Local Traditions and Subsistence: A Synopsis from Twenty-Five Years of Research by the State of Alaska

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ABSTRACT

This report provides a synopsis of findings on subsistence systems in Alaska, drawing on a quarter century of research by the Alaska Department of Fish and Game, Division of Subsistence. The synopsis examines the localized nature of subsistence systems. Subsistence is shown to comprise a diverse set of localized systems of food production and distribution, representing relatively unique combinations of ecological, cultural, and economic factors. The report concludes that there is not one subsistence tradition in Alaska, but a multitude of subsistence traditions linked to particular localities. The creators and principal users of these localized subsistence traditions are the long-term residents in the communities and areas where they occur. For resource managers to achieve fish and game management goals, locality is at times an essential regulatory tool. To illustrate this, the report presents three case examples of local subsistence traditions associated with difficult resource management issues arising from competition between urban-based harvesters and rural subsistence users: brown bear hunting in western Alaska, salmon dip net fishing in the Copper River, and Nelchina caribou hunting. The three cases illustrate ways that resource management systems have used locality within regulations to resolve resource issues.

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Introduction

In Alaska, subsistence uses are the customary and traditional uses of fish and wildlife for food and other noncommercial purposes.[1] Subsistence uses are parts of localized traditions of wild food production, tied to specific places by ecology, community, culture, and economy. After twenty-five years of subsistence research, data collected by the State of Alaska strongly support this observation. There is not one subsistence tradition in Alaska, but a multitude of subsistence traditions linked to particular localities. The creators and principal users of these localized subsistence systems are the long-term residents in the areas where they occur.

The localized nature of subsistence traditions can be illustrated by two case examples. The first is the communal hunt of bowhead whales from Arctic coastal villages (cf., Ahmagoak 2004; Case 1989; Ellanna 1983a, 1983b; Pedersen, Coffing, and Thompson 1985). In this annual hunt, whale strikes (determined within an international management structure) are allocated and transferred among a designated set of communities with traditional uses of bowhead whales. The skin, fat, and meat from a killed whale (pulled ashore by community members) are widely distributed and celebrated within communities following customary rules.[2] This subsistence system is clearly localized: bowhead whale hunting is found in Alaska within four Arctic slope villages (Point Hope, Wainwright, Nuiqsut, and Kaktovik), five Bering Strait villages (Gambell, Savoonga, Wales, Little Diomede, and Kivalina), and one regional center (Barrow), all member communities of the Alaska Eskimo Whaling Commission (AEWC). The second example, less well known but of regional importance, is the annual subsistence harvest of herring roe on hemlock branches in Sitka Sound (cf., Schroeder and Kookesh 1990b; Victor forthcoming; see also Wright and Chythlook 1985). In this fishery, individual boatmen (predominately Tlingit from Sitka and neighboring communities) sink hemlock branches beneath the milky waters of spawning herring runs to capture their eggs (up to about 120,000 lbs some years). The egg-covered branches (called *haaw*) are cut up (commonly frozen) for distribution among families throughout the region, with some sold for small amounts of money.[3] This subsistence system is also localized: roe-on-hemlock fisheries are found in Alaska only at Sitka and a few other villages in the southeast archipelago.

When "subsistence" is examined across Alaska, one discovers it comprises a diverse set of localized systems of food production and distribution, much like these two cases, representing relatively unique combinations of ecology, community, culture, and economy. The annual bowhead hunts and the annual herring roe-on-hemlock harvests are just two examples of a multitude of localized subsistence systems throughout rural Alaska.

Many localized subsistence systems have been described by the State of Alaska's subsistence program, formally established by statute in 1978 to document subsistence patterns in Alaska (AS 16.05.094; Fall 1990).[4] Descriptions are found in the state's technical paper series, covering research in about 180 communities, while quantitative information is stored in a computerized Community Profile Database (the website *http://www.subsistence.adfg.state.ak.us/geninfo/publctns/techpap.cfm* contains the database and list of publications). Scientific documentation has been essential for the sustainability of some subsistence systems, as illustrated by our two examples. The bowhead hunt in Alaska continues as a legal hunt because of a special exemption written into the federal Marine Mammal Protection Act of 1972 allowing for traditional hunts by coastal Alaska Natives under customary rules through the AEWC.[5] Similarly, the herring roe-on-hemlock fishery in Sitka Sound continues as it does under subsistence regulations crafted by the Alaska Board of Fisheries alongside a much larger and newer commercial fishery that exports herring sac roe to Japan (5AAC 01.710(c) and 01.716(b)). Documentation has allowed the bowhead hunt and roe-on-hemlock fishery to successfully compete within their respective resource management regimes. Without good information, Alaska's customary and traditional subsistence systems otherwise might be inadvertently or unwisely displaced, disallowed, transformed, or neglected among other competing enterprises.

This report provides a synopsis of some findings on subsistence systems in Alaska, drawing on the quarter century of research by the Division of Subsistence of the Alaska Department of Fish and Game. Previous summaries of this data set have identified general characteristics of subsistence socioeconomic systems in Alaska, including substantial wild food production in rural communities, domestic modes of production, and mixed cash-subsistence sectors in rural economies, among other features

(cf., Wolfe and Ellanna 1983; Wolfe and Walker 1987; Fall 1990; Wolfe 2001a). Adding to these general summaries, this synopsis highlights the localized nature of subsistence systems. The report elaborates on a point that is sometimes lost in general descriptions of subsistence, that subsistence systems are localized because of a constellation of factors, including the ecologies, cultures, and economies of communities of users.

The focus on locality for this synopsis was chosen because of its pertinence for current subsistence management regimes. While subsistence traditions and their participants are clearly localized, using geographic information as regulatory tools has at times proved difficult within resource management systems, particularly in regards to delimiting eligibility for subsistence hunts and fisheries under federal and State regulations. Yet, in order to achieve management goals, locality is at times an essential regulatory tool for resource managers. The synopsis begins with a general discussion of two types of local socioeconomic systems in the state and their relationship to subsistence uses. The discussion then describes the local character of subsistence traditions. Following this, the report presents case examples of local subsistence traditions. The cases were associated with difficult resource management issues, primarily due to competition between urban-based sportsmen and rural subsistence users. The cases illustrate ways that state and federal resource management systems have used locality within regulations to resolve resource issues.

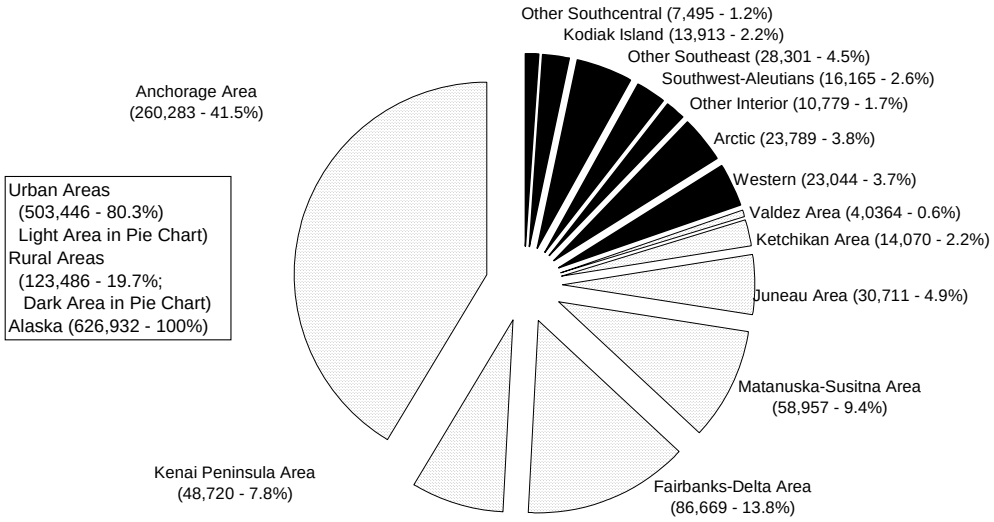
Local Socioeconomic Systems and Subsistence Uses

To understand the local character of subsistence traditions, it helps to understand the general socioeconomic history of communities in Alaska.[6] Prior to the mid-19th century, most Alaskan communities were supported by fishing and hunting for subsistence uses, organized within traditional economic systems of wild food production and distribution. Most communities harvested fish and game within identifiable territories, described in greater detail below. After the mid-19th century, American business and governmental interests headquartered in the continental United States expanded into the Alaska territory, developing new commercial industries, including Alaska's high-profile industries of commercial fishing, mining (gold, copper, zinc, silver, and coal), logging, oil extraction, and recreational tourism (including parks, guided tours,

and sport fishing and hunting). After the Second World War, national defense (military bases and stations) emerged as another major sector of the Alaskan economy.

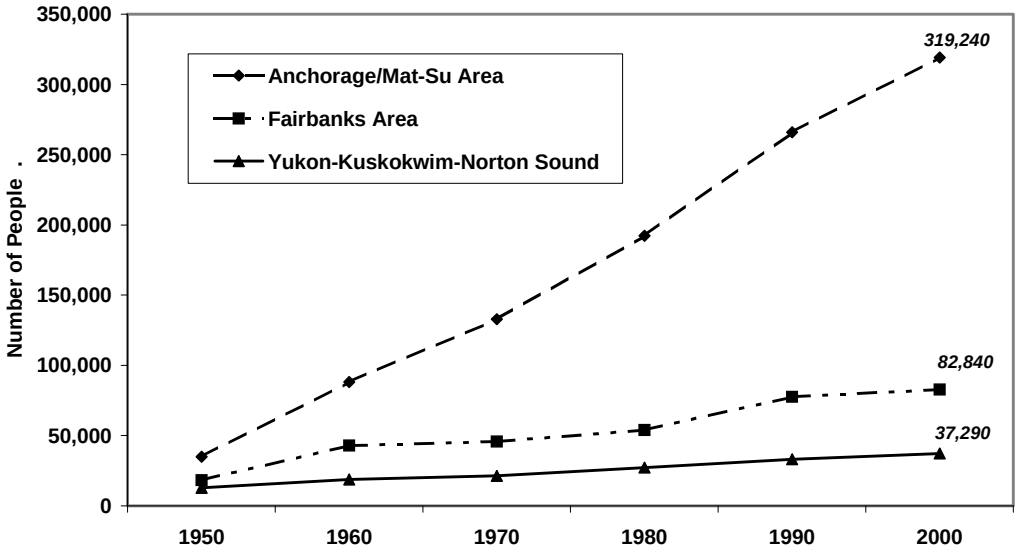
New urban centers developed to support the enterprises, populated primarily through the migration of people from the continental United States, but secondarily through population shifts from rural areas. The growing urban areas offered employment in services, trade, finance, manufacturing, and government not found in rural areas. During the 20th century, Alaska's population became increasingly urban so that by the turn of the 21st century, 80 percent of Alaskans were living in urban areas (Fig. 1).[7]

Fig. 1. Alaska's Population by Area, 2000



The greater growth of Alaska's urban areas compared with certain rural areas is illustrated in Fig. 2. Between 1950 and 2000, the Anchorage/Mat-Su urban area (Alaska's principal population center) grew from 35,021 to 319,240 people, and the Fairbanks urban area grew from 18,129 to 82,840 people. The rural communities of the Yukon, Kuskokwim, and Norton Sound drainages grew substantially less, from 12,882 to 37,290 people (Fig. 2).

Fig. 2. Population Trends in Urban and Rural Alaska



The socioeconomic system of Alaska's urban areas can be broadly termed "industrial capitalism," a socioeconomic system that evolved after America's industrial revolution. In the urban areas, most economic labor is sold to capital, goods and services are provided for markets, and most food is purchased in stores, imported from outside the state. Industrial capitalism became the principal socioeconomic system supporting Alaska's population centers, replacing traditional subsistence-based economic systems.

Outside of Alaska's urbanized areas, in the open rural countryside, traditional subsistence economies evolved into new types of socioeconomic systems broadly termed "mixed subsistence-market economies."[8] At the turn of the 21st century, characteristics of rural socioeconomic systems included mixed subsistence-cash sectors in small communities, substantial wild food outputs for local consumption, domestic modes of food production (by family-based groups rather than business entities), seasonal cycles of production activities, noncommercial networks for distributing wild foods, and traditional systems of land use. In Alaska's rural areas, a significant portion of the local food supply was produced through hunting, fishing, and gathering on public lands (Wolfe and Walker 1987; Wolfe and Utermohle 2000). Rural families typically supported themselves by a combination of subsistence and income-generating activities that included (depending on the community) wage employment, commercial fishing, and fur

trapping. Other income sources included State permanent fund dividends from oil royalties, dividends from Native Corporation investments, and government transfers (such as food stamps and aid to families with dependent children). The combination of primary food production and wage-market activities comprised the "mixed economy" of Alaska's rural areas.

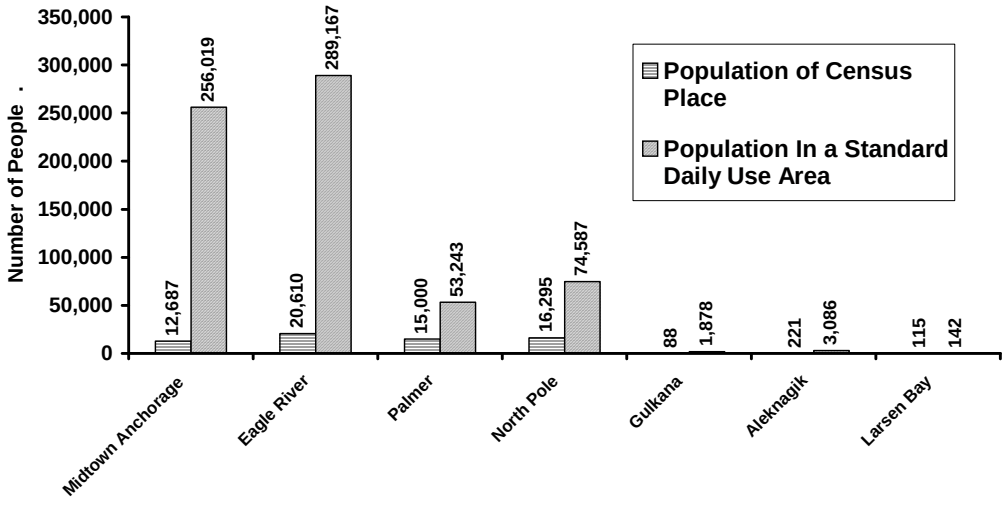
Accordingly, by the turn of the 21st century there were two main socioeconomic systems operating in different parts of Alaska: industrial capitalism in the urbanized areas and mixed subsistence-market systems in the rural countryside. In 2000, there were about 255 rural communities in Alaska, totaling 123,486 people (19.7 percent of the state's population in 2000). There were about 65 census-designated populations located in seven urbanized areas, totaling about 503,446 people (80.3 percent of the state's population) (see Fig. 1). Alaska's population was as urban as the general United States population, which was 79.0-80.3 percent urban depending on the urban standard (U.S. Department of Commerce 2003).[9] In sum, most of Alaska's population lived and worked in a few urban areas without local subsistence systems, while most of Alaska's rural communities relied on local subsistence systems as central to their livelihoods and ways of life.

Communities without subsistence systems are called "nonsubsistence areas" under Alaska's State law. A "nonsubsistence area" is defined as "an area or community where dependence upon subsistence is not a principal characteristic of the economy, culture, and way of life of the area or community" (AS 16.05.258(c) and 5 AAC 99.015).[10] Nonsubsistence areas are composed of urbanized areas with industrial capital socioeconomic systems, and portions of the rural-urban fringe. At present, the Joint Board of Fisheries and Game has identified five nonsubsistence areas in Alaska – the Anchorage-Kenai-Matsu area, the Fairbanks area, the Juneau area, the Ketchikan area, and the Valdez area (5 AAC 99.015; Fall 1990:81-83; Alaska Department of Fish and Game 1992).

Subsistence traditions are localized in this broad respect: subsistence fishing and hunting can occur only within communities and areas outside the boundaries of nonsubsistence areas.[11] Fishing and hunting can occur within nonsubsistence areas under nonsubsistence regulations, including sport fishing, general/sport hunting, personal use

fishing, and commercial fishing. When an Anchorage resident kills a moose in the urban Anchorage bowl, regulations recognize that its use as food in Anchorage is part of a nonsubsistence tradition, most likely a sport tradition.[12]

Fig. 3. Population Within Standard Daily Use Areas of Urban and Rural Places



There are a number of important differences between nonsubsistence areas and rural subsistence areas, which affect how residents are differently situated relative to wildlife and economic opportunities. The most basic difference is demographic. Alaska's rural communities are situated in open, sparsely-settled country.[13] By contrast, Alaskans in nonsubsistence areas are situated in developed, more densely-settled areas. The sparsely-settled character of rural Alaska compared with nonsubsistence areas is illustrated by seven case communities in Fig. 3. Four are in nonsubsistence areas: North Pole (16,295 people) is on the outskirts of Fairbanks; Palmer (15,000 people) is the population center of the Matanuska-Susitna Borough, about 35 miles from downtown Anchorage; Eagle River (20,610 people) is a neighborhood at the northern edge of Anchorage; and Midtown Anchorage are several census tracts near the center of Anchorage (12,687 people).[14] For communities in nonsubsistence areas, relatively large numbers of people live within a standard daily use area, defined as the people living within 30 miles of the geographic center of each place: North Pole (74,587 people),

Palmer (53,243 people), Eagle River (289,167 people), and Midtown Anchorage (256,019 people) (for a discussion of standard daily use areas, see Wolfe and Fisher 2003). [15]

Because of where they are situated, residents of nonsubsistence areas find relatively large numbers of people living in their immediate surroundings, the area used in a normal round of daily activities. This is not surprising, as these residents are situated in urbanized areas that, by definition, are areas with larger populations and higher densities. As a consequence to these local demographic facts, urban residents also are situated differently to wild foods, store foods, food prices, employment opportunities, and other economic factors related to population size and densities, as discussed below.

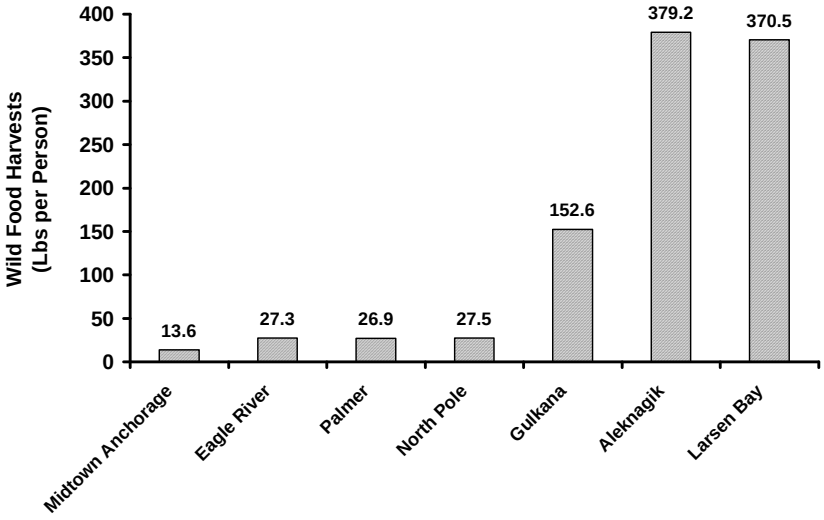
By Alaska rural standards, the nonsubsistence areas are congested, as illustrated by the three rural cases in Fig. 3. Like most Alaska rural places, they are small communities: Gulkana (88 people), Aleknagik (221 people), and Larsen Bay (115 people). Moreover, the communities are situated in sparsely-settled, undeveloped country, with few other people living in a standard daily use area. Gulkana sits along the road system in the Copper Basin within 30 miles of several other places, including Gakona, Glennallen, Copperville, Tazlina, Silver Springs, Copper Center, and Willow Creek, yet in total, only 1,878 people lived in the 30-mile standard daily use area according to the 2000 federal census. Aleknagik sits at the head of the Wood River within 30 miles of Dillingham and Manokotak, with only 3,086 people living in the standard daily use area. Larsen Bay on Kodiak Island has only one community (Karluk) closer than 30 miles, with only 142 people in its standard daily use area. Because of where they are situated, the residents of Alaska's rural communities live and work on a daily basis in sparsely populated country. Again, this is not surprising, as rural places are by definition situated in low-density countryside.

Because they are situated in sparsely-settled, undeveloped country, Alaska rural communities are able to continue traditional fishing and hunting as ways of making a living. Food production is an economic enterprise in rural areas. This is a second important difference between rural subsistence and nonsubsistence areas. Most rural communities in Alaska are dependent on extensive land uses, particularly fishing and hunting to produce food for local consumption.[16] Extensive land uses such as primary

food production are usually not economically feasible in urbanized areas, as daily use areas are congested with people and traffic and developed for other economic uses. Residents of urbanized areas commonly hunt and fish, but it is part of non-economic (recreational) patterns, both locally and in the rural countryside.

The basic contrast in the economic food production of rural communities with low-level recreational harvests in urban communities is illustrated in Fig. 4, which shows the amounts of noncommercial wild foods harvested per person in the seven case communities. Harvests in the urban cases (Midtown Anchorage, Eagle River, Palmer, and North Pole) ranged between 13.6 and 27.5 lbs per person, compared with harvests in the rural cases (Gulkana, Aleknagik, and Larsen Bay) between 152.6 and 379.2 lbs per person.

Fig. 4. Wild Food Harvests by Urban and Rural Places



In Alaska as a whole, wild food harvests are strongly related to population density in a community's daily use area. This is illustrated in Fig. 5, which shows wild food harvests by 116 rural Alaska communities (those with less than 2,000 people) and 41 urban Alaska populations.[17] Residents of low-density areas produced substantial quantities of food by hunting and fishing, while residents of higher density areas produced low amounts (the scales in Fig. 5 are logarithmic). These relationships are

consistent with the different socioeconomic systems that support rural and urban communities.

Fig. 5. Population Density and Wild Food Harvests for Select Rural and Non-Rural Populations in Alaska

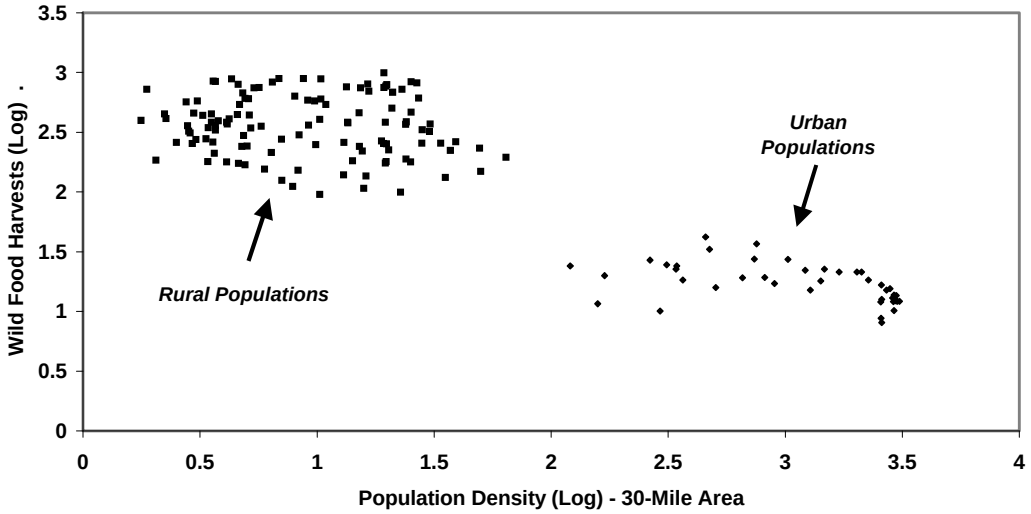


Fig. 6. Wild Food Harvests by Area

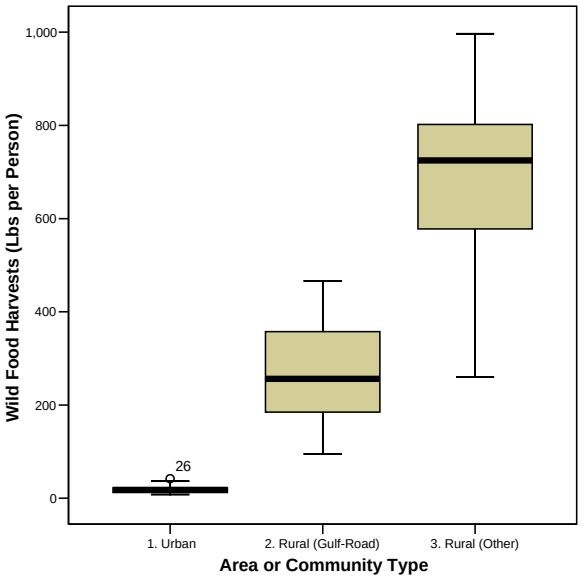
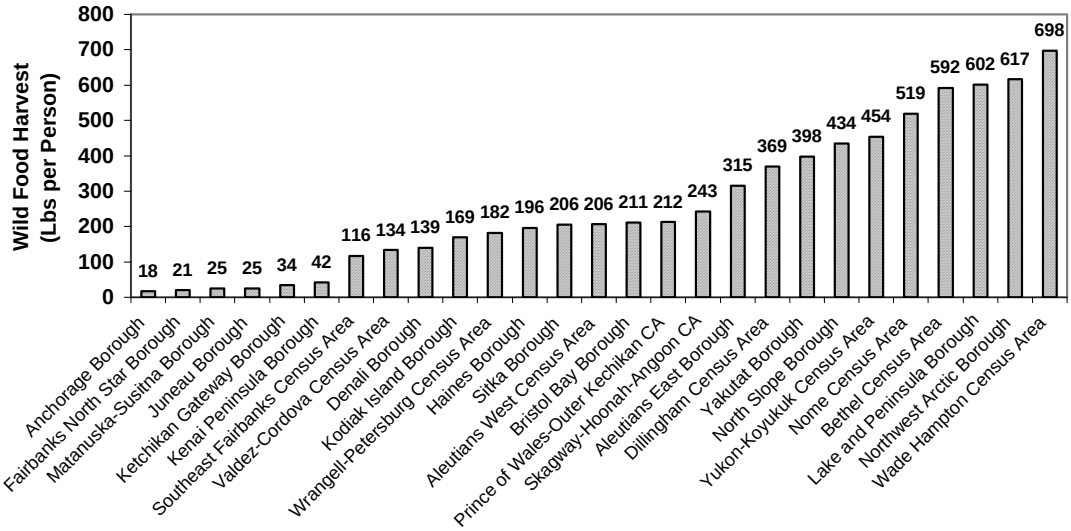


Fig. 6 compares the harvests of 155 Alaska communities or populations with harvest information collected by the state. The highest productivity of wild foods

occurred in 41 rural communities off the road network and not along the Pacific Coast: most communities in this set harvested between about 627-732 lbs per capita per year (this is the statistical range where 95 percent of communities fall, shown as the box in the graphic). Most of the 73 rural communities along the road system or the Pacific Coast harvested between 247-293 lbs per person (the 95 percent statistical range). Most of the 41 urbanized communities in nonsubsistence areas harvested between 16-21 lbs per person (the 95 percent confidence range). Each community grouping is statistically different from the others using the Bonferroni test (sig <.000).

Fig. 7. Wild Food Harvests (Lbs Per Person per Year) by Residents of Alaska Census Areas

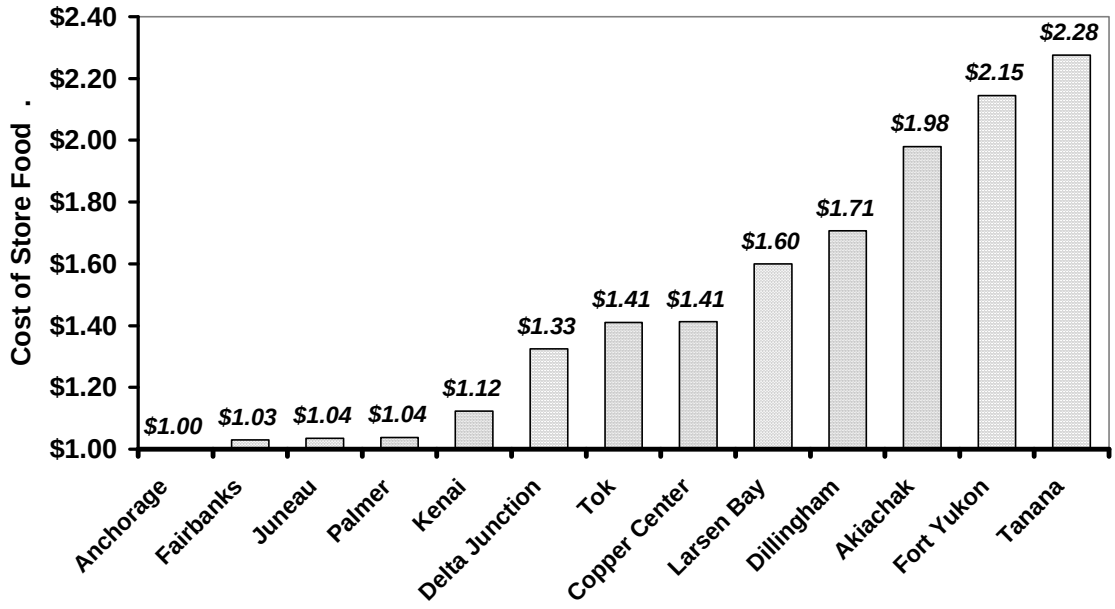


The localization of wild food production by geographic region also is illustrated in Fig. 7. The ten most productive boroughs were producing 315-698 lbs per person of wild foods, amounts that contained more than 100% of the protein requirements and 29%-69% of the caloric requirements of the local populations.[18] The four most urbanized boroughs (Anchorage, Fairbanks North Star, Matanuska-Susitna, and Juneau) were producing between 18-25 lbs per person of wild foods, amounts that contained 11%-16% of the protein requirements and 1%-3% of the caloric requirements of the population. In the primarily rural boroughs along the road system and Pacific Coast,

harvests ranged between 116-243 lbs, amounts that contained 75% or more of the protein requirements and 11%-22% of the caloric requirements of the population.

A third important socioeconomic difference between nonsubsistence areas and rural subsistence areas are the costs of store foods. Cheaper store foods are more available in nonsubsistence areas compared with rural subsistence areas. This is due to a number of factors. Alaska's urbanized areas, as commercial centers, offer more retail outlets for food and other products compared with rural areas, so competition drives down costs. The higher volumes of products bought and sold in urban areas lowers food costs on individual items, a function of supply and demand and scale. Alaska's urbanized areas are nearer to supply sources compared with rural areas, so lower distribution costs (transportation and transfer expenses) result in lower costs to consumers. All these factors increase the availability of less expensive store foods in Alaska's urban areas.

Fig. 8. Costs of a Dollar's Worth of Store Food (Relative to Food Costs in Anchorage)



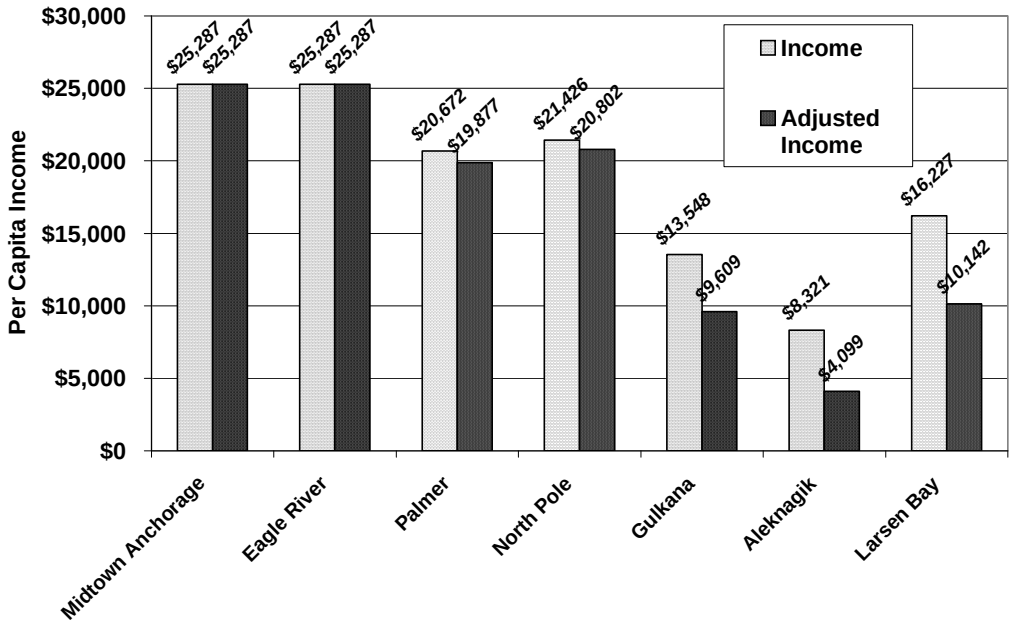
The costs of store foods in urban and rural communities are illustrated in Fig. 8, based on cost of living surveys conducted by the University of Alaska's Cooperative Extension Service.[19] Anchorage has the least expensive food stores in Alaska. Taking it as a base for comparison, a dollar's worth of food in Anchorage costs $1.03 in Fairbanks and $1.04 in Juneau and the Palmer-Wasilla area. That is, relatively inexpensive store foods are available in all of Alaska's large metropolitan areas, with food prices fairly close to one another (within a few percentage points). Store-bought foods increase considerably in price in the rural countryside. Along the road networks, a dollar's worth of food in Anchorage costs a $1.41 at Tok in the upper Tanana region and $1.41 at Copper Center in the Copper River Basin. Off the road networks, food prices skyrocket. A dollar's worth of food in Anchorage costs $1.98 at Akiachak on the lower Kuskokwim River, $2.15 at Fort Yukon on the upper Yukon River, and $2.28 at Tanana on the middle Yukon River. Geography plays the central role in determining local food costs, with prices increasing the farther goods move along trade networks, and with supplies decreasing in volume, quality, and diversity in smaller, more remote communities. Store-bought foods are not reliable in villages at the geographic fringes of trade networks. It is not uncommon for village stores to run out of many commercial products, particularly when weather interferes with shipments.[20] Alaskans are not similarly situated when it comes to access to affordable and reliable food stores.

In addition to greater access to commercial foods, urban residents have greater access to wage employment and other income sources. Urban centers boast more robust local economies. More opportunities exist for full-time wage employment in a variety of economic sectors (private and government, retail, services, and so forth).

Because of greater employment, monetary incomes are greater in communities in nonsubsistence areas compared with small rural communities. Per capita monetary income levels reported by the U.S. Census 2000 are shown in Fig. 9 for the same set of urban and rural cases compared in Figs. 3 and 4. Whereas per capita incomes were $25,287 in Midtown Anchorage, incomes were $13,548 in Gulkana on the state highway system in the Copper Basin and only $8,321 in Aleknagik in southwest Alaska. Further, the higher costs of imported commercial products erode the purchasing value of a dollar earned in rural areas compared with urban areas. When adjusted by the cost of food, per

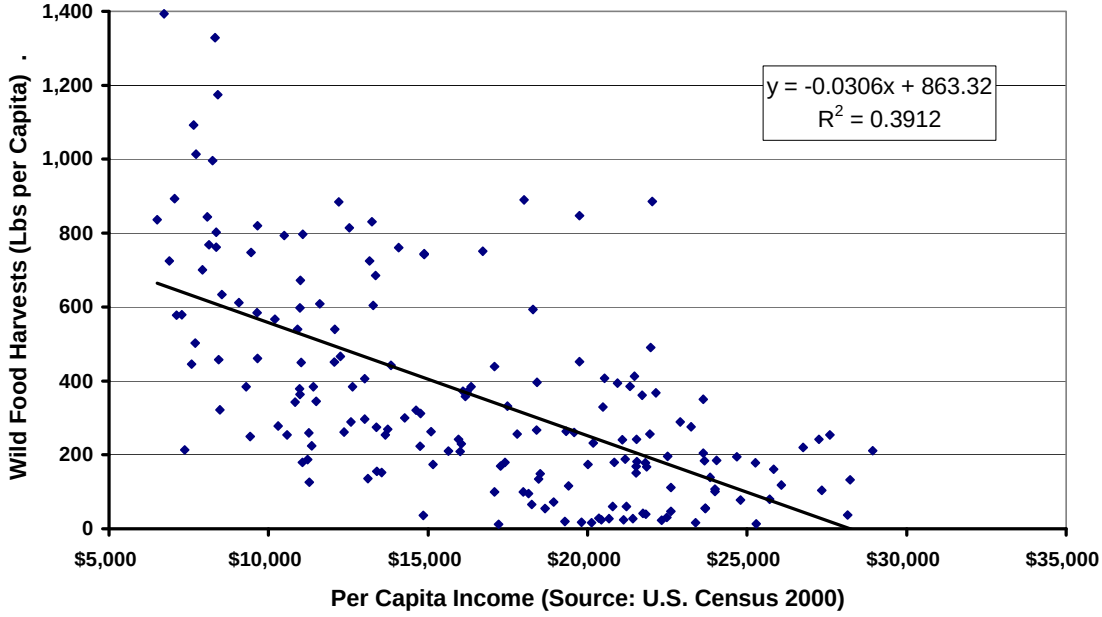
capita incomes in Anchorage ($25,287) are substantially larger than incomes at Gulkana ($9,609) and Aleknagik ($4,099). Simply because of where an Alaskan is geographically located, there are substantially different opportunities regarding basic food necessities and the income to obtain them.

Fig. 9. Per Capita Incomes and Incomes Adjusted for Cost of Food by Community. Source: U.S. Census 2000



Higher subsistence harvests in rural areas (see Fig. 4) are a necessary part of economic survival in rural Alaskan communities where incomes are low, prices are high, and imported foods unreliable. The relationship between per capita income (unadjusted for cost of living) and wild food harvest levels in communities is illustrated in Fig. 10. In this figure, each case is a community for which there are estimates of wild food harvests (from State records) and per capita incomes (from the U.S. Census 2000). The relationship between income and wild food harvests is inverse. Lower per capita incomes are associated with higher per capita wild food harvests comparing across communities (see Wolfe and Walker 1987 for a discussion of this relationship). The relationship is statistically strong, with 39% of the variation wild food production levels accounted for by per capita income.

Fig. 10. Wild Food Harvests and Income in Alaska Communities



In sum, fishing, hunting, and economic patterns are firmly related to geographic location in Alaska. In rural areas of Alaska, the communities of users are fishing and hunting as an economic strategy in mixed, subsistence-market economies. The activities are making substantial contributions to the local food supply, following longstanding traditions. In nonsubsistence areas of Alaska, the communities of users are hunting and fishing as part of industrial-capital socioeconomic systems. The primary values of the activities are not subsistence values, but recreational values. These rural and urban distinctions are anchored in different local socioeconomic systems and are recognized in the State's subsistence statutes pertaining to nonsubsistence areas.

Local Ecologies and Staple Foods

Subsistence traditions are localized. This fact becomes evident when one is confronted with answering a basic question – "what are the most important subsistence species in Alaska?"[21] Despite its apparent simplicity, the question is difficult to answer simply, as the answers depend on the community of subsistence users. This is because subsistence harvests and uses are localized, contained within the traditional areas of communities. Subsistence users harvest most of their food in the commons immediately

surrounding and contiguous to their communities, where most of the traditional foods are consumed. This is the "local store," the natural storehouse of wild foods available to the community.[22] The mix of food species differs markedly between traditional use areas due to ecological factors. Subsistence users are not equally situated in respect to food resources. They harvest species living in their traditional use areas and they generally do not leave their traditional areas to hunt or fish. By contrast, as discussed below, sport hunting and fishing patterns differ from this, with urban-based sportsmen commonly ranging widely to fish and hunt. Generalizing about the most important food species in Alaska communities is extremely difficult, because the local ecological niches, the "natural food stores" available to subsistence communities, are so different in Alaska. Alaska's multiple, complex subsistence systems do not easily fall into a few simple categories.

The complexity of identifying important food species is illustrated in Table 1, which lists the three top wild food species for ten communities, based on single-year surveys by the State subsistence program: Akutan (1990), Aleknagik (1989), Fort Yukon (1987), Gulkana (1987), Kaktovik (1992), Kotzebue (1991), Northway (1987), Old Harbor (1997), Sitka (1996), and Tununak (1986).[23] The set of ten communities reflects a diverse geography, including coasts, uplands, arctic tundra, boreal forests, and so forth. It is not a statistical sample of communities, but simply an illustrative set of cases. Most urban Alaskans would have trouble locating these communities on a map. However, for residents, the geographic location of each community is central for the shape of its economy and way of life. To say, "I live in the coastal Southeast forest" or "I live on the Bering Sea in Western Alaska" begins an explanation of the traditional foods likely (or not likely) to be in a rural resident's diet.

Table 1. Top Three Wild Foods by Community

Community	Top Three Wild Foods		
	1st	2nd	3rd
Fort Yukon Upper Yukon	Chum Salmon	Chinook Salmon	Moose
Gulkana Copper River	Sockeye Salmon	Moose	Caribou
Northway Interior Uplands	Whitefish	Moose	Hare
Kaktovik Arctic Coast	Bowhead Whale	Caribou	Arctic Char
Kotzebue Northwest Arctic	Caribou	Bearded Seal	Sheefish
Old Harbor Kodiak Island	Coho Salmon	Deer	Halibut
Sitka Southeast Forest	Deer	Sockeye Salmon	Halibut
Tununak Bering Sea	Herring	Halibut	Bearded Seal
Akutan Aleutian Islands	Halibut	Sockeye Salmon	Steller Sea Lion
Aleknagik Bristol Bay	Moose	Caribou	Sockeye Salmon

Table 1 lists the top three species (by weight) harvested for food by residents of the community.[24] Based on this data set, it would be difficult to answer the original question, "what are the most important subsistence species?" The top-most species differs for each community: it was deer for Sitka, herring for Tununak, moose for Aleknagik, coho salmon for Old Harbor, and so on. Looking further down the table at the second-ranked and third-ranked species, we see there is some duplication of important species between communities. In the thirty slots, sixteen species are represented. Caribou, halibut, moose, and sockeye salmon are among the top three species in four communities. Bearded seal and deer are among the top three species in two communities. Ten other species appear once (arctic char, bowhead whale, Chinook salmon, chum salmon, coho salmon, hare, herring, sheefish, Steller sea lion, and whitefish). So can we say that caribou, halibut, moose, and sockeye salmon are the most important subsistence species in Alaska? We might, but we'd be on shaky ground. Caribou, halibut, moose, and caribou were among the top three species in four of ten

communities, but six out of ten communities did not mention any of them in their top three food species. And we have no idea whether harvests in these ten communities represent the harvests in the approximately 255 rural communities with subsistence systems in Alaska.

Looking for clusters of species in Table 1 helps little in identifying the most important traditional food items in rural communities. The cluster moose-caribou is found in two communities, as is moose-sockeye, sockeye-halibut, and halibut-deer. There are no other species groupings beyond that.

The search for patterns grows messier when the top ten species in each case community are considered, shown in Table 2. The number of subsistence species increases from sixteen to forty-two. Among the new species, some are found in more than one community, such as pink salmon, northern pike, and harbor seal (three communities each). But 25 of the 42 top-ten subsistence species are found in only one or two case communities. Some unusual top-ten food species appear (at least unusual to me), such as feral cattle (no. 5 at Akutan), polar bear (no. 10 at Kaktovik), and burbot (no. 7 at Gulkana and no. 8 at Northway). From this set of case communities, it is a challenge to tease out the staple subsistence foods in Alaska villages.[25]

For those who enjoy solving puzzles with all the pieces, more complete lists of species harvested in the ten case communities are shown in Appendix Tables 1 and 2. The tables are placed as appendices because the lists of species grow very large, totaling more than 172 kinds of resources harvested for food among the ten communities. The totals vary by community: Sitka (77 kinds), Akutan (76 kinds), Aleknagik (68 kinds), Kotzebue (66 kinds), Old Harbor (63 kinds), Fort Yukon (51 kinds), Tununak (45 kinds), Kaktovik (43 kinds), Northway (40 kinds), and Gulkana (38 kinds).[26] The mix of resources presents an extremely complex picture at the species level.

Table 2. Top Ten Wild Foods by Community

Resource	Fort Yukon Upper Yukon	Gulkana Copper River	Northway Interior Uplands	Kaktovik Arctic Coast	Kotzebue Northwest Arctic	Old Harbor Kodiak Island	Sitka Southeast Forest	Tununak Bering Sea	Akutan Aleutian Islands	Aleknagik Bristol Bay
Chum Salmon	1				4	9	9			
Coho Salmon						1	6	9	6	8
Chinook Salmon	2	4				7	4			5
Pink Salmon						8		5	7	
Sockeye Salmon		1	7			5	2		2	3
Spawnouts										9
Herring								1		10
Herring Roe							5			
Smelt								8		
Pacific Cod (gray)									4	
Saffron Cod					10					
Halibut						3	3	2	1	
Black Rockfish									10	
Burbot		7	8							
Dolly Varden					7					7
Arctic Char				3						
Grayling		9								
Pike	6		5							6
Sheefish	5				3					
Whitefish		8	1					10		
Cisco	4			4						
Humpback Whitefish	9									
Black Bear	10									
Caribou	8	3	4	2	1					2
Deer						2	1			
Elk						10				
Moose	3	2	2	8	5					1
Muskox				7						
Dall Sheep				5						
Hare	7	10	3							
Muskrat		5	6							
Cattle - Feral									5	
Polar Bear				10						
Bearded Seal				6	2			3		
Harbor Seal						6	8		8	
Ringed Seal				9	6			4		
Spotted Seal					9			7		
Steller Sea Lion						4			3	
Bowhead				1						
Mallard			10							
Shrimp							10			
Vegetation		6	9		8		7	6	9	4

Source: Alaska Department of Fish and Game, Division of Subsistence, Community Profile Database

These long species lists aptly illustrate the point that there is not one set of important subsistence species in Alaska, but a multitude of important species sets that vary from community to community, principally because of where the residents of those communities are situated relative to food resources. The species harvested differ largely because of ecological factors. A general "ecological designation" is given to each community in Table 1: Interior Uplands (Northway), Southeast Forest (Sitka), Bering Sea (Tununak), and so forth. These general ecological labels provide some explanation for the important species and species mix for case communities. Deer are important for Sitka because community members hunt the coastal forests where there are deer. Burbot are important for Northway (the no. 8 resource) because community members fish the rivers and lakes in the Interior subarctic uplands where there are burbot. But these ecological labels are only gross indicators of observed harvest patterns. For instance, herring is the top resource in Tununak not solely because it is a Bering Sea community, but because the community is situated in a place where herring runs are one of the few abundant and reliable food sources. Aleknagik and Akutan also are Bering Sea communities, yet herring is ranked 10th for Aleknagik and 25th for Akutan. Herring roe is the fifth-ranked resource at Sitka, which is not on the Bering Sea. Classifying local ecological niches that are of significance to groups of communities of subsistence users may be a research task for the future, when more information has been collected on the issue of food staples. What one can say at present is that ecological niches used for subsistence vary considerably across the vast Alaska landscape, and the important subsistence species differ from community to community.

Local Use Areas and Subsistence

Alaska's ecological systems present limitations for food harvesting primarily because of the localized character of subsistence land use patterns. If subsistence hunters and fishers ranged widely throughout Alaska, subsistence food use patterns would not show such extreme local variation. However, this is not the case, as shown by the community use areas that have been mapped by the State's subsistence program (cf., Ellanna, Sherrod, and Langdon 1986; Schroeder, Andersen and Hildreth 1987; and Schroeder et al. 1987).[27] Examples of subsistence use areas are illustrated for Angoon

(Fig. 11), Kodiak Island communities (Fig. 12), Arctic slope communities (Fig. 13), upper Yukon River communities (Fig. 14), and Northway (Fig. 15).[28]

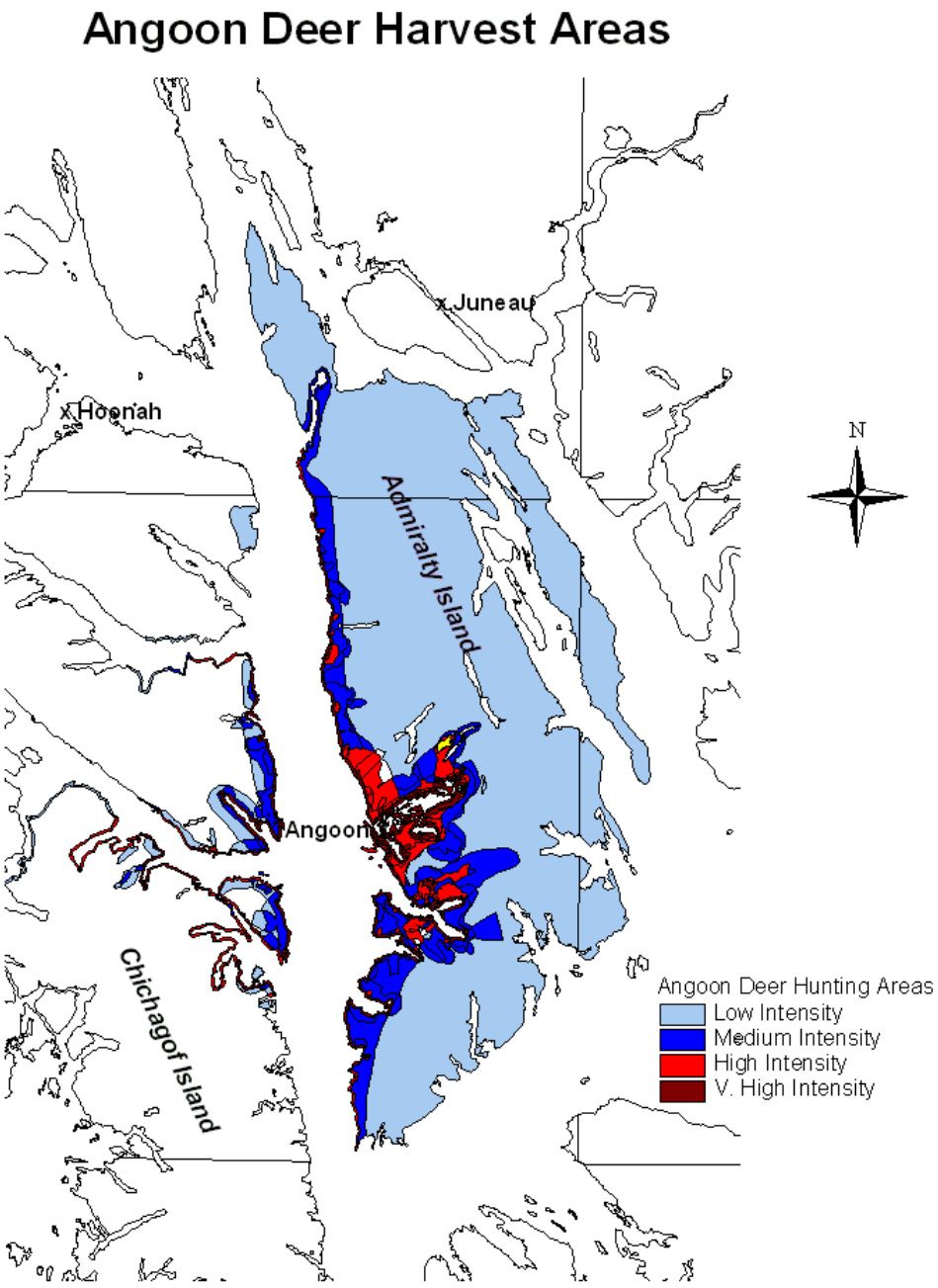


Fig. 11. Subsistence use areas for deer, Angoon, Southeast Alaska. Source: Rob Bosworth, Division of Subsistence, Alaska Department of Fish and Game.

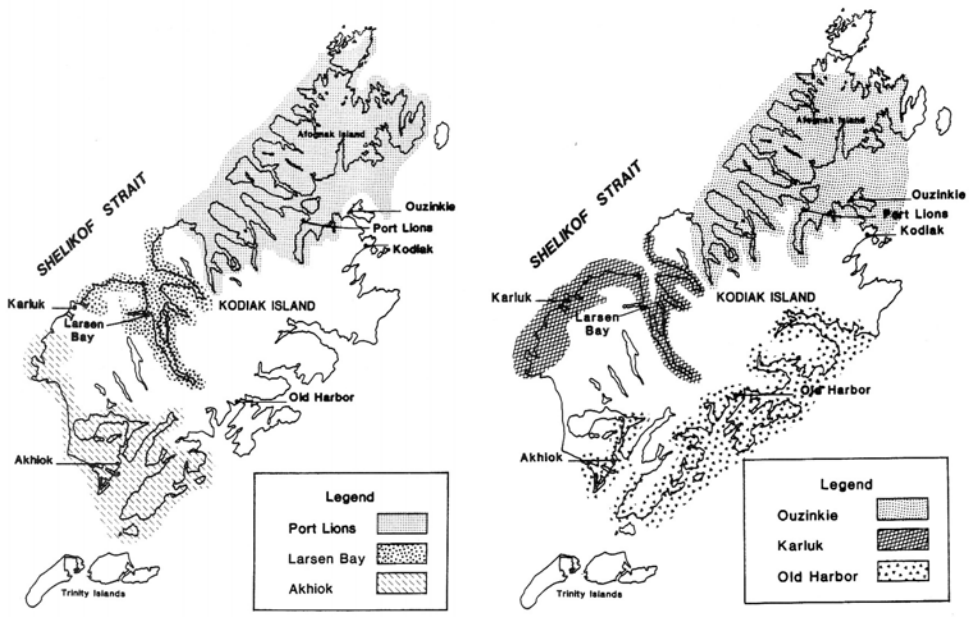


Fig. 12. Subsistence use areas for six communities on Kodiak Island, 1983. Source: Schroeder et al. (1987:468-469)

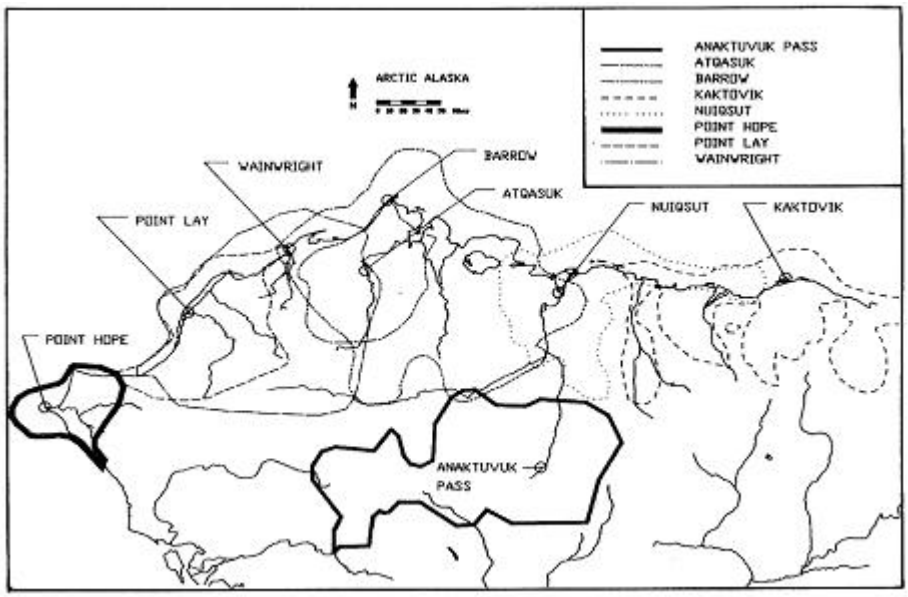


Fig. 13. Subsistence use areas for eight arctic communities. Source: Schroeder et al. (1987:49).

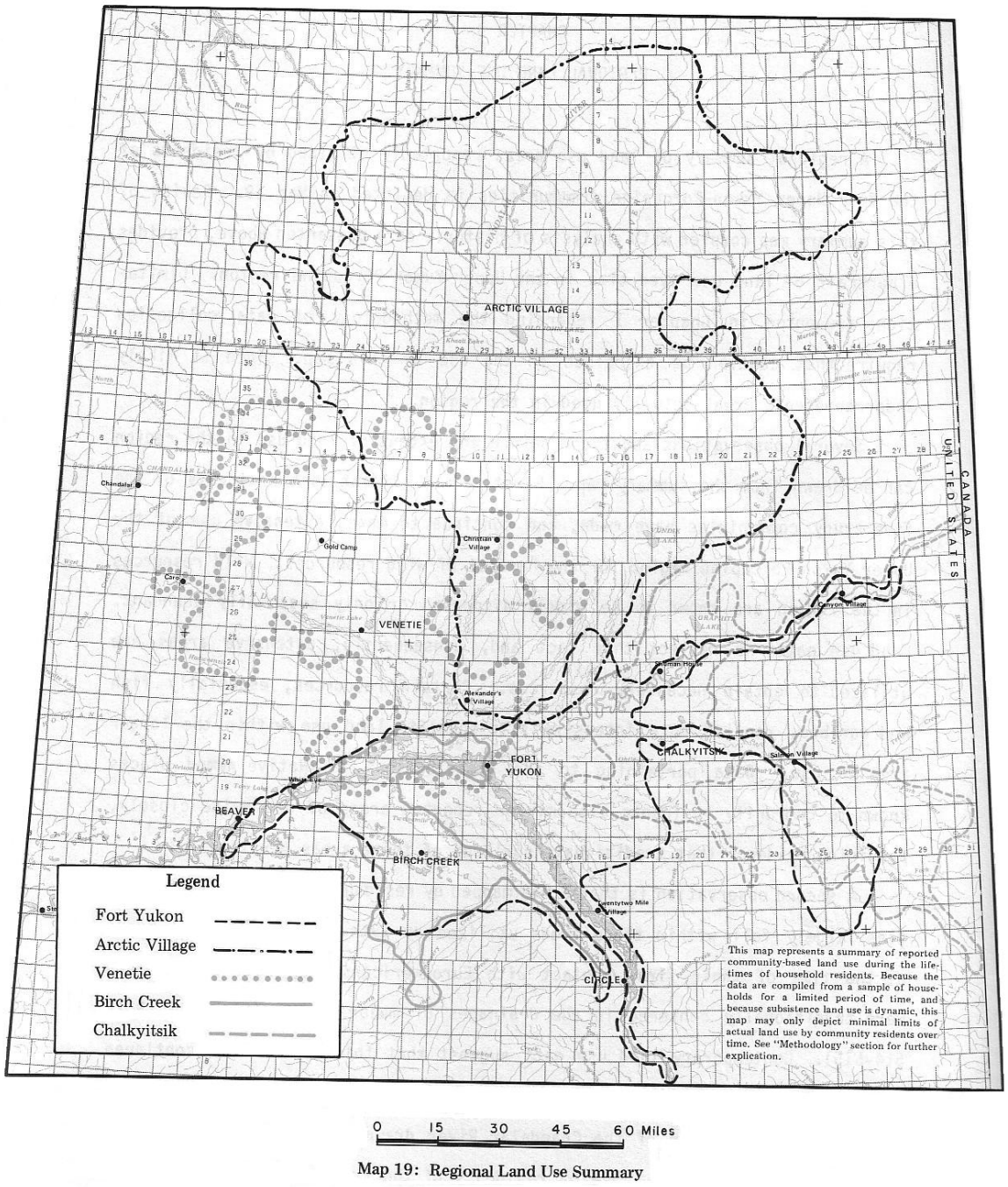


Fig. 14. Subsistence use areas for five communities, Upper Yukon region. Source: Caulfield (1983:188).

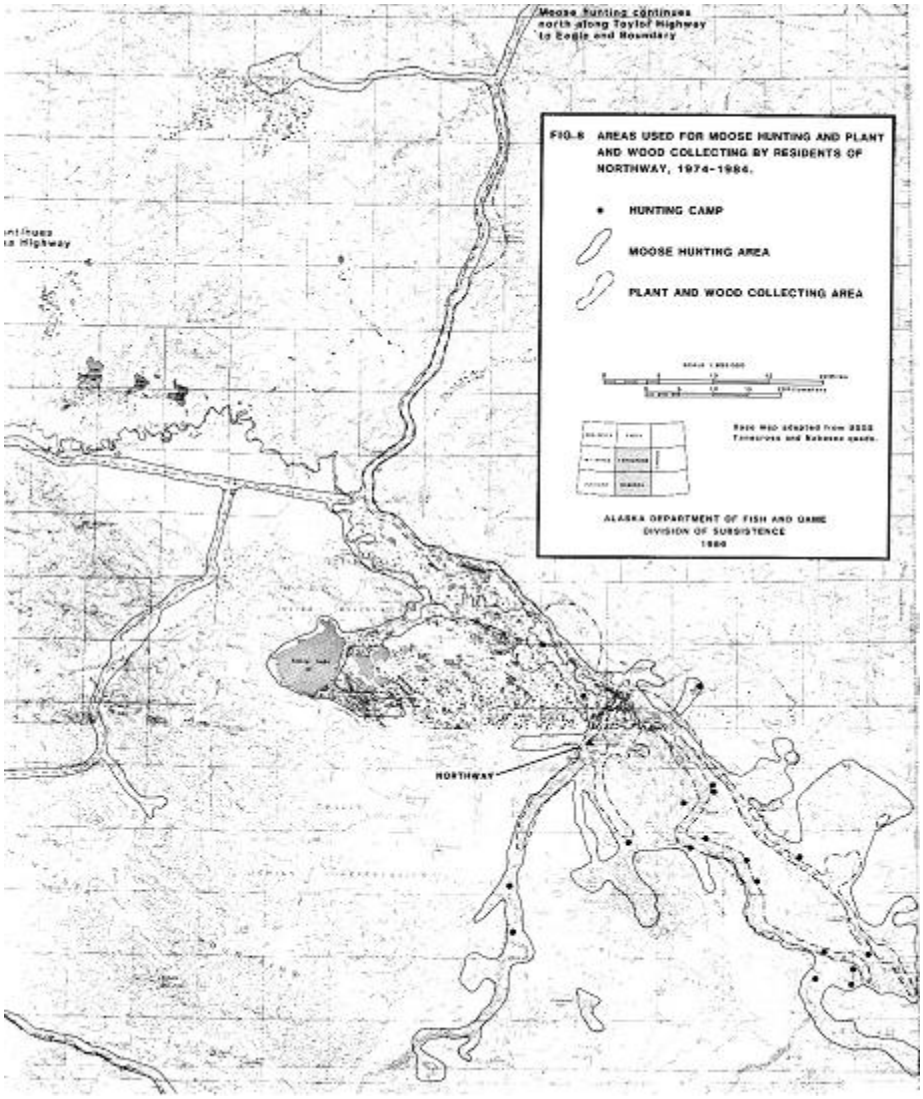


Fig. 15. Subsistence use areas for moose, Northway, Upper Tanana area (the major portion of the use area is shown). Source: Case (1986: 57)

As illustrated by this set of cases, a community of subsistence users typically hunt and fish in traditional areas surrounding their communities. For example, areas used for deer hunting by residents of Angoon, a small community on Admiralty Island in the rainforests of the Southeast archipelago, are shown in Fig. 11. For Angoon residents, most hunting takes places in areas near the settlement and along the coast of western Admiralty Island and eastern Chichagof Island, directly across from the community. Other deer hunting areas extend beyond this core area, but these areas are used only more

occasionally. In this study, the intensity of use was measured by the percentage of hunters using an area.

This subsistence land use pattern may be called a *central-based use area*, and it is the typical pattern for communities with subsistence uses in Alaska (see Figs. 11-14; Wolfe and Fischer 2004:12). The "central base" is the community itself, the place where most subsistence foods are consumed. In regions off Alaska's road system, rural settlements are usually compact, centralized places containing residences, businesses, schools, services, and airports. The surrounding commons are relatively open and undeveloped, with low human populations and modest infrastructures such as trail systems, fishing camps, hunting camps, trapping cabins, and trapping lines. A core use area surrounding the community generally supports most subsistence food production. More extensive areas beyond the intensively-used core are used more occasionally. In addition to federal and state regulations for fishing and hunting, customary rules guide the access and use of the commons for subsistence activities, such as local conventions for using fishing eddies, seasonal camps, and trapping lines. Traditional use areas of rural communities commonly overlap at their margins, a pattern illustrated for the Kodiak Island communities (Fig. 12), Arctic Slope Communities (Fig. 13), and upper Yukon River communities (Fig. 14). The overlap of some close, neighboring rural communities may be considerable, shown by the use areas of Karluk and Larsen Bay (Fig. 12), and Birch Creek and Fort Yukon (Fig. 14).

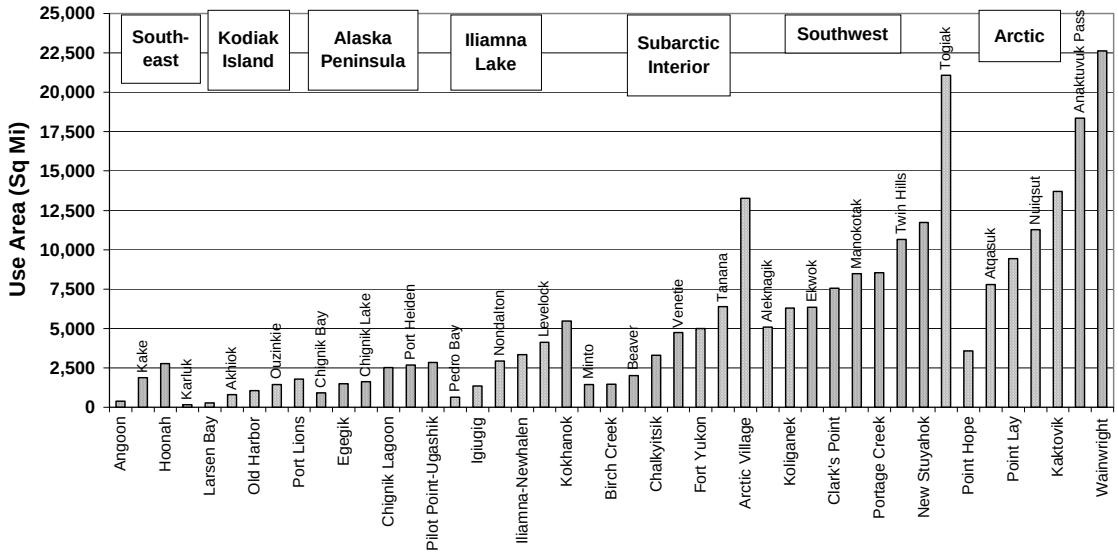
Along Alaska's road system, rural settlement patterns commonly show the influence of State land disposal programs. There are still centralized communities, but residences also are found strung out along the road corridors between communities (regions displaying this pattern include the Copper Basin, the Upper Tanana region, and the Nenana River Valley). However, even in rural regions with roads, central-based use patterns characterize fishing and hunting, illustrated by Northway, a community on the Upper Tanana drainage on the road system (Fig. 15). Northway hunters reported 19 hunting camps within about 20-30 miles of the community (shown as dots on the map), comprising the core area where most moose was reported harvested. However, because of the road system, moose also were reported killed while residents drove the roads. These hunting areas are shown as the narrow corridors following the roads, resembling

the narrow corridors along the Nabesna River and a winter trail to the community's southwest.

Economy of effort and money in subsistence food production is a main reason for a central-based use area pattern. Subsistence users typically hunt and fish in ways to efficiently optimize food output per investment of effort and money (Wolfe 1986). This is because subsistence traditions are at root economic activities, practiced to feed a local community of users. Subsistence equipment in rural areas tends to be small-scale, so as to be affordable and usable by householders (Wolfe 1989). The gear is designed for efficiency, such as set gill nets or fishwheels (these produce greater outputs per effort than rod-and-reel gear), and snowmachines and four-wheelers (these are faster than dog teams but much less expensive than airplanes). Subsistence food production is an economic activity of households investing limited assets of labor and money. For reasons of economic efficiency, rural hunters and fishers establish local use areas in subsistence activities. Special trips to more distant parts of the community use area occur seasonally for special resources, or on certain years when local fish and game are scarce. Intensive uses of core areas like that illustrated in Figs. 11 and 15 result from the economic need of food producers to be efficient.

Returning to the deer map shown in Fig. 11, one can see that there are large areas in southeast Alaska not hunted by Angoon residents. The unused areas commonly have deer, and most are potentially accessible to Angoon hunters with sufficient time and money. But Angoon hunters leave them alone. If asked about their traditional use areas, Tlingit hunters from Angoon sometimes explain that "protocols" (customary rules) influence where they hunt in addition to economics. For example, northern Chichagof Island is known to be a traditional area for Hoonah and Tenakee Springs (Schroeder and Kookesh 1990a; Kookesh and Leghorn 1986) and southern Chichagof Island and southeast Admiralty Islands are said to be traditional areas of Kake (Firman and Bosworth 1990). Angoon hunters generally do not hunt there by "protocol." Such customary rules are related to local histories and social customs of clans and communities. Local customary rules like these generally do not influence the hunting choices of urban-based sport hunters, who do not know about them or who consider them irrelevant to sporting activities.

Fig. 16. Size of Use Areas of Selected Alaska Communities



The sizes of use areas differ substantially between rural communities, shown in Fig. 16. In this selection of communities, use areas range in size from about 400 sq mi (Angoon) to 22,609 sq mi (Wainwright). The use areas for communities in the Subarctic and Arctic generally are larger than those of Pacific coastal settlements. This reflects the greater biological productivity of Pacific coastal areas compared with the boreal forest and coastal tundra biomes. Even so, there is a considerable range in the sizes of use areas between communities within the same region (compare the neighboring communities of Point Hope and Point Lay), reflecting differences in local economies, local ecological niches, community sizes, and other factors.

In a few studies, place names within traditional use areas of communities have been documented by the State subsistence program (cf., Caulfield 1983a, 19893b; Kari 1983; Kari 1985; Simeone and Kari 2002). An example of the locations of place names is shown in Fig. 17 for Chalkyitsik, a community in the upper Yukon River drainage. Most of these are Gwich'in names, developed over the course of an occupancy that probably stretches back several thousand years. The place names are most concentrated in the core of the community's use area (compare Figs. 14 and 17), reflecting more cultural associations with the landscape in the core area. The outer margins of

Chalkyitsik's use areas are indicated by fewer place names. Eventually the place names disappear, suggesting the start of *terra incognita* for the community of subsistence users.

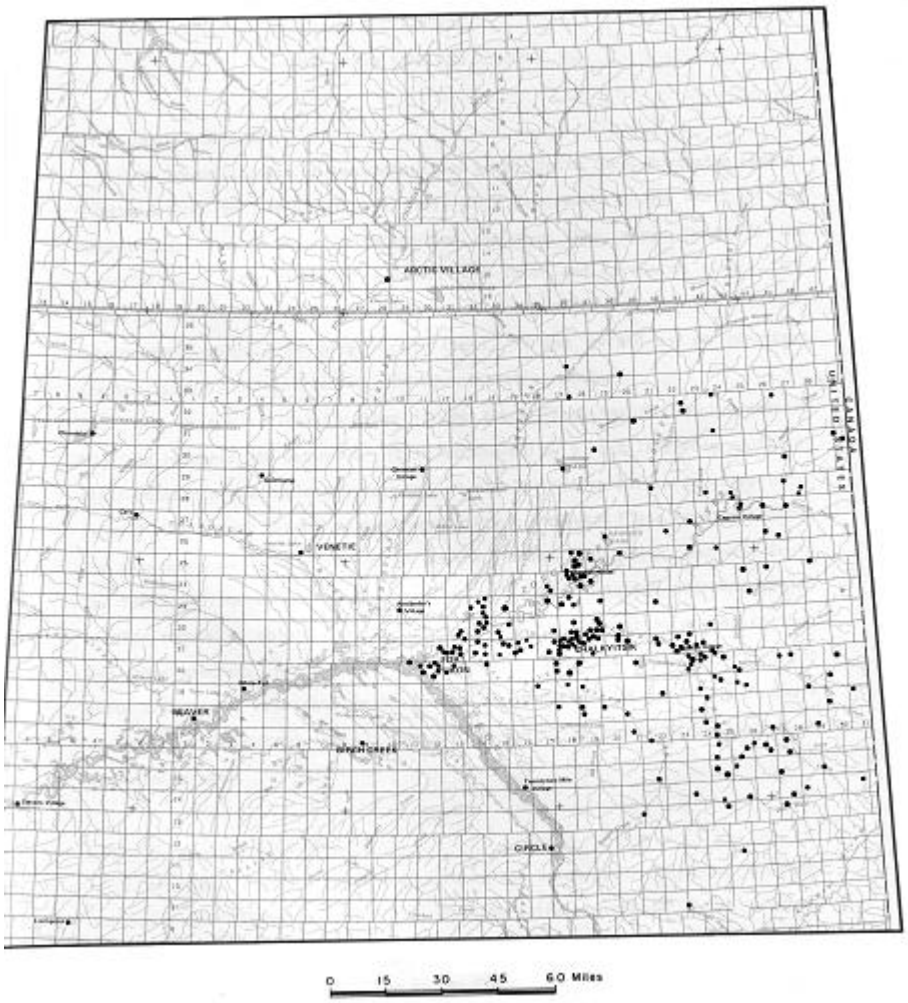


Fig. 17. General Locations of Chalkyitsik Place Names. Source: Caulfield (1983:143)

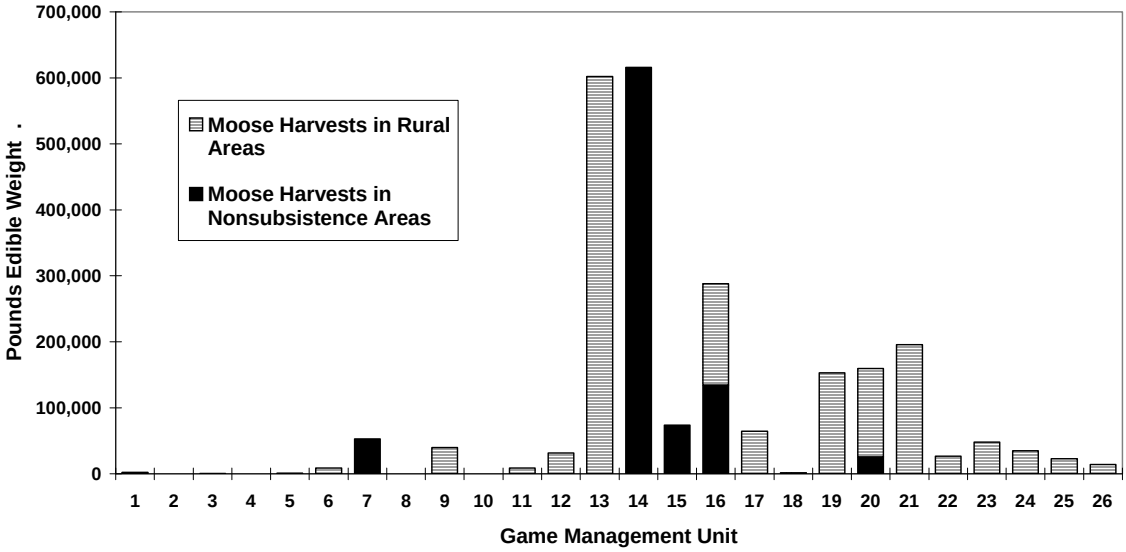
Metropolitan Land Use Patterns

Compared with rural communities, Alaska's urban populations display a different land use pattern, one that may be called a *metropolitan land use* pattern (Wolfe and Fischer 2004:15). A metropolitan land use pattern characterizes Alaska's large urban communities such as Anchorage, Fairbanks, Juneau, and the Palmer-Wasilla area. In these places, the human population is dispersed within road-connected metropolitan zones. The dispersed settlement pattern contrasts with the compact, central locations of

most rural settlements in Alaska. The urban population uses the metropolitan area on a daily basis for employment, commerce, schooling, and other activities. The "commons" used daily by urban residents are relatively developed, with built infrastructures including features like roads, shopping centers, business parks, suburban housing developments, parks/recreational areas, and military bases and airstrips.

In Alaska, fishing and hunting commonly occur within metropolitan areas. As stated previously, hunts and fisheries in urbanized areas (nonsubsistence areas) are managed as recreational, personal use, or commercial activities. In addition to harvesting locally, urban residents periodically travel to rural areas outside the metropolitan area for fishing, hunting, and other outdoor pursuits. This type of use pattern by urban residents, partly inside and partly outside of the local metropolitan area, is illustrated in Fig. 18, which shows moose harvests (total lbs by Game Management Unit) for a five-year period (1992/93 through 1996/97, from harvest ticket returns) for residents of the Anchorage area. Of the moose killed by Anchorage-based hunters during this period, 37 percent was killed in non-subsistence (urbanized) areas, including Anchorage (GMU 14), the Mat-Su urban area (GMU 16 portions), the Kenai Borough area (GMUs 15 and 16 portions), the Fairbanks area (GMU 20 portions), and the Juneau area (GMU 1 portions). Of moose killed by Anchorage-based hunters, 63 percent was killed in rural areas. Anchorage-based hunters killed moose in every Game Management Unit in the state where moose hunting was allowed. Important hunting areas were the Copper Basin (GMU 13) and Interior regions (GMU 20) that were accessible by roads to hunters with vehicles. Other important hunting areas included the upper Kuskokwim River area (GMU 19), the middle Yukon River area (GMU 21), and the non-road areas of the Mat-Su and Kenai Boroughs (GMU 16), where air or boat transport typically was used. Other more remote areas included the Bristol Bay area (GMU 17) and the Northwest Arctic area (GMU 23).

Fig. 18. Locations of Moose Harvests by Residents of Anchorage (GMU 14C), 1992-93 to 1996-97



To access areas off the roads, Anchorage-based hunters spent significant amounts of money in air transportation, guide/outfitter fees, and equipment. Hunting or fishing at an economic loss is compatible with sport traditions, where the sport value of the activity itself is considered more important than producing food economically. Sport traditions commonly promote less efficient harvest methods (such as rod-and-reel fishing gear and shotguns limited to three shells) and more restrictive bag requirements (such as three-quarter curl ram horns, or small possession limits per angler). These restrictions are designed to promote principles of "fair chase," high-quality hunts, and greater opportunities for participation by other sportsmen. It is also good business practice for recreational industries where earnings typically are based on the number of participants and user days rather than catch success rates. These cultural values are higher goals than efficient food production.

Urban-based populations potentially place rural populations at a disadvantage in regards to competition for fish and game.[29] Because urban-based hunters/fishers are mobile, more numerous, and politically advantaged (that is, they are capable of achieving majorities on elected bodies and appointed boards by sheer numbers), they hold the potential for overwhelming harvesters from rural communities. When Alaska's urban economies were strong and growing (as occurred during the 1970s to the mid-1980s),

greater numbers of urban-based sportsmen accessed rural areas to fish and hunt, especially areas opened by roads like the Copper Basin, the upper Tanana drainage, the Kenai Peninsula, and (most recently) Prince William Sound. With increased harvest pressure from urban-based harvesters came more restrictive seasons, bag limits, and harvest methods, especially in road-connected areas, reducing harvest efficiencies in ways that impacted the rural population's ability to produce wild foods to eat. These processes are illustrated in the cases that follow.

The State subsistence statute (passed in 1978) and the federal subsistence statute (passed in 1980) were designed in part to mediate the growing competition between urban-based and rural-based users of wild resources. The subsistence preference offered some protections for customary and traditional practices of small rural communities, while still providing for sport and commercial activities. How this has worked in practice will be illustrated later with three case examples: brown bear hunting, dip net salmon fisheries, and caribou hunting. Each of these cases describes local subsistence uses under pressure from urban-based hunters or fishers. Each also is a case for which the management of competition between users required the use of locality in regulations.

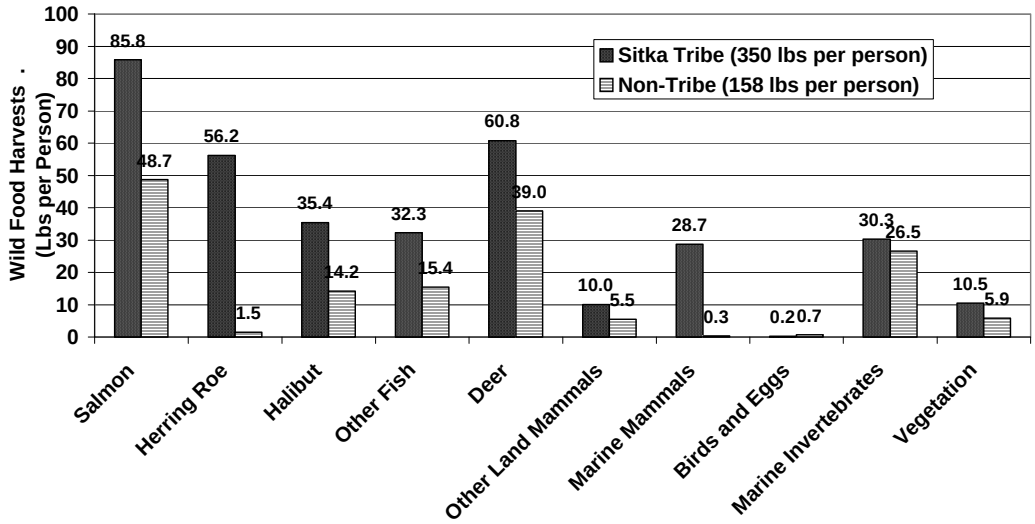
Local Cultural Traditions and Subsistence

Subsistence traditions are localized as a matter of culture, as well as by factors of ecology and community land use patterns. [30] Local cultural traditions are developed within particular communities of users, linked to specific wildlife populations. Subsistence uses are customs and traditions within the larger cultural systems of these communities.

Herring roe-on-hemlock gathering, previously described, is an example of a cultural tradition developed and passed on in particular communities of users. The herring roe fishery is a customary practice of the Tlingit community at Sitka. This is illustrated in Fig. 19, which shows that the amounts of herring roe produced by members of the Sitka tribe (56.2 lbs per person) far outstrip the amounts produced by other segments of the Sitka population (1.5 lbs per person).[31] The greater use by the Tlingit community at Sitka is not a result of State regulations limiting the harvests to particular groups. Any Alaska resident can harvest herring roe for subsistence uses at Sitka Sound.

But harvesting herring roe on hemlock branches is part of the Sitka tribe's cultural traditions. It is not a cultural tradition acquired by Sitka residents who have moved from outside Alaska. Consequently, roe harvesting is primarily a tribal fishery. This contrasts with subsistence uses of deer, salmon, and halibut, which are practices of both tribal and non-tribal communities in Sitka (Fig. 19).

Fig. 19. Wild Food Harvests (Lbs per Capita) in Sitka, by Sitka Tribe and Non-Tribe Populations, 1996



Eating bowhead whale, described previously, is another example of a local cultural tradition. It is part of the traditions of certain Inupiat and Yup'ik communities, but not most. These local traditions earn particular communities exemptions in the federal laws prohibiting bowhead whale hunting. Local traditions of using marine mammals commonly vary between Alaska Native groups. This is illustrated by the traditional uses of harbor seals and sea lions, two species that frequent the Pacific coast of Alaska. The Tlingit communities of southeast Alaska are the biggest users of harbor seal in Alaska (Wolfe and Mishler 1993; Haynes and Mishler 1991). Yet the Tlingits do not usually hunt sea lions, even though sea lions swim in the same areas as harbor seals and both populations are large and healthy in southeast Alaska. By contrast, Aleuts in Aleutian Island communities and Alutiiqs in the Gulf of Alaska communities harvest and use sea lions and harbor seals, considering both species to be important sources of food

and raw materials. Sea lions ranked third among species at Akutan (Aleut) (Table 1) and fourth at Old Harbor (Alutiiq) (Table 2). When Tlingit hunters are asked why they do not use sea lions, there is a shrug of shoulders. Tlingit hunters know sea lions are edible, and sea lion hunting is featured in oral traditions. But Tlingit hunters today say that they "leave them alone." There seems to be no reason other than "custom." This is not a remarkable reason. If non-Native Alaskans are asked why they do not eat harbor seals or sea lions, custom is also the primary reason. Harbor seal meat and oil are readily available through non-commercial distribution networks in places like Juneau and Anchorage. Both are nutritious and tasty. But non-Natives make little effort to acquire these food products to eat, because they are not parts of their cultural food traditions. In statistical predictive models of subsistence production levels, culture is the factor most strongly related to wild food production, outperforming geography, income, and other variables (Wolfe and Walker 1987).

Brown Bear Hunting: Competing Cultural Traditions

Brown bear hunting provides a good example of traditions of use whose distribution across communities is primarily due to culture. Brown bear uses are described here because they provide such clear cases of how subsistence patterns and sport patterns are rooted in local cultural traditions. The case also illustrates how local subsistence traditions were impacted by the regulations of hunters with sport traditions. To mediate impacts, State management system has used locality as a management tool for regulating subsistence and sport hunting.

In the early 1980s, State regulations for brown bear hunting did not recognize subsistence traditions in Alaska, only sport traditions.[32] Under sport hunting traditions, brown bears are hunted for their hides and skulls, memorialized by hunters as trophies.[33] These high-profile, high-value sport hunts are big business in Alaska, accruing significant revenues to guides, outfitters, transporters, taxidermists, and State agencies (through license and tag fees). Because of high public demand for sport hunting Alaskan brown bears, especially at places with record-size animals like Kodiak Island, the State has had to carefully manage hunting pressure to ensure the sustained yield of bear populations. Hunts typically have been restricted by permits, commonly allocated by random draws in

high-demand areas. At times permits restrict a hunter's harvests to "one bear every four regulatory years" to spread opportunity among the pool of sport hunters. Such restrictive rules generally are acceptable to sport hunters when perceived as providing fair competition among applicants for the opportunity to participate in general/sport hunts.

In Alaska, the meat from brown bear trophy hunts customarily is discarded as an unwanted byproduct. This practice is not viewed as wasteful under the cultural food traditions of sport hunters. Under Euroamerican traditions (those held by most sport hunters in Alaska), brown bears (grizzly bears) are not classified as food for humans.[34] There is no objective nutritional basis or taste standard for this food rule. It is simply a matter of custom, a classification rule learned by most sport hunters to be correct and self-evident, usually accepted without question from mentors. State hunting regulations also accept as valid the sport classification rule that brown bear is "not food," and regulations indicate that brown bear meat from a general/sport hunt does not have to be salvaged (5 AAC 92.220). Discarding brown bear meat is not treated as "wanton waste" of an edible food product. State regulations treat brown bear differently from most other big game species (bison, caribou, deer, elk, moose, and musk oxen), whose meat must be salvaged from a general/sport hunt because they are classified as "food" within sport traditions.[35]

In the early 1980s, the State subsistence program provided information to the Alaska Board of Game that in certain Alaska localities brown bears were hunted each year for food as part of longstanding subsistence traditions.[36] Among contemporary settlements, these traditions were practiced in certain Inupiat communities in Northwest Alaska such as Noatak, Noorvik and Shungnak (Georgette 1989; Loon and Georgette 1989), Yup'ik communities in Western Alaska such as Kwethluk, Quinhagak, and Togiak (Coffing 1989; Coffing 1991; Wolfe et al. 1983), and Alutiiq communities along the Alaska Peninsula such as Chignik Lake, Ivanof Bay, and Perryville (Fall and Hutchinson-Scarbrough 1996). The traditional practices were not accommodated by the State's hunting regulations and harvest reporting systems. Some members of the Alaska Board of Game were incredulous that brown bears were eaten. But others were less surprised by the information, stating they were aware that actual use patterns of brown bears in Alaska were more diverse than provided in the State's trophy-hunting regulations.

The local cultural traditions of the Inupiat, Yup'ik, and Alutiiq communities presented special management issues. Out of their respect for the powerful brown bear (and to help ensure safe, successful hunts), some subsistence hunters were reluctant to openly announce their intentions to hunt bears, animals said by subsistence hunters to have good hearing. This reluctance was an impediment to obtaining bear hunting permits. Subsistence hunters also were reluctant to bring in the hide and head to be sealed, because customary rules in some communities of users required leaving them at the kill site, sometimes pointed in certain directions or treated in other culturally-specified manners. Traditional seasons and methods at times differed from sport patterns: hunters killed bears in dens during winter or newly emerging from dens during spring. Some hunters killed bears every year for food (not just one bear every four years), sharing the fat and meat with others in their communities.

Fig. 20. A shallow-draft "bear boat," constructed of brown bear skins, floats a Yup'ik family from a spring squirrel camp in the Kilbuck Mountains to Kwethluk, circa 1970s-80s. Source: Coffing 1989; Photograph by John W. Andrew.

Notwithstanding the initial incredulity of particular members, the Board of Game eventually adopted subsistence hunting regulations for brown bears in 1992. The subsistence regulations allowed hunting brown bears for food every year in the localities

where these traditions were practiced. Under subsistence regulations, hunters were required to salvage meat. Hunters were exempted from bringing in the hide or skull for sealing, unless these items were exported from the local area.[37] The subsistence regulations applied to three new management areas created by the Board: the Chignik, Western, and Northwest Alaska Brown Bear Management Areas (Fig. 21).

The formal recognition of subsistence brown bear hunts in the brown bear management areas raised immediate management concerns: what prevented urban-based sport hunters from masquerading as subsistence hunters to take advantage of more liberal subsistence hunting regulations in the bear management areas? For example, during the 2004-2005 season in Game Management Unit 9E on the Alaska Peninsula (the Chignik Alaska Brown Bear Management Area), hunters were limited to one bear every four regulatory years under general/sport regulations, but allowed to kill one bear every year under subsistence regulations. Further, the general/sport hunt was opened only during the fall of odd numbered years and spring of even numbered years; so, the general hunt was closed completely in 2004-2005, while the subsistence hunt remained open. What prevented sport hunters living in Anchorage (or other places) from flying to the Alaska Peninsula every year to hunt for a trophy? Such potential masqueraders posed difficulties. Previously-small subsistence harvests for food might swell to much higher levels because of the high demand for trophies. Bears killed by fly-in hunters masquerading as subsistence hunters would enjoy a legal priority over the general/sport hunt. Legitimate trophy hunts might have to be closed completely in some areas, if the masquerading harvests grew too large.

A straightforward way of dealing with the problem of masqueraders is to limit subsistence brown bear hunting eligibility to residents of the communities with the subsistence traditions. This is the approach found in current federal subsistence regulations (and State subsistence regulations just prior to 1990). For example, eligibility for federal subsistence brown bear hunts in GMU 18 is limited to residents of Akiachak, Akiak, Eek, Goodnews Bay, Kwethluk, Mountain Village, Napaskiak, Platinum, Quinhagak, St. Mary's, and Tuluksak, the subset of Yup'ik communities in the Western region with traditions of hunting brown bear for food in GMU 18.

The Board found another way to apply locality as a management tool. The Board reasoned that the subsistence traditions for brown bears were associated with particular local management areas. Regulations were crafted specific to these geographic areas. Inside the special bear management areas, no tags were necessary for subsistence hunts. Inside these areas, salvage of meat was required. The Board also reasoned that the transport of skulls and hides for use (or tanning) outside the local area was probably a mark of a sport pattern. Flying in and bringing out skulls and hides are elements of a trophy hunt, and not a subsistence hunt. Based on this, the Board adopted a regulation dealing with the transport of bear products: if a brown bear hide or skull taken under subsistence regulations is transported by a hunter out of a local bear management area, at that time the hide and skull must be sealed by an authorized sealing agent, and the skin of the head and front claws must be removed and retained by the Alaska Department of Fish and Game (5 AAC 92.165(b)). In other words, State sealing agents are authorized to deface hides and skulls leaving the local management areas. The subsistence user is allowed to possess defaced hides and skulls outside the management area, but not unaltered hides and skulls. The defacement is designed by the Board of Game to diminish the values of the hide and skull as trophies, thereby presenting a disincentive to sport hunters thinking to masquerade as subsistence hunters. The Board reasoned most sport hunters would not spend thousands of dollars to hunt on the Alaska Peninsula to bring back a mutilated hide and skull.

The odd regulation calling for defacing hides and skulls apparently has worked to prevent masquerading sport hunters. The brown bear case illustrates that in distinguishing subsistence uses from sport uses, and in regulating participation in subsistence hunts, locality can be a useful management tool. Locality could be reasonably applied in crafting subsistence brown bear regulations because, in fact, subsistence brown bear traditions were tied to particular areas.

Fig. 21. Map of the Chignik Alaska Brown Bear Management Area in GMU 9E, where subsistence hides and skulls are defaced when transported from the area.

The brown bear case illustrates additional points about locality and hunting traditions. The Board of Game has adopted subsistence hunts only for specific game populations and areas where communities have established local traditions for hunting brown bear.[38] Subsistence hunts have been created only in those localities where it can be documented that a community of users has traditionally hunted. It is commonly the case that hunters from those traditions move elsewhere in Alaska, such as residents of Noatak or Quinhagak moving to southeast Alaska. But the community's traditions for hunting brown bear do not automatically move with that single person. The Board has not identified any compelling reason to establish subsistence brown bear hunts wherever Noatak or Quinhagak residents move. The subsistence brown bear traditions of communities of users are anchored to specific game populations in traditional use areas.[39]

By contrast, Alaskan sport hunting traditions are not similarly anchored to specific game populations with established uses by a community of users. By the nature of sport, sport hunting traditions commonly move with their practitioners. Sport traditions are expansive. As sport hunters discover new game populations in "undeveloped" areas (that is, not yet developed for sport use), sport hunting commonly expands into those areas. During the 20th century, it was common practice for the State Boards to provide for sport hunts or sport fisheries in new areas if there were harvestable surpluses.[40] An established pattern of use has not been required for recognition of a sport

harvest in an area. Consistent with expansionism, game species at times have been transplanted to expand sport opportunities, examples including elk on Kodiak Island, musk oxen on Nunivak Island, and bison in the Copper Basin. In general, sport traditions are not considered tied to identifiable game populations, areas, or communities in the same ways that subsistence traditions are. The expansive nature of urban-based sport hunting, of course, is one reason for the State's subsistence statute. The subsistence law was designed to provide some protection for preexisting subsistence uses in the rural areas where new sport or commercial activities were expanding.

Splitting Localities: The Case of Salmon Dip Net Fishing

Like urban-based sport hunters, urban-based fishers commonly are active in rural areas. This is illustrated by the salmon dip net fishery at Chitina on the Copper River, which had a harvest of about 132,000 sockeye salmon in 2001 and whose 9,463 permit holders were mostly urban Alaskans (primarily from the Anchorage, Fairbanks, and the Palmer-Wasilla areas).[41] In 2001, fishers typically accessed the dip net fishing area using cars, trucks, and recreational vehicles, driving either the Glenn Highway (220 miles from downtown Anchorage) or the Richardson Highway (280 miles from downtown Fairbanks) to the 7-mile stretch of river below the Chitina Bridge, where the Edgerton Highway/McCarthy Road crosses the Copper River. Below the bridge, fishers commonly drove a railway grade easement, parked, and walked to the river's bank to fish.

Parking and access have posed problems for the thousands of participants in the dip net fishery. Most lands in the Chitina area were selected by the Ahtna during Native Land Claims, and so are privately owned by the Chitina Village Corporation, the Ahtna Regional Corporation, or by Alaska Natives as Native allotments. In 2003, the State's public information handout about the fishery requested that dip netters "please respect the rights of landowners in the area – obey all regulatory signs concerning access, parking, and other subjects." In 2003, an "access portion" of a $25 permit fee paid for access through Ahtna and Chitina Village Corporation lands from the Alaska Department of Transportation Right of Way (the Copper River railway easement) to the ordinary high water mark on the west bank of the Copper River. This allowed fishers to walk from

their cars to the river. The remainder of the permit fee covered the costs of garbage and sanitary services and a portion of the State's permit administration.

In the Chitina fishery, fishers harvest salmon with dip nets, bag-shaped nets supported by a rigid frame, not exceeding five feet in diameter, attached to a single rigid handle. The nets are operated by hand. To fish, dip netters typically pull on waders and stand alongside or step into the river. The fisher submerges the dip net to intercept salmon swimming near the bank. The river is opaque with glacier silt, so fishing is by feel. When a salmon is felt in the net, the fisher hauls it to shore. Salmon are typically stored in coolers for transport back to the fishers' home where they are consumed or processed. There can be dozens of dip netters at a fishing spot on a given day, fishing side-by-side, resembling the shoulder-to-shoulder sport angling on the Russian and Kenai rivers during the peaks of the Chinook and sockeye salmon runs. The dip net fishery commonly has a festive atmosphere, fishers negotiating the crowded waters to face the challenges of cold, swiftly-running currents and roulette-style catches.

Managing the dip net fishery has posed significant challenges to the State because of its phenomenal growth and its potential impacts on local subsistence fisheries, the commercial salmon fisheries in Prince William Sound, and salmon escapements. The growth in the fishery is shown in Figs. 22 and 23 (Fall and Stratton 1984 and ADF&G 2003). The average annual number of permits issued for dip netting has increased each decade: 801 (1960s), 3,255 (1970s), 4,585 (1980s), and 7,625 (1990s), with a high of 10,006 permits issued in 1998 (Fig. 22). The average annual sockeye catch also has increased: 5,932 sockeye (1960s), 16,825 sockeye (1970s), 44,018 sockeye (1980s), and 101,980 sockeye (1990s), with a high of 148,727 sockeye in 1997 (Fig. 23). As more urban-based fishers have learned about the fishery, its popularity and total harvests have grown each decade. The impacts of the burgeoning fishery on local landowners, mentioned above, have been managed through public notices and annual permit fees for access and garbage/sanitation services. The impacts on traditional subsistence uses of Copper River salmon have been additional concerns, managed through other regulatory means.

Fig. 22. Dip Net Permits and Fishwheel Permits, Copper River Salmon Fisheries, 1960-2001

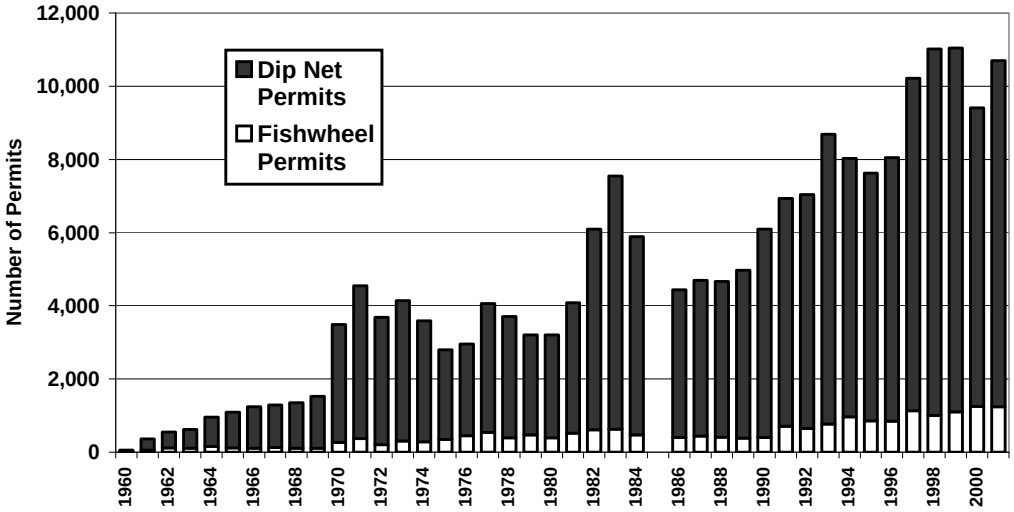
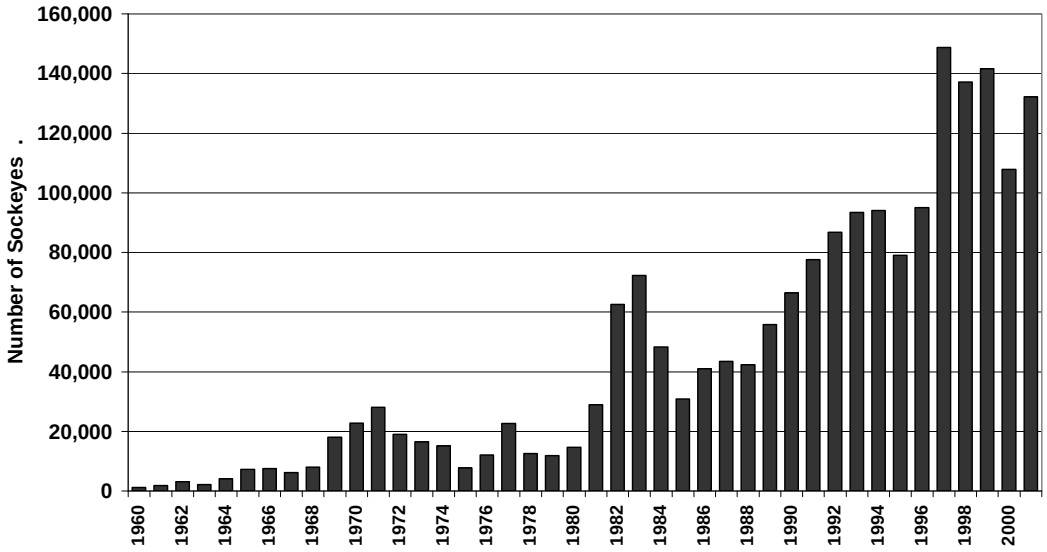


Fig. 23. Sockeye Harvests, Chitina Dip Net Fishery, 1960-2001



Subsistence fisheries along the Copper River are at least a thousand years old.[42] Historically, the Ahtna and other settlers in the Copper Basin harvested salmon for food at traditional sites, using gear such as spears, traps, weirs, and dip netting platforms. Since about 1910, fishwheels became the principal method used for subsistence fishing in the Copper River. A fishwheel is a fixed, rotating device for catching fish. Two large

baskets of wood and wire mesh typically are constructed atop a floating platform. The platform is set out from the shore by poles (commonly about 20-40 feet), so that the current rotates the baskets. Salmon swimming along the shore are caught in the baskets, lifted from the river, and deposited into a holding bin.

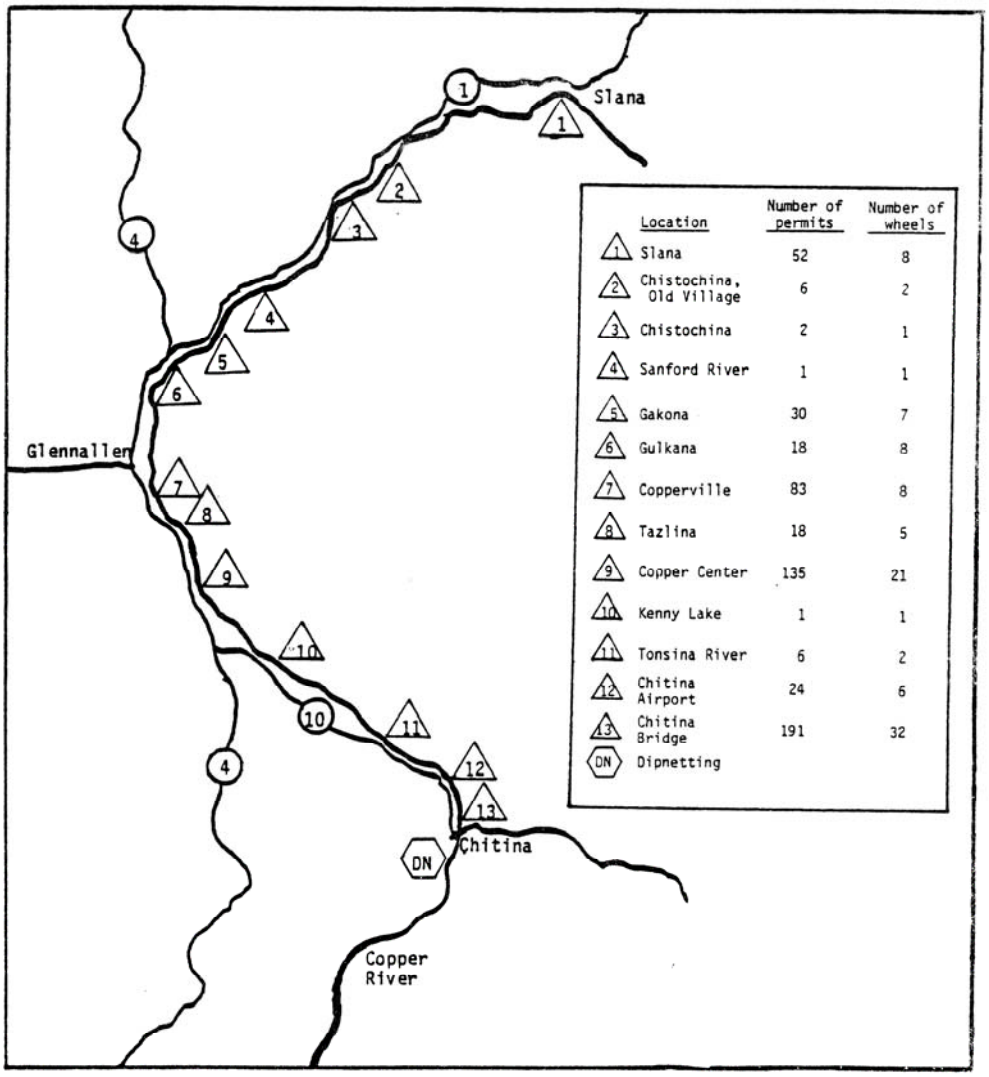


Fig. 24. Locations of fishwheels and permits, Copper River 1982. Source: Fall and Stratton (1984:35).

Fishwheels typically are set at traditional fishing sites, frequently close to a summer fish camp where fish are processed. Fig. 24 shows the locations of fishwheels operating along the Copper River in 1982, with the Chitina dip net area (labeled DN) at

the southern edge (Fall and Stratton 1984:35). A single fishwheel commonly provides fish to one or several extended family groups composed of households linked through kinship. For instance, in 1982, 567 households operated 102 fishwheels in the Copper River, an average of 5.6 households per wheel (Fall 1989). The number of permits and fishwheels by location are depicted in Fig. 24. For Copper Basin families, salmon provided more pounds of edible food than any other wild resource category. Typically, salmon is processed near the harvest site by several methods, including air drying and cold smoking.

The average number of participants obtaining permits to take part in the subsistence fishwheel fishery has grown each decade: 105 (1960s), 364 (1970s), 477 (1980s), and 847 (1990s) (Fall and Stratton 1984 and ADF&G 2003). Its growth is substantially less than the dip net fishery, as shown in Fig. 22. Compared with dip netting, the more-complex technology and social requirements of fishwheels act as disincentives to most urban-based harvesters. Also, establishing a location for a fishwheel within the traditional use areas along the Copper River is another challenge for persons without links with local families and the private property system.

As the urban-based dip net fishery grew, fitting it into the established patterns of the subsistence fishery was a management goal. To manage the burgeoning dip net fishery, the Board of Fisheries has applied two major regulatory tools: the "personal use" fishing category, and locality. The Board of Fisheries has classified the dip net fishery as a type of "personal use," a food fishery that requires a sport fishing license.[43] Personal use fishing means harvesting fish by an individual for consumption as food by that individual or his immediate family (5 AAC 77.001). The personal use category primarily was created to provide opportunities for urban-based residents to fish for food with nets. Most personal use fisheries are found in nonsubsistence areas where subsistence harvests are disallowed by law. For example, net fisheries for salmon in nonsubsistence areas are allowed under personal use regulations, such as the Taku River gillnet fishery near Juneau, the Tanana River gillnet fishery near Fairbanks, and the Kenai River dip net fishery near Kenai-Soldotna. In the case of the Chitina dip net fishery, the Board established the personal use fishery outside a nonsubsistence area.

By statute, personal use fisheries have no allocation preferences over commercial fisheries and sport fisheries. Nor does the State automatically have to provide for growth in a personal use fishery. When the urban-based dip net fishery rapidly expanded after the 1970s, its potential for growth was difficult to predict. The personal use category provided the Board of Fisheries considerably more flexibility in its management of the fishery compared with a subsistence fishery classification. As the dip net fishery grew in size and harvests, guidelines for the personal use fishery were increased (AS 16.05.251(e)). In 2003, the harvest guidelines were 100,000-150,000 salmon for the Chitina Subdistrict personal use fishery under the Copper River Personal Use Dip Net Salmon Fishery Management Plan (5 AAC 77.590, 591). The annual bag limits were 15 salmon for a single-person household and 30 salmon for larger households, with a limit of one Chinook salmon among the total. Bag limits and weekly fishing periods could be increased or decreased by emergency order, based on the projected in-river returns estimated by sonar counts. These bag limits for the personal use fishery compare with annual limits in the subsistence fishwheel fishery of 30 salmon for a single-person household and 60 salmon for a two-person household plus 10 salmon for each additional household member, renewable up to 500 salmon (5 AAC 01.630(e)). The 2003 subsistence harvest guideline was 60,000-75,000 salmon for the Copper River (Glennallen Subdistrict) (5 AAC 01.616(b)).

Locality was the other tool used by the State to manage the potential impacts of the urban-based growth in the personal use fishery. The Board of Fisheries separated the subsistence and personal use fisheries geographically. The area downstream from the Chitina Bridge was carved out as the personal use fishing area. The area upstream from the Chitina Bridge was the subsistence fishing area. A fisher could not be issued permits for both the up-bridge and down-bridge areas.

Using locality in management kept the growing personal use fishery from expanding geographically and potentially impacting traditional areas used for subsistence fishing. Families using fishwheels from traditional camps were insulated by a geographic barrier. This solution was possible because the dip net fishery had developed in an identifiable location that could be separated from traditional subsistence fishing areas. By regulation, subsistence fishwheels cannot intrude on the dip net areas, and personal

use dip nets cannot intrude on the fishwheel area.[44] The two types of permitees, defined by gear type and area, currently operate in close proximity near the Chitina bridge, with their fishing activities separated by clear geographic boundaries.

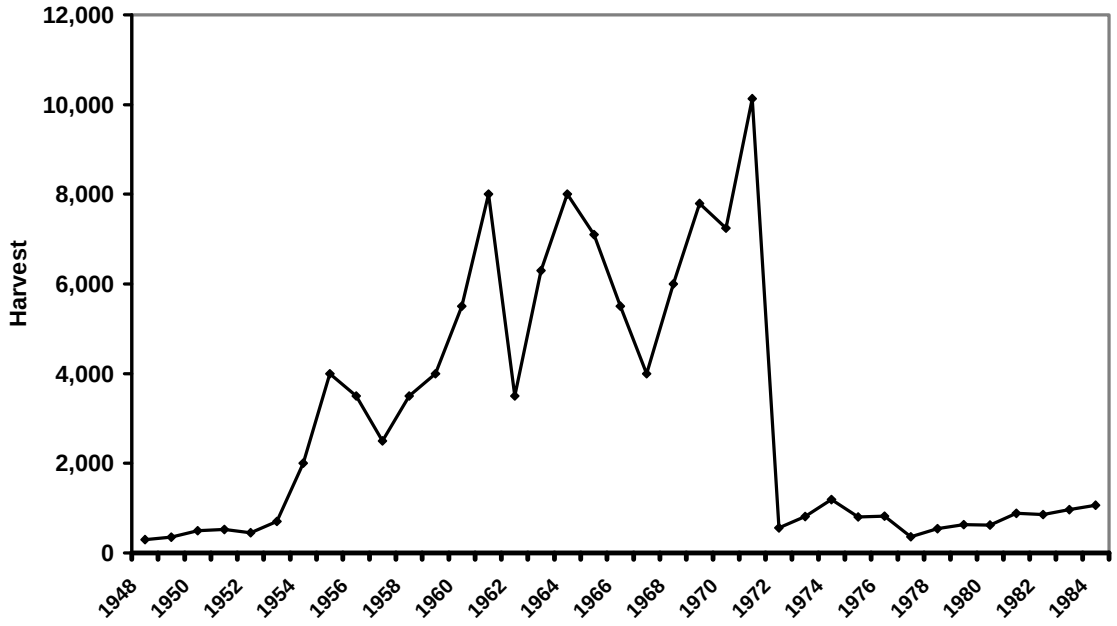
Management With and Without Locality: The Case of Nelchina Caribou

Among Alaskan hunts, the Nelchina caribou hunt has been among the most popular, and most controversial, during recent decades. It provides a classic example of the impacts of large, growing urban-based hunts on small, local subsistence traditions.[45] It illustrates the types of management systems that are possible with and without locality as a regulatory tool. As will be shown below, without locality as an eligibility standard, the State regulatory system has found it impossible to provide for a general/sport hunt for Nelchina caribou while also providing opportunities for the subsistence traditions of the small rural communities of the Copper Basin.

The Nelchina caribou herd primarily ranges a 25,000 sq mi area in GMU 13 and 14B within the Copper River and Susitna drainages of southcentral Alaska (Tobey 2003). The herd grew from about 5,000-15,000 caribou in the late 1940s to a peak of about 70,000 by the mid 1960s, dramatically declined to 7,000-10,000 by 1972, grew again to a peak of 50,000 by 1995, and declined again to 29,600 animals by 2000. In 2003, the State's management objectives were to maintain a sustainable population of 35,000-40,000 caribou in the Nelchina herd (with a minimum of 40 bulls:100 cows and 40 calves:100 cows), providing for an annual harvest of between 3,000-6,000 caribou (Tobey 2003:109).

The Copper River drainage is easily accessible to urban-based hunters from the Anchorage area and Fairbanks area using major highways, similar to the Chitina dip net fishery. From Anchorage to Eureka (a popular staging area) is 128 miles using the Glenn Highway, and from Fairbanks to Paxson is 178 miles using the Richardson Highway (Stratton 1982:73I). Because of its easy accessibility, the Copper River drainage has been a popular hunting destination for urban-based hunters. For caribou, hunters typically drive to the basin during the fall season and search for caribou along the roads and in the surrounding uplands using off-road vehicles and 3- or 4-wheelers.[46] The meat is brought back to the city.

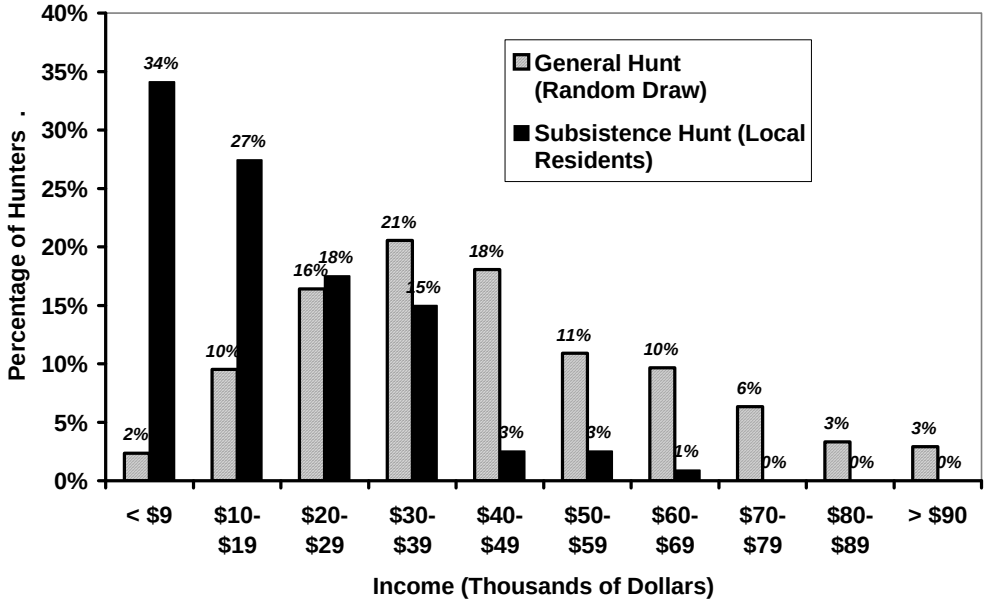
Fig. 25. Nelchina Caribou Harvests, 1948-1984
Source: Fall 1985:25



As Alaska's urban hunters grew with urban expansion, Nelchina caribou harvests also increased substantially, from less than 1,000 caribou annually in the early 1950s up to about 10,000 caribou at its peak in 1971, shown in Fig. 25 (Fall 1985:25). In 1971, there were long seasons (August 10 through March 31), liberal bag limits (4 caribou per hunter), and no limits on the number of hunters (Fall 1985:28). Harvests crashed with the herd during the early 1970s to less than 1,000 caribou (Fig. 25). In 1972, by State regulation, bag limits were reduced to one caribou and seasons were dramatically shortened, eliminating the winter/spring season and reducing the fall season. By 1975, the hunting season was only16 days (September 5 to 20), and even that was too long for the thousands of urban-based hunters driving the highways in search of caribou. In 1976, hunters killed 800 caribou in merely five days, triggering an emergency closure. This display of hunting efficiency along the road network ended the era of unlimited Nelchina caribou hunters (Tobey 2003). Since 1977, the numbers of hunters have been restricted through a limited number of permits. In the late 1970s, permits were issued by random

draw, a system common for general/sport hunts, and most permits were won by urban residents in the random draw (Stratton 1982:8).

Fig. 26. Household Incomes of Nelchina Caribou Hunters, General/Sport Hunt and Subsistence Hunt, 1982-83
Source: Stratton (1983:23)



The restrictive regulations successfully reined in the urban-based hunt. However, they did not provide an opportunity for traditional hunting patterns of rural communities in the Copper Basin. In 2000, there were about 3,212 people living in the Copper Basin distributed among about 20 small communities. Of these, 28 percent were Alaska Native, primarily Ahtna Athabaskans. Traditionally, caribou were harvested by residents of the Copper Basin after the subsistence salmon fishing season. Moose was a preferred animal, but caribou were commonly taken in fall and also during winter and spring, sometimes as food at trapping camps. Surveys conducted by the State research program showed that the rural-based pattern differed from the urban-based pattern along a number of factors, including seasons, length of history of use, level of dependency on caribou, and integration with household income activities (Stratton 1982, 1983). For instance, low incomes and seasonal employment were more common for resident hunters from the Copper Basin than random-draw hunters in the general/sport hunt, as shown in Fig. 26 (Stratton 1983:23).

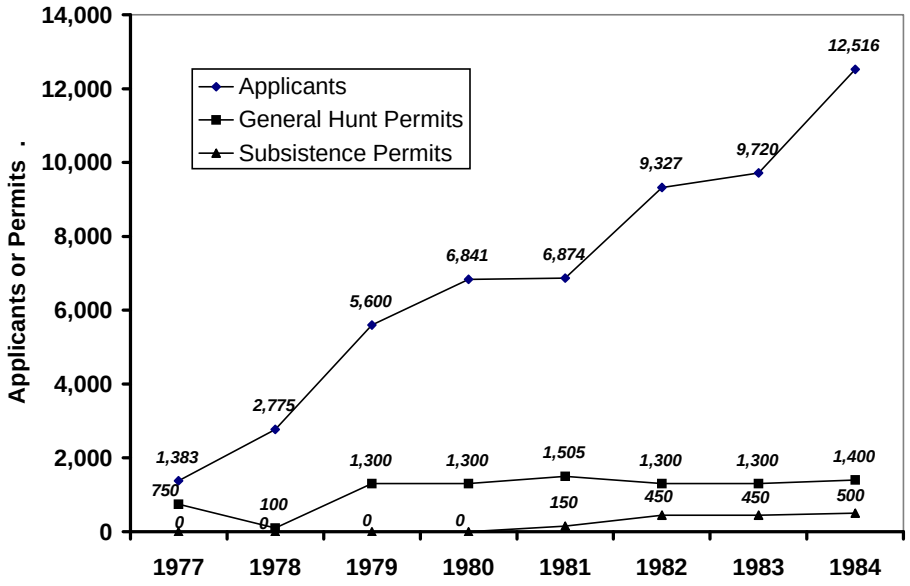
Traditionally, for Copper Basin communities, caribou was an important food source in the region's mixed, subsistence-market economy. For example, caribou ranked third among wild food species (after sockeye and moose) in Gulkana (see Tables 1 and 2; Appendix Table 2). In Gulkana, residents harvested about 153 lbs of wild foods per capita in 1987, of which 15 lbs were caribou (Fig. 4, Appendix Table 2). The place of caribou in the local socioeconomic pattern was described for one Gulkana household, interviewed in 1981:

> A life-long Gulkana resident in his sixties, this hunter reportedly harvested caribou on a regular basis since childhood, a use pattern learned from his parents who also hunted Nelchina caribou. This pattern of use was disrupted ten years ago [1971], which was the last time he harvested caribou. At that time the season was open in the winter months. The caribou was taken near Crosswind Lake, where the hunter still has a cabin and traps during the winter. At that time, the caribou was dragged back to the village with a snowmachine and dried for later consumption. In addition to caribou, the man and his wife also harvested (and continues to harvest) moose, rabbits, beaver, whitefish and lingcod during the winter. In the summer months they operate a fishwheel for salmon. The hiatus of this hunting pattern for caribou was due to the random draw permit system and discontinuation of the winter season [by State regulations]. The random draw reduced the opportunity to obtain a permit. Furthermore, caribou primarily frequent the Gulkana hunting area during winter; thus, the fall season restricted the chance to obtain a caribou near his home. (Stratton 1982:53)

One problem with the State's general/sport hunt regulations for Nelchina caribou was that subsistence users could not obtain permits in competition with the much larger numbers of urban-based hunters. In addition, traditional hunting seasons, such as during winter and spring, were closed. In 1980, the courts ruled that the State's general/sport hunt regulations did not provide for subsistence uses of Nelchina caribou, deciding a case where a Gulkana hunter was cited for taking a caribou at his trapping cabin during the closed winter season (Alaska v Danny O. Ewan, 3 GL 80-21,22,23,33, Alaska District Court, September 30, 1980).

In 1981, to fix this problem, the Alaska Board of Game established regulations for a separate subsistence hunt. The Board allocated a set number of permits to the subsistence hunt (450 in 1982) to provide a reasonable opportunity for the local pattern of caribou use. The remainder of Nelchina caribou permits (1,300 permits in 1982) was allocated to the general/sport hunt. The subsistence season included a winter hunting season. The Board had evidence that the subsistence hunting tradition was a pattern of use by local rural residents (Stanek 1981; Stratton 1982, 1983). Therefore, eligibility for the subsistence hunt was limited to residents of the Copper Basin and Upper Tanana River, the communities of users with the established tradition. For the general/sport hunt, all Alaskans were eligible to participate with permits issued by random draw.

Fig. 27. Applicants and Permits for the Nelchina Caribou Hunt, 1977-1984
Source: Fall 1985:29



This dual-hunt system essentially prevailed between 1982-1990. The system recognized two distinct types of hunts. Regulations provided a reasonable opportunity for the subsistence tradition, open to residents of local communities. Regulations for the general/sport hunt provided an opportunity for a high-quality hunt open to all Alaskans. Participation in the permit systems for Nelchina caribou from 1977-1984 is shown in Fig.

27 (from Fall 1985:29). After the institution of the dual hunts in 1981, the general/sport hunt continued to grow in popularity with urban-based hunters, so that by 1984 there were 12,516 applicants vying for 1,400 permits in the general/sport hunt. That same year, there were 500 permits for the subsistence hunt, eligible to local residents. Total participation in the Nelchina hunt was limited so that harvests were consistent with sustained yield goals. Under this dual-hunt system, most caribou permits went to urban-based hunters (Fig. 27).

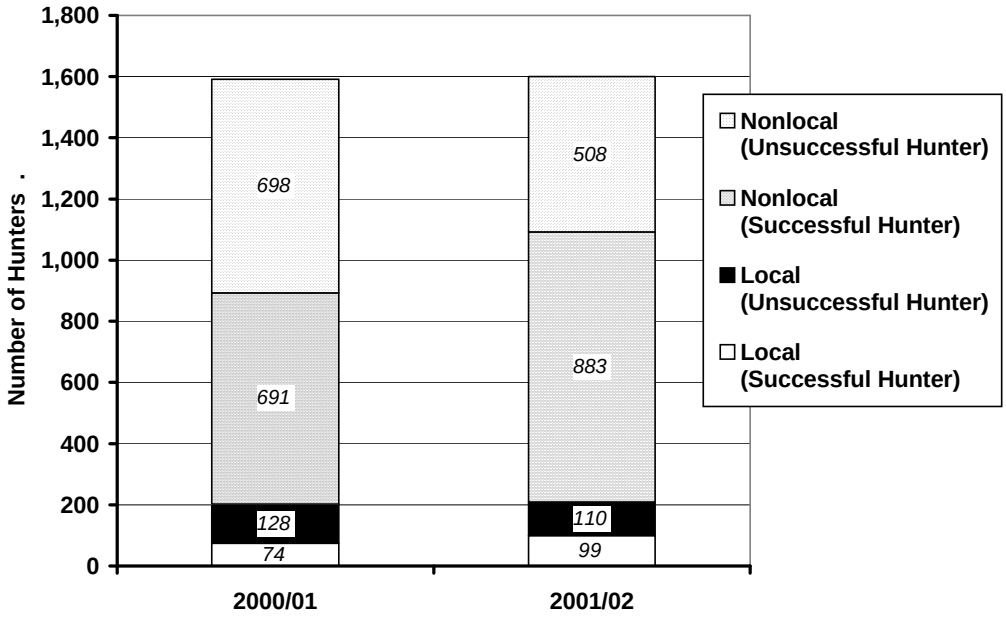
The dual-hunt solution unraveled after 1989, when the State Board was instructed that allocation of subsistence permits could not take into account where an applicant lived. This threw open the subsistence hunt to any resident in Alaska. What transpired was that urban residents applied for subsistence permits by the thousands, claiming to be subsistence users.[47]

With so many new applicants for the subsistence hunt, the Board was forced to close the general/sport hunt entirely. Also, the Board was instructed that they could not randomly allocate subsistence permits. Instead, the Board created a system for awarding permits based on two criteria established by the legislature: the customary and direct dependence on the game population by the subsistence user as a mainstay of livelihood; and the ability of the subsistence user to obtain food if subsistence use is restricted or eliminated (AS 16.05.258(4)).[48]

Since 1990, the State has scored thousands of permit applications for the Nelchina caribou hunt each year (the largest subscribed hunt in Alaska), awarding permits in descending order of scores on the two criteria, until permits run out.[49] Under this system, most permits continue to go to urban-based hunters, as shown by permit awards in 2000/01 and 2001/02 (Fig. 28). For instance, of 1,600 permits awarded and hunted in 2001/02, 209 went to "local" applicants (Copper Basin residents) and 1,391 went to "non-local" applicants (persons outside the Copper Basin). Of these, 99 local hunters and 883 non-local applicants successfully killed a caribou. While Nelchina caribou hunters continue to be predominately urban dwellers in the single-hunt system, the composition of the set of urban-based hunters has changed radically from the dual-hunt system. Applicants with longer personal histories of hunting Nelchina caribou receive higher scores, so relatively new hunters have little chance in being awarded a permit. Under the

previous random-draw general/sport hunt, applicants had equal chances regardless of their personal histories.

Fig. 28. Local and Nonlocal Hunters, Nelchina Caribou Tier II Hunt, 2000/01 and 2001/02 Seasons



The public controversy surrounding Nelchina caribou management is difficult to overstate. The Nelchina herd continues to be one of the most desirable of the big game hunts for urban residents. A fair system for allocating permits is consistently a high-profile issue before the State Board of Game. The complete conversion of the Nelchina general/sport hunt into a subsistence hunt in order to protect a local pattern of use by Copper Basin residents has been viewed with incredulity from all quarters. To many, it has appeared absurd that subsistence standards must be used to allocate permits among applicants living in nonsubsistence areas, where subsistence uses by definition do not exist. Regardless, the single-hunt system appears to have been the only reasonable outcome when residency cannot be taken into account in allocating permits. Without locality as a regulatory tool, the State Board was forced to eliminate Alaska's most popular general/sport hunt.

Conclusions: A Convergence of Factors

Subsistence traditions are localized in Alaska by factors of ecology, community, culture, and economy. What is generally called "subsistence" in law is in fact, on the ground, a myriad of distinct, localized traditions established by identifiable communities of users. Examples described in this report have included spring brown bear hunts in the Kilbuck Mountains by Kwethluk and Quinhagak residents, herring roe fisheries in Sitka Sound by Tlingit boatmen, and bowhead whale hunts in the Arctic Ocean by residents of AEWC communities. Such local traditions are parts of rural ways of living, practiced by communities of users that are economically dependent on extensive land uses, especially the production and distribution food for local consumption.

The local nature of subsistence systems results from a convergence of factors. Ecological factors establish opportunities and constraints to communities of users, a framework within which hunters and fishers operate. One cannot find bowhead to hunt in southeast Alaska or Sitka black-tailed deer on the Arctic slope. But local ecological factors do not dictate subsistence patterns. Cultural traditions mediate the relationship between available ecological opportunities and actual subsistence practices. Just because spawning herring runs and hemlock trees are available does not mean a community will have a roe-on-hemlock fishery. Just because brown bears roam the local hills does not mean they will be eaten. Subsistence uses develop within particular cultural traditions and not others. Subsistence uses come to exist when communities of users develop and apply cultural traditions of harvesting, distributing, processing, and consuming wild resources in particular local areas. There must be a convergence of ecology and culture for a subsistence use to exist.

A community of users is another essential element in this convergence of factors. Cultural traditions such as subsistence uses are developed within communities.[50] In Alaska, communities with subsistence traditions are most commonly rural settlements and Alaska Native tribes. The relationship of community and culture is complex. For anthropologists who reify culture, it is joked that people are the fleas on the back of culture. However, any sensible assessment shows that it is the community that is primary, not culture. Cultural traditions ride on the backs of communities. Subsistence traditions are developed through the customary actions of a community of users. The

customary actions are passed on as traditions between generations within the community of users. Without a community of users, there can be no living subsistence traditions. For identifying local subsistence practices, communities of users usually are easily discerned and described. The participants of a local subsistence practice are primarily residents of local settlements or local tribes in which that tradition has developed.[51] The case examples of subsistence patterns in this report have illustrated how local cultural practices are identified with particular communities of users.

Economy also plays an important role in the convergence of factors that result in local subsistence traditions. The local economy of a community of users is strongly related to wild food uses. As described above, the mixed, subsistence-cash economies of rural communities in Alaska are typically dependent upon extensive land uses, including primary food production by fishing and hunting. By contrast, the economies of urban communities are not. The geographic dimensions of these two types of socioeconomic systems have been identified by the State management system. Subsistence uses occur in the rural communities outside the boundaries of the urban nonsubsistence areas, while within nonsubsistence areas, nonsubsistence uses primarily occur. Economic factors also influence the size and shapes of the areas used by hunters and fishers. For subsistence users, fishing and hunting occur in traditional local areas defined in large part by economic efficiency, while for sport users, fishing and hunting areas are primarily established through other standards.

In sum, local subsistence traditions arise from a convergence of ecological, community, economic, and cultural factors. Subsistence uses comprise a diverse set of localized traditions because of such factors.

These are contested findings, however. There is a substantially different and competing view of subsistence traditions held by some in Alaska. Rather than being localized traditions, subsistence traditions are viewed as a common heritage of all Alaskans. According to this view, traditional uses of wild resources established by subsistence users in a particular locality automatically comprise a common cultural heritage of the general public. Under this view of a shared heritage, all local subsistence traditions are automatically opened for competition to the general public. For instance, if the State Board of Game recognizes that Yup'iks in Quinhagak have a cultural tradition

of killing and eating brown bears emerging from dens in spring in the Kilbuck Mountains, this subsistence use becomes available for any Alaskan, even an urban Alaskan who has never hunted or eaten brown bear. Since 1990, this open-access viewpoint has been the prevailing influence in State fish and game management. The open-access approach is inconsistent with federal subsistence standards, and it has compelled the federal government to take back management of subsistence fishing and hunting on federal lands in Alaska.

Subsistence traditions are localized by factors of ecology, community, economy, and culture. As subsistence patterns are tied to locations, locality has proved a useful tool in managing subsistence hunts and fisheries. As discussed in this report, to manage hunts and fisheries in urbanized areas, locality is used to define nonsubsistence areas setting the boundaries for where subsistence uses can and cannot occur. To manage subsistence brown bear hunting, locality is used to restrict the flow of brown bear products out of special brown bear management areas, in order to prevent abuses of the hunt by sport hunters masquerading as subsistence hunters. To manage sockeye dip net fishing at Chitina, locality has been used to geographically separate subsistence activities and personal use activities.

Locality is used to define eligibility in a great many subsistence hunts and fisheries managed by federal and State entities. For example, eligibility for the jointly-managed spring subsistence waterfowl hunt in Alaska is limited to the residents of Alaska communities with established traditions of hunting waterfowl during spring (U.S. Department of the Interior 2004). Eligibility for the jointly-managed subsistence halibut fishery in Alaska is limited to members of tribes and residents of rural communities with established traditions of harvesting halibut for subsistence uses (U.S. Department of Commerce 2002). Eligibility for federally-managed marine mammal hunts (seals, sea lions, sea otters, walrus, and others) is limited to coastal Alaska Native communities with traditions of using marine mammals (16 U.S.C. 1371, Sec. 101(b) Marine Mammal Protection Act, Moratorium and Exceptions). Eligibility for many federal subsistence hunts and fisheries on federal public lands is limited to residents of rural communities with established customary and traditional uses of the hunts and fisheries (U.S. Fish and Wildlife Service 2004). For these hunts and fisheries, defining eligibility in terms of

communities of users provides a reasoned, straightforward approach to meeting management goals.

Alaska is distinguished by its diversity of small, rural communities that are economically and culturally dependent on fish and game. Multiple ways of living have developed within these communities of users that include the traditional harvest and use wild resources, adapted to local ecological and economic circumstances. A myriad of local subsistence traditions have developed within this diversity of peoples, ecologies, and economies. The wisdom of the State and federal subsistence statutes was to recognize the important roles of fishing and hunting within Alaska's communities. The ongoing challenge of the subsistence laws is how to apply them in ways that allow for localized traditions to be sustainable. In this way, diversity at the local level can continue to enrich the lives of all Alaskans.

Endnotes

[1] Alaska State law defines "subsistence uses" as "the noncommercial, customary and traditional uses of wild, renewable resources by a resident domiciled in a rural area of the state 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 by-products of fish and wildlife resources taken for personal or family consumption, and for the customary trade, barter, or sharing for personal or family consumption (AS 16.05.940(33)). McDowell v State, 1989 invalidated the clause "by a resident domiciled in a rural area of the state." "Customary and traditional" are defined as "the noncommercial, long-term, and consistent taking of, use of, and reliance upon fish or game in a specific area and the use patterns of that fish or game that have been established over a reasonable period of time taking into consideration the availability of the fish or game" ((AS 16.05.940(7)). The definition of subsistence uses of fish and land mammals in federal law is similar (see Endnote No. 11).

[2] Distribution rules for bowhead in Inupiat communities are summarized by Maggie Ahmaogak, Executive Director of the Alaska Eskimo Whaling Commission: "A third of the *uati*, or community share, is served to the community at this time [butchering], along with half of the heart, kidney, a quarter of the tongue, and half of the small intestines. The *tavsi* (the share of the successful crew) is divided among the captain and his crew. The rest of the whale is shared in very specific ways – some to the successful crew; some to all of the crews; some set aside for community feasts. Finally comes *pilianiaq* – when women who are present at the end of the butchering are invited to remove whatever meat is left." (Ahmaogak 2004).

[3] The customary trade of herring roe on kelp is allowed under state regulations (5 AAC 01.717, 01.730): a person may sell up to 32 lbs for an individual or 158 lbs for a household of two or more persons, the limits of the subsistence permit. No permits or permit limits are set in regulation for harvesting herring roe-on-hemlock branches. This practice is essentially self-limiting and the product is not desired in commercial export markets to Japan. The Board of Fisheries has determined that 105,000-158,000 lbs of herring roe annually is the amount necessary for subsistence uses in the Sitka area (5 AAC 01.716(b)).

[4] Sec. 16.05.094 states: "Duties of section of subsistence hunting and fishing. The section of subsistence hunting and fishing shall (1) compile existing data and conduct studies to gather information, including data from subsistence users, on all aspects of the role of subsistence hunting and fishing in the lives of the residents of the state; (2) quantify the amount, nutritional value, and extent of dependence on food acquired through subsistence hunting and fishing; (3) make information gathered available to the public, appropriate agencies, and other organized bodies; (4) assist the department, the Board of Fisheries, and the Board of Game in determining what uses of fish and game, as well as which users and what methods, should be termed subsistence uses, users, and methods; (5) evaluate the impact of state and federal laws and regulations on subsistence hunting and fishing and, when corrective action is indicated, make recommendations to the department; (6) make recommendations to the Board of Game and the Board of Fisheries regarding adoption, amendment and repeal of regulations affecting subsistence hunting and fishing; (7) participate with other divisions in the preparation of statewide and regional management plans so that those plans recognize and incorporate the needs of subsistence users of fish and game."

[5] According to Ahmaogak (2004): "Whereas AEWC's initial authority came through ICAS [the Inupiat Community of the North Slope], the Federal Government also takes its authority from

several sources. This regulatory authority is vested in the Federal Government under the Whaling Convention Act of 1949, the Marine Mammal Protection Act (MMPA) of 1972 and the Endangered Species Act (ESA) of 1973. Federal authority for local management of the Eskimo subsistence bowhead whale hunt and for enforcement of regulations imposed on that hunt is substantially delegated to the AEWC through a cooperative agreement, initiated in March, 1981, with the US Department of Commerce, National Oceanic and Atmospheric Administration (NOAA)."

[6] Histories of particular communities and regions in Alaska are found at the Alaska Department of Community and Economic Development website: www.dced.state.ak.us/cbd/AEIS/AEIS_Home.htm. See also Wolfe and Ellanna 1983 and Williams 2000.

[7] Population numbers here and elsewhere in the paper derive from the U.S. federal census, and from the Alaska Department of Labor (Williams 2000).

[8] The characteristics of the mixed, subsistence-market economies in Alaska's rural areas are discussed in a number of reports produced by the State's subsistence program, including Andersen (1992), Fall et al (2001), Lonner (1980), Magdanz, Utermohle, and Wolfe (2002), Wolfe (1992), Wolfe and Ellanna (1983), Wolfe and Utermohle (2000), and Wolfe et al (1983). A large number of community studies provide case examples of mixed subsistence-market economies, such as Andrews (1989), Behnke (1982), Coffing (1991), and Smythe (1988), among many others listed in the Division of Subsistence technical paper series.

[9] When "urban" is defined as places of 2,500 people or more, 79.0 percent of the U.S. population lives in urban places. When "urban" is defined as populations within Standard Metropolitan Areas, 80.3 percent of the population is urban (U.S. Department of Commerce 2003).

[10] The statute pertaining to "nonsubsistence areas" was passed in 1990. Prior to 1990, the Joint Board was charged with identifying "rural areas" of the state where subsistence uses occurred (see Fall 1990:81-83). In State statute, "rural" is defined as "a community of the state in which the noncommercial, customary and traditional use of fish or game for personal or family consumption is a principal characteristic of the economy of the community or area." (AS 16.05940(27)). Nonsubsistence areas essentially are the flipsides of rural areas, in that areas outside the boundaries of nonsubsistence areas are rural areas.

[11] This describes the Alaska State statutes and regulations. On the federal side, federal subsistence statutes recognize that subsistence uses are practices of "rural" residents. Section 803 of the Alaska National Interest Lands Conservation Act (ANILCA), passed by Congress in 1980, defines "subsistence uses" as "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 non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal family consumption; and for customary trade" (*emphasis added*). Its legislative history named Anchorage, Fairbanks, Juneau, and Ketchikan as examples non-rural places and Barrow, Bethel, Dillingham, Kotzebue, and Nome as examples of rural places. In federal regulation, the procedure for identifying rural places is found at 50 CFR 100.___ and 36 CFR 242.___. In 2003, the non-rural communities were listed in federal regulations as Adak; Fairbanks North Star Borough; Homer area including Homer, Anchor Point, Kachemak City, and Fritz Creek; Juneau area including Juneau, West Juneau and Douglas; Kenai area including

Kenai, Soldotna, Sterling, Nikiski, Salamatof, Kalifornsky, Kasilof, and Clam Gulch; Ketchikan area including Ketchikan City, Clover Pass, North Tongass Highway, Ketchikan East, Mountain Pass, Herring Cove, Saxman East, and parts of Pennock Island; Municipality of Anchorage; Seward area including Seward and Moose Pass; Valdez; and Wasilla area including Palmer, Wasilla, Sutton, Big Lake, Houston, and Bodenberg Butte (§____.23).

[12] An anomaly under the current State regulatory system is that if that same Anchorage hunter crosses over the nonsubsistence area line and kills a moose, bringing the meat back to Anchorage to eat, it can be called a "subsistence use." The Anchorage hunter, his socioeconomic situation, and his uses of the two moose (one killed inside and one killed outside the nonsubsistence area boundary) are identical, but State regulations treat the uses as being somehow different.

[13] This is the core meaning of the term, "rural." Rural means of, relating to, or characteristic of *the country*, as opposed to *the city* (*American Heritage Dictionary of the English Language* 2000:1525, 1st meaning). The "country" in this sense means an area or expanse outside cities and towns, with relatively lower human population to land densities. So low density (open country) is a key indicator of a rural community. "City" means a center of population, commerce, and culture, or a town of significant size or importance (*AHDEL* 2000:339, 1st meaning), so the basic contrast is between *the country* and *the city*. "Urban" means of, relating to, or located in a city, from the Latin stem *urb-*, city, and is a common contrast term for rural (*AHDEL* 2000:1892). See Wolfe and Fisher 2003:3-26 for a discussion of rural and urban concepts.

[14] These urban places are comprised of federally-defined census tracts or census designated places in close geographic proximity, following groupings provided in Wolfe and Fischer 2003:50-52. North Pole contains three census tracts (Fbx14, Fbx15, and Fbx16) with populations of 5,396, 7,152, and 3,747 people, respectively. What is called Palmer here contains seven census designated places (Buffalo Soapstone, 699 people; Butte, 2,561 people; Farm Loop, 1,067 people; Fishhook, 2,030 people; Gateway, 2,952 people; Lazy Mountain, 1,158 people; and Palmer, 4,533 people). Eagle River contains four census tracts (Anc201, 3,060 people; Anc202, 5,924 people; Anc203, 9,165 people; and Anc204, 2,461 people). Midtown Anchorage contains three census tracts (Anc1400, 5,083 people; Anc1900, 4,181 people; and Anc2000, 3,423 people).

[15] A *standard daily use area* is used by Wolfe and Fischer (2003:42) to measure population density in Alaska communities. A standard daily use area is simply the geographic area surrounding a community that is potentially used on a daily basis (a local commons). It can be measured by any number of standard distances. A 30-mile area (about 2,826 sq miles) was found to perform best at statistically distinguishing rural and non-rural populations in Alaska using a discriminant function analysis, compared with 10-mile and 20-mile distances (Wolfe and Fischer 2003:63). Thirty miles represents a fairly liberal daily commute to and from work along the Alaska highway system.

[16] This is the second common meaning of "rural." Rural means of, or relating to *farming, agriculture, or other extensive land uses* (American Heritage Dictionary of the English Language 2000: 1525). As stated by Larsen (1968: 581), "the production of food and other raw materials is a basic function of rural societies; indeed, in modern society the survival of the urban sector is dependent upon the effective conduct of this function." In Alaska's rural areas, subsistence hunting, gathering, and fishing (foraging) is the primary mode of food production, instead of agriculture and raising livestock in rural areas elsewhere.

[17] These are rural communities for which harvest estimates are available in the Community Profile Database of the Division of Subsistence. The harvest estimates for rural and urban places derive from that source and from harvest records collected under the State's annual permit/tag systems.

[18] This is based on an average Recommended Dietary Allowance (RDA) of 49 g of protein and 2,317 kcal of energy per person per day for the general population, assuming an average of 115.7 g of protein and 771.1 kcal of energy per lb of wild food.

[19] The source of this information is the Division of Subsistence, Community Profile Database, Cost of Food Index, which derives from the latest cost of living surveys conducted by the University of Alaska, Anchorage, Cooperative Extension Service.

[20] Bird hunters during spring on the Yukon-Kuskokwim Delta tell of one year when weather interrupted food shipments into villages. They joked that one week, lime marmalade and pilot crackers were the only foods available in one community's store. The story was told to illustrate the importance of spring bird hunting for food on some years.

[21] This is a question commonly asked the author by students in classes on subsistence, and by members of the general public attending presentations on subsistence in Alaska.

[22] I have heard harvest areas referred to as "our gardens" by Arctic Slope Inupiat ("the sea is our gardens"), and referred to as a "table" by Southeast Alaska Tlingit ("when the tide is out, the table is set"; Tlingit means "People of the Tides"). For these two groups, "gardens" and "tables" may be more apt metaphors than "local store." I also have heard western Yup'iks say they go out to hunt and fish when food runs short, like urban residents go to their local stores. This statement is a comment about the limited offerings of many village stores, as well as a metaphor equating hunting areas with food stores.

[23] The source of the information in this discussion (Tables 1 and 2 and Appendix Tables 1 and 2) is the Community Profile Database (ADF&G 2004). Descriptions of subsistence patterns in these case communities are as follows: Aleknagik (Seitz 1990), Fort Yukon (Sumida and Andersen 1990; Caulfield 1983), Gulkana (Stratton and Georgette 1984; Stratton and Georgette 1985; Stratton 1983; Fall and Stratton 1984), Kaktovik (Pedersen, Coffing, and Thompson 1985; Pedersen and Coffing 1984; Coffing and Pedersen 1985; Pedersen 1990; Pedersen, Haynes, and Wolfe 1991; Fall and Utermohle 1995), Kotzebue (Georgette and Loon 1993; Wolfe et al. 1986; Fall and Utermohle 1995), Northway (Marcotte, Wheeler, and Alexander 1992; Haynes et al 1984), Old Harbor (Schroeder et al 1987; Fall and Walker 1993; Fall and Utermohle 1995), Sitka (Gmelch, Gmelch, and Nelson 1983; Schroeder and Kookesh 1990; Wolfe and Ellanna 1983), and Tununak (Pete and Kreher 1986; Pete 1984; Pete, Albrecht, and Kreher 1987; Pete 1992; Pete 1990; Pete 1991).

[24] These were the top species the year of the household survey. There are differences between years in foods harvested in a community (see Burch 1985 and Fall et al 2001), a fact that further increases the complexity of answering the question about the "most important" species.

[25] Listed by the number of times a resource appears in the top ten, the resources mentioned by five or more communities are vegetation (7 communities), sockeye salmon (6), caribou (6), moose (6), coho salmon (5), and Chinook salmon (5).

[26] The Appendix Tables 1 and 2 list the resource categories covered by the State's subsistence survey and lumps some types of food resources, such as "vegetation." Consequently, the number of species harvested in each community is somewhat greater than indicated by the count.

[27] Hard-copy maps of use areas are found in many of the reports of community subsistence patterns published in the Division of Subsistence technical paper series. A list of maps is contained in the Map Catalog Database of the Division of Subsistence.

[28] The sources for these materials are as follows: Angoon (George and Kookesh 1982; George and Bosworth 1988), Kodiak Island and Arctic Slope (Schroeder et al 1987), upper Yukon River (Caulfield 1983), and Northway (Case 1986).

[29] Several studies conducted by the State subsistence program have examined issues resulting from the interaction between sport uses and subsistence uses, such as the need to create "controlled use areas" to moderate the impacts of fly-in sport hunters (cf., Fall 1989; Fall 1990; Georgette and Loon 1998; Georgette and Loon 1991; Georgette and Loon 1992; and Stokes and Andrews 1982).

[30] *Culture* mean the socially-transmitted behavior patterns, arts, beliefs, institutions, and other products of human work and thought shared within a particular period, class, community, or population (*American Heritage Dictionary of the English Language* 2000: 442).

[31] The non-tribal roe harvests shown in Fig. 16 were primarily collected by Tlingits living in Sitka but enrolled in tribes other than the Sitka tribe.

[32] While subsistence uses are defined as "customary and traditional uses" in Alaska, they are not the only hunting or fishing traditions in Alaska. Two other major traditions are "sport uses" and "commercial uses," each with long histories inside and outside of Alaska. Sport traditions were introduced to Alaska by the mid-19th century and currently they represent the predominant cultural tradition of urban-based harvesters. Commercial traditions predate sport traditions in Alaska. Clear distinctions between sport and subsistence traditions are evident in the case of brown bear uses.

[33] A "trophy" is a symbolic expression of cultural values. The root of the word "trophy" derives from the Greek *tropaion*, a memorial of conquest, a spoil of war. The mount or tanned hide is a symbol of a hunter's successful conquest of the powerful brown bear. While public displays of a hide and skull convey positive messages under sport hunting traditions, it is an anathema under subsistence traditions that forbid boasting about killing a brown bear.

[34] In all social groups, there are cultural rules classifying animals as "food" or "not food." In Euroamerican cultural traditions, grizzly bears are placed in the category of "not food," alongside animals such as horses, minks, and seagulls, among many others. Such classification rules vary across cultural traditions.

[35] Under State regulations for general/sport hunting and trapping, a person may discard the meat from a wolf, wolverine, brown bear, black bear (June 1 through December 31), coyote, fox, lynx, marten, mink, weasel, land otter, beaver, muskrat, ground squirrel, and marmot (5 AAC 92.220).

[36] Brown bear use patterns are documented in several technical papers, including Loon and Georgette 1989; Thornton 1992; Fall and Hutchinson-Scarbrough 1996; and Georgette 2001.

Other reports describing brown bear uses include Behnke 1981; Krieg, Coiley, and Hutchinson-Scarbrough 1996; Andersen, Utermohle, and Brown 1998; Andersen, Utermohle and Brown 1999; and Andersen, Utermohle, and Jennings 2001. Harvest numbers for brown bear in surveyed communities are contained in the Division of Subsistence Community Profile Database.

[37] "Sealing" means having an authorized ADF&G representative in Alaska place a locking seal on the hide and skull of the bear. The sealing officer asks questions about when, where, and how the animal was taken and may measure the skull and take some biological samples. The seal must remain on the hide and/or skill until it has been transported from the state or until the tanning process has begun.

[38] Customs and traditions are explicitly tied to specific geographic areas in the definition of "customary and traditional" in State statutes. "Customary and traditional" are defined as "the noncommercial, long-term, and consistent taking of, use of, and reliance upon fish or game *in a specific area* and the use patterns of that fish or game that have been established over a reasonable period of time taking into consideration the availability of the fish or game" ((AS 16.05.940(7)) [emphasis added].

[39] This is not to say that subsistence practices are forever frozen by regulations. In practice, subsistence patterns continually adapt to changing circumstances. State regulations tend to accommodate many changing subsistence practices of communities, such as changes in subsistence technology and harvest levels. However, customary and traditional subsistence uses generally are linked to particular fish stocks and wildlife populations in State regulations.

[40] In fact, the Division of Sport Fish in ADF&G understands its mandate to include the expansion of sport fishing opportunities to new river systems in Alaska. The Division of Sport Fish expends a part of its budget to develop public access for sport fishing and to advertise fisheries to the general public. By contrast, the mandate of the Division of Subsistence has never included the expansion of subsistence uses to new areas in the State.

[41] For instance, of dip net permit holders in 1983, 98.2 percent were from urban places or other areas outside the Copper Basin (Fall and Stratton 1984:42). Of the non-local dip netters, 50.1 percent were from Anchorage, 40.2 percent from the Fairbanks area, 6.6 percent from the Palmer-Wasilla area, and the remaining 3.1 percent from other places, like Valdez and the Kenai Peninsula.

[42] Descriptions of the subsistence fishery are found in Stickney and Cunningham 1980; Stratton 1982; Fall and Stratton 1984; Fall 1989; Simeone and Fall 1996; and Simeone and Kari 2002.

[43] The Board of Fisheries established a personal use salmon fishery in the Copper River drainage in 1984 under the Copper River Personal Use Dip Net Salmon Fishery Management Plan (5 AAC 77.590). Between 1999-2002, the Board classified the Chitina dip net fishery as a subsistence fishery. In 2003, the Board reclassified the fishery back to a personal use category (ADF&G 2003).

[44] The Chitina personal use fishing area downstream from the bridge was once a subsistence fishing area (and still is under federal rules), but non-local fishers began to displace subsistence fishers over time. Carving out this seven-mile stretch as an exclusive personal use fishing area was a compromise solution chosen by the Board of Fisheries to geographically separate gear types and uses. Of course, it is permissible for any fisher to obtain a subsistence dip net permit

upriver from the Chitina bridge. While some non-local fishers have done this, it has not been to a large extent, even given the advantages of higher seasonal limits, probably due to access issues.

[45] Sources for this summary of the Nelchina caribou history include Fall (1985), Stanek (1981), Stratton (1982 and 1983), and Tobey (2003).

[46] In the 2001/2002 hunt, the principal modes of access reported by Nelchina caribou hunters were 3- or 4-wheelers (35 percent of hunters), highway vehicles (26 percent), off-road vehicles (12 percent), snowmachines (8 percent), boats (7 percent), airplanes (6 percent), horses (1 percent), airboats (1 percent), and unknown (1 percent) (Tobey 2003). Of course, most hunters also used highway vehicles to transport ATVs and ORVs to and from the hunting area.

[47] This event was anticipated by most managers in ADF&G. In ten public hearings on Nelchina caribou management in 1981, the three most common opinions stated by those in attendance were "equal rights to all residents" (45 people stated this), "the [random draw] permit system is acceptable and creates a fair chance for everybody" (34 people stated this), and "everybody that is a resident is a subsistence user" (31 people stated this) (Stanek 1981:5). These types of comments showed that many urban-based hunters were poised to compete in a subsistence hunt, should one be opened up for the Nelchina caribou herd. Also, the statements showed that many hunters supported a random draw for permits.

[48] This has been called a "Tier II" permit system. The mandate to the Alaska Boards of Fisheries and Game in AS 16.05.258(4) states: "If the harvestable portion of the stock or population is not sufficient to provide a reasonable opportunity for subsistence uses, the appropriate board shall (A) adopt regulations eliminating consumptive uses, other than subsistence uses; (B) distinguish among subsistence users, through limitations based on (i) the customary and direct dependence on the fish stock or game population by the subsistence user for human consumption as a mainstay of livelihood; (ii) the proximity of the domicile of the subsistence user to the stock or population; and (iii) the ability of the subsistence user to obtain food if subsistence use is restricted or eliminated." The Board has been told that the second criteria (proximity) cannot be used because of McDowell v Alaska, 1989.

[49] Over 17,000 applications have been scored some years (Tobey 2003). Scores are based on answers to questions on the permit application. "Customary and direct dependence" has been measured by two questions: the history of use of Nelchina caribou by the applicant, and the history of use by the longest user in an applicant's household. The "ability of the subsistence user to obtain food" has been measured by three questions: the relative availability of store foods, the relatively availability of fuel for hunting, and the relative availability of alternative hunts to an applicant. The State's Tier II system has attempted to use verifiable standards to deal with a so-called "liar's game" played by some of the thousands of applicants. Some of the measures have been challenged as illegal, because they are related to where an applicant lives, including the availability of store foods, fuel, and alternative hunts, all of which are influenced by the geographic location and size of the community an applicant lives in.

[50] A *community* is a named human population forming a distinct segment of society by virtue of a common government, common interests, a pattern of sharing, participation, fellowship, or other factors (*American Heritage Dictionary of the English Language*, 4th Edition 2000: 374). Community boundaries commonly are defined by governmental jurisdictions, such as municipal borders or local tribal membership roles. Communities also may be indicated by measures of economic or social integration, such as commuting patterns for work. A *society* is a group of

people broadly distinguished from other groups by mutual interests, participation in characteristic relationships, shared institutions, and a common culture (*AHDEL* 2000: 1650). A *population* is a set of people identified by geographic or community boundaries.

[51] One exception to this rule in Alaska are individuals who have family and a community-of-origin elsewhere than their resident community, and who maintain dual residencies. Seasonally, such individuals may travel "home" to participate in his/her family's subsistence activities, sometimes at seasonal camps. Some of the subsistence foods produced in those activities remain with the family in the area of the subsistence activities and some products are brought back to the individual's other resident community. Individuals with dual residencies may be accommodated in fishing and hunting regulations through special provisions.

References

Ahmaogak, Maggie
2004 *Alaska Eskimo Whaling Commission – Overview and Current Concerns.* http://www.uark.edu/misc/jcdixon/Historic_Whaling/AEWC/aewc_maggie%20presentation.htm.

Alaska Department of Fish and Game
1992 *Board Book for the Joint Board of Fisheries and Game, November 1-7, 1992, Hilton Hotel, Anchorage, Alaska.* Unpublished materials on nonsubsistence area proposals on file at the Alaska Department of Fish and Game, Division of Boards, Juneau, Alaska.

Alaska Department of Fish and Game
2003 *A History of the Copper River Personal Use and Subsistence Salmon Fisheries.*. Division of Sport Fish, Juneau, Alaska, December 10, 2003.

Alaska Department of Fish and Game
2004 *Community Profile Database.* Division of Subsistence, Anchorage, Alaska.

American Heritage Dictionary of the English Language (4th Edition)
2000 Boston: Houghton Mifflin Company.

Andersen, David B.
1992 *Trapping in Alaska and the Proposed European Community Import Ban on Furs Taken with Leghold Traps*. Technical Paper Number 223, ADF&G, Division of Subsistence, Juneau, Alaska.

Andersen, David B., Charles Utermohle, Louis Brown
1998 *The 1997/98 Harvest of Moose, Caribou and Brown Bear in Middle Yukon and Koyukuk River Communities, Alaska*. Technical Paper Number 245, ADF&G, Division of Subsistence, Juneau, Alaska.

Andersen, David B., Charles J. Utermohle, and Louis Brown
1999 *The 1998-99 Harvest of Moose, Caribou, and Bear in Ten Middle Yukon and Koyukuk River Communities*. Technical Paper Number 251, ADF&G, Division of Subsistence, Juneau, Alaska.

Andersen, David B., Charles J. Utermohle, and Gretchen Jennings
2001 *The 1999-2000 Harvest of Moose, Caribou, and Bear in Ten Middle Yukon and Koyukuk River Communities*. Technical Paper Number 262, ADF&G, Division of Subsistence, Juneau, Alaska.

Andrews, Elizabeth
1989 *The Akulmuit: Territorial Dimensions of the Yup'ik Eskimo*. Technical Paper Number 177, ADF&G, Division of Subsistence, Juneau, Alaska.

Behnke, Steven R.
1981 *Subsistence Use of Brown Bear in the Bristol Bay Area: A Review of Available Information*. Technical Paper Number 46, ADF&G, Division of Subsistence, Juneau, Alaska.

Behnke, Steven R
1982 *Wildlife Utilization and the Economy of Nondalton*. Technical Paper Number 47, ADF&G, Division of Subsistence, Juneau, Alaska.

Burch, Ernest S. Jr
1985 *Subsistence Production in Kivalina, Alaska: A Twenty-Year Perspective.* Technical Paper Number 128, ADF&G, Division of Subsistence, Juneau, Alaska.

Case, David
1989 Subsistence and Self-Determination: Can Alaska Natives Have a More "Effective Voice"? *University of Colorado Law Review* 60(4): 1009-1035.

Case, Martha
1986 *Wild Resource Use in Northway, Alaska*. Technical Paper Number 132, ADF&G, Division of Subsistence, Juneau, Alaska.

Caulfield, Richard A.
1983a *Subsistence Land Use in the Upper Yukon-Porcupine Region, Alaska*. Technical Paper Number 16, ADF&G, Division of Subsistence, Juneau, Alaska.

Caulfield, Richard A., Walter J. Peter, and Clarence Alexander
1983b *Gwich'in Athabaskan Place Names of the Upper Yukon-Porcupine Region, Alaska: A Preliminary Report*. Technical Paper Number 83, ADF&G, Division of Subsistence, Juneau, Alaska.

Coffing, Michael W.
1989 Bear Boats. Floating Home From Squirrel Camp. *Alaska Fish and Game* 21(6):12-13.

Coffing, Michael W.
1991 *Kwethluk Subsistence: Contemporary Land Use Patterns, Wild Resource Harvest and Use and the Subsistence Economy of a Lower Kuskokwim River Area Community*. Technical Paper Number 157, ADF&G, Division of Subsistence, Juneau, Alaska.

Coffing, Michael W. and Sverre Pedersen
1985 *Caribou Hunting: Land Use Dimensions, Harvest Level, and Cultural Aspects of the Regulatory Year 1983-84 in Kaktovik, Alaska*. Technical Paper Number 120, ADF&G, Division of Subsistence, Juneau, Alaska.

Davis, Brian L.
1999 *Geographic Patterns of Seal Hunting in Southeast Alaska, 1992-94*. Technical Paper Number 256, ADF&G, Division of Subsistence, Juneau, Alaska.

Ellanna, Linda J.
1983a *Bering Strait Insular Eskimo: a Diachronic Study of Ecology and Population Structure*. Technical Paper Number 77, ADF&G, Division of Subsistence, Juneau, Alaska.

Ellanna, Linda J.
1983b *Technological and Social Change of Marine Mammal Hunting Patterns in Bering Strait*. Technical Paper Number 79, ADF&G, Division of Subsistence, Juneau, Alaska.

Ellanna, Linda J., George K. Sherrod, and Steven Langdon
1986 *Subsistence Mapping: An Evaluation and Methodological Guidelines*. Technical Paper Number 125, ADF&G, Division of Subsistence, Juneau, Alaska.

Fall, James A.
1985 Historical Changes in the Hunting and Fishing Patterns in the Copper River Basin, Alaska. Paper presented at the symposium *Modern Hunting and Fishing Adaptations in Northern North America*, 84th Annual Meeting of the American Anthropological Association, Washing, D.C.

Fall, James A.
1989 Deciding Who Gets To Catch 1,000,000 Sockeye Salmon. *Alaska Fish and Game* 21(6):28-30.

Fall, James A.
1990 The Division of Subsistence of the Alaska Department of Fish and Game: An Overview of Its Research Program and Findings: 1980-1990. *Arctic Anthropology* 27(2):68-92.

Fall, James A., and Lisa B. Hutchinson-Scarbrough
1996 *Subsistence Uses of Brown Bears in Communities of Game Management Unit 9E, Alaska Peninsula*. Technical Paper Number 235, ADF&G, Division of Subsistence, Juneau, Alaska.

Fall, James A., Rita Miraglia, William Simeone, Charles Utermohle, and Robert J. Wolfe
2001 *Long-Term Consequences of the Exxon Valdez Oil Spill for Coastal Communities of South Central Alaska*. Technical Paper Number 264, ADF&G, Division of Subsistence, Juneau, Alaska.

Fall, James A. and Lee Stratton
1984 *The Harvest and Use of Copper River Salmon: A Background Report*. Technical Paper Number 96, ADF&G, Division of Subsistence, Juneau, Alaska.

Fall, James A. and Charles J. Utermohle, eds.
1995 *An Investigation of the Sociocultural Consequences of Outer Continental Shelf Development in Alaska.* OCS Study MMS 95-012. Technical Report Number 160, U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region, Anchorage.

Fall, James A. and Robert J. Walker
1993 *Subsistence Harvests by Six Kodiak Island Borough Communities*. Technical Paper Number 193, ADF&G, Division of Subsistence, Juneau, Alaska.

Firman, Anne S. and Robert G. Bosworth
1990 *Harvest and Use of Fish and Wildlife Resources by Residents of Kake, Alaska.* Technical Paper Number 145, ADF&G, Division of Subsistence, Juneau, Alaska.

George, Gabriel D. and Robert G. Bosworth
1988 *Use of Fish and Wildlife by Residents of Angoon, Admiralty Island, Alaska*. Technical Paper Number 159, ADF&G, Division of Subsistence, Juneau, Alaska.

George, Gabriel D. and Matthew A. Kookesh
1982 *Angoon Deer Hunting, 1982*. Technical Paper Number 71, ADF&G, Division of Subsistence, Juneau, Alaska.

Georgette, Susan
1989 Left-Handed Bears. How the *Kuuvangmiit* See the Grizzly. *Alaska Fish and Game* 21(6):8-10.

Georgette, Susan
2001 *Brown Bears on the Northern Seward Peninsula: Traditional Knowledge and Subsistence Uses in Deering and Shishmaref*. Technical Paper Number 248, ADF&G, Division of Subsistence, Juneau, Alaska.

Georgette, Susan and Hannah Loon
1988 *The Noatak River: Fall Caribou Hunting and Airplane Use*. Technical Paper Number 162, ADF&G, Division of Subsistence, Juneau, Alaska.

Georgette, Susan and Hannah Loon
1991 *Subsistence and Sport Fishing of Sheefish on the Upper Kobuk River, Alaska.* Technical Paper Number 175, ADF&G, Division of Subsistence, Juneau, Alaska.

Georgette, Susan and Hannah Loon
1992 *Subsistence Sheep Hunting in Northwest Alaska*. Technical Paper Number 208, ADF&G, Division of Subsistence, Juneau, Alaska.

Georgette, Susan and Hannah Loon
1993 *Subsistence Use of Fish and Wildlife in Kotzebue, A Northwest Alaska Regional Center*. Technical Paper Number 167, ADF&G, Division of Subsistence, Juneau, Alaska.

Gmelch, George, Sharon Gmelch and Richard Nelson
1983 *Sitka: Resource Use in a Small Alaskan City*. Technical Paper Number 90, ADF&G, Division of Subsistence, Juneau, Alaska.

Haynes, Terry L., Martha Case, James A. Fall, Libby Halpin, and Michelle Robert
1984 *The Use of Copper River Salmon and Other Wild Resources by Upper Tanana Communities, 1983-1984*. Technical Paper Number 115, ADF&G, Division of Subsistence, Juneau, Alaska.

Haynes, Terry L. and Craig Mishler
1991 *The Subsistence Harvest and Use of Steller Sea Lions in Alaska*. Technical Paper Number 198, ADF&G, Division of Subsistence, Juneau, Alaska.

Haynes, Terry, and Robert J. Wolfe, Editors
1999 *Ecology, Harvest, and Use of Harbor Seals and Sea Lions: Interview Materials from Alaska Native Hunters.* Technical Paper Number 249, ADF&G, Division of Subsistence, Juneau, Alaska.

Kari, Priscilla Russell
1983 *Land Use and Economy of Lime Village*. Technical Paper Number 80, ADF&G, Division of Subsistence, Juneau, Alaska.

Kari, Priscilla Russell
1985 *Wild Resource Use and Economy of Stony River Village*. Technical Paper Number 108, ADF&G, Division of Subsistence, Juneau, Alaska.

Kookesh, Matt and Ken Leghorn
1986 *Timber Management and Fish and Wildlife Utilization in Tenakee Springs, Alaska*. Technical Paper Number 138, ADF&G, Division of Subsistence, Juneau, Alaska.

Krieg, Ted, Philippa Coiley, and Lisa B. Hutchinson-Scarbrough
1996 *Subsistence Harvests and Uses of Caribou, Moose and Brown Bear in 12 Alaska Peninsula Communities, 1994/1995*. Technical Paper Number 240, ADF&G, Division of Subsistence, Juneau, Alaska.

Larson, O. F.
1968 Rural Society. In D. L. Sills (eds), *International Encyclopedia of the Social Sciences* (pp. 580-588). New York: Macmillan.

Lonner, Thomas
1980 *Subsistence as an Economic System in Alaska: Theoretical and Policy Implications*. Technical Paper Number 67, ADF&G, Division of Subsistence, Juneau, Alaska.

Loon, Hannah and Susan Georgette
1989 *Contemporary Brown Bear Use in Northwest Alaska*. Technical Paper Number 163, ADF&G, Division of Subsistence, Juneau, Alaska.

Magdanz, James S. and Annie Olanna
1984 *Controls on Fishing Behavior on the Nome River*. Technical Paper Number 102, ADF&G, Division of Subsistence, Juneau, Alaska.

Magdanz, James S., Charles J. Utermohle, and Robert J. Wolfe
2002 *The Production and Distribution of Wild Food in Wales and Deering, Alaska.* Technical Paper Number 259, ADF&G, Division of Subsistence, Juneau, Alaska.

Marcotte, James R., Priscilla Wheeler, and Clarence L. Alexander
1992 *Fish and Game Use by Residents of Five Upper Tanana Communities, 1987-88*. Technical Paper Number 168, ADF&G, Division of Subsistence, Juneau, Alaska.

Pedersen, Sverre
1990 *Caribou Hunting: Land Use Dimensions, Harvest Levels, and Selected Aspects of the Hunt During Regulatory Year 1987-88 in Kaktovik, Alaska*. Technical Paper Number 172, ADF&G, Division of Subsistence, Juneau, Alaska.

Pedersen, Sverre and Michael Coffing
1984 *Caribou Hunting: Land Use Dimensions and Recent Harvest Patterns in Kaktovik, Northeast Alaska*. Technical Paper Number 92, ADF&G, Division of Subsistence, Juneau, Alaska.

Pedersen, Sverre, Terry L. Haynes and Robert J. Wolfe
1991 *Historic and Current Use of Musk Ox by Kaktovik Residents*. Technical Paper Number 206, ADF&G, Division of Subsistence, Juneau, Alaska.

Pedersen, Sverre, Michael W. Coffing, and Jane Thompson
1985 *Subsistence Land Use Baseline for Kaktovik, Alaska*. Technical Paper Number 109, ADF&G, Division of Subsistence, Juneau, Alaska.

Pete, Mary C.
1990 *Herring Survey Report*. Technical Paper Number 196, ADF&G, Division of Subsistence, Juneau, Alaska.

Pete, Mary C.
1991 *A Summary Herring Report*. Technical Paper Number 192, ADF&G, Division of Subsistence, Juneau, Alaska.

Pete, Mary C.
1992 *1992 Herring Survey Report*. Technical Paper Number 221, ADF&G, Division of Subsistence, Juneau, Alaska.

Pete, Mary C.
1984 *Subsistence Use of Herring in the Nelson Island Region of Alaska*. Technical Paper Number 113, ADF&G, Division of Subsistence, Juneau, Alaska.

Pete, Mary C.
1991 *Subsistence Herring Fishing in the Nelson and Nunivak Island Districts, 1991*. Technical Paper Number 211, ADF&G, Division of Subsistence, Juneau, Alaska.

Pete, Mary C., Daniel E. Albrecht and Ronald E. Kreher
1987 *Subsistence Herring Fishing in the Nelson Island District and Northern Kuskokwim Bay*. Technical Paper Number 160, ADF&G, Division of Subsistence, Juneau, Alaska.

Pete, Mary C. and Ronald E. Kreher
1986 *1986 Subsistence Herring Fishing in the Nelson Island District*. Technical Paper Number 144, ADF&G, Division of Subsistence, Juneau, Alaska.

Schroeder, Robert F., David B. Andersen, Robert Bosworth, Judith M. Morris and John M. Wright
1987 *Subsistence in Alaska: Arctic, Interior, Southcentral, Southwest, and Western Regional Summaries*. Technical Paper Number 150, ADF&G, Division of Subsistence, Juneau, Alaska.

Schroeder, Robert, David B. Andersen, and Grant Hildreth
1987 *Subsistence Use Area Mapping in Ten Kotzebue Sound Communities.* Technical Paper Number 130, ADF&G, Division of Subsistence, Juneau, Alaska.

Schroeder, Robert F. and Matthew Kookesh
1990a *Subsistence Harvest and use of Fish and Wildlife Resources and the Effects of Forest Management in Hoonah, Alaska*. Technical Paper Number 142, ADF&G, Division of Subsistence, Juneau, Alaska.

Schroeder, Robert F. and Matt Kookesh
1990b *Subsistence Harvest of Herring Eggs in Sitka Sound*. Technical Paper Number 173, ADF&G, Division of Subsistence, Juneau, Alaska.

Seitz, Jody
1990 *Subsistence Fishing in the Nushagak Bay, Southwest Alaska*. Technical Paper Number 195, ADF&G, Division of Subsistence, Juneau, Alaska.

Simeone, William E. and James Kari
2002 *Traditional Knowledge and Fishing Practices of the Ahtna of the Copper River, Alaska*. Technical Paper Number 270, ADF&G, Division of Subsistence, Juneau, Alaska.

Smythe, Charles E
1988 *Harvest and Use of Fish and Wildlife by Residents of Petersburg, Alaska*. Technical Paper Number 164, ADF&G, Division of Subsistence, Juneau, Alaska.

Stanek, Ronald T
1981 *Nelchina Caribou User Group Assessment*. Technical Paper Number 28, ADF&G, Division of Subsistence, Juneau, Alaska.

Stickney, Alice A. and Paul Cunningham
1980 *Report on the Survey of Permitholders in the Copper River Subsistence Fishery -- 1979*. Technical Paper Number 36, ADF&G, Division of Subsistence, Juneau, Alaska.

Stokes, Jeff W. and Elizabeth Andrews
1982 *Subsistence Hunting of Moose in the Upper Kuskokwim Controlled Use Area, 1981*. Technical Paper Number 22, ADF&G, Division of Subsistence, Juneau, Alaska.

Stratton, Lee
1982 *The Dipnet and Fishwheel Fisheries of the Copper River, 1982*. Technical Paper Number 37, ADF&G, Division of Subsistence, Juneau, Alaska.

Stratton, Lee
1982 *Patterns of Use of the Nelchina Caribou Herd*. Technical Paper Number 38, ADF&G, Division of Subsistence, Juneau, Alaska.

Stratton, Lee
1983 *Copper Basin Caribou Use: A Research Update*. Technical Paper Number 75, ADF&G, Division of Subsistence, Juneau, Alaska.

Stratton, Lee and Susan Georgette
1984 *Use of Fish and Game by Communities in the Copper River Basin, Alaska: A Report on a 1983 Household Survey*. Technical Paper Number 107, ADF&G, Division of Subsistence, Juneau, Alaska.

Stratton, Lee and Susan Georgette
1985 *Copper Basin Resource Use Map Index and Methodology*. Technical Paper Number 124, ADF&G, Division of Subsistence, Juneau, Alaska.

Sumida, Valerie A. and David B. Andersen
1990 *Patterns of Fish and Wildlife Use for Subsistence in Fort Yukon, Alaska*. Technical Paper Number 179, ADF&G, Division of Subsistence, Juneau, Alaska.

Thornton, Thomas F.
1992 *Subsistence Use of Brown Bear in Southeast Alaska*. Technical Paper Number 214, ADF&G, Division of Subsistence, Juneau, Alaska.

Tobey, B.
2003 Units 13 and 14B caribou management report. Pages 108-124 *in* C. Healy, editor. *Caribou management report of survey and inventory activities, 1 July 2000-30 June 2002*. ADF&G, Division of Wildlife Conservation, Juneau, Alaska.

U.S. Department of Commerce
2002 *Pacific Halibut Fisheries; Subsistence Fishing.* National Oceanic and Atmospheric Administration, National Marine Fisheries Service. 50 CFR Parts 300, 600 and 679. Federal Register Vol. 67, No. 165, pp. 54767-54783, August 26, 2002, Proposed Rules, Washington, D.C.

U.S. Department of Commerce
2003 *Statistical Abstract of the United States, 2003. 123rd edition.* Economics and Statistical Administration, Washington, D.C.

U.S. Department of the Interior
2004 *Migratory Bird Subsistence Harvest in Alaska; Subsistence Harvest Regulations for Migratory Birds in Alaska During the Spring/Summer 2004 Subsistence Season.* U.S. Fish and Wildlife Service. 50 CFR Part 92. Federal Register Vol. 69, No. 64, pp. 17318-17329, April 2, 2004, Rulea and Regulations, Washington, D.C.

U.S. Fish and Wildlife Service
2004 *2003-2004 Federal Subsistence Regulations.* Office of Subsistence Management, Anchorage.

Victor, Anne-Marie
Forthcoming *Subsistence Harvest and Trade of Herring Eggs on Macrocystis Kelp in Hydaburg, Alaska.* Technical Paper Number 225, ADF&G, Division of Subsistence, Juneau, Alaska.

Williams, Greg
2000 *Alaska Population Overview: 1999 Estimates*. Alaska Department of Labor, Juneau, Alaska.

Wolfe, Robert J.
1982 *The Subsistence Salmon Fishery of the Lower Yukon River*. Technical Paper Number 60, ADF&G, Division of Subsistence, Juneau, Alaska.

Wolfe, Robert J.
1986 The economic efficiency of food production in a Western Eskimo population. In Steven J. Langdon (ed.), *Contemporary Alaska Native Economies,* University Press of America, Maryland, p. 101-120.

Wolfe, Robert J.
1989 Tools: A Crucial Difference. *Alaska Fish and Game* 21(6):20-23.

Wolfe, Robert J.
1992 *Trapping in Alaska Communities with Mixed Subsistence-Cash Economies*. Technical Paper Number 217, ADF&G, Division of Subsistence, Juneau, Alaska.

Wolfe, Robert J.
2001a Subsistence Food Production and Distribution in Alaska: Social Organization, Management, and Development Issues. *INUSSUK – Arctic Research Journal 1:213-231*.

Wolfe, Robert J.
2001b *The Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 2000.* Technical Paper Number 266, ADF&G, Division of Subsistence, Juneau, Alaska.

Wolfe, Robert J. and Linda J. Ellanna (compilers)
1983 *Resource Use and Socioeconomic Systems: Case Studies of Fishing and Hunting in Alaskan Communities*. Technical Paper Number 61, ADF&G, Division of Subsistence, Juneau, Alaska.

Wolfe, Robert J., James A. Fall, Virginia Fay, Susan Georgette, James S. Magdanz, Sverre Pedersen, Mary Pete and Janet Schichnes (contributors)
1986 *The Role of Fish and Wildlife in the Economies of Barrow, Bethel, Dillingham, Kotzebue, and Nome*. Technical Paper Number 154, ADF&G, Division of Subsistence, Juneau, Alaska.

Wolfe, Robert J. and Victor Fischer
2003 *Methods for Rural/Non-Rural Determinations for Federal Subsistence Management in Alaska.* Report to the U.S. Fish and Wildlife Service, Alaska Region by Robert J. Wolfe and Associates and the Institute of Social and Economic Research, University of Alaska, Anchorage.

Wolfe, Robert J., Joseph J. Gross, Steven J. Langdon, John M. Wright, George K. Sherrod, and Linda J. Ellanna
1983 *Subsistence-Based Economies in Coastal Communities of Southwest Alaska.* Technical Paper Number 89, ADF&G, Division of Subsistence, Juneau, Alaska.

Wolfe, Robert J. and Craig Mishler
1993 *The Subsistence Harvest of Harbor Seal and Sea Lion by Alaska Natives in 1992.* Technical Paper Number 229, ADF&G, Division of Subsistence, Juneau, Alaska.

Wolfe, Robert J. and Robert J. Walker
1987 Subsistence Economies in Alaska: Productivity, Geography, and Development Impacts. *Arctic Anthropology* 24(2):56-81.

Wolfe, Robert J., and Charles J. Utermohle
2000 *Wild Food Consumption Rate Estimates For Rural Alaska*. Technical Paper Number 261, ADF&G, Division of Subsistence, Juneau, Alaska.

Wright, John M. and Molly B. Chythlook
1985 *Subsistence Harvests of Herring Spawn-on-Kelp in the Togiak District of Bristol Bay* Technical Paper Number 116, ADF&G, Division of Subsistence, Juneau, Alaska.

Appendix Table 1 (pt. 1 of 4). Wild Food Harvests by Community (Lbs per Person and Percentage of Community Total)

Resource	Sitka Southeast Forest		Akutan Aleutian Islands		Aleknagik Bristol Bay		Kotzebue Northwest Arctic		Old Harbor Kodiak Island	
Chum Salmon	6.37	3.1% *	1.68	0.4%	3.21	0.8%	73.07	12.3% *	7.26	2.4% *
Coho Salmon	10.67	5.2% *	21.85	4.7% *	15.49	4.1% *	.04	0.0%	65.14	21.7% *
Chinook Salmon	18.31	8.9% *	1.15	0.2%	22.47	5.9% *	1.56	0.3%	8.40	2.8% *
Pink Salmon	2.71	1.3%	20.34	4.4% *	.00	0.0%	.27	0.0%	7.65	2.5% *
Sockeye Salmon	19.77	9.6% *	76.24	16.4% *	42.17	11.1% *	.22	0.0%	22.04	7.3% *
Landlocked Salmon			.09	0.0%						
Spawnouts					11.73	3.1% *				
Herring	5.90	2.9%	1.34	0.3%	6.05	1.6% *	5.86	1.0%	.67	0.2%
Herring Roe	14.90	7.3% *	.00	0.0%	5.72	1.5%			.00	0.0%
Smelt	.72	0.3%			4.40	1.2%	.84	0.1%		
Bass	.03	0.0%								
Pacific Cod (gray)	.05	0.0%	29.24	6.3% *	.23	0.1%			6.57	2.2%
Pacific Tom Cod	.01	0.0%							.00	0.0%
Arctic Cod										
Saffron Cod							5.87	1.0% *		
Walleye Pollock (whiting)			.02	0.0%						
Flounder	1.14	0.6%	.81	0.2%	.60	0.2%	.32	0.1%		
Greenling	2.93	1.4%	2.09	0.4%					1.12	0.4%
Greenling Roe			.47	0.1%						
Halibut	19.42	9.5% *	85.45	18.3% *	.00	0.0%	.04	0.0%	36.15	12.0% *
Lamprey										
Perch	.00	0.0%								
Black Rockfish	.61	0.3%	10.58	2.3% *					3.06	1.0%
Red Rockfish	4.47	2.2%							2.49	0.8%
Sablefish (black cod)	.69	0.3%	.23	0.0%					.21	0.1%
Sculpin									.03	0.0%
Bullhead Sculpin			.68	0.1%						
Irish Lord			.06	0.0%						
Shark	.00	0.0%							.06	0.0%
Skates	.01	0.0%								
Sole			.22	0.0%					.00	0.0%
Stickleback (needlefish)										
Wolffish										
Blackfish					.79	0.2%	.00	0.0%		
Burbot					.06	0.0%	2.37	0.4%		
Brook Trout	.14	0.1%								
Arctic Char										
Dolly Varden	1.36	0.7%	10.15	2.2%	15.59	4.1% *	18.24	3.1% *	.99	0.3%
Lake Trout					5.77	1.5%				
Grayling	.00	0.0%			.26	0.1%	.28	0.0%		

Appendix Table 1 (pt. 2 of 4). Wild Food Harvests by Community (Lbs per Person and Percentage of Community Total)

Resource	Sitka Southeast Forest		Akutan Aleutian Islands		Aleknagik Bristol Bay		Kotzebue Northwest Arctic		Old Harbor Kodiak Island	
Pike					19.57	5.2% *	5.14	0.9%		
Sheefish							116.93	19.7% *		
Sucker					.29	0.1%				
Cutthroat Trout	.27	0.1%								
Rainbow Trout	.58	0.3%	2.07	0.4%	.93	0.2%			.22	0.1%
Steelhead	.65	0.3%								
Whitefish					1.09	0.3%				
Broad Whitefish							1.13	0.2%		
Cisco					.00	0.0%	1.19	0.2%		
Humpback Whitefish							4.36	0.7%		
Lake Whitefish										
Black Bear	.25	0.1%					.78	0.1%		
Brown Bear			.00	0.0%	1.16	0.3%	.19	0.0%	.94	0.3%
Caribou	.00	0.0%	.00	0.0%	60.46	15.9% *	140.98	23.8% *	.94	0.3%
Deer	44.37	21.6% *	.00	0.0%					45.10	15.0% *
Elk	.00	0.0%							7.08	2.4% *
Goat	.99	0.5%							1.37	0.5%
Moose	5.26	2.6%	.00	0.0%	90.00	23.7% *	34.59	5.8% *	3.40	1.1%
Muskox										
Dall Sheep							.23	0.0%		
Beaver	.02	0.0%			5.58	1.5%	.18	0.0%		
Coyote					.00	0.0%				
Arctic Fox							.00	0.0%		
Red Fox	.00	0.0%			.00	0.0%	.00	0.0%	.00	0.0%
Arctic Hare			.22	0.0%	.66	0.2%	.17	0.0%		
Snowshoe Hare					.62	0.2%	.23	0.0%	.09	0.0%
Land Otter	.00	0.0%			.00	0.0%	.00	0.0%		
Lynx										
Marmot										
Marten	.05	0.0%			.00	0.0%	.00	0.0%		
Mink	.00	0.0%			.00	0.0%	.00	0.0%		
Muskrat							.10	0.0%		
Porcupine	.02	0.0%			4.65	1.2%				
Squirrel	.00	0.0%								
Parka Squirrel (ground)					.19	0.0%	.01	0.0%		
Tree Squirrel										
Weasel							.00	0.0%		
Wolf	.00	0.0%					.00	0.0%		
Wolverine					.00	0.0%	.00	0.0%		
Cattle - Feral			27.54	5.9% *						
Reindeer - Feral			.00	0.0%						
Polar Bear							.00	0.0%		
Fur Seal	.00	0.0%	9.87	2.1%						
Bearded Seal					2.17	0.6%	126.04	21.3% *		
Harbor Seal	6.95	3.4% *	18.44	4.0% *	5.65	1.5%			17.96	6.0% *

Appendix Table 1 (pt. 3 of 4). Wild Food Harvests by Community (Lbs per Person and Percentage of Community Total)

Resource	Sitka Southeast Forest		Akutan Aleutian Islands		Aleknagik Bristol Bay		Kotzebue Northwest Arctic		Old Harbor Kodiak Island	
Ribbon Seal										
Ringed Seal					.43	0.1%	18.54	3.1% *		
Spotted Seal							6.74	1.1% *		
Sea Otter	.31	0.2%							.00	0.0%
Steller Sea Lion	.05	0.0%	75.61	16.2% *	1.55	0.4%			25.16	8.4% *
Walrus					.00	0.0%	2.56	0.4%		
Belukha					5.43	1.4%	3.83	0.6%		
Bowhead							.00	0.0%		
Minke (bottlenose)			1.97	0.4%			.00	0.0%		
Sei Whale			.00	0.0%						
Bufflehead	.01	0.0%	.61	0.1%					.17	0.1%
Canvasback			.03	0.0%	.06	0.0%			.15	0.1%
Eider			3.02	0.6%	.51	0.1%	.01	0.0%		
Gadwall			.06	0.0%					.75	0.2%
Goldeneye	.01	0.0%	1.24	0.3%	.14	0.0%			1.03	0.3%
Harlequin			1.42	0.3%	.11	0.0%			.02	0.0%
Mallard	.20	0.1%	1.41	0.3%	.95	0.3%	.64	0.1%	2.67	0.9%
Merganser			.58	0.1%	.11	0.0%			.04	0.0%
Long-tailed Duck (Oldsquaw)			.46	0.1%	.15	0.0%			.13	0.0%
Northern Pintail	.04	0.0%	.78	0.2%	.59	0.2%	.33	0.1%	.35	0.1%
Scaup			1.12	0.2%					.82	0.3%
Scoter			2.00	0.4%	.09	0.0%			2.39	0.8%
Northern Shoveler					.08	0.0%				
Teal	.03	0.0%	.75	0.2%	.10	0.0%			.14	0.0%
Wigeon	.02	0.0%	.06	0.0%	.03	0.0%			.76	0.3%
Geese										
Brant			.12	0.0%	.01	0.0%	.07	0.0%		
Canada Geese	.12	0.1%	.97	0.2%	.11	0.0%	.34	0.1%	.37	0.1%
Emperor Geese			3.93	0.8%			.06	0.0%	.11	0.0%
Snow Geese							.02	0.0%		
White-fronted Geese	.01	0.0%			.15	0.0%	.12	0.0%		
Swan					.13	0.0%	.05	0.0%		
Crane					.14	0.0%	.11	0.0%		
Common Snipe									.01	0.0%
Auklet			.30	0.1%					.02	0.0%
Cormorants	.02	0.0%	.22	0.0%						
Loons			.32	0.1%						
Murre			.22	0.0%						
Puffins			1.09	0.2%						
Grouse	.08	0.0%			5.61	1.5%	.02	0.0%		
Ptarmigan	.05	0.0%	1.31	0.3%	3.93	1.0%	1.51	0.3%	.14	0.0%
Owl							.01	0.0%		
Bird Eggs										
Duck Eggs			.13	0.0%					.01	0.0%
Geese Eggs										

Appendix Table 1 (pt. 4 of 4). Wild Food Harvests by Community (Lbs per Person and Percentage of Community Total)

Resource	Sitka Southeast Forest		Akutan Aleutian Islands		Aleknagik Bristol Bay		Kotzebue Northwest Arctic		Old Harbor Kodiak Island	
Shorebird Eggs			.04	0.0%					1.01	0.3%
Seabird & Loon Eggs	.01	0.0%	6.19	1.3%	1.05	0.3%	.23	0.0%		
Marine Invertebrates										
Abalone	.52	0.3%								
Chitons (bidarkis, gumboots)	1.07	0.5%	2.40	0.5%					1.35	0.4%
Butter Clams	3.89	1.9%	.19	0.0%	2.21	0.6%			6.70	2.2%
Horse Clams (Gaper)	.00	0.0%								
Pacific Littleneck Clams (Steamers)	.74	0.4%	.36	0.1%					2.00	0.7%
Pinkneck Clams							.12	0.0%		
Razor Clams	.02	0.0%	1.36	0.3%	.46	0.1%	.04	0.0%	1.51	0.5%
Basket Cockles	2.08	1.0%								
Heart Cockles	.19	0.1%								
Cockles			.19	0.0%	.35	0.1%				
Dungeness Crab	4.28	2.1%	.04	0.0%					1.81	0.6%
Hair Crab			.37	0.1%	.11	0.0%				
King Crab	6.25	3.1%	5.66	1.2%			.01	0.0%	1.36	0.5%
Tanner Crab	1.25	0.6%	9.87	2.1%			.01	0.0%	3.28	1.1%
Geoducks	.01	0.0%								
Limpets	.00	0.0%	.02	0.0%					.05	0.0%
Mussels	.06	0.0%	.00	0.0%	.01	0.0%	.00	0.0%		
Octopus	.42	0.2%	7.68	1.6%					.67	0.2%
Scallops	.03	0.0%	.00	0.0%						
Sea Cucumber	.24	0.1%							.00	0.0%
Sea Urchin	.05	0.0%	.03	0.0%					.28	0.1%
Shrimp	6.35	3.1% *	.00	0.0%			.01	0.0%	.19	0.1%
Snails			.00	0.0%						
Starfish	.00	0.0%								
Vegetation	6.99	3.4% *	11.21	2.4% *	27.07	7.1% *	16.23	2.7% *	5.97	2.0%
TOTAL HARVEST	205.01		466.14		379.29		592.84		300.36	
USED	77		76		68		66		63	

** Top ten resource by weight*

Appendix Table 2 (pt. 1 of 4). Wild Food Harvests by Community (Lbs per Person and Percentage of Community Total)

Resource	Fort Yukon Upper Yukon		Tununak Western Alaska		Northway Interior Uplands		Gulkana Copper River		Kaktovik Arctic Coast	
Chum Salmon	380.04	38.2% *			.26	0.1%				
Coho Salmon	.81	0.1%	28.97	2.7% *	3.97	1.4%	.36	0.2%	.00	0.0%
Chinook Salmon	226.92	22.8% *	22.58	2.1%	2.57	0.9%	9.37	6.1% *	.00	0.0%
Pink Salmon			62.26	5.7% *	.00	0.0%	.58	0.4%	.54	0.1%
Sockeye Salmon					7.66	2.8% *	75.80	49.7% *	.00	0.0%
Landlocked Salmon										
Spawnouts										
Herring			438.91	40.2% *						
Herring Roe			5.58	0.5%						
Smelt			32.69	3.0% *						
Bass										
Pacific Cod (gray)			15.92	1.5%			.00	0.0%		
Pacific Tom Cod			14.51	1.3%						
Arctic Cod									1.55	0.2%
Saffron Cod										
Walleye Pollock (whiting)										
Flounder			.44	0.0%					.01	0.0%
Greenling							.06	0.0%		
Greenling Roe										
Halibut			93.49	8.6% *	.31	0.1%	.82	0.5%		
Lamprey	.00	0.0%								
Perch										
Black Rockfish										
Red Rockfish										
Sablefish (black cod)										
Sculpin			.20	0.0%						
Bullhead Sculpin										
Irish Lord										
Shark										
Skates										
Sole										
Stickleback (needlefish)			.50	0.0%						
Wolffish			.89	0.1%						
Blackfish			13.31	1.2%						
Burbot	6.05	0.6%	9.64	0.9%	7.47	2.7% *	2.40	1.6% *	.00	0.0%
Brook Trout										
Arctic Char									80.11	9.0% *
Dolly Varden	.02	0.0%	3.76	0.3%	.03	0.0%	.12	0.1%		
Lake Trout	.00	0.0%			.64	0.2%	.10	0.1%	4.53	0.5%
Grayling	2.21	0.2%			5.46	2.0%	2.18	1.4% *	.82	0.1%

Appendix Table 2 (pt. 2 of 4). Wild Food Harvests by Community (Lbs per Person and Percentage of Community Total)

Resource	Fort Yukon Upper Yukon		Tununak Western Alaska		Northway Interior Uplands		Gulkana Copper River		Kaktovik Arctic Coast	
Pike	27.72	2.8% *	9.20	0.8%	12.17	4.4% *				
Sheefish	28.40	2.9% *	.18	0.0%						
Sucker	.93	0.1%			2.57	0.9%	1.15	0.8%		
Cutthroat Trout										
Rainbow Trout					.40	0.1%	.18	0.1%		
Steelhead							.00	0.0%		
Whitefish			23.93	2.2% *	100.20	36.0% *	2.35	1.5% *		
Broad Whitefish									.00	0.0%
Cisco	29.20	2.9% *							31.35	3.5% *
Humpback Whitefish	24.10	2.4% *								
Lake Whitefish	2.61	0.3%								
Black Bear	6.94	0.7% *			2.06	0.7%	.82	0.5%		
Brown Bear	.00	0.0%							.00	0.0%
Caribou	24.88	2.5% *			12.84	4.6% *	14.92	9.8% *	99.14	11.2% *
Deer	.16	0.0%								
Elk										
Goat										
Moose	167.76	16.9% *	4.62	0.4%	74.65	26.8% *	29.51	19.3% *	10.42	1.2% *
Muskox			13.96	1.3%					16.47	1.9% *
Dall Sheep	.00	0.0%			.40	0.1%			22.69	2.6% *
Beaver	2.63	0.3%	1.42	0.1%	.00	0.0%	1.73	1.1%		
Coyote							.00	0.0%		
Arctic Fox	.00	0.0%	.00	0.0%					.00	0.0%
Red Fox			.00	0.0%	.00	0.0%	.00	0.0%	.00	0.0%
Arctic Hare			.31	0.0%	19.06	6.9%				
Snowshoe Hare	26.74	2.7% *				*	1.82	1.2% *		
Land Otter	.00	0.0%	.02	0.0%	.00	0.0%	.00	0.0%		
Lynx	.23	0.0%			.17	0.1%	.33	0.2%		
Marmot									.55	0.1%
Marten	.00	0.0%			.00	0.0%	.00	0.0%		
Mink	.00	0.0%	.18	0.0%	.00	0.0%	.00	0.0%		
Muskrat	1.42	0.1%	.00	0.0%	8.89	3.2% *	3.55	2.3% *		
Porcupine	1.53	0.2%			.17	0.1%	.45	0.3%		
Squirrel										
Parka Squirrel (ground)	.68	0.1%							.28	0.0%
Tree Squirrel	.01	0.0%			.00	0.0%				
Weasel	.00	0.0%	.00	0.0%	.00	0.0%	.00	0.0%	.00	0.0%
Wolf	.00	0.0%					.00	0.0%	.00	0.0%
Wolverine	.00	0.0%					.00	0.0%	.00	0.0%
Cattle - Feral										
Reindeer - Feral										
Polar Bear										
Fur Seal									6.89	0.8% *
Bearded Seal			77.04	7.1% *					22.00	2.5% *
Harbor Seal										

Appendix Table 2 (pt. 3 of 4). Wild Food Harvests by Community (Lbs per Person and Percentage of Community Total)

Resource	Fort Yukon Upper Yukon		Tununak Western Alaska		Northway Interior Uplands		Gulkana Copper River		Kaktovik Arctic Coast	
Ribbon Seal			9.11	0.8%						
Ringed Seal			65.74	6.0% *					8.75	1.0% *
Spotted Seal			33.14	3.0% *					.88	0.1%
Sea Otter										
Steller Sea Lion			.00	0.0%						
Walrus			16.57	1.5%					.27	0.0%
Belukha			18.64	1.7%					.00	0.0%
Bowhead									560.35	63.3% *
Minke (bottlenose)										
Sei Whale										
Bufflehead	.00	0.0%			.05	0.0%				
Canvasback	.34	0.0%								
Eider			9.59	0.9%					1.97	0.2%
Gadwall										
Goldeneye	.01	0.0%								
Harlequin										
Mallard	2.63	0.3%			5.54	2.0% *	.54	0.4%		
Merganser										
Long-tailed Duck (Oldsquaw)									.82	0.1%
Northern Pintail	1.69	0.2%			.15	0.1%	.00	0.0%	.07	0.0%
Scaup	.00	0.0%								
Scoter	3.52	0.4%								
Northern Shoveler					.07	0.0%				
Teal	.08	0.0%			.04	0.0%	.00	0.0%		
Wigeon	.64	0.1%			.04	0.0%				
Geese			8.36	0.8%						
Brant									5.87	0.7%
Canada Geese	6.50	0.7%			.79	0.3%	.39	0.3%	3.81	0.4%
Emperor Geese										
Snow Geese	3.90	0.4%							.22	0.0%
White-fronted Geese	6.43	0.6%							1.16	0.1%
Swan	.28	0.0%	2.07	0.2%					.07	0.0%
Crane	.36	0.0%	1.12	0.1%	.04	0.0%				
Common Snipe										
Auklet										
Cormorants										
Loons										
Murre										
Puffins			4.04	0.4%						
Grouse	2.19	0.2%			2.32	0.8%	.25	0.2%		
Ptarmigan	1.32	0.1%	5.88	0.5%	.64	0.2%	.19	0.1%	2.79	0.3%
Owl										
Bird Eggs			.85	0.1%						
Duck Eggs										
Geese Eggs									.00	0.0%

Appendix Table 2 (pt. 4 of 4). Wild Food Harvests by Community (Lbs per Person and Percentage of Community Total)

Resource	Fort Yukon Upper Yukon	Tununak Western Alaska	Northway Interior Uplands	Gulkana Copper River	Kaktovik Arctic Coast
Shorebird Eggs					
Seabird & Loon Eggs					.00 0.0%
Marine Invertebrates		5.03 0.5%			
Abalone					
Chitons (bidarkis, gumboots)					
Butter Clams					
Horse Clams (Gaper)					
Pacific Littleneck Clams (Steamers)					
Pinkneck Clams					
Razor Clams					
Basket Cockles					
Heart Cockles					
Cockles					
Dungeness Crab					
Hair Crab					
King Crab					
Tanner Crab					
Geoducks					
Limpets					
Mussels					
Octopus					
Scallops					
Sea Cucumber					
Sea Urchin					
Shrimp					
Snails					
Starfish					
Vegetation	3.44 0.3%	37.94 3.5% *	6.44 2.3% *	2.62 1.7% *	1.18 0.1%
TOTAL HARVEST	998.83	1,092.58	278.06	151.56	885.6
RESOURCES USED	51	45	40	38	43

** Top ten resource by weight*