

THE DIPNET AND FISHWHEEL FISHERIES
OF THE COPPER RIVER, 1982

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ABSTRACT

This report describes the fishwheel and dipnet fisheries of the Copper River based on data collected from observation and interviews of a sample of permitholders during the 1982 season.

The 1982 data corroborates 1979 Division of Subsistence research which found substantial differences between local and non-local participants. In general, Basin fishwheel users have a longer history of participation than non-Basin participants. Patterns of harvesting other resources also differed. While both segments of the sample tended to participate in hunting and fishing activities, Basin residents hunt, fish, trap, and gather berries almost exclusively within the Copper River Basin, while non-local fishwheel users engaged in these activities outside the Basin.

Eighty-one fishwheel fishery participants were interviewed, primarily at their fishwheel sites at eleven different locations. The interview sample constituted 13.2 percent of the 615 fishwheel permitholders in 1982. Of those interviewed, 69.1 percent were residents of the Copper River Basin, and 30.9 percent lived outside the Basin.

Of the dipnet fishery participants at Chitina, 93 were interviewed, representing a 1.5 percent sample of the 5,481 permitted dipnetters in 1982. Of these 93 interviewees, 78 (83.9 percent) resided outside the Copper River Basin and 15 (16.1 percent) were residents of the Basin.

In 1982, 51.1 percent of the fishwheel permitholders were local residents and 48.9 percent were non-Basin residents. The local fishwheel sample was characterized by a long-established participation in the fishery; non-local permitholders generally had shorter histories of involvement in the fishery. Among the fishwheel participants hunting was the most commonly mentioned additional resource harvest activity.

Non-local fishwheel operators were much more likely to participate in other salmon fisheries in addition to the Copper River fishery than the local residents. Copper River Basin residents were most likely to participate in fishing, hunting, trapping, and berry picking activities within the Basin, while non-local residents frequently reported using areas outside the Basin.

Four areas with several fishwheel sites are described in detail. The Chitina Bridge and Slana clusters are included because of the predominately non-local residency of most of the fishermen. The Chitina Bridge cluster was also the cluster within the largest number of wheels and permits in the fishwheel fishery. The Copper Center cluster illustrated a mixture of mostly use patterns. The Gulkana cluster also is a local use fishery characterized by even less non-Basin participation than Copper Center, and an over-all longer history of involvement in the fishery.

The dipnet fishery is characterized by a vast majority of non-local participants (98.5 percent). Forty-one percent of the interviewed dipnetters were first-year permitholders. Fourteen percent had a history of involvement greater than 10 years. Fishing for species other than salmon was the resource harvesting activity mentioned most frequently by dipnetters that were interviewed. Dipnetters normally fish and hunt outside the Copper River Basin. Basin dipnetters engage in resource harvesting activities within the Basin more often.

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INTRODUCTION

The advisory committee system and Copper Basin organizations have annually submitted proposals for modifications of the Copper River salmon fishery regulations. In January 1982, the Board of Fisheries requested that the Division of Subsistence, Alaska Department of Fish and Game, gather additional information on the fishwheel and dipnet fisheries of the Copper River. Participation in these fisheries has increased markedly in recent years (Table 1). For example, 26.8 percent more dipnet permits were issued in 1981 than in 1980; preliminary data for 1982 indicate another increase of 54.2 percent. The corresponding increase in fishwheel permits was 31.1 percent in 1981 and 17.6 percent in 1982. The vast majority of this growth can be attributed to increased participation by non-Copper Basin residents in both fisheries (Table 2). Earlier Division of Subsistence research (Stickney and Cunningham 1979) suggested that Basin residents' use of the fisheries is part of an economic pattern which contrasts with those of non-Basin residents who participate in the fisheries. Generally, the Basin residents' economic pattern is characterized by a wide use of other Basin resources, seasonal employment, and relatively low monetary incomes. In contrast, non-Basin residents are more likely to hunt and fish outside the Basin, hold full-time jobs, and have more substantial cash incomes. The research which the Division of Subsistence undertook in the summer of 1982 was designed to explore further the relationships between residency, resource uses, and participation in the Copper River salmon fisheries. The results presented in this report will be of use to the Board of Fisheries, the fish and game advisory system, and the public.

The Division of Commercial Fisheries report on the Copper River fishery describes the physical and geographic characteristics of the Copper River drainage, and includes a discussion of portions of the Copper River Subsistence

TABLE 1. PARTICIPATION IN COPPER RIVER SUBSISTENCE FISHERY 1948-1982*

Year	Catch		Dip Net	Fishwheel	Permits Issued		Total	Catch by Species											
	Dip Net	Fishwheel			Dip Net	Fishwheel		Sockeye	Chinook	Coho	Other								
1948																			
1949	5,100																		
1952	5,500																		
1954	2,136																		
1955	3,145																		
1957	2,086																		
1958	7,753																		
1960	13,263																		
1961	1,179	5,660	32		26		58												
1962	1,777	12,419	307		59		366												
1963	3,203	11,101	435		117		552												
1964	2,124	12,395	514		110		624												
1965	4,133	7,749	794		158		952												
1966	7,215	5,813	982		115		1,097												
1967	7,452	9,188	1,132		110		1,242												
1968	6,146	8,360	1,166		125		1,291												
1969	8,040	6,071	1,235		112		1,347												
1970	18,054	6,220	1,415		113		1,528												
1971	22,700	9,886	3,220		267		3,487												
1972	28,115	9,370	4,168		374	1	4,542												
1973	18,996	7,854	3,485		205		3,690												
1974	16,477	10,943	3,840		305		4,145												
1975	15,143	7,657	3,305		288		3,593												
1976	7,694	5,626	2,452		350		2,802												
1977	12,130	8,321	2,512		451		2,963												
1978	22,612	12,751	3,526		540		4,066												
1979	12,569	6,638	3,313		392		3,705												
1980	11,887	10,251	2,730		470		3,200												
1981	14,661	9,716	2,804		399		3,203												
1982	28,872	26,924	3,555		523		4,079												
**1982 (prelim)	6,303	28,357	5,481		615		6,096												

1 Last use of Dip Net/Fishwheel Combination permits.
 2 First issue of permits at Chitina.
 3 Last year permits were denied fishermen who failed to return their previous year permits.
 4 Issue of permits at Chitina and Glennallen only.

*modified from Randall et al. 1982:35
 **Roberson 1982c.

TABLE 2: LOCAL AND NON-LOCAL PARTICIPATION IN COPPER RIVER SUBSISTENCE SALMON FISHERY¹

Fishwheel Permits			
	<u>Local</u>	<u>Non-local</u>	<u>Total</u>
1981	338 (64.6%)	185 (35.4%)	523
1982	314 (51.1%)	301 (48.9%)	615

Dipnet Permits			
	<u>Local</u>	<u>Non-local</u>	<u>Total</u>
1981	71 (2.0%)	3484 (98.0%)	3555
1982	85 (1.5%)	5411 (98.5%)	5496

¹ Roberson 1982 c, 1982a.

Salmon Management Plan (Roberson 1982c). A Copper River Basin resident is defined in the management plan (5 AAC 01.647)

"as an Alaskan resident as defined in AS 16.05.940(14), who for the preceding 12 consecutive months has maintained his place of residence and voting residence (if applicable) in Game Management Units 11, 13-A, 13-B, 13-C, and 13-D as described in 5 AAC 90.010 and the Jacksina River drainage to its confluence with the Nabesna River and who does not maintain a permanent residence or voting residence elsewhere."

Figure 1 is a map of the Basin area including major access routes. An estimate of the number of residents in the unincorporated portion of the Valdez-Cordova census area is 3,133 (Roberson 1982b:3). For the purposes of this paper, the terms Basin resident and local resident will be used interchangeably.

The subsistence fishery for salmon on the Copper River pre-dates Russian contact with the aboriginal inhabitants of the region (Reckord 1979; Workman 1976). The aboriginal salmon harvesting technology included spear, fishtraps, and dipnets made of woven spruce roots. Salmon were harvested in tributaries as well as the main channel of the Copper River.

Fishwheels were introduced to Alaska and to the Copper Basin region in the early 1900s (VanStone 1974) and rapidly replaced or augmented the other harvest methods.

Current regulations allow the use of dipnets from the down-stream edge of the Chitina-McCarthy Road Bridge to a point roughly 5 miles down-stream. Fishwheels may be located in the portion of the river from the downstream edge of the bridge up to the confluence of the Slana and Copper rivers, near the community of Slana, a distance of approximately 120 river miles.

PURPOSE

In April 1982, Division of Subsistence staff undertook a study aimed

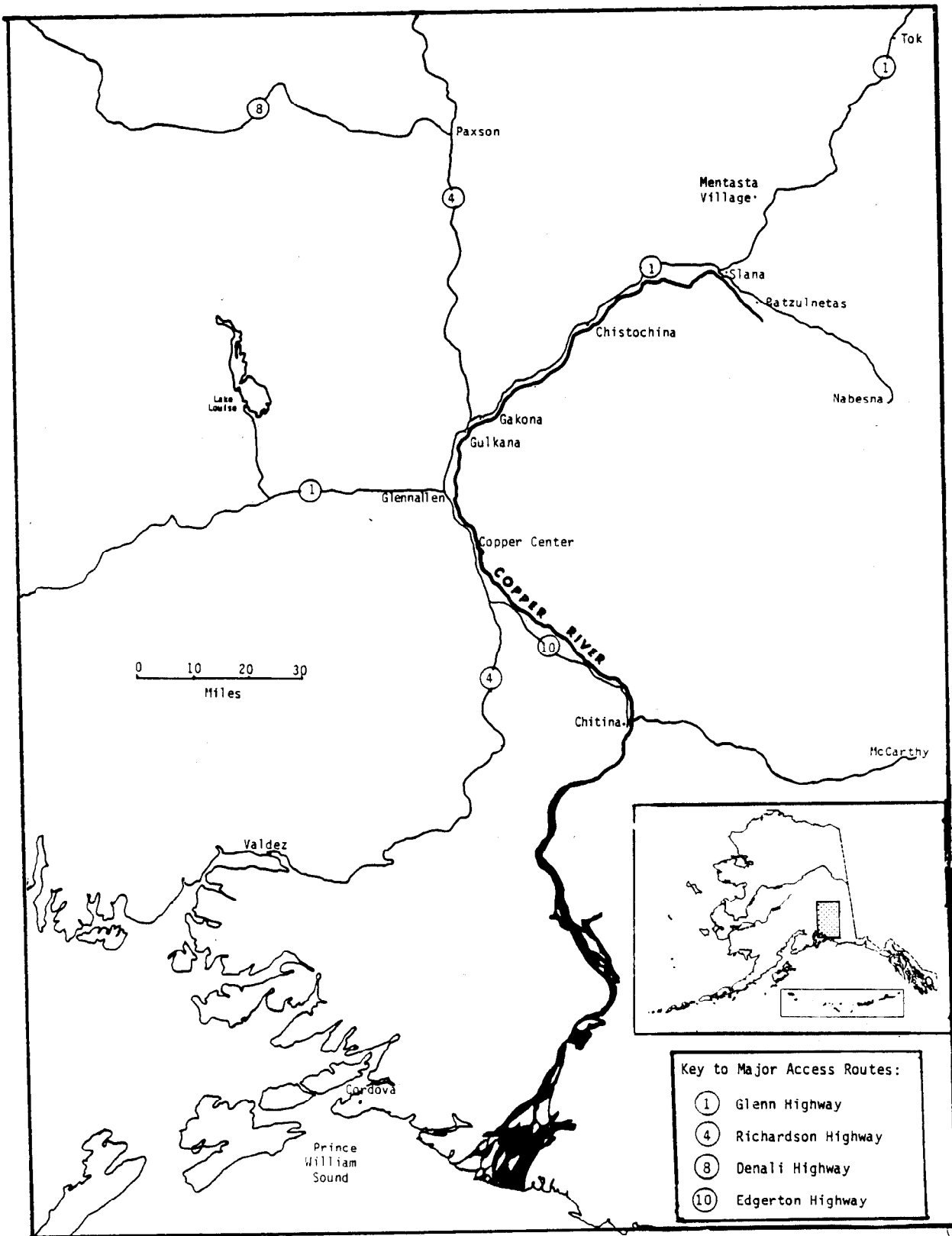


Figure 1. Map of Copper River Area.

at describing the 1982 fishwheel and dipnet fisheries on the Copper River. Two purposes of the study were 1) to describe the functioning of the dipnet and fishwheel fisheries and 2) to describe the place of the fishery in the household economies of a sample of permit holders.

Objectives for the first purpose included the development of maps of the major fishing areas along the Copper River and individual fishwheel sites used during 1982; a description of a sample of fishing groups with respect to size, transportation, residency and equipment; a description of harvest methods including type of gear, fishing time, gear placement strategies, and preservation techniques; a description of the division of labor with respect to wheel construction, placement and operation and fish transporting, cleaning and processing; and organization of fishery use areas, including land ownership and site access.

The objectives for the second purpose included collecting data on socioeconomic and demographic characteristics for a sample of permit holders, including household composition, residency and length of residency; gathering descriptive information on household economy with respect to wage employment and natural resource harvesting activities; and documenting history of participation in the Copper River salmon fishery.

METHODOLOGY

A research approach including interviews with participants and on-site observations was chosen as the methodology for describing the Copper River salmon fishery. Patterns of fishing along the Copper River vary in terms of geographic conditions, fishing techniques, and residencies of participants. A design was developed for interviewing and on-site observations which would accurately represent these variations.

The Copper River initially was stratified by geographic area, based upon the expectation that use patterns and characteristics of users might vary along the length of the river. Interviews and observations were planned for all major segments of the river. Major fishing sites were identified along the river. Information on fishing sites was derived from Department of Fish and Game personnel of the Division of Commercial Fisheries in Glennallen, members of the local fish and game advisory committee representatives of local village councils and the regional native corporation, and an aerial survey of the river on June 30, 1982 (Figures 2 and 12 in the Findings section depict these fishing sites).

In addition, the sample was stratified by fishing gear. Participants using fishwheels and dipnets were interviewed. Thus, interviews were conducted with two groups: (1) fisheries participants using fishwheels, located along different sections of the river, and (2) fisheries participants using dipnets, located at Chitina.

Eighty-one fishwheel fishery participants were interviewed, primarily at their fishwheel sites at 11 different locations (Table 3), representing a 13.2 percent sample of the 615 permitted fishwheel users. The sample used 56 fishwheels, 53.8 percent of the maximum number of registered fishwheels (104) that were active in 1982 on the Copper River. Of the interviewed fishwheel users, 69.1 percent were residents of the Copper River Basin, and 30.9 percent lived outside the Copper River Basin. Interviews and on-site observations were conducted at all fishing sites accessible by road during the course of the summer. A local resident was hired to help locate fishcamps and to translate where language differences existed.

Of the fisheries participants using dipnets at Chitina, 93 were

TABLE 3: NUMBER OF FISHWHEELS AND PERMITS BY FISHING AREA IN 1982

<u>Location of wheels</u>	<u>Est. # of wheels¹</u>	<u>Est. # permits¹</u>	<u>Percent of total permits</u>	<u>Average # permits per wheel</u>	<u># of inter-views</u>	<u>% of inter-views</u>
Chitina Bridge	32	191	33.7	6.0	22	27.2
Chitina Airport ²	6	24	4.2	4.0	4	4.9
Tonsina	2	6	1.0	3.0	0	0
Kenny Lake	1	1	0.2	1.0	0	0
Copper Center: Loop Area	11	72	12.7	6.5	6	7.4
Village	8	29	5.1	3.6	6	7.4
Silver Springs	2	34	6.0	17.0	4	4.9
Tazlina	5	18	3.2	3.6	3	3.7
Coperville	8	83	14.6	10.4	5	6.2
Gulkana	3	18	3.2	2.2	3	3.7
Gakona	7	30	5.3	4.3	5	6.2
Sanford River	1	1	0.2	1.0	1	1.2
Chistochina	1	2	0.3	2.0	1	1.2
Chistochina--Old Village	2	6	1.0	3.0	5	6.2
Slana	8	52	9.2	6.5	16	19.7
	<u>102</u>	<u>567³</u>	<u>99.9⁴</u>	<u>5.5</u>	<u>81</u>	<u>99.9⁴</u>

¹ Estimated from 1982 permit data.

² Includes Horse Creek fishwheel.

³ Some permits did not indicate fishing site.

⁴ Due to rounding error.

interviewed, representing a 1.5 percent sample of the 5,481 permitted dipnet users in 1982. Of these 93 interviewees, 78 (83.9 percent) resided outside the Copper River Basin, and 15 (16.1 percent) were residents of the Basin (see Table 4.)

Both fishwheel and dipnet groups are non-random samples. A randomized design utilizing on-site interviews and observations was not feasible because a single researcher was conducting interviews in a large geographic area, and it was not known when persons would be on-site fishing during the summer. Instead, the researcher visited fishing site locations and interviewed the persons fishing at the time of her visit. Using this selection procedure, the initial sample of dipnet fishermen numbered 83, of which only 6 were local residents. Since a broader sample including more local residents was desirable to allow more meaningful comparisons with non-local participants an additional 10 local dipnet permit holders were identified from the permit list and interviewed by telephone near the end of the season. Data reported on the dipnet fishery in the Findings section refer to the initial 83 on-site interviews, unless comparisons are made between non-local and local uses, in which case the sample of local dipnet users includes the additional 10 persons.

The interviews followed a general topical outline. The permit holder was asked how long he had participated in the fishery and how he or she had first become involved. Other general questions dealt with the length of the fishing trip, size and nature of the fishing group, reasons for fishing at the site, residency, wage employment, and salmon preservation methods and utilization. Finally, the person was asked about participation in other resource harvesting activities, including species, harvest locations and seasons.

TABLE 4: 1982 DIPNET INTERVIEW SAMPLE
(n=83)

<u>Community</u>	<u>Number of Interviews</u>	<u>Percent of Sample</u>	<u>Percent of Total Dipnet Permits</u>
Anchorage ¹	23	27.7	31.2
*Copper Center	1	1.2	.9
Delta Junction	2	2.4	4.7
Fairbanks ²	39	47.0	38.5
*Kenny Lake	1	1.2	***
Ketchikan	1	1.2	**
Military ³	8	9.6	12.0
Palmer	1	1.2	3.3
*Tazlina	1	1.2	***
*Upper Tonsina	2	2.4	***
Valdez	3	3.6	2.7
Wasilla	<u>1</u>	<u>1.2</u>	1.9
	83	99.9 ⁴	

1 Includes Chugiak and Eagle River

2 Includes North Pole, College, and Ester.

3 Includes Eielson AFB, Elmendorf AFB, Fort Richardson and Fort Wainwright

4 Due to rounding error

* denotes Basin community

** less than .1 percent

*** included in Copper Center

The interviewer systematically recorded observations on the following characteristics of the fishery participants: the gear type, processing equipment, means of transportation, fishing methods (for dipnetters), handling of salmon, and types of processing occurring on-site. Observations of salmon processing included what members of the fishing group performed each task and how tasks were performed. Ages of the person being interviewed and others in the fishing group were estimated by the researcher.

FINDINGS

THE FISHWHEEL FISHERY

Permits and Residences

Division of Commercial Fisheries permit data indicate that 615 fishwheel permits were issued in 1982, of which 314 (51.1 percent) were held by Copper River Basin residents and 301 (48.9 percent) held by non-Basin residents (Roberson 1982c). Permitholder residencies derived from zipcodes are shown in Table 5. Registration numbers for 116 fishwheels were issued. Numbers are issued annually in order to identify individual fishwheel owners but are separate from permits. Anyone who uses a fishwheel, regardless of whether he or she owns the equipment, must have a permit. There is no limit on the number of permits that may be used on the same wheel, although no more than one permit per household is issued. Fishwheel owners often allowed use of their wheels by neighbors, friends, and relatives having permits. An aerial survey of the fishery verified 84 wheels in or near the water on June 30. In the course of fieldwork it was learned that at least twelve of the 116 fishwheel numbers represented wheels that had never been put in the water or were duplicate

TABLE 5: RESIDENCES OF FISHWHEEL PERMITHOLDERS, 1982¹

<u>Community</u>	<u>Local</u>	<u>Non-local</u>	<u>Total</u>	<u>Percent</u>
Anchorage ²		102	102	(16.6)
Chicken		5	5	(0.8)
Chitina	21		21	(3.4)
Copper Center ³	105		105	(17.1)
Delta Junction		16	16	(2.6)
Dot Lake		4	4	(0.6)
Fairbanks ⁴		37	37	(6.0)
Gakona ⁵	45		45	(7.3)
Glennallen ⁶	120		120	(19.5)
Kenai Peninsula ⁷		8	8	(1.3)
Mentasta	1		1	(0.2)
Military ⁸		5	5	(0.8)
Northway		5	5	(0.8)
Palmer ⁹	19 ¹⁰	52	71	(11.5)
Slana	3		3	(0.5)
Tok		34	34	(5.5)
Valdez		9	9	(1.5)
Wasilla ¹¹		14	14	(2.3)
Other Alaska ¹²		6	6	(1.0)
No address		4	4	(0.6)
	<u>314</u>	<u>301</u>	<u>615</u>	<u>99.9</u> ¹³

- 1 Derived by zipcodes from 1982 permit data.
- 2 Includes Chugiak, Eagle River.
- 3 Includes Kenny Lake and Tonsina.
- 4 Includes College and North Pole.
- 5 Includes Chistonchina and Gulkana.
- 6 Includes Tazlina, Coperville, and some Copper Center residents.
- 7 Includes Homer, Kenai, Seward, Sterling, and Soldotna.
- 8 Includes Elmendorf AFB and Fort Richardson.
- 9 Includes Sutton.
- 10 Estimated number of permitholders residing in Copper River Basin.
- 11 Includes Trapper Creek and Willow.
- 12 Includes Douglas, Healy, Juneau, Sitka, Tenakee Springs, and Cantwell.
- 13 Does not equal 100 due to rounding error.

numbers for a single wheel. Thus, a maximum of 104 different fishwheels were operated in the Copper River during the 1982 season.

Fishing Sites

Figure 2 depicts the locations of thirteen areas where fishwheels are commonly placed in the river. According to the June 30 aerial survey, four sites (noted with asterisks) had one wheel in 1982. Multiple fishwheels and permits were used in nine areas. These clusters of fishwheel sites and the estimated number of wheels and permits are summarized in Table 3. The presence of roads, proximity of population concentrations, and long-established use of sites seemed to be responsible at least in part for the clustering of fishing sites in certain areas.

History of Involvement in the Fishery

Ten percent of those interviewed were participating in the fishery for the first time (Figure 3). A little more than one fourth of the respondents had a history of five years or less in the fishery, and almost half had been involved for ten years or less. Thirty-three respondents (40.7 percent) had a history of involvement in excess of twenty years.

Non-local residents were characterized by a shorter history in the fishery. Fifty two percent of the non-Basin sample had five or fewer years experience in the fishery, while only 15.4 percent had a history of more than 20 years. By comparison, 16.1 percent of the local sample had participated in the fishery for five years or less, while 51.8 percent had been in the fishery more than 20 years (Figure 4).

Local permit holders' initial involvement in the fishery frequently dated back to childhood and their families' use of fishwheels in the Copper

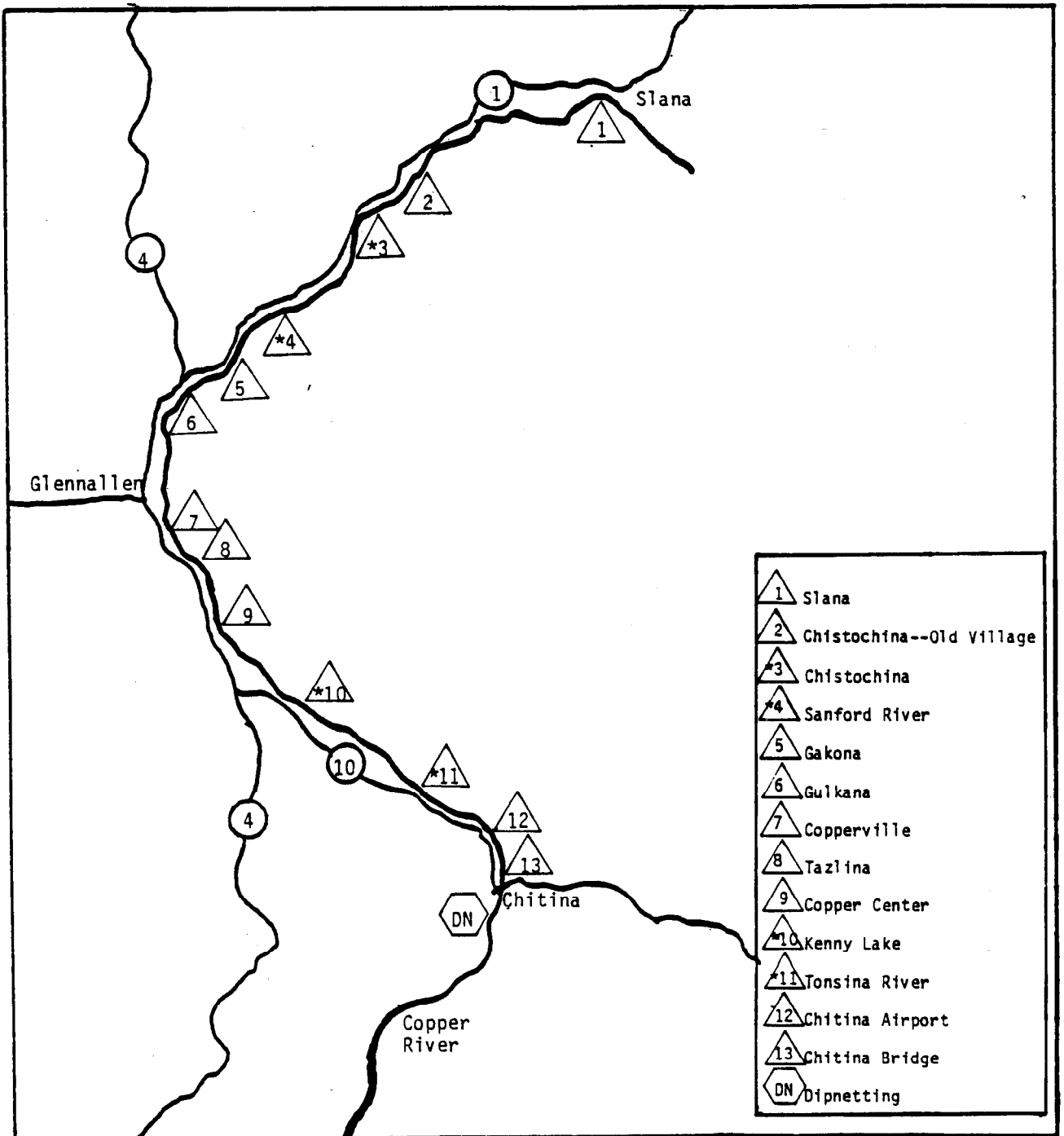


Figure 2. Major Copper River Fishing Sites, 1982*.

* Derived from June 30, 1982 aerial survey data by Ken Roberson.

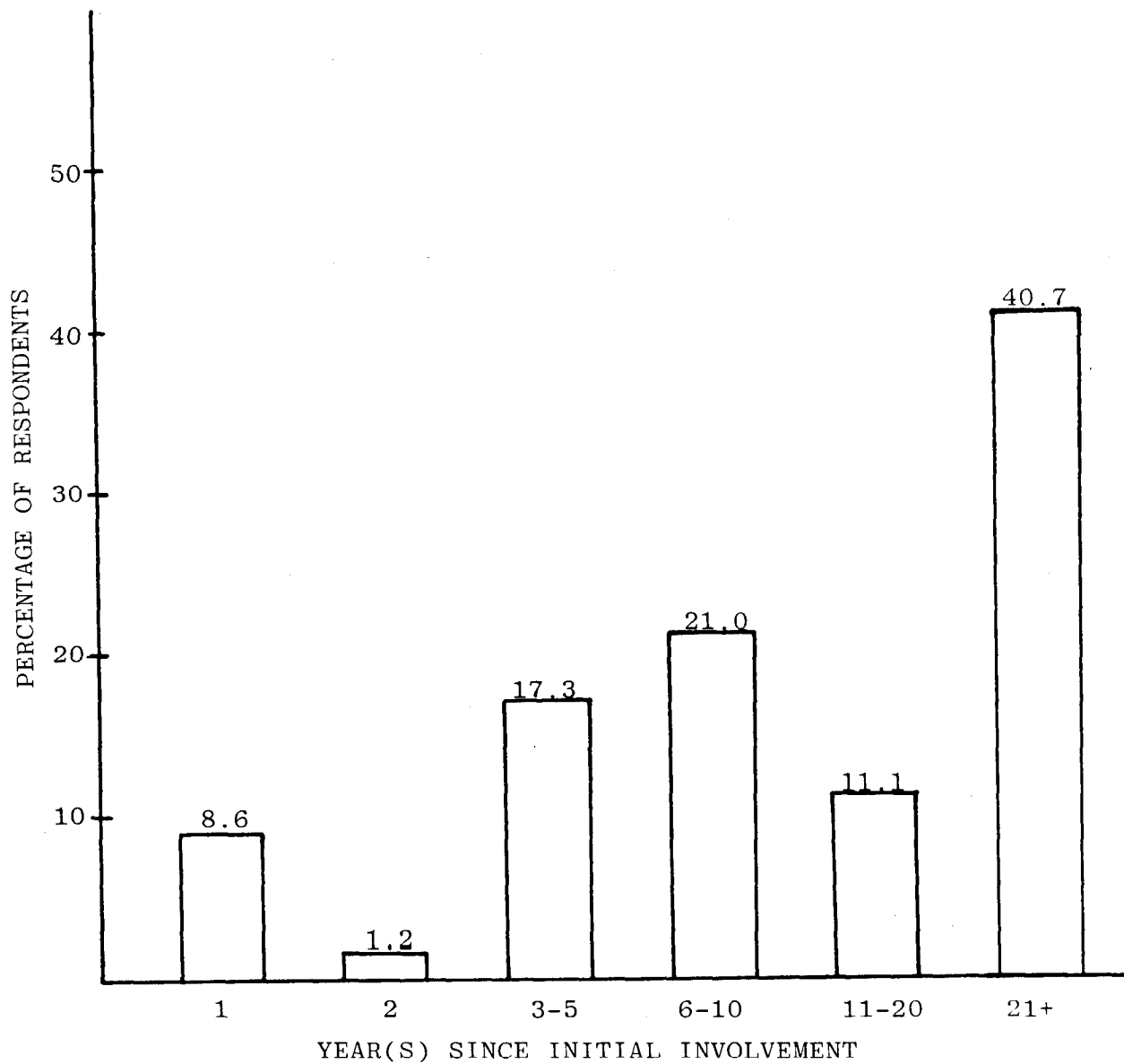


Figure 3. History of Initial Involvement in the Copper River Fishwheel Fishery, 1982. (n=81)

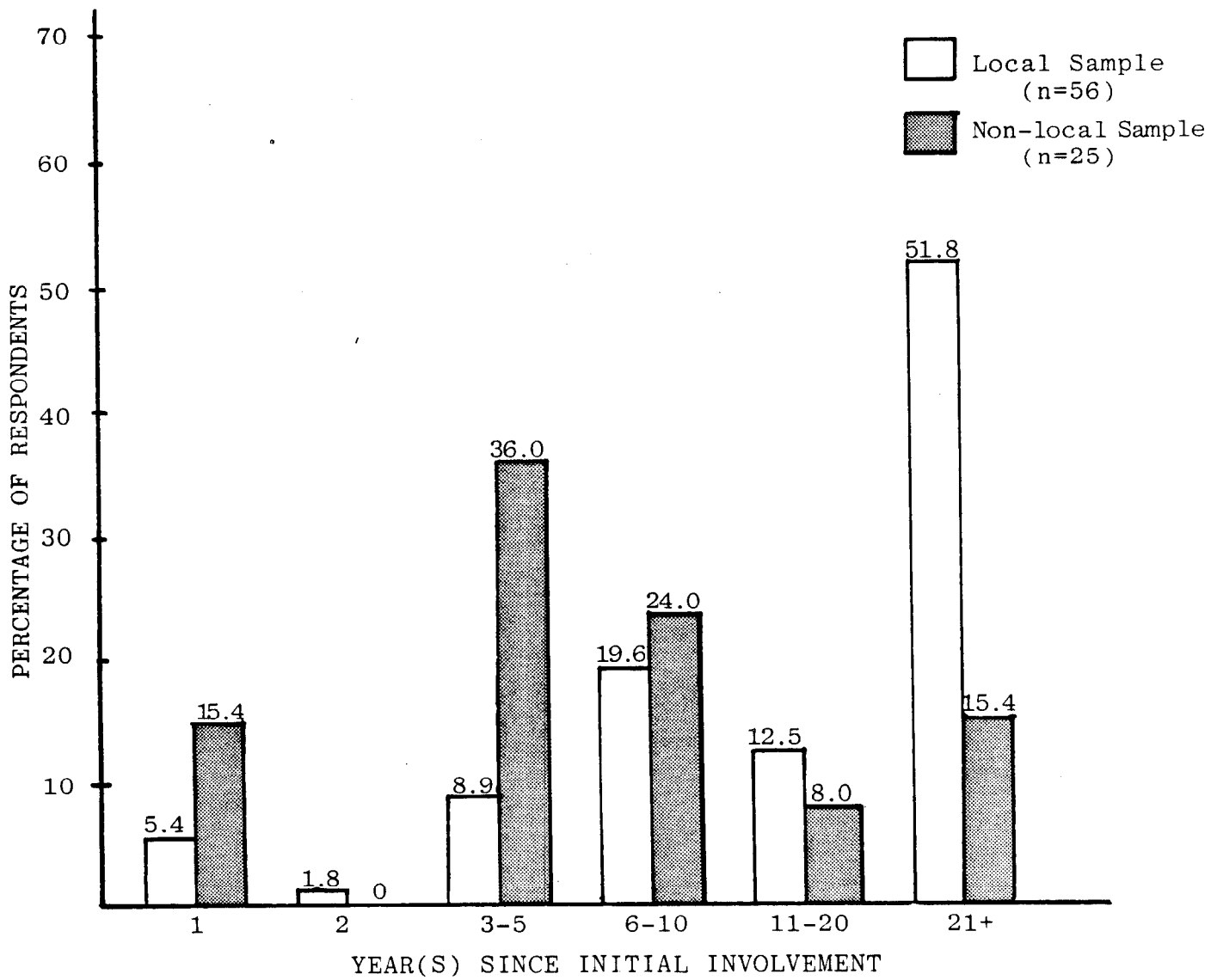


Figure 4. History of Involvement in the Copper River Fishwheel Fishery by Residency, 1982.

River. Basin residents who had moved into the area frequently started by using a neighbor's or friend's fishwheel and many eventually built their own wheels. Of the non-Basin residents using wheels at Chitina, many initially had used dipnets, and later switched to fishwheels. Seven percent of the local sample and 32 percent of the non-local respondents had participated in the dipnet fishery before utilizing fishwheels.

Use of Fishwheels

Gear Types

The overall design of fishwheels was typical and consistent throughout the fishery in 1982, although they differed markedly in size. The fishwheels were constructed most frequently of a combination of wood and metal, with the exception of floats. Floats were typically of three varieties: metal drums, large logs or styrofoam. One fishwheel in 1982 had four revolving baskets; all the rest had the usual two.

Ownership

Fishwheel owners generally placed their wheels in the same vicinity each year. These may be near their places of residence or at accessible locations with which they have become familiar. Some fished from fishcamps, which for the purposes of this report are places with permanent facilities for processing fish each year. Other permittees processed fish at home, or transported equipment to a site with motorized vehicles.

Owners seemed to have the right to use their wheel over other permit-holders using the same equipment. Owners usually operated the wheel at the height of the run or whenever it was most convenient for them. Others used the wheel when the owner was finished.

Initial construction of a wheel and complete wheel loss were the primary times of wheel owners' major monetary investment in equipment. They incurred most or all of the costs of constructing a wheel, both in terms of materials and construction time. They also were responsible for repairing the wheel at the beginning of each season. Many wheels are run successfully for several years with minor repairs each season. These repairs were usually made by the person operating the wheel at the time. Wheels were at times lost down the river because of insufficient anchoring or high water conditions. During high water conditions, wheels may also be destroyed by driftwood floating down the river.

Damage, destruction, or loss of the wheel also occurs during winter ice jams and spring break up. At the end of the season most wheel owners or operators pull the wheels at least partially out of the river to prevent damage from driftwood and ice. Because of their great size and weight, and consequent difficulties in hauling them up steep river banks, many wheels are left in the river or on the river bank, commonly on a log rack, partially dismantled or locked. Some wheel owners delegate the responsibilities of storage to other permitholders who operate the wheel. A few of the non-Basin residents transport their wheels by trailer to their homes during winter.

Fishing Groups

Fifty three percent of the fishwheel permitholders were accompanied only by family members when fishing or checking the wheels. An additional 20 percent of the fishing parties included friends in addition to family members. Twenty percent fished with friends only, and 7.4 percent fished alone. Seventy three percent of the local fishermen fished in groups

containing only relatives, compared to 36 percent for non-local participants, who fished more frequently in groups containing friends and relatives together (Figure 5).

Preservation

Canning was a preservation method utilized by 76.5 percent of the respondents. Sixty-three percent reported freezing and the same number mentioned smoking at least some of their salmon. Twenty-four of those contacted (29.6 percent) preserved part of their salmon by drying (Figure 6). Many respondents made use of more than one method, and often a combination of methods was employed; accordingly, responses are not mutually exclusive in each category.

Overall, preservation patterns of Basin and non-Basin residents were similar, but there were several contrasts (Figure 7). Canning was the method most frequently mentioned by those residing outside the Copper River Basin, while smoking was the preservation method reported most frequently by local residents. Only 16 percent of the non-local sample dried a portion of their salmon harvest, compared to 45 percent of the local fishermen who utilized this method of preservation.

The various preservation methods require differing amounts of knowledge, skill, effort, and equipment. Freezing clearly required the least amount of time, but implied ownership of or access to a freezer and the accompanying electricity costs. Preparation of the fish for freezing varied and included: wrapping the fish whole (uncleaned); gutting; filleting; trimming off heads, fins, and tails; or cutting the fish into steaks. For canning, the salmon must be cut up, and some fishermen also opt to fillet and/or remove the skin from the fish. In addition, canning requires

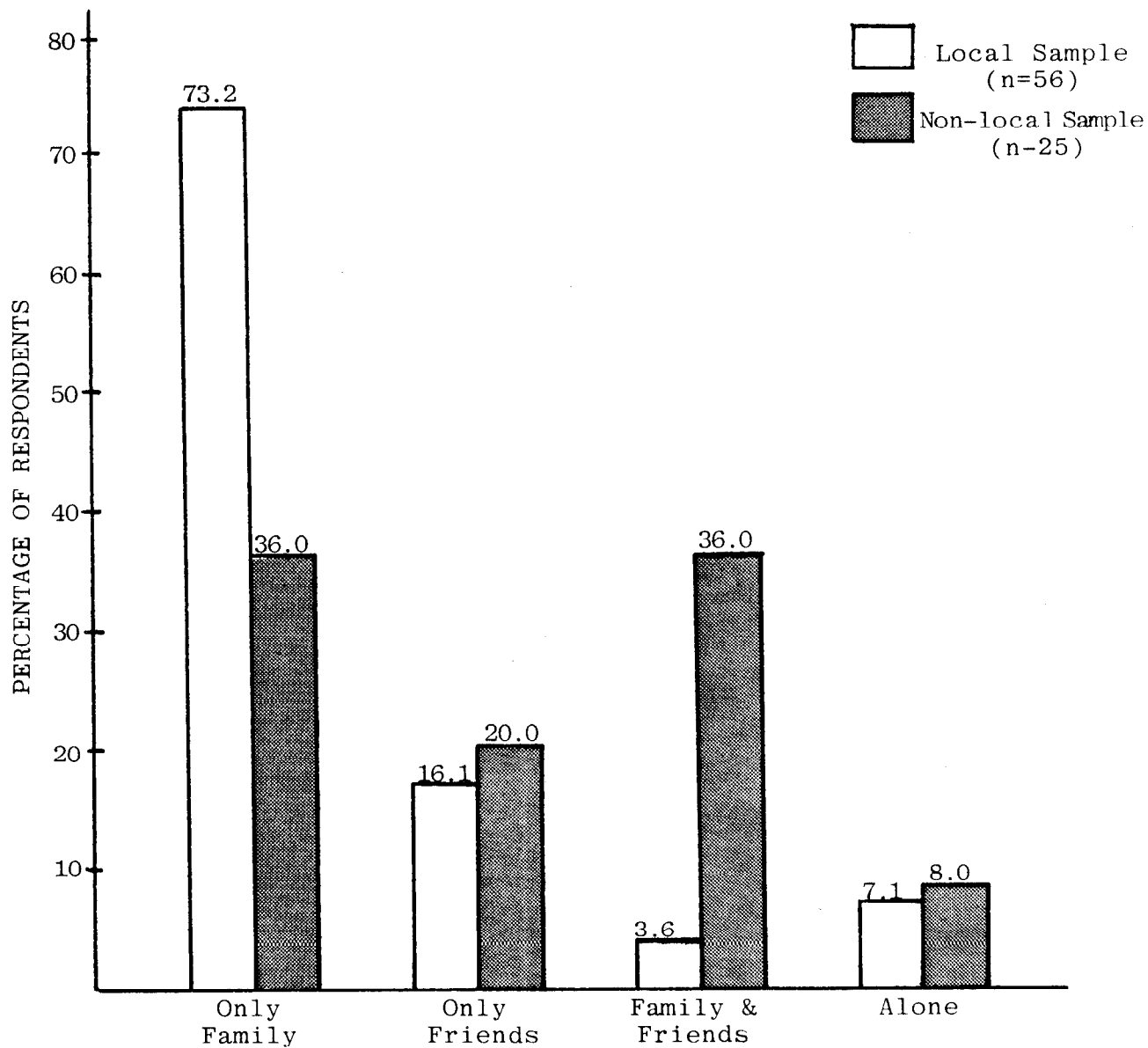


Figure 5. Fishwheel Sample: Fishing Groups by Area of Residence, 1982.

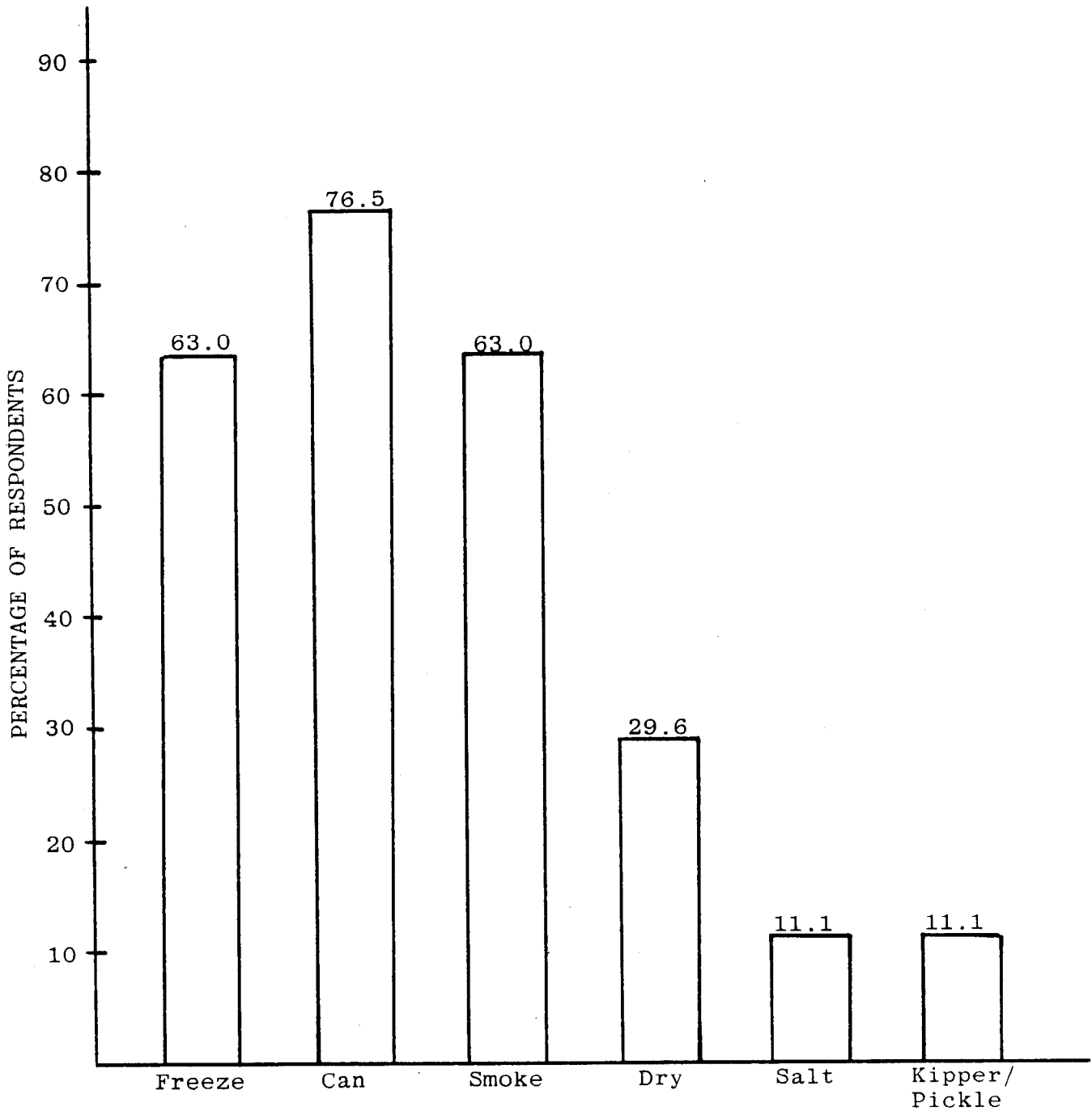


Figure 6. Fishwheel Sample: Salmon Preservation Methods, 1982*
(n=81)

*Categories are not mutually exclusive; respondents could mention more than one method.

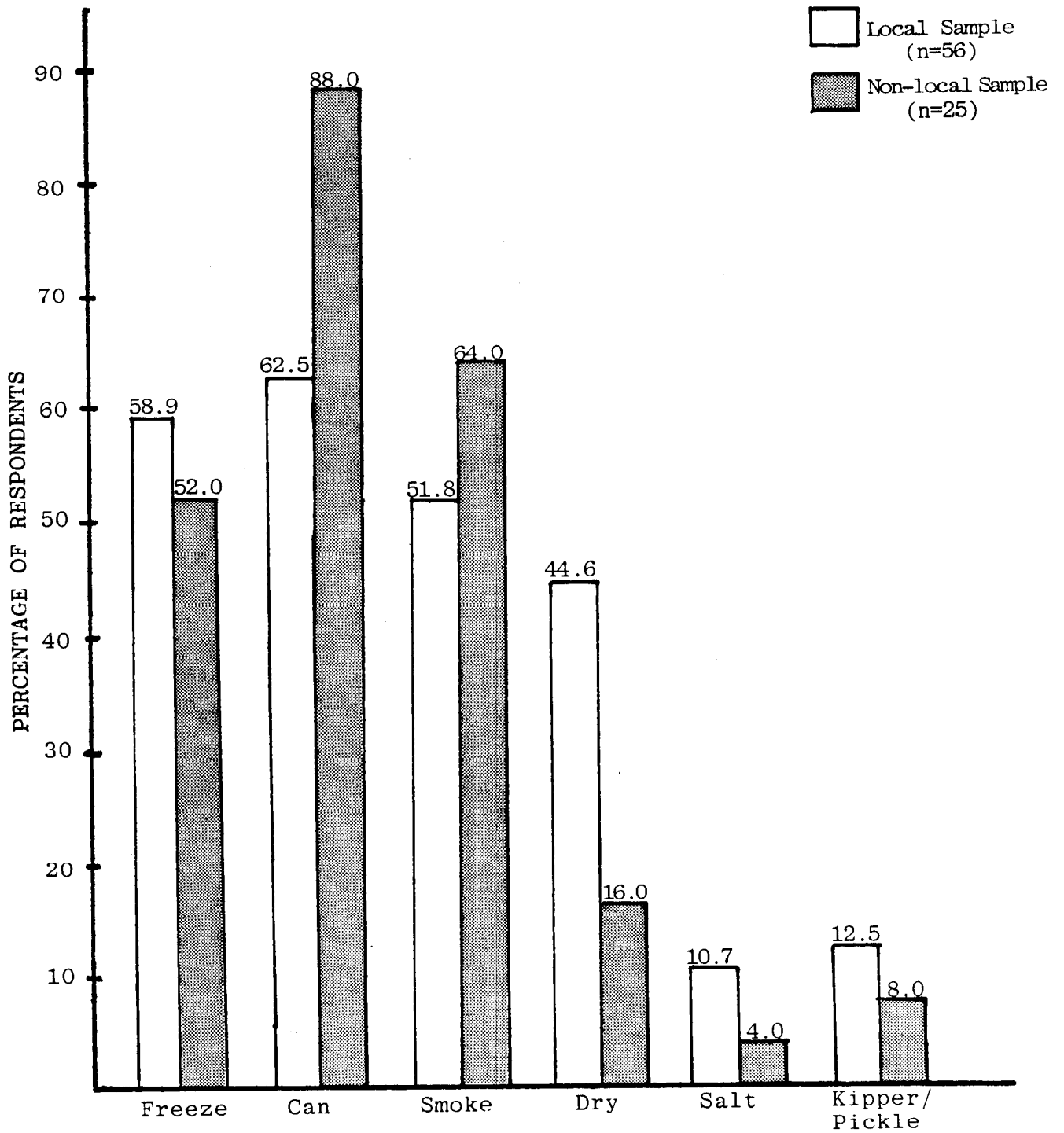


Figure 7. Fishwheel Sample: Salmon Preservation Methods by Area of Residence, 1982.*

* Categories are not mutually exclusive.

purchase a pressure cooker and either a can sealer and cans or a quantity of jars.

Smoking fish is more complex. The time and effort involved in smoking depends on individual preference and the equipment utilized. Preparation of fish begins with cutting, which usually but not always includes filleting, and soaking in brine; smoking then follows. Effort in smoking corresponds to the desired product and the type of smoker utilized. Many fishwheel users, primarily non-local residents, utilized manufactured aluminum electric smokers, an option requiring an initial purchase of perhaps \$35. Some, also predominately non-Basin residents, described homemade smokers comprised of modified discarded refrigerators. The more elaborate homemade smokers included vented-in smoke from wood stoves. Local residents were most likely to have permanent wooden smokehouses. Unlike electric smokers, which produce a product in four to six hours, homemade smokers and smokehouses require two to six days for completing the process. As a rule, all of the above approaches to smoking also entailed either freezing or sealing the fish in cans or jars after the fish was smoked.

Dried fish appeared to be the most time-demanding method of cutting fish, but entailed the lowest monetary costs. Most local people who prepared dry fish had covered drying racks built of dead trees and scrap lumber. Fish were cut and then hung. While time spent smoking fish was enumerated in hours or days, drying fish involved at least a week and frequently longer. Smoldering fires were employed by many during the first few days to add flavor, aid in drying and keep flies away. Once dried, the fish were most commonly stored in caches or smokehouses, although a few reported freezing them.

Salting fish was primarily an auxiliary preservation method employed

most commonly by those without electricity who had also smoked or dried a quantity of fish. Time investment was minimal, requiring only the cutting and layering of the fish with salt.

Salmon Utilization

Salmon heads and eggs were utilized by one fourth of those contacted. Food and fishing bait were the common uses of the salmon roe. Fishheads were kept for consumption, with several long-time local residents mentioning the making of "stinkheads" and fishhead grease. Alternate uses for fishheads were trapbait, dogfood and fertilizer. More local residents than non-local residents reported using or saving the heads and eggs (Figure 8).

Other Resource Activities

As shown in Figure 9, hunting was the most frequently mentioned additional resource harvesting activity (67 respondents; 82.7 percent). Fishing for species other than salmon, such as grayling, trout, burbot and whitefish was reported by 60.5 percent, berry picking by 53.1 percent, trapping by 19.7 percent and other salmon fishing by 17.3 percent.

Figure 10 illustrates that both local and non-local fishery participants harvest other resources, with a notably higher percentage of non-local people participating in other salmon fisheries, and more local fishermen involved in trapping and berry picking.

Figure 11 contrasts the local and non-local patterns of harvesting resources inside and outside the Copper River region. Few local residents sampled harvested salmon with gear other than a Copper River fishwheel. Local people were more likely to fish, hunt, trap and pick berries in the

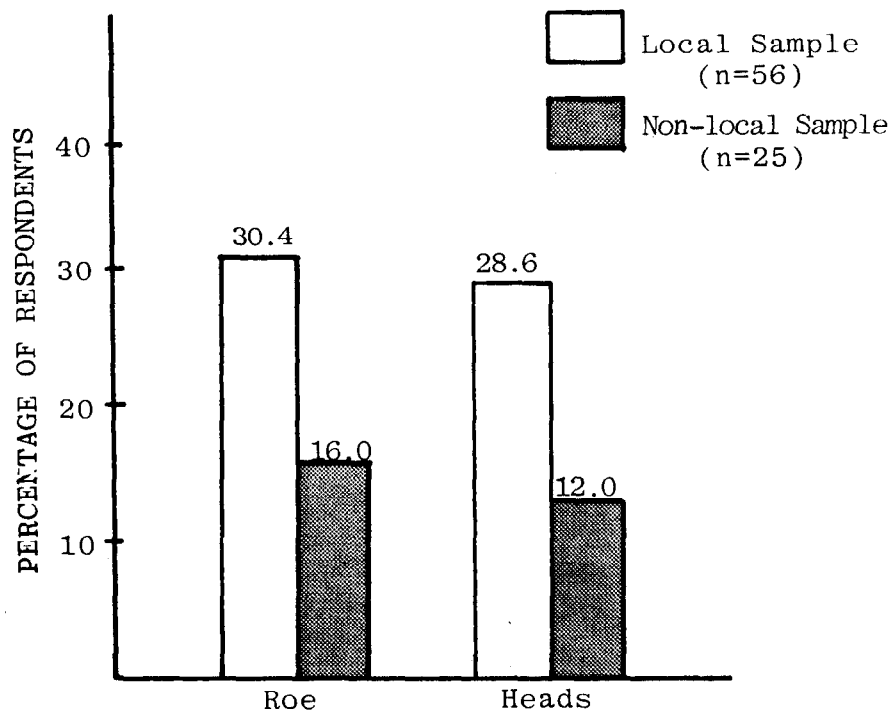


Figure 8. Fishwheel Sample: Salmon Part Utilization by Area of Residence, 1982.

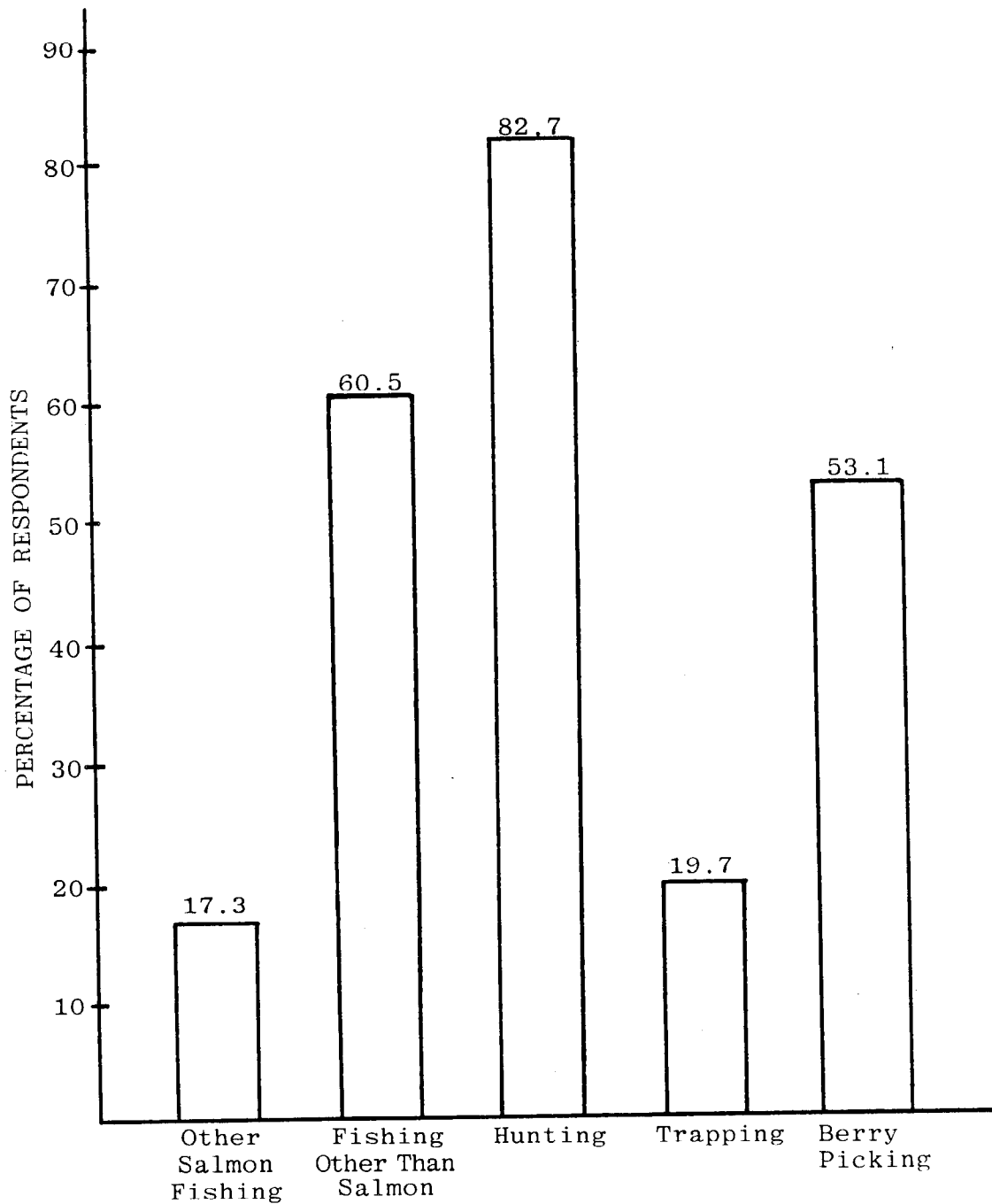


Figure 9. Fishwheel Sample: Other Resource Harvesting Activities, 1982.* (n=81)

* Categories are not mutually exclusive; respondents could mention more than one category.

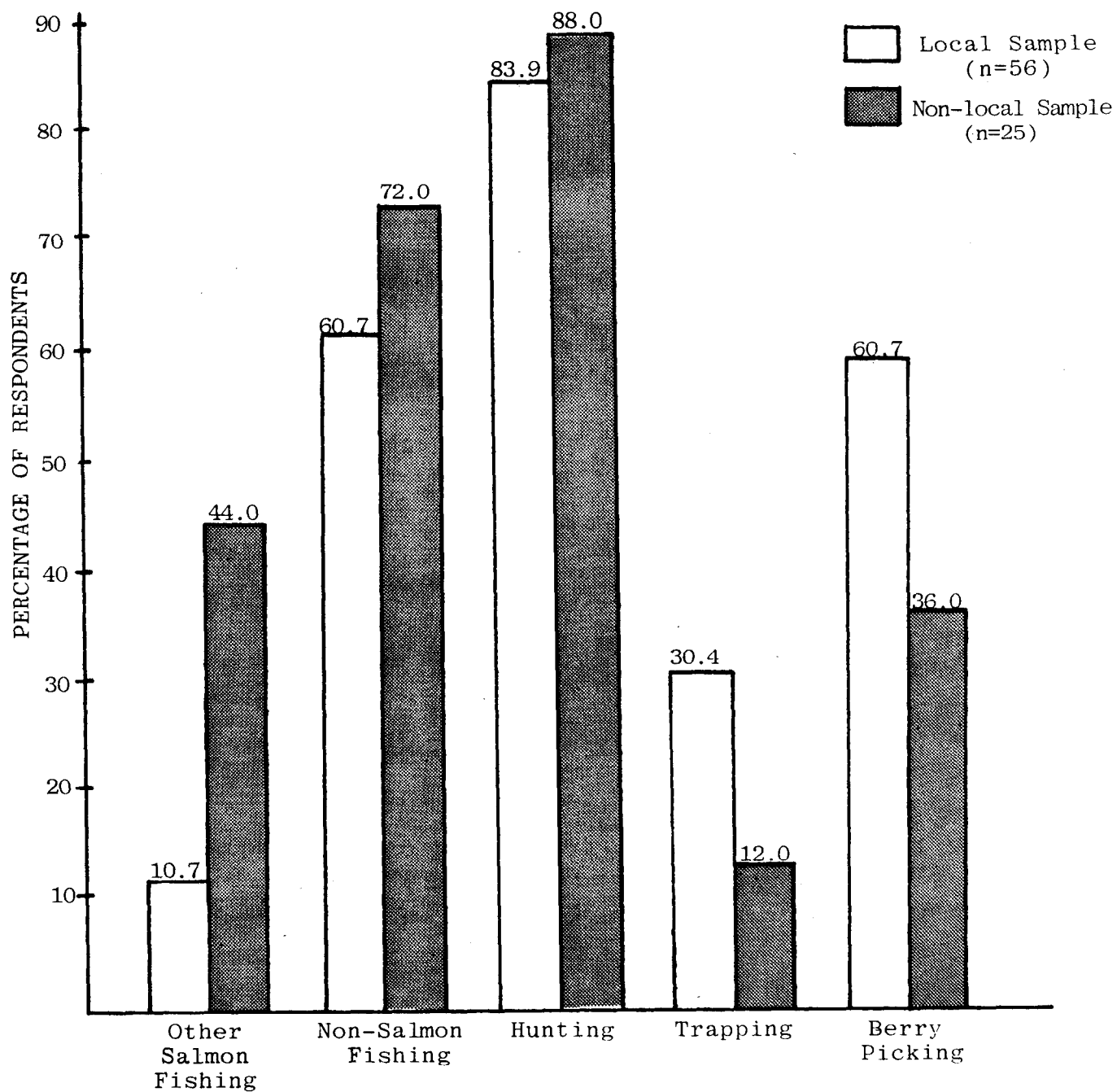


Figure 10. Fishwheel Sample: Local and Non-Local Participation in Resource Harvesting Activities by Area of Residence, 1982.*

* Categories are not mutually exclusive.

Copper River Basin, while non-local residents mentioned other locales most frequently. Almost one fourth of those residing outside of the area mentioned hunting in Units 11 and 13, however.

Fishwheel Clusters

As mentioned above, individual fishwheel sites frequently occurred in clusters for a variety of reasons. While each cluster of fishwheel sites on the Copper River has its unique attributes, four such clusters are presented here to provide more detail about the patterns of fishwheel use in the Copper River fishery and how this use is integrated into the economic patterns of a sample of case households. The Chitina Bridge cluster is included because of its high level of use and because of the predominately non-local residency of most of the fishermen. Copper Center, which is broken into three sub-groupings in the discussion, illustrates a mixture of mostly local use patterns. The Gulkana cluster also is a local use fishery, characterized by even less non-Basin participation than Copper Center and an overall longer history of involvement in the fishery. The fishwheel fishery at Slana is included as an example of a combination of local and non-local fishwheels, and an area that has a rapidly increasing number of fishwheels. Non-Basin residents using Slana wheels also appear to have reasons for involvement in the fishery which contrast them with the non-local sample from other clusters. These include fewer alternative salmon fisheries in relatively close proximity and a previous usage of the Copper River salmon fishery prior to relocating outside of the Basin.

Chitina Bridge Cluster

The fishwheel fishery at Chitina Bridge is notable in that it is the

largest, most geographically concentrated and the most diverse in terms of residencies of the permit holders of all the Copper River fishwheel clusters. The fishery occurs just over a mile down the Edgerton Highway from the community of Chitina, an unincorporated village with a population of 42 people (US Census 1980). The community experiences a seasonal influx of summer residents, recreationists, tourists and other visitors each year.

Residency

In 1982, residents from at least 23 different communities obtained permits to operate fishwheels at Chitina, in contrast to representation from only five communities in the Gulkana fishwheel cluster. Approximately one third of the Copper River fishwheel permittees (191) harvested fish using fishwheels put in the river near the Chitina Bridge. Of these, 69.9 percent live outside the Basin and 27.8 percent are Basin residents. The residencies of the remaining 2.0 percent are unknown (Table 6). This contrasts with the residency pattern of the fishwheel permittees as a whole--51.1 percent local and 48.9 percent non-local.

Twenty wheels were observed at Chitina during the aerial survey at the end of June. All the wheels were placed on the east side of the river within a three-quarter mile stretch. Some wheels were as close as five yards apart. The density gave rise to some complaints and various kinds of accommodations among the fishermen. For example, some local residents waited to run their own wheels until others had finished fishing and had pulled their wheels.

Chitina is a site highly favored by non-Basin residents primarily because of easy access from the road; vehicles are able to travel right to the river bank. This expedites transporting and placing the fishwheel,

TABLE 6: RESIDENCY OF CHITINA BRIDGE FISHWHEEL PERMITHOLDERS, 1982¹

<u>Community</u>	<u>Estimated Number of Permits</u>	<u>Percent</u>
Anchorage	57	29.8
* Chitina ²	17	8.9
Delta Junction	11	5.8
Eagle River	5	2.6
Fairbanks ³	7	3.7
* Glennallen	5	2.6
Kenai/Soldotna	3	1.6
* Kenny Lake	23	12.0
* McCarthy	2	1.0
Palmer & Wasilla ⁴	36	18.8
* Sourdough	1	0.5
Tok	2	1.0
* Tonsina	5	2.6
Trapper Creek	2	1.0
Valdez	5	2.6
Other ⁵	5	2.6
Unknown	<u>5</u>	<u>2.6</u>
	191	99.7 ⁶

* Denotes Copper Basin communities.

1 Derived from 1982 permit data.

2 Includes seasonal residents.

3 Includes North Pole and College.

4 Includes some Basin residents.

5 Includes Tenakee Springs, Douglas, Sterling, Healy, and Cantwell.

6 Due to rounding error.

as well as transporting the catch. It is possible that the visibility and general knowledge about the Chitina site also have contributed to the popularity of the area for non-Basin fishwheel operators.

Fishwheel Sites

The fishwheel sites of individual wheel operators at Chitina appear to vary from year to year. Some wheel owners leave their wheels on the bank during the closed period, and others arrive in Chitina in mid-May to put in their wheels. However, the presence of a wheel at a site does not deter others from putting in wheels immediately above or below the spot. As a result of the growing use of this area, fishwheel sites with access and appropriate wind conditions for drying fish are at a premium in the Chitina area. Some local residents have given up vying for a spot at the bridge and are testing other locations. One such family now puts in a wheel near the Chitina airport, on a gravel island which is reached by crossing over two smaller channels of the river with small driftwood or dead wood bridges that are built each year. In spite of the access difficulties, the users prefer the site for its privacy and usually good conditions for drying fish in June.

History of Involvement in the Fishery

Twenty-two fishwheel permitholders were interviewed at the Chitina Bridge site. Sixteen, or 72.7 percent, were from outside the Copper River Basin. Of those sixteen, three (18.8 percent) had been involved in the fishery longer than ten years, and only one more than twenty years. A high percentage of the Chitina fishwheel operators interviewed had initially participated in the dipnet fishery.

Use of Fishwheels

Possibly because of the long distance from home for many permitholders, transportation to the fishwheel sites in Chitina was characterized by campers and motor homes.

The fishwheels themselves were quite diverse in size and style. Drums and styrofoam floats were most prevalent. A few wheels were almost exclusively wood, except for the chickenwire or mesh used in the revolving scoops. A few were constructed almost entirely from metal, except for a few wooden planks to access the wheel.

No wheel owners were encountered who made only one trip to Chitina. At least two trips and two different weekends were invested in the fishery. Permitholders operating someone else's wheel were more likely to spend only a weekend or a three-day period at the site.

Preservation

No fishcamps were observed at Chitina. Fishery participants brought cutting tables with them or improvised facilities during the season. No drying racks or smokehouses were standing or constructed.

Several respondents brought other fish processing equipment with them, primarily pressure cookers, for use in the event they obtained many fish in a short period of time. Non-local fishermen, however, were much more likely to have coolers or garbage cans with ice for holding the fish until returning home with the catch. Local residents usually cleaned their fish on the bank, and then transported them back to their residences on the same day to be preserved or eaten fresh.

Case Study A

This example describes a non-local fishwheel owner who fishes at Chitina and whose first involvement in the fishery had been dipnetting just downstream from his fishwheel site.

A husband and wife in their early fifties from Soldotna were operating a fishwheel at the north end of the string of fishwheels above the Chitina-McCarthy Road bridge on the first day of the season. The couple had lived in Alaska 8 years. They moved to Alaska after a visit to a son who was working in the state, and were fishing with another couple, also in their fifties. The husbands work together on an oil platform in Cook Inlet. It was the fourth year the couples had come to Chitina. The first two years the husbands had dipnetted. In the third year, 1981, they photographed fishwheels, built their own at home and transported it to Chitina. At the end of the season, they took it back to Soldotna for modifications, and brought it back to Chitina this year.

Each couple in the fishing group had driven 20' motor homes from their residences. The interviewed man also had brought an elaborate homemade collapsible butchering table that he had built for cutting the fish. The table had a trough for holding the fish, screening for holding the slippery fish in place on the table, and hooks for hanging buckets and tools. The table was a result of his three years' experience cleaning fish at Chitina and his 23 years of experience as a meat cutter prior to coming to Alaska. The motor homes were set up for canning salmon, with four pressure cookers, cans and a can sealer. The two couples also had brought a generator and a freezer.

The men were in charge of cleaning and cutting the fish for steaks and for canning. A few fish were saved for smoking. The women were canning

the fish. Each couple harvested their limit of 70 fish.

The couple reported that they participated in other resource-related activities including rod and reel fishing for king salmon on the Kenai, halibut fishing, and "a lot of hooligan fishing." They sometimes go ice fishing. When they first arrived in Alaska they hunted moose, but now "it's getting to the point where you have got to go too far [from their home in Soldotna] to find a moose." Recently, they have not hunted at all.

Copper Center Cluster

Fishwheel Groupings

The Copper Center fishwheel area includes that portion of the Copper River along the Richardson Highway between mileposts 100 and 106. Residents of Copper Center (population 213 in 1980) commonly use this area to place fishwheels, which occur in three distinct groupings (see Figure 12). Each grouping differs in the residencies of its permit holders and in their sociocultural patterns.

Copper Center Loop

Fishwheel Sites. The Copper Center Loop cluster occurs from mile 100 on the Richardson Highway just south of the Klutina River Bridge, to mile 101.5. Eight fishwheels were observed in the river or on the bank at the time of the aerial survey. Eleven wheels were reported by permittees in the area behind the Copper Center Lodge this year and just south of the Klutina River.

Residency. Seventy-two permits were issued in this area, 51.4 percent were given to Copper River Basin residents and 48.6 percent were issued to

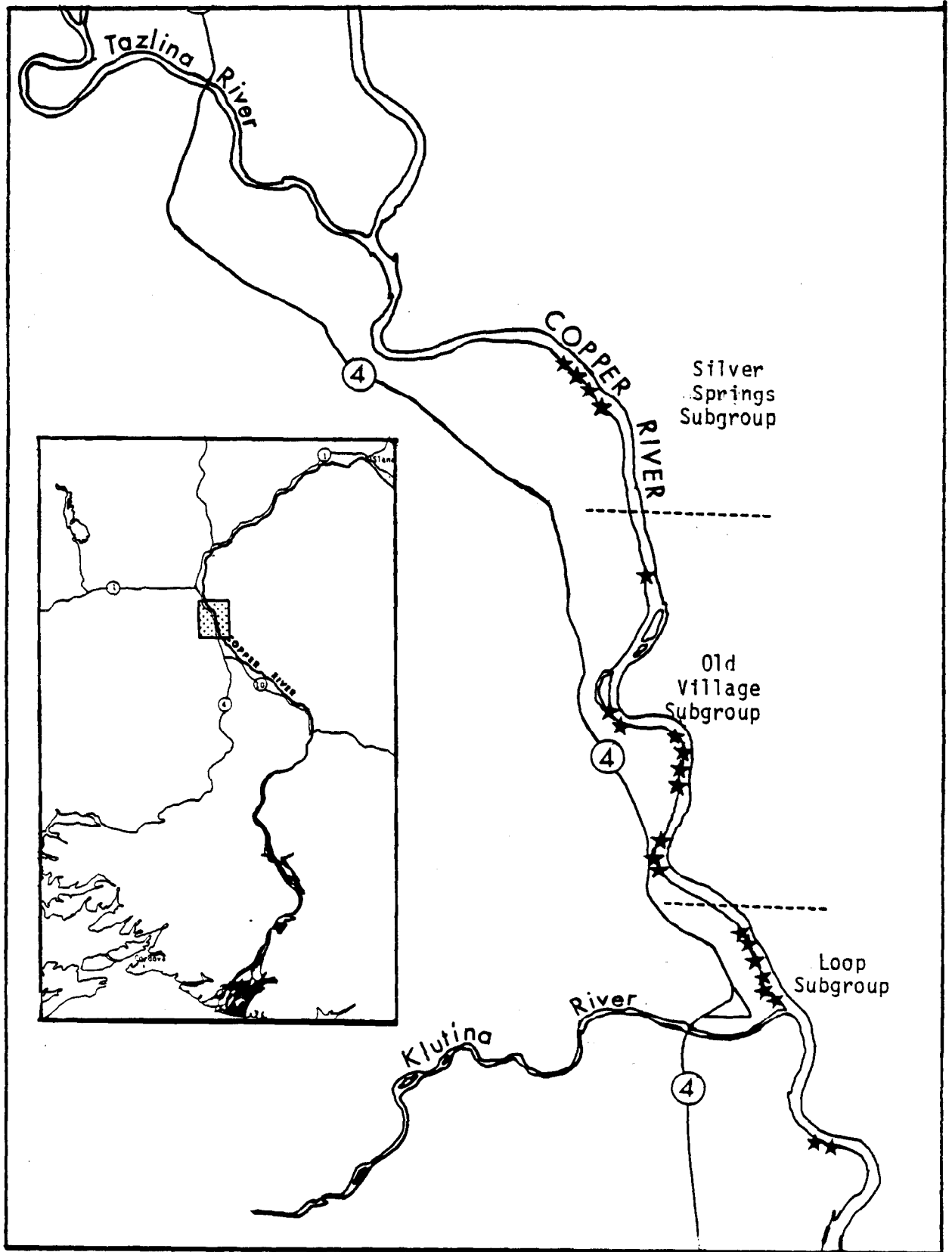


Figure 12. Copper Center Fishwheel Locations, 1982
 (From Aerial Survey on June 30, 1982 by K. Roberson,
 Division of Commercial Fisheries).

non-Basin residents. More than half of the eleven fishwheels were owned by Copper Center residents, a few by other Copper River Basin residents, and three by non-local residents. Of the six permit holders interviewed, five were Copper River Basin residents and one was from Fairbanks.

History of Involvement in the Fishery. Of the six permittees interviewed, one was participating for the first time, four had participated between three and ten years, and one had a history of using the same site for more than 20 years (since moving into the area from Fairbanks with his family).

Design and construction of wheels were similar in diversity to the Chitina fishery in diversity. Transportation was confined to passenger vehicles and pickup trucks. The only non-local permittee encountered was camping in a tent. Local residents visited the fishing sites to check the wheel and to obtain fish, but except for cleaning the fish, all other handling and processing was conducted at the homes of permit holders.

Preservation. Canning was mentioned by all participants interviewed as a method of preservation they employed. Freezing and smoking were methods mentioned by two-thirds of the contacts, and drying of fish, or fish parts was reported by one-third. Most local residents contacted had built smokehouses near their homes, and one had erected a drying rack where fish parts were dried for dogfood. Half the people interviewed utilized fishheads for dogfood or eggs for fishing bait.

Other Resource Activities. None of the local permit holders travelled outside the Basin to hunt, fish, trap, or pick berries. Two-thirds, however, fished for species other than salmon and hunted in the Copper River Basin.

Case Study B. This example illustrates a Copper Center household that has participated in the fishwheel fishery for six years in the Copper Center Loop area.

The household consists of a husband and wife who moved into the Copper Center area from out-of-state seven years ago. The wife has a full-time job in Glennallen, and the husband pursues various seasonal and part-time occupations, including trapping, crafting dogsleds, and weaving birch bark and spruce root baskets. Their two sons are married and living away from home, one out-of-state and one in Palmer.

During six years in the fishery, the husband has built four fishwheels. Broken cables and ice jams resulted in the loss or destruction of three of these. The current wheel, in use for its third year, is positioned on an island in the river. He uses a skiff with an outboard motor for access to the wheel.

This year the household operated their fishwheel from mid-June to late August. Five other permitholders also used the wheel during that time, three of whom were Copper Center residents, one the owner's son from Palmer, and one a friend from Anchorage.

The owner and his wife reported freezing most of their salmon this year, putting up two cases of salmon in jars, and drying the salmon backbones and heads for dogfood on a 12' by 12' drying rack which stands near the house. Neighbors and friends save fish heads and backbones for him, and some years he also obtains salmon carcasses from the hatchery at Paxson which he dries for dogfood. In addition to salmon, the fishwheel also occasionally catches eels, whitefish, grayling, burbot and trout. Only the eels are not eaten.

In addition to the fish acquired by using the fishwheel, the husband also fishes for king salmon on the Gulkana River with rod and reel. The last two years he has not had the time, however. He has been busy with visits from friends and relatives, gardening, drying fish for dogfood, and

cutting firewood. Also, he occasionally has taken part-time or short-term jobs.

The husband hunts for moose, caribou and rabbits. For the last six years, he has hunted unsuccessfully for moose every year. He and his wife or son get one or two caribou every year in Units 11 or 13. He shoots rabbits while trapping. Also, the permitholder tans, sews and beads moose and caribou hides, many of which he receives from friends.

The Old Village

The second Copper Center grouping occurs between miles 102 and 104 of the Richardson Highway, where on the east side of the highway several small access roads lead to fishcamps. The residences of many of the fishcamp and fishwheel owners are on either side of the highway.

Fishwheel Sites. Almost every site visited in the Old Village area was a fishcamp, with drying racks and cutting tables. A recent change in channel which washed away several feet of bank had taken some fishwheels and drying racks as well. Many sites had been in use for twenty to thirty years. None of the interviewed residents in the Old Village vicinity actually had been born in Copper Center, but all had been born in the Copper Basin. One-third had been born at former villages and camps on the other side of the Copper River, and the other two-thirds had been born in the Dry Creek area and had moved to Copper Center because of marriage or government-induced resettlement during World War II.

Residency and History of Involvement in the Fishery. Twenty-nine permits were issued for the eight wheels operated in the area, 79.3 percent to Basin residents and 17.2 percent to non-Basin residents. One permittee was of unknown residency. Of the six interviewed, five were local residents. All

had participated in the fishery more than twenty years, usually for their lifetimes.

Fishwheels were characterized by recycled parts, use of dry logs for floats, and saplings which had been shaped for the basket supports. The most frequently reported annual cost was the purchase of chickenwire. Transportation costs were minimal since many fishwheels were within one-quarter to one mile of the residences. The major investment was the time spent harvesting and processing the fish.

Preservation. Drying and freezing were the most frequently used methods of preservation, mentioned by two-thirds of those interviewed in the area. Canning and smoking were mentioned by half, and salting by one respondent. The village area fishery was typified by older people cutting and drying their fish. Younger people placed the fish on the table, rinsed and hung them, kept the fire going and procured the right alder branches with which to spread the drying fish. For a few participants, fishing involved the entire month of June and the early part of July. As the weather changed and made circumstances less favorable for successful drying of fish, the July, August, and early September harvests were frozen, smoked, or canned.

Methods for drying fish differed in minor ways among individuals, but the basic process was common throughout the Copper River fishery. The preferred method involved burying the freshly caught fish in the ground for a period ranging from overnight to two days. Next, the fish were strung on wire or rope and hung in the river for 4 to 12 hours, then heads were removed and the fish were cut and cleaned according to size, condition of the fish, and intended use. Cut fish were hung on covered drying racks, designed to protect the fish from birds, sun, and rain, but to allow the

air and wind to circulate freely. Smoldering fires were utilized in the first few days of drying to add flavor, aid in drying, and keep flies away. Fish were checked and turned every few days, and when satisfactorily dry, the majority of the fish either was baled or was bundled in boxes or sacks and stored in food caches. Drying time is heavily dependent on weather conditions. Humidity or rain can prolong the time and cause spoilage.

There was a relatively high incidence of salmon head and roe usage in this group. Eggs were used for both human consumption and fish bait, and four of the six respondents were using fishheads to make salmon grease, soup, or "stinkheads." The stinkheads were made one of two ways, either by leaving them for a prolonged period of time (two weeks) in the river on a wire or string, or else by burying them in the ground for a shorter period of a week to ten days.

Other Resource Activities. The most active participants in the Old on Village fishwheel fishery tended to be fifty years of age or older. As a result, while able to cut fish and direct others in more physically demanding tasks, they often were not strong enough to engage in such activities as hunting and trapping. Half of the respondents indicated, however, that they or other members of their households engaged in fishing for species other than salmon and also went hunting.

Case Study C. This example is typical of several fishcamps in the Copper Center area, as well as at the Chitina airport and Tazlina.

The household consists of a retired permitholder and his wife who are in their early sixties, a son and daughter in their mid twenties, and a teen-age granddaughter. The husband was born in the Copper Center area and raised in Gulkana; his wife was born and raised in the Dry Creek (Gulkana Airport) area.

The fishcamp is about a half-mile from their residence, and has been in use approximately 40 years. It consists of cutting tables and drying racks.

In mid-June, both drying racks were half full, with over a hundred fish cut and drying. The husband transferred freshly caught salmon from the catch box on the wheel to a hole in the ground, "assisted" by a young grandson. Approximately thirty salmon were lying in the water, strung on a rope through the mouth and gills. The man started cutting the bodies off, leaving the heads on the rope in the water. The bodies were put on or near the cutting table, where his wife and a woman from a village outside the Basin were cutting the fish in preparation for drying. The women put the cut fish in tubs of water. The wheel owner eventually carried the fish to the drying racks and hung them.

In late August and early September, the husband and wife go caribou hunting and berry picking along the Denali Highway. Moose and rabbits are hunted across the river from fishcamp, where the permitholder has a trapline. They also make trips to the Gakona River for berries, porcupines and rabbits, and hunt ducks and moose in the Dry Creek area.

Silver Springs

The Silver Springs subgrouping, consists of four fishwheels and occurs between miles 104 and 106 of the Richardson Highway.

Fishwheel Sites. At Silver Springs, wheel placement patterns are a function of land ownership, access, and traditional use areas. Two of the wheels are placed on private property. One fishwheel is used at a traditional fishcamp, near the family graveyard and old cabin.

Residency and History of Involvement in the Fishery. Four wheels

were observed in the area, all owned by Copper Basin residents. At least 34 permits were issued for these wheels, 61.8 percent to local residents and 38.2 percent to non-local residents. Of the four people interviewed, one was participating in the fishwheel fishery for the first time, one for the seventh year, and the remaining two had histories of involvement longer than 40 years.

Passenger vehicles and pickups were utilized for transporting the fishwheel operators and the harvested fish from the fishwheel to the nearby residences. A few non-local residents not interviewed were observed in campers and a motor home as they spent a weekend operating a wheel.

Preservation. Several preservation methods were employed by each respondent. Freezing, smoking and drying were mentioned by half of those interviewed and canning was used by three out of four.

Other Resource Activities. Patterns for the Silver Springs grouping mirrored the general fishwheel patterns, with local residents staying in the Copper River Basin to participate in other harvesting activities.

The Silver Springs grouping was different from the Loop and Village in that the group was not as homogenous as the other two. Two wheels resemble the Loop patterns of fairly recent residency, relatively short history in the fishery, and canning and freezing of salmon; and two wheels had more elements in common with the village characteristics--life-long Basin residency and use of the fishery, and predominant use of drying as a preservation method.

Gulkana

The fishwheel fishery above the confluence of the Gulkana and Copper rivers takes place near the community of Gulkana, about a half mile off

the Richardson Highway at mile 127, twelve miles north of Glennallen. The 1980 Census shows a population of 104 in Gulkana.

Fishwheel Sites

The fishcamps and fishwheel sites are reached by road from the village and are about a mile away from the village. All the sites have been in use for many years, as evidenced by old cabin and tent frames, caches, and drying racks. However, a channel change in the river in 1981 washed away portions of some fishcamps including several drying racks. The river change has affected the efficiency of fishwheels at the established fishcamps, and by August some of the fishwheel owners were discussing the possibility of returning to the "old fishcamp" further downriver from the village, closer to the confluence of the Gulkana and Copper rivers. This site was abandoned in favor of the current camps when a road was put through to the currently used area. Access to "old fishcamp" is by a two-mile foot path. In the 1940s and before, fishcamps near the present Gulkana Airstrip were utilized. Described in English as "5-mile" and "6-mile" camps, local residents cited distance from Gulkana and the steep bank down to the river (making the transporting of fish extremely rigorous) as primary reasons for moving to the closer Gulkana sites. The better condition of the fish and the king salmon of the 5- and 6-mile sites is remembered and missed.

Residency and History of Involvement in the Fishery

All Gulkana fishwheel users contacted were Basin residents. Permit data indicates that as many as eight wheels were operated. Fifteen permits (83.3 percent) were held by Copper River Basin residents, primarily Gulkana residents, and four permits (16.7 percent) were issued to non-Basin residents who have friends or relatives in Gulkana. All three of the local residents interviewed had participated in the fishery throughout their lives, and

two recalled the days when they lived on Crosswind or Ewan Lakes in the winter and came down to the Copper River in the summer to fish for salmon.

Gear Type and Use

At Gulkana, fishwheels were similar in construction to the Copper Center Old Village group, characterized by large logs nailed together for floats, young trees stripped and shaped providing the frame for the chicken-wire on the revolving baskets, and wooden axles. Fishwheel builders travelled substantial distances to obtain trees of sufficient size and dryness to serve as floats. 1982 was a particularly expensive year for the wheel owners because apparently all the wheels had been washed downstream when the bank was cut away by high water the preceeding year.

Since it takes longer for salmon to travel upriver to the Gulkana site and because the few fish in the river after July are considered by many local people to be of a poor quality, the fishing season is shorter there than at Copper Center. The later runs that pass Copper Center apparently go up the Tazlina and Gulkana rivers and other tributaries that feed into the river below Gulkana.

Preservation

Smoking and drying salmon were the two methods mentioned by the permit-holder sample from Gulkana. Information gathered from village residents and permit holders during field work for another project indicated that freezing also is commonly employed for small quantities of fish. Most preservation activities, such as cutting, drying, and smoking, currently take place near the homes of Gulkana residents. Increasing non-local traffic down to the fishcamps and marauding bears have prompted local fishwheel operators to move the fish processing activities to the residential area. However, at least three fishcamps were still used for the initial "sliming,"

the burying of whole fish in a hole in the ground for a time varying between 6 hours and 2 days, depending on personal preferences, and then rinsing in the river for another period prior to the cutting of the fish.

Other Resource Activities

Gulkana fishermen stated that they did not journey outside the Copper River Basin for any other resource gathering or harvesting activities and did not participate in any other salmon fisheries in the region. All reported participating in other fisheries, commonly for grayling and whitefish. All respondents also hunted, and two ran traplines.

Case Study D

This case study of a Gulkana fishwheel site and fishcamp is typical in the Gulkana area and is consistent with the pattern observed in the Copper Center area (described previously in Case Study C).

The permit holder and his wife are in their late sixties. They have only a limited cash income. Their two sons have their own families and homes in Gulkana.

The husband put his fishwheel in the river a mile from the village, at a place that he has been using for several years. He fished in June and the first part of July before the wheel broke loose and washed downriver to an island near Copperville. He hopes to salvage at least part of the wheel for next year. The number of fish harvested this year was fewer than expected, and was attributed to the change of channels in the river.

The harvested salmon were buried and then put in the water in a manner similar to Case H. Then the fish were transported to the cutting table and drying rack at the residence in the village. A smoldering fire was used during the first few days of drying. A few of the fish were also

frozen. Other Gulkana residents who did not put in their own wheels in 1982 were allowed to run this wheel when the owner was out of town.

The husband has a trapline and two cabins between the village and Crosswind Lake and another cabin at the lake. In the late fall, winter and early spring, he and others from the village, often relatives, go fishing, hunting and trapping in the area between the village and the lake and also around the lake. Depending on the weather, an all terrain vehicle (ATV) or a snowmachine may be used for transportation. Whitefish, trout, lingcod, muskrat, and caribou, as well as furbearers, are harvested during such trips.

Slana

Slana is a small community about 60 miles from the Gakona Junction of the Richardson Highway and the Tok Cutoff. The community lies near the junction of the Nabesna Road and the Tok Cutoff and near the confluence of the Slana and Copper rivers, the northernmost limit of the fishwheel fishery. The 1980 Census reports Slana's population as 49. A Department of Transportation highway camp is the main local source of year-round employment.

Fishwheel Sites and Residency

The aerial survey and site visitation indicated a total of six wheels. Permit data suggested as many as eight wheels and at least 52 permits, 15 of which were issued to Copper River Basin residents (28.8 percent) and 37 (71.1 percent) that were held by non-Basin residents. At least 25 (48.1 percent) were residents of Tok, a service center at the junction of the Alaska and Glenn highways, 65 miles north of Slana. A proliferation of Tok residents participating in the fishery has occurred since the mid-1970s,

with a noticeable increase in the number of wheels and permits in the last two years. Geographically, the Copper River salmon fishery is closer to Tok than the gill net fisheries on the Yukon and Tanana rivers and may provide salmon in better shape and at a lower investment with respect to gear type, time and distance travelled. Sixteen participants in the fishery were contacted, ten of whom resided in the Copper River Basin and the remaining six in Tok.

Another community which is classified as non-local to the Copper River Basin, but which views the fishwheel fishery as very important, is Dot Lake, population 50 in 1980. The association with the fishery originated with the village of Batzulnetas, a Copper River village which was abandoned sometime in the 1940s. Inhabitants of the village resettled at Mentasta Village, Dot Lake, and Chistochina, and some have maintained seasonal residences near Twin Lakes on the Nabesna Road. Dot Lake residents return annually to the Copper River for salmon, participating in the fishery either at the Slana site or Chistochina.

Two discrete clusterings of wheels at Slana were observed. Two wheels were located on a local resident's property. One of these wheels was owned by a Slana area resident, and the other by a Tok resident. However, both wheels were cooperatively operated by local and a few Tok and Dot Lake residents, with all local residents having the owners' permission to use the wheels if they wanted fish. The second clustering was a little farther south. In the past, wheels were placed there and reached by boat from the bridge a mile upriver. Recently, a road has been cut through allowing vehicle access. All users of the three wheels that were contacted were Tok residents.

History of Involvement in the Fishery

Both the local and Tok portions of the sample included first year participants as well as permit holders who have been in the fishery for over twenty years. Five of the six Tok (non-local) respondents reported involvement in the fishery of ten years or less, while 60 percent (6 respondents) of the Basin sample had been participating for over 10 years. One respondent originally had participated in the salmon fishery near the abandoned village of Batzulnetas, using a fish trap in Tanada Creek and a fishwheel in the Copper River near the village. Changes in regulations have altered this pattern; fishwheels are prohibited in Copper River tributaries and in the Copper River itself upstream from Slana.

Gear Type

Of the two wheels utilized by local people, the one owned by a Slana resident was particularly a community effort. The owner provided the materials for wheel maintenance and equipment needed to place the wheel in the river. However, five other families helped in repairing the wheel, putting it in er and pulling it out at the end of the season. Other cooperation was observed among the families, including aid in transporting fish and in preserving fish as well.

Local residents travelled up to 29 miles to the fishwheels (from Twin Lakes on the Nabesna Road), while Tok residents travelled approximately 65 miles. A few of the Tok residents made weekend camping trips, but the majority of those contacted drove to Slana to check the wheels in the evenings, and then returned home.

Preservation

Canning was the most frequently used method of preservation by both local and non-local respondents; all six of the Tok contacts and 7 of the

10 local residents reported canning. Two thirds of the nonlocal sample, and forty percent of the local fishermen froze some of their salmon. Smoking was mentioned by 5 out of 6 non-local respondents and less than one-third of the local sample. Thirty percent of the Basin residents mentioned preserving at least some of their salmon by drying, and the same proportion mentioned salting fish.

Salmon roe were saved and used by one Tok resident. Fishheads and fisheggs were utilized by two of the local contacts. Other parts of the fish were used for dogfood and trap bait by several Basin residents.

Other Resource Activities

Half of the Tok respondents reported participating in salmon fisheries elsewhere in the state as well as the Copper River fishery. None of the local participants harvested salmon anywhere else. The majority of the Basin respondents fished for species other than salmon and hunted in the Copper River Basin on a regular basis. All of the Tok contacts fished and hunted outside the Basin. Trapping and berry picking were activities mentioned by at least a third of each of the samples, with Basin residents pursuing these activities within the Basin, and non-Basin residents going elsewhere.

Case Study E

This is an example of a Tok resident who runs a wheel in the Slana area. His history of involvement in the fishery and other characteristics are similar to the other Tok residents contacted.

The permitholder, a Tok resident since the 1950s, has a wife and three children. He has a full-time job in Tok. His involvement in the fishery began five years ago when he used the wheel of a friend also living in Tok. He has been operating his own wheel for four years now. He chose the closest place to Tok where he could put in a wheel and initially used a boat to

search for a good fishwheel site. The boat also was used to transport the wheel in pieces to its current location, approximately a mile below the confluence of the Copper and Slana rivers. Now there is road access.

When he first built the wheel, it was used for a week to two weeks, beginning June 1. With the increasing number of friends from Tok using his wheel, the permitholders had the wheel running for 26 days this year, the longest time ever for this wheel.

The salmon the owner harvests are taken on ice (which he obtains from a glacier accessible from the highway) back to Tok where they are gutted and the heads and fins cut off. The entrails and heads are given to a friend for use as dogfood. The eggs are saved for fishing bait and for a relative who eats them. Some salmon are canned, some are frozen, and some are smoked in a converted refrigerator with smoke vented in from an airtight stove.

The whole family drives annually to Homer for halibut fishing and a vacation. Moose are hunted near the Taylor Highway in the Tok area every year, and he usually averages one every other year. The wife picks blueberries each year.

Case Study F

This example illustrates local usage of a fishwheel in Slana. The household consists of a couple in their early forties. Twenty year Alaskans, they moved from Anchorage to the Slana area 13 years ago. The husband works full-time at the highway camp in Slana, runs an excavating business and recently has started planting crops of hay, in part to feed his eight horses and also to sell. He also runs a trap line in the winter.

Five other local families help with repairing, installing, and removing the fishwheel. These five and many other Slana area residents use the

wheel. The fishwheel site is just below the confluence of the Slana and Copper rivers, and access is by a driveway on private property. The land owner also uses the wheel.

This household's salmon harvest in 1982 was 2 kings and 23 reds, which was less than their bag limit but all they wanted. They can most of their salmon, either fresh or after smoking it in a commercially manufactured smoker, Chief" and they also freeze some.

The husband hunts extensively in the area, making use of his horses on these trips. He hunts sheep, moose and caribou regularly. A few rabbits, spruce grouse and ptarmigan are also harvested. His trapping includes beaver, lynx, muskrat, wolf, wolverine, and fox. Beaver carcasses and stray fish in the fishwheel such as lingcod, grayling and whitefish are used for trapbait and dogfood.

THE DIPNET FISHERY

Residencies

As reported by the Division of Commercial Fisheries, a record number of permits (5481) for the Copper River dipnet fishery were issued in 1982 (Roberson 1982c). Eighty-five Basin residents (1.5 percent) held dipnet permits. Of the remaining 5396 dipnet permits, residents of the Fairbanks area (including College, North Pole and Ester) and Anchorage area (including Chugiak and Eagle River) were predominant recipients with 2112 permits (38.5 percent) and 1713 permits (31.2 percent) respectively. Military permitholders from Eielson Air Force Base, Elmendorf Air Force Base, Fort Greely, Fort Richardson and Fort Wainwright accounted for 722 (13.2 percent) of the permits. Other communities with a minimum of one hundred permitholders were Delta Junction (260 permits, 4.7 percent), Palmer (184 permits, 3.3 percent), Valdez (148 permits, 2.7 percent), and Wasilla

TABLE 7:
RESIDENCY OF DIPNET PERMITHOLDERS, 1982 ¹

<u>Community</u>	<u>#</u> <u>permits</u>	<u>percent</u>	<u>Community</u>	<u>#</u> <u>permits</u>	<u>percent</u>
Anaktuvuk Pass	1	-	Kenai	1	-
Anchorage	1449	26.4	Ketchikan	2	-
Anderson	1	-	Kotzebue	1	-
Barrow	3	-	Manley Hot Springs	1	-
Bethel	3	-	* McCarthy	1	-
Big Lake	6	0.1	McGrath	1	-
Boundary	1	-	McKinley Park	2	-
Central	2	-	Mekoryuk	1	-
Chalkyitsik	1	-	Minchumina	1	-
* Chitina	6	0.1	Moose Pass	1	-
Chugiak	102	1.9	Murphy Dome	3	-
Circle	1	-	Nenana	12	0.2
Clear	21	0.4	Nome	2	-
College	75	1.4	North Pole	129	2.3
* Copper Center	48	0.9	Northway	2	-
Cordova	1	-	Nulato	1	-
Craig	1	-	* Palmer ²	182	3.3
Delta Junction	260	4.7	Peters Creek	1	-
Eagle River	162	3.0	Petersburg	2	-
Eielson AFB	297	5.4	Salcha	3	-
Elmendorf AFB	94	1.7	Seward	5	0.1
Ester	6	0.1	Shishmaref	1	-
Fairbanks	1902	34.7	* Slana	1	-
Fort Greely	61	1.1	Soldotna	3	-
Fort Richardson	72	1.3	St. Marys	1	-
Fort Wainwright	198	3.6	Stevens Village	1	-
Fort Yukon	2	-	Sutton	1	-
* Gakona	5	0.1	Tok	14	0.3
Girdwood	8	0.1	Trapper Creek	1	-
* Glennallen	26	0.5	Unalaska	1	-
Haines	2	-	Usibelli	3	-
Healy	4	0.1	Valdez	148	2.7
Homer	2	-	Wasilla	105	1.9
Hope	1	-	Willow	18	0.3
Hyder	1	-	No address	2	-
Juneau	1	-	Out of state	<u>1</u>	<u>-</u>
			TOTAL	5481	98.7 ³

* Denotes Copper River Basin Residency.

¹ Derived by zip code from 1982 permit data.

² Includes some Basin residents.

³ Due to rounding error.

(105 permits, 1.9 percent). Table 7 shows individual communities and the corresponding number of permits according to 1982 permit data.

History of Involvement in the Dipnet Fishery

Thirty-four (41 percent) of all dipnet permitholders interviewed indicated that 1982 was their first year in the fishery, and a total of 60 (72.3 percent) of the sample had a history in the fishery of five or fewer years (Figure 13). Twelve interviewed permitholders (14.5 percent), had initially participated in the fishery ten or more years ago.

The dipnetters' initial involvement in the fishery frequently stemmed from word-of-mouth reports about the fishery. Several military respondents mentioned the "grapevine on base" as their source of information. Many former military personnel from Fairbanks, and some from other areas as well, first started dipnetting in the Copper River or heard about it while in the military. None of the non-Basin residents interviewed had previously participated in the fishwheel fishery on the Copper River before dipnetting there, although many had been aware of it.

Many respondents indicated that since their initial involvement in the dipnet fishery, there had been intervening years when they did not participate. Reasons given for this included wage employment, absence from the state, involvement in another salmon fishery, or sufficient preserved fish from previous years still on hand. As Case K illustrates, however, participation has been continuous for some dipnetters.

Forty percent of the local dipnet fishermen interviewed had previously participated in the Copper River fishwheel fishery. Former fishwheel users reported they were dipnetting in 1982 because they could not afford the time and financial investment in a fishwheel, had heard that the

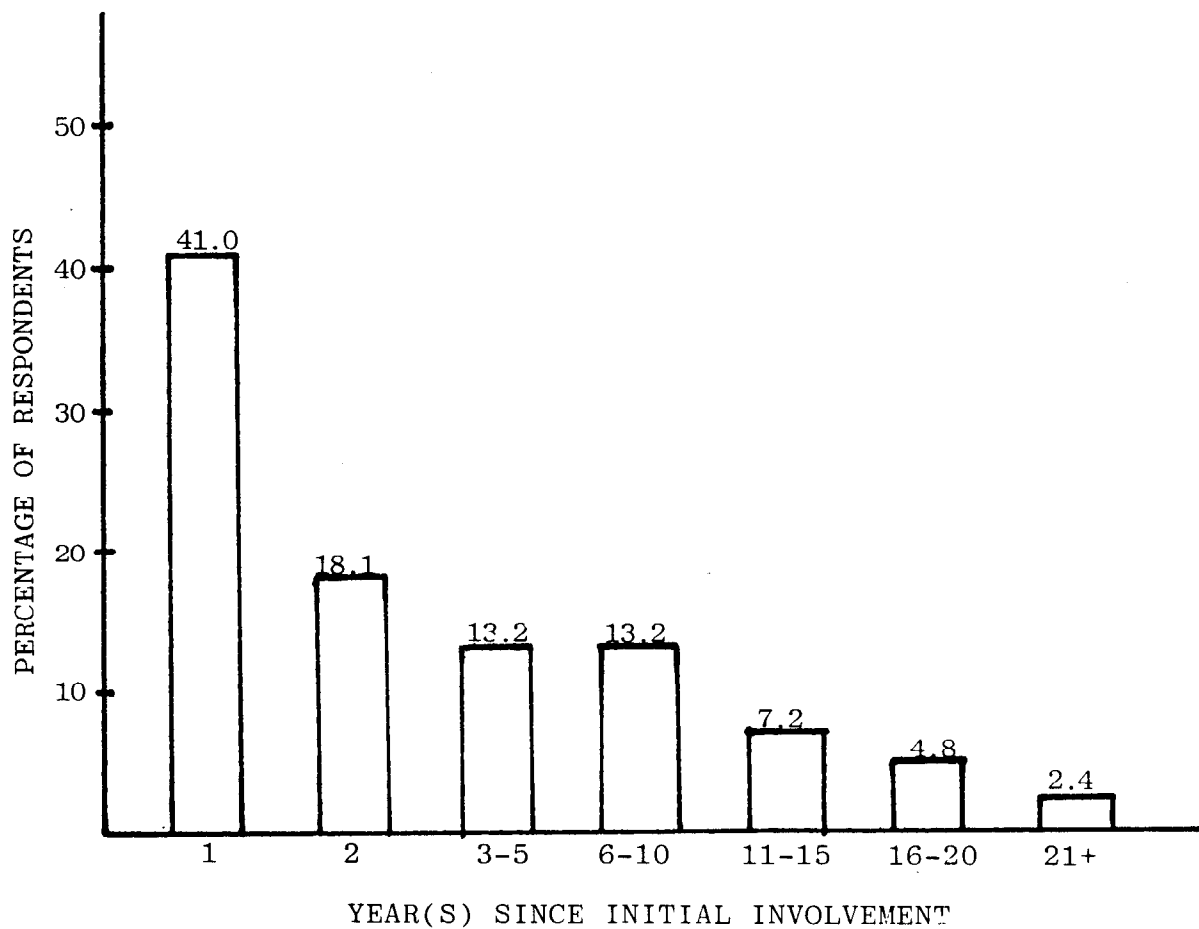


Figure 13. History of Initial Involvement in the Copper River Dipnet Fishery, 1982. (n=83)

dipnetting was particularly good this year, or did not have the access to a fishwheel that they had in the past.

Gear and Methods

The gear of dipnet fishermen reflected different levels of investment in the fishery. Some fishermen had no gear aside from a dipnet. Many had pole extenders and some form of kneeboots, hipboots, or waders. A few wore full length wetsuits. Less expensive gear included the use of rain jackets and pants, or the elaborate use of tailored and tied plastic garbage sacks to keep the fishermen dry while wading in the river.

About 20 percent of those interviewed in the general sample planned to spend 24 hours or less at Chitina. One third were spending the weekend and slightly less than one third expected to spend three to five days, unless they harvested their limit of fish sooner. One sixth planned to make more than one trip to Chitina during the fishing season. Basin residents, with a single exception, fished for the day and returned home in the evening, making more trips back and forth than non-local fishermen. Local fishermen brought passenger vehicles or pickup trucks without campers for transportation. Over half of those interviewed from Anchorage made use of campers or motor homes.

An additional observable investment or commitment that varied among fishermen is the risk and effort applied to the fishery. A few considered the drive the primary effort, fished an hour or two and enjoyed the area. Some fished from the shore, either remaining stationary or sweeping the river with the net. Commonly, fishermen stood in the river at depths varying from knee deep in the water to chest deep, sweeping with the nets. On several occasions one could watch groups of fishermen seemingly "bouncing" down the river, getting out of the water, walking up the river on shore,

returning to the water and moving downstream in a circular pattern. One group of fishermen, chest deep in the water, tied themselves with "life-lines" anchored on shore.

Fishing Groups

In the 1982 sample, the majority of Copper River dipnetters fished with family members or a combination of friends and family. Family members were the companions of half the fishermen, and family-plus-friend groupings accounted for 11 (13.8 percent) of those interviewed. One third were accompanied just by friends and one person was alone. Groups of two to four men, including at least one experienced dipnetter and newcomers to the fishery, were fairly common.

Preservation

Freezing was the most frequent method of preservation, used by 73.5 percent of the sample (See Figure 14). This category includes both fresh frozen fish and smoked fish that were frozen. Of the sample, 45.8 percent smoked at least a portion of their catch, and 38.5 percent canned fish. Many respondents made use of more than one method of preservation, so the categories are not mutually exclusive.

Location of other Resource Activities

In order to understand better the use of the Copper River dipnet fishery in the context of other household resource-related activities, participants were asked about other fishing and hunting activities in which they engaged currently (see Figure 15). Responses showed great variation. Just under half of the respondents reported participating in other salmon fisheries, such as rod and reel fishing in the Gulkana, Kenai,

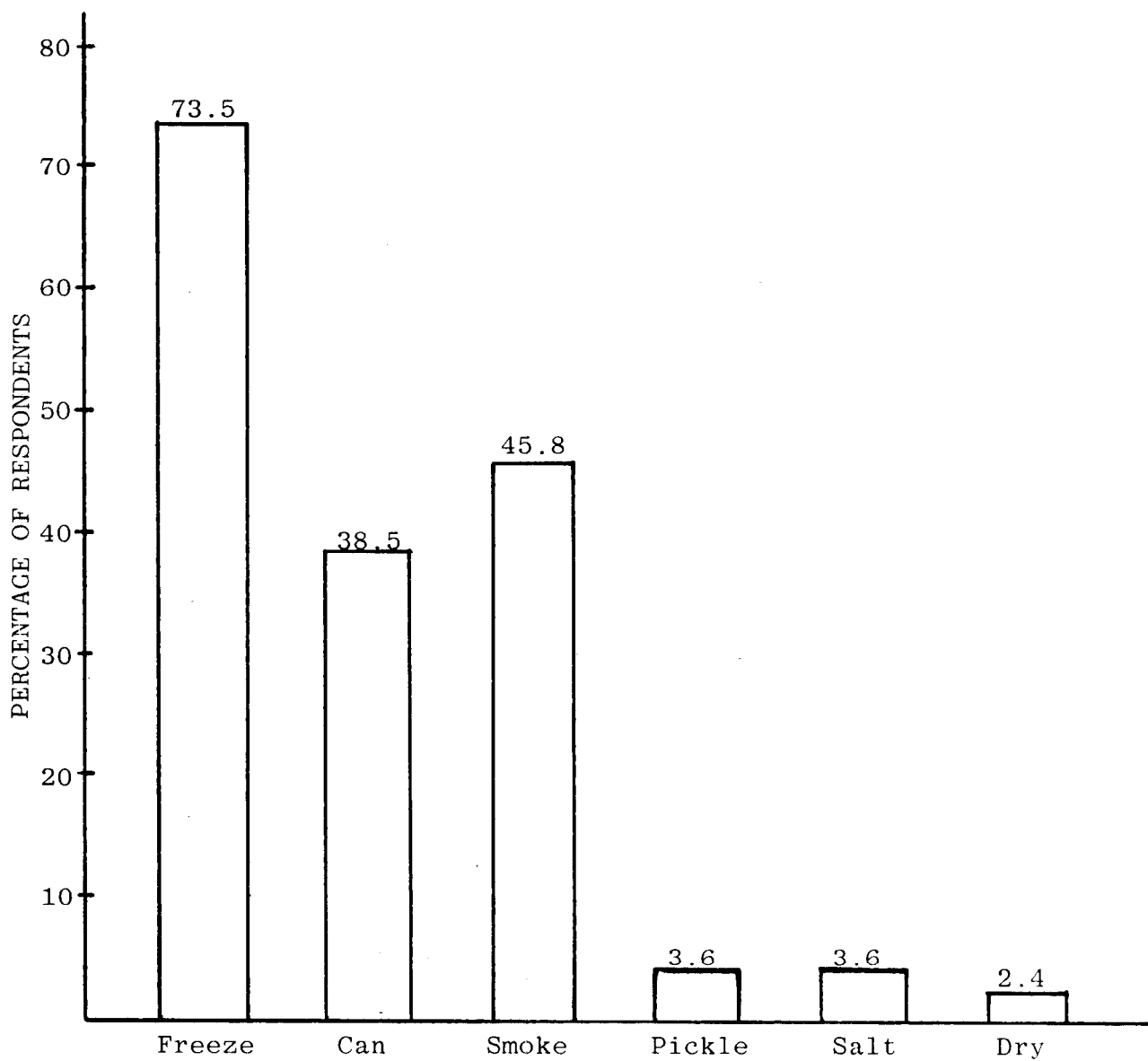


Figure 14. Dipnet Sample: Salmon Preservation Methods, 1982.
(n=83)

* Categories are not mutually exclusive; respondents could mention more than one category.

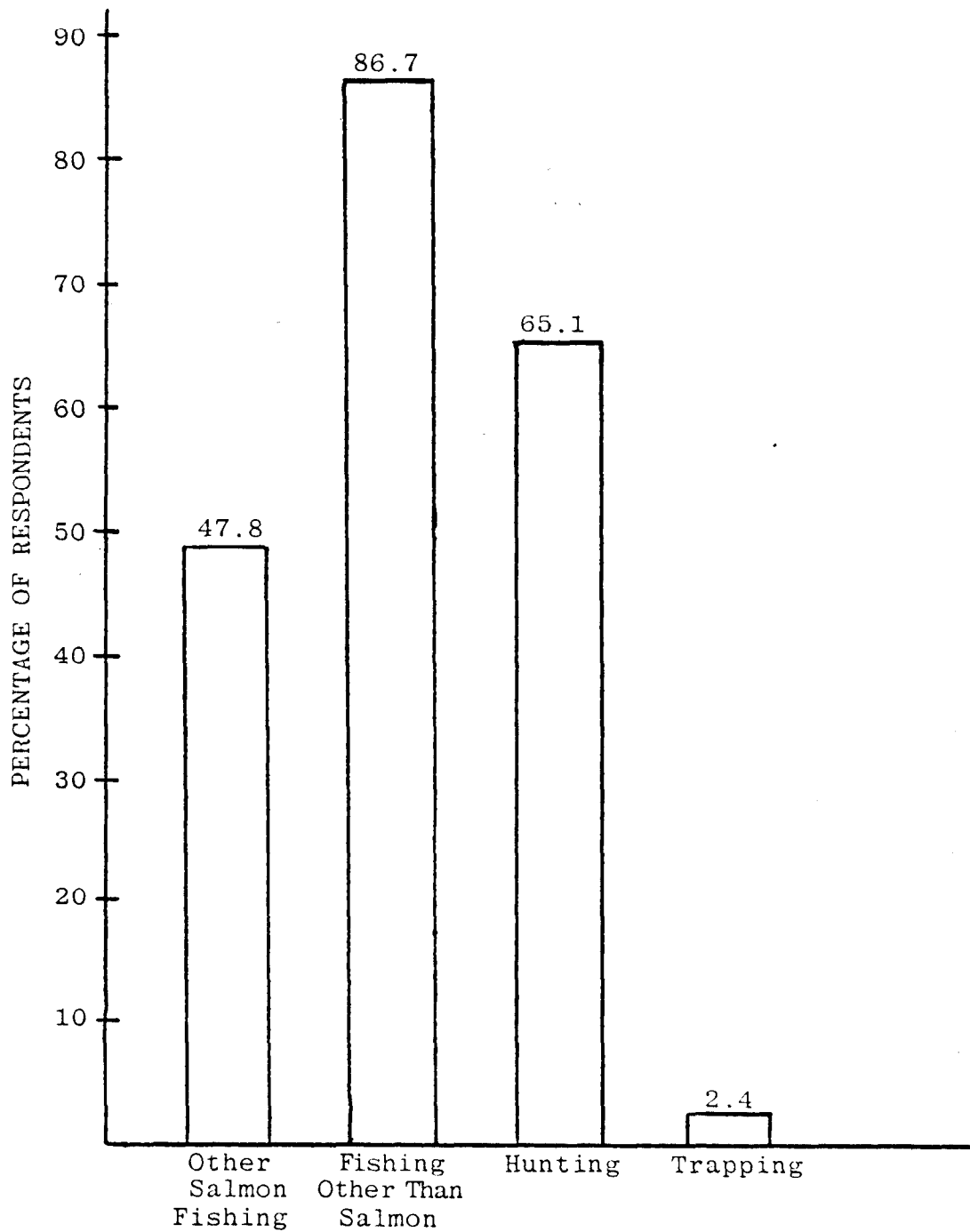


Figure 15. Dipnet Sample: Other Resource Harvesting Activities, 1982.* (n=83)

* Categories are not mutually exclusive; respondents could mention more than one category.

or Russian rivers, in Valdez Bay, in the Little Susitna River, at Seward, and in the Salcha River, as well as net fishing on the Yukon and Tanana rivers. Several Anchorage permittees reported previously fishing for salmon on the Russian and Kenai rivers until large crowds caused them to switch to the Chitina dipnet fishery. Fishing for non-salmon species, such as grayling, trout, lingcod, whitefish, and halibut, was mentioned by 72 (86.7 percent) of the general sample. Hunting activities, including both large and small game, were reported by 65.1 percent of the general sample. Only two (2.4 percent) of all dipnet interviewed permit holders participated in any trapping.

The non-Basin residents who participated in the dipnet fishery conducting their other fishing and hunting activities primarily in areas outside the Copper River Basin. For instance, 76 percent fished for non-salmon species outside the Copper River Basin, compared with 6 percent who fished inside the Copper River Basin. Similar geographic distributions hold for hunting and other salmon fishing activities, as shown in Figure 16. Of the 15 Basin resident dipnet fishermen interviewed, all conducted fishing and hunting activities primarily within the Copper River Basin (see Figure 17).

Case Studies

The following examples illustrate various kinds of dipnet permit holders that were interviewed during the research.

Case Study G

This case is representative of many dipnet fishing groups composed of non-Basin residents that reported intermittent usage of the fishery over the past several years. It also characterizes some of the participa-

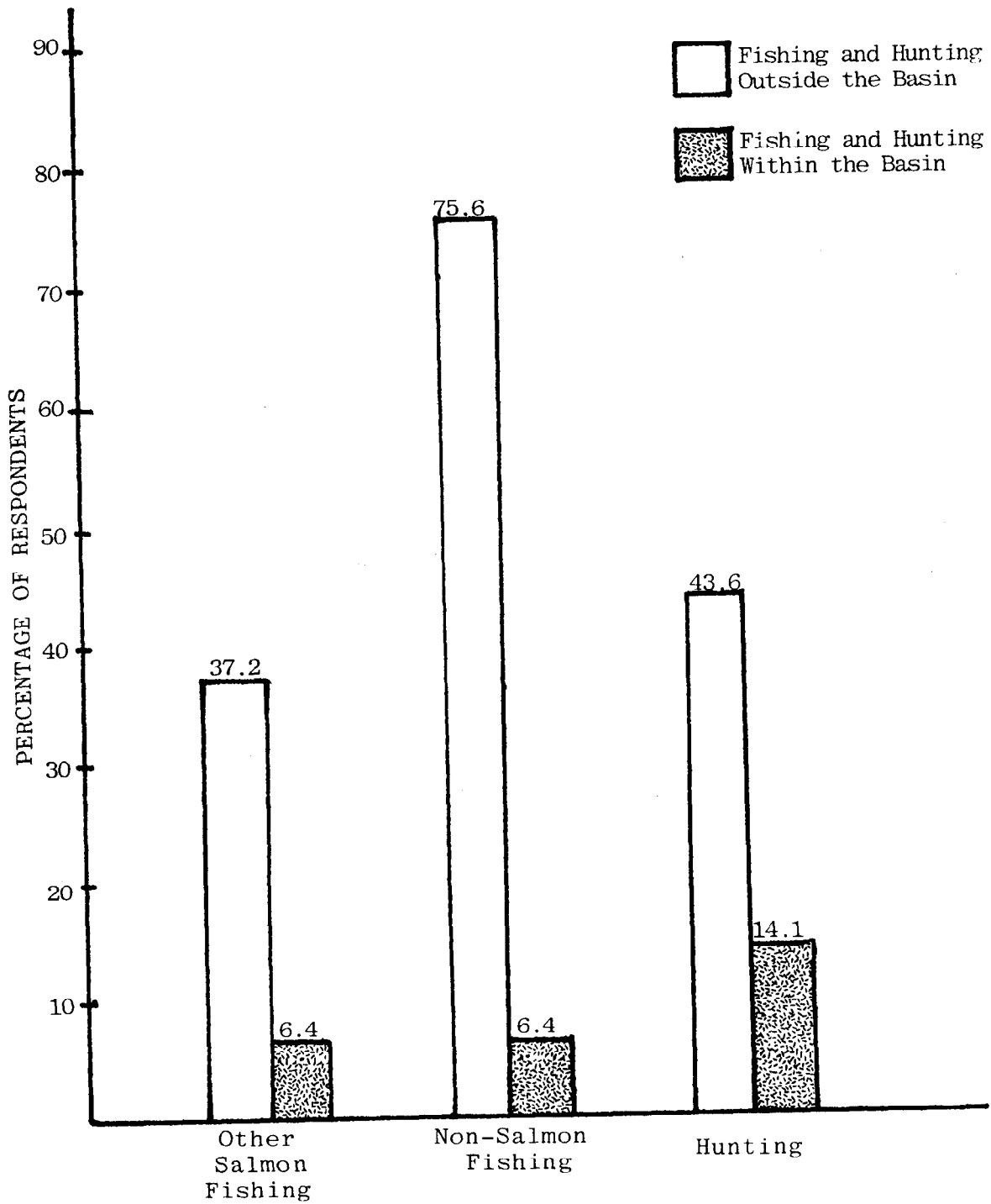


Figure 16. Non-Basin Dipnetters' Resource Harvesting Areas, 1982.* (n=78)

*Categories are not mutually exclusive.

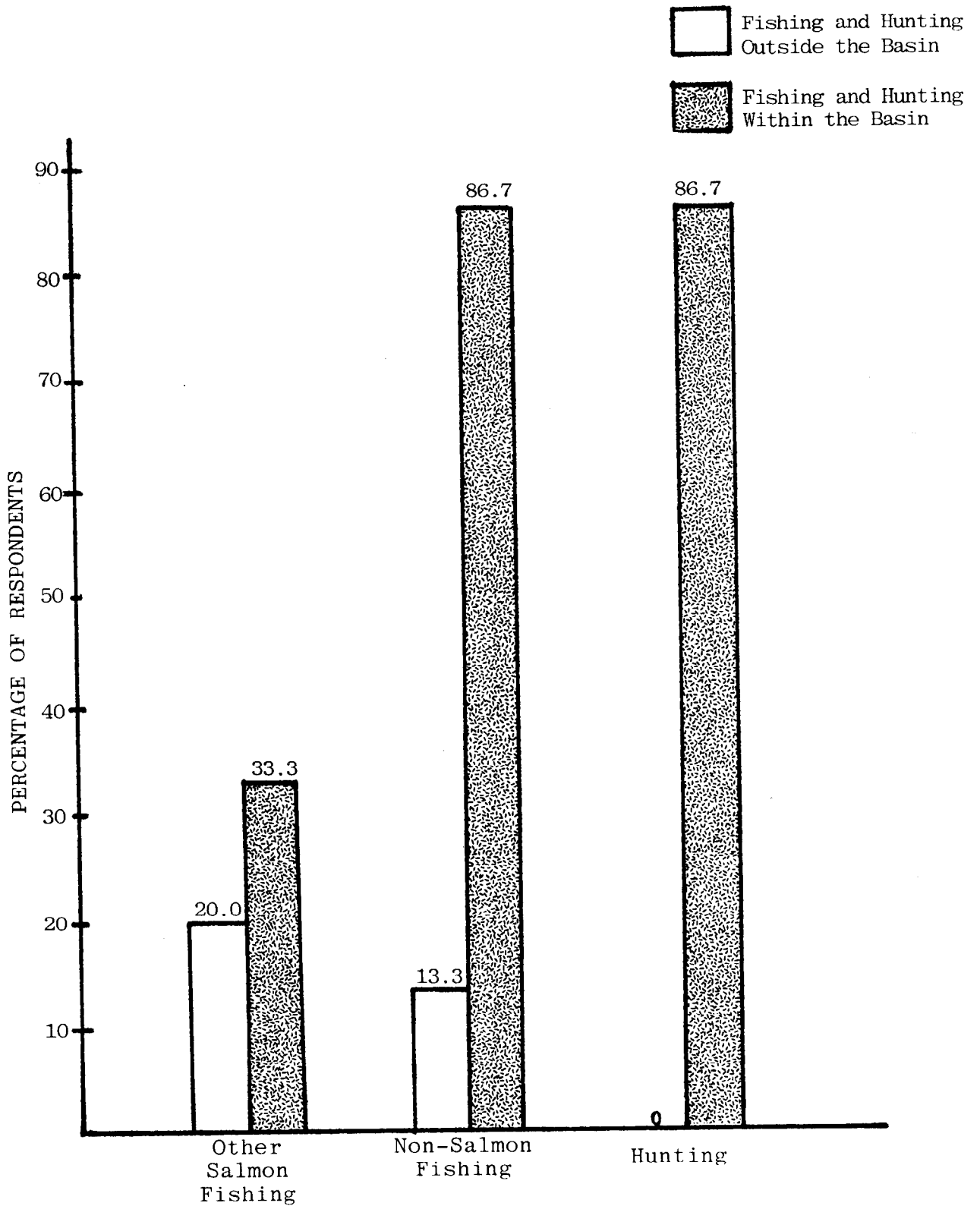


Figure 17. Basin Dipnetters' Resource Harvesting Areas, 1982.*
(n=15)

* Categories are not mutually exclusive.

tion in the fishery by military personnel; although in contrast to this case, a number of the fishermen who are in the military service brought their families with them to the fishing site.

Two men in the military, both in their mid-forties, were interviewed on a Friday afternoon while fishing three quarters of a mile below O'Brien Creek early in August. O'Brien Creek is about three miles from Chitina, and marks the end of the road, as the bridge over the creek has been washed out. The site was reached from the old railroad grade by a narrow path down the steep, gravelly bank. Both men were sat on rocks and used average length (8' to 10') dipnets to fish in the eddies.

The permitholder interviewed had first dipnetted while in the service in 1970, but mentioned he had been stationed out of state for five years since that time. He was part of a group of three servicemen that had driven to Chitina the night before from Eielson Air Force Base. Four more men from Eielson had joined them that morning. The rest of the fishermen were at the party's campers at O'Brien campground. The entire group had come down for the weekend.

The man interviewed already had caught several fish, which were strung on a secured rope in an eddy. His catch so far that day was two silvers and seven reds, but no particular species of salmon were sought; the fisherman was unsure what species he had caught and said he was just fishing for "salmon". He intended to cut most of the salmon into steaks and freeze them. A few would be smoked in a commercially manufactured smoker. Some salmon eggs would be saved for fishing bait.

Other fishing activities in which he participated included silver salmon fishing at Big Lake (in the Wasilla area), rainbow trout fishing at Birch Lake outside of Fairbanks, icefishing for pike in the Fairbanks

vicinity, fishing in the Susitna River for "whatever is there," and angling for grayling and trout in various streams.

His hunting was limited to small game, specifically rabbit, ptarmigan and grouse, in the Fort Greely area.

Case Study H

This case typifies the fishing groups consisting of young men who were newcomers to the fishery; many of these participants were non-local residents and in the military.

On a Sunday morning in mid-June, a group of four men in their mid-twenties from Eielson Air Force Base were contacted. Two of them were returning to Chitina for their second year, but it was the first year they actually had fished. The previous summer they were non-residents and had come to Chitina with other friends from Eielson who were fishing. The two friends who accompanied them this year were observing, since they did not qualify as residents. The group fished near the Chitina Bridge on the west side. They camped out in tents across the river at the campground. The two men fished by sharing a dipnet and hipboots; so they alternated time in the river.

No fish had been caught yet, but the fishermen were planning to "eat some, smoke some, and freeze some for a big fish fry."

Other resource harvesting activities included trout fishing at Paxson Lake and rabbit hunting in the Fort Greely area.

Case Study I

This is an example of a permitholder with a short history of involvement in the fishery. This case also illustrates participation characterized

by more than one trip to Chitina a year.

On the Fourth of July weekend, two men were fishing below O'Brien Creek, at a site reached by a small path leading down the steep, dirt and gravel bank to the river. Their wives and a young child were back in Chitina at their 25 foot motor home. The man interviewed was an Anchorage resident in his late thirties who had full-time employment. He was fishing with an extended pole on his dipnet, sweeping an eddy as he stood on the bank. He and his family had lived in Alaska seven years. This was their second year in the dipnet fishery, about which he had learned from a friend. They had come down for the holiday weekend, and planned on returning later in the month for the Chitina Jazz Festival, as he had the previous year.

All of the salmon would be frozen, and a few of them would be smoked prior to being frozen.

Besides dipnetting at Chitina, the man also fished for rainbow trout and Dolly Varden on the Kenai Peninsula and burbot at Lake Louise. The family also icefished at Lake Louise for trout, while staying at a friend's cabin there. Other activities included caribou and moose hunting in Game Management Unit 13, and some rabbit hunting.

Case Study J

The following is an example of local residents who participated in the dipnet fishery when their usual access to a fishwheel was interrupted.

This Kenny Lake family dipnetted in 1982 for the first time. During the previous twelve years that they had lived in the area, they had used a friend's fishwheel in Copper Center. However, the fishwheel had been lost in the spring flooding that occurred because of an ice jam during break-up. The wheel had not been replaced.

The father and two teenage children went to Chitina on two successive weekends in early June, which is also the time they usually had run the wheel. The salmon harvested were for the seven member household's use. They harvested their limit of 30 fish which "isn't very much, but it'll have to do." The majority of the fish were canned, some of it plain and some of it smoked. A few fish were stored in a neighbor's freezer.

A few family members also fished for grayling in the Glennallen and Sourdough areas and members of the household reported going to to Valdez once a year halibut fishing. Other activities included hunting moose and black bear and snaring rabbits on a regular basis.

The father works seasonally as a surveyor. He traps in the winter if the family needs the money. Of the animals that are trapped, occasionally the meat from lynx is eaten.

Case Study K

This case describes a dipnetter with a long and regular history of involvement in the fishery. Although only a small percentage of the sample, a few other dipnetters showed similar use histories and patterns.

The fisherman interviewed was a man in his fifties from Fairbanks who had lived in Alaska for 23 years. He first dipnetted at Chitina with friends twenty years ago and has never missed a year since that time. This year he was there for the season opening on June 1 but said that he and his family usually come down on Father's Day weekend, the third weekend in June. He expected to spend three days fishing, but if he caught his limit, he and his family would leave earlier. This year, his son had accompanied him to Chitina. Normally, his wife also comes with him, and he recalled earlier years when the whole family, all seven children and his wife, would drive down from Fairbanks and camp in tents for a week.

Back in Fairbanks, he and his wife would smoke and can the salmon. In past years they had tried canning the fish at Chitina, but found it to be "too messy."

The permitholder also fishes for grayling and pike most years, traveling to Minto Lakes for pike, and to streams in the Fairbanks area for the grayling. He has not hunted in the last few years, but previously hunted sheep each year in the Chitina-McCarthy area.

DISCUSSION

The findings of this report have corroborated the conclusions of research conducted by the Division of Subsistence in 1979 (Stickney and Cunningham 1979). The initial research found substantial differences between local and non-local participants in terms of use patterns and other characteristics. The use of Copper River salmon by Basin residents is part of a local economic system of substantial duration which is characterized by a wide use of other Basin fish and wildlife resources, supplemented by part-time and seasonal wage employment (cf. Stickney and Cunningham 1979: 10,13,16-19). The 1982 research has highlighted several contrasts between local and non-local residents' patterns of use of Copper River salmon, which especially illustrate the nature of the Basin residents' relationship to this fishery. These contrasts appear most clearly in the sample of fishwheel permitholders.

In general, Basin fishwheel users have a longer history of participation in the fishery than non-Basin residents. Local people were most likely to have begun participating in the fishery as children with parents, aunts, or uncles. Locals also more frequently had learned from friends by operating someone else's wheel for a few years, then had located a

suitable fishing site, and had built and operated their own wheels. On the other hand, one third of the non-Basin participants previously had participated in the dipnet fishery at Chitina and almost all had first used fishwheels as adults.

Fishing groups observed or reported during the research differed noticeably between the local and non-local samples of fishwheel users. The family groupings that dominated local participation were associated with processing activities on site and shorter, more spontaneous trips to the fishwheel or fishcamp. Non-local participation also included family groupings but an equal number of family-plus-friends groups were encountered. Especially, non-Basin fishwheel users at Chitina made more lengthy visits to the fishing site, probably because of the long travel distance involved. The use of motor homes and campers was a distinct characteristic of the non-local sample, but was rare among Basin residents.

Preservation methods differed slightly between the local and non-local samples, with non-local people mentioning canning more frequently. Local people also canned fish, though the percentage was considerably lower, and similar percentages in both samples froze and smoked fish. Local people were much more likely to dry fish, a method requiring a great deal more time, special storage conditions, and knowledge of how to prepare the product. The use of drying as a preservation method was most prevalent among those fishwheel users having the longest history of involvement in the fishery, such as those at the Chitina airport sites, at the Copper Center Old Village sites, and at Gulkana (see Cases C and D).

Contrasts between Basin and non-Basin fishwheel permit holders also were evident in their reported harvest patterns of other resources. While both segments of the sample tended to participate in hunting and fishing activities, Basin residents hunt, fish, trap, and gather berries

almost exclusively within the Copper River Basin. Conversely, non-local Copper River fishwheel users harvest non-salmon species of fish and game predominately outside the Basin (cf. Stickney and Cunningham 1979:16).

Especially interesting was the finding that only 7.1 percent of the sample of Basin residents using fishwheels utilize other salmon fisheries in the Basin and that just 3.6 percent go outside the Basin to harvest salmon. In contrast, 36 percent of non-Basin residents who harvest Copper River salmon with fishwheels also participate in other salmon fisheries. This possibly indicates that non-Basin residents are aware of and are able to take advantage of more alternative fisheries to procure salmon than are Basin residents.

The determining factors in choice of fishwheel sites also differed between the local and non-local participants. Non-local participation was concentrated at both geographical "ends" of the fishery, at Chitina and at Slana. Ease of access to the fishing area and visibility or public knowledge of the fishwheel fishery, sometimes through previous dipnetting experience in the vicinity, may account for the particularly heavy non-local participation at the Chitina fishing area. At Slana, proximity to place of residency appeared to have more influence on non-Basin residents than did ease of access, since, prior to road access, several participants had been willing to expend the effort and resources to transport wheels and boats down from Tok and to utilize the boats in positioning and operating the wheel. Local residents clearly also took access and proximity into account, but traditional sites were preferred, even when permittees had moved to other areas within the region. The appropriateness of a site for particular preservation methods, such as drying, was an important consideration for Basin residents; and some also valued privacy as they harvested and processed fish.

Contrasts between Basin and non-Basin dipnetters are much more difficult to discern because of the study's small sample size and the overwhelming preponderance of non-Basin residents participating in the dipnet fishery at Chitina. Overall, however, the results of the research suggest that the dipnetters most closely resemble the non-Basin fishwheel users in several respects, including a shorter history of involvement in the Copper River fishery than Basin fishwheel users, the harvesting of other fish and wildlife resources outside the Copper River Basin, participation in other Alaskan salmon fisheries, and fishing in groups that include both family members and friends.

The ready road access to the Chitina fishing site and the scenic quality of the area are possible factors contributing to the appeal of the dipnet fishery to non-local people. Participants who are in the military services comprised a significant portion of the non-local sample, both those currently in the military and former military personnel whose original involvement occurred while in the military. Reasons for this repeating pattern of participation are not clear, but a substantial number of people have apparently been introduced to the fishery; some have participated only a year or two, while others have remained in the state after discharge and have perpetuated their involvement.

The shorter history of participation that characterized the majority of dipnet permit holders is due in part to the growing popularity of the fishery as it becomes better known and as the number of fish returning to the upper Copper River area remains high. The Kenai Peninsula salmon fisheries apparently have contributed fishermen seeking other, less-crowded fisheries. The dipnet fishery also has served to familiarize non-Basin residents with the Copper River fishwheel fishery. As Case F illustrated,

some of these dipnetters move on to the fishwheel fishery after a few years of dipnet fishing at Chitina.

A few of the Basin residents who participate in the dipnet fishery exhibited a different set of characteristics than that shown by the permit-holder sample as a whole. These participants (e.g., Case J) are sometimes former fishwheel users who for a variety of reasons turn to dipnetting to harvest their households' salmon. Basin residents who dipnet also harvest other Basin resources. In this characteristic they resemble the Basin fishwheel user sample, rather than other dipnetters.

Because of the small dipnet sample size and the large number of dipnetters, it is possible that small but discrete subgroups of dipnetters might have been overlooked. One such group might be non-local residents who, in contrast to Case A, lack the financial resources to procure motor-homes or, unlike Case E, fishwheels, but who nevertheless harvest Copper River salmon with dipnets to fill an economic need.

As the number of participants in the Copper River salmon fisheries grows, the characteristics of the non-Basin residents will increasingly dominate the general pattern of use of both fishwheel operators and dipnetters. Yet, as this and earlier research have demonstrated, the use of Copper River salmon has long occupied a central place in the economies and ways of life of Copper River Basin residents.

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