

**The Subsistence Harvest of Herring Eggs
in Sitka Sound, 1989**

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I. INTRODUCTION

This report documents the non-commercial harvest of Pacific herring (*Culpea harengus*) eggs on western hemlock branches, on hair seaweed (*Desmarestia viridis* sp.), and on macrocystis kelp (*Macrocystis integrifolia*) that took place in the Sitka area in April and May, 1989. Field observation of the harvest and interviews with elders and key harvesters supplied most of the information presented in this report. Additional information was available from historical documents describing herring roe harvest in Sitka Sound. Some quantitative data were available from earlier research conducted by the Alaska Department of Fish and Game (ADF&G) Division of Subsistence in Sitka and in other communities that use this resource and from permit files kept by ADF&G.

In prior Division of Subsistence community studies conducted in Angoon in 1985, Hoonah in 1986-88, Haines in 1983, Kake in 1986, Sitka in 1983, and Tenakee Springs in 1983, we found that harvest and receipt of herring eggs from Sitka Sound was part of the seasonal round of subsistence activities (Gmelch and Gmelch 1983, Mills et al 1983, Leghorn and Kookesh 1987, Mills and Firman 1986, Firman 1989, George and Bosworth 1988, Schroeder and Kookesh 1990). The Tongass Resource Use Cooperative Study (TRUCS), conducted in 1988, provided a current measurement of the level of herring egg harvest in all major communities in southeast Alaska. This information is summarized in this report.

These earlier studies provided harvest levels and gave an indication of the importance of the Sitka Sound herring eggs harvest to many southeast communities. The goal of the research reported here was to describe how the subsistence herring egg fishery takes place and to examine the distribution and exchange of herring eggs from Sitka Sound to other communities. This study was designed to complement existing studies by providing a description of the 1989 Sitka Sound subsistence herring egg harvest.

The following sections of this report describe the methodology followed in the field study, the historic herring egg fishery in Sitka Sound, contemporary patterns of harvesting, harvest estimates from other studies, and directions for further research.

II. METHODOLOGY

The research design for this project was prepared in early April, 1989, and circulated for comment to Sitka area ADF&G biologists, Fish and Game Advisory Council members, and to other Sitka community members. The research design identified key questions to be answered in the research and the primary research tasks to be undertaken. The main research tasks were:

1. Review of existing information and literature;
2. Contact with ADF&G staff, Sitka Community Association, Sitka Fish and Game Advisory Committee, and other individuals concerned with the herring egg harvest;
3. Develop of research questions and interview schedule;
4. Identify known very active harvesters from key informants and interview selected high harvesters;
5. Interview clan elders about historic patterns of harvesting;
6. Record distribution of eggs from selected high harvesters;
7. Record shipment of eggs by common carriers to other SE locations;
8. Identify communities known to have sent people or boats to harvest eggs in Sitka; and
9. Participant observation of harvest and processing of eggs on branches and eggs on hair seaweed.

Most field work on this project was done by Matthew Kookesh in late April and early May, 1989, during the period of active harvesting.

III. THE HISTORIC HERRING EGG FISHERY IN SITKA SOUND

According to elders we interviewed, Sitka was considered the herring egg capital of the northern portion of southeast Alaska before the colonial period began. Although herring spawn was collected elsewhere in the northern part of southeast Alaska¹, the harvest in Sitka Sound was particularly valued.

The sheer abundance of spawn and the length of the spawning period has made the Sitka Sound harvest special both in the historic and contemporary period. Numerous informants spoke of the whole of Sitka Sound being white with spawn during their childhoods and told of unattached eggs washing up with the tide two or more feet deep on shore². The whole area would be pervaded with the smell of spawn. We also heard that, in times of high herring abundance, herring were frequently stranded or beached in large numbers after being frightened by seals, sea lions, or other predators; beached herring were a spring food source for birds and furbearers. Herring generally have spawned in Sitka Sound over a period of two or more weeks; informants report that spawn in other parts of northern southeast has usually been of shorter duration. Since it is difficult to predict exactly when herring will spawn, harvesters have had a much better chance of getting a good quality product in the quantity that they need from the longer spawning period in Sitka.

In this early historical period members of many communities would come to Sitka during the spawning period to harvest eggs for their own use or for trade. We were told that people coming to

- 1.Herring spawn near Angoon and Hoonah was sometimes harvested. Local herring spawn figure importantly in a story from Hoonah. After Huna Tlingit were forced from Glacier Bay by the ice advance, they were camped near the present location of Hoonah. Food was in very short supply. Some young men came back to the camp after unsuccessfully foraging for food and told the elders that the sea bottom close to shore was white near Long Island. Elders sent them back after telling them to pull sticks through the white bottom. The young men did this and returned with canoes full of thick herring spawn. Hoonah residents report that, since a log transfer facility was built on this site, the amount of herring spawning has declined and that egg harvesting has become infrequent. Auke Bay and areas near Klawock were other areas where herring eggs were commonly harvested. Herring have not spawned in Auke Bay in abundance in recent times.
- 2.We examined beaches near Sitka following the 1989 spawn and found small quantities of unattached eggs washed ashore, well under one inch in depth. In years when there are storms during the spawning period, more eggs may wash up. The ADF&G management biologist in Sitka has seen three feet of eggs on beaches after storms (DeJong, 1989).

Sitka for the harvest usually had clan ties with Sitka clans. To start off the welcome of the out-of-town guests, the Sitka Tlingit had a herring festival. The out-of-town guests would send a runner in to let the host know that they were coming. The guests would stop at the site of old Sitka and prepare for the festivities by donning robes, crests, and other clan emblems. One elder reported, *When people are coming for herring we went into the water waist deep to steady the canoes and carried the women ashore.*

Some elders recalled that visiting clan members would stay at island camps near Sitka that were used by local branches of that clan. Informants agreed that the Sitka Sound herring egg harvest was open to members of other communities who were free to harvest eggs where and in whatever quantity they wished. One elder told us, *my grandfather will not slap my hand if I reach into his bowl,* meaning that clan relatives have customary rights to use foods in another clan members area.

Written records corroborate the oral history and document the history of herring spawn harvest by Tlingits living in the Sitka Sound area or coming from home communities for the harvest. Marchand visited Sitka as part of his 1790-92 voyage (Fleurieu, 1969) and wrote

The principle food of the natives of Tchinkitanay {Sitka Tlingit} is fish, fresh or smoked, the dried spawn of fish, of which they make a sort of cake³, and the flesh of the animals that they kill.

Captain Richard Cleveland visited Sitka Sound on a trading voyage in 1799. He mentioned two groups of Indians present in the sound on April 2.

The following morning, the natives came soon after daylight and began without hesitation to dispose of these furs to us,.....Our linguist recognized them to be the Hoodsnahoo tribe {Kootznahoo Inlet or Angoon Tlingit}, who had come thus early to the coast to get a supply of the spawn of a certain fish {herring} which constitutes their principal food in the spring of the

3. We have no recent references to use of a pressed cake of herring eggs.

year. As this tribe had attacked the cutter last year, alone, we thought it not improbable that, now that they were united with the Norfolk Sound tribe {refers to Tlingit in Sitka Sound}, they might determine to make another attempt (DeArmond, 1978).

Rezanov wrote that over a thousand Kolosh (Tlingit Indians) had come to Sitka Sound and were present for the herring egg harvest on Mar 22, 1806 (Pierce, 1972). Khlebnikov, who spent much time in Sitka during his work in North America as a manager for the Russian America Company from 1817 through 1832, wrote

The Kolosh {Tlingit} of Sitka begin preparing food in February when the herring come in. They do not preserve this fish because it molds and spoils easily; but they do preserve the roe. The Kolosh know when the herring spawn, and prepare a wicker container, tie it, and submerge it with stones in the water near the shore. The released roe settle on the wicker, which is then taken from the water and dried in sun or just in the air. When the roe is dry, they remove it from the wicker and keep it to use..... In addition to fish, raspberries are preserved and eaten with herring roe, thus making a tolkaska⁴ (Klebnikov 1976, orig. 1861).

Indians continued to come to Sitka Sound for this harvest despite the recent war with the Russians at Sitka. Krause (1979, orig. 1885), in writing of events in Sitka in the early 1800s, reported that

From 1821 to 1826 Murawief administered the {Russian} colonies.....In the springabout one thousand people assembled there {Sitka Sound mainland} and perhaps as many again on the neighboring islands to gather the eggs⁵.

4. Other sources do not mention the use of wicker or baskets for use as deposition strata.

5. Tlingits continued return to Sitka Sound for herring egg harvest even after the war with Baranof. Many Sitka Tlingit lived in Peril Strait near Sitkoh Bay in the decades immediately following the war (Thornton 1989; Price 1989).

Krause arrived on a field trip to Sitka on April 25, 1882 and reported:

Everywhere along the beach I see fisheggs {herring eggs} being dried on strings hung up between poles. Some fisheggs are spread on rocks and cloths (McCaffrey 1981, orig. 1881-82).

One informant told us that Father Duncan, founder of Metlakatla, recorded 20,000 people in Sitka for a herring festival, sometime in the late 1800s. This estimate is probably exaggerated, but it does indicate that many people from other communities in southeast came to Sitka Sound for the harvest. Moser (1899) described the herring egg harvest in southeast as follows:

In April the herring come to the shores in countless numbers to spawn, depositing their eggs in the sea grass, rockweed, and on the bushes hanging in the water. At this time the Indians plant hemlock twigs at the low-water mark, where they become covered with spawn, after which they are gathered in canoe loads. The spawn is heaped upon the twigs, to which it adheres in grapelike clusters, which are sometimes called "Alaska grapes," and is consumed by the natives in large quantities, either fresh or dried, and cooked as occasion demands, and for winter use. Usually it is eaten with rancid oil, which is the sauce that goes with all their delicacies, even the berries.

The Tlingit language has a developed vocabulary for herring harvest, trade, and barter of resources shown in Table 1. This reflects the importance of subsistence harvest of herring eggs.

TABLE 1. Tlingit nomenclature related to herring egg harvest and trade⁶.

Hemlock = <i>yan</i>
Young hemlock = <i>tukl'</i>
Hemlock = <i>haaw</i> (for herring eggs)
Macrocystis kelp = <i>daaw</i>
Hair Kelp = <i>ne</i>
Yellow seaweed = <i>tayeyidi</i>
Herring = <i>yaaw</i>
Herring oil = <i>yaaw eexi</i>
Herring rake = <i>xidalaa, xitlaa</i>
Herring eggs are generally referred to as <i>haaw</i> , <i>daaw</i> , or <i>ne</i> depending on whether the substratum used for egg collection is hemlock branches, macrocystis kelp, or hair seaweed respectively.

Types of Exchange

aat yax = exchange, general.

aa daa seix = fair exchange. What ever you feel is fair exchange. If a person feels it is not fair he says:

aat dei akwstaak = I will add this much more on top of it.

aa yeen dax = Split right in half such as a catch of fish between two partners. Elders said that Tlingits were always fair to each other in order to always protect good will.

ku kaa.u = I will buy. This type of exchange came in with the use of money in transactions.

at wu hoon = Selling, this type of exchange also came in with the use of money in transactions.

aa wu.xa = A certain relative can come and take part of your harvest without asking for a share. It is just understood. He just takes his share.

du kaanix di gee du = (material things from a relative) A *love gift* is prompted by the receiver and involves unequal exchange. For example, the receiver will give you less than the value in return, and you have to accept. Usually when a food gift is given, it is received with the understanding that it shall be repaid with fair exchange. If the gift is not repaid then no other food gift will be given until the debt is paid.

Historic Harvest Methods

At least two types of western hemlock were recognized by informants- smooth and scored bark. The type with smooth bark was preferred as a collecting strata for herring eggs to the variety with scored or indented bark. Eggs deposited on the second variety tend to pick up dirt and plant material from the variegated bark. Both branches and small trees were cut. Trees and branches with full foliage have been preferred since they provide more strata for egg deposition. For this reason trees

6. Transcription of Tlingit words follows the system proposed by Naish and Story as closely as possible. Spelling for some terms were supplied by elder Tlingit speakers we interviewed and may differ slightly from the Naish and Story system for writing Tlingit (Davis, 1976).

on the forest edge or recent regrowth have been preferred for herring egg harvest. Trees and branches were usually cut and placed in the water in advance of herring spawn.

Hemlock branches and small trees were set just slightly outside the intertidal zone in areas where herring were known to spawn. Strata were weighted with rocks or other heavy objects so that they would hang vertically in the water column with the weighted end on the bottom. Branches and trees were set individually and in skates. Sets were made from canoes and directly from the beach. Since spawn might not appear at a particular location, harvesters tended to set branches in a number of locations. Hemlock sets were checked regularly for presence of spawn. When spawn was thick enough, hemlock sets were cut into manageable pieces and brought ashore by canoe for processing. Branches with thin spawn, branches with spawn that has become sandy from unsettled weather, and branches with over-ripe spawn were left *in situ* to hatch⁷.

Herring eggs on macrocystis kelp and on hair seaweed were generally harvested from naturally occurring beds. Of these two, eggs on hair seaweed, *ne*, was preferred, possibly because of its abundance, ease in processing, and the neutral taste of this strata⁸. *Ne* grows in the intertidal zone. If presence of good spawn coincides with large tides, *ne* can be gathered by hand or with a short rake. Under other tidal conditions, a long rake or a grapple was used to reach submerged *ne*. As with *haaw*, *ne* was brought ashore by canoe for processing.

Eggs on macrocystis kelp were harvested from canoe. Less was said about use of this strata than about *haaw* and *ne*⁹. We heard some reports that macrocystis kelp was occasionally cut from a

7. Because spawn can develop on hemlock branches, excess sets of hemlock do not damage the resource.

8. Other Native groups may prefer other strata for deposition.

9. Some interesting speculations can be made about the ecological relationships among sea otter, sea urchins, and macrocystis kelp. Perhaps low sea otter populations allow large sea urchin populations which keep macrocystis kelp grazed down.

During the recent historic period sea otter populations have been low, so use of macrocystis kelp as a strata for herring eggs might also be depressed.

kelp bed and transported to a spawning area where it was then set as a strata. This probably took place occasionally, but it was not a major characteristic of harvest.

Other strata have occasionally been used for herring egg collection. Informants told us they sometimes used a rockweed, *Fucus distichus*, called *te tayeidi*¹⁰ for a stratum. We also learned of a *Japanese set* in which blueberry bushes are used as a stratum. Informants recall that this item was sold to Japan at one time¹¹.

From our interviews with elders we believe that most Sitka Tlingit clan houses participated in the herring harvest in the historic period. Given how highly prized herring eggs have been as both a food and a trade item and the methods of harvest and preservation used, harvest levels were probably substantial. A traditional household unit included all persons living in a clan house and may have totalled 50 persons or more¹². A household planning a potlatch or payoff party may well have planned to harvest enough eggs to feed hundreds of guests over a number of days¹³. A household actively engaged in traditional trade and exchange would likely dry large quantities of herring eggs for this purpose¹⁴. Based on these uses for herring eggs and interviews with elders, we can roughly estimate that a harvesting household may have taken from 500 to 10,000 lbs of herring eggs, depending on household size, anticipation of coming potlatches and payoff parties, and involvement in inter-village trade and exchange of eggs.

10. Literally "hanging from a rock". Eggs deposited on this strata are harvested commercially in the Togiak area and sold in Japan (Immamura, 1989).

11. We have no information on this sale or the quantities of herring eggs sold. Informants stated that sale was banned because of possible damage to blueberry bushes, known to be eaten by deer. Some informants saw sets of blueberry bushes in the 1989 harvesting season. They thought that some illegal sale of eggs on berry branches may be taking place, since they did not know of use of herring eggs on blueberry bushes by southeast Alaska residents.

12. Tlingit families traditionally lived in clan houses with large numbers of related people living under one roof. A clan household was typically made up of matrilineally related nuclear households.

13. Potlatches or payoff parties are traditional Tlingit celebratory feasts in which a clan of one moiety honors or "pays off" a clan of the other moiety. These may be associated with death rites, house building, or other life cycle events. Large quantities of special food is gathered and prepared for feeding guests and for distribution as gifts. Preparation for a payoff party was an expressed purpose of part of the Angoon herring egg harvest in Sitka Sound in 1989.

14. Dried eggs were needed for exchange with trading partners and for more loosely structured trade. Sitka Tlingit traded well into interior communities in what are now British Columbia and Yukon Territory.

Historic Preservation and Utilization Methods

Historically, herring egg laden hemlock branches, hair seaweed, and macrocystis kelp were taken to preservation areas for processing. In the precontact and early contact period, air drying of herring eggs was the preservation method used. Because they were close to harvesting areas and usually had good winds for drying eggs, the islands in Sitka Sound were used by all the Sitka clans and visiting relatives from around southeast Alaska. The islands were known as ideal drying areas because the wind would blow through the trees without obstruction. Egg laden hemlock branches, hair seaweed, and macrocystis kelp were hung on tree branches to air dry. Children would take the branches and climb up the tree and tie off the eggs to the overhanging tree branches¹⁵. Ne was also dried on rope strung for that purpose. Swanton (1905b) described this preservation method,

When covered with eggs, these boughs were lifted into the canoe, carried ashore, and placed to dry on the branches of a tree which had been stripped of its smaller twigs. To raise them into place there was employed a large wooden hook taken from a tree where a branch comes off, and it was thjen a comparatively simple matter, but after they were dried the eggs became very brittle and had to be handled with care. Hemlock boughs are said to be used in preference to others because they leave no peculiar taste.

Respondents remember seeing whole trees white with drying eggs, and some problems occurred with the seagulls landing by the eggs¹⁶. Herring eggs took about four days to dry, depending on the weather. Dried eggs were stored in boxes for trade and local consumption. Traditional bent wood boxes were originally used for this purpose. Later on, use of fish packing boxes became common.

15.A number of elders now in their 70s recall doing this as children.

16.These herring egg drying trees can still be seen around Sitka and are marked by long trimmed branches parallel to the ground. Trees were trimmed to be good for drying.

Fresh herring eggs on all strata were eaten after being rinsed in sea water to remove sperm or milt¹⁷, briefly blanched in boiling water, and dipped in seal oil. Dried *haaw* were reconstituted by soaking in salt water. The reconstituted *haaw* were then cooked and eaten as the fresh product. Dried *ne* was sometimes eaten without soaking. Some specialty food items may have been made by pounding dried eggs (Petrov, 1880). In addition to being a prized subsistence food in daily diet, both fresh and dried herring eggs were needed for potlatches and other important feasts.

According to our elder informants, preservation methods began to change with the arrival of fish-buying schooners in the 1880s. Schooners salted fish, and Tlingits experimented with salting herring eggs. Fresh eggs were kept in heavy brine for three days, and then drained and packed with dry salt. The dry salt would pull even more liquid out of the eggs. Eggs were reconstituted by soaking to remove the salt.

The opening of the cold storage in Sitka in about 1915 led to further change in preservation for some households. The cold storage rented out freezer space, some of which was used for storing of herring eggs. People started to get home freezers in the 1940s and began to use them to store eggs. Freezing has become the most common preservation method today, although we were told that some people continue to dry or salt small quantities of eggs.

The use of camps on islands for harvesting and drying of herring eggs declined over time. We were told that Tlingit use of many of the islands in Sitka Sound was eliminated or restricted when fox farms were established early in this century. Later on, power boats made it possible for harvesters to return to locations closer to home for herring egg processing. As freezing supplanted drying as the preferred method of preservation, island camps, with their good drying conditions, were no longer necessary or generally used.

17. Some respondents living on the east side of town complained that it has been difficult to get clean sea water on the east side of Sitka due to industrial pollution. Herring eggs are presently harvested well away from the pulp mill which is located close to Herring Cove in Silver Bay.

Historic Trade and Exchange

Extensive trade networks existed in southeast Alaska before the Russian period. Herring eggs, sea otter pelts, and fur seal pelts were some of the items available to Sitka Tlingits that were widely traded. This strictly indigenous trading network enlarged during the historic period as Tlingit became middlemen between Russian traders and tribes in the interior of Canada. Later on they were middlemen trading between American independent traders and Hudson Bay Company trading posts on the Canadian coast and interior Indians.

Sitka traded with members of other tribes for specialized foods such as soap berries, hooligan oil, dried hooligan, nagoon berries, high bush cranberries, dried seaweed, and mountain goat meat, and prized raw materials and craft products such as mountain goat fleece, sheep horns, horn ladles, wolverine fur, dyes for Chilkat blankets, baskets, copper, and other items. Elders told us that dried herring eggs were traded as far as the Yukon Territory. They were gifts to the Asek, Klukwan, Stikine, and Taku tribes that required gifts for passage into interior Alaska and Canada. Trade took place both with members of other tribes coming to Sitka and members of Sitka clans going to other areas.

Sitka traders frequently had trading partners in other communities with whom they had regular exchanges over the years. With a trading partner, payment or exchange of other items for those received would not be expected to take place immediately. While some of the trade and exchange was carried on through a system of direct barter, economies of southeast Alaska also used other currencies throughout the 1800s or earlier. At time of contact, sea otter and fur seal pelts, seal and hooligan oil, dried salmon sides and strips, dried herring eggs, and other indigenous trade items were probably cross-valued, meaning that the value of one item could be expressed in terms of the quantity of another item. Blankets, rifles, bullets, buttons, and beads became an introduced currency early in the 1800s and, along with furs, were used as a medium of exchange. Cash was well established

in the late 1800s. Traditional trade and exchange of subsistence herring eggs included these currencies and cash.

Based on interviews with elders and our review of the literature on Tlingit society (cf. de Laguna 1960, 1972; Krause 1979; Landon 1977; Oberg 1980; Swanton 1908, 1909) most trade and exchange in traditional Tlingit society was reciprocal, that is, the giver almost always expected payment in kind or in currency in return for the gift¹⁸.

Elders we interviewed thought that trade in herring eggs was a very important part of the traditional subsistence seasonal round when they were growing up and in the preceding historical period. Based on the importance elder informants placed on herring egg harvest and on trade and exchange of dried eggs with other communities, we would estimate that a substantial portion of the total herring egg harvest in Sitka Sound was traded to or exchanged with other communities¹⁹.

Along with changes in preservation methods, changes in transportation systems in southeast Alaska have altered the way trade in herring eggs takes place. Before other methods of preservation and transport were available, herring eggs for trade were dried and then transported in water proof packing in dugout canoes. Although some change may have occurred with use of sailing vessels for transport, bigger changes took place with increase in motorized vessel traffic in southeast with commercial fishing boats, barge lines, and other commercial carriers moving herring eggs for trade in the early part of this century. With the availability of much faster means of transportation and a shift to freezing as a preferred preservation method, fresh herring eggs have become the main item that is traded and bartered. Eggs are used fresh or frozen by the recipient. These are transported by fishing

18. An elder explained how his household sent eggs to Yakutat and received hooligan. He said that he would stop sending the eggs to Yakutat if he did not get hooligan or other products in exchange. In anthropological terms, this type of "balanced reciprocity" can be contrasted with other non-reciprocal forms of distribution and exchange found in other hunting and gathering societies. In contrast with some hunter gatherer societies where non-reciprocal sharing is the norm, Tlingit society may be based more on a "pay as you go" principle.

19. Note that, while we know that large quantities of eggs were harvested by both local and non-local Tlingits for both their own consumption and for trade, we have no quantitative measures for the historical period.

boat and Alaska State ferries, but, increasingly, the bulk of eggs traded and bartered move by air freight between Sitka and other communities.

Change in Harvesting

Elders were consistent in noting that the strength of herring spawn had declined drastically in their lifetimes²⁰. We were told that the spawn was almost always good until about 1935 when sardine boats started taking loads of herring to salteries located in Washington Bay, Port Conclusion, Port Alexander, and Killisnoo²¹. Herring population was reportedly reduced until about 1940. They also noted that age class of herring taken commercially has gone down a great deal in recent years. No one spoke of a year when it was impossible to harvest herring eggs in Sitka Sound, although there was reference to a time of *two winters* when summer did not arrive and spawn was poor²². The regularity of the Sitka Sound herring spawn contrasts with spawn near Angoon, Hoonah, and other southeast communities that does not consistently appear in quantity from year to year.

Cultural Context

The Kiksadi, one of the main Sitka Tlingit clans, have songs, dances, stories, and an oral history that include reference to herring, herring eggs, and Herring Rock. Herring Rock, located across from the Sitka Pioneer Home and presently covered by the Sheffield Hotel, was an important landmark in Tlingit Sitka before the coming of the Russians and continued to be a focal point for

20. Commercial harvest of herring began in 1882 with a herring reduction plant at Killisnoo. In the peak year of 1929, 3,120,307 gal. of herring oil and 23,872,093 lbs of herring meal were produced at reduction plants. Stock depletion resulted in fishing restrictions in 1939 (Huizer, 1952).

21. Mr. Herman Kitka collected fur seals near Sitka as part of U.S. Fish and Wildlife research in the 1940s and has seal pelts and a seal skin coat from that time. Fur seal migration takes them close to Sitka. The seals were feeding on herring. Herman believes that decline in herring has caused a decline in fur seal abundance. We do not know of hunting of fur seals by Sitka Natives in recent times.

22. This occurred before our oldest informants were born and may well have been the cold summer following the eruption of Krakatoa in 1883.

traditional celebrations, including a herring festival held prior to the herring egg harvest²³. Nine clans were present or represented in the Sitka herring egg harvest festivities. The nine clan houses in Sitka are the Shark, Halibut, Murrelet, Brown Bear, Thunderbird, Eagle, Land Otter, Eagles Nest and the Wolf houses. People coming to Sitka to harvest herring eggs were recognized by their Tlingit name or names and their membership in the Eagle or Raven moiety.

A Kiksadi settlement was located just to the north of Herring Rock at the time of the arrival of Russian traders. Kiksadi women are entitled to use a herring emblem on blankets and other regalia, and Kiksadi have a dance and accompanying song that points to the importance of herring, herring eggs, and Herring Rock to their clan²⁴.

According to one story, herring come to Sitka Sound in February to look over the bays and inlets. They then leave until they return to spawn in March and April. Another story tells of the dire consequences of fishing in the dark. A man was fishing for herring off Herring Rock well into the night. He did not notice any physical changes taking place to his body as he fished but, by dawn, he had been transformed into an owl. The owl then flew off and landed in trees near the 1988 location of the community college. Informants interpreted this story, which said that you would turn into an owl if you fished past sunset, as the first regulation to prevent over harvesting of herring in Sitka Sound^{25,26}.

23. The herring festival was probably held close to Herring Rock. According to Mark Jacobs Jr., Herring Rock had a pool where herring were stranded at low tide.

24. Herring Rock has been "emblematic" for Sitka Kiksadi and has been tied to their position as the first clan to settle in the Sitka area. Some controversies exist concerning Herring Rock and use of the symbol that stem from relations between the Kiksadi and the clans of the Kagwataan and from the resolution of the war with Wrangell.

25. Cultural myth may often be used to encode a behavioral prescription, and the story of the man who turned into an owl provides an easy mnemonic for a harvesting rule.

26. Swanton (1905a) recorded the following, summarized Skidegate Haida text concerning herring egg harvest.

"Raven went to the dance house of the Herring People, and when he opened the door to look at them dancing, his mustache was covered with herring spawn. This spawn tasted bad, and Raven became disgusted and threw his mustache away. It grew into a seaweed [Raven's mustache in Haida]. Raven then pushed a hemlock bough into the house and drew it out. It was covered with thick, good-tasting spawn. This is why hemlock boughs are used to collect herring spawn today, in preference to Raven's mustache." (quoted in Turner, 1982)

IV. CURRENT PATTERNS OF HARVESTING

Timing of Harvest

Seal, sea lion, and the sea gull feeding activity are indicators for the subsistence harvester that the herring have arrived to Sitka Sound. Regular monitoring of the traditional herring spawn areas is necessary to anticipate when the herring will spawn. Active harvesters drive out on Halibut Point road to check for spawn daily or use skiffs to cruise the islands in Sitka Sound looking for schooled herring close to the beach. In recent years the ADF&G has monitored the herring roe percent as part of its management of the commercial herring roe fishery in Sitka Sound. Subsistence users follow ADF&G herring roe percent estimates. When the roe count reaches about 10 percent the herring are ready to spawn. In most years Sitka herring spawn in April. In the current year, however, first herring spawn appeared on March 26²⁷.

One elder said that a late spring, like the one experienced in 1989, results in an early herring spawn. Locations of herring spawn also changed in 1989. The location of spawn used for subsistence shifted from southern Sitka Sound to as far north as Katlian Bay. Three Entrance Bay and Pirates Cove, areas used for macrocystis harvest, did not receive any spawn in 1989; this limited harvest on this stratum. Apart from these changes, the locations where herring eggs were harvested for subsistence in 1989 appear to be basically the same ones that were used historically. Figure 1 show areas most commonly used for herring egg on hemlock and hair seaweed, and herring egg harvest on macrocystis respectively²⁸. Herring are known to spawn in other areas accessible to Sitka residents. Katlian Bay and Nakwasina Sound and other areas receive some use as well. These secondary areas

27.Data on timing of spawn are from Bob Dejong, ADF&G management biologist in Sitka and from interviews with active harvesters.

28.Some Sitka harvesters may use additional areas for herring egg on macrocystis harvests.

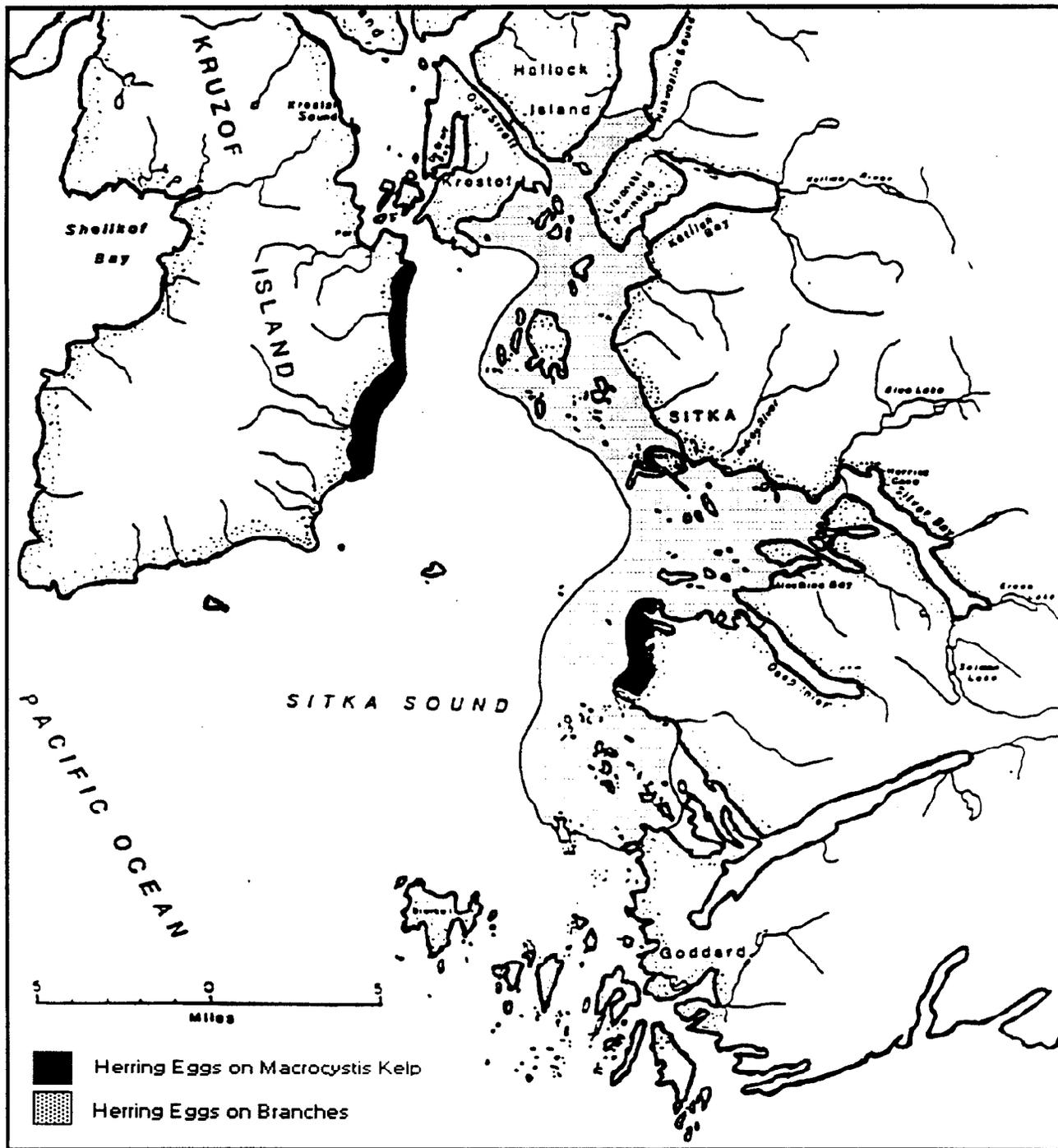


Figure 1. Areas Used for Harvest of Herring Eggs on Branches and on Kelp

are held in reserve by Sitka subsistence users and may be used should harvest in Sitka Sound become unproductive.

Selection and Placement of Hemlock Branches and Trees

Sitka's most active harvesters, those who supply many people with herring eggs, set 60 to 80 small hemlock trees about 15 to 20 feet long in sets of 2 to 10 trees. In contrast, less active harvesters may set a small number of hemlock branches in one or two sets. Branches are much easier to handle. Egg laden trees can be so heavy that harvest from a small skiff is difficult. The most active harvesters prepare well in advance so that they are able to have their sets in place at the optimal time and place. Less active harvesters may wait until herring are spawning to begin their preparations.

Young hemlock trees are selected for use as herring egg strata. Elder informants told us that there are two type of young hemlock. The first type has small ridges running parallel on the tree. The second and preferred tree is a smooth round tree. This was confirmed by active harvesters who told us that they do not harvest the tree with the ridges because they have moss growing in the ridges. The harvesters do not like moss peeling off on the eggs when they are cooked therefore round hemlocks are the preferred tree. Trees with full branches are preferred because they provide more area for egg deposition²⁹. Informants told us that they used to be able to cut trees right at the spawning beaches, but that they currently have to go further afield to find good trees. Trees are cut along the Sitka road system and transported by skiff to harvest sites. They are also cut from areas closer to the shoreline and spawning sites, particularly by the most active harvesters. Some harvesters go to more isolated areas in Sitka Sound for good trees. Trees are cut and trimmed with chainsaws, handsaws, and axes.

High harvesters told us that they were putting out more sets in recent years and modified the way they make their sets. They have come to anticipate that some of their sets will be stolen and put in

²⁹.One of the most active harvesters regularly cut trees growing in clear-cut areas because they had full branches.

enough sets to cover this expected loss³⁰. As much as possible, subsistence harvesters hide their set locations so that they will not be found by others. Harvesters stopped using buoys to mark their sets and stopped using heavy rope to tie their trees or branches together. When they used heavy rope, seine boats were able to use their blocks and winches to hoist whole sets on deck. Tying off sets to the beach was also discontinued because the shore line would also be covered with spawn and show as a thick white line running to the beach from the set. Harvesters are able to find their hidden sets by remembering shore features.

The hemlock trees and branches are usually set such that they will just be submerged at low tide. Sets we observed were in water from about 10 to 30 feet deep³¹. Rocks or construction bricks were tied to the butt end of trees and bunches of branches with pieces of web or seine twine. The trees or branches were set such that they would float perpendicular in the water. Trees in skates were tied together with heavy twine or pieces of ground line and separated about 20 feet from one another. The most active harvesters try to get their sets in the water before spawning occurs and have found that good deposition of eggs will not occur if sets are made after the water is milky.

Subsistence harvesters think that herring spawn best at mean low water, however, the spawn fluctuates with the flood and ebb tides. One respondent said that he has noticed that herring usually start spawning at small tides. Herring trees and branches are left to soak for 2-4 days after the spawn has begun, depending on the amount of spawn in an area.

This year saw an early false spawn in some areas. A false spawn occurs where male herring are releasing sperm with very few females releasing eggs. When this happens, subsistence harvesters may pull their sets and move them to another area. Although it is possible to wait for another herring

30. Sitka harvesters believe that out of town seine boats are responsible for most of the theft. We were told that one Juneau boat was seen pulling egg laden hemlock branches in the 1989 season.

31. A limited amount of direct observation was done with very active harvesters. Less active or less experienced harvesters may use other methods.

spawn to set on top of the thin false spawn, the resulting subsistence product will not be high quality; the inner herring eggs from the false spawn will mature under the fresh new eggs. Matured herring eggs start turning brown and small eyes become visible. When the color of eggs has changed from white to brown the eggs are of lower quality for eating. When eyes have formed they are no longer used. The preferred quality eggs are white, deposited about an inch thick on the branches.

In addition to the setting methods described above, some branches are set directly from the beach at low tide. We also noted that about three branches were set from the float at Sandy Cove. We also heard reports that blueberry bushes, wire mesh screen, cheese cloth, and plastic tarp were occasionally used as deposition strata.

Harvesting Herring Eggs on Hemlock Branches

Small skiffs and runabouts are the most common vessels used by Sitka residents for harvesting herring eggs. We saw 14 to 18 foot aluminum skiffs with small outboards, open Boston Whalers of various sizes, and 23 foot cabin cruisers and other similar small vessels being used for herring egg harvest.

Harvesters using sunken and unmarked sets get in the vicinity of their set by locating shore landmarks. They then drag a grappling hook through the water to snag either the egg laden branches or the ground line connecting individual trees. The roe covered trees and branches that have been snagged are then pulled to the skiff. Although smaller branches may then be pulled directly into a skiff, branches and trees are more commonly cut into manageable pieces before they are loaded. Based on our observations, a fully laden tree can hold more than 1000 lbs of quality eggs, much more than can be handled in a small skiff. The cut branches are placed in plastic totes, pails, and garbage cans or loaded directly into the harvesting skiff. Before the eggs are put in the boat they are usually dipped 2-3 times to

rinse both the milt or sperm and to wash out any sand or foreign matter from the branches. Sand or other material lowers the quality of the herring eggs, and they stay fresh longer if milt is washed out.

If trees and branches are thickly covered with spawn, the harvesting vessel can be quickly filled to capacity. Eggs are brought home for processing and distribution. While harvesters of small amounts of eggs may carry them up from any docking location, high harvesters prefer docks with loading ramps that facilitate transfer of eggs to the bed of a pickup. One enterprising harvester loaded eggs directly from his 17 foot Boston Whaler to the lined bed of his pick-up. A boat load of eggs, estimated at 1000 to 1500 lbs, could be quickly loaded in this way.

In addition to having sets stolen or ruined by false spawn, sets may not be harvested for other reasons. Spawn might be too thin in a particular location, resulting in a low quality subsistence product. Rough weather might wash sand and debris into the eggs. Because of weather or other reasons the harvester may not be able to get back to his sets until eggs have developed. Trees and branches also may also be left in the water because the harvester has fulfilled his or her subsistence needs. The eggs left in the water are thought to develop normally.

Harvesting Herring Eggs on Hair Seaweed

Harvestable hair seaweed grows just below lowest low water. A subsistence harvester wanting this product pays attention to where this seaweed grows and whether or not the area usually receives a good herring spawn. When minus tides coincide with good spawn deposition, as they did in 1989, *ne* (herring eggs on hair seaweed) can be harvested in quantity by hand by a person wearing waders or rubber boots. This variety of seaweed breaks off easily, especially when thickly covered with herring eggs. *Ne* can quickly be gathered by the arm load. At higher tides, *ne* is gathered with rakes and grappling hooks. *Ne* beds can be extremely productive under good conditions. In 1989 we observed

the harvest by hand of about 500 lbs of *ne* by two people from a 10 foot by 10 foot area in about 20 minutes at a minus tide. As with *haaw* or herring eggs on branches, *ne* are taken home for processing.

Harvesting Herring Eggs on Macrocystis Kelp

Egg covered fronds of macrocystis kelp are selected by subsistence harvesters from kelp beds where herring have spawned. Fronds are pulled into the harvesting vessel by hand or with a rake or grapple and cut into containers for transport³². Based on interview reports, 1989 was a poor year for harvest of herring eggs on macrocystis kelp. A number of our informants stated that they usually harvested on this strata, but did not find good spawn in their usual harvest locations. We were not able to observe this harvest.

In terms of overall harvest of herring eggs, eggs on macrocystis kelp is harvested by fewer subsistence users and in much smaller quantity than *ne* and *haaw*³³. Figure 1 shows harvesting locations for herring eggs on macrocystis kelp³⁴. The main productive macrocystis harvesting area is located south southwest of Sitka at Three Entrance Bay and Pirates Cove; some herring eggs on kelp are also taken north of the airport at Whiting Harbor. In some years herring spawn near kelp beds west of Sitka across Sitka Sound, bordering Kruzof Island, and these areas are used for harvesting. Reaching the main productive area requires crossing open water and entail both more exposure to seas and weather and more time and cost than the areas where *ne* and *haaw* are harvested. Informants indicated that larger skiffs or boats were needed to safely harvest in these areas. This difficulty of access may be a factor that limits harvest.

32. Occasionally some subsistence users may cut kelp and move it to spawning areas. We did not hear of anyone doing this in the 1989 season.

33. Kelp beds in the vicinity of Sitka may still be recovering from possible excessive harvesting of commercial roe on kelp some years ago.

34. Some Sitka residents may use areas in addition to those shown for harvest of this subsistence product.

Harvest of herring roe on macrocystis kelp is regulated by permits are issued from the Sitka ADF&G office. Permits allow an individual to take 32 lbs of egg covered kelp or a household to take 158 lbs. Selected state regulations covering subsistence and personal use herring egg harvesting are reproduced in Appendix 1. The regulatory permit limits placed on harvest of macrocystis may restrict both the total annual harvest and participation in harvest on this strata to some extent. Informants told us that, when they did harvest macrocystis, they harvested in quantity, much as with *ne* and *haaw*. With these latter two items, ability to transport and process the subsistence food is more of a limiting factor than regulatory limits or difficulty of harvest. We were told that, when herring eggs on kelp are gathered in abundance, this subsistence food was distributed to those who did not harvest it themselves.

Herring roe on macrocystis was not frequently mentioned in our interviews with elders concerning early herring egg harvesting practices and few informants referred to the Tlingit word *daaw* (macrocystis kelp) as an important herring egg stratum. This indicates that harvest on *daaw* has been of less importance in Sitka Sound than harvest on the other two strata for some time.

Permits for harvesting herring roe on kelp have been required since 1979. Note that most herring eggs harvested in Sitka Sound are taken as *ne* or *haaw* rather than as eggs on kelp. The permitted harvest amount of roe on kelp has been limited to eliminate illegal sale of this food item. We were told that subsistence harvesters gathering eggs on kelp for themselves and for barter and trade did not always observe the permit limits. For this reason permit data should be seen as providing an indication of the level of interest in this type of harvest rather than an actual measurement.

Table two shows the harvest for 1987 though 1989³⁵. Table three shows the number of subsistence permits issued for harvest of herring eggs on macrocystis kelp by community and year for 1979 though 1989. Based on these data, harvest of from 3,900 to 8,800 lbs per year of herring eggs on

35. For all of these years Alaska residents from any Alaskan community were eligible for permits. New Board of Fisheries regulations defining subsistence and personal use (see Appendix 1) will take effect for the 1990 season.

macrocystis kelp have been reported in recent years, with between 62 and 75 percent of permits issued to Sitka residents. The number of permits issued rose from 26 in 1981 to 127 in 1988, and reported harvest level rose from 192 lbs in 1981 to a high of 8827 lbs in 1987. Part of this change may reflect better understanding of and compliance with permit requirements than a rise in demand for this subsistence food. Good spawn on kelp was not available in 1989; this is reflected in the low number of permits issued for 1989 and the sharply decreased harvest level over previous years.

TABLE 2. Macrocyctis harvesting permits issued by community for Sitka Sound area, 1987 through 1989.

Community	1987	1988	1989
Anchorage		1	
Angoon		1	
Craig	6	2	1
Hydaburg	4	1	1
Juneau	8	5	3
Kake	2	8	2
Kasaan			1
Ketchikan	8	2	3
Kotzebue			1
Petersburg	2	4	4
Seattle	4	6	1
Sitka	60	89	52
Wrangell	2	8	1
Other	1		
Total permits	97	127	70

Source: ADF&G, Sitka. Data files.

TABLE 3. Herring spawn on kelp subsistence harvests, 1979-88, Sitka Sound³⁶.

Year	Permits Issued	Permits Returned	Total Pounds Harvested
1979	21	10	137
1980	19	13	145
1981	26	19	192
1982	36	25	886
1983	69	48	1991
1984	50	40	1281
1985	71	45	3963
1986	90	82	3929
1987	97	59	8827
1988	127	77	6146
1989	70	53	962

Source: ADF&G, 1989a and ADF&G records in Sitka.

Preparing, Preserving, and Packing Herring Eggs

Food preparation follows the traditional cooking methods. Herring roe, both *ne* and *haaw*, is dipped in boiling water once or twice. Eggs become unpalatable if they are cooked too long. Overcooked eggs turn dull white, and they become quite rubbery in texture and lose their flavor. Properly cooked bunches of eggs are barely warmed and retain some translucence. Cooked roe is eaten with seal oil or hooligan oil. Soy sauce, butter, mayonnaise, honey, vinegar, salt and pepper are also used. Herring roe may also be eaten fresh or uncooked.

Preservation starts as soon as possible after harvest. Although some eggs are dried or salted, freezing is the most common method of home preservation. *Haaw* are cut into suitable pieces and placed in ziplock bags for freezing. *Ne* is treated similarly. Some people are experimenting with vacuum packing as a new method for preservation. Frozen eggs can be used until the next year's harvest, although quality declines as with other frozen products.

³⁶Total harvest expanded from harvests reported on returned permits to include estimate of the non-reported harvest.

Eggs harvested for customary trade and barter are shipped out of town fresh, with *haaw* predominating. Eggs are shipped out of town by Alaska Airlines, local air taxis, private boats and Alaska Marine Highway. Usually eggs are packed in large boxes with liners to protect from leakage. Alaska Airlines requires and other carriers encourage people to use standard seafood shipping boxes with liners, and Alaska Airlines has a special shipping rate for seafood packed this way. The boxes with liners cost \$4.50. Smaller quantities may be sent in five gallon food buckets or other packages.

High Harvesters

Based on subsistence survey data for the 1987 harvest year, a relatively small number of households in Sitka account for a large portion of the total harvest of herring eggs taken for subsistence use³⁷. Field work in 1989 confirmed the earlier survey results. Through interviews with ADF&G staff and Sitka residents and examination of shipping records, we found that about 20 households fall into the high harvesting group. For our purposes a *high harvester* was a household that was known to supply many households with herring eggs. Although systematic measurement was not attempted in 1989, we estimate that households in this group harvested about 300 lbs of eggs or more. We also found all of the identified high harvesters were Alaska Native residents of Sitka. While there is non-Native participation in this fishery, non-Natives are not known to harvest in quantity or to participate as major suppliers of herring eggs to non-harvesting households.

We also observed harvest of herring eggs by other households and saw small beach sets of hemlock branches in areas easily accessible to the Sitka road system. In terms of quantity harvested, however, this is not the major mode of harvest activity, although many Sitka residents harvest herring eggs near the road system. Survey data discussing participation in harvest and use of herring eggs are discussed below.

37. Division of Subsistence data and that from the Tongass Resource Cooperative Study are reported below.

Distribution and Exchange

A number of high harvesters assisted us by providing detailed descriptions of their harvesting, trade, and barter of herring eggs during the 1989 season. Except among the closest of family members, fairly direct reciprocity is expected in the exchange of herring eggs. This often takes the form of barter where a different, similarly valued, subsistence food is returned for herring eggs received. When the receiver has nothing to offer in return for herring eggs, cash may be the medium of exchange with the receiver paying the giver some amount to cover the expenses and time involved in harvesting, packing, and sending this highly prized food. The case descriptions reproduced below provide a indications of how widely herring eggs are distributed. They are written in the words of the high harvesters.

Harvester A

You have to be knowledgeable about herring egg harvest locations. Most of the time the herring have a spawning pattern. If you know the pattern, then you can anticipate the spawn. You can lay the trees in an area that has not spawned, or you can lay them when the spawning begins because you know the pattern. This year the pattern changed a bit, and we lost some sets by anticipating the spawn. There was a false spawn, and we got excited because the herring appeared to have changed the timing of the spawn. Usually they spawn in April, but this year they started on March 26.

In the past, I used to set one or two trees and watch the spawn fill the trees. On one occasion I came home and told my family that the eggs were thick on our branches. I cut off one branch and brought it home to eat. I left the rest for the harvest when I got off work. I went back the next day to check my branches, and they were gone. The buoy and line were gone.

Because of this I stopped using buoys and started setting more trees. I started anchoring the trees to a rock up to the high tide line so that I can pick up my set at any time. Some times I would tie to a rock or a tree. Tying off to the beach still didn't stop people from stealing my branches. When the herring spawned on the branches, they would also spawn on my anchor line. So at low tide, you would see a streak of white herring roe up to where my anchor line was tied off. This let the poachers know exactly where my branches were in the water. I always knew when a big seiner (seine boat) stole my branches. They would take a whole set of eight trees and hoist it on their deck. We stopped using heavy line to tie off our trees. This prevented seiners from lifting our trees out of the water with power gear.

The X boys caught the Y (boat name) from Juneau stealing their trees. Z caught a couple of guys stealing his branches from the beach. They pulled them in from mean low tide and started breaking branches from the tree.

Today, my family sets 60-80 trees. We anchor with bricks rather than with rocks. Six to eight trees are tied together like a halibut set. My two boys and a friend help in cutting the trees. The average tree is about 7 feet long. I try to pick a tree with young branches. Most of the trees are round with no grooves. If a tree has grooves, then there is a good chance of moss or fuzz on the trees. We don't like to eat eggs with the hemlock growth stuck to the eggs, especially if it peels off with the cooked eggs.

We don't anchor the set to any rock, buoy, or to the beach. We try to hide the set as much as possible. When the set sinks in the spawn, it is pretty hard to see. Only we know where it is. We have to check the set at low tide to make sure that it is at the low water level, since that is where the herring spawn. Sets usually stick out at low water until the herring start

spawning on the branches. Then they sink and become inconspicuous. Some years the trees are dry and harder to sink.

To retrieve our sets, we use a grappling hook. We know roughly where a set is, so we start throwing the hook to the area, hook the trees, and slowly pull it in so that we don't break the twine. We usually try to leave our branches in the spawn for three days. After we pull a set up to the boat, we start clipping the thick branches off the tree. We used to use an axe and a saw to cut branches, but we switched to a garden scissors to snip off the branches. We throw the sparse branches back so that the eggs can hatch. We dip the branches in the water a couple of times to wash out the sperm and sand.

Herring eggs can sit outside for two days without spoiling, but we usually let them sit overnight at the longest. We give a lot away before they begin to spoil. We have friends that come and help themselves to hundreds of pounds of eggs.

We gather *ne* only if people request it. We use a grappling hook with a pole attached. *Ne* is usually at the low water mark. *Macrocystis* is also received the same way. We averaged about 2000 lbs of *ne* per trip last year.

This year we set 63 trees and lost 12 trees to false spawn. In 1989, we averaged about 700 lbs per harvesting trip and made eight trips. Our total harvest was about 5600 lbs. We made daily trips from March 27 through March 31 to set trees. We made two harvesting trips on April 1 and one each from April 2 through April 7; on our last trip on April 10 we brought back only 75 lbs. In addition to other expenses we used about 25 gal. of gas for the truck and about 50 gal for the boat.

A lot of people get herring eggs from us.

This harvester's distribution is shown in Table 4.

TABLE 4. Harvester A Herring Egg Distribution.

Place	Amount (lbs)	No. of families
Angoon	905	12 families and 2 payoff parties
Haines/Klukwan	500	7 families
Hoonah	350	3 families
Juneau	750	8 families
Kake	550	8 families
Kasaan	100	1 family
Portland	150	3 families
Seattle	150	2 families
Sitka	850	17 families
Skagway	100	2 families
Yakutat	400	4 families

Cockles, clams, fresh salmon, and fresh and dried halibut from families in Angoon, fresh sockeye from families in Klukwan, seaweed and seal oil from families in Sitka, strawberries from families in Portland, and raspberries from families in Seattle are some of the things we receive in return for herring eggs.

Harvester A's equipment list for the 1989 harvest included:

- 17' Boston Whaler with 70 HP motor
- 13' Boston Whaler with 13 HP motor
- pickup truck
- car
- chainsaw
- 6, 30 gal. garbage containers
- 7, 10 gal. garbage containers
- 12, 5 gal. pails
- 1, 30 gal. fish box
- 1, 20 gal. fish box
- 67 shipping boxes
- 5 boxes garbage bags
- 10 boxes ziplock bags
- 3 weed cutters
- grappling hook
- small herring seine

twine and rope
bricks
3 tarps.

Harvester B

This person set 16 trees in 1989. This was less than usual because of the early spawn. The harvester reported that kelp harvest was poor this year. Harvester B used a 16' Lund skiff with a 30 HP motor and estimated expenses at about \$200.

This harvester's distribution is shown in Table 5.

TABLE 5. Harvester B Herring Egg Distribution.

Place	Amount (lbs)	No. of families
Anchorage	50	1 family
Fairbanks	150	3 families
Ketchikan	200	4 families
Kotzebue	150	3 families
Sitka	50	1 family
Wrangell	100	2 families

In addition this person gave about 600 lbs to a relative who came to Sitka on a fishing boat. This person harvested a total of about 1300 lbs with a primary distribution to 15 households.

Harvester C

My brother taught me how to harvest herring eggs. When we first started out we used big trees, but we found out that they got too heavy to pull up after the herring spawned on them. We also used to use rocks to anchor trees, but we switched to small red bricks.

I cut trees ahead of time so that all the work is stretched over time. I set trees and branches according to how much the boat can pack and how much herring eggs I can use in one day.

I spend a lot of time driving out the highway and running on my boat to check the spawn. This year we had a false spawn. We usually lose some branches when there is a new spawn on top of an old spawn. The eggs start turning brown underneath the new spawn.

It is a matter of pride to send people good eggs. You have to send the best. If eggs are too thick then eggs cook on the outside and not on the inside. Some people like them like that. I try to get eggs that are just right for cooking all the way through with one or two dippings into boiling water.

I run out to check my branches to make sure no one is stealing them and to make sure they are not up on the beach. I prefer my branches to be below mean low water so that no one can get them from the beach at low tide. This is also where the herring spawn.

The patterns of the herring spawn have changed in the last two years. They have moved up toward Katlian Bay and are not spawning in the south by Three Entrance Bay.

This year I set 60 trees in eight sets of about seven trees per set. I had about \$500 of expenses before the season started.

Harvester C fished from a 17' Boston Whaler and was active almost every day over a three week period. Harvester C reported primary distribution is shown in Table 6.

TABLE 6. Harvester C Herring Egg Distribution.

Place	Amount (lbs)
Angoon	500
Hoonah	650
Juneau	1642
Kake	1050
Ketchikan	250
Klukwan	50
Sitka	500
Yakutat	50

This amounted to about 4,700 lbs of herring eggs.

Harvester D

My husband used to do the harvesting, but his time is taken up in his work. His uncle taught me how to set branches and harvest eggs. The uncle used a buoy to anchor his branches, but I stopped this practice so that I don't advertise my branches. I used to set trees, but a seiner stole my set. Now I just set small branches and spread them out.

I made about seven trips using a small Boston Whaler or small aluminum skiff and harvested eight sets of branches and lost 6 to the false spawn. I harvested about 1300 lbs of *ne* and 1350 lbs of *haaw*.

Egg distribution is shown in Table 7.

TABLE 7. Harvester D Herring Egg Distribution.

Place	Amount (lbs)	No. of families
Juneau	200	unknown
Metlakatla	150	unknown
Sitka	unknown	15 families
Sitka	unknown	senior citizens at Double O
Sitka	unknown	senior citizens at elderly housing
Sitka	unknown	students of Sitka Native Education Program
Sitka	unknown	students at Sheldon Jackson College
Sitka	unknown	students at Mt. Edgecumbe
Sitka	unknown	students in a third grade class
Sitka	unknown	students in a Sitka pre-school

Harvester E

This person set 12 trees at Katlian Bay using a 19' aluminum skiff with a 90 HP motor. He noted some people use herring eggs on rock kelp for garden fertilizer³⁸. He reported primary distribution of about 1000 lbs of eggs, as shown in Table 8.

38. Tingit elders thought that Natives would not use herring eggs for this purpose.

TABLE 8. Harvester E Herring Egg Distribution.

Place	Amount (lbs)
Angoon	300
Clarks Point	50
Juneau	100
Kake	150
Sitka	300
Yakutat	120

Shipments

Alaska Airlines and Bellair kept records of shipments of herring eggs made during the 1989 season. Estimates of the amounts shipped by Alaska State ferries are from researcher observations and interviews. According to these records and observations, Alaska Airline shipped about 23,000 pounds, Bellair shipped 3,607 pounds, and about 4,000 pounds of herring eggs left on Alaska State ferries. We also found that private boats from Angoon took 900 pounds, and that two boats from Kake, one boat from Hoonah, and one boat from Ketchikan all harvested eggs in Sitka Sound. An additional boat from Ketchikan took back approximately 600 lbs received from a Sitka harvester³⁹. Table 9 summarizes known 1989 shipments of herring eggs, accounting for about 39,600 lbs of herring eggs sent to other communities.

³⁹This listing is indicative rather than exhaustive since we undoubtedly did not observe or hear of all the boats that took eggs from Sitka in 1989.

TABLE 9. Known Shipment of Herring Eggs, 1989⁴⁰.

Mode of Shipment or Carrier	Amount (lbs)	Destination
Alaska Airlines ⁴¹	2300	Anchorage
	370	Haines
	200	Hoonah
	250	Hydaburg
	6800	Juneau
	2500	Ketchikan
	185	Klawock
	2300	Metlakatla
	??	Nome
	200	Petersburg
	??	Portland
	2500	Seattle
	??	Thorne Bay
	500	Wrangell
1200	Yakutat	
6000	Unknown	
Bellair	1035	Angoon
	2546	Kake
	26	Pelican
Alaska State Ferries	1200	Angoon
	500	Hoonah
	650	Juneau
	400	Kake
	300	Ketchikan
	150	Other
Private boats ⁴²	900	Angoon
	2000	Hoonah
	4000	Kake
	600	Ketchikan
Total	39612	

40. Air carrier figures are for freight shipped and do not include accompanied baggage.

41. Known destinations account for about 17000 lbs of eggs; Alaska Airlines was not able to provide us with destination data for the other 6000 lbs; these are listed as "unknown" for this reason.

42. The estimate for private boats for Angoon and Ketchikan are based on interview data. Other estimates are based on size of the vessels used only and are approximate.

This total does not include eggs taken from Sitka as baggage on passenger flights, eggs that may be sent later in frozen state, shipments by other air carriers, unknown harvest or transport by the commercial seine fleet, and harvesting by other private boats than the ones we noted⁴³. Adding in a factor for eggs that were transported away from Sitka by these means, we would estimate that about 50,000 lbs of eggs harvested in the Sitka area were used in other communities in 1989.

Customary Trade

The legal context for customary trade is set by state and federal law and Joint Board of Fisheries and Game regulatory procedures. All three recognize that subsistence items are widely bartered, exchanged, and traded from areas where they are harvested to areas where they are consumed or used. The legal context attempts to preserve existing patterns of customary trade, while preventing general commercialization of subsistence harvests. In discussions leading to the passage of ANILCA, the U. S. Senate Committee on Energy and Natural Resources discussed customary trade in its report to the full Senate:

The Committee does not intend that "customary trade" be construed to permit the establishment of significant commercial enterprises under the guise of "subsistence uses." The Committee expects the Secretary and the State to closely monitor the "customary trade" component of the definition and promulgate regulations consistent with the intent of the subsistence title. (Senate Report No. 413, 96th Congress, 2nd Session, 234)

ANILCA included trade as a part of subsistence, defined barter, but did not expand on its definition of trade.

⁴³.For example, one reviewer reported sending 150 lbs of eggs to Kotzebue and 100 lbs to Fairbanks.

As use in this Act, the term "subsistence uses" means the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade.

(2) "Barter" means the exchange of fish or wildlife or their parts, taken for subsistence uses--

(A) for other fish or game or their parts; or

(B) for other food or for nonedible items other than money if the exchange is a limited and noncommercial nature. (16 USA 3113)

The wording of state law follows the ANILCA wording for subsistence, defines barter as in ANILCA, and also does not provide a further definition of customary trade.

The Joint Board criteria number seven deals with customary trade and states:

(7) a use pattern in which the hunting or fishing effort or the products of that effort are distributed or shared among others within a definable community of persons, including customary trade, barter, sharing, and gift-giving; customary trade may include limited exchanges for cash, but does not include significant commercial enterprises; a community may include specific villages or towns, with a preponderance of subsistence users, and encompasses individuals, families, or groups who in fact meet the criteria described in this subsection. (emphasis added) (5 AAC 99.010(b))

Under these laws and regulatory standards customary trade, including limited exchanges for cash, is a recognized subsistence use of fish and wildlife harvested for subsistence. The Board of

Fisheries determined that residents of Sitka have subsistence use of herring eggs (see Appendix 1); customary trade is part of their subsistence uses⁴⁴.

The previous section documents known shipments of herring eggs from Sitka to other locations, and the high harvester case notes describe how this distribution takes place. For some harvesters, customary trade includes a cash payment for eggs. Based on our field interviews, a shipping box of eggs sent out of town weighing about 50 lbs cost about \$50 in the 1989 season, with the receiver paying for freight charges. In Sitka, households picking up herring eggs from high harvesters usually pay \$10 to \$20 for the 50 to 100 lbs of eggs they take. Herring eggs are not weighed, and there is no fixed price per pound in these local transactions. Cash payments are generally understood to compensate the harvester for the costs incurred in harvesting and processing the herring eggs.

Some of the characteristics of customary trade we noted in our field interviews are briefly discussed below to distinguish this trade from general commerce.

1. The buyer and seller engaging in customary trade for cash were found to have other ties with each other of long duration. Buyer and seller were typically related by Tlingit or western kinship, were trading partners, or were friends who had worked or gone to school together. Their relationship involved much more than the simple exchange of herring eggs for cash. Often the herring egg supplier appeared to feel obligated to supply people with eggs. In fact, no seller would supply eggs to someone he did not know well.

We heard of no case where herring eggs were supplied on order to an unfamiliar buyer⁴⁵.

44. Board of Fisheries regulation 5 AAC 01.010 METHODS, MEANS AND GENERAL RESTRICTIONS part (d) states It is unlawful to buy or sell subsistence-taken fish, their parts, or their eggs, unless otherwise specified in this chapter (emphasis added). No regulations have been enacted to date that specifically authorize sale of herring eggs harvested under subsistence regulations in Sitka Sound. As of this writing, no provisions specifically authorizing any customary trade of fish, fish parts, or fish eggs for cash have been enacted by the Board of Fishery for any part of Alaska.

45. Social scientists sometimes consider these to be "multi-plex" relationships in which there are many interwoven ties between people. In the "simplex" relationship of general commercial trade, the act of buying and selling is the only thing that joins the buyer and seller.

2. Herring eggs on hemlock branches and on hair kelp have no general commercial market but are traded almost exclusively within the Tlingit, Haida, and Tsimshian communities. We found no indication that customary trade was resulting in movement of eggs to commercial markets either in the United States or abroad.
3. Relatively small amounts of cash change hands in herring eggs transactions. We estimate the maximum return to any one trader in 1989 was well under \$3,000 gross, and under \$2,000 net after accounting for gas and other supplies but not for equipment and time⁴⁶. No one makes a living from herring egg sales. All traders were found to be gainfully employed and to support their families with other earnings.
4. Relatively small quantities of herring eggs were traded to any individual. A receiver or buyer would typically get one or two shipping boxes of eggs.
5. Herring eggs are highly prized traditional foods and may be a required item for potlatches and death celebrations. Cash purchase might occur for these activities.
6. Herring egg harvesters highly value their reputation as skilled harvesters and their social position as suppliers of high quality herring eggs to friends, relatives, and trading partners. Reputation and social standing appear to provide more motivation than cash payments. Cash payments alone do not provide sufficient compensation for the amount of time, work, and equipment required to harvest and process quantities of herring eggs.
7. Harvesters did not maintain specialized harvesting or processing equipment or use a business location for their customary trade. A commercial business in herring eggs would likely capitalize in equipment to maximize profits.
8. No middle men are involved in the herring egg trade.
9. Herring egg harvesting is done by families or friends. No hired labor or payment for work done is made.

⁴⁶Figuring in cost of boats, motors, trailers, tools, and other equipment used for herring egg harvest would make customary trade for cash at best a break-even activity.

10. No special shipping arrangements are made for herring eggs. Traders use regular flights and ferry service and pay regular freight rates.
11. Herring eggs on hemlock branches and on hair seaweed have no market price. Sale is made at a price set by the seller before harvesting takes place. This price does not appear to vary with supply of and demand for herring eggs during the harvesting period as would be predicted for a market commodity.
12. Contemporary trade in herring eggs from Sitka Sound is a direct outgrowth of earlier trading patterns for this subsistence food. Oral and written historical sources prove that trade in herring eggs has been a feature of Sitka's subsistence economy since the late 1700s. Trade in this subsistence product has probably taken place from the time of early Tlingit inhabitation of Sitka Sound, at least 800 years ago.
13. We did not find evidence that levels of herring egg harvest changed in response to pricing or market forces⁴⁷. In economic terms, both the supply of and demand for eggs appear to be inelastic and to be set by social and cultural values rather than by cost, profit, or loss considerations.

Harvest Quantities Based on Household Surveys

Division of Subsistence field studies have documented herring egg use in many of the communities where research has been conducted. In addition to recording harvest levels for Sitka (Gmelch and Gmelch, 1983), division research found use of Sitka Sound herring eggs in Angoon (George and Bosworth, 1988), Hoonah (Schroeder and Kookesh, 1989), Kake (Firman, 1989), Tenakee Springs (Leghorn and Kookesh, 1987), Haines (Mills et al, 1984), and Yakutat (Mills and Firman, 1986)⁴⁸.

47. Harvesters do not to increase or decrease their take of herring eggs based on the price of eggs. Persons receiving eggs do not increase or decrease their consumption according to price.

48. Harvest and use levels of herring eggs were lumped with other marine invertebrates in these last two studies.

The 1983 study (Gmelch and Gmelch, 1983) showed the most common trade items by Sitka residents are herring eggs, seaweed, and halibut. The report also stated that the most common items received for trade good were eulachon or hooligan oil, seal oil, seaweed and dry fish. Herring eggs were collected by 24 percent of the 139 households in the sample. Of harvesters, 62 percent were Alaska Native households and 11 percent were non-Native households. The average harvest per household of harvesters was 14 gallons. At about 5 lbs/gal, this is equivalent to 70 lbs. The mean harvest for the entire sample was 3 gallons or about 15 lbs. One household reported sending 600 pounds of eggs to a relative out of town. Of the 33 harvesting households, 28 harvesters gave herring eggs to other households. Of the entire sample 34 households received herring eggs from community members⁴⁹.

According to a 1985 study (George and Bosworth, 1988), 15.8 percent of Angoon households harvested herring eggs in 1985. Fifty percent of Angoon households received herring eggs, and 10 percent gave herring eggs. Angoon has close ties to Sitka, and Angoon residents obtain most of the herring eggs they use from Sitka Sound. The Division of Subsistence found that Hoonah residents used an estimated 10,318 lbs of herring eggs in 1986 (Schroeder and Kookesh, 1989). They harvested only 4,800 lbs of this total use; other herring eggs were received through traditional systems of exchange, including barter and trade. Hoonah was found to rely on Sitka Sound for most of the herring eggs used.

Studies in Kake (Firman, 1989) found that 4.3 percent harvested herring eggs and 37.1 percent used herring eggs in 1986. Households harvested an average of 3.1 lbs per household per year and used an average of 7.7 lbs. Kake residents harvest herring eggs in Sitka Sound and receive eggs from that area as well. In the Tenakee Springs study (Leghorn and Kookesh, 1987) 21 percent of households used herring eggs and 21 percent received herring eggs from others. One household harvested herring

⁴⁹This random sample may have not included high harvesters because of luck-of-the-draw.

eggs in 1984 and took 55 lbs of eggs. Tenakee Springs residents were found to harvest herring eggs in or receive herring eggs from Sitka Sound.

1987 Subsistence Survey, Tongass Resource Use Cooperative Study

In 1988 the Division of Subsistence participated in the Tongass Resource Use Cooperative Study (TRUCS), in cooperation with the Institute of Social and Economic Research (ISER) at University of Alaska, Anchorage, and the U.S. Forest Service. Household surveys of the harvest and use of fish and game were done in 30 Southeast Alaska communities. The survey work was undertaken in 1988 and documented harvests that took place in 1987. Interviewers completed surveys with 1465 southeast households. Depending on community size, either straight random sampling or stratified random sampling was employed⁵⁰. Except for Sitka where telephone interviewing was done, all interviews were conducted face-to-face. Data entry and analysis were conducted by ISER and Division of Subsistence⁵¹.

This field research asked respondents the amount of herring eggs their household harvested and whether they received herring eggs from others in 1987. This second question was not asked of Sitka households⁵². Interviewers also collected data on household ethnicity. Analysis of these data provide an indication of harvest levels, participation in harvest, and receipt of herring eggs from others.

Figure 2 presents mean herring egg harvest per household by community for 1987. Residents of Craig, Hydaburg, Klawock, and Sitka, communities with very productive herring spawning areas, harvest substantial quantities of herring eggs. Residents of Angoon, Hoonah, Kasaan, Metlakatla,

50.The sampling strategy was designed to optimize accuracy of harvest information.

51.Reports from this study are available from ISER or U.S. Forest Service and may be inspected at Division of Subsistence, ADF&G, Douglas.

52.For this reason we are unable to present quantitative data showing percent of Sitka households receiving herring eggs.

Pelican, Saxman, and Tenakee Springs harvest some herring eggs, either relying on small localized herring spawn areas or by going to Sitka or the Craig-Klawock area during the harvesting

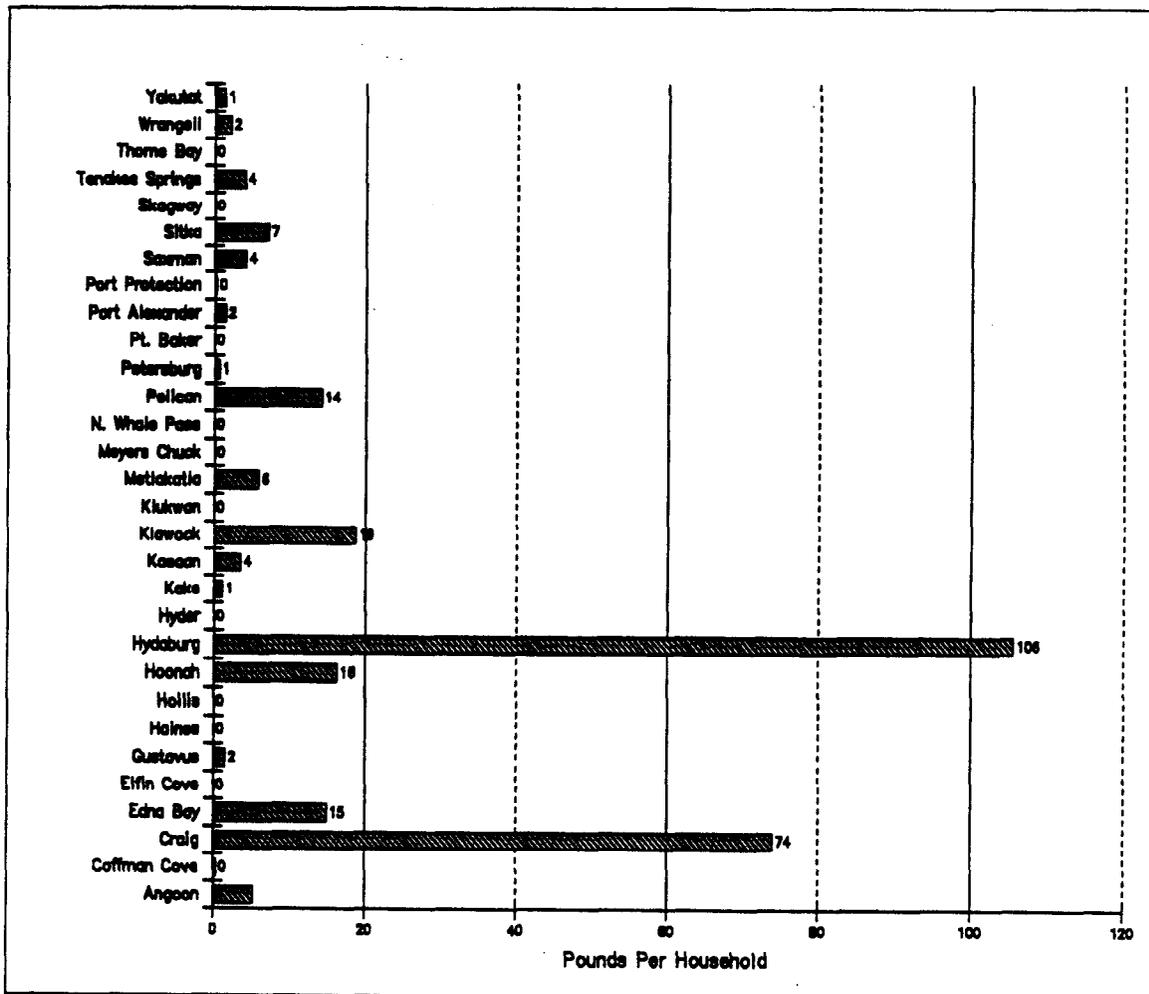


Fig. 2. Herring Egg Harvest in 30 Southeast Communities, 1987

period. Some residents of Edna Bay, Gustavus, Kake, Petersburg, Port Alexander, Wrangell, and Yakutat also harvest some herring eggs, although overall quantities are low. Surveyed residents of other southeast communities did not report any harvest of herring eggs in the 1987 baseline year⁵³.

53. Some harvesting of herring eggs could have been done by households that were not included among the households sampled in the TRUCS survey.

Figure 3 shows the percent of households harvesting herring eggs by community and ethnicity. In most communities a much higher percentage of Alaska Native households harvest eggs than white households. Customary and traditional harvesting of herring eggs by Tlingit and Haida families in southeast accounts for almost all the harvesting taking place. In contrast to harvest of salmon, deer, and many other fish and wildlife species, harvest and distribution of herring eggs continues to take place primarily within the Alaska Native families. Non-Native use of this resource does take place; however, the levels of harvest and participation are much lower than by the Alaska Natives.

Figure 4 shows the percent of households receiving herring eggs by community and ethnicity. In most communities with substantial Alaska Native populations, a large majority of Alaska Native households receive eggs from others. Note that a substantial minority of non-Native households also receive some eggs in many communities⁵⁴.

In all communities the number of households that actually harvest herring eggs is much lower than the proportion of households that shares in the harvest. This is true both within and across communities. For example, Figure 3 shows that three percent of all Yakutat households and five percent of Yakutat Alaska Native households harvested herring eggs in 1987. Figure 4 shows that 46 percent of all households, 12 percent of non-Native households, and 67 percent of Alaska Native households received herring eggs in that community.

Other communities show a similar pattern indicating that herring eggs are widely distributed from harvest communities to receiver communities through customary trade and barter.

⁵⁴Data from Gustavus, Port Protection, and other communities with very small Alaska Native populations may reflect harvest and use of eggs by a very small number of Alaska Native families and may not be statistically reliable.

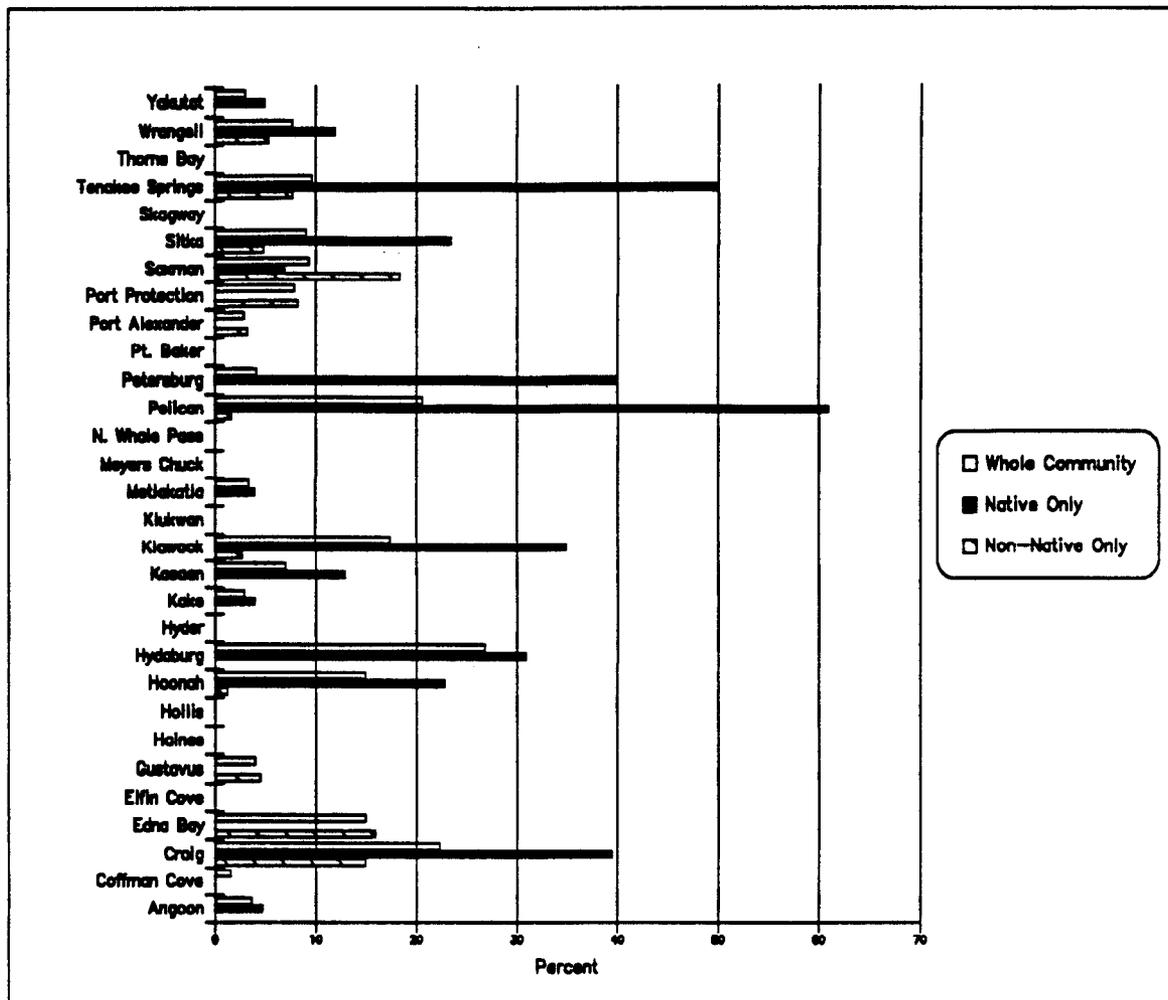


Fig. 3. Percent of Households Harvesting Herring Eggs by Ethnicity of Household, 1987

Figures 5, 6, and 7 show percent of households harvesting and percent receiving by community. Figure 5 shows these data for all households in each community; Figures 6 and 7 examine Alaska Native and non-Native patterns.

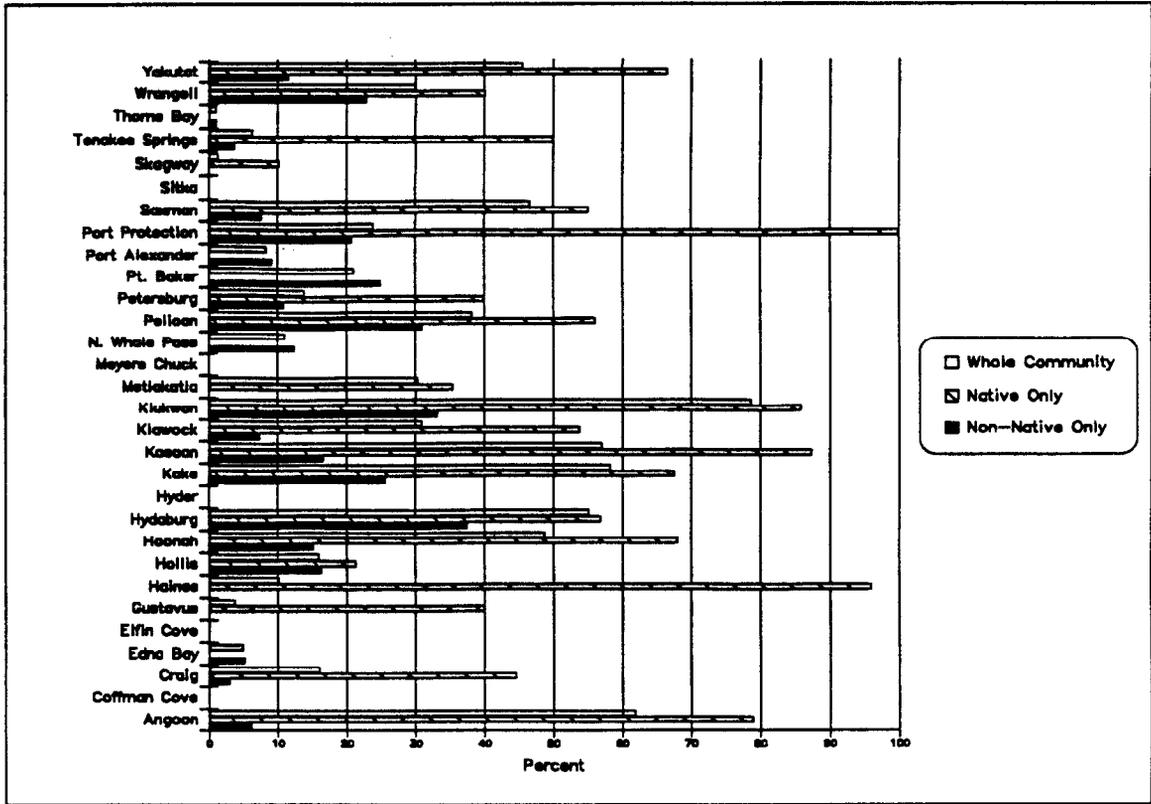


Fig. 4. Percent of Households Receiving Herring Eggs by Ethnicity of Household, 1987

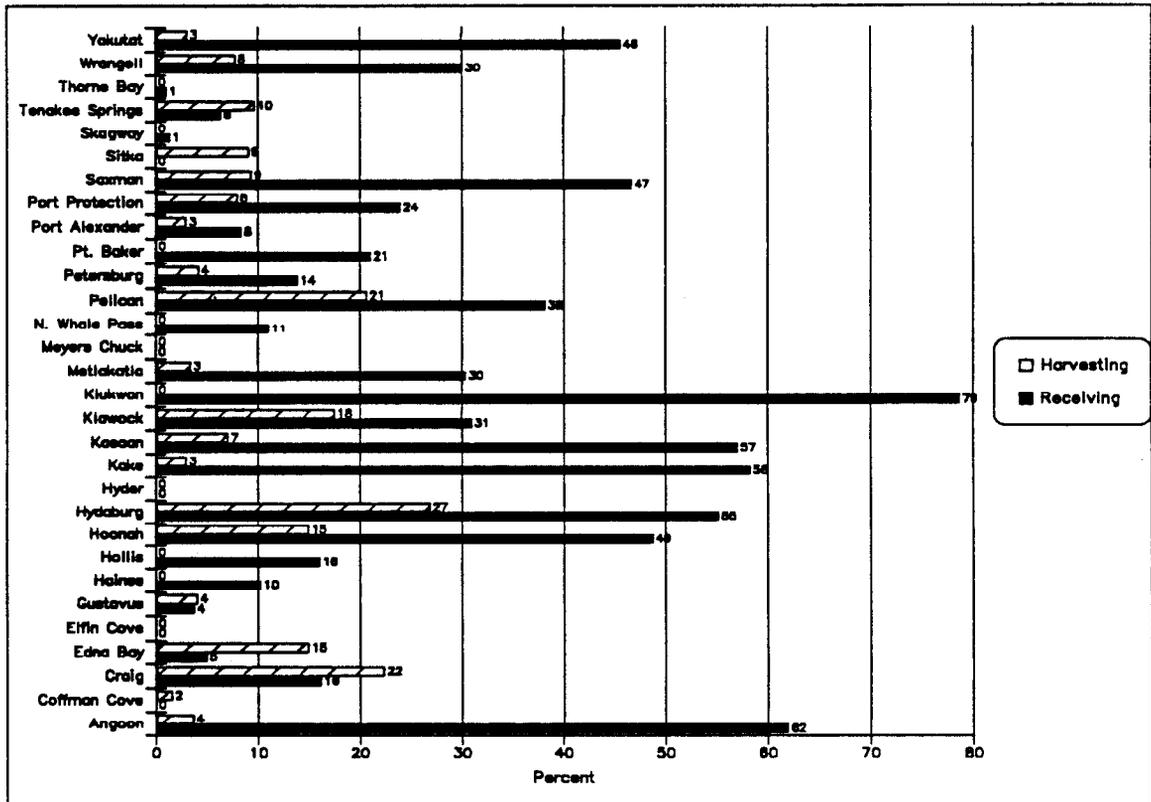


Fig. 5. Percent of Households Harvesting and Receiving Herring Eggs by Community, 1987

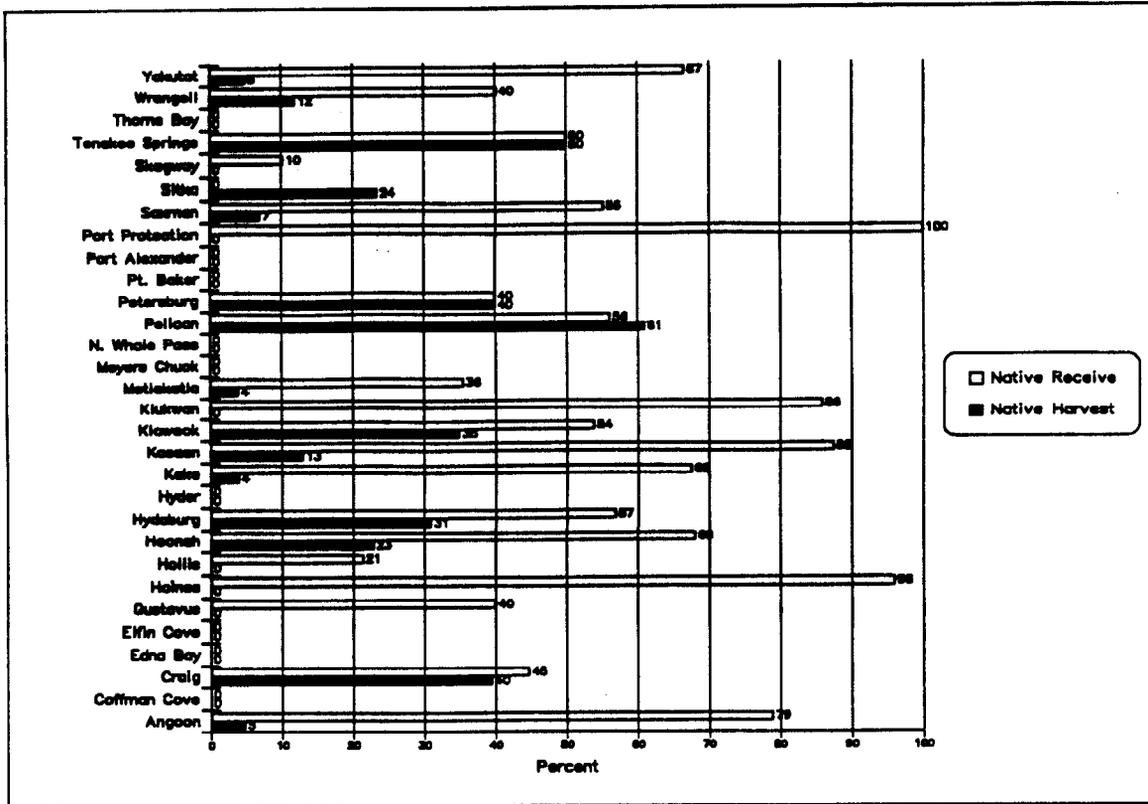


Fig. 6. Percent of Native Households Harvesting and Receiving Herring Eggs by Community, 1987

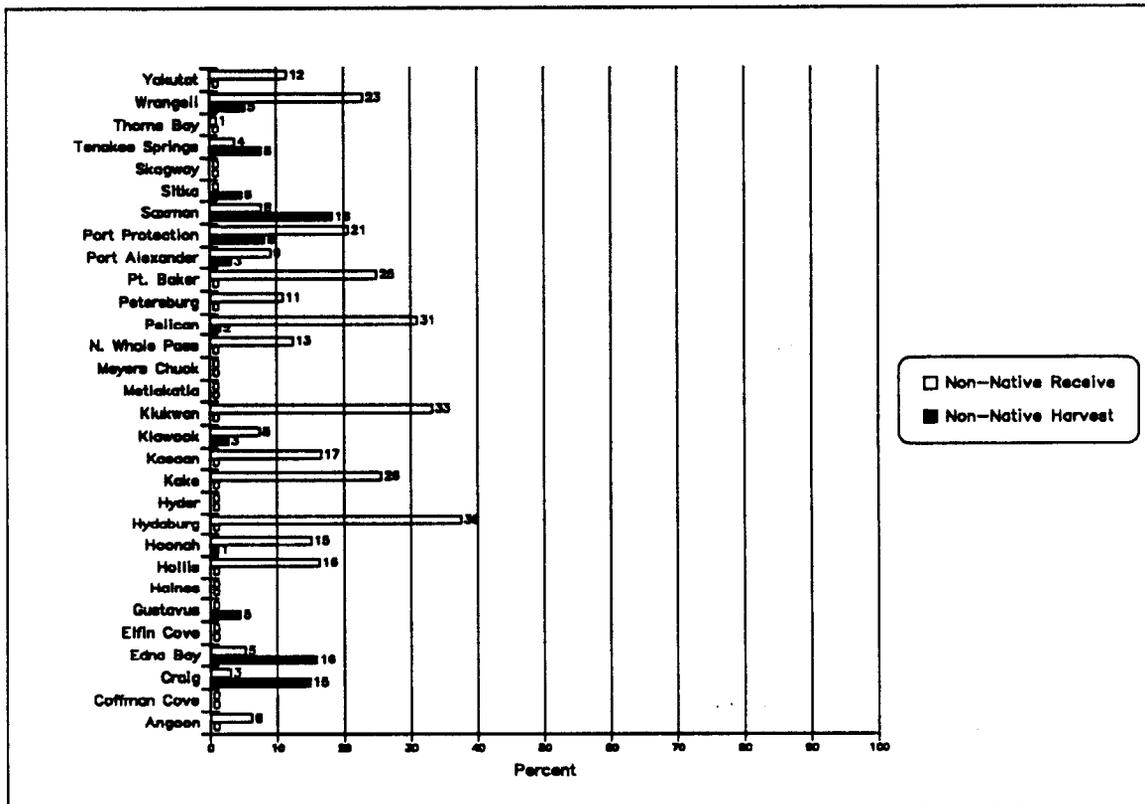


Fig. 7. Percent of Non-Native Households Harvesting and Receiving Herring Eggs by Community, 1987

These three graphs show that a relatively small number of households actually harvest herring eggs, even in the communities known for good herring spawn. In Craig, Hydaburg, and Klawock, for example, 22 percent, 27 percent, and 18 percent, respectively, of all households reported actually harvested herring eggs in 1987, (Fig. 5). This harvesting pattern persists when we examine data for Alaska Native households in Figure 6, although rates of harvest participation are slightly higher. Figure 7 shows very low rates of harvest participation for non-native households in most communities.

Figure 8 depicts reported harvest level for active Alaska Native and active white households for 1987. The harvest level of households that actively participate in this fishery is much higher than the mean harvest level for communities as a whole. Highest harvests were computed for Craig, Hydaburg, and Metlakatla active Alaska Native households with a mean of 547, 392, and 173 lbs per active household. Numerous other communities showed harvest levels for active households of over 100 lbs per household⁵⁵.

In examining the Sitka data from the 1988 survey we find that mean reported herring egg harvest was seven lbs per household for Sitka. About 24 percent of Alaska Native households, 5 percent of non-Native households, or 9 percent of all households in Sitka reported harvesting herring eggs in 1987. Alaska Native households that did harvest herring eggs took about 109 lbs per household in 1987; non-Native households that did harvest took about 29 lbs per household⁵⁶.

55. In examining the distribution of responses in these surveys, we found that high harvesting families were under-represented in these samples. Harvest of herring eggs is inherently "lumpy", meaning that a small number of harvesters bring in large quantities of eggs and distribute them to others. In looking at the 1988 data we found that very few high harvesters of herring eggs were included in the random samples. This has probably lead us to underestimate the overall magnitude of harvest.

56. Standard deviations and confidence intervals for the TRUCS data presented were high because of the sampling size and sampling frame, limited participation in harvest, and the extremely wide range of harvest levels reported between households.

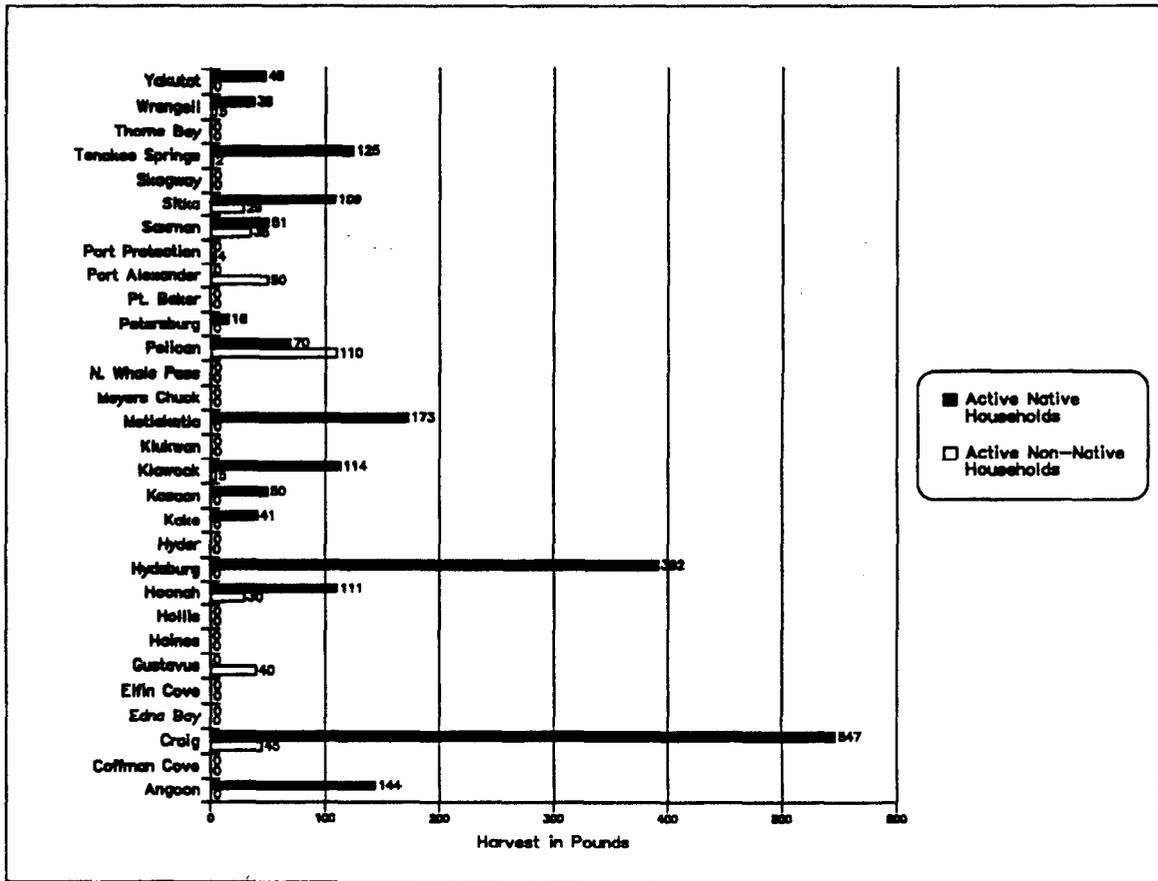


Fig. 8. Mean Herring Egg Harvest per Household by Community, Active Harvesters Only, 1987

Total Harvest of Herring Eggs in Sitka Sound

TRUCS data presented above show an approximate mean harvest of 7 lbs per household for Sitka for 1987 and the 1985 Division of Subsistence data show about 15 lbs per household. Sitka has slightly less than 3,000 households⁵⁷. Simple expansion of the survey data would indicate a total harvest between 21,000 and 45,000 lbs for those years. Our current research shows that more than this quantity were shipped from Sitka during the 1989 season. This indicates that earlier estimates derived from the random surveys are probably low due to either under sampling of the few high harvesters in Sitka or under-reporting by survey respondents. We have no means to precisely determine what the total harvest may have been in 1989. If the portion of the harvest used locally in Sitka was the same as that sent out for trade and barter, the total harvest would be about 100,000 lbs. The researchers believe it

⁵⁷When the TRUCS survey was conducted in February and March 1988, Sitka had 2,872 household.

would be safe to assume that the total subsistence harvest in Sitka Sound by all harvesters would lie between 80,000 lbs and 120,000 lbs in 1989, including the estimated 50,000 lbs of herring eggs used outside the community of Sitka^{58,59}.

V. DISCUSSION AND FURTHER RESEARCH

This report reviews the history of the subsistence harvest of herring eggs in Sitka Sound, describes the methods and means used for harvesting, the extent of distribution and exchange of this product through local and non-local trade and barter, and provides order-of-magnitude estimates of total harvest. A few questions remain to be discussed.

One significant finding of this research was that almost all herring egg harvesting, receiving, and distribution was within the Alaska Native community. In this respect herring eggs are similar to a few other resources that are predominantly or almost exclusively used and traded within the Alaska Native community, including sea urchins, chitons, spruce cambium, seals, and sea gull eggs. Hemlock branches and hair seaweed were the primary deposition strata used by harvesters, with less use being made of macrocystis kelp. There are no developed commercial markets for the *ne* and *haaw* that are the main subsistence products⁶⁰.

58. This estimated assumes that Sitka's Alaska Native households harvested an average of 30 to 60 lbs per household and Sitka's non-Native households harvested an average 5 to 10 lbs per household. $((30 \text{ to } 60) * 750) + ((5 \text{ to } 10) * 2250) = (22500 \text{ to } 45000) + (11250 \text{ to } 22500) = 33750 \text{ to } 67500$.

59. Assuming a 10 percent roe content, this harvest level implies subsistence harvest of herring eggs from a maximum of 800,000 to 1,200,000 lbs or 400 to 600 tones of spawning herring. The actual biomass needed to produce the subsistence harvest amount would be much less, since eggs hydrate after being released by the female herring. By means of comparison, the commercial sac roe fishery in Sitka Sound had harvested 11,831 tones of herring in 1989, the highest harvest ever recorded (ADF&G, 1989b). Herring caught in the sac roe fishery are permanently removed from the ecological system; the free spawning herring that produce the subsistence harvest do not die after spawning but will spawn for a number of years. Alaska herring mature at three or four years; herring 12 years old are common, and individuals 17 years old have been recorded (Huizer 1952).

60. Developed commercial markets selling mainly to Japan and other east Asian countries exist for "daaw" or eggs on macrocystis and sac roe.

Partly because it remains a Alaska Native cultural pattern, the distribution and exchange of herring eggs throughout southeast Alaska and reaching to points north and south follow traditional trading patterns. In an earlier era Tlingits traded and exchanged dried eggs carried by canoe with kinsmen and trading partners using the currency of the day. At the present time eggs also go to kinsmen and modern trading partners with other subsistence foods, other items, and cash received in return. This customary trade is fundamentally non-commercial in nature.

The present research confirms that subsistence herring egg harvesting is a specialized activity with relatively few community members harvesting most of the product and distributing it to others. In this respect, this harvest resembles certain other subsistence harvests such as harvest of marine mammals which are also commonly harvested by a small number of hunters who then share the kill with others. High harvesters were found to utilize over 5000 lbs of herring eggs.

There are several reasons why a small number of households harvest most of the eggs used. Successful harvesting of herring eggs requires specialized knowledge, focused time and attention over a two or three week period, and the freedom to drop everything when the unpredictable spawn begins. A successful harvester also must have the skiff and other resources necessary for this harvest. When these conditions are met, however, the harvester is prepared to harvest in bulk⁶¹.

This season's field research was aimed at providing background information on the herring egg fishery in Sitka Sound and a description of how the contemporary fishery takes place. In the course of this research we found that herring eggs and their exchange continue to figure importantly in Tlingit society and culture and have much more than a dietary value. We have noted harvest and preservation of herring eggs for later use in potlatches, payoff parties, mortuary feasts, and other cultural occasions. We also became aware that the distribution, trade, and exchange of herring eggs has an importance in

⁶¹Specialization in harvest may follow clan and lineage lines in Sitka. Further research would be needed to understand this concentrated harvest.

its own right. Both within and between communities this movement of herring eggs appears to provide an opportunity to fulfill social obligations and maintain cultural values. In future work we will focus on the system of distribution, trade, and exchange of herring eggs and its relationship to Tlingit social and cultural values.

APPENDIX 1. SUBSISTENCE AND PERSONAL USE REGULATIONS FOR HERRING AND HERRING EGGS

A number of Board of Fisheries regulations pertain specifically to the subsistence and personal use Sitka Sound herring egg fishery and participation in the fishery by residents of southeast communities. These regulations 1) determine which communities have subsistence use of herring eggs in Sitka Sound and 2) establish management procedures for subsistence and personal use herring egg harvest and 3) set individual and household bag limits for harvest of eggs on macrocystis kelp. The regulations are:

Article 14. 5 AAC 01.715.

LIMITATIONS ON PARTICIPATION IN SUBSISTENCE FINFISH FISHERIES.

(a) finfish may be taken for subsistence purposes only as provided in this section.

(f), Sitka: Only those residents of the City and Borough of Sitka domiciled in drainages which empty into section 13-b north of the latitude of Dorothy Narrows, except those domiciled in the U.S. Coast Guard base on Japonski Island, may take,

(1) herring and herring spawn in waters of 13-b north of the latitude of Apid Cape.

Article 01. 5 AAC 77.001

PERSONAL USE FISHERY.

The intent of the regulation is to allow a personal use fishery so that an individual can still fulfill his personal use needs for fish under subsistence fishing regulation; the states's subsistence priority law changed the definition of subsistence in a manner that now precludes some individuals (communities) from participating in customary and traditional subsistence fisheries and efficiently harvesting fish for their personal use.

5 AAC 77.672

PERSONAL USE HERRING FISHERY.

In the personal use taking of herring and herring spawn

(1) herring may be taken any time;

(2) herring and herring spawn may be taken by gear listed in 5 AAC 01.010;

(3) there is no annual possession limit for herring or for herring spawn which is not on kelp;

(4) Herring spawn on kelp may only be taken under authority of a personal use fishing permit; when issuing a personal use permit for the taking of spawn on kelp, The department may specify on the permit the times and locations for harvesting and the species of kelp which may be taken; the annual possession limit for herring spawn on kelp is 32 pounds for an individual or 158 pounds for a household of two or more persons; the department may, in its discretion, issue an additional permit for taking spawn on kelp above the annual possession limit if harvestable surpluses of herring spawn on kelp are available.

5 AAC 01.730

SUBSISTENCE FISHING PERMITS.

(A) Salmon, trout, char and herring spawn on kelp may be taken only under authority of a subsistence fishing permit.

(G) When issuing a herring spawn on kelp subsistence permit, the department may specify on the permit the times locations for harvesting and the species of kelp that may be taken. The annual possession limit for herring spawn on kelp is 32 pounds for an individual or 158 pounds for a household of two or more persons. The department will, in its discretion, issue an additional permit for herring spawn on kelp above the annual possession limit if harvestable surpluses of herring spawn on kelp are available.

REFERENCES CITED

- ADF&G. 1989a. *1988 Southeastern Herring Fishery and Macrocystis Kelp Transport Fishery: Report to the Board of Fisheries*. Division of Commercial Fisheries: Juneau.
- ADF&G. 1989b. Department records of 1989 sac roe herring fisheries. Division of Commercial Fisheries, Juneau.
- City and Borough of Sitka. 1981. *Sitka Coastal Management Program*. Sitka: City and Borough of Sitka.
- Davis, Henry and associates. 1976. *English Tlingit Dictionary*. Sheldon Jackson College
- De Armond, R. N. and Dale De Armond, eds. 1978. *Early Visitors to Southeastern Alaska: Nine Accounts*. Anchorage: Alaska Northwest Publishing Company.
- De Laguna, Frederica. 1960. *The Study of a Tlingit Community: A Problem in the Relationship between Archaeological, Ethnological, and Historical Methods*. Smithsonian Institution Bureau of American Ethnology Bulletin 172. Washington: United States Government Printing Office.
- De Laguna, Frederica. 1972. *Under Mount Saint Elias: The History and Culture of the Yakutat Tlingit*. Smithsonian Institution Bureau of American Ethnology. Washington: United States Government Printing Office.
- Dejong, Robert. 1989. Management Biologist, Division of Commercial Fisheries, ADF&G, Sitka.
- Ellanna, Linda J. and George K. Sherrod. 1987. *Timber Management and Fish and Wildlife Utilization in Selected Southeast Alaska Communities: Klawock, Prince of Wales Island, Alaska*. Technical Paper No. 126. Juneau:Division of Subsistence.
- Firman, Anne. 1989. *Harvest and Use of Fish and Wildlife by Residents of Kake, Alaska*. Technical Paper No. 145. Juneau:Division of Subsistence.
- Fleurieu, Charles P. C. ed. 1969. *A Voyage Round the World 1790-1792 Performed by Etienne Marchand. Vol. 1*. New York: Da Capo Press.
- George, Gabriel D. and Robert G. Bosworth. 1988. *Use of Fish and Wildlife by Residents of Angoon, Admiralty Island, Alaska*. Technical Paper No. 159. Juneau:Division of Subsistence.
- Gmelch, George, Sharon Bohn Gmelch 1983. *Resource Use in a small Alaskan City—Sitka. Technical Paper #90*. Juneau: Division of Subsistence, Alaska Department of Fish and Game.
- Huizer, E. J. 1952. *History of Alaska Herring Fishery*. In *1952 Annual Report*. Report No. 4. Juneau: Alaska Fisheries Board and Alaska Department of Fisheries.
- Immamura, Kenneth. 1989. Pers. comm. Fisheries biologist, Division of Commercial Fisheries, Juneau, Alaska.
- Klebnikov, Kyrill T., 1976, orig. 1861. *Colonial Russian America: Kyrill T. Khlebnikov's Reports, 1817-1832*. Translated by Basil Dmytryshyn and E. A. P. Crownhart-Vaughn. Portland: Oregon Historical Society.
- Kozloff, Eugene N. 1983. *Seashore Life of the Northern Pacific Coast*. Seattle: University of Washington Press.

- Krause, Aurel. 1979 (1956, 1885). *The Tlingit Indians: Results of a Trip to the Northwest Coast of America and the Bering Straits*. Translated by Erna Gunther. Seattle: University of Washington Press.
- Langdon, Stephen J. 1977. *Technology, Ecology, and Economy: Fishing Systems in Southeast Alaska*. Unpublished Ph.D. dissertation. Stanford: Stanford University.
- Leghorn, Ken and Matt Kookesh. 1987. *Timber Management and Fish and Wildlife Utilization in Selected Southeast Alaska Communities: Tenakee Springs, Alaska*. Technical Paper No. 138. Juneau:Division of Subsistence.
- McCaffrey, Margot Krause. translator. 1981. *Journey to the Tlingits by Aurel and Arthur Krause 1881-82*. Haines: Haines Centennial Commission.
- Mills, David D. and Anne S. Firman. 1986. *Fish and Wildlife Use in Yakutat Alaska: Contemporary Patterns and Changes*. Technical Paper No. 131. Juneau:Division of Subsistence.
- Mills, David D., Valerie Sumida, Gabe George, and Matthew Kookesh. 1983. *Salmon Use by the Residents of the Chilkat and Chilkoot River Drainages*. Technical Paper No. 95. Juneau:Division of Subsistence.
- Moser, Jefferson F. 1899. *The Salmon and Salmon Fisheries of Alaska. Report of the Operations of the United States Fish Commission Steamer Albatross for the Year Ending June 30, 1899*. Washington: Government Printing Office.
- Oberg, Kalervo. 1980 (1973). *The Social Economy of the Tlingit Indians*. Monograph 55. The American Ethnological Society. Seattle: University of Washington Press.
- Pierce, Richard A. ed. 1972. *Rezanov Reconnoiters California, 1806*. San Francisco: Book Club of California.
- Petroff, Ivan 1880. *Alaska: Its Population, Industries and Resources*. 10th Census of the United States, Vol. 8. Washington D.C.: U.S. Printing Office.
- Porter, Robert P 1890. *Population and Resources of Alaska. 11th Census:1890*. Department of the Interior. Washington D.C.: Government Printing Office.
- Price, Robert. pers. comm., 1989.
- Schroeder, Robert F. and Matthew Kookesh. forthcoming 1990. *Timber Management and Fish and Wildlife Utilization in Selected Southeast Alaska Communities: Hoonah, Alaska*. Technical Paper No. 156. Juneau:Division of Subsistence.
- Swanton, John R. 1905a. *Contributions to the Ethnology of the Haida*. Jesup North Pacific Expedition. Vol. V. New York: Amercian Museum of Natural History.
- Swanton, John R. 1905b. *Tlingit Method of Collecting Herring eggs*. Note in Anthropologic Miscellanea. *American Anthropologist*. V. 7. No. 1.
- Swanton, John R. 1908. *Social Condition, Beliefs, and Linguistic Relationships of the Tlingit Indians*. Smithsonian Institution Bureau of American Ethnology 26th Annual Report. Washington: Government Printing Office.

Swanton, John R. 1909. *Tlingit Myths and Texts*. Smithsonian Institution Bureau of American Ethnology Bulletin 39. Washington: Government Printing Office.

Thornton, Thomas. forthcoming. *Utilization of Salmon in Sitkoh Bay*. Juneau: Division of Subsistence.

Turner, Nancy J. 1982. *Food Plants of British Columbia Indians. Part 1. Coastal Peoples*. Victoria: British Columbia Provincial Museum.

Widdoson, Thomas B. 1973. *The Marine Algae of British Columbia and Northern Washington: Revised List and Keys. Part I. Phaeophyceae (brown algae)*. Syesis 6:81-96.