

**THE USE OF DOG TEAMS AND THE USE OF
SUBSISTENCE-CAUGHT FISH FOR FEEDING SLED DOGS
IN THE YUKON RIVER DRAINAGE, ALASKA**

by

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ABSTRACT

The propriety of feeding subsistence-caught fish to sled dogs used for certain activities emerged as an issue from a March 1991 meeting of the Alaska Board of Fisheries, resulting in Proposal No. 396. To address this issue the Alaska Department of Fish and Game, Division of Subsistence, conducted interviews with dog mushers in the Yukon River drainage communities of Fort Yukon, Huslia, Kaltag, Manley Hot Springs, Russian Mission, St. Mary's, and Tanana during the summer of 1991.

In interior Alaska, the history of dog team use and of feeding fish to dogs can be traced to the contact period 150 years ago and before. Ethnographic and historic accounts from the 100-year period 1850 to 1950 show that dogs were traditionally used to support a variety of activities including trapping, exploration, commercial freighting, individual and family transportation, racing, and even military applications. Throughout this period, fish, specifically dried salmon, was the standard diet for working dogs and became a commodity of trade and currency along the Yukon River and elsewhere.

Since their introduction in the 1960s and 1970s, snowmachines have become the dominant mode of winter transportation for most rural Alaska residents, but have not eliminated the use of dog teams. Dog teams are maintained in most Yukon River drainage communities today to support activities such as general transportation, trapping, wood hauling, and racing. In recent years, estimates of the dog population in 32 rural Yukon drainage communities have averaged about 5,000 dogs.

Among the seven study communities, 68 surveyed mushers owned 1,078 dogs. Kennels ranged in size from 4 to 80 dogs and all surveyed mushers (100 percent) reported using fish to some extent to feed their dogs. In general, larger kennels tended to rely less on fish to feed their dogs than smaller kennels. Regional differences were noted in the size of teams, how dogs were used, and the kinds of fish fed to dogs. Kennel size in lower Yukon River study communities averaged 11 dogs compared to the upper Yukon average of 17 dogs. More than half (51.9 percent) of surveyed mushers along the upper Yukon reported using dog teams for trapping, compared with 14.3 percent of lower Yukon River mushers. Salmon was the most commonly used fish species fed to dogs in upper Yukon River

communities, while non-salmon species comprised most of the fish fed to dogs in lower Yukon River communities.

The overall harvest of salmon in the Yukon River drainage that is fed to dogs is viewed as a subset of the drainage-wide subsistence harvest of small salmon. The average subsistence harvest of small salmon in the Yukon River from 1984 to 1988 is estimated to be 453,100 salmon. This study and previous subsistence studies indicate that perhaps 62 percent of this harvest is fed to dogs, resulting in an average annual harvest of about 281,000 subsistence-caught salmon used to feed dogs in the Yukon River drainage in recent years. In some middle Yukon River communities, commercially-caught salmon comprise the bulk of the fish fed to dogs.

Information from researchers in other regions of Alaska suggests that the patterns of sled dog use observed during this study of the Yukon River drainage are similar to other rural areas of the state, where small numbers of dog teams continue to be maintained in most communities and wild resources are commonly used as dog food. In contrast, among urban Fairbanks area dog racers surveyed, only a small number of mushers reported using significant quantities of fish.

Issues raised by Proposal 396 are vitally important to many rural Alaska residents where raising and training sled dogs have long been a source of individual and community pride. Sled dogs remain part of a whole sphere of activities that is actively encouraged as an alternative to idleness, unemployment, and substance abuse. The ability to feed dogs using local resources appears to be a key factor in the viability of dog mushing in rural Alaska.

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INTRODUCTION

The Issue and Board of Fisheries Proposal No. 396

In late 1990, a petition was submitted to the Alaska Board of Fisheries that would have prohibited the use of subsistence-caught salmon from the Yukon River drainage for feeding dogs in "commercial kennels" used for breeding or racing and other commercial purposes. This petition was considered by the Board in March 1991 and resulted in a Board-generated proposal (Proposal 396) that expanded the scope of the petition to apply statewide and broadened it to prohibit the use of all subsistence-caught fish to feed dogs used for commercial purposes, including commercial dog kennels, dog racing, and trapping for fur sales (Appendix 1).

Subsistence studies conducted by the Division of Subsistence over the last decade have shown that dog teams continue to play an important role in the mixed subsistence-cash economies of many rural communities. In several instances, the division has collected information on quantities of subsistence resources used as dog food, but the actual use and feeding of dog teams have never been the focus of a division study. Studies have shown, for example, that in 1987, Fort Yukon residents fed an estimated 229,194 pounds of subsistence resources to dogs, a quantity that represents about 37 percent of the total annual subsistence harvest for that community (Sumida and Andersen 1990). A 1985 study in Stevens Village found that residents utilized an estimated 50,436 pounds, or about 55 percent of the total community harvest to feed dogs (Sumida 1988). From studies such as these, it has been shown that fish comprises the bulk of the resources used for dog food and that dogs are commonly used to support activities such as hauling wood, transportation, resource harvesting, and cash-generating activities such as racing and trapping. These data underscore the continued importance of dogs in the mixed economies of many communities today.

Given the potential impacts of Proposal 396 to a large number of subsistence users and residents throughout Alaska, a research project was designed to collect information on the past and present uses of

dog teams and the role that fish plays in feeding them. The study was carried out from May through September 1991 and the results of this effort are presented below.

Purpose and Objectives

This study was undertaken in order to describe how dog teams are fed and used in the Yukon River drainage today and in the past. The information is useful in examining the customary and traditional aspects of dog mushing and feeding fish to dogs, and the role dogs play in the mixed economies of rural communities today. The specific objective of this research was to collect information to examine the following general hypotheses: 1) within the Yukon River drainage there are different kinds of dog teams that are used for different purposes; 2) dog mushing has played an historical role that has largely disappeared in some communities, but has continued almost uninterrupted in others; and 3) the use of subsistence-caught fish to feed sled dogs is more common in some locations and for some kinds of dog teams than for others.

Methodology

Regional Focus and Study Communities

The Yukon River drainage was selected as the regional focus of this study (Fig. 1). It was the feeding of salmon from the Yukon River to sled dogs that sparked the original petition to the Board of Fisheries. Additionally, the Yukon River drainage is well known for its historic and contemporary use of dog teams. Within this study area, the communities of Fort Yukon, Huslia, Kaltag, Manley Hot Springs, Russian Mission, St. Mary's, and Tanana were selected as study communities. Time and funding constraints necessitated this representative sampling approach. These communities were selected on the basis of known concentrations of dog teams and because, together, they represent the diversity of the Yukon River drainage in terms of geography, Native cultures, and fishery resources.

Prior to traveling to communities, lists of known dog owners were compiled from post-season subsistence salmon survey data collected annually by the Alaska Department of Fish and Game

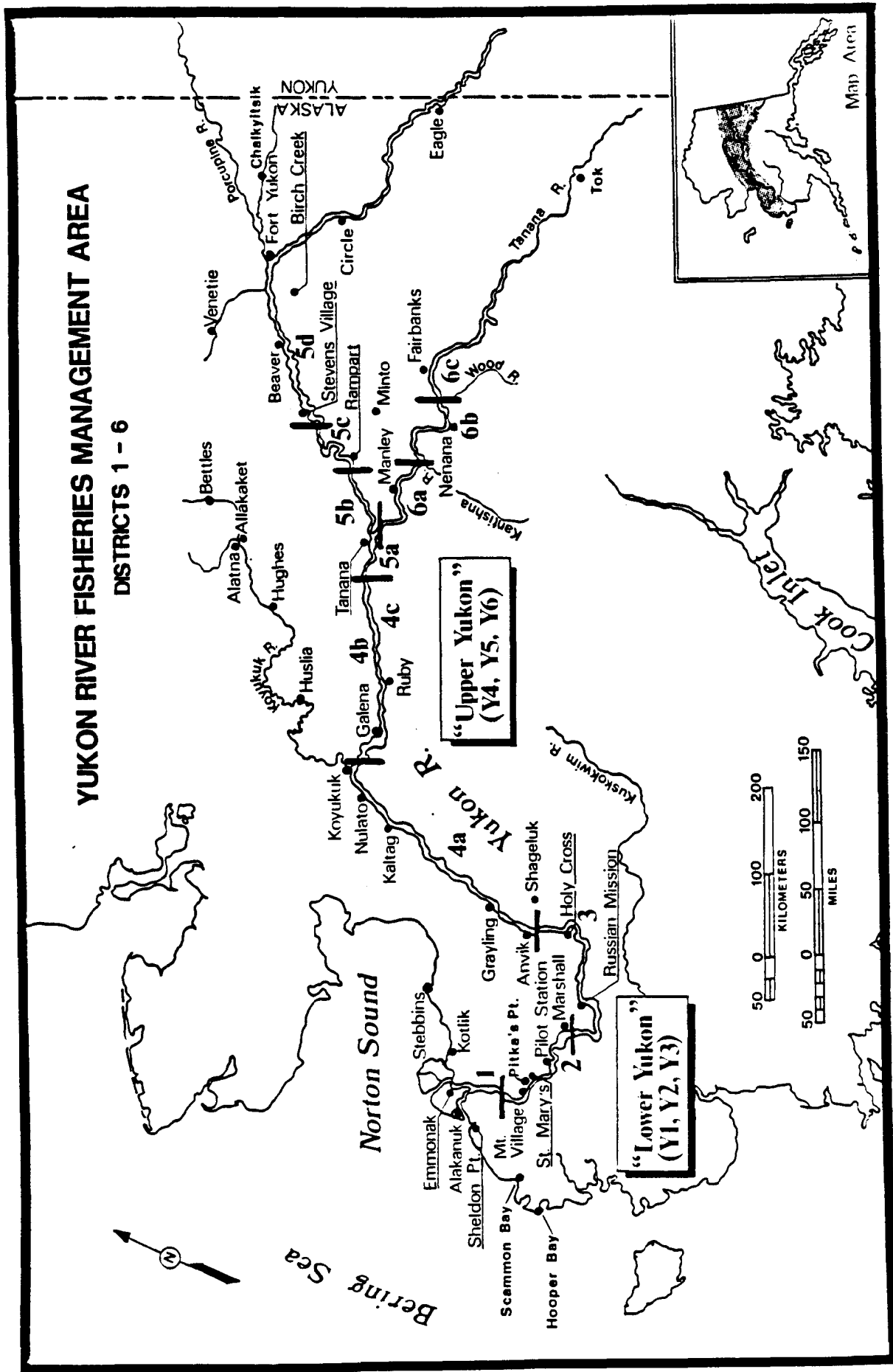


Fig. 1. Communities and commercial fishing districts in the Yukon River drainage.

(ADF&G). As an initial step, the lists were revised and updated by key respondents in each community to include all current dog team owners. During field visits to each study community, researchers attempted to contact all active mushers and dog team owners. In addition to mushers who harness dogs for various activities, individuals who owned more than four dogs for other purposes such as "bear dogs," "scrap dogs," or watch dogs were also identified and interviewed. Interviews with all dog owners were structured using a 21-question survey instrument (Appendix 2). Rates of contact ranged from 59.1 percent of the mushers surveyed in Fort Yukon to 88.9 percent of the mushers surveyed in Manley Hot Springs. Overall, the survey sample represented 71.6 percent of the 95 mushers residing in survey communities.

Sampling Urban Mushers

Use of dog teams is not confined to rural Alaska. Using unofficial estimates offered by feed company operators and members of local dog mushing associations, the number of sled dogs in the Fairbanks North Star Borough probably exceeds the dog population of the rest of the Yukon River drainage communities combined. While some urban area mushers are reputed to use fish to feed sled dogs, the overall number of mushers using significant quantities of fish to feed dogs is thought to be small. This supposition was examined using a telephone survey of a sample of Fairbanks area dog mushers involved in racing (Appendix 2). Additional interviews were conducted with knowledgeable individuals involved in the dog feed business, fish processing, and local mushing associations for their assessment of the extent to which urban mushers may utilize wild fish to feed sled dogs.

Gathering Historical Information

Historical information on dog mushing was obtained through a review of the literature and from key-respondent interviews. In each study community, residents were identified who were witness to the mail-trail, trapping, and pre-snowmachine eras of mushing in the 1920s through the 1950s. Historical

interviews with these key respondents were less structured than those with current mushers, but were guided by a list of topics outlined in the Historical Data Interview Guide (Appendix 2).

Statewide Issues Prompted by Proposal 396

While this research effort focused on the feeding and use of dog teams in the Yukon River drainage, the restrictions imposed by Proposal 396 would apply statewide. To address the statewide aspect of this issue, division staff with expertise in other geographic areas of the state were asked to contribute data from existing sources or professional knowledge that describe the use of sled dogs and what they are fed in areas outside the Yukon River drainage. These data are presented in brief regional summaries of dog team use.

A separate, but related, statewide issue brought forth by this proposal is the identification of trapping as a "commercial activity." This issue will be addressed in a separate report to the Board of Fisheries discussing the customary and traditional aspects of trapping and the role trapping has had and continues to play in the mixed subsistence-cash economies of rural Alaska (Wolfe 1991).

AN OVERVIEW OF DOG USE IN ALASKA

The Pre-Contact Use of Dogs (Prior to 1840)

The relationship between Alaska Natives and dog traction in the pre- and proto-historic period is not well documented. Archaeological evidence dating back thousands of years shows that coastal Eskimo groups throughout the north utilized sleds and kept dogs. Evidence to suggest dogs were harnessed for pulling sleds dates back perhaps 500 to 1,500 years (McGhee 1978; Alaska Geographic Society 1987). Among the interior Alaskan Athabaskan groups, dog traction is an even more recent development and can be traced to the historic or early contact period of the mid-19th century. Scholars generally agree that dogs were traditionally used by interior Athabaskans for hunting moose and caribou and as pack animals, but were not used to pull sleds or toboggans prior to the contact era (Osgood 1970, 1971; Slobodin 1981;

Hosley 1981; Townsend 1981). Dogs used by Indians in the pre-contact era were also known to be smaller than the large imported sled dogs that were adopted in the latter half of the 19th century in Alaska (Osgood 1970).

The Period 1840 to 1895

This time period encompasses the late Russian and early American periods in Alaska's history and is characterized by a period of significant culture change within the Yukon River drainage. Mikhailovskiy Redoubt, known later as St. Michael, was established in 1833 and set the stage for Russian penetration of the Yukon River region. In 1842, the first significant explorations of the lower Yukon, Kuskokwim, and Koyukuk River drainages were made by Lt. Lavrentii Zagoskin. Ethnographic information recorded by Zagoskin during his travels in 1842-43 include observations of Natives utilizing dogs for hunting and for sled traction on a well-established network of winter trails, and the use of dried fish as dog food (Zagoskin 1967). Zagoskin attributed Native use of the "tandem hitch" method of harnessing as a (then) recent development resulting from Russian influence (Zagoskin 1967:127). Previously, dog traces were hitched separately to the sled. Zagoskin's own party utilized 38 dogs, pulling six sleds, and nearly 1,000 pounds of locally acquired dried fish ("yukola" described as trout or salmon) for dog food. During their travels, additional fish for dog food were obtained at the Yukon River community of Nulato. Thus, the first glimpse into the early contact period of the Yukon River shows a well-developed technology surrounding the use of dogs and the feeding of fish to dogs in western interior Alaska.

In the late 1840s European explorers, traders, and missionaries had also succeeded in penetrating the upper Yukon River drainage from the east. The Canadian-based Hudson's Bay Company established a trading post at the site of Fort Yukon in 1847 to take advantage of the rich fur resources in this region. Interior Athabaskan groups quickly became involved in the developing fur trade, placing a greater emphasis on fur trapping in their seasonal round and adopting dog traction technology and a larger breed of dog from neighboring Eskimos in order to increase their trapping efficiency (Osgood 1971). The pace of exploration and accompanying cultural change and the development of the fur trade quickened

following the purchase of governing rights to Alaska by the United States in 1867. In addition to the increased involvement in winter trapping, another important change in the traditional seasonal round was a new emphasis on summer fishing activities to feed the growing number of sled dogs (Wolfe 1979).

By the 1870s dogs on the upper Yukon River drainage were reported to have a cash value of \$25 to \$40 each (Osgood 1971). Lieutenant Frederick Schwatka, descending the Yukon River in 1883, noted large populations of "Indian dogs" at villages he passed. At that time, "Nuklakayet," near the present-day site of Tanana, was the apparent dividing line between dogs and sleds of the "Eskimo variety" below and the "Indian variety" above (Schwatka 1900). At the site of the Nuklakayet post itself, there were more than 50 dogs and traders were paying one cent each for dried salmon. Differences in the types and uses of dogs between regions were also observed by early explorers. In 1885, a party exploring the Copper and Tanana rivers noted along the Copper River, that each Native family had two or three small dogs that were used as pack animals. Among the Tanana Indians of the interior, the number of dogs per family was about the same, but the dogs were of larger build and generally harnessed to pull sleds (Allen 1900). A Chandalar Gwich'in Athabaskan elder recalled using a toboggan sled drawn by just two dogs in the 1890s, perhaps typifying upper Yukon River Indian utilization of dogs in the last decade of the 19th century (Herbert 1982).

The Period 1896 to 1940

With the discovery of gold in the Circle, Fortymile, and Klondike districts in the 1890s the influx of non-Natives into the Yukon River drainage increased dramatically and had effects throughout the interior in terms of the use of dogs for traction. New settlements were established and traditional settlements and trading sites given renewed importance. An expanded network of winter trails was established for hauling passengers and supplies by dog sled. During winter 1897-98 dogs were selling for \$250 to \$400 each at Dawson and dried salmon to feed them commanded \$1 a pound (Wells 1900). A U.S. Army lieutenant, traveling the upper Yukon River in winter 1898-99 acquired seven dogs for his use at Rampart and upon arrival at Dawson found his dogs to be "among the few interior or native dogs on the upper river and the envy of all travelers" (Castner 1900:697). The following year, another Army

expedition led by Lt. J. S. Herron seeking an overland route between Cook Inlet and the Yukon River acquired three sleds and nine dogs for his use from Natives at Telida (Herron 1909). Upon reaching the Yukon River, Herron commented on the extensive network of trails along the main river and offered observations of dog teams illustrating the specialization of dogs and teams (Herron 1909). Mail teams were observed to consist of five or six fast dogs, capable of pulling loads of 75 pounds each at six to nine miles per hour on a good trail. Freight teams consisted of 7 to 11 large dogs capable of hauling loads of 200 pounds per dog at two or three miles per hour. Miners and Indians were observed to have smaller teams of two to five dogs (Herron 1909).

By 1900, the gold rush stampede had reached its peak. The Yukon River had become a major highway for immigrants into Alaska and the Klondike district with more than 100 steamships operating along its length (Cantwell 1904). For winter travel, dogs had become established as the most practical method of transportation. At the height of the Nome gold rush in 1900, strong, durable dogs sold for \$1,000 or more and a canine black market developed with dogs purchased or stolen from west coast communities in the continental U.S. and sold to Alaska miners at inflated prices (Alaska Geographic Society 1987). As the stampede continued into the early decades of the 20th century, towns, mining districts, and the network of sled trails connecting them continued to expand. Major overland trails between the coast and interior, such as the Valdez-to-Fairbanks trail and the Iditarod trail from Seward to Nome were established. Among interior Athabaskans, wage labor joined trapping as another means for obtaining cash. Many Athabaskans were attracted to mining settlements by job opportunities where they worked as woodcutters, guides, freighters, and market hunters (VanStone 1974). Along with changes in the seasonal round noted above, Native material culture continued to change, such as the abandonment of traditional dwellings for log cabins and canvas tents, and the adoption of the fishwheel, which was introduced around 1910 (Clark 1981). The efficiency of the fishwheel, coupled with an extraordinarily high demand for fish as dog food by immigrants, placed new emphasis on salmon fishing in the seasonal round and as a source of income for many Athabaskans. Bales of dried salmon entered the economy as a standard of trade, as longer, more intense periods of summer salmon fishing were required to supply the growing demand for dog food (Wolfe 1979; Hosley 1981; McKennan 1981).

The first four decades of the 20th century might be described as the heyday of dog mushing in Alaska. For individuals and families in rural Alaska, sled dogs were essential to the seasonal round of activities that provided food and cash income. Except for the elderly, each middle Yukon River family commonly kept a team of 7 to 11 sled dogs used for trapping, hunting, general transportation between points, and for hauling wood, water, and supplies (Sullivan 1942). In addition to the small dog teams maintained by individuals and families, numerous commercial freighting operations using dog traction developed for hauling mail, passengers, and supplies between major supply centers and outlying areas. By 1918, the Yukon River dog population was estimated at more than 6,000 dogs and an estimated 1 million salmon were being harvested from the Yukon River drainage each year for use as dog food (U.S. Bureau of Fisheries 1920). Dried salmon remained a standard of trade and barter at posts and stores with a cash value of about ten cents per pound. Individual mushers with commercial mail or freight contracts maintained dog lots of up to 60 dogs, utilizing as many as 20,000 salmon a year to feed them (U.S. Bureau of Fisheries 1920).

In the 1920s and 1930s roadhouses or government supplied "stop cabins" were established along most major trails at 20- to 40-mile intervals, a distance approximating one day's travel. Contract mushers often used the same cabins but maintained their own caches of food, dried fish, and supplies at critical points along their routes (J. Wells, pers. comm., 1991). Contract mushers were usually paid by the trip and were required to adhere to fairly strict schedules in order to meet with connecting mushers at established points. Mail service between Fairbanks and Fort Yukon, for example, took six days with one carrier making the Fairbanks to Circle leg in three days by dog team or horse and another carrier making the three-day trip from Circle to Fort Yukon by dog team (J. Wells, pers. comm., 1991). Contract carriers were based in most established communities such as Eagle, Nenana, Tanana, Ruby, Nulato, Kaltag, and Unalakleet. Freight teams generally consisted of 10 to 20 large dogs pulling 12- to 15-foot sleds and loads of 700 to 1,000 pounds. One respondent recalled seeing a freight team on the trail from Nenana to Lake Minchumina consisting of 35 dogs hitched to a tow-line of steel cable and pulling two large sleds, one behind the other (T. Luke, pers. comm., 1991).

Dried fish, generally salmon, cooked with tallow and rice or corn meal was the standard diet for working dogs. Some contract mushers fished during the summer months and stored salmon themselves for use as dog food. Others found summer wage employment that enabled them to purchase dried fish for their dog teams. In some upriver communities, such as Fairbanks, Nenana, and Fort Yukon which had become regional freighting or trapping centers, the demand for dried salmon frequently exceeded the capacity of local fishermen and bales of dried fish were shipped in from premier fishing locations along the Yukon, such as Kaltag and Tanana, and warehoused for winter use (J. John and J. Wells, pers. comm., 1991).

In addition to mail teams, freight teams, and trapping teams, dog racing began to develop as an organized sport in the early decades of the 20th century. In 1908, the "All Alaska Sweepstakes" was organized in Nome and became the first officially judged mushing event (Alaska Geographic Society 1987). This was followed by the establishment of kennel clubs and organized dog racing events in other locations such as Ruby, Iditarod, and Anchorage between 1913 and 1918. These races were generally 50 to several hundred miles in length and offered cash prizes ranging from several hundred to several thousand dollars (Alaska Geographic Society 1987). Fairbanks had developed an organized dog racing program by 1927 and quickly became a major center for dog racing activity in Alaska. In the 1930s, the concept of short, sprint races was popularized, emphasizing the use of small, fast dogs. This development led to major changes in dog care, focusing the attention of competitive mushers on improved breeding, feeding, and training of dogs used strictly for racing (Alaska Geographic Society 1987).

In the 1930s airplanes began replacing dog teams as the primary method of carrying freight and mail. The transition from dog teams to airplanes for these purposes took a decade or more in many locations. While some contract mushers operating near aviation centers, such as Fairbanks, were replaced relatively quickly, air service to many outlying areas remained sporadic, hampered by adverse weather conditions and a lack of developed landing fields. The gradual nature of this transition apparently prevented any rapid decline in the Yukon River dog population. As freight teams were slowly replaced by aircraft, freight dogs were simply retired or found use on traplines or other freight teams (J.

Wells, pers. comm., 1991). Dogs continued to carry the mail as late as 1940 on some routes such as Circle to Fort Yukon and Nulato to Unalakleet (J. Wells and G. Semaken, pers. comm. 1991). The last U.S. Postal Service mail carrier to use dogs was Chester Noongwook of Savoonga who retired his dog team with the advent of scheduled air service to St. Lawrence Island in 1963 (Alaska Geographic Society 1987).

The Period 1941 to 1960

While commercial freighting and mail delivery using dogs declined with the development of commercial aviation in the 1930s, dog teams continued to be utilized throughout Alaska as an affordable means of individual and family transportation through the 1940s and 1950s for local travel, hauling wood and water, hunting, and trapping. Families in the Huslia and Tanana areas, for example, generally kept from 5 to 15 dogs comprising one or more teams of three to eight dogs depending on family size and use (S. Attla, J. John, T. Luke, pers. comm. 1991). Throughout much of interior Alaska, and wherever salmon were abundant, dried fish remained the standard dog food, usually cooked with rice or corn meal. Families commonly fished in summer and fall, putting up dried salmon for their own use and extra bales of fish for trade or credit at the community store. Bales of dried salmon remained a standard trade item at community stores and trading posts into the 1960s.

With the increasing presence of the military in Alaska during the 1940s and 1950s dogs were also put to military uses. Up to 200 sled dogs were maintained by the U. S. Army 10th Air Rescue Squadron at Ladd Field in Fairbanks between 1943 and the early 1950s (Alaska Geographic Society 1987). These dogs were trained in 10-dog teams and were on alert 24-hours a day for rescue work in remote locations. According to one Army musher/caretaker, the government spared no expense in feeding these dogs, purchasing red meat, dry and canned commercial dog food, corn meal mush, and rice, "by the truckload" and locally dried salmon "by the ton" for use as dog food (T. Carroll, pers. comm., 1991).

The Period 1961 to Present

In the early 1960s, "mechanical toboggans" or "snow-travelers," now called snowmachines, began to be used in rural Alaska. While large motorized snow vehicles, such as the Nodwell, had been used much earlier for commercial applications, they were too expensive to be considered by individual hunters or trappers as an alternative to dog teams. Snowmachines, however, provided a small, track-propelled vehicle for use on snow capable of basically the same work as a dog team. The utility of this new technology was quickly realized and put to the test by enterprising villagers across Alaska.

The appearance of the first snowmachine was earlier in some communities than in others. Among 27 arctic and interior Alaska communities surveyed in one study, none reported the presence of a snowmachine prior to 1960 (Francis 1969). The first snowmachine in Kotzebue was purchased in 1960 and a dealership was established there the following year (Hall 1971). In the community of Noatak, north of Kotzebue, the first snowmachine was purchased in 1965 and just two years later, 19 Noatak residents had snowmachines (Hall 1971). In Alaska's interior, snowmachines were acquired by village residents somewhat later than in coastal communities. In Chalkyitsik, for example, in the upper Yukon River drainage, the first snowmachine was purchased in 1967 and by 1970 about one-half of the active hunters in that community were using them (Nelson 1973). In the regional center of Fort Yukon, the first snowmachine was purchased for \$860 in 1968 (C. Alexander, pers. comm., 1991).

In rural Alaskan communities, individuals with access to wage employment were generally the first to purchase a snowmachine which cost from \$700 to \$1,200 in the early 1960s (Francis 1969). In Kaltag, for example, the first snowmachine was purchased by one of the few year-round employees of the school district (G. Semaken, pers. comm., 1991). For these individuals, the speed and convenience of a snowmachine allowed them to work a wage-earning job and engage in more efficient hunting and fishing activities during time off to provide their families with preferred wild foods. These individuals quickly abandoned the use of dog teams, freeing themselves from the difficult task of maintaining a dog team while holding down a steady job. Hunters and trappers experimenting with using snowmachines were less likely to abandon the use of dog teams altogether despite the significant economic hardships of maintaining both. In Noatak, of 16 people who were among the first to own snowmachines, only five

reported that they had immediately given up use of their dog team upon purchase of a snowmachine and 11 reported that they had retained dogs as secondary transport or as transportation for other family members (Hall 1971). In some other areas of Alaska, the transition from the use of dog teams to snowmachines was apparently more complete. In Huslia, for example, by 1967 the use of dogs for subsistence activities had declined to just one team with similar declines in dog teams noted for Hughes, Alatna, and Bettles (Nelson, Mautner, and Bane 1982).

A survey of 27 communities in arctic and interior Alaska counted 187 snowmachines and 726 active dog teams in 1963, or 913 dog teams and snowmachines combined (Francis 1969). By 1968, the same villages reported having 974 snowmachines and 420 dog teams, totalling almost 1,400 dog teams and snowmachines combined. While these data show a five-fold increase in the number of snowmachines over a five-year period, they also show that nearly a decade after the introduction of snowmachines, more than one-half of the dog teams had been retained. Thus, the initial result of the introduction of the snowmachine was simply a more mobile village population through the combined use of dog teams and snowmachines.

These numbers indicate that the incorporation of snowmachine technology was a decade-long process that varied in timing and completeness from region to region and from community to community. In some areas of coastal Alaska, wage employment activities connected with commercial fishing, the treeless terrain, and snow conditions ideally suited for snowmachine use combined to result in an early and rapid conversion from dog team to snowmachine use. In other areas, such as the heavily wooded upper Yukon River region, the process was not one of snowmachines completely replacing dog teams, but a shift to a transportation system that retained the use of dog teams by some individuals for some purposes, and the use of snowmachines for others. In the upper Yukon region, wage employment opportunities were few, income levels lower, and century-old trapline trails built to accommodate narrow toboggan sleds and a string of dogs had to be laboriously widened to accommodate snowmachines, a process that still continues today in some areas (C. Alexander, pers. comm., 1990).

While dog teams continued to be used in many communities, the snowmachine emerged in the 1970s as the dominant method of winter transportation in rural Alaska and the number of working dogs

along the Yukon River declined to historic lows. During the mid to late 1970s, an era of renewed interest in dog mushing began, largely sparked by highly publicized events such as the Iditarod Trail Race from Anchorage to Nome. The development of large-prize, long-distance races such as the Iditarod and the Yukon Quest, combined with a slate of middle-distance and sprint racing events, made sled dog racing attractive to a wider variety and increasing number of mushers and dog numbers began to rise. The rise in dogs cannot be solely attributed to racing. During the 1970s, some rural residents began to more fully realize the limitations and financial obligations associated with snowmachine ownership. On small incomes, it was sometimes difficult to purchase and maintain a working snowmachine for travel, trapping, hunting, fishing , and hauling goods. Some residents returned wholly, or in part, to the use of dog teams to support activities such as these. By the 1980s and 1990s dogs continued to be used in many Yukon River drainage communities for general transportation, hauling wood, racing, and trapping, out of preference for some and out of necessity for others.

CONTEMPORARY USE AND FEEDING OF SLED DOGS

The Yukon River Drainage Sled Dog Population

Sled Dog Breeds

Sled dogs in rural communities of the Yukon River drainage, do not fit neatly into one recognized breed, but are generally described as a "husky-mix" weighing from 30 to 70 pounds. When the 68 surveyed mushers in the seven study communities were asked what kind of dogs they had, some responded by describing their primary use, such as "trapline dogs," "racing dogs," "sprint dogs," or "work dogs." Others described their dogs simply as "huskies" or "husky mix," "malemute mix," "hound-husky mix," "river huskies," "river dogs," or "racing huskies." Some respondents included size in their description of their dogs such as "large race dogs" or "small trapline dogs." A few mushers referred to specific bloodlines or kennels from which their dogs descended, for example by responding, "I have Attla dogs" or "these are Erhart dogs."

This report makes a distinction between "sled dogs" used in harness, usually as part of a team for pulling a sled, and "scrap dogs," pets, or "house dogs" that were not harnessed and not considered "working dogs." Specific uses of dogs are described in more detail in following sections of this report. While sled dogs often served as "scrap dogs" during the summer months, they were generally referred to by their owners as "sled dogs" designating their primary use. Although the terms "sled dogs" and "work dogs" were sometimes used interchangeably, this report uses the term "sled dog" to describe all working dogs.

One finding of this study was that the categories "commercial dogs," "recreational dogs," and "subsistence dogs" were not part of the typical vocabulary of rural mushers. Descriptions of dog mushing in rural areas did not usually include these categories. Consequently, dividing up dog teams for regulatory purposes into "commercial-recreational-subsistence" categories does not make sense to most

rural mushers nor does it conform with their social realities. Among urban mushers, however, the term "recreational team" or "recreational musher" were frequently used to describe dog teams and mushers.

While all the sled dogs owned by surveyed mushers appeared to be of the same general "husky" type and build, there were certain observable differences between individual dogs and between certain kennels used for different purposes. Trappers and middle-distance racers using dogs to pull loaded sleds through deep snow tended to prefer larger, stocky dogs weighing 45 pounds or more and having longer fur. Dogs used primarily for sprint-racing were commonly sleek, longer-legged dogs in the 30- to 40-pound range and often had shorter fur due to "hound" strains that have been introduced to increase speed. Between these two extremes, there were seemingly endless, sometimes subtle variations in size, color, fur length, and build.

Numbers of Sled Dogs

The 68 mushers contacted in seven study communities owned a total of 1,078 adult dogs. Although the 68 mushers surveyed did not represent the entire population of mushers and sled dogs in these communities, an attempt was made, through key respondents, to determine the total number of mushers and sled dogs in each of the study communities. In the seven study communities there were an estimated 95 mushers and 1,363 adult sled dogs (Table 1).

Table 2 presents estimates of the dog population by community and by fishing district in the Yukon River drainage for the years 1977 to 1989. These data are derived from the annual post-season subsistence salmon harvest surveys conducted by ADF&G (Walker and Brown 1988; Walker, Andrews, Andersen, and Shishido 1989; Bergstrom, Merkouris, Schultz, Holder, Sandone, Schneiderhan, Barton, and Mesiar 1991). These data reflect the total number of dogs reported by surveyed fishing households in each community and have not been extrapolated to include unsurveyed households. In most years an attempt was made to contact all fishing households. This effort usually resulted in a high percentage of fishing households being contacted in each community. Because households with dog teams also tend to be fishing households, a majority of the dogs are thought to have been censused using this method. In

TABLE 1. NUMBER OF MUSHERS SURVEYED AND NUMBER OF SLED DOGS OWNED
BY SURVEYED MUSHERS IN SEVEN YUKON RIVER DRAINAGE COMMUNITIES,
1990-91.

Community	Number of mushers surveyed	Dogs owned by surveyed mushers	Estimated total number mushers (dogs)	Percentage of mushers surveyed
Fort Yukon	13	140	22(245)	59.1%
Huslia	9	141	11(153)	81.8
Kaltag	7	84	11(113)	63.6
Manley Hot Springs	8	222	9(234)	88.9
Russian Mission	7	66	10(100)	70.0
St. Mary's	7	84	9(91)	77.8
Tanana	17	341	23(427)	73.9
Totals	68	1,078	95(1,363)	71.6

TABLE 2. NUMBER OF DOGS IN RURAL COMMUNITIES AND FISHING DISTRICTS IN THE YUKON RIVER DRAINAGE, 1977-1989.^a

COMMUNITY	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
DISTRICT 1													
Sheldon Point	50	71	27	29	53	39	38	175	74	59	45	26	23
Alakanuk	98	125	159	142	168	139	114	164	157	189	140	166	80
Emmonak	119	91	150	147	145	158	80	197	105	103	104	104	48
Kotlik	52	69	116	165	125	117	168	172	214	170	176	191	111
District Total	319	356	452	483	491	453	400	708	550	521	465	487	262
DISTRICT 2													
Mountain Village	105	87	93	115	176	129	141	173	153	219	185	210	75
Pitkas Point	35	126	64	36	32	25	23	48	65	77	78	85	46
Saint Mary's	73	NA	102	72	117	140	166	190	190	379	216	157	113
Pilot Station	128	58	97	81	95	76	120	103	103	117	154	133	22
Marshall	152	145	168	168	173	170	201	241	224	379	465	305	157
District Total	493	416	524	472	593	540	651	755	735	1,171	1,098	890	413
DISTRICT 3													
Russian Mission	44	62	54	71	55	88	101	73	77	108	81	162	57
Holy Cross	46	41	58	113	87	112	71	71	88	66	78	69	51
District Total	90	103	112	184	142	200	172	144	165	174	159	231	108
DISTRICT 4													
Anvik	153	99	127	96	102	134	112	112	NA	92	117	73	75
Grayling	109	184	182	251	179	222	169	216	42	183	215	243	73
Kaltag	280	277	271	239	251	128	NA	NA	161	163	120	155	123
Nulato	226	249	223	151	194	105	NA	NA	207	128	130	113	84
Koyukuk	77	119	112	164	117	123	86	63	49	49	61	79	57
Galena	136	179	163	199	154	126	241	221	180	139	112	162	137
Ruby	96	237	233	227	306	306	295	185	259	220	188	151	129
Huslia	79	164	200	178	181	106	149	169	119	158	190	202	179
Hughes	93	140	153	130	139	114	60	120	96	78	37	47	75
Allakaket/Alatna	158	183	278	132	157	169	142	71	149	191	161	207	124
District Total	1,407	1,831	1,942	1,767	1,780	1,533	1,254	1,157	1,262	1,401	1,331	1,432	1,056

TABLE 2. (continued)

COMMUNITY	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
DISTRICT 5													
Tanana	309	430	409	549	491	382	652	806	556	686	511	269	343
Rampart	124	102	178	99	195	189	153	180	240	68	170	10	18
Stevens Village	66	146	74	103	145	79	112	70	154	106	90	101	92
Beaver	21	25	21	26	30	28	18	12	NA	54	50	47	53
Fort Yukon	218	301	261	296	438	145	169	146	268	216	281	264	297
Venetie	54	93	51	75	146	23	72	73	NA	87	58	73	127
Circle	43	24	109	35	116	52	33	44	50	97	70	56	60
Eagle	79	80	201	270	230	220	245	254	142	230	276	142	128
District Total	914	1,200	1,304	1,453	1,791	1,118	1,454	1,585	1,410	1,544	1,506	962	1,118
DISTRICT 6													
Manley Hot Springs	357	255	297	207	320	223	260	107	110	127	124	178	250
Minto	NA	NA	NA	206	188	28	141	226	179	72	196	219	98
Nenana	334	240	302	491	327	290	261	363	346	324	567	190	58
District Total	691	495	599	904	835	541	662	679	652	523	887	587	426
GRAND TOTALS	3,914^b	4,402^b	4,933^b	5,263	5,632	4,385	4,593^b	5,028^b	4,774^b	5,334	5,446	4,589	3,383

Sources: Walker and Brown 1988; Walker *et al.* 1989; Bergstrom *et al.* 1991.^a Data pertain to reporting households only.^b Incomplete data, one or more communities were not surveyed.

NA = Data Not Available.

addition, since a relatively consistent methodology was used over the years, and similar rates of contact were achieved from year to year, these data are thought to accurately reflect general trends in the dog population over time.

Table 3 compares dog numbers reported by recent post-season harvest surveys and those collected during this study. In general, data on the number of sled dogs collected in conjunction with this survey compare favorably with recent five-year average number of dogs reported on the post-season harvest surveys for the study communities. There are a certain number of scrap dogs which are not included in the 1991 counts, but are probably included in the post-season harvest survey data. Given this difference, and the inherent variability of kennel sizes on both an individual and community basis described in more detail below, discrepancies between these two data sets are well within the range of what might be attributed to normal or seasonal variations in kennel size with the exception of Manley Hot Springs and St. Mary's. In Manley Hot Springs, the higher estimate of 234 dogs in 1991 is probably attributable to the inclusion of certain kennels (30 to 80 dogs) in Manley Hot Springs that were surveyed during this study, but may not have been included in the annual post-season harvest surveys from 1985-88. The 1991 estimate for Manley Hot Springs is similar to the 1989 post-season figure of 250 dogs and, thus, is within the range of dog numbers reported for Manley Hot Springs from 1985 through 1989.

The much lower number of dogs in St. Mary's reported in 1991, compared with recent post-season survey data, documents what is reportedly an actual decline in dog numbers. Interviews with key respondents in St. Mary's confirmed that in the last two years, five mushers who previously resided in St. Mary's had moved, no longer had dog teams, or were deceased. Five additional St. Mary's residents owning between four and ten dogs had been included in recent post-season estimates but, described their dogs as "scrap dogs" and, thus, were not included in the count of sled dogs presented here. This reduction of ten dog teams explains the discrepancy between data collected in St. Mary's during this survey and those collected on the post-season surveys from 1985 to 1989.

Estimates of dog numbers in Table 2 were also compared to recent (1989-91) rabies vaccination records for rural interior communities compiled by Tanana Chiefs Conference, Inc. (TCC). The TCC

TABLE 3. COMPARISON OF DOG POPULATION ESTIMATES FOR SEVEN YUKON RIVER DRAINAGE COMMUNITIES, 1985-91.

Community	Number of sled dogs						1991
	1985	1986	1987	1988	1989	Average 1985-89	
Fort Yukon	268	216	281	264	297	265	245
Huslia	119	158	190	202	179	170	153
Kaltag	161	163	120	155	123	144	113
Manley Hot Springs	110	127	124	178	250	158	234
Russian Mission	77	108	81	162	57	97	100
St. Mary's	190	379	216	157	113	211	91
Tanana	556	686	511	269	343	473	427
Totals	1,481	1,837	1,523	1,387	1,362	1,518	1,363

Sources: Data for 1985-87 are from Walker and Brown 1988. Data for 1988 are from Walker *et al.* 1989. Data for 1989 are from Bergstrom *et al.* 1991. Data for 1991 are from this study.

vaccination program attempts to visit most interior villages annually, with the goal of vaccinating all dogs. Vaccination visits varied in timing and completeness, but administrators of the program felt confident that 75 to 100 percent of the dogs were accounted for in most communities using this method (D. Strausbaugh, pers. comm., 1991). Estimates resulting from 1989-90 vaccination data result in similar, but generally lower, dog numbers than the five-year average number of dogs reported on the harvest surveys 1985-89 (Table 2). While these two sets of data may not be strictly comparable, they generally corroborate one another and indicate that the harvest survey methodology is probably not flawed in a way that allows significant numbers of dogs in survey communities to go undetected.

In light of these comparisons, the data in Table 2 are offered as reasonable estimates of the dog population in surveyed communities. As indicated in Table 2, there were several years where one or more communities were not part of the salmon survey. For the six years listed when all 32 communities were surveyed, the estimated total dog population ranged from a high of 5,632 in 1981 to a low of 4,385 in 1982. Using the six years of complete data available from 1980 to 1988, the average number of dogs in the 32 surveyed communities is estimated to be 5,108 or, in round numbers, approximately 5,000 dogs. Because the data in Table 2 are not expanded to include unsurveyed households, the estimate of 5,000 dogs should perhaps be viewed as a minimum number of dogs in 32 rural Yukon River drainage communities covered by the post-season salmon harvest survey.

There appears to be no definite or discernable trend in dog numbers for the Yukon River drainage (Table 4). A three-year moving average shows an increase of about 1,000 dogs between 1977 and 1980, a decrease of about 600 dogs between 1980 and 1983, an increase of 500 dogs between 1983 and 1986, and another decrease between 1986 and 1989 of 1,200 dogs. Thus, dog numbers seem to have fluctuated up and down every few years about 20 to 25 percent. Some of this fluctuation may be due to the imprecision in measurement by the survey, as certain communities and fishing families are missed or included in particular years. In all, during the 13-year period 1977 to 1989, the number of dogs in rural communities have shown no definite trends in any direction. Administrators of the TCC rabies vaccination program indicated that they have seen a general decline in the number sled dogs in most Yukon River drainage communities in the last few years (D. Strausbaugh, pers. comm., 1991).

TABLE 4. TRENDS IN THE NUMBER OF DOGS IN RURAL YUKON RIVER DRAINAGE COMMUNITIES, THREE-YEAR MOVING AVERAGE, 1977-89.

Year	Average number of dogs ^a
1977 ^b	4,158
1978	4,416
1979	4,866
1980	5,276
1981	5,093
1982	4,870
1983	4,689
1984	4,798
1985	5,045
1986	5,185
1987	5,123
1988	4,473
1989 ^c	3,986

^aThree-year moving average of totals presented in Table 2.

^bMean of 1977 and 1978.

^cMean of 1988 and 1989.

Comparison of ADF&G salmon harvest survey data on numbers of dogs and recent TCC rabies vaccination data tend to support this, but several more years of data are needed to determine if this is the beginning of a sustained decline, or just a short-term drop in the dog population which characteristically has fluctuated over the past 15 years.

Factors Contributing to Variability in Sled Dog Numbers

Surveys with mushers in seven communities revealed that the number of sled dogs within a community and within an individual kennel was variable both seasonally and from year to year. Because of the small size of most communities, one or two mushers and their dogs moving into or out of communities can significantly alter the area's dog population. Mobility occurs for a number of reasons, such as death, marriage, schooling, and work. In addition, when some residents decide to "get into" or "get out of" dog mushing, they may buy or sell entire teams or kennels, resulting in similar changes to a community's dog population. Other mushers live remote from a community base either year-round or seasonally. They, and their dogs, may or may not be considered residents of a particular community depending upon the season. Respondents in Manley Hot Springs, for example, disagreed on whether two individuals with large dog teams living and working seasonally in the Fairbanks area should be counted as Manley Hot Springs residents. Similar situations arose in other study communities.

Within an individual kennel, the number of dogs can fluctuate significantly during a single year and between years as dogs are traded, are bought or sold, are "culled," or as litters of pups are born. One musher stated that while she generally strived to maintain a kennel of 20 dogs for trapline use and local racing, she has had as few as ten and as many as 30 dogs in recent years. With regard to seasonal variation in kennel size, several mushers explained that kennels were generally pared down to their lowest in spring by trading, giving way, or "culling" old dogs or dogs that had not worked out as well as expected. This practice reportedly allowed them to care for a minimum number of dogs through the summer months and to make room for new litters of pups. Although litters of pups can occur at any time, many mushers reported that spring and summer litters were preferred because the survival rate of

pups was better. In addition, pups from spring litters could be harnessed and tested by early winter, and breeding females were fully recovered and ready to work again during the winter season. Given these practices, a census of sled dog numbers in a particular region or community can be expected to show different numbers from year to year and from season to season.

Kennel Size and Structure

Among the 68 mushers surveyed in seven communities, the average kennel size was 15 dogs and the median number of dogs owned was 12. Kennels or "dog yards" ranged in size from 4 to 80. Figure 2 shows the number of kennels in each size category. Fifty-five of the 68 surveyed mushers (81 percent) reported having kennel sizes in the range of 5 to 19 dogs. Only eight mushers (12 percent) reported having kennels with 25 dogs or more.

Some regional differences were noted in the sizes of kennels. In the lower Yukon River communities of Russian Mission and St. Mary's, kennel sizes ranged from 5 to 21 dogs with a mean kennel size of 11 dogs and a median kennel size of ten dogs. Among the five study communities in the upper Yukon River drainage, kennel size was generally larger and more variable. Kennels there ranged in size from 4 to 80 dogs with an average size of 17 dogs and a median size of 14 dogs.

Additional information was sought from key respondents on kennel structure and team size. Mushers commented that kennels generally consisted of different aged dogs so that only a few dogs needed to be replaced in any given year due to "retirement." A common kennel structure was that of a core of trained "team dogs" along with a few young dogs or pups that would eventually become team dogs, and a few semi-retired older dogs which may serve as trainers for the younger dogs or as spare team dogs to replace sick or injured dogs. A typical kennel of 16 dogs, for example, might include nine or ten active "team" dogs ranging in age from two to eight years old, two or three pups less than a year old that were being trained for the team, and several older dogs used to train pups, or as spare team dogs,

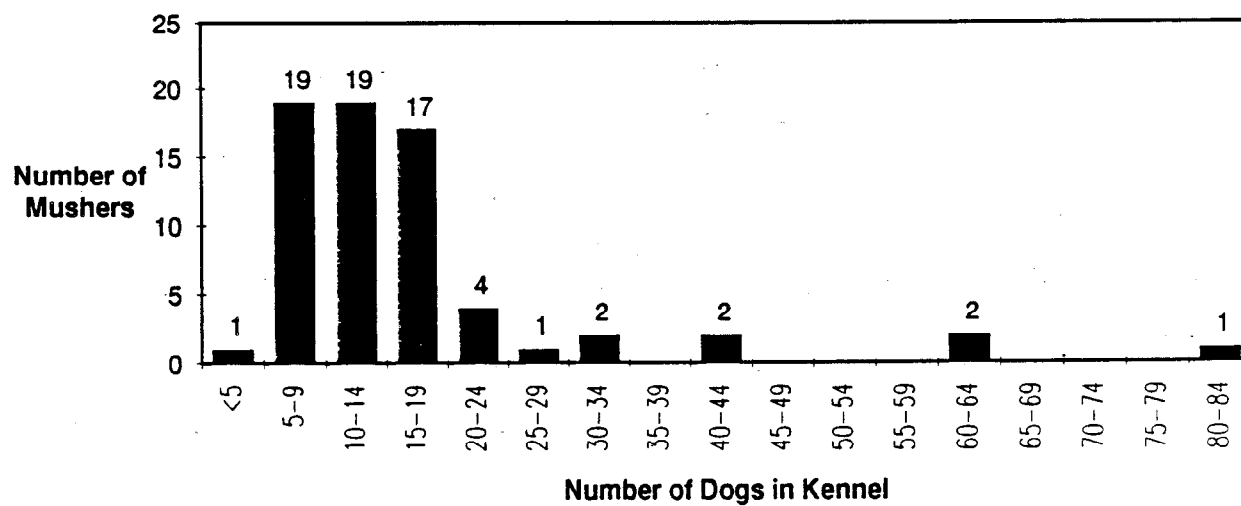


Fig. 2. Number of dogs owned by surveyed mushers in seven rural Yukon River drainage communities, 1991.

or that were simply retired.

Of the 68 surveyed mushers, only five (7.4 percent) had 40 or more dogs. Large kennels of 40 dogs or more were often associated with individuals who were more involved in racing, breeding, selling, or trading dogs. The largest kennel surveyed consisted of 80 dogs. Nearly one-half of these dogs were described as prime racing dogs, or "the truck team," meaning dogs that would be trucked to major races in order to give the musher an assortment of dogs to choose from at the starting line depending upon the perceived competition, the level of prize money involved, distance, weather, trail conditions, and the day-to-day health of individual dogs. The remainder of this large kennel consisted of dogs classified by the musher into the following categories: "yearlings," dogs between one and two years old with demonstrated ability that were being trained for the racing team; "puppy teams," dogs less than one year old that were being tested or trained with older leaders to determine their potential; and "leftovers," which included good, marketable dogs of mixed ages.

Mushers variously reported the useful life of a working dog to be from 8 to 12 years. Those mushers involved in sprint racing reported that peak performance of a dog was obtained at between three and five years of age although many dogs raced at older ages. Several mushers who used their dogs for trapping and distance racing reported that they could usually expect ten working years from a dog, but that many dogs begin to "lose their edge" after six or seven years of age.

How Dogs are Used in Rural Yukon Drainage Communities

Yukon River drainage dog teams of the 68 surveyed respondents were found to support a variety of activities including racing, trapping, hauling wood, general transportation, and leasing dogs or dog teams. In addition to these winter activities, dogs also served useful roles as watch dogs, "bear dogs" in camps, "scrap dogs," and breeding dogs for sale. These categories of use are described in more detail below and listed in Table 5 by reported frequency.

As shown in Table 5, 82.4 percent of surveyed mushers indicated they used their dogs for transportation. This included general winter travel, camping, and recreational travel. About 55 percent

TABLE 5. PERCENTAGE OF SURVEYED MUSHERS IN RURAL YUKON DRAINAGE COMMUNITIES REPORTING USE OF DOGS IN SPECIFIC USE CATEGORIES, 1991.

Use category	Percentage of surveyed mushers
Transportation/camping/recreation	82.4 %
Hauling (wood, water, etc.)	55.9
Sprint racing	54.4
Trapping	44.1
Watch dog/guard dog/bear dog	44.1
Household pets/scrap dogs	29.4
Distance racing	27.9
Breeding dogs for sale	26.5
Rent or lease dogs or teams	20.6
Other uses	13.2

reported using sled dogs for hauling wood, water, and other materials (55.9 percent). Similarly, about 55 percent used their teams for sprint racing (54.4 percent). About 44 percent used dogs for transportation on their traplines. About one-fourth (26.5 percent) of surveyed mushers reported breeding dogs for sale and one-fifth (20.6 percent) rented or leased dogs or teams. In the "other uses" category, mushers reported using dogs as pack dogs, to pull carts or wheelbarrows, and to set and pull fish nets.

Forty percent of respondents indicated they used their dogs in five or more of the ten use categories listed on the survey. The median number of categories indicated by those surveyed was four. Among the 68 mushers surveyed, only one musher described himself as a "recreational musher." As one Tanana musher commented, "Dogs out here either do work or earn money or they don't exist." Survey data indicate that dogs were typically used for a range of productive activities. In contrast to more urban areas of interior Alaska, where recreational dog mushing is frequently cited as the primary reason for maintaining teams, dog teams in rural areas are maintained for more productive purposes.

Of the ten use categories, five could potentially result in cash earnings to the musher. These include sprint racing, distance racing, trapping, breeding dogs for sale, and renting or leasing dogs or teams. Of the 68 mushers surveyed, 59 mushers (86.8 percent) reported using their dogs in one or more of these activities. With the exception of Kaltag, where commercially-caught salmon are commonly fed to dogs, almost all those mushers reported feeding subsistence-caught fish to their dogs.

In Yukon Drainage communities there is usually no clear distinction between "work dogs," "trapline dogs," and "racing dogs." Of those mushers who reported using their dogs for trapping, 63.3 percent said that they also used their dogs for racing. Several respondents described trapping as a good way to train and condition dogs used for middle- or long-distance racing. It is noteworthy that the 1991 winner of the Yukon Quest race between Whitehorse and Fairbanks was an interior region musher who fed his dogs fish for much of the year and utilized them on his trapline. Working teams, racing teams, and other common uses of dogs are described in more detail below.

Working teams include those used for hauling wood, trapping, and general transportation. The use of dogs on traplines was found to be most common in the five upper Yukon River drainage communities (Fort Yukon, Huslia, Kaltag, Manley Hot Springs, and Tanana). Among these, 51.9

percent of the mushers reported using their dogs in conjunction with trapping activities. By comparison, only 14.3 percent of the mushers surveyed in Russian Mission and St. Mary's along the lower Yukon River reported using their dogs for trapping. Among Yukon Drainage trappers, dogs were used exclusively by a few trappers, but most reported using both dogs and snowmachines for specific tasks during the trapping season.

Among surveyed mushers, 67.6 percent reported using their dogs for sprint or distance racing. The extent of involvement in racing varied from participation in renowned races such as the North American Sled Dog Championship and the Yukon Quest, to participation in local spring carnival races or what are sometimes referred to as "kiddy races." Mushers indicated they participated in local racing events as a source of entertainment and for the chance to win small amounts of prize money. Most Yukon Drainage communities have winter and spring carnivals that feature dog races as part of the festivities. Prizes for these races varied from a sack of commercial dog food in some communities, to several thousand dollars in others. Money for these events was raised through donations, raffles, and community activities, such as bingo and bake sales. Neighboring communities often attempt to schedule these events in succession, so that participants from nearby communities may attend and compete in a series of races with competitors from around the region. The prize money for local races is not so large as to attract competition by well-known mushers from outside the region and, therefore, in comparison with the more renowned races, local racers with small kennels or trapline teams can compete with a more reasonable expectation of placing "in the money."

In addition to the shorter sprint races, more and more middle-distance dog races are being created to meet the demand for this kind of mushing, which is more suited to the types of sled dogs commonly used for trapping. Middle-distance races generally span two or three days and cover distances of 200 to 500 miles. Prize money varies greatly from race to race. A middle-distance race in Manley Hot Springs during 1991 had a total purse of about \$2,000 and paid through seventh place. The 1991 Norton Sound Portage 200 from Unalakleet to Kaltag and return offered a total purse of about \$16,000 with cash payments down to 10th place. Racers are frequently sponsored, in part, by local businesses such as air taxi services which help defray the cost of transporting mushers and their dogs to and from

the village hosting the race. These races are an important event to many local mushers, providing a proving ground for those interested in advancing to the larger races, and providing local dog mushers with an opportunity to compete and the chance to win cash prizes to help offset the costs associated with raising and racing dogs.

Lower Yukon River area mushers were more likely to be involved in sprint racing than middle-distance racing. Only 14.0 percent of mushers surveyed in Russian Mission and St. Mary's reported involvement in middle-distance racing compared to 71.4 percent participation in sprint races. In the upper Yukon drainage, 50 percent of surveyed mushers reported participating in sprint racing and 31.5 percent were involved in middle-distance racing.

While working teams and racing teams characterize the major categories of use for dog teams, other uses were also described. Many households, particularly in the lower and middle Yukon River communities of Russian Mission, St. Mary's, and Kaltag, indicated that while they did not "run" dogs, they retained a small number of sled-dog type dogs for use as "bear dogs" or "scrap dogs." Bear dogs were used to ward off bears at fish camps or alert camp residents to the presence of bears. Bears are frequently attracted to camps by the smell of fish being processed for subsistence uses. If not discouraged, a bear may do considerable damage to the family's subsistence food supplies being prepared and stored for later use. Thus, bear dogs served an important economic function. Bear dogs were often part of a working or racing team, but in other cases were dogs whose only function was to warn of the presence of bears. It was common practice throughout the Yukon River drainage to take several dogs or entire teams of dogs to fish camp for this purpose.

Many households that were not involved in dog mushing owned one or several dogs as a convenient way of disposing of table scraps year-round and the large quantity of fish heads, tails, and fins seasonally produced in the process of cutting fish for drying. This served the practical purpose of keeping the village and camps clean. It also adhered to important cultural beliefs surrounding the proper use of all parts of the fish so as not to offend the animal. While dogs served this function throughout the Yukon River drainage, the term "scrap dog" has been more or less formalized on the lower Yukon River to describe dogs that are kept solely for this purpose. Therefore, a distinction was made between "scrap

dogs" and working dogs that consume fish scraps. People would say, for example, "We used to have a dog team, but now we just have a couple of scrap dogs."

A small number of mushers surveyed also indicated that some of their dogs were classified as pets or watch dogs. Several mushers said that their dog yards contained dogs that were sometimes brought inside, played with their children, or were retired "old friends" that would qualify as pets. While few respondents stated the primary function of their dogs was to act as watch dogs, several said their dogs were effectively used to warn them when people or animals were near their property. A few respondents also said that their dogs were used as pack animals during summer months.

The Use of Fish to Feed Sled Dogs

Among the 68 mushers interviewed in the seven Yukon River drainage communities, all (100 percent) reported using fish to some extent to feed their dogs. For some mushers, fish composed a very small part of their dogs' diet. For a few (4 percent of the mushers and 1.9 percent of the dogs in the survey), fish constituted 100 percent of their dogs' diet. Among most mushers, fish was regarded as a high-quality, low-cost food base for working dogs when supplemented with rice, fat, or commercially manufactured dry dog food. Racers generally regarded fish as an inadequate racing diet for their dogs, but utilized it either as a "maintenance diet" during the off-season or as one of many ingredients in a specialized, highly supplemented racing diet. For most other mushers, fish was a major component of their dogs' diet. More than half (52.3 percent) of the mushers responding to the survey indicated that their dogs were fed a diet of 75 to 100 percent fish. Six survey respondents (8.8 percent) reported that fish made up one quarter or less of their dogs' diet. These mushers included those with the three largest dog yards surveyed and accounted for 18.1 percent of the total number of dogs. Thus, survey data show that larger kennels tended to rely less on fish than smaller kennels. Of those mushers reporting that fish made up 25 percent or less of their dogs' diet, the average kennel size was 32.5 dogs. Among those reporting that fish made up 75 to 100 percent of their dogs' diet, the average number of dogs owned was 13.5 dogs. Kinds and quantities of fish used are discussed in more detail below.

Fish Species Utilized as Dog Food

The species of fish commonly used for dog food varies from region to region along the Yukon River. In the lower river study communities of Russian Mission and St. Mary's, non-salmon species of fish such as lamprey eel (*Lampetera japonica*), northern pike (*Esox lucius*), and Alaska blackfish (*Dallia pectoralis*) were the most commonly used species for dog food. In Russian Mission, for example, all ten respondents reported using eels and four mushers reported harvesting quantities of eels ranging from 1,700 to 2,000 pounds. Along this section of the Yukon River, there exists an unusually productive eel fishery, generally in October after freeze-up (Pete 1991.) Smaller quantities of whitefish (*Coregonus sp.*), sheefish (*Stenodus leucichthys*), pike, burbot (*Lota lota*), blackfish, pink salmon (*Oncorhynchus gorbuscha*), and summer and fall chum salmon (*Oncorhynchus keta*) were also reported. In St. Mary's, pike and blackfish made up the bulk of the fish used as dog food. Harvests of these species were commonly estimated in terms of the number of 50-pound sacks (*i.e.*, twelve 50-pound sacks of blackfish). Smaller quantities of burbot, whitefish, pink salmon, summer chum, eels, fall chum and coho salmon (*Oncorhynchus kisutch*) were also reported.

Further up the Yukon River drainage in the study communities of Kaltag and Huslia, summer chum salmon was the fish species most frequently used as dog food. In harvesting summer chum salmon, mushers reported they commonly caught whitefish, pike, and burbot and that these were also utilized as dog food. In the upper Yukon River communities of Tanana, Manley Hot Springs, and Fort Yukon, mushers reported using mostly fall chum and coho salmon to feed dogs along with sometimes sizable incidental harvests of whitefish, burbot, pike, and longnose sucker (*Catostomus catostomus*).

Thus, from the lower to the upper Yukon River drainage, there was variability in the fish species utilized for dog food. In the lower part of the drainage, non-salmon species such as eels, blackfish, and pike were more commonly fed to dogs than salmon. Along the middle Yukon and Koyukuk rivers, summer chum salmon was the most commonly harvested species of fish for use as dog food. Along the upper Yukon and Tanana rivers, fall chum and coho salmon were the most common fish species harvested for dogs.

Methods of Preserving and Preparing Fish for Sled Dogs

In some areas, particularly in the lower portion of the Yukon River drainage, non-salmon fish species such as whitefish and pike are available to fishermen on nearly a year-round basis. Consequently, these species are commonly cooked fresh and fed to dogs in summer or are preserved in winter by natural freezing. For salmon, more elaborate preservation methods have been developed over generations to deal with their seasonal abundance during summer. Salmon harvested for use as dog food generally are preserved for use throughout the winter by one of several drying techniques. Late in the season, some salmon are allowed to freeze naturally. Preservation methods used are a function of timing of the salmon runs, weather conditions, and the kind of product desired. According to respondents, the three commonly used methods for preserving salmon to be used for dog food are "split-and-scored," "split fish," and "cribbed" or "green fish."

The "split-and-scored" method of drying salmon is used in early or mid-summer when warm, wet weather conditions are common and spoilage from flies and other insects is a problem. Salmon are gutted, split lengthwise, and the flesh scored horizontally; then hung on open air drying racks to promote quick, thorough drying and prevent spoilage. Properly done, the dried product has a very low water content and is extremely lightweight. Because of the early summer timing of salmon runs in the lower and middle Yukon River this method of drying was the most commonly used method of drying fish in those areas.

The "split fish" method of drying is preferred in the slightly cooler and less insect-prone conditions of late summer or early fall, when salmon can be gutted, split lengthwise and hung to dry without scoring the flesh horizontally. Cut and hung in this way, "split fish" dry more slowly and less thoroughly. Thus, the flesh of split fish may have a slightly higher water content and may turn slightly "sour" making it more attractive to dogs. Given the right weather conditions, this method of cutting is preferred because it is less labor intensive. This method of cutting and drying was most common in the upper Yukon River drainage where the run of fall chums normally coincides with cool weather.

The "cribbed fish" or "green fish" method of preservation is commonly used after mid-September, when nighttime temperatures often dip below freezing. Using this preservation method, fish are stored whole in large wooden boxes or log cribs and allowed to cool and eventually freeze over a period of weeks. The slow freezing process allows the fish to decompose slightly as it freezes making it both more digestible and more palatable to dogs. This method was most commonly used by residents of the upper Yukon River where the peak of the fall chum and coho salmon run generally coincides with the advent of freezing weather. Cribbing fish is less labor intensive than cutting and drying fish and the product reportedly retains more nutrients than dried fish. The disadvantages of preserving fish as cribbed fish are that the product is heavy and, therefore, less convenient for mushers who must haul large quantities of dog food from their fishing location to their home or to remote trapping cabins. Cribbed fish are also more susceptible to spoilage with the return of warm temperatures in spring. Various methods are used to extend the life of leftover cribbed fish in spring, including packing them in a mixture of snow and sawdust, spraying them with insecticide, or cutting and hanging them as they thawed to make dry fish.

Some mushers, especially those in the upper Yukon River region, reported using all three methods for preserving salmon, gauging weather conditions throughout the season and selecting the least labor-intensive method of preserving fish that weather conditions allowed to produce the kind of product required. Trappers that needed to haul large quantities of fish to remote trapping cabins often preferred a larger proportion of their harvest processed into lightweight split-and-scored fish. Mushers with both dried and cribbed fish available tried to use supplies of cribbed fish first and saved supplies of dried fish for use in spring. Mushers reported that good quality dried fish could be kept for more than a year without spoiling, if necessary, but that it diminished in nutrient value over time.

Fish normally were cooked (boiled) before being fed to dogs. This was the case regardless of the fish species or whether the fish was fresh, whole, dried, cribbed fish, or cutting scraps. In dog yards and fish camps along the entire length of the Yukon River, "dog pots" and cookers constructed from 55-gallon drums were a common feature. According to mushers, cooking kills potentially harmful parasites in the fish, allows the easy addition of supplements such as rice, fat, and vitamins, and the resulting "fish

soup" can be fed to dogs warm in cold weather. Dried fish, or cribbed fish that has been frozen for at least 30 days, were generally regarded as free of parasites and could be fed to dogs without cooking if fuel for cooking was in short supply or in the interest of saving time. But cooked fish was preferred by most mushers as it allowed the use of the fewest fish to feed the most dogs and assured that the dogs received liquids to prevent dehydration.

Fish Required Per Dog

Mushers were asked to estimate the number of fish needed to feed one dog for a year. The number of fish needed to maintain a working dog for a year varied depending upon the size of the dog, the work it was doing, the outside temperature, the species and condition of the fish when it was harvested, and the way the fish was preserved. Despite these variables, mushers in each study community were able to offer "rules-of-thumb" they had developed over the years to estimate the number of fish required to feed a dog through the winter.

According to mushers, there are roughly 200 feeding days for which dog food must be preserved. This is generally defined as the seven-month period between mid-October when all salmon fishing ceases and mid-May when fishing activities for species fed to dogs such as pike and whitefish begin again in earnest. While the timing of this 200-day period differs slightly from the lower to the upper reaches of the Yukon River, the concept of a 200-day total for which fish must be "put up" or stored appears to be the objective for most of the Yukon River drainage mushers who use fish to feed their dogs. During the late spring, summer, and early fall months, dogs are commonly fed whole fresh (cooked) fish of various species that are by-products of subsistence and commercial salmon fishing activities, as well as the heads, tails, fins, and entrails of salmon produced during the process of cutting fish for drying. Thus, dogs were typically maintained on scraps and incidental harvests of non-salmon species for about five months of the year. During this same period, mushers using fish to feed their dogs had to harvest, process, and store fish for the remaining seven months of the year.

On the upper Yukon River, mushers said that 1/2 to 3/4 of a dried chum or coho salmon was needed to feed each dog each day during the winter or roughly 100 to 150 fish per dog for the 200-day feeding season. If cribbed or whole salmon were used, or if dried salmon was heavily supplemented with rice, fat, or commercial dry food, dogs required less fish, perhaps 1/3 of a fish per day. However, the most common rule-of-thumb offered in the upper Yukon River region, based on the common practice of using a combination of some dried fish, some cribbed fish, and some commercial supplements, was 1/2 to 3/4 salmon per dog per day or 100 to 150 salmon per dog for the winter feeding period.

Along the middle Yukon River the availability of commercially-caught salmon carcasses from a summer chum commercial roe fishery greatly influenced the number of fish used to feed dogs. Virtually all of the dried salmon used to feed dogs in Kaltag, for example, was a product of the commercial roe fishery there. Because there was also a small market for male summer chum salmon sold whole, most of the salmon that were cut and dried for dog food were female summer chum. Mushers in Kaltag explained that female summer chum salmon were a relatively small fish, averaging about five or six pounds each, and that it took more of them to feed a dog than chum salmon used to feed dogs elsewhere. In addition, the timing of the summer chum run in the middle Yukon did not allow the preservation of whole fish, or cribbed fish, by natural freezing. Salmon used for dog food, therefore, was almost exclusively preserved by drying and lacked the nutrient value of some other preserved fish such as cribbed fish. Kaltag mushers also tended to rely more exclusively on fish to feed their dogs than mushers in other study communities. Of the 68 mushers surveyed, only three said that fish made up 100 percent of their dogs diet, and all three resided in Kaltag. Consequently, the number of fish reportedly required to feed a dog in Kaltag was about twice that reported in the upper Yukon River study communities. Estimates of one fish per dog per day times 365 days a year were given by several mushers. One Kaltag musher explained that during winter, one dried salmon per dog per day was sufficient if the weather was mild, but that two fish per dog per day might be required when temperatures were well below zero degrees Fahrenheit. On this basis, assuming an average of 1.5 fish per dog per day over the 200-day feeding season, a reasonable standard for the middle Yukon River roe fishery communities would be approximately 300 salmon per dog per year.

Along the lower Yukon River, salmon comprised only a small part of the fish used to feed dogs. For some lower Yukon River mushers, salmon was an almost inconsequential component of their dogs' diet. The variety of fish species used to feed dogs made it difficult to generate a standard regarding numbers of fish fed per dog. When asked to estimate the number of fish needed per dog per year many mushers did not respond in terms of salmon, but offered estimates in pounds of eel, or of pike, whitefish, and sheefish combined with eel. One musher in Russian Mission noted that one ton of eels was required to feed a team of ten dogs for the winter. Another musher commented that 1,000 pounds of eel were needed to feed his team of seven dogs. Several mushers said that about 150 fish (mixed freshwater species such as pike, whitefish, and sheefish) were needed to feed each dog along with two or three eel per dog every other day. A musher in St. Mary's with 12 dogs stated that he cooked an average of seven or eight fish of various species (chum salmon, pike, whitefish, burbot, and blackfish) in the dog pot each day from October through April and that this worked out to be about 100 fish (of mixed species) per dog per winter in his estimation.

Quantities of Salmon Used for Dog Food by Surveyed Mushers

Table 6 summarizes the use of fish for dog food by surveyed mushers in each of the seven study communities. A total of 103,970 salmon were used to feed the 1,078 dogs owned by the 68 mushers surveyed. This resulted in an overall average of 96 salmon per dog. There were, however, important and distinct differences between the upper, middle, and lower sections of the Yukon River drainage with regard to the use of salmon to feed dogs. In the upper Yukon River drainage communities of Fort Yukon, Huslia, and Tanana, the average number of salmon used per dog was 103, 105, and 122, respectively (Table 6). These numbers fall within the estimated range of 100 to 150 fish per year offered as a "rule-of-thumb" by mushers interviewed in the region. In Manley Hot Springs, the comparatively lower average harvest of 45 fish per dog is probably accounted for by the presence of three fairly large kennels, representing 72 percent of the dogs in the Manley Hot Springs sample, for which salmon made

TABLE 6. FISH HARVESTED FOR DOG FOOD BY SURVEYED MUSHERS IN SEVEN RURAL YUKON RIVER DRAINAGE COMMUNITIES, 1990-91.

Community	Number of mushers surveyed	Number of dogs owned	Number of non-salmon fish fed to dogs	Number of salmon fed to dogs	Average number of salmon/dog
Fort Yukon	13	140	355	14,425	103
Huslia	9	141	4,453	14,825	105
Kaltag	7	84	2,780	20,200 ^a	240
Manley Hot Springs	8	222	160	10,000	45
Russian Mission	7	66	1,617 + 4,650 lbs ^b	1,730	26
St. Mary's	7	84	6,434 + 2,200 lbs ^b	1,290	15
Tanana	17	341	8,403	41,500	122
Totals	68	1,078	24,202 + 6,850 lbs ^b	103,970	96

^a Mostly carcasses from the commercial catch.

^b Pounds of blackfish and eels.

up less than 25 percent of the dogs' diet. Also, since Manley Hot Springs is connected to Fairbanks by road, purchased commercially manufactured dog food is more accessible and less expensive than in other non-road-connected communities. For the four upper Yukon River drainage study communities combined, mushers fed each of their dogs an average of 94 salmon a year.

Along the middle Yukon River, the average of 240 salmon per dog in Kaltag is somewhat less than the standard of 300 salmon estimated by mushers there, but confirms mushers reports that the use of fish is about twice the average used in the upper Yukon River region. This is probably due to the almost exclusive use of dried summer chum salmon for dog food. As stated above, these fish are a by-product of the commercial roe fishery in fishing district Y-4A in which Kaltag is situated.

Survey data show that use of salmon to feed dogs in the lower Yukon River region is substantially lower than elsewhere in the Yukon River drainage. In this region, mushers relied more on a mix of other freshwater fish species such as eel, blackfish, pike, whitefish, and sheefish to feed their dogs. An average of 26 salmon and 15 salmon per dog was found for the communities of Russian Mission and St. Mary's, respectively, or 21 salmon per dog per year averaging data from both communities.

Drainage-Wide Estimates of the Number of Salmon Fed to Dogs

There has never been a comprehensive study of the quantity of fish used to feed dogs in the Yukon River drainage. However, by using estimates of the overall subsistence salmon harvest and the number of dogs derived from annual post-season surveys by ADF&G, combined with information collected from this study and other subsistence studies conducted by the Division of Subsistence, it is possible to arrive at rough estimates of the number of Yukon River salmon being used to feed sled dogs. Below, three methods are offered and compared for estimating the number of subsistence-caught salmon fed to dogs in the Yukon River drainage. The limitations of these estimates are also discussed.

Method One. This study and other subsistence studies confirm that the vast majority of salmon fed to dogs is composed of "small salmon," specifically summer chum, fall chum, and coho salmon.

Except for scraps from cutting fish, such as heads and backbones, chinook or king salmon (*Oncorhynchus tshawytscha*) are rarely fed to dogs. Since dog food constitutes a major use, although not the only use, of small salmon harvested for subsistence in the Yukon River, the number of subsistence-caught salmon fed to dogs may be viewed as a subset of the drainage-wide subsistence harvest of small salmon. Table 7 summarizes subsistence harvest data for small salmon in the Yukon River drainage 1984-88. Based on these data, the five-year harvest average for the period 1984 to 1988 was equal to 453,110 salmon, an unknown portion of which was fed to dogs. Estimate One, therefore, simply assumes that, in recent years, the number of subsistence-caught salmon fed to dogs in the Yukon River drainage is some quantity less than 453,110 salmon.

Method Two. Data from other studies conducted by the Division of Subsistence can be used to estimate the proportion of the subsistence harvest of small salmon that is fed to dogs in various part of the Yukon River drainage. In the upper Yukon River region, for example, 88 percent of the small salmon harvested in Fort Yukon in 1987 were reportedly fed to dogs (Sumida and Andersen 1990). In Tanana, a 1987 study found that 82 percent of the small salmon harvest there was fed to dogs (Case and Halpin 1990). Similarly, Sumida (1988) found that 83 percent of the small salmon harvest in Stevens Village was used as dog food, and Marcotte (1986) reported that 75 percent of the 1983 summer chum harvest in Huslia was used to feed dogs. Based on data from these four studies, it could be estimated that about 82 percent of the small salmon harvested for subsistence purposes in the upper Yukon River drainage are used for dog food.

This contrasts with the lower Yukon River where a study conducted in Russian Mission in 1984 showed that 35 percent of the small salmon harvested there for subsistence use were utilized for dog food (Pete 1991). The proportion of non-salmon fish harvested and fed to dogs was not documented in that study. While no community-based subsistence studies describing the use of fish for dogs have been conducted in the middle Yukon River area, data collected during this study indicated that communities involved in the summer chum roe fishery (Anvik, Grayling, Kaltag, and Nulato) utilized few subsistence-caught salmon to feed dogs. Instead, the commercial roe fishery produced salmon carcasses which were dried and used to feed dogs.

TABLE 7. SUBSISTENCE HARVEST OF SMALL SALMON^a IN YUKON RIVER FISHING DISTRICTS, 1984-88.

Fishing district	1984	1985	1986	1987	1988	5-year average
District 1	43,439	40,870	50,579	49,134	31,150	43,034
District 2	45,456	36,173	64,119	49,882	41,181	47,362
District 3	10,324	6,353	8,094	7,695	9,114	8,136
District 4	146,984	167,260	185,372	192,655	118,619	162,178
District 5 ^b	130,196	134,270	102,028	133,950	133,519	126,793
District 6 ^b	52,641	66,759	47,056	81,189	79,490	65,427
Totals	429,040	451,685	457,248	514,505	413,073	453,110

Source: Walker, Andrews, Andersen, and Shishido 1989.

^a Small salmon are predominantly summer chum, fall chum, and coho salmon.

^b Excludes harvests by Fairbanks residents.

Assuming that roughly 35 percent of the subsistence harvest of small salmon from lower Yukon River fishing districts 1, 2, and 3 (Fig. 1), and 82 percent of the subsistence harvest of small salmon from upper Yukon River districts 4, 5, and 6 (excluding Anvik, Grayling, Kaltag, and Nulato, but including the Koyukuk River) is fed to dogs, it is possible to estimate the amount of small salmon from subsistence catches that is fed to dogs. Table 8 shows that using 1988 harvest data, Method Two yields an estimate of 254,588 small salmon harvested for subsistence purposes and fed to dogs for that year.

Method Three. Data from this study on the number of salmon harvested per dog in each study community and estimates of the overall dog population can be used to estimate the total number of salmon used to feed dogs in the Yukon River drainage. As noted previously, survey data showed an average of 21 salmon were used to feed each dog in the lower Yukon River region (districts 1-3), and an average of 94 salmon per dog were used in the upper Yukon River drainage (districts 4-6). By applying these averages to the total number of dogs estimated for each fishing district in 1988, the number of salmon utilized for dog food can be estimated. As in Method Two, the subdistrict Y-4A communities of Anvik, Grayling, Kaltag, and Nulato, are not included since fish fed to dogs there are derived almost entirely from the commercial fishery. Table 9 shows that using 1988 estimates of the dog population, the number of small salmon fed to dogs in 1988, using Method Three, is estimated at 259,086 salmon.

Methods Two and Three, above, result in similar estimates of the number of subsistence-caught salmon used to feed dogs in 1988. The estimates of 254,588 fish (Table 8) and 259,086 fish (Table 9) represent 61.6 percent and 62.7 percent, respectively, of the 413,073 small salmon harvested for subsistence purposes in the Yukon River drainage in 1988. If the quantity of fish fed to dogs is assumed to be approximately 62 percent of the subsistence-caught small salmon harvest and this percentage is applied to the recent five-year harvest average of 453,110 (Table 7), the average number of subsistence salmon used to feed dogs for the period 1984-88 was 280,928 fish, or about 281,000 salmon.

The above estimates exclude the subdistrict Y-4A communities of Anvik, Grayling, Kaltag, and Nulato, which, for the most part, use commercially-caught salmon to feed dogs. The number of commercially-caught salmon used for dog food in the region can be estimated using survey data. This study found that in Kaltag, an average of 240 salmon were used per dog per year. In 1988 there were an

TABLE 8. METHOD TWO ESTIMATE OF THE NUMBER OF SUBSISTENCE-CAUGHT SMALL SALMON FED TO DOGS IN THE YUKON RIVER DRAINAGE, 1988.

Fishing district	Estimated 1988 harvest of small salmon ^a	Estimated percentage fed to dogs ^b	Estimated no. small salmon fed to dogs
District 1	31,150	35 %	10,903
District 2	41,181	35	14,413
District 3	9,114	35	3,190
District 4 ^c	62,700	82	51,414
District 5 ^d	133,519	82	109,486
District 6 ^d	79,490	82	65,182
Totals	357,154		254,588

^a Source: Walker, Andrews, Andersen, and Shishido 1989.

^b Source: 35% figure based on Pete (1991) for Russian Mission; 82% figure based on Marcotte (1986) for Huslia, Sumida (1988) for Stevens Village, Case and Halpin (1990) for Tanana, Sumida and Andersen (1990) for Fort Yukon.

^c Excludes harvests from the Y-4A roe fishery communities of Anvik, Grayling, Kaltag, and Nulato, but includes Koyukuk River drainage communities of Huslia, Hughes, Allakaket, Alatna, and Bettles/Evansville.

^d Excludes harvests by Fairbanks area residents.

TABLE 9. METHOD THREE ESTIMATE OF THE NUMBER OF SUBSISTENCE-CAUGHT SMALL SALMON FED TO DOGS IN THE YUKON RIVER DRAINAGE, 1988.

Area	Total number of dogs in 1988 ^a	Average no. of salmon used per dog ^b	Estimated no. of salmon fed to dogs
Lower Yukon River Districts 1-3	1,608	21	33,768
Upper Yukon River Districts 4-6 ^c	2,397	94	225,318
Totals	4,005	64.34	259,086

^a Source: Walker, Andrews, Andersen, and Shishido 1989.

^b Data from this study.

^c Excludes harvests from the Y-4A roe fishery communities of Anvik, Grayling, Kaltag, and Nulato, but includes Koyukuk River drainage communities of Huslia, Hughes, Allakaket, Alatna, and Bettles/Evansville. Also, excludes harvests by Fairbanks area residents.

estimated 584 dogs in the communities of Anvik, Grayling, Kaltag, and Nulato. If the average of 240 fish per dog is used, it can be estimated that 140,160 carcasses of commercially-caught salmon used for roe sales were fed to dogs in these communities in 1988.

These estimates are rough approximations of the number of salmon fed to dogs in the Yukon River drainage. They are qualified by several assumptions. First, in Method Two, the presumption that 82 percent of the subsistence harvest of small salmon in the upper Yukon districts 4, 5, and 6 (excluding Y-4A) is fed to dogs may be high. This is because it is derived, in part, from studies in communities where there was little, if any, commercial fishing activity (Huslia, Fort Yukon, and Stevens Village). Communities with heavy participation in commercial fishing may focus more effort on the commercial harvest and sale of salmon rather than the subsistence harvest and processing of salmon for dog food. Likewise, the assumption that 35 percent of the subsistence harvest of small salmon in districts 1, 2, and 3, may also be high since it is derived from Russian Mission where commercial fishing is known to be less than other lower Yukon River communities. Second, the above estimates assume that the number of subsistence-caught salmon reported on ADF&G's post-season harvest surveys includes fish that were caught for the purpose of feeding to dogs, otherwise, the total reported harvest is low. Third, it is assumed that the number of subsistence-caught salmon reported on ADF&G's post-season harvest surveys does not include fish retained from commercial harvests (for example, fish not sold due to poor quality fish or no buyer available); otherwise, the total reported harvest is high. Finally, in the Y-4A roe fishery communities it is assumed that all salmon fed to dogs were caught commercially. While this is generally true, small numbers of subsistence-caught salmon are known to be used for dog food in Y-4A, just as small numbers of commercial-caught fish are known to be fed to dogs in other communities.

Use of Commercial Feeds and Other Foods

Only three dog owners (4.5 percent) of those responding to the survey indicated that their dogs ate a diet of strictly fish. Almost all dog owners who used any quantity of fish said that their dogs' fish diet was supplemented with other foods. Among those surveyed, 17.6 percent of the mushers,

representing almost one-quarter (23.7 percent) of the dogs in the study communities, used mostly commercially produced dog food to feed their dogs. Store-bought rice, tallow or fat, and commercially manufactured dry dog food were the most commonly mentioned commercial foods. Ninety-one percent of respondents said that they used some quantity of commercially produced dry dog food. Rice or other bulk grain was used by 53.7 percent of the mushers. Some mushers reported mixing these supplements with cooked fish only during the winter season when nutritional requirements for working dogs were at their peak. Others used supplements on a year-round basis.

In addition to commercial supplements, furbearer carcasses, especially those of beaver and lynx were reportedly used as dog food by almost one-half (49.3 percent) of the mushers responding to the survey. Beaver meat has a reputation among racers as being premium food for racing dogs (Welch 1989). Cutting scraps and bones from other wild game such as bear, caribou, and moose were also reportedly used as dog food.

A Comparison of Sled Dog and Snowmachine Use

Among those interviewed in the seven study communities, mushing households owned an average of 1.5 snowmachines. Fifty percent owned one machine and 30.3 percent owned two. Only seven households (10.6 percent) reported owning three or more snowmachines. Six households (9.1 percent) did not own a snowmachine and relied strictly on dogs for winter transportation. All of the households reporting no snowmachines were in upper Yukon River communities.

Respondents were asked to comment on why snowmachines had not completely replaced dog teams in their community. Responses can be characterized as falling into one or several of the following five categories: 1) preference; 2) economy; 3) tradition; 4) sport and entertainment; and 5) social health. Those that stated they preferred using dogs to snowmachines cited the companionship of having dogs. Dogs were simply preferred by some because they were good "companions," part of the family, or considered friends. Others mentioned that they were philosophically opposed to modern technology, the consumption of fossil fuels, or that they were not mechanically inclined and preferred dogs for one or more of these reasons. Several who cited reasons of economy noted that dogs could be acquired for less

than the cost of a snowmachine and could be powered with locally available resources and thus, in some cases, dogs were viewed as an economical means of transportation. Others spoke about the economic advantage of being able to offset the cost of raising dogs through race winnings or by selling dogs. Numerous respondents mentioned that dog mushing was a part of a local tradition, their Native culture, or Alaska's history, and was being preserved, in part, for these reasons. Others cited sport and entertainment values. Mushing dogs was viewed as a source of fun and entertainment that could not be duplicated by other activities. Finally, values associated with social health were also noted. Mushers commented that dog mushing was promoted and encouraged by community leaders, residents, and mushers' associations in their communities for its role in keeping people occupied in a healthy, socially acceptable, culturally relevant, and worthwhile past-time.

Respondents were asked to compare the use of dog teams and snowmachines and list the advantages of each. Mushers generally agreed that the major advantages of snowmachines included speed and the fact that they did not need to be fed or maintained when not in use. Snowmachines were cited as being ideal for short trips around town, for breaking or setting trail in deep snow conditions, and for hauling heavy loads on good level trails. Mushing dogs was recognized as a fairly strenuous activity. Snowmachines were characterized as an easier mode of travel for the elderly and others who are incapable of running dogs, enabling them to get out for visiting, sightseeing, and subsistence activities.

The advantages of dogs centered on their reliability and dependability, especially in extremely cold temperatures. Snowmachines were described as unreliable and difficult to start at temperatures below minus 30 degrees Fahrenheit. Dogs, on the other hand, were described as being less weather dependent, capable of running in temperatures as low as minus 50 degrees Fahrenheit and able to find the trail in blizzard and overflow conditions. "Dogs are intelligent animals," one respondent said, "they will keep you off bad ice, and will run through slush and overflow." He added, "they might be slow, but they will always get you home and when you are out in the middle of nowhere [traveling] with young kids at 30 below, getting home is what counts."

Numerous respondents, particularly in the upper Yukon River region, spoke about specific areas, terrain, or snow conditions in which snowmachines could not be operated and which could only be

accessed by dog team. These conditions included steep river banks and inclines, extended areas of large tussocks, narrow and winding trails in heavy timber, and trail sections that were prone to frequent overflow and slush conditions. Several trappers said that using a dog team in such areas allowed them to reach trapping grounds that trappers on snowmachines could not, and thus enabled them to increase their fur harvest. Trappers also mentioned that snowmachines required a deeper cover of snow before they could be used effectively for pulling loads, whereas dog teams could be used with only a couple inches of snow on the ground, allowing them access to their trapping area with the first snowfall.

Dogs were viewed as having significant economic advantages over snowmachines in that they could be acquired without a large cash outlay and could be operated without the use of costly gasoline and oil. Snowmachines reportedly had a useful life of only two or three years with the hard use they were commonly put to by hunters and trappers. To many rural residents, the initial cost of a snowmachine at \$4,000 to \$7,000, coupled with the price of spare parts and fuel, was considered prohibitive. A trapper in Fort Yukon reported that with the depressed fur market of the past few years, the use of dog teams had allowed him to continue trapping at a profit while several trappers using snowmachines had gone broke. "Snogos allow you to do more in less time if you want to join the rat-race and make monthly payments," one trapper said "but if you are willing to spend some time and work a little bit, dogs are much cheaper."

Other attributes of using dog teams rather than snowmachines included a slow and quiet pace that allowed mushers a better view of wildlife and the countryside, and the fact that dogs have multiple uses. In addition to providing transportation, dogs were used to guard camps from bears and as pack dogs in the summer. Dogs minimized waste by eating table scraps and fish parts. Mushers noted that dogs could be raced and sold to generate income, or traded for other goods, and that they were self-regenerating and frequently become incorporated into the lives of individuals and families as friends or companions in a way that snowmachines do not.

As stated above, most mushers owned one or more snowmachines and the use of dogs and snowmachines was frequently combined to meet specific needs. "It's not a question of one or the other," one musher explained, "I couldn't get by out here without either one." Several respondents noted that

snowmachines were almost universally used for short trips within or near the community. On longer trips, either a dog team or a snowmachine might be used depending upon weather and trail conditions, size of the load to be hauled, age and reliability of the snowmachine, the availability and cost of gasoline, and the importance of speed. Trappers using dog teams frequently reported that they used snowmachines to make quick trips to and from their home community for supplies and for breaking trapline trails following heavy snowfall, but used dogs to patrol the trapline on a daily basis either out of necessity because of terrain conditions, or because of the greater reliability of dogs in all kinds of weather. Others reported using snowmachines for primary transportation, but maintained a dog team as secondary transportation in case of mechanical breakdowns or shortages of fuel.

Among those who maintained dog teams primarily for sprint racing, snowmachines generally were used as the main method of transportation. Dogs were run regularly on more of a recreational basis for training, conditioning, and for races. Among those involved in distance racing, dogs were often "worked" as part of their training and conditioning and mushers said they sometimes chose to use their dogs instead of a snowmachine simply because their dogs needed the exercise.

The Social and Economic Role of Sled Dogs in Rural Alaska

Aside from the practical role that dogs play in providing basic transportation, dogs also have important economic and social roles in the study communities. In the mixed subsistence-cash economies of contemporary rural Alaska, cash is necessary to purchase a variety of required goods, services, and subsistence equipment such as boats, outboard motors, snowmachines, fuel, traps, and fishing nets. Cash and wage earning opportunities are few in most rural communities of the Yukon River drainage and the limited number of wage-earning jobs that are available are usually part time or seasonal in nature. This is evident in the average taxable incomes for rural residents which are far below the average incomes of urban centers such as Anchorage and Fairbanks. Average 1985 taxable incomes for the seven study communities ranged from \$9,134 in Russian Mission to \$13,999 in Manley Hot Springs, compared with \$25,464 for Fairbanks (Alaska Department of Revenue 1988). Lacking other wage earning opportunities, studies have shown many rural residents turn to income sources, such as trapping and

commercial fishing, which are usually extensions of subsistence activities for which they are already trained and equipped (Andrews 1989; Case and Halpin 1990).

Like trapping and commercial fishing, raising and maintaining sled dogs is a way of using traditional skills and natural resources to produce limited amounts of cash through racing, breeding, and selling dogs. Dogs can be obtained relatively easily by almost anyone through purchase, barter, or trade. Because they reproduce rather quickly, and can thrive on a diet of locally available fish, very little cash investment is needed "to get into dogs." Mushers interviewed placed varying emphasis on the cash-producing aspects of raising dogs. For most mushers, winning \$500 in the spring carnival race was a rare, but welcome, side benefit to having economical transportation on their trapline. For a few, race winnings and money earned from the selling, trading, or leasing of dogs was the primary motive for having a dog team.

Dogs also play several important social roles. Several mushers asserted that raising dogs was a good way to teach children responsibility. They kept a few dogs so their children would learn how to feed, care for, and train the dogs. Maintaining dog teams was viewed as an important and useful skill to pass on to children, providing them with options for transportation and cash production later in life. Raising quality dogs was also a source of individual, family, and community pride. Thus, among some mushers, raising dogs is looked upon as something of a tradition, and a part of their personal or family history and culture.

Dogs are an integral part of a way of life that is practiced and preferred by many rural residents interviewed. This way of life involves spending summers at fish camp, harvesting and drying fish for table use as well as for dog food, and spending the winter caring for and working with dogs in a variety of activities. One musher described the importance of dogs this way:

"Having dogs gives people a reason to be out on the river, living in fish camp, and living the lifestyle that they know and love. If I didn't have dogs, there would be no reason to move out to summer fish camp. I could easily fish those short commercial openings and get fish for us to eat from my home here in [the village]. Having dogs requires you to move out to fish camp for the summer with the dogs and the kids and everything, and this is something we look forward to all year long. It is a lifestyle we are dealing with here, something people have always done, and a great way to raise the kids. Having dogs is the reason behind it all."

Finally, and perhaps most importantly, mushers repeatedly commented on the social benefits that individuals and whole communities derive from dog mushing. Mushers pointed out that raising, training, caring for, and fishing for dogs was practically a full time job, and one that keeps participants involved in a culturally relevant, useful, and healthy past-time on a year-round basis. Raising and running dogs was viewed as an attractive alternative to unemployment, idleness, and substance abuse. Involvement in mushing is actively advocated for these reasons by community leaders and local mushers' organizations in many communities. "Take away our dogs," one musher said, "and you will see more drinking, and drugs, and suicide here."

Case Examples of Four Yukon River Drainage Mushers

Specific case examples are useful for more clearly describing the social and economic role of sled dogs in rural communities and to individual families. From the 68 mushers surveyed, four mushers with kennels ranging in size from 11 to 80 dogs were selected as case examples to provide a more detailed look at the ways that dog teams of various sizes are typically fed and used.

Case Example 1: Musher "F11" from Fort Yukon

The first case study is that of a 30-year-old life-long resident of the Fort Yukon area referred to as musher "F11." In 1990-91, F11 supported his family of four and his kennel of 15 sled dogs through winter trapping, summer fire fighting, occasional local construction jobs, and subsistence fishing. His wife worked part time as a bookkeeper and as a correspondence teacher for their children.

F11 described his dogs as medium-sized Alaskan huskies ranging between 55 and 65 pounds. His primary use of the dogs was to provide general winter transportation for trapline work, hauling wood, and active involvement in local sled dog races following the trapping season.

F11 and his trapping partner operated a 70-mile main trapline and 20 miles of side lines in the upper Black and Salmon Fork River drainages. Target species were primarily lynx and marten. Incidentally caught furbearers included fox, squirrel, and hare. Together, they used snowmachines and his 10-dog team, interchangeably, to patrol their line. Their trapping camp was situated such that it took three days to reach it by dog team from Fort Yukon. Total miles accumulated during an average trapping season was estimated to be about 2,000 miles.

Over the past five or six years, F11 has participated in long- and middle-distance races including the Iditarod, Yukon Quest, Kuskokwim 300, Chandalar 70, and Angel Creek 150. He scratched as a rookie in both the Iditarod and the Yukon Quest out of concern for his dogs' feet and lack of financial support. In shorter, middle-distance races, he has consistently placed among the top five finishers and has averaged about \$3,000 a year from race activity in recent years. To

maintain his dog team, F11's kennel has produced about four litters of pups annually. From each litter some pups have been kept while others were given away, traded, loaned, or sold.

About half of his dogs' diet consisted of fall chum salmon with 1,500 harvested for use as dog food in 1990. F11 maintained a fishwheel and he and his family spent much of their summer and fall at fish camp cutting and drying fish. In addition to dried salmon, F11 also fed his dogs rice, fat, commercially manufactured dry dog food, and incidentally caught whitefish, suckers, and "herring" or ciscos. Food for the dogs was always prepared by cooking.

F11's wife emphasized the dogs' important role in maintaining their family's way of life, recreational opportunities, and good physical and mental health.

Case Example 2: Musher "M1" from Manley Hot Springs

Case example 2 describes the use of dogs by a 45-year old musher, "M1," and his wife. In 1990, commercial fishing was the primary wage-earning activity for this household along with their dog kennel operation and a small amount of income generated by rental properties. In May 1991, M1 reported having 80 adult sled dogs, the largest dog yard of any musher surveyed during this study. He described his dogs as "racing huskies," used primarily for sprint racing. In addition to participating in dog races himself, he sold and leased sled dogs. He comes from a mushing background, and has been involved in dog mushing since the age of 5. Even during his tour of duty in the U.S. Army he mushed dogs for the military.

At the center of M1's large kennel was his core racing team of 30 to 40 well-trained and conditioned dogs. The rest of his kennel consisted of one or more teams of six to eight "yearlings" (dogs one to two years old) being trained for eventual use in the racing team, several "puppy teams" (dogs 6 to 12 months old) in basic training with older leaders, and a selection of good, marketable dogs of all ages offered for sale. He has sold an average of ten dogs per year for prices which ranged from \$200 to \$1,500 each. During the 1990-91 racing season, M1 participated in about a dozen sled dog races, placing "in the money" in many of them including the North American Sled Dog Championship and the Anchorage Fur Rendezvous race. He was totally self-financed in his dog racing activities with no outside support from sponsors. While M1 derived most of his income from commercial fishing, he estimated that dog sales and dog racing were responsible for about 25 percent of his household income in an average year.

Like most competitive racers, M1 used a highly specialized diet and feeding program for his racing team that included commercial dry dog food, rice, bone meal, beef and beef fat, horse meat, chicken, corn oil, eggs, liver, and vitamins. During the winter, his dogs consumed more than 120 pounds of commercially purchased meat and feed each day. Fish were not used to feed any of the dogs in his prime racing team. He used fish to some extent to feed puppies and yearlings. In 1990, he reported harvesting about 2,000 fall chum and coho salmon combined for use as dog food. A portion of these were cut and dried and the remainder were frozen whole out-of-doors. During the summer and fall fishing season, he often obtained additional fish heads and scraps from local fishermen and processors to supplement his use of commercial dog food. Dried and frozen fish, as well as fish scraps, were always cooked prior to feeding to the dogs. While fish may represent a larger proportion of the diet for the young dogs in his kennel, M1 estimated that fish supplied ten percent or less of his dog food needs overall.

Case Example 3: Russian Mission Musher "RM6"

Musher "RM6" was in his late 20's and supported his family of five and 11 sled dogs by various and combined means. He has lived in Russian Mission all his life and inherited his father's "limited entry" commercial salmon fishing permit. Commercial fishing provided his major source of income along with seasonal construction jobs in the village. His wife worked part time at a local business. Through local trade and barter networks, he frequently supplemented his income by selling locally available resources such as firewood, ash from burnt birch and willow fungus, freshwater fish, furs from trapping, and carcasses from furbearers. He has been an active subsistence hunter and fisherman, noted within the community for high productivity in harvesting and for generous sharing of wild foods.

Growing up, RM6's father had always maintained a dog team of 7 to 14 dogs used for general transportation, trapping, and hauling wood and ice. Since the 1960s snowmachines have been used for most family subsistence activities, but the dog team functioned for all winter transport when cash income was low or when prevailing travel conditions were best met with a dog team. The dog team also provided protection from bears at fish camp. Now, RM6 has assumed primary care and ownership of the family dog team. In June 1991, RM6 had 11 trained, adult dogs and was looking to add several more pups.

RM6 used his dog team for general transportation, hunting, camping, recreational trips with his family, and as guard dogs. He has also trained them to compete in local sprint races. In local spring carnival sled dog races he has frequently won prizes ranging from a sack of dog food to \$200. While he used a snowmachine for most subsistence activities, he was planning to expand the use of his dogs to include middle-distance racing by using them on training runs to check furbearer traps, fish traps, and to haul wood.

In 1990-91, RM6 fed his dog team primarily with subsistence-caught fish. Throughout the summer his team was kept at fish camp and was fed scraps from sheefish, king, summer, and fall chum salmon. Unmarketable "calico" summer chum salmon caught during commercial fishing periods were also fed to his dogs. In all, he estimated that 300 chum salmon were eaten fresh or were dried for winter dog food. That amount fell short of his goal of putting up 75 salmon per dog, but the difference was made up with other fish species. An estimated 250 pounds of pike, burbot, sheefish, and whitefish combined were taken in nets for use as dog food and fish traps were used to harvest about 300 pounds of blackfish. RM6 also reported that he caught over one ton of eels in 1990 just after freeze-up and that most of these were frozen for use as dog food. Moose scraps were also fed to his dogs. This diet of wild resources was supplemented with oats, rice, and commercial dog food, which he shipped via parcel post from Anchorage at a cost of about \$21 per 50-pound bag. In 1990-91 he reported buying seven to nine bags of commercial dog food.

RM6 described the maintenance and care of a dog team as a positive outlet for energy, and a great way to focus the teaching of responsibility to his children. He liked the interaction with his kids and other village residents engendered by having a dog team. He found that many older people related to him through his dogs and that he learned much about the country and subsistence work through this exchange. Lastly, he noted that traveling with a dog team provided the ultimate enjoyment of the environment, and a quiet ride with greater opportunity for observation and learning.

Case Example 4: Musher "T14" from Tanana

The final case example examines musher "T14," a 43-year-old resident of Tanana who supported his family of four by trapping, commercial fishing, and running a small gas engine repair business. His wife worked as a part time nurse and also made and sold custom arctic clothing. They have lived and mushed dogs in the Tanana area for 16 years. In May 1991 he had 20 adult dogs which he described as "medium-sized trapping dogs in the 50- to 65-pound range." His primary use for the dogs was to provide transportation on his trapline, but he also used his dogs for general winter transportation, hauling wood, and racing.

T14 operated two traplines; a winter trapline for marten, lynx, and wolverine which he ran with another Tanana resident, and a spring trapline for beaver which he operated alone in the Tozitna River drainage, 40 miles from Tanana. He estimated that his dogs run more than 1,000 miles during an average trapping season. For trapline work, he used a team of 12 dogs. He has found that to maintain a working team of 12 dogs, it is necessary to have a kennel of 18 to 20 dogs. In addition to dogs, his household owned two snowmachines, one for in-town use and one which was maintained for trapline use. On the trapline, the snowmachine was used for quick trips to town and to break trail for the dogs following heavy snowfall. Dogs were preferred by T14 for the task of patrolling the trapline because of their reliability in all kinds of weather and their ability to pull heavy loads in the steep, hilly terrain which characterizes his trapping area. Furs harvested were not sold as raw furs, but were tanned and used by his wife to make garments which she sold.

Throughout the winter and spring, T14 participated in local middle-distance and sprint sled dog races. In 1990-91, T14 finished in four local sprint races that offered small cash prizes. His total race winnings for the year were less than \$100. In years past, he has competed in several major long-distance races such as the Coldfoot Classic and the Yukon Quest. Problems with sick dogs forced him to scratch from a middle-distance (280-mile) race in 1991 which might have earned him several hundred dollars in prize money. To maintain his kennel and replace aging dogs, T14 has tried to have two or three litters of pups produced each year. From these breedings he has normally kept several dogs and has also given away or traded dogs for services or commodities. He has also sold two or three dogs each year for cash. Dogs sold were usually trained, young adult dogs which he sold for \$500 to \$600 each.

T14 and his family maintained a fishwheel and lived at fish camp during the summer for both commercial and subsistence fishing. During the 1990 fishing season, T14 processed an estimated 2,700 salmon for use as dog food. This included 200 summer chum, 1,875 fall chum, and 625 coho salmon. In addition, an estimated 200 whitefish and 45 sheefish were harvested in conjunction with commercial salmon fishing and used as dog food. At fish camp the dogs were fed fish heads and scraps, and non-salmon fish species caught in the fishwheel. For winter use, about one-fifth of the salmon harvested for dog food were cut and dried and the rest were preserved by natural freezing out-of-doors. Fresh, dried, and frozen fish were always cooked prior to being fed to the dogs. In addition to using fish, T14 purchased commercial dry dog food (1,000 pounds in 1990-91), rice, fat, and vitamins for his dogs, but estimated that 75 percent or more of his dogs' diet was comprised of fish.

T14 described dogs as an essential part of his family's lifestyle and fish as the only practical alternative for feeding and maintaining a dog team in Tanana.

The Use of Fish as Dog Food by Urban Mushers

This study focused primarily on rural communities within the Yukon River drainage where the use of subsistence-caught fish to feed dogs is a traditional practice. Less is known about the number of sled dogs or the number of mushers residing in the urban and near-urban area around Fairbanks, or about their use of fish to feed dogs. Through a review of salmon harvest data, telephone interviews with Fairbanks area mushers, and informal discussions with individuals involved in fish processing, dog food sales, and local dog mushing organizations, this study attempted to gather information that would help characterize the use of fish for dog food by the greater Fairbanks mushing population.

By some estimates, there are more sled dogs in the Fairbanks North Star Borough than there are in the rest of the Yukon River drainage communities combined. The Alaska Dog Mushers Association (ADMA) has a membership of approximately 200 mushers, thought to represent about 25 percent of the Fairbanks area mushing population (ADMA, pers. comm., 1991). This diverse mushing population includes professional mushers with kennels of 100 dogs or more and recreational mushers with small teams of ten dogs or less. One Fairbanks area feed store operator guessed that the Fairbanks area sled dog population was probably 10,000 dogs or more.

As part of this study, a list of 181 mushers participating in greater Fairbanks area sled dog racing events was compiled from race results printed in the *Fairbanks Daily News-Miner* between January and April 1991. This list was found to contain the names of many mushers who resided outside the Fairbanks North Star Borough, did not have listed phone numbers, or were part of the same mushing household as others on the list. Eliminating these, a list of about 60 Fairbanks area sled dog racers was created. From this list, telephone interviews were conducted with a total of 37 racers residing in the Fairbanks North Star Borough to determine the extent to which they utilized fish to feed their dogs. The 37 urban mushers interviewed reported owning 1,019 dogs, with kennel sizes ranging from 2 to 85 dogs. The average kennel size was 27.5 dogs. During the course of these interviews, names of mushers using fish were sometimes suggested as additional contacts. The sample, therefore, was biased in some cases, specifically to include mushers who used fish. Thus, these data cannot be extrapolated across the larger musher population to estimate the absolute percentage of urban mushers using fish to feed their dogs.

However, data collected from these interviews can be used to generally characterize the use of fish for dog food by Fairbanks area mushers based on comments from both groups -- those who did not use fish and those who did.

Most urban sled dog racers contacted said that they did not have the time or equipment necessary to harvest or process fish for their dogs. They stated it was both easier and more economical for them to purchase commercially manufactured dry dog food and meat supplements such as liver, chicken, horse, and beef to feed their dogs. Salmon was regarded as an adequate protein source for dogs, particularly when used as a summer maintenance diet or for raising pups, but was viewed as inconvenient to obtain and was considered by most mushers to be an inadequate diet for dogs during the racing season. For these reasons, most urban mushers surveyed thought that the number of dog racers in the Fairbanks area using significant quantities of fish to support their kennel operations was probably small. The handful of mushers that do use significant amounts of fish, generally obtain those fish through commercial or subsistence fishing activities in Yukon River district Y-5 near the Dalton Highway bridge or through fishing activities with friends or relatives in other rural Yukon River drainage communities.

Salmon harvest data were examined to ascertain if the number of fish used by Fairbanks area mushers could be quantified. The number of fish retained from commercial harvests is unknown. No mechanism currently exists to record the number of fish caught, but not sold, under commercial regulations. Salmon harvested under subsistence regulations in a rural community and used by an individual in Fairbanks may or may not be recorded as part of the post-season subsistence harvest survey for that rural community. This record depended upon whether the individual harvested the fish themselves or in conjunction with other fishing households that were part of the post-season survey sample. Subsistence and personal use fishing by Fairbanks residents in the vicinity of the Dalton Highway bridge (Yukon River district Y-5) can be quantified through an examination of harvest data for district Y-5 between Hess Creek and Dall River, an area referred to as "Fairbanks Fish Camp."

Subsistence salmon harvest data for the Yukon bridge area show a precipitous decline in numbers in 1988 (Table 10). A change in the subsistence law in 1987 classified Fairbanks area residents as "non-rural" and disqualified them from fishing under subsistence regulations. Although Fairbanks

TABLE 10. 1984-88 SUBSISTENCE SALMON HARVESTS FROM YUKON RIVER FISHING DISTRICT Y-5, "FAIRBANKS FISH CAMP."^a

Year	Number of permits fished	Summer chum	Fall chum	Coho	Chinook
1984	54	4,065	12,920	254	2,499
1985	42	2,027	13,874	13	1,865
1986	58	1,382	11,708	709	1,762
1987	47	5,755	21,014	64	2,287
1984-87 average	50	3,307	14,879	260	2,103
1988 ^b	39	1,327	2,653	0	2,044

Source: Whitmore, C., D. J. Bergstrom, F. M. Andersen, G. Sandone, J. Wilcock, L. Barton, and D. Mesiar 1990.

^a Fairbanks residents fishing in the vicinity of the Dalton Highway bridge between Hess Creek and Dall River.

^b Data reported for "personal use" permittees only.

residents were allowed to continue salmon fishing in the Yukon River in 1988 using a personal use fishing permit, fish caught under personal use regulations were specified for human consumption only and were not allowed to be fed to dogs. The sharp decline in the number of chums harvested from this area since 1988 is thought to be attributed to this factor. The 1988 harvest of chinook salmon from this area did not undergo a similar decline, indicating that fishing to meet human consumption needs probably continued at usual levels. Of 58 permittees, 39 reported salmon harvests from this area in 1988. A comparison of the 1988 harvest of small salmon from this area with the average harvest of small salmon from the preceding four years shows a decline in harvest of about 14,500 fish. This number is considered to approximate the annual number of subsistence-caught salmon harvested from this area in the years immediately preceding the 1988 regulation change, and fed to sled dogs in the Fairbanks area.

Fairbanks area mushers surveyed by telephone who used salmon to feed dogs reported obtaining salmon through "village connections," from fishing activities in the vicinity of the Dalton Highway bridge, and from several other sources. These sources included 1) subsistence salmon fisheries on the Tanana and Copper rivers, 2) gathering spawned-out salmon carcasses from the Delta River and Gulkana River hatchery, 3) fish heads, entrails, and cutting scraps from processors, friends, and relatives, and 4) gifts of freezer-burned fish from friends and relatives. Fish or fish scraps obtained from these sources were generally preserved by freezing or cooked fresh to feed the dogs and constituted a very small part of the dogs' diet. Several mushers reported using small quantities of freezer-burned fish, for example, as snacks or treats for their race team before or after races. Spawned-out salmon carcasses from the Delta River or Gulkana River hatchery were obtained by some mushers under permits or verbal agreements with ADF&G and sometimes provided individual mushers with significant quantities of fish such as several hundred fish or a "pick-up-truck load."

Fairbanks residents have been major participants in both the Copper River subsistence and personal use dip net fishery near Chitina and the Tanana River Y-6C subsistence and personal use salmon fishery near Fairbanks. Between 1986 and 1990 Fairbanks residents were classified as urban "personal use" fishermen and prevented by statute from feeding fish caught under these regulations to dogs. Under subsistence regulations prior to 1986 it is likely that relatively restrictive harvest limits in those fisheries

made them unattractive sources of food for dog teams. In the Tanana River Y-6C subdistrict, for example, the relatively low harvest limits of five chinook salmon and 75 chum/coho salmon per permit holder have been in effect since 1973. A 1980 survey of 255 Y-6C salmon fishing permit holders in the Fairbanks area found that nearly 80 percent of permittees made no use of Y-6C salmon for dog food (Caulfield 1981). An additional 11.5 percent of those surveyed fed some of their harvest to dogs, although most noted that this was generally entrails and cutting scraps.

While most Fairbanks mushers do not use subsistence-caught fish as dog food, a small number of sled dog racers and kennel operators in the Fairbanks area do feed salmon from the Yukon River drainage to their teams. Several urban area mushers interviewed, reported that they maintained fish camps, used set gill nets or fishwheels, and dried or froze large quantities of fish for use as dog food. The number of Fairbanks area mushers actually doing this could not be ascertained but is thought to be small.

In summary, it appears that the majority of mushers in the Fairbanks area, particularly those involved in dog racing, do not use fish to feed their dogs. Of those that do feed fish to their dogs, the quantities of fish used are typically small and come to them in the form of fish scraps or gifts of freezer-burned fish no longer usable for human consumption.

USE OF SLED DOGS IN OTHER REGIONS OF ALASKA

In addition to the more detailed information on the use and feeding of sled dogs in the Yukon River drainage presented above, Division of Subsistence staff in other parts of the state were asked to briefly summarize the use of dogs in their geographic area of expertise, based upon previous research and direct observation. These summaries are presented below for southwest, western and arctic Alaska. Reports indicate there is little use of sled dogs, if any, in southeast Alaska. Sled dog teams occur in many southcentral Alaska communities. Their uses and food sources have not been documented.

Southwest Alaska

Recent subsistence studies in the Bristol Bay/Iliamna Lake region indicate that a small number of households in most southwest Alaska communities maintain dog teams. In the Iliamna Lake area, for example, a 1982 survey of Iguigig, Iliamna, Lake Clark-Port Alsworth, Kokhanok, Newhalen, Nondalton, and Pedro Bay (Fig. 3) found a total of 22 dog teams in those seven communities (Morris 1986). Teams ranged in size from 3 to 30 dogs. Salmon were dried and used as dog food by some mushers and it was estimated that households using fish for dog food used one dried fish per dog per day. No information was collected on total quantities of fish fed to dogs or on how dog teams were used. However, dog races were known to be a popular feature of several community spring carnival celebrations.

A 1985 study of the Nushagak River communities of Ekwok, Koliganik, and New Stuyahok (Fig. 3) found 19 active dog teams combined (Schichnes and Chythlook, forthcoming). Among these communities, the major fish species used to feed dogs were spawned-out sockeye salmon (known locally as "redfish") and chum salmon. To a lesser extent, pink salmon, coho salmon, sucker, pike, grayling, and whitefish were also used as dog food. For the three communities combined, almost 25,000 pounds of fish were harvested for dog food in 1985.

In the southwest regional center of Dillingham there have been as many as six to 12 dog teams at various times in the past decade, but in 1991 there were only two active teams in the community (J. Schichnes, pers. comm., 1991). Some Dillingham mushers dry salmon, particularly chum and sockeye salmon for their dogs. Others rely on fish scraps or donations of freezer-burned fish to supplement their dog food supply. Dog races are an important part of the annual Beaver Roundup festivities held in Dillingham each spring. These races attract mushers from communities in western and southwest Alaska and prize money has totalled about \$12,000 in recent years. No information has been collected on the use of dog teams to support activities such as trapping, recreation, or general transportation within the southwest region.

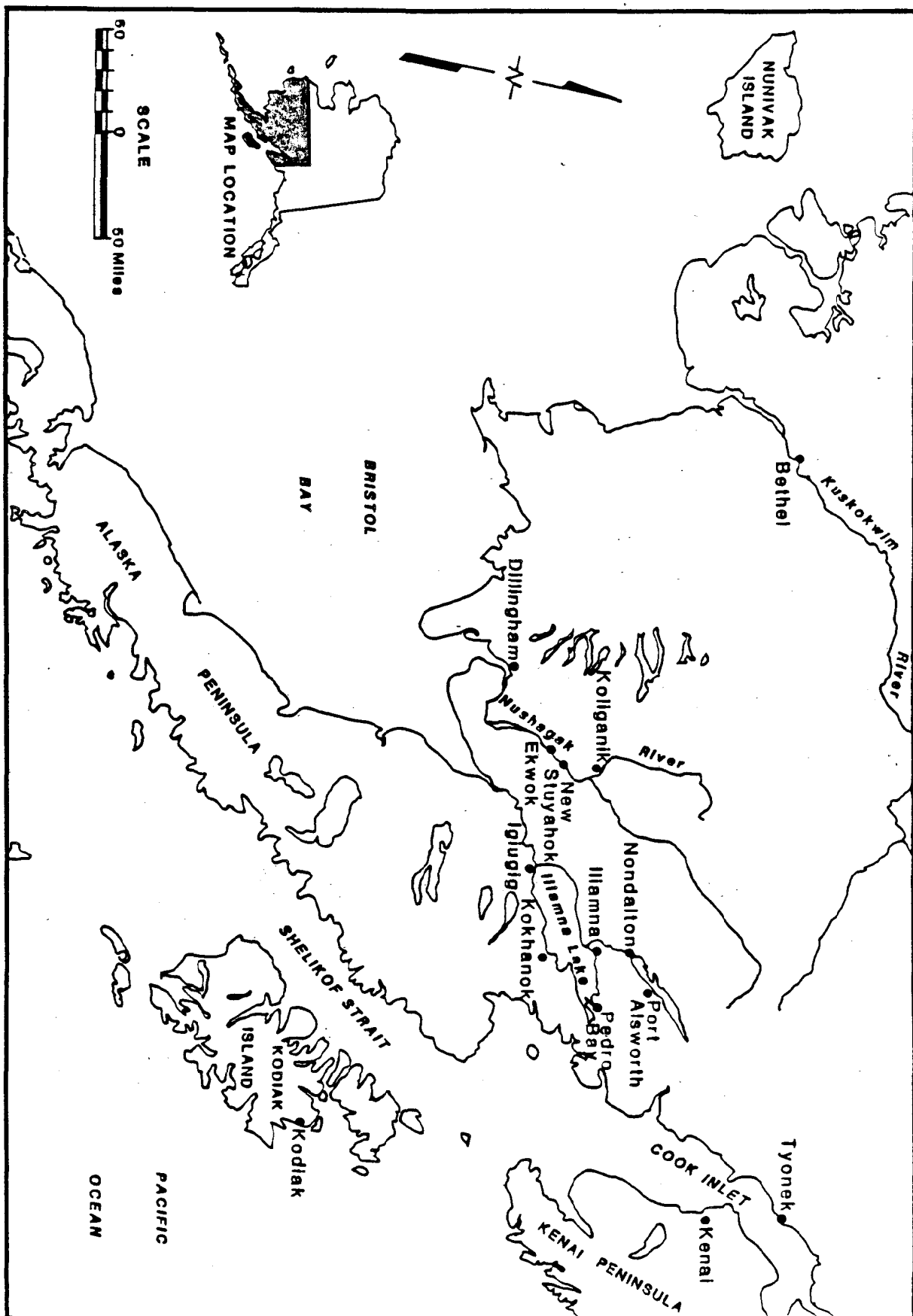


Fig. 3. Southwest Alaska.

Western Alaska

Yup'ik Eskimo communities along the Bering Sea coast commonly keep one to five dogs per household for use as "scrap dogs," but the maintenance of working or racing dog teams is much less common (M. Pete, pers. comm., 1991). A few households still utilize small working dog teams for activities such as hauling wood and transporting ice used for drinking water. In recent years, the popularity of dog racing has spurred dog mushing activities and increased the number of dog teams used for racing in some communities. Dog teams commonly range in size from 5 to 20 dogs.

There has been no systematic study on the number, use, or feeding of dog teams in this region. Based on recent observations, three teams were maintained in the community of St. Michael in 1991, including one Iditarod competitor with a kennel of more than 50 dogs (M. Pete, pers. comm., 1991). Other observations on the number of dog teams in Yukon River delta communities in 1991 include two in Stebbins, four in Kotlik, and one dog team each in the communities of Scammon Bay, Newtok, and Toksook Bay (Fig. 4). Use of commercially produced dog foods in the region was uncommon and fish made up a large component of the diet of most dogs. Chum, pink, and coho salmon for winter use as dog food are commonly dried or preserved by burying. Many dog owners also set nets or traps under the ice throughout the winter to harvest whitefish, pike, sheefish, blackfish, burbot, cod, and cisco to feed dogs. Sea mammal scraps and organs not used for human consumption were sometimes fed to dogs teams along the Bering Sea coast.

Only limited information is available on the contemporary use of dog teams in the Kuskokwim River drainage. A subsistence study in Kwethluk (Fig. 4.) in 1986-87 found eight to ten dog teams in that community (M. Coffing, pers. comm., 1991). These teams were used for a variety of activities including trapping, hauling wood and water, transportation to ice fishing locations, recreation, and participation in local races. In the upper Kuskokwim River community of Lime Village (Fig. 4) in 1988 and 1989, several families were observed to use dog teams exclusively to support all their winter transportation needs (M. Coffing, pers. comm., 1991). Dogs there were fed a wide variety of wild resources including most available fish species and some big game species.

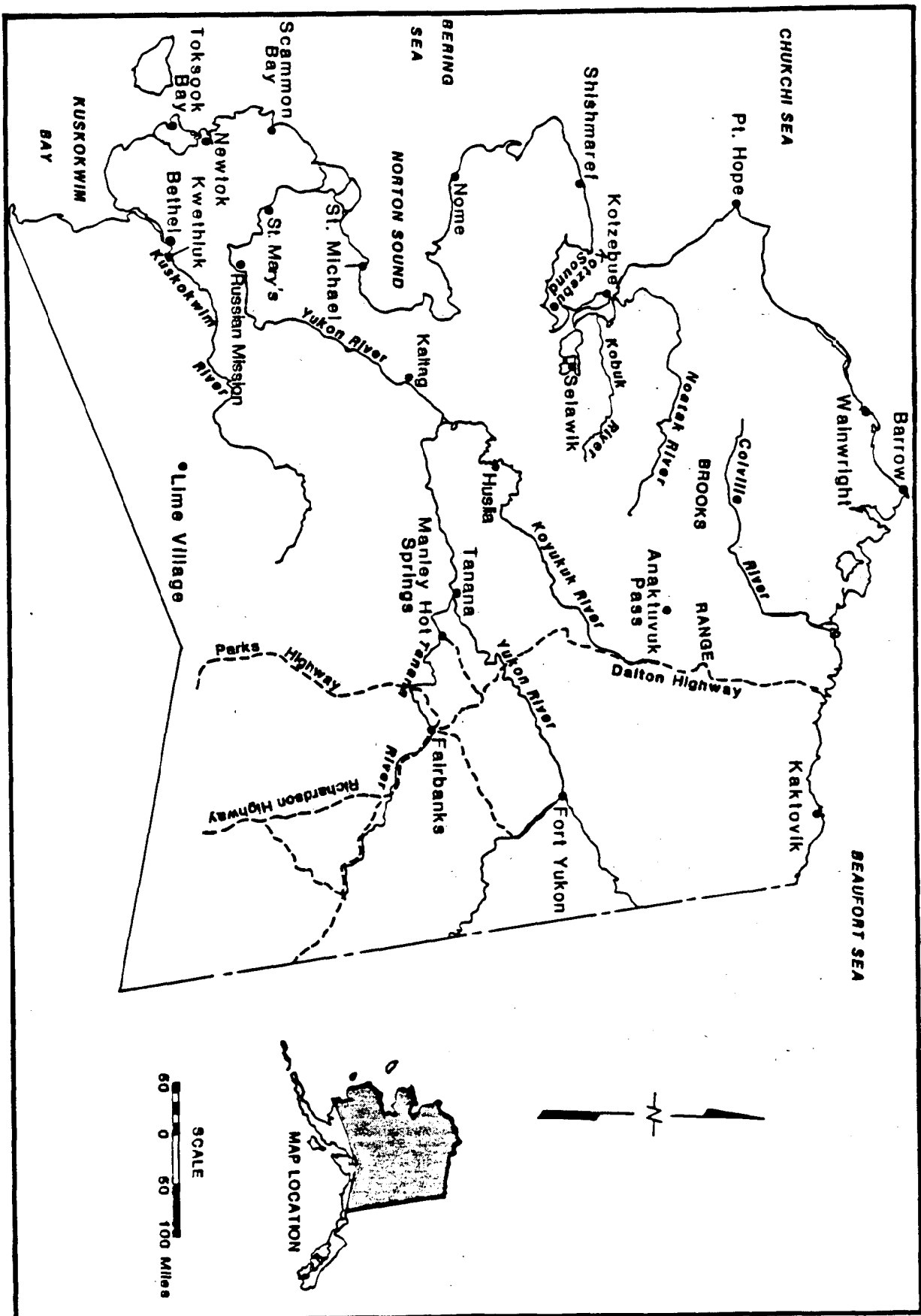


Fig. 4. Western and arctic Alaska.

Arctic Alaska

In northwest Alaska in 1991, dog teams were most common in Nome, Shishmaref, Kotzebue, Selawik, (Fig. 4) and communities along the Kobuk River. There were an estimated 150 teams in the 33 communities in this region in 1991 (S. Georgette and J. Magdanz, pers. comm., 1991). Most teams were used for a combination of recreation, inter-village travel, transportation to support hunting, fishing, and wood gathering activities, and local racing. Only about 20 mushers from the Norton Sound region and less than ten mushers from the Kotzebue Sound region competed regularly in dog sled races in other parts of the state.

Wild foods still were commonly used for dog food in northwest Alaska in 1991, although not to the extent that they were used in the past. Commercially manufactured dog food has become increasingly common, especially in Kotzebue and Nome where many dog mushers have relatively stable employment and where barge service significantly reduces the freight cost of commercial feed. In addition, most competitive mushers from this region agree that dogs fed solely on wild foods did not hold up well under the stress of racing. Still, in smaller communities and camps, wild foods, particularly fish, remained the staple food of dog teams, and even in the larger community of Kotzebue, most mushers supplemented their dogs' diet with wild food when available.

In Kobuk River communities, salmon and whitefish were the main wild resources used for dog food. The lower Kobuk River community of Noorvik likely used sheefish as well. In the upper Kobuk River, sheefish were regarded as a premium subsistence food and were not generally used for dog food. Parts and scraps from the seasonally abundant harvest of caribou were also used for dog food.

Kotzebue's coastal location provided access to a greater diversity of resources for dog food including salmon, whitefish, sheefish, herring, pike, flounder, saffron cod, sculpin, sucker, and marine mammals such as seals, and occasionally walrus. A 1986 harvest study of Kotzebue found an estimated 74,127 pounds of wild foods were fed to dogs during the study year (Georgette and Loon, forthcoming). This included 3,190 salmon, 6,695 sheefish, 1,983 whitefish, and 14,090 herring. Other wild resources used for dog food included saffron cod, pike, muskrat, and seal. Kotzebue's dog population in 1986 was estimated at 1,889 dogs, although not all were sled dogs.

In some Norton Sound communities, marine mammals comprised the majority of wild foods fed to dogs, followed by fish. For example, a 1984 survey in Brevig Mission found that 65 to 71 percent of sampled households used portions of spotted, ringed, and ribbon seal to feed dogs (Magdanz, forthcoming). By comparison, only 8 to 18 percent of the households reported using salmon or whitefish for dog food. In other Norton Sound locations, such as Unalakleet, dried pink salmon made up the largest portion of the wild resources fed to dogs.

On Alaska's vast North Slope there appears to be little use of dog teams compared with other areas of Alaska north of the Alaska Range. While dog teams played an important role for the Inupiat Eskimo for transportation during the first half of the 20th century, they have been largely replaced with snowmachines since the mid-1960s and, more recently, by three- and four-wheeled all-terrain vehicles. Based on the observations of one researcher involved in North Slope subsistence studies for 13 years, there has probably not been more than one dozen functional dog teams between Point Hope and Kaktovik since 1979 (S. Pedersen, pers. comm., 1991). The total number of sled dogs on the North Slope in 1991 was estimated at less than 100 dogs including two teams known to race competitively. Dogs in North Slope communities are commonly fed fish, seal meat, whale meat, and some commercial feed.

These summaries show that the patterns of dog ownership and use of dog teams observed in the Yukon River drainage are not unique to the region. Throughout western, interior, and arctic Alaska, small numbers of dog teams continue to be maintained in most communities, supporting a variety of activities from general transportation to racing. Frequently the same teams used for trapping or wood hauling, also competed in local races for prize money. Wild resources, particularly fish, are used to some extent by most mushers. Large kennels and urban area mushers were less likely to use wild resources than small teams based in rural areas. In general, the wild resources fed to dogs were those available seasonally in great abundance or those species least desirable for human consumption. While the species fed to dogs vary from region to region and from coastal to inland locations, salmon is perhaps the most commonly used wild resource for feeding dogs across Alaska.

SUMMARY AND CONCLUSIONS

Dog teams have played a unique and colorful role in the history and development of Alaska. From at least the contact period of 1840 onward, dogs, fed on a diet of fish, provided the major means of winter transportation through the fur trade and gold rush eras through the first half of the 20th century. Along with this utilitarian role, dogs were bred, sold, traded, leased, and raced. The roots of organized dog racing in Alaska can be traced back more than 80 years.

The introduction of the snowmachine in the late 1960s and early 1970s significantly reduced, but did not eliminate the use of dog teams in rural interior Alaska. Costs associated with buying, operating, and maintaining snowmachines coupled with concerns about their reliability caused some mushers to retain or return to dogs for at least some of their transportation needs in the 1970s and 1980s. At the same time, a growing interest in dog racing led to a revival in the raising and training of sled dogs. Since the mid 1980s the dog population in 32 rural Yukon River drainage communities is thought to have averaged about 5,000 dogs. During the last 15 years, there has been no discernable trend in the numbers of dogs in these communities.

This study found that dog teams were maintained in communities of the upper, middle, and lower Yukon River for a variety of activities including trapping, racing, hauling, and general transportation. Dogs were also used to guard fish camps from bears, as pack animals, and as scrap dogs, consuming fish scraps associated with seasonal subsistence fishing and fish processing activities. There was no evidence that there were different kinds of dog teams used for different purposes. Data showed that most teams were used for a variety of purposes. Among surveyed mushers, dog yards or kennels ranged in size from 4 to 80 dogs. Regional differences were noted in kennel size and use of dogs. In study communities along the lower Yukon River the average kennel consisted of 11 dogs compared to the upper Yukon drainage average of 17 dogs. Teams from both areas were almost equally involved in racing. Along the lower Yukon River, 71.4 percent of mushers reported using dogs for racing compared with 66.7 percent of the upper Yukon River teams. Involvement in racing was highly variable ranging from once-a-year participation in small spring carnival races, to participation in highly competitive races

such as the Yukon Quest and the North American Sled Dog Championship. More than one-half (51.9 percent) of mushers surveyed in the upper Yukon drainage used dogs for trapping, whereas only 14.3 percent of lower river mushers reported trapping with dogs. There was commonly no distinction between work dogs and race dogs. More than 63 percent of those using dogs for trapping used the same dogs for racing. Overall, 86.8 percent of mushers surveyed reported using their dogs in ways that could potentially be classified as income-producing or commercial activities including all types of racing (sprint, middle-distance, and spring carnival races), trapping (for both home use and furs for sale), breeding dogs for sale, and renting or leasing dogs or teams.

Among surveyed dog team owners in rural communities, 100 percent reported using fish to some extent to feed their dogs. In contrast, use of subsistence-caught fish to feed dogs in the greater Fairbanks area appears to be rare. In general, larger kennels in rural areas tended to rely less on fish than smaller kennels. For the 8.8 percent of the mushers reporting that fish made up 25 percent or less of their dogs' diet, the average kennel size was 32.5 dogs. Among 52.3 percent of surveyed mushers reporting that fish made up 75 to 100 percent of their dogs' diet, the average kennel size was 13.5 dogs. These data indicate that the use of fish to feed large sled dog teams in rural areas is less common than for feeding smaller teams.

The survey found distinct regional differences in the kinds of fish used to feed dogs. On the lower Yukon River, subsistence harvest of non-salmon species such as eel, blackfish, pike, whitefish, and sheefish were reported as the most common fish species fed to dogs. Salmon formed a relatively small proportion of fish fed to dogs in this region, with an average of 21 salmon used per dog per year. In the middle Yukon River community of Kaltag, the commercial salmon roe fishery in that area was found to significantly affect the number and species of fish fed to dogs. There, carcasses of female summer chum salmon harvested commercially for their roe were cut and dried and provide most of the fish used to feed dogs. An average of 240 salmon per dog per year was reported by Kaltag mushers. Among the four upper Yukon River and Koyukuk River communities, subsistence harvests of summer chum on the Koyukuk River and fall chum and coho salmon in the upper Yukon River supplied much of

the fish fed to dogs along with smaller harvests of whitefish, sheefish, pike, and suckers. Mushers in this region reported using an average of 94 salmon per dog per year.

The harvest of salmon in the Yukon River drainage that is fed to dogs is viewed as a subset of the drainage-wide subsistence harvest of small salmon. The average subsistence harvest of small salmon in the Yukon River from 1984 to 1988 is estimated to be 453,100 salmon. This study and previous subsistence studies indicate that about 62 percent of this harvest is fed to dogs, resulting in an average harvest of about 281,000 subsistence-caught salmon used to feed approximately 5,000 dogs in 32 Yukon River drainage communities in recent years.

A telephone survey of Fairbanks area mushers involved in dog racing indicated that most urban area sled dog racers do not generally use fish to feed their dogs. Of those that do feed fish to their dogs, the quantities of fish used are frequently small and come in the form of fish scraps or gifts of freezer-burned fish no longer usable for human consumption. Some respondents asserted that a small number of sled dog racers and kennel operators in the Fairbanks area used Yukon River salmon as dog food. The extent of this practice and the total number of salmon harvested by this small group of urban mushers is undocumented.

Limited information from subsistence researchers in other regions of Alaska suggests that the patterns of dog use and ownership observed during this study of the Yukon River drainage are similar to some other areas of the state, particularly the southwest, northwest, and upper Kuskokwim River areas. Only on North Slope have sled dogs largely disappeared in some places. In other regions, dog teams continued to be maintained in many communities. Dog teams supported a variety of activities including recreation, general transportation, trapping, and racing. Wild resources, particularly fish, were used to some extent by most rural mushers to feed dogs. Urban area mushers are less likely to use wild resources to feed their dogs than the owners of small dog teams based in rural areas. In general, the wild resources fed to dogs were those that are available seasonally in great abundance or are species that were least desirable for human consumption. The species of wild resources fed to dogs varied from region to region, and from coastal to inland locations. But throughout Alaska, salmon has been, and remained, perhaps the most commonly used wild resource fed to dogs. In all cases, the use of fish to feed dogs was

a labor-intensive activity. Fishing requires time, equipment, labor, and a commitment to maintain the dog team on a daily basis. In addition to several drying and preservation techniques, virtually all fish was prepared by cooking prior to feeding to dogs.

The use of dogs to support activities such as recreation, trapping, general transportation, and racing has been woven into the social and economic fabric of families and communities over generations in Alaska. In rural communities of the Yukon River drainage, raising and training "good dogs" have long been, and remained in 1991, a source of individual and community pride and were part of a way of life that was actively encouraged and valued as an alternative to idleness, unemployment, and substance abuse. Working dogs also served an educational purpose for youth, teaching them responsibility while learning skills that could benefit them later on. The ability to feed sled dogs using local wild resources, particularly fish, continued to be a key factor in the viability of dog mushing in rural Alaska.

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APPENDIX 1. Proposal 396

PROPOSAL 396 - 5 AAC 01.XXX. STATEWIDE PROVISIONS - SUBSISTENCE FISHING. and 5 AAC 39.975. DEFINITIONS. and 5 AAC 77.XXX. STATEWIDE PROVISIONS - PERSONAL USE FISHING.

5 AAC 01.XXX. Fish caught for subsistence purposes cannot be fed to dogs used for commercial activities including but not limited to dog racing, trapping, or commercial kennels.

5 AAC 39.975. DEFINITIONS.

(XX) commercial purposes means(language will be adopted by the Board of Fisheries).

(XX) commercial kennels means(language will be adopted by the Board of Fisheries).

5 AAC 77.XXX. Fish caught under personal use regulations cannot be used as animal feed.

PROBLEM: At the request of the Alaska Board of Fisheries at the March 19 through 25, 1991 meeting, the staff has developed this proposal. The Board of Fisheries is requesting public input into these proposed regulations.

WHAT WILL HAPPEN IF NOTHING IS DONE? These proposals are an attempt to clarify current regulation and place the public on notice of the Board of Fisheries intent on the use of subsistence caught fish as dog food.

WHO IS LIKELY TO BENEFIT? Clearer regulations will benefit all users.

WHO IS LIKELY TO SUFFER? Fishermen who are currently feeding subsistence caught fish to dogs in a commercial activity and believe that this is legal.

OTHER SOLUTIONS CONSIDERED? The proposals are meant to generate public discussion, final regulation language will be adopted by the Board of Fisheries.

PROPOSED BY: Alaska Board of Fisheries

APPENDIX 2. Survey Instruments

SURVEY ON DOG TEAM USE AND THE FEEDING OF SUBSISTENCE FISH TO DOGS Division of Subsistence, Alaska Department of Fish and Game, Fairbanks, Summer 1991

Survey Date _____ Interviewer _____

Community _____ Person Interviewed _____

DOGS/KENNEL INFORMATION

1. How many dogs do you currently have?(exclude puppies < 9 mo. old) _____

2. What kinds of dogs are they?(How would you describe your dogs)

3. How do you use your dogs? (check all uses that apply)

<input type="checkbox"/> sprint racing	<input type="checkbox"/> transportation/camping/recreation
<input type="checkbox"/> distance racing	<input type="checkbox"/> breeding dogs for sale
<input type="checkbox"/> trapping	<input type="checkbox"/> rent or lease dogs or teams
<input type="checkbox"/> hauling wood, water etc.	<input type="checkbox"/> watch/guard/bear dogs
<input type="checkbox"/> household pets/"scrap" dogs	<input type="checkbox"/> other _____

(Questions 4 through 6 are for mushers only)

4. How long have you had dogs? _____ 5. Did your father or mother have dogs? Yes _____ No _____

6. Do you use different size teams or different dogs for different activities? (Do you have several teams?)

DOG FOOD INFORMATION

7. Do you feed fish to your dogs? Yes _____ Scraps Only _____ No _____ (if no, skip to question 13)

8. I would like to know what kinds of fish you used for dog food last year, approximately how much you used, and how you obtained them. (Record fish used for dog food between summer 1990 and summer 1991)

Fish Species	Quantity Used	How Obtained (circle)
_____	_____	commercial fishing subsistence fishing barter/trade purchase given
_____	_____	commercial fishing subsistence fishing barter/trade purchase given
_____	_____	commercial fishing subsistence fishing barter/trade purchase given
_____	_____	commercial fishing subsistence fishing barter/trade purchase given

9. How are these fish preserved and prepared?

10. Do you have a rough estimate for how much fish you need or use per dog per year?

11. In the last year, about what proportion of your dogs' diet was fish?(circle)

1/4 or less 1/4 to 1/2 about half 1/2 to 3/4 3/4 or more all

12. If you could not use subsistence-caught fish, what would you feed your dogs?

13. What do you feed your dogs besides fish?

_____ commercial dry dog food

_____ rice or other bulk grains

_____ commercial bone or fish meals

_____ other purchased foods _____

_____ furbearer carcasses

_____ moose scraps

_____ caribou scraps

_____ other wild foods _____

14. How much does a bag of commercial dog food cost in your community? _____

INFORMATION ON SNOWMACHINES vs DOGS

15. How many snowmachines does your household own?(working machines) _____

16. Can you comment on why snowmachines have not completely replaced dog teams in your community?

17. How are dogs better than snowmachines? (Explain)

18. How are snowmachines better than dogs? (Explain)

19. Do you have any comments on the proposal now before the Board of Fisheries to prohibit the feeding of subsistence fish to dogs used for racing, trapping, or other commercial purposes?

DEMOGRAPHIC INFORMATION

20. Age of respondent _____

Number of people in household _____

THANK YOU VERY MUCH FOR TAKING THE TIME TO ANSWER THIS QUESTIONNAIRE

HISTORICAL INTERVIEW GUIDE
Topics for Discussion With Key Respondents on Dog Mushing History

Division of Subsistence, Alaska Department of Fish and Game, Fairbanks, Summer 1991

(With permission of the respondent, interviews will be recorded on tape)

FOR THOSE THAT REMEMBER MUSHING IN THE MAIL TRAIL ERA OF PRE-1935

DOGS AND TEAMS

How big were the commercial teams that carried freight and mail?

Were the dogs different than those used today?

How were the commercial teams and dog lots different from the teams individual families maintained?

How many dogs did most households have for their own use?

Do you remember what a good sled dog cost back then?

DOG FOOD

What did people feed their dogs?

Did most mushers catch fish for their own dogs or did a few people specialize in fishing and providing fish to mushers?

How much did dry fish cost? (per pound-----per bale)

RACING

Were there dog races?

Did people race their freight and trapping teams or were there dogs that were bred just for racing?

How about prize money?

INFORMATION ON THE TRANSITION FROM DOG FREIGHTING TO AIRPLANES

Do you remember the days when freight and mail were carried by dog team?

When aircraft began replacing commercial mushers was there a large surplus of dogs around?

FOR THOSE THAT REMEMBER THE PRE SNOWMACHINE ERA

DOGS AND TEAMS

Before snow machines, about how many dogs did most people have?

Were there a lot more dogs around then than now?

Were the dogs different than those used today?

Would a single household have different teams for different purposes? (trapping vs village transportation etc.)

What did a good sled dog cost back then?

DOG FOOD

What did people feed their dogs?

Did most mushers catch fish for their own dogs or did a few people specialize in fishing and providing fish to mushers?

Were there commercial dog foods available?

How much fish did an average household put up for their dogs?

Did people barter and trade to obtain fish for dogs?

RACING

Were there dog races?

Did people race the same teams they used for trapping and transportation or did they have special racing teams?

Prize money?

INFORMATION ON THE TRANSITION FROM DOGS TO SNOW MACHINES

When did snow machines become common popular in this community?

Did people switch from dogs to snow machines right away or was there a transition?

What did people do with their dogs when they made the switch to snow machines?

Where there people who made the switch to snow machines and then went back to using dogs?

Why do you think there are still dog teams around now that snow machines are commonplace?

TELEPHONE SURVEY OF URBAN AREA DOG RACERS

Division of Subsistence, Alaska Department of Fish and Game, Fairbanks, Summer 1991

Date _____ Interviewer _____

Person Interviewed _____ Phone _____

1. How many dogs do you currently have in your dog lot? (excluding pups < 9 mo. old) _____

2. Do you use your dogs for any other activity besides racing?

3. Do you feed fish to your dogs? Yes _____ No _____ (if no, skip to question 10)

4. What kinds of fish do you feed your dogs _____

5. How do you obtain these fish? (circle)

commercial fishing subsistence fishing barter/trade purchase other _____

6. How are these fish preserved and prepared? _____

7. How many fish did you use for dog food last year? (summer 1990 to summer 1991) _____

8. Do you have a rule-of-thumb for how much fish you need or use per dog per year?

9. In the last year, about what proportion of your dogs diet was fish?

1/4 or less 1/4 to 1/2 about half 1/2 to 3/4 3/4 to all

10. What do you feed your dogs besides fish?

THANK YOU FOR TAKING THE TIME TO ANSWER THESE QUESTIONS

APPENDIX 3.

Comments From Surveyed Mushers on Proposal 396.

FORT YUKON

(Fort Yukon)-They should categorize different intent of uses of the fish if this is going to make it illegal. The communities that have commercial activities like racing should be monitored. Trapping should be placed in its own category because it is a different activity than like racing. Racing is more like a hobby and trapping is the only economy established here since Hudson Bay and the system has been in place for a long time. This involves customary trade such as the exchange of fish between fishermen and trappers for things like beaver castor. Some people never go out to fish but they trap and some order the "fermented fish" for bait. So fish are an integral part of this economy here.

(Fort Yukon)-Most of the fish and by-products will be thrown back into the river if not used for dogs.

(Fort Yukon)-I have been doing this for 60 years. There is still plenty of fish in the river.

(Fort Yukon)-We have to have fish. Why would you destroy our economy?

(Fort Yukon)-Everything is fine just as it is. Why bother doing something like this?

(Fort Yukon)-No comment.

(Fort Yukon)-This is ludicrous, [it] would destroy our way of living.

(Fort Yukon)-We use our trapline dogs for spring races just to earn a little extra money, that's all.

(Fort Yukon)-No comment.

(Fort Yukon)-I can't believe that this is even being [seriously] considered.

(Fort Yukon)-Our forefathers have used fish for 150 years without any problems.

(Fort Yukon)-No comment.

(Fort Yukon)-I am strongly against this. This will completely put me out of the [trapping] business. At least 50 percent of my trapline is not accessible by snogo so I will only be able to catch half the fur I usually do. My trapline is in ANWR [Arctic National Wildlife Refuge] and I am using the most traditional method of travel possible. This law would force me to change my whole lifestyle. My whole livelihood is at stake here.

HUSLIA

(Huslia)-What are our dogs going to eat? The fish come up this way to die. This [fishing] is our custom. This [regulation] is wrong. Dogs are just like us, they can't eat "Friskies" all the time, they need to have that fish.

(Huslia)-It is almost impossible to make money raising dogs. Fish really helps make ends meet. Whoever proposed this should have to buy us dog food. How can you enforce something like this? What are you gonna do, put a fish cop in every village?

(Huslia)-If this passes you can take my fish and replace it pound for pound with meat for me to feed my dogs. I am opposed to this.

(Huslia)-I don't have any comment on this.

(Huslia)-I'd be against this. All us people up this way will be against this.

(Huslia)-What are we supposed to feed our dogs? There is nothing else here to feed them.

(Huslia)-This regulation is just stupid. Dog salmon is the only fish we get here.

(Huslia)-I thought they were just joking when I first heard of this. We have to make it with what we have available to us here. Fish is all we got. We have no commercial fishing here and it is hard to get sponsors so you can buy commercial food.

(Huslia)-I am really against this. You guys should have better things to do with your time than mess around with issues like this.

KALTAG

(Kaltag) This law is crazy, even though it won't affect us much here it will hurt other Native people in our region. Feeding fish to dogs is not a waste of fish, it is what has always been done.

(Kaltag) People have to have dogs, even nowadays, to protect our fish camps. Dogs are very important to us.

(Kaltag) The historical aspect of drying chum salmon for dog food is very engrained in the culture here. The whole seasonal cycle of village life has centered around providing for dogs.

(Kaltag) You have no reason to say that anyone can't have dogs or feed them fish. This law will make it hard on people. The State should be required to supply us with dog food for the villages if they say we can't use fish. This is our Native tradition you are talking about.

(Kaltag) The historical use of fish to feed dogs in this area existed long before the commercial fishery. The economic impact of not being able to feed dogs fish would be discriminatory against people who are not financially capable of alternative feeding programs for their dogs.

(Kaltag) I don't like this a damn bit. We live by what is needed out here. We don't waste anything.

(Kaltag) I think whoever is trying to do this is crazy. We use dogs for everything and always have.

(Kaltag) A lot of the fish we get here are not fit for human consumption. People have to have dogs for protection at camp from bears. People who need dogs will continue to feed fish to dogs as they always have no matter what the law says.

MANLEY HOT SPRINGS

(Manley Hot Springs)-I really don't think there is a problem with the number of fish going to dogs. Most big time mushers are not using much fish. I'm not in favor of this proposal because I'd hate to see the small kennels with working dogs be hurt.

(Manley Hot Springs)-Trapping is a subsistence way of life, not a commercial operation. I don't see how you can call this way of life commercial. I think you are going to have a lot of difficulty proving things like profit and profit motive and it will be impossible to police. I'm concerned about rules like this coming without warning just like they did with the Kantishna closure. People will need time to prepare for a regulation like this. I believe that if anyone is taking welfare or food stamps they should not be eligible for subsistence privileges. I hope this issue does not turn into a racial issue.

(Manley Hot Springs)-The feeding of subsistence fish to dogs has a long history in Alaska and is easily documented through photos, written record, and diaries. It could be supported on the basis of "customary and traditional" grounds alone. Attempting to limit the feeding of subsistence fish to non-commercial kennels requires a very precise definition of commercial. Will commercial be defined by the number of dogs in the kennel, the activities engaged in by the kennel, the amount of profit, the issuance of a business license, the filing with IRS, or some other criteria?

There are problems using any of these criteria to define commercial kennels or limit the feeding of fish. A 10- to 20-dog kennel operator who traps is a profit-making enterprise, whether it makes a profit or not. The kennel receives a business license and files an income tax form but I would not consider it a commercial kennel. A 20-dog kennel may only have ten adults that are capable of running the trapline. The others are pups, breeding animals, or "old friends of the family" (older dogs past working ability). A dog team must be built and maintained year-round and over a period of years. The number of available working dogs varies from year to year. You cannot go down to the local dealer and buy a new dog team each year.

Dog racing is a traditional activity in interior Alaska. Many communities hold regular races and many have a dog race as the focal point of the spring carnival. Residents participate in the races and are able to win some cash. They join with others by leasing and renting dogs to get a better team and then breeding from the better dogs. Many villagers own 10-30 dogs because they have always had dogs and they like them. It is part of their culture. You take away the fish for feed and dogs will disappear from the villages because commercial feed is too expensive. A source of pride, achievement, and identity will be gone. Keeping a kennel, be it ten dogs or 50, requires a lot of hard work, much more than taking that assistance check down and buying a snogo.

There is now no problem with the present number of subsistence fish being harvested. Escapement is first priority and subsistence is second. The amount of subsistence fish caught and fed to dogs is not substantial when compared to the number of fish in the river or the amount needed for escapement. Limiting the taking of subsistence fish will not necessarily increase the number for commercial harvest which is, I believe, the motive behind this proposal.

The feeding of subsistence fish to dogs is a customary and traditional use and should not be restricted unless escapement levels are endangered.

(Manley Hot Springs)-I am against this. I'm inclined to say this proposal is no good for people who have traditional subsistence uses such as trapping. Anyone who has a number of dogs is going to try to have those dogs pay for themselves or bring in a little bit of money if the opportunity arises. Whether or not someone can use subsistence fish for dogs should not be based on how their dogs are used but on their overall subsistence lifestyle.

(Manley Hot Springs)-Very few people actually make any money on dogs. What is the difference between feeding moose to a person who then goes out and works for a living and feeding fish to a dog that is used to help earn a dollar? I would rather see a reasonable harvest limit put on each household than definitions of who can have fish and who can't.

(Manley Hot Springs)-ADF&G is on record stating that there is not a problem with the salmon resource here. This proposal implies that feeding fish to dogs is a threat to the resource and I don't think it is. If the Board views this as a quick fix to a resource problem then they don't understand the complexity of the village economies in rural Alaska. Having dogs allows me to make a small amount of cash and make a good use of a local resource. Having dogs just makes sense.

(Manley Hot Springs)-Everything I do out here is at the subsistence level. Even though I raced my dogs last year and made a few dollars I am not a commercial racer. Make sure you guys get your vocabulary and clear definitions together before you come up with ideas like this. There will be lots of repercussions from this and it will create haves and have-nots.

(Manley Hot Springs)-There are a lot of trappers that also race and fish around here but they don't make enough money to even feed their families. This proposal will hurt the little guys who are just trying to make ends meet and make criminals out of a lot of good people.

RUSSIAN MISSION

(Russian Mission)-The proposal is good, but needs to be qualified more.

(Russian Mission)-You can't keep dogs without fishing. Commercial dog food is too expensive.

(Russian Mission)-Depends on what the definition of "commercial purposes" is. If any [all] winnings are used as "commercial" then this is a problem and [this proposal] will work against us. Dog mushing in rural communities is also a time consuming productive, healthful hobby. It can add to a community's dysfunction if it is regulated out from under us. Mushing is a family activity.

(Russian Mission)-This is too much. We shouldn't have sent it to the Board. We hurt ourselves. Having dogs fits our lives and if this will make it harder, it doesn't make sense. They should pick on real problems like intercept fisheries.

(Russian Mission)-I hope they don't stop us from feeding fish to dogs, especially if we use them for trapping. Mostly, we trap to use the fur ourselves to make our clothes or things to sell, like beaver hats or parka ruffs.

(Russian Mission)-I would be against this proposal. But if there are abuses by large dog lots and kennels they should be stopped.

(Russian Mission)-I don't think they should pick on small teams. Not pick on people who feel like they have to have dogs because they grew up with them. Nobody makes money trapping, so if they use their dogs, they should be able to feed them fish.

(Russian Mission)-This is the first time I have seen the proposal. It depends on which fish are involved and how "commercial purposes" is defined.

(Russian Mission)-This would be a real problem. [We have] nothing else to feed them. It is illegal to feed them moose. There is fish around here year-round. [I] don't see why they'd want to stop us.

(Russian Mission)-Don't know.

ST. MARY'S

(St. Mary's)-[I am] strongly against it.

(St. Mary's)-I think its unconstitutional--taking away our rights.

(St. Mary's)-This would be a problem. Fish is all that is here for dog food.

(St. Mary's)-Sounds like slime! [I] don't like the proposal--not much understanding of our lifestyle.

(St. Mary's)-The definition should be refined. [I] wouldn't have a problem if it eliminated salmon as dog feed. I have a problem if all subsistence fish were included. I understood the petition to target salmon.

(St. Mary's)-This is a real problem. It is unfair.

TANANA

(Tanana)-The fish here have no commercial value. Dog food is the best use of the fish we have here.

(Tanana)-Most people can't afford commercial food for their dog lots out here. People have to use what is here, and fish are a resource that are here and available for people to use.

(Tanana)-It doesn't seem right to pass a regulation like this when there are plenty of fish in the river. The lower Yukon commercial fishery is relatively new compared to the fishery here for feeding dogs. We can't drive to town and buy dog food like they can in some places. I'd like to see a hatchery up in Canada as a way of putting more fish in the river rather than to start cutting back the quotas for fishermen. If the hatchery was in Canada the fish would still be in good shape when they went by Tanana.

(Tanana)-There probably is a category of musher that could be classified as a commercial kennel but they are few in number. Telling someone they can't participate in a village race just because they are a subsistence user and feed fish to their dogs is crazy. This proposal is out of line.

(Tanana)-I don't see why commercial interests should have final say on how a resource is used or should take priority over what I am doing. They are infringing on the whole concept of mushing and raising dogs.

(Tanana)-I would prefer to see ADF&G impose limitations on the number of fish allowed per household rather than to eliminate harvest on the basis of how dogs are used.

(Tanana)-I have a job and a good income and I use my dogs basically for recreation. This proposal will not really affect me but will really hurt the real subsistence users out here. It just does not make sense that someone like me, who has a high paying job and uses dogs like I do will qualify to keep feeding fish to their recreational team and those who are really out there trapping and doing other subsistence activities to just scrape by, would not qualify.

(Tanana)-This is a ridiculous proposal. People have been doing this for hundreds of years. My grandfather did the same thing.

(Tanana)-If we couldn't feed these fish to dogs they would just go to waste. Most of the fish here are not good for human consumption. Fish here are good for dog food and not much else.

(Tanana)-What an individual is doing with his dogs at any given time is subject to change. There has been a long term, consistent pattern of use that includes leasing, racing, and trading dogs. This use patterns fits all of the eight criteria, especially criteria [sic] eight which deals with the cultural, and social elements of a subsistence user's life.

(Tanana)-There is no problem with the number of fish being harvested in terms of escapement. If you can't make a living on the resources out here we will all be on welfare or all have to move to big cities. There is no alternative out here--you have to use the resources that are here.

(Tanana)-Fish up here are not edible for humans...they are hardly edible for dogs but dog food is the best use for them.

(Tanana)-The fishery resource on the Yukon belongs to the people of the area and it is being utilized. I feel strongly about protecting my right to keep using this resource. You are taking away a right that we have. Fish we don't use or catch here will be caught somewhere else. This proposal will not save fish.

(Tanana)-I was under the impression that trapping was firmly established as a subsistence activity in ANILCA. If so, using subsistence fish to support trapping can't be considered anything else but subsistence. Racing may be a once or twice-a-year activity for an otherwise "trapline" team and provides a small but necessary source of cash as a sideline. It is quite possible for a trapline team to be competitive as a distance race team and a respectable sprint team given a month or two of proper training and feeding.

(Tanana)-You are trying to commit cultural genocide. There are so few economic opportunities out here. These resources are ours, we depend on them and don't want to overharvest.

(Tanana)-This will further put an end to a lifestyle that has been going on for a long time. It will put more people on welfare and cause more suicides.

(Tanana)-You start taking our subsistence rights away and we will go to war. More fish are wasted by gillnetters in Bristol Bay than on the whole Yukon River.