

## **Non-competing small-scale fisheries in Western Alaska : subsistence and commercial fishing by native alaskans**

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### **PÊCHES ARTISANALES SANS COMPÉTITION DANS L'OUEST DE L'ALASKA : PÊCHE COMMERCIALE ET DE SUBSISTANCE PAR LES AUTOCHTONES D'ALASKA**

#### **RÉSUMÉ**

*Au cours de la décade passée, les recherches parmi les communautés autochtones d'Alaska ont montré qu'il s'était produit une intégration harmonieuse des activités de pêche commerciale pour l'exportation dans une économie de subsistance, sans déplacement ou contraction de la pêche de subsistance. La pêche commerciale n'a pas abouti à une stratification sociale et économique inégalitaire. La gestion participative a abouti à des limitations de la pêche commerciale pour préserver la pêche de subsistance, à l'initiative des communautés de pêcheurs. La préservation de la ressource et le maintien de l'organisation traditionnelle ont été la base du développement de la pêche commerciale et de son contrôle. L'article décrit l'économie des pêches dans deux communautés de pêcheurs et met en lumière la compatibilité entre pêches commerciale et de subsistance, à travers la participation, les lieux de pêche, et la distribution des ressources.*

#### **1. INTRODUCTION**

Over the past decade, research among contemporary Native Alaskan communities has shown that there has been a compatible integration of commercial fishing for market export into the subsistence-based economy rather

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than displacement or constriction of fishing for subsistence (WOLFE, 1984 ; WOLFE *et al.*, 1984). These studies have demonstrated that commercial fishing has not resulted in a stratified, non-egalitarian organization of economic relations in production in part because the development of the commercial fishery did not create a regulatory structure that restricted subsistence fishing (WOLFE, 1984). This paper describes the fishing economies of two *Yup'ik* Eskimo communities where research has yielded additional insight into the compatibility of the two sectors of the fishing economy - production of fish for subsistence use (domestic production) and for commercial sale (simple commodity production). Compatibility is analyzed by focusing on the participants, fishing areas, fishing schedules, and the distribution of income derived from the commercial fishery.

## 2. STUDY AREA

In the 1980s, the *Yup'ik* of western Alaska resided in about 45 communities along the coast of the eastern Bering Sea, and along the Kuskokwim and Yukon rivers. The predominantly Native regional population was approximately 18 000 in 1985 (Alaska Department of Labor, 1987). Villages were small and ranged in size from 200 to 650 people. The region is about 800 km by air west of Alaska's largest metropolis, Anchorage. None of the communities in the region were linked to one another by road; air and water transportation were the primary means of access. In 1985, the communities in this region were among the poorest in the state with most wage earning residents having the lowest average individual income compared to those of other Alaskan communities (less than \$12 000 per wage earner) (Alaska Department of Revenue, 1988). Due to tremendous costs of importing goods and services, the cost of living was approximately twice that of the contiguous United States.

In the 1980s, as in the past, fish was the basis of the subsistence economy (ANDREWS, 1989 ; PETE, 1988). Fishing for subsistence and commercial purposes occurred each summer by residents of most communities with salmon (*Oncorhynchus sp.*) and herring (*Clupea pallasii*) being the major fish species taken for commercial export. A variety of fish species including herring and salmon comprised the subsistence harvests. In the 1980s, fish species accounted for up to 82 percent of all wild food produced for subsistence (ANDREWS, 1989).

## 3. THE DATA

This paper focuses on the herring fisheries of the eastern Bering Sea and the salmon fishery of the lower Kuskokwim River derived from data collected in Tununak situated along the Bering Sea coast and Nunapitchuk located along a tributary of the Kuskokwim River (Fig. 1). Subsistence fishing refers to the «procurement of fish for consumption of the fishers, their families and community» (BERKES, 1988 : 319). It differs from an artisanal fishery in that a portion of the catch is not sold.

### 3.1. Methodology

Research projects began in the study communities following approval for this work by local community officials. At the onset of field studies a census of each community was conducted. Each individual was identified and their name, sex, date of birth, and household residence recorded. Each household and individual was assigned a code number with which harvest and income information could be collated and to insure confidentiality of the data.

The goal of field work, which was achieved, was to interview members of all subsistence fishing households during the fishing season. Systematic interviews were conducted in the Native *Yup'ik* language and data were

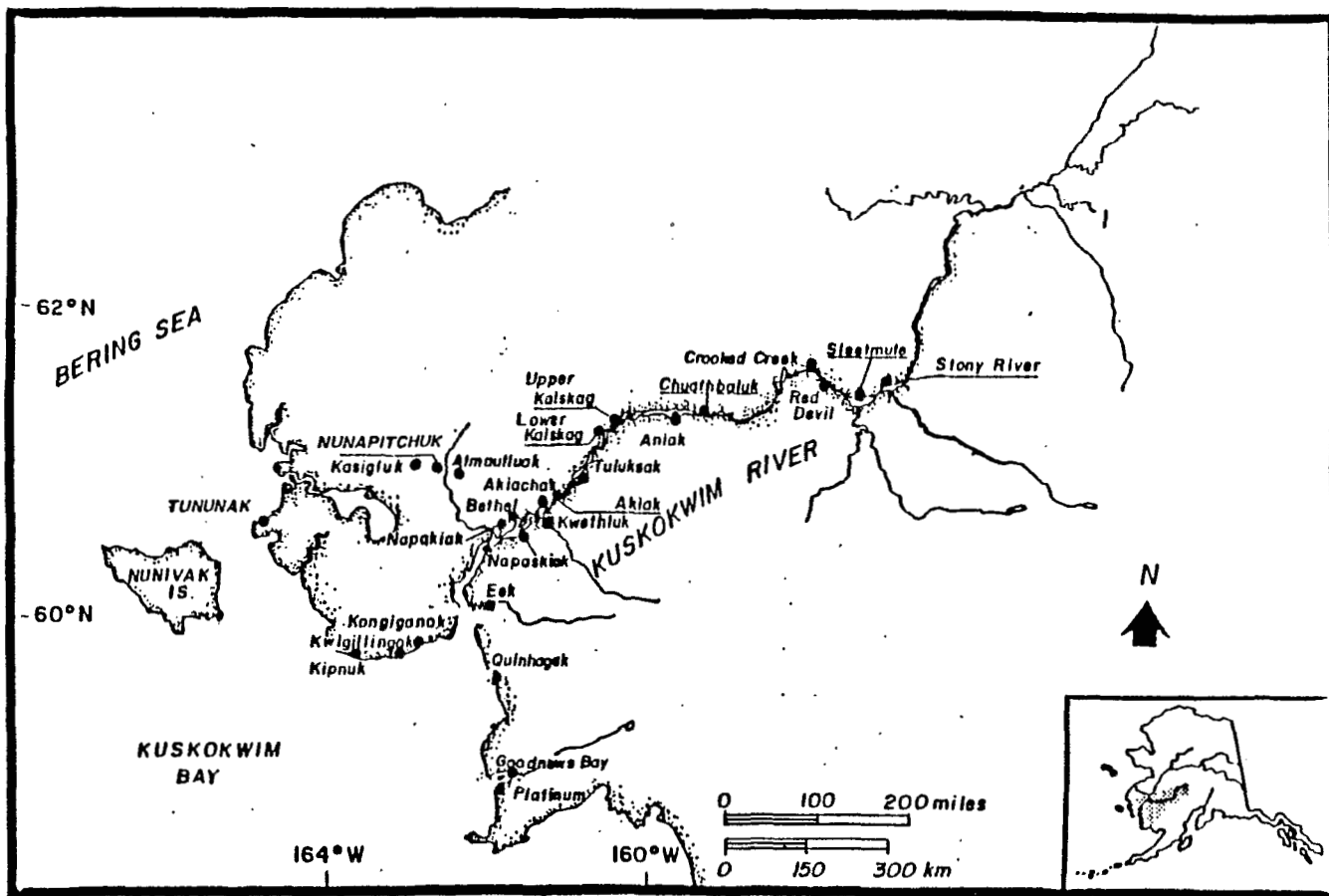


Fig. 1 - Location of Nunapitchuk and Tununak in western Alaska

Figure 1. Location of Nunapitchuk and Tununak in western Alaska.

recorded on survey forms. The surveys recorded information on fishing area, gear, processing facilities, period of harvest, harvest levels, and work group composition. In addition, fishing areas were mapped on Geological Survey maps (scale 1 : 63 360) by direct observation.

Commercial fishing data (harvests in pounds and income earned) were taken from State of Alaska Commercial Fisheries Entry Commission records. Their records were derived from «fish tickets» that documented the number of pounds per fish species purchased by a company from a permit holder.

Demographic data and quantitative information on harvests and income were entered onto computer files and analyzed using the Statistical Package for the Social Sciences (SPSS) and Lotus 1-2-3 software. Average and range of individual, household, and community earnings were computed for commercial fishing. Average and range of household and community harvests also were computed for subsistence fishing. Participation in commercial and subsistence fishing by community households was calculated to show the extent of dual participation by household. Cumulative percentage of income by cumulative percentage of fishermen was computed to show the distribution of commercial fishing earnings across fishermen.

## 3.2. Research Findings

Typical of other communities in the region, the study communities were small. In 1983, Nunapitchuk had 341 people residing in 70 households and, in 1987, Tununak had a population of 314 in 66 households. Nunapitchuk household members fished for four species of salmon (chinook, sockeye, chum, and coho) for subsistence and commercial use, whereas Tununak residents fished for herring.

### 3.2.1. Participation

In Nunapitchuk, extended family groups worked together to harvest and process salmon for subsistence use by drying and smoking the salmon for use at other times of the year. Most (57 percent) subsistence fishing households fished from a fish camp. Of the 40 subsistence fishing households, 30 also fished commercially (Tab. 1). During the same fishing season, 10 households fished for salmon exclusively for subsistence use and 6 households fished for salmon only for commercial sale (Tab. 1). Thus, both types of fishing were integrated by most fishing households. Participation in the subsistence fishery was not restricted in any way to community residents. Commercial salmon fishing in this area was limited. Only individuals who had applied for and received a permit from the state during the mid 1970s or who have purchased or received a transferred permit could fish for salmon for sale. Relatively few households participated exclusively in either subsistence or commercial fishing; in most cases the two activities were combined.

In 1987, 30 of the 66 Tununak households were involved exclusively in subsistence herring production, while 7 households had members who only fished commercially for herring (Tab. 1). As in Nunapitchuk, dual participation by Tununak households in both the subsistence and commercial herring fishery was considerable; 26 households participated in both fisheries (Tab. 1). Annually renewed permits are required of commercial herring fishermen, however limited entry had not been established, so there was no limit to the number of commercial herring fishermen. However, commercial fishermen were restricted to fishing in a single herring fishery. As with subsistence salmon production by Nunapitchuk residents, extended family groups, often encompassing several households, cooperated to harvest, process, and dry herring for food in Tununak. Processing and drying herring was a time-consuming, labor-intensive operation.

### 3.2.2. Fishing areas

Salmon do not occur in the tributary along which Nunapitchuk is situated. Fishermen had to travel at least 32 km to the nearest salmon fishing area. Some individuals and families seasonally relocated to traditional fishing camps

along the Kuskokwim River, whereas others commuted from the village. Some of the fishing camps were substantial in terms of number of people and structures. One camp housed members of 9 households including 30 people using 29 structures such as cabins and wall tents, smokehouses, drying racks, and steambath houses. In 1983, these customary areas were legal fishing areas for both subsistence and commercial salmon fishing.

In contrast to the use of fish camps to fish for salmon by Nunapitchuk families, all herring fishing at Tununak occurred from the community, which traditionally functioned as a seasonal camp from which various fish species, including herring, were caught and preserved. Major herring spawning areas near the community were the key fishing areas. Two critical spawning areas were closed to commercial fishing since that fishery began in 1985. One area was known to host consistently productive and healthy spawn substrate from year to year, even when other areas fluctuated in production. The other area had been the major subsistence fishing ground of Tununak residents for generations. They requested that commercial fishery managers close the area to protect their subsistence fishing opportunities, which were not restricted in time or place.

### *3.2.3. Gear*

In 1983, Nunapitchuk fishermen used locally handcrafted wooden boats and commercially manufactured imported aluminum boats for salmon fishing. These small skiffs were generally 6 or 7,2 m in length. Boats were equipped with outboards generally 50 or 70 HP. Gill nets used while drifting downstream was the primary method for harvesting salmon. Nets were generally 90 m in length and varied in mesh size depending upon the species of salmon targeted. State fishing regulations dictated maximum net length for subsistence and commercial fishing and mesh size used for commercial fishing.

Homemade wooden and purchased aluminum and fiberglass boats used by Tununak fishermen in 1987 ranged from 4,2 to 8,4 m in length. Outboard engines were similar in power to those used by Nunapitchuk fishermen. In a practical sense, riverine conditions and required mobility while drifting for salmon have limited boat size and outboard power in the Kuskokwim salmon fishery. In order to confer an advantage to local fishermen who did not have the capital to invest in equipment that would be competitive with fishermen from other areas, a limit on vessel length and prohibition of power equipment to handle nets was implemented in the commercial herring fishery. Herring gill nets ranged from 7,5 to 180 m in length, with the longer nets typically used also for commercial fishing. Most subsistence fishing nets were shorter than commercially used nets and their webbing was made from cotton or multi-filament nylon, so as not to cut into herring carcasses used for food. In contrast, commercial fishing nets were primarily of mono-filament nylon and generally 180 m long, the legal limit for length.

### *3.2.4. Fishing schedules*

In 1983, subsistence salmon fishing was limited to 4 days per week and commercial fishing limited to 2 or 3 periods per week ranging in length from 6 to 9 hours each, depending upon the species. By state regulation, subsistence fishing was not allowed during commercial fishing periods, nor was commercial fishing allowed during subsistence fishing periods. There were several periods per weeks (up to 24 hours long) during which no fishing was allowed. During most any one-week period throughout the annual migrations of salmon up the Kuskokwim River, fishermen had opportunity to fish for subsistence use, and if permitted, for commercial sale. Local fishermen, including those from Nunapitchuk have been actively involved in developing measures for conserving the salmon resource when fishery managers have reported declining escapements. They have agreed to reductions in commercial fishing opportunity in favor of maintaining subsistence fishing schedules.

In Tununak, subsistence herring fishing was not limited in time - it could occur as soon as herring arrived in the area and could continue unrestricted throughout the month whenever consecutive runs passed through the area. However, at times, severe coastal weather and tidal action restricted all fishing activity. When these conditions

subsidized and herring were present, subsistence fishing occurred around the clock. The commercial fishery occurred at discrete times established by regulations ; these times were dictated on the developmental quality of herring sac-roe. This determination was made cooperatively by fishermen and fishery managers through test fishing. The commercial herring fishing season has progressively decreased from 48 hours to 6 hours as fishermen become more efficient and timing of openings around presence of sea ice contributes to productive sets. Local residents requested lower commercial harvest rates than those established for other commercial herring fisheries in the state to assure orderly development of this fishery and to minimize any possible disruptive effects on the subsistence fishery.

### 3.2.5. Distribution of fishing income

Commercial fishing by Nunapitchuk fishermen has been an unstable source of income. Salmon run strength, market prices, and allowable harvest levels (by state regulation) all contributed to the success of fishing for each salmon species during the fishing season. As a result most (76 %) fishermen fished two-thirds or more of all fishing periods. The majority of a fisherman's seasonal earnings could not be derived simply from fishing for a particular species or during certain periods. Instead, income from commercial fishing was evenly distributed throughout the season and among commercial fishermen (Fig. 2). Fifty percent of the income was earned by 65 % of the fishermen.

The commercial herring fishery in Tununak was new compared to the commercial salmon fishery on the Kuskokwim. However, its contribution to and place in the community economy was similar to that of commercial salmon fishing in Nunapitchuk. Commercial herring use was adjunct to subsistence use. Community income generated from commercial fishing varied from year to year and for individual fishermen. The variation was a result of several factors : abundance and distribution of herring throughout the fishing district, quality of sac-roe in the fished stocks, and market price. However, for those that participated, distribution of income across fishermen was very similar to that found for Nunapitchuk salmon fishermen (Fig. 2)

## 4. DISCUSSION

This paper depicts integration of subsistence and commercial fisheries in two *Yup'ik* Eskimo communities. Many households in each community participated in both commercial and subsistence fishing. Distribution of income showed no stratification among fishermen ; there was no disproportionate amount of income acquired by a minority. Compatibility of uses occurred regardless of species (each fishery was based on a different primary species - salmon in Nunapitchuk and herring in Tununak) and differences in longevity of each commercial fishery

This process has come about through co-management within the state regulatory and management system (PINKERTON, 1987). Regulatory restrictions affecting commercial fishing, such as those limiting gear, areas fished, and harvest levels, have not been extended to the subsistence fishery, and in turn, have not affected productivity in the subsistence fishery. In fact, many regulations restricting aspects of the commercial fishery were borne out of local concern for the subsistence fishery. In Nunapitchuk, fishermen agreed to reduce commercial opportunities to maintain critical subsistence salmon fishing times, and, in Tununak, fishermen requested commercial fishing area closures to protect herring stocks and to honor areas where traditionally undisturbed subsistence fishing could occur.

The state of Alaska has statutory requirements to give priority to subsistence uses of fish stocks, when those uses have been legally recognized and established, as they have for these two fish species and the communities that use them. However, the choice of regulatory schemes was significant for both fisheries, because other legal options for managing the fisheries were possible. Alternatives measures were possible which could have restricted subsistence fishing and allowed some level of commercial fishing. In Nunapitchuk and other lower Kuskokwim River communities, fishermen preferred to keep the subsistence fishery intact and forego commercial fishing of one salmon species.

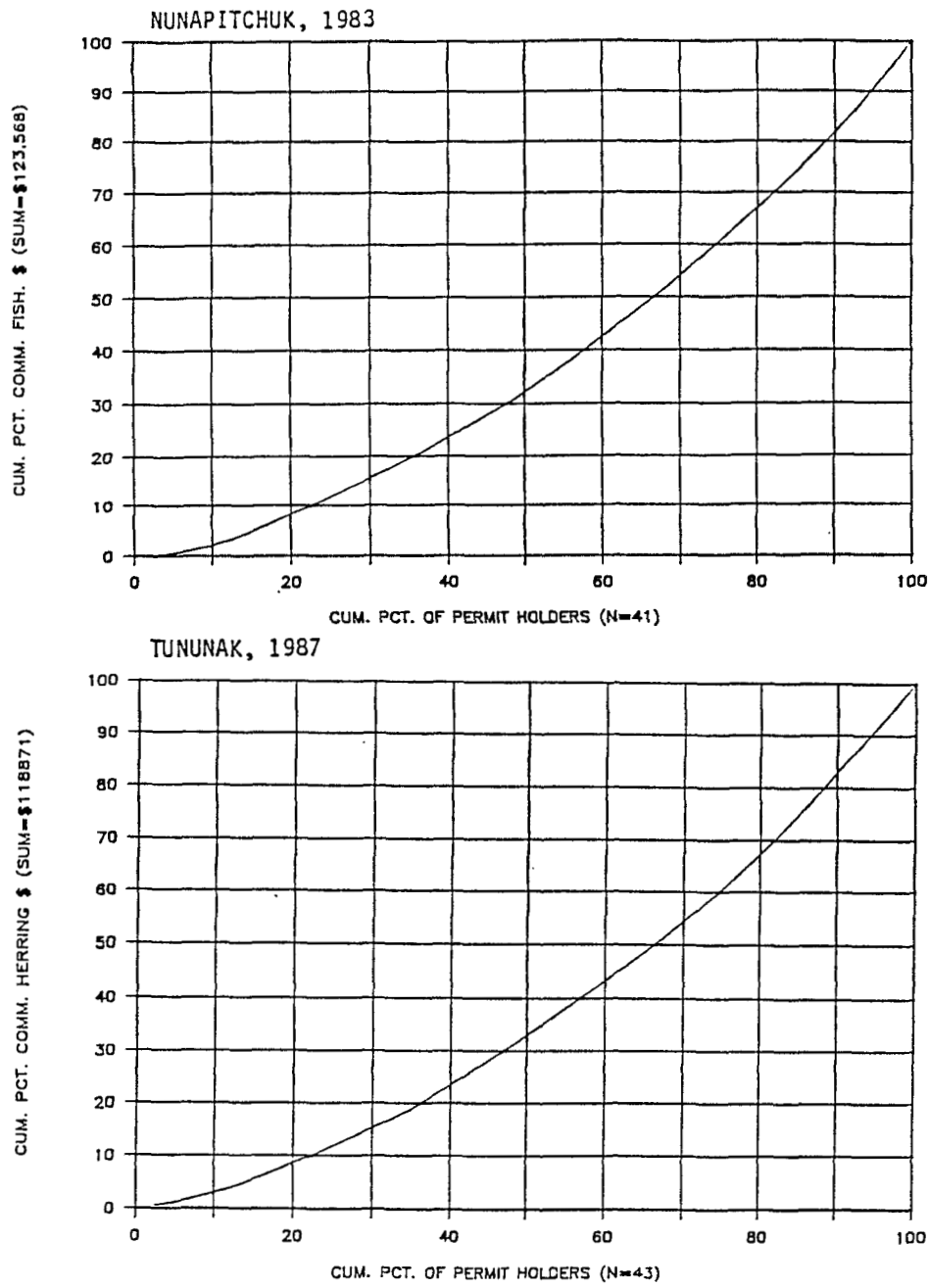


Fig. 2 - Distribution of commercial fishing income among Nunapitchuk and Tununak fishermen

The subsistence sector has been the most stable and consistently productive part of the mixed economy in the region (WOLFE, 1984). It has been the major factor in considerations of other uses and management plans. In the case of Nunapitchuk, this long-term relationship (10 + years) between the subsistence and commercial sectors of the salmon fishery has not resulted in reduced subsistence productivity or participation. The developing commercial herring fishery indicates a similar compatibility of subsistence and commercial fishing. In both Nunapitchuk and Tununak, concern by village fishermen for conservation of the resource and a preference for maintaining the traditional pattern and level of fishing have taken precedence over commercial interests. In a region where commercial and subsistence fishermen are the same individuals, competition for the resource was not a major issue.

**Table 1 - Household participation in subsistence and commercial fishing in two Western Alaska communities**

Type of fishing	Number of households	
	Nunapitchuk 1983 (N = 70)	Tununak 1987 (N = 66)
Subsistence only	10	30
Subsistence and Commercial	30	26
Commercial only	6	7

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