning. They still play around in the eddies and feed, so we catch them going both ways. A good trap will continue to catch mudshark right up until the ice rises and tears the trap apart as breakup begins.

There are many details that must be perfect or the trap won't work at all and many other aspects of construction that will cause more or less fish to get caught, depending on how well they are done. Usually several extended families will share in both the work of building and checking it all winter, and in the large amount of fish caught. There is a temptation today, to use chicken wire to speed up construction, but that is not ecologically right when it washes out with breakup, as traps do.

From the beginning, choosing the right spot is critical. The trap must be built where the bottom is gravel of just the right size—coarse enough to hold the poles and not wash out with the current yet fine enough so the poles can be driven in securely. The current must be just right, swift enough to keep the trap fresh, and entice mudshark up, yet not too swift, so it tears the trap

apart. The ice has to be the right height above the bottom, around 6 feet. Early November is the time to decide on the exact place for a trap where the water depth, current, and bottom are perfect. By then the ice has finished most of its dropping, and the water flow has stabilized.

The ice will drop more during the winter and will freeze thicker, so we want to start with the trap deep enough so there will still be enough water in March.

To make the trap:

Once we have chosen the exact place, we start by getting lots of poles. Before cutting the ice, we must have these poles ready, and long enough to both stick into the gravel a foot or so and still stick out above the ice a few feet, about 10 to 12 feet long. Poplars are used most often because they grow thickly along the river edge and they are easy to split. We also need a lot of willow brush.

After we have the poles and brush ready, we start cutting a long V in the ice about 2 or 3 feet wide. Drive pairs of poles into the bottom about a foot or two apart, flat sides toward each other and spaced 4 or 5 feet from the last pair. Then push the willow brush down in between the posts all along to completely block any fish. We just do a section at a time whatever we figure we can finish in a day, because the area chopped out will be full of water and then freeze that night to hold the posts and willows.

At the point of the V, leave a space for the 'throat'. This is pre-fabed with one or more split poplar poles along the bottom with their white faces up so we can see the fish as they pass.

Drive a single row of poles, tightly together, to form a holding corral then continue on with the rest of the wing. A willow funnel is made to exactly fit the throat and is fastened securely. Fish swimming against the current will go through the funnel but be unable to find their way back out. In smaller channels, a large woven willow basket is attached to the throat instead of the holding corral.

Once completed, check the trap every day or two. Chop out the ice above the holding corral and hook or gaff the fish out as they mill around. It is dark down there under the snow, ice and water, and hard to know how many fish are there, and then, where they are to catch them. Mostly we do this by feeling the fish with the gaff. Those bright white, split half-rounds of poplar help us see where the fish are to gaff them out.

That is the fun part. It's fascinating to look down and watch the fish on a bright day, but in stormy weather during December and January, there is not much light.

If there is a hole in the fence you will catch less fish and if there is a hole in the holding pen you won't catch any. If a fish gets caught in the fence and dies or you don't take all the fish out regularly and a fish dies, the smell will keep other fish away. That's why you don't want to injure any fish trying to get it out.

Our bright flashlights today would be a great help to use in this ancient operation.

(For more details, see *Kuuvangmiut* Subsistence, pages 189-198)

Noatak and Kotzebue people in the past fenced off much of a small channel or slough with their mudshark traps. They reversed the door of their trap in mid-winter to catch the run returning downstream in the spring.

BUCKLAND SEASONAL FISHING CYCLE

Buckland villagers primarily have fresh river waters flowing past their village but due to wind and tidal influences, the brackish waters come varying distances up from Kotzebue sound, sometimes past the village, bringing flounders and seal. Although the Buckland River is small compared to the Kobuk and Noatak Rivers, it has the same complex of ecosystems and all the same fish.

The Bering ciscoes only come up the river as far as Old Corral, while the suckers and pike usually only go down the river that far. Grayling, mudshark, trout, sheefish plus humpback and broad whitefish are caught by net during open water and by hooking under the ice.

Winter—December, January, February

A few people go hooking, even all winter, when the weather is good.

Early spring—March, April, May

We are really hooking fish through the ice these days as the sun gets higher and warmer. Some people only go to Kobuk Lake to hook sheefish and other people go to Selawik Lake. The sheefish are firmer in Kobuk Lake, must be better food for the *sii* (sheefish). The *sii* from Selawik Lake have a more mushy texture. The smaller sizes are better for eating and drying, like the 20 pounders. The bigger ones, like 60 pounds, get too fat living off Kobuk Lake good food. We used to go down and camp for a while and hook for sheefish, but now most people run down on their snow-machine to hook for the day and bring back their fish.

There also are trout, pike, whitefish and grayling in our river to catch. Sometimes the whitefish get snagged by the hook, even on their body.

Breakup—late May

Early Summer—June

Smelt come up the river to spawn for just one day and then they are gone. We are waiting for them and catch as many as we can to dry on the stones along the riverbank. Just as soon as our smelt are dry and stored in the cache, we head for Elephant Point to catch the herring. We dry those by laying them out on the grass. Then as soon as our herring are dry and put safely away we move camp and go after the beluga and next the *ugruk* (bearded seal). We can't think about the other fish now, we have to get what is most important at the time it is available. Buckland is famous for its good beluga *muktuk* (boiled skin with some fat).

Summer — July, August

(All five salmon are claimed to be caught here, and they would appear to each come in two runs by the widely varying information about which salmon is first, second, etc.) They are caught by gill net and seined further up the Buckland River.

Early Fall — September

Freeze-up — October

Right after freeze-up we start hooking grayling through the ice in front of town and on up river. Sometimes we set nets under the ice for whitefish where the water is deep and incidentally catch a few trout, mudshark, and grayling. We hook for tomcod and mudshark from town on down the river to the mouth and to Igloo Point.

Early Winter — November

Sometimes we hook tomcod right in front of town, but usually we go down the river on the ice and hook them closer to the salt water.

KIVALINA SEASONAL FISHING CYCLE

Kivalina village is on an island with a large lagoon behind it to the east. There are channels on either end where the fresh waters from the Wulik and Kivalina Rivers flow out and ocean waters flow in to the lagoon. The open ocean of the Chuckchi Sea borders it to the west. Kivalina villagers catch fish from the saltwater, brackish lagoon water and fresh water from the rivers. Kivalina is mostly known for its exceptionally fat, delicious and abundant trout which seek the springs in the Kivalina and Wulik Rivers for overwintering.

Most of the fishery is focused on trout year around. Traditionally, Kivalina has no pike, blackfish, sucker, broad whitefish or sheefish. Grayling can be hooked all year long, if you know where to find them! Least ciscoes, smelt and herring pass by in the ocean.

There is some salmon fishing for mostly chum salmon but a few pink, king, red and silver salmon are caught. Of the 4 whitefish here some humpback whitefish are seined in the fall and occasionally some Bering ciscoes are caught in gill nets or seined with the whitefish. Tomcod and Arctic cod are hooked through the ice. In 2002, we caught the first few sheefish ever seen here, right in the channel.

We get crabs washed ashore by storm waves. Some are a good 8” across their body. The flounders follow the crabs. Small clams and mussels occasionally wash ashore too.

Winter—December, January, February

We are hooking trout through the ice up the Kivalina and Wulik Rivers. They stay in the deepest pools. These trout are all sizes of Dolly Varden or Arctic char plus what we call ‘rainbow trout’ which are the brightly colored, spawned-out, trout that are very skinny. Sometimes the rainbow trout are so thick far back in the mountains that you can just snag them. They are there in July too, they live there the year around and they winter way up the creeks.

We hook trout through the ice of the rivers all winter long. Sometimes we catch grayling too. This winter was so mild we used a net in November and December. Usually we don’t use a net in the winter.

Early spring—March, April, May

We keep hooking for trout up the rivers, and it gets easier as the days get longer and warmer. Trout are the main fish we go after here year around.

By May there are many other foods to go after, like caribou if they are close and especially the sea mammals, so we don’t think about trout so much.

Breakup—June

In June the small trout, we call them *samaiyuk*, are so thick in some places way up the Kivalina and Wulik Rivers that they jump like rain, whitefish too. On the North Channel, the trout and whitefish can be gillnetted. We gill net and seine the trout when they are coming out of the rivers in June, right by town. We prefer fish about 16” to 20” which dry up well because they aren’t too oily, they keep well then. We hang them before there are mosquitoes and flies.

Three or four racks is enough for a whole year. We store these small dried ones in seal oil and not in the freezer, but in a cold place. The ones that aren't completely dried can ferment a bit and get good tasting.

The medium ones we dry just for a few days then eat or freeze them for *iyamaagtuk* (half-dry). The bigger ones we eat every-which-way or put into our freezers for *quaq* (frozen). Trout have eggs when they come out in June. There are no trout here in the summer because they are out in the ocean feeding. There are a few *qaalgigiq* (humpback whitefish) too, but we never hunt for them now.

Summer — July, August

In July the salmon pass by our beach going north, then later they come back down and pass by our beach going to Kotzebue. The pink salmon come first and are good fresh. The salmon are mixed but we have chum mostly. There are a few kings and they seem to be increasing slightly ever since the 80's when they first began coming here. We fish for the salmon in the channels between the ocean and the lagoon and in the lagoon with a gill net when they first come in. Some only go up river 6 to 10 miles or so to spawn, while others spawn over 40 miles upriver.

In late July to early August, the herring pass by, close to the beach. We can see them traveling and catch them with dip nets and gill nets. They come into the lagoon by the 1,000's, just come in and go out, then they get lost after July. A story is told that some people have seined for them with a 1" seine but it caught so many they had to let them all go, they were too heavy to pull in. Usually, at this time of year most people have gone to Kotzebue to fish commercially or to work, so herring are seldom caught here.

Fall time — September

By mid-August the trout start coming back and we get a few fresh fish to eat by gill net in the lagoon near the channel or by rod and reel. By late September or October, just before freeze-up, we go after the trout by seining when the temperatures are cool enough so the fish will keep for *tipliaqtaaqaq*.

We used to go up the rivers and camp for a month or so, all fall until freeze up. There would be 3 or 4 boatloads of people and their camps. We seined trout and the salmon were included. We made *anaalik* (hung with the eggs intact) with the female salmon full of eggs. There were some king and red salmon with the chum and pink salmon and more seem to come every year.

To store and ferment our seined trout, we made a nest with willows on the bottom and sides then covered the trout with willows too. We put lots of willows underneath so they wouldn't stick down and get too smelly. It is good to have air around them. The ones on the bottom got the strongest taste. Each person made his own nest of willows, and he judged how large to make it by how many trout he had seined. Different camps of people were a quarter mile apart on the river, seining, camping, hunting, having a good fall.

In the old days there were few bears, but now there are too many and they started tearing up our trout piles, so we have to bring the trout home to pile. However, there aren't good places

to pile them in town so we put them in sacks in our deep cold holes. Today most seining trips are for one or two days because we have fast boats and we can bring the trout home

Right after we seine the trout we seine *qaalgic* (humpback whitefish), just before freeze-up. We put them in sacks to make *quaq*. Rarely we catch a few mudshark in the seine too. This year we seined trout in October because it was too warm even in September. Then it rained. Rain spoils our *quaq*. They rot and don't freeze.

Freeze-up—October

We hook tomcod and arctic cod in the lagoon as soon as the ice freezes over. Sometimes there are so many cod, that they jump out of the water through the hooking hole! We may hook them anywhere on their body, even hook them by their tail. They are feeding on the bottom. If we leave our hook down too long, unattended, we catch *kanayuk* (bullheads). However, we never have tomcod for several years now. That is how the cod are—sometimes lots and other times nothing.

Cold holes

Kivalina people use the ancient traditional deep underground storage holes common throughout the Arctic. They are a unique technology for storing food where the permafrost keeps the ground frozen year round and provides a service similar to that of our modern freezers. These holes were made 20 or more feet deep and stayed frozen all summer, but when the outside air began freezing the lag in temperatures underground caused the food down in the hole to warm somewhat, although they stayed frozen year round. Food stored there had a special quality that is remembered as way better than food stored any other way because of the way the food aged.

These cold holes accumulated a gas that displaces oxygen, so they had to be well aired out before anyone climbed down to put food in or take it out. The gas caused a person to get weak so they couldn't think right or climb out, then they could suffocate and die from lack of oxygen. The top was constructed carefully over the cold hole with a little sod house that had a door to open and shut for access. It was very important that all rain was kept out of the cold hole. The little sod house also had a controlled air vent to provide cold air in the winter, since cold air sinks. In summer, the vent must be closed.

Orin Knox's cold holes had a large door so the cold hole would air out fast and a person wouldn't have to wait as long before going down to work. People usually went in groups so they could watch each other and help if anyone got weak from lack of oxygen. People carried their fish and meats down there to freeze and brought out what they needed to eat. Once a year they cleaned out the hole. Cold storages like this are still used all along the arctic coast.

Global warming causes problems with these old arctic technologies. People mention with alarm that the sea ice used to be 6' to 7' thick whereas now it may only freeze two and a half feet thick. By cooling a few months later in the season, the timing is off for making *tipliaqtaaqa quaq*, because when stored properly, the weather is too warm, and they spoil. If, on the other hand, people were to wait until the weather was cool enough, the trout would be unavailable to seine.

NOORVIK SEASONAL FISHING CYCLE

Noorvik village was built on a high bluff along the lower Kobuk River. People from there have all the freshwater fish plus easy access to the brackish water Kobuk Lake with its spring sheefishing. Especially now with fast transportation they also can harvest the fish of the coast.

Deep Winter—December, January, February

There is not much fishing going on now when the days are short and the temperatures are cold. This is the time we are eating the fish we have put away the rest of the year, the *quaq* and dry fish with oil and the fresh frozen fish to cook.

Early Spring—March, April, May

We start to find the schools of sheefish under the ice on Kobuk Lake. Lots of people love to go hooking for the *sii*. Sometimes we camp out down there on the ice like in the old days and other times we buzz down on our sno-go to hook for the day then come back with our fish to the warmth and lights of home.

We can always catch blackfish for dog food. They are in the lowland marsh lakes. My grandpa used to set a trap made with willows in a cone like for a mudshark trap with a gunnysack tied to the bottom. The willows were 3” to 6” below the bottom of the ice under a hole that the fish were keeping open.

Later in the spring like mid-April through May we like to go to a spring camp somewhere out away from town to camp over breakup. We go there by sled with dogs or sno-go and then come back home by boat after breakup. It is so nice to camp with light all the time, the geese and all the birds coming back, the ice melting, muskrat hunting, starting to catch fish—just living off the land and eating many different kinds of food.

Breakup—mid to late May

This a great time to be out in camp—fishing, hunting, traveling around and watching spring come back to the frozen world.

Early Summer—June

After breakup we fish for about a month for the pike and whitefish, mostly the *qaalgiq* and *qausiluk*, to dry. They are best to dry then before the weather gets too hot. We can catch the *sii* as they begin their spawning migration up the Kobuk River. Today most people love to go after the *sii* with rod and reel, but we are also catching them in our nets, the ones set in the river. Sometimes we catch the smelts as they pass by on their way to spawn below Kiana but sometimes they pass by deep down in the channel and we don't even notice them. Then we take

a break from fishing to go after the sourdock and rhubarb and go to church, to Friends Yearly Meeting.

Summer — July, August

By July, the salmon and berries are beginning and we still get a few *sii* in our nets or by hooking. Later we seine the salmon and whitefish from sand bars and dry them. Summer is always very busy between fishing and picking berries. Today many people have to go somewhere to work in the summer, which means more work for those who stay home. Some people have steady jobs, but they still want their traditional foods so they set a net and catch fish on a weekend. They take real good care of them, just for themselves, not for dogs.

This is a good time to smoke fish. We like to cut them differently so they hang well when they are smoked and dry. We cut the salmon the regular way only about an inch thick. We take off the backbone then cut each side into two strips to smoke. We take off the collarbones, although they are good food, but they leave a lump when packed so we take them off to save space in the freezer. We cut off the belly to salt down in a barrel along with the heads. We are sure to soak and press out all the blood because that makes a better product both salted and smoked. After this good washing, we hang them low until they stop dripping then we hang them up on the racks where we smoke them as they finish drying.

Everyone loves the salted fish and especially they love the pickled fish we make from the salted fish. We use 1 quart of vinegar to 3 quarts of water and no sugar but some pickling spices. We mix it all cold then pour it over our fish that has just some of the salt soaked out and stir it every time we pass by. We eat it when we can't wait any longer.

To ferment fish we dig a hole, line it with grass and put our fish down there and cover them well, just the heads and milt. Some people eat the milt but most don't, it just coats the heads. Most people here don't like it too strong. The people from down Bethel way are the ones who like it very strong, all green and slimy.

Early Fall — September

By now we are fishing again, this time to make our *tipliaqtaaquaq*. We get mostly *qaalgigiq* and *qausriluk* and some *sii*. The *qalushaq* are for their eggs and the fish are for the dogs. There are a few sucker but not many and not many grayling which are more back in the mountains or up the side streams. We cut the big fish as *aanaalik* and the smaller ones as *amatchiaq* and we cut the males the same as the females even though they don't have any eggs.

Freeze-up — October

As soon as the ice is strong enough we set our under-ice nets for the whitefish and a few *sii*. We start hooking for mudshark through the ice, and catch them in our nets.

Early Winter—late October, November

We are checking our under-ice nets and hooking for mudshark, all through October and November. (Some details of these processes are described in Ambler Seasonal Fishing Cycle.)

SELAWIK SEASONAL FISHING CYCLE

Selawik Village is surrounded with more water than land in a vast complex of lakes and slough channels. The Selawik and Fish Rivers drain out through this maze past the town and into Selawik Lake and then Kobuk Lake and on into the ocean. Selawik is most famous for its whitefish. From all over the region, people love the flavor and texture of their dried whitefish and pike. People from different villages like to eat the fresh and dried fish from all the other areas because they taste different and all the good fish food in the waters around Selawik make the fish here extra fat and good.

Selawik has year-round abundant whitefish both humpback and broadnose plus possible variations of these species which are locally considered separate types based on their looks, habits and edible qualities. There also are many sheefish and pike plus some sucker and mudshark. There are no saltwater fish or Bering cisco there but there are a few least cisco, round whitefish, trout and king salmon.

Deep Winter—December, January, February

In very warm winters, we may still be checking our nets under the ice, catching whitefish, *siulik* (pike), *qalupiaq* (trout) and sometimes *tiktaaliq* (mudshark).

When the days start getting longer, we begin hooking *siulik* through the ice by the *kugachaks* (the mouths of the little creeks and rivers). Sometimes we'd get *tiktaaliq*.

Later on, we start going down by Kobuk Lake and Selawik Lake checking for *sii* (sheefish). We keep jigging for *siulik*. They taste good in the winter, way better than in the summer. Their *suvaich* (eggs) are good.

Early Spring—March, April

We can still jig for *siulik* but we are getting excited about jigging for the *sii* on Kobuk Lake. Noorvik starts first. They start hooking earlier, because the fish are in that area. They find the *sii*, and start catching a few. When we hear that they are catching *sii*, we start going down. That's later in March when they come down this way. First, someone has to find out where the *sii* are—we have to work to get them.

In the old days, when we went hooking *sii* by dog team, we'd stay down there for weeks at a time, camping on the ice. We'd bring our tent and camp stove, our *qaatchiat* (mattress of caribou skin), and the feather comforters we had made. We'd follow the fish, hooking all day long. We'd move camp as the school of fish moved, and make *kallruch* (shelters) to protect us from the wind as we hooked for *sii*. We used to jig for *sii* like this until the ice got weak before breakup. We'd go back and forth between home and the fishing areas. When the slush comes, we'd stop hooking.

When the river edge gets open a bit, we set our nets even before breakup and catch *siulik* (pike) and *qalupiaq* (trout). Sometimes, different fish are mixed together in some places. Other sloughs always have the same kind of fish year after year.

Breakup—late May

Soon as the breakup ice clears out, we go to our fish camps to set our nets and really fish for whitefish. There are *ikkuiyiq*, and *siulik*, mixed. *Tiktaaliq* aren't as many by now, and soon they are gone. When there is no ice, we go back and forth to *Tuqfumaagruk* hooking for *sii*. They are jumping out of the water, lots of fun to catch.

The grayling are caught closer to the mountains, same as the *kanak*, or lake trout.

We catch lots of *milugiaq* (sucker) after breakup. My Dad sure likes to eat those sucker heads. *Qalutchiaq* (least cisco) are small but we catch lots for their eggs. We dry the eggs on a willow frame, then bake them and put them into fish oil. After we take the eggs out, we use the rest for dog food.

Early summer—June

We are still in fish camp and drying our whitefish and pike. Those people who didn't spend breakup in their spring camp will go to camp right after breakup. There are no bugs then, and the Selawik ice is slow to melt so the temperature is not too hot, just right to dry fish. Many people want our dry fish and we have to keep some for ourselves too. We catch *siulik* (pike), *ikkuiyiq* (a type of whitefish) and occasionally a *qalukpik* (trout) or *tiktaaliq* (mudshark).

Some fish spawn in the springtime when there is very high water during the breakup flood. When beaver block off the stream, the fish get trapped. This bothers us a lot, because fish runs are more important to us than beaver skins and meat.

Summer-July, August

Now it's too hot to dry fish and they get softer too in the heat so we pull our nets, unless we have to keep fishing to feed our dogs. We go after sourdock and rhubarb. There are king salmon that spawn in the Selawik River and we get them every chance we can. They go up the rivers to spawn, keeping in the middle and deep down so sometimes people don't even know they are traveling.

Suckers get thick in August, lots of them. Sometimes we just shake them out of our nets. Now some people seine *ikkuiyiq* up the Fish River a ways, but most of our fishing is by gillnets. *Qaalgiq* are called *ikkuiyik* around here. Some are real big like *qausriluk*. They are hard to scale so some just leave the scales on. These fish are always around, and we can set our nets for them just about any time all year. Certain sloughs also have lots of *siulik*.

The *sii* are way up the Selawik River now for spawning. They go up that river because it is clear. We can hook them now up there, with a rod and reel. They are very fat. At *Tuqfumaagruk* there are *sii* all summer, they go out in August.

Early Fall—September

The *qausriġuk* increase now, and there are even more in October. We make *paniqtuq* and *aanaalik* with them. Our *qausriġuk* are big here and when we cut them to hang with their eggs in the fall, we call them *aanaalik* instead of *amatchiaq*.

September 15th used to be the date we would start to put away fish for *tipliaqtaaġ quaq* but it has been too warm lately and we have to start around the end of the month, whenever the flies are gone. To make this, we take the guts out with two tiny cuts. Then we put the fish into gunnysacks and cover them with grass. We keep turning the sacks each day and keep them covered from the sun.

In the old days before there were gunnysacks, fish were put in baskets made from our grasses here. *Piliġuk* is the grass that was used to make these grass baskets. It can cut your hands when you run your hand along the edge of the grass blade. We never made grass baskets ourselves, because we always had gunnysacks to use, ever since we can remember.

Freeze-up—October

Soon as it freezes up in the fall time we put out our nets under the ice. We fish these nets, called *siku mataġ*, all winter long, even into February or later, as long as the ice is right. We mostly catch *qausriġuk* (broad whitefish) under the ice, but also some *ikkuiyiq*, *siulik* (pike), *tiktaaliq* (mudshark), *qalutchiaq* (least cisco), and *sii* (sheefish). We mostly use 3-1/2" and 4-1/2" nets. If we don't have dogs to feed, we use the larger mesh size so we just catch the bigger fish. The *sii* die fast so we have to check our nets every day. We also hook these fish under the ice all fall, especially the *tiktaaliq* for their good liver and eggs. We eat these fish fresh, freeze them, or cut and hang them so they freeze-dry to make *iyamaagġuk-paniqtuq*. This is especially good because the fat *sii* don't get rancid.

There are a great many blackfish around all winter if we want to go get them. They can be so thick that they seem to boil in the water because there are so many fish moving around. We scoop them out with a brailer or make a gunnysack trap to catch them.

We don't eat them because we have better food. If we were hungry, we would eat them. We would boil them well, and eat them, bones and all. Some people take out the guts and some people leave them in. They have real good eggs and liver which the old people would eat raw. Blackfish are always good dog food.

SISUALIK SEASONAL FISHING CYCLE

Although *Sisualik* is not one of the major population clusters in this study area, it is included as a reference point because there is a good cycle of fishing data available. The Kotzebue fishing cycle is similar. Both Kotzebue and *Sisualik* are on a peninsula bordering the Kotzebue Sound salt water, with a large brackish water lagoon on their other side. The Noatak, Kobuk and Selawik Rivers all join to flow past Kotzebue on their way to the ocean. This means that the water flowing past Kotzebue and *Sisaulik* beaches alternates between cold salt water and warmer fresh water from the rivers, plus all possible variations in between. Thus, they have access to all the saltwater fish and most of the freshwater fish, too, depending on the currents and seasons. (See **Deering** for discussion of how the currents move in Kotzebue Sound.)

Sisualik beach has no sucker, mudshark, grayling, round whitefish, pike, or blackfish, although all but the round whitefish live further back in the lagoon, sloughs and lakes. Smelt are available but not sought because that small a net would catch too many young and useless fish, good only for dog food.

Deep Winter—December, January, February

No one is camped here during the winter.

Early spring—March, April

When the weather is good we haul loads of firewood down to our camp to store for summer and fall use. Just before the trails become too soft to travel, we haul our camp down to the beach to begin our summer season. This is the time of year when we go hooking for sheefish on Kobuk Lake. We used to camp over there for weeks, hooking sheefish every day, following them around the lake. Now we usually go over for the day to hook, with sno-machine, and come back by night.

We also can hook tomcod through the ice or in the cracks in the sea ice along the beach. Sometimes there are bullheads too, but both fish are poor in flesh and good only for dog food. We always hook a few each spring just to see if they are still there and test how they are doing. When the creeks are flooding there may be a few whitefish that we can hook through the ice but not usually.

Breakup

After the lagoon ice floats, the herring come in to spawn. On some years we have gill netted herring back in the lagoon but not consistently. If there is a lot of ice, the herring may spawn elsewhere. Herring seem to need to get in to spawn while the water is cold, and out again before it warms up to the temperatures necessary for the eggs to hatch 14 days later.

The tundra water is flowing out, bringing whitefish. Some years we can push a gill net out between pieces of ice or in cracks in the sea ice and catch these first whitefish. Smelt and

herring are hooked off of *Nuguvaurak* Point and Kotzebue in the springtime, even while the ice is running out.

Early Summer—June

At this time, we fish along the *Sisualik* beach, albeit without a boat to use in setting the gill net or *kuvrachak*. Along the ocean, it is hard to keep a boat anchored during stormy weather, and boats are heavy to pull up and down the beach. So instead, we use a long pole to push the net out each time we set it. This pole is just a bit longer than the *Kuvrachak* and is made by lashing about five of the local spruce poles together. This technique has been used for longer than anyone remembers.

To prepare a net to be set this way, tie a gunnysack half full of gravel to the far net-end stick with a rope yoke that is adjusted so the net will float upright in the water properly. The yoke has a small rope loop to hold the end of the pole while pushing the sack, with attached net, out into the ocean. The technique to set the net out where it will catch fish just beyond the wave line goes like this. Wading out into the surf, use the pole to push the net as far out as possible, jerk the pole back to dislodge the sack and drop the gravel, then bring the pole back to the beach and pull it up.

In Figure A-1, Bob Uhl is retrieving the net to remove the fish. In Figure A-2, Bob is taking salmon out of the net. Both end sticks can be seen plus the net and gunnysack weight. The long pole is not visible; it is stored further up on the beach where waves won't take it. On the distant horizon lies the city of Kotzebue, visible on a clear day.



Figure A-1. Bob Uhl, Sisualik, ca. 1990.



Figure A-2. Bob Uhl, Sisualik, ca. 1990.

At first in early summer, the fish coming out are purely whitefish. Later sculpins and other fish are mixed in. All these early fish are lean, and about half are too skinny to use, desperate for food. These very skinny fish dry up like cornflakes and aren't of any worth. However, by selecting only the best, there are usually enough good ones to eat.

After several days of catching whitefish, the first sheefish may come out with a different color of water that is from the Noatak, more muddy than the lagoon water. The first sheefish are usually smaller and skinny from the Noatak mouth. Occasionally we catch a fat one. After several more days, more sheefish come out and they are usually in better shape and more worth eating and drying.

Then the trout come mixed with the sheefish, trout too skinny to cook, with a big head and snaky body. Some years there are many and some years only a few. These trout may be dried to make *aniraq paugmiituq*, which is a general term for trout and whitefish that are dried and stored in seal oil.

The whitefish are continuing sporadically. If they are finding many dead clams up in the lake they will trickle out, but if they are hungry, they will come out faster, looking for food.

The trout that come out later will be fatter because they have been finding food. Some of these trout have been up river for more than one year. Every year varies with how many fish come out, their timing, and how fat or poor they are, but the fish in better shape had a better winter.

The sheefish are continuing to increase in relation to how much the trout and whitefish decrease. Their stomachs are stuffed with four-inch tomcod which they must be following out to sea. This has possibly lured sheefish up to Pt. Hope and Kivalina for the first years in history.

They suffer when they get lost and find themselves in saltwater. That is why *Anigaaq*, *Akulaq* and other lagoons fill up with these young sheefish about 12 “ long and larger.

This is the time we pull our nets to avoid catching these little fish that we can't use and don't need for dog food. In perfect weather, these small, lean fish are marginally worth drying, but sheefish are delicate the first two days they are hung and require perfect weather to dry well. It is not known why so many sheefish are coming out now in the late 1990's, when they haven't before.

All this time we are waiting for the trout to come from the Kivalina direction because they are fat, not as fat as in the fall time but just right for our freezers. They are returning to spawn in their home streams where they were hatched. We don't know how many days we will have to get all the trout we want, this run may last for only a short while, or it may be long. In the beginning the trout come in schools that are so large they leave a wake, causing us great excitement. In muddy water, the trout get caught in our nets, but when the water is clear, they go around it. Then we use our net like a seine to trap the fish. Lots of people and kids help to scare the fish into the net and to pull it in. The skinny trout have finished traveling past us before these fat trout come.

Summer—July, August

The first salmon to come are usually caught at Sealing Point. This has been earlier lately because they are governed by the ocean water temperatures. All the other fish have diminished by the time the salmon show up. The pink or humpy salmon come along with the chums in large numbers, while the king, silver, and red salmon come sporadically and only occasionally. These humpies make good *paniqtuq*, and they are especially good when 2/3 dried and stored in oil.

The flounders and bullheads are here too ever since the end of the whitefish run and they are poor in flesh and not worth eating. They are thickest in our nets when there are few salmon, and when we are catching many salmon, they are fewer.

We are fishing salmon all of July, hanging them to dry whenever the weather permits, selling them, trading them, eating them fresh and half-dried, giving them away.

Around mid-July the humpback whitefish return, fat from their brief summer of good food. These are the same fish that moved out with the breakup waters in June. Now they are returning to their spawning areas up the rivers, except the ones that may have become trapped in the lagoons. We eat them fresh, half-dry and dry when the weather is good.

With the last of the salmon come the first trout around August 10th. They are coming back from the ocean, fat from good food, headed to over-wintering places. Now we can eat *tiñaulik* with the fat trout livers and the blackberries just ripening. A few of these trout are late spawners while the early spawners already came in. Late spawners continue thru several peaks and dwindle by September 1st. Occasionally a few pass by until mid-September.

Early Fall—September

Flounders thin out after the salmon run is over, then they fatten up and return with the tomcods and eventually get fat enough to be good eating boiled or dried by the end of September. They get better to eat, with time, but are gone by early October. The bullheads are

good to eat then too, full of liver and eggs. A few ugly, sheefish stagger back from the salt water. *Tipuk* follow the trout in varying numbers, maybe 5-10/night. Perhaps they are coming from the coastal lagoons that didn't close. *Tipuk* are a lagoon fish. There are still a few *tipuk* when the tomcods come, leaving no gap between them.

Tomcods show up fat and in good flesh for boiling, drying and half-drying their meat and making *tinaulik* with their livers.. They are passing by on their way to their spawning and wintering grounds near Kotzebue, when we catch them here in our gill nets. They are not here in *Sisualik* to hook through the ice as they are in Kotzebue. Herring are here too, but they aren't passing through but seem to be moving in and out feeding. Thousands pass by Kotzebue, seemingly too many to over winter, but they may get pushed by storm waves back into the sloughs of Kobuk Lake where many herring have been observed in the fall time. The sheefish are eating them.

Some years, when the *Anigaaq paa* closes, we have gone down there to fish whitefish at this time of year. When berry-pickers report lots of trapped fish, several families go there to camp and fish for winter *quaq*. We fish there when the weather cools off so our fish will age just right before they freeze. This is a uniquely simple fishery, requiring a shovel to dig a ditch in the gravel to create a current for the dammed slough water to flow out toward the ocean. Near the end of the ditch, or *qargisaq*, the water flows through the coarse gravel and the fish go dry. We pick them up and store them in gunnysacks for *quaq*. These are humpback whitefish mostly that came past *Sisualik* earlier this spring and have grown fat feeding on the good food in *Anigaaq* Lagoon all summer. Now they want to get out to travel back to their spawning areas, possibly up the Fish River.

River Freeze-up—late October

Ocean freeze-up—November

Tomcods have gone past here by the time the sea ice slush begins forming. Then the blue cod come, spawning fairly close to the beach where they gather in great schools, so thick that it looks black along the edge. If choppy waves come up at that time, the fish get thrown out on the gravel for us and all the birds and animals left here for the winter to feast on.

“Go out on the beach and look both directions. You will see a silvery sheen on the beach 2–3 feet up from the edge of the water. That is the gift of the arctic cod. Some years we have them, and some years, none.”

Now that the lagoon and rivers have frozen strong enough for sled travel, we move back into the forests to our winter cabin for the winter, away from the fierce winds and drifting snows along the open coast. When we need some of the food stored in the *sigluaq* we sled down to the beach camp, dig out the *sigluaq* and bring back what we want, barrels of berries, fish or black meat stored in oil, sacks of *quaq* or *paniqutut*.

HISTORY OF NIQUIPIAQ PROJECT

While visiting the village of Kivalina in 1960, I became fascinated with the local foods; their variety, the clever environmental adaptations used in processing, and the expediency with which these resources were gathered, prepared and used. I decided to document this traditional *lñupiaq* food wisdom, with a book called “*Niqipiaq*”, which in *lñupiaq*, means, “the real foods, the foods from the land”.

Three years later, my husband and I left the University of Alaska in February and traveled to the Kobuk Valley as part of a caribou study group. After the study, we became involved in the local lifestyle, and ended up spending the next 23 years in the area. We were intrigued by the depth of the elders’ wisdom and memory, and how vital that was to guiding daily activities throughout the seasons in their constant provision of food. Thus, we followed the Elders and their subsistence camps, looking for food, moving to where the fishing was good, and to where the caribou herds crossed in the autumn.

All this time I was tuned into foods, seeking to learn, practice, and eat what ever the land and waters offered. I kept notes, shot a few rolls of film each year and made some drawings. Unfortunately, many times a shot was not possible due to weather, or a drawing couldn’t be made with hands covered with fish scales, or a notebook or pencil wasn’t available as choice words were spoken, etc. Always, the work of living took priority, and money was never sufficient to develop much film, or buy adequate supplies. The first winter was spent 9 miles below Ambler village at Onion Portage, where we built our first sod house. Summers were spent in Kotzebue, earning a few dollars for necessities. Then five winters were spent at *Kapukagvik*, 21 miles below Ambler. We moved to live a mile above Ambler, and in 1972, adopted a Barrow *lñupiat* girl. In 1974, a second daughter joined the family, this time born in our fourth sod house.

In the early 1970s, we were camping up to 7 or 8 months of the year in a land where the ground is free of snow for 5 months. Each year, we moved our family and camp-gear down river 20 miles by dog sled in April, to spend over a month in spring camp. After break-up, when the river opened up, we moved back home by boat, planted a garden, stored our winter gear, packed our summer gear, and boated to Kotzebue. We camped at *Sisualik* beside Bob and Carrie Uhl, on Carrie’s native allotment. There the men commercial fished, while the women subsistence fished to feed the camp and make dried fish (*paniqutut*).

Before the ice began running in the autumn, we boated home, harvested the garden, exchanged summer gear for winter gear, and boated back downriver 20 miles to camp for the under-ice fishing. This 4 to 6 week camp was the most challenging, living in a 10’ X 12’ wall tent, with two small children, at first in diapers (before pampers were invented), with no close neighbors, checking the nets twice a day, and hunting caribou. The girls were homeschooled the first years, but by the third grade we stopped going to spring and fall camps, so the girls could be in school for the full season, but we continued going to our two and a half month summer fishing camp in *Sisualik*.

Bob Uhl had come to Alaska in 1946, with the Army’s 1st Combat Intelligence Platoon. They were fighting in the Aleutians with the Castner’s Cut Throats. Two years later, he was discharged in Kotzebue where he married Carrie Williams, a local *lñupiat*, and never again left Alaska. Together they followed the subsistence lifestyle typical for most in that era, but continued long after many others had moved to town and taken jobs. Throughout his lifetime

there, Bob made it a point to learn and practice everything possible about the traditional ways of living, especially the subsistence food gathering and preparation with which Carrie had grown up. This report includes some of their extensive knowledge of these subjects from both the expansive, multi-faceted *lñupiaq* viewpoint as well as from the inquisitive scientific mindset that seeks to analyze and understand everything.

For 14 years, our family camped each summer with Uhls. During those days, many hours were spent discussing the nuances and details of processing the local *lñupiaq* foods. Practically everything in this report was discussed then, but only that which was recorded in journals is now available.

In 1981, Fred Wemark and I developed a \$100,000.00 grant through the *Maniilaq* Association, from Indian Health Services' Nutrition Program to develop my notes into a book documenting traditional *lñupiaq* food wisdom. As I began organizing my notes, it became apparent that there was far too much information for one book and that it would take four books to do justice to the richness of *lñupiaq* foods. Being a botanist by training, I began with the plants and wrote *Nauriat_Nigiñaqtuat, Plants That We Eat* [Jones 1983]. This ethno-botanical recipe book identified the edible plants in the region covered by the Northwest Arctic Native Association Corporation and discussed in detail the traditional ways to gather, prepare, and eat them. The 2,000 copies were distributed exclusively by the non-profit *Maniilaq* Association and were much appreciated, but are now gone and need to be reprinted.

In 1986, our family moved to central California, but I have returned to the area for a visit almost every summer. Work on this fish report continued slowly until 2001, when the National Park Service offered me a 6-month contract to process the fish notes. This didn't happen because I could not create something of use to the Park Service in that short amount of time. Then in 2002, this project began with the Fisheries Information Services of the U.S. Fish and Wildlife Service with the objective of completing the organization of this fish information as a report. I intend to continue improving this information until it is ready to publish in book form.

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