

Informational Leaflet 108

RED SALMON SPAWNING GROUND SURVEYS IN THE NUSHAGAK AND TOGIAK DISTRICTS, BRISTOL BAY,

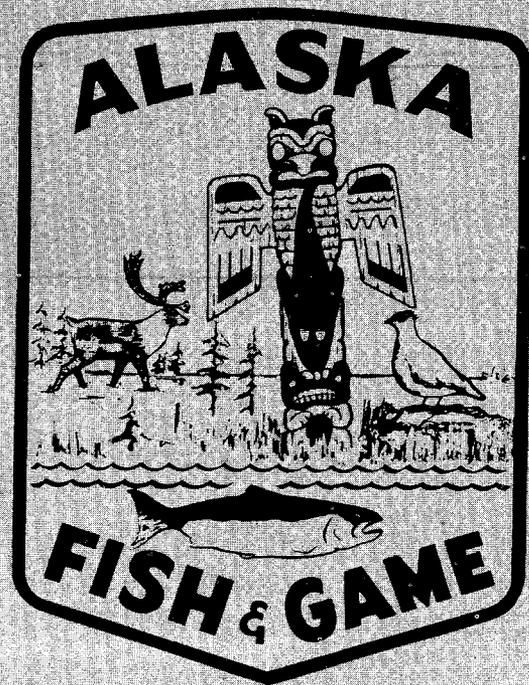
1964

By:

Howard Metsker
Division of Commercial Fisheries
Dillingham, Alaska

July 21, 1967

STATE OF ALASKA
WALTER J. HICKEL - GOVERNOR
DEPARTMENT OF
FISH AND GAME
URBAN C. NELSON - COMMISSIONER
SUPPORT BUILDING, JUNEAU



RED SALMON SPAWNING GROUND SURVEYS IN THE
NUSHAGAK AND TOGIK DISTRICTS
BRISTOL BAY, 1964

By

Howard Metsker, Fishery Biologist
Alaska Department of Fish and Game
Division of Commercial Fisheries
Dillingham, Alaska

INTRODUCTION

Extensive ground and aerial surveys have been conducted each year since 1946 in the Nushagak and Togiak districts of Bristol Bay. The purpose of these surveys is to evaluate salmon distribution on the spawning grounds for varying levels of escapement and to aid in the establishment of escapement goals. The Alaska Department of Fish and Game has been responsible for these surveys since 1960. Survey estimates included all species of salmon for the first time in 1964. The king, chum, pink and coho salmon in addition to the red salmon make up a substantial segment of the catch in this district; pink salmon enter the catch in large numbers only on even years. In the Togiak district, four species of salmon are important: red, chum, king and coho. A few pink salmon are taken during even years; however, they are not taken in any appreciable numbers.

Systems surveyed include the primary red salmon spawning areas: Wood River, Igushik, Nunavaugaluk, Tikchik, Togiak and Kulukak, their lakes and connecting systems. Special survey emphasis was given other salmon species in the Nushagak-Mulchatna River system of the Nushagak district and in the Cape Newenham, Osviak and Matogak section of the Togiak district (Figures 1-7).

METHODS

Survey Methods

Surveys of salmon populations in the Nushagak district included tower, aerial, ground and boat counts. The salmon spawning populations in the Togiak

district were enumerated by tower and aerial counts.

The aerial surveys were conducted as near as possible to the standardized method employed by Alaska Department of Fish and Game personnel (Wilbur Church and Michael Nelson, 1960-1963). A Cessna 180 float plane was used in conducting the surveys and large scale maps of 1 inch = 2 miles were used for documenting spawning ground information. Counts were made either in aggregates of 100 or 1,000 depending on the density of fish encountered. The pre-designated peak spawning periods in each area were used in estimating the spawning populations. Subsequent cross checks were made while conducting surveys in the near vicinity.

Ground surveys were conducted by the Fisheries Research Institute and Alaska Department of Fish and Game personnel in the Wood River Lake system^{1/}. Department personnel conducted ground and boat surveys in portions of the Igushik and Nushagak-Mulchatna River systems.

The chain-link counting method was employed as in previous years for estimating the total red salmon escapement in the Nushagak and Togiak districts. The chain-link method was first employed by the Fisheries Research Institute in 1956 (Gilbert, 1963) and has been employed each year since. The method was developed for assigning total spawning populations to various spawning areas in each river and lake system.

In applying the chain-link method, a comparison with the previous year estimate is made. Peak spawning estimates from all the areas (lake, beaches and creeks) within a system are added together and a ratio obtained for each area. The previous years total population estimates are then multiplied by the factor (ratio) obtained to arrive at the present years population estimate for each area. In this way, the population estimates can be corrected to agree with the tower counts by distributing the difference in the aerial tower counts (Nelson, 1963).

NUSHAGAK DISTRICT

The Nushagak district is comprised of three sections; Nushagak, Igushik

^{1/} Dr. Robert L. Burgner and Fishery Biologist Ken Roberson provided information on ground counts conducted by the Fisheries Research Institute.

and Snake River. Major rivers entering Nushagak Bay are the Nushagak, Wood, Igushik and Snake.

Wood River Lakes

Four major lakes originate in a series at the head of Wood River; Lake Aleknagik, Lake Nerka, Lake Beverly and Lake Kulik. In 1964, 80 percent or 1,076,100 of the districts total estimated red salmon escapement (1,338,900) entered this system. The distribution of spawners to the three major types of spawning areas as determined by aerial surveys was 19,54, and 27 percent for creek, beach and river spawners respectively (Table 8).

The 46,000 red salmon spawners entering Lake Aleknagik was the largest number recorded since 1959, but still only amounted to four percent of the total system escapement. Seventy-five percent of these spawners utilized creeks entering the lake and the remaining 25 percent spawned on lake shore beach shoals.

Lake Nerka received approximately 36 percent of the total Wood River spawners (Table 5). Beach spawners constituted about 67 percent of the spawning population (Table 1), with the largest concentration of beach spawners located in Anvil Bay. Lesser but also important beach spawning areas were N4-N6 beach (10,000), Pick Creek beach (8,700), Amakuk Arm-Otts Bay (4,400) and Anvil Bay-Elbow Point beach areas (9,100) (Table 1). The major spawning streams were Stovall (11,300) and Pick Creeks (12,400) (Table 1). Creek spawners constituted about 33 percent of the Lake Nerka spawning population. The Little Togiak River estimated spawning escapement was 26,000.

Lake Beverly received approximately 29 percent of the total Wood River spawning escapement and 24 percent of the districts total escapement (Table 5). Approximately 94,900 (68 percent) red salmon utilized Hardluck and Silver Horn Bays for spawning (Table 1). B12 beach, also an important beach spawning area, received 9,900 spawners.

Lake Kulik received approximately 10 percent of the total Wood River spawners (Table 5). The 1964 spawning population of 111,600 red salmon in the lake was considerably more than the previous four years (average of 68,100). The north shore beach spawning areas as in previous years were again heavily utilized. Lake Mikchalk with 9,500 spawners and Little Togiak Lake with 15,210 spawners (Table 1) are relatively small lakes

(under 10 square miles) in the system. Little Togiak Lake enters Lake Nerka near the northwest end. Lake Mikchalk flows into Lake Beverly near the northeast end (Figure 1).

The series of four Wood River Lakes are interconnected by two major rivers, the Agulowak and the Agulukpak. Peace and Wind Rivers are minor streams connecting Lake Beverly and Lake Kulik (Figure 1).

In 1964, 146,400 red salmon, 27 percent of the Wood River Lakes escapement, were estimated utilizing the river spawning areas (Table 8). For comparison with the lakes, Lake Aleknagik received a spawning population of 46,000, Lake Nerka 384,700 spawners, Lake Beverly 317,300 and Lake Kulik 111,600 (Table 5). The creek spawning populations in comparison with the river population are normally the lesser important of the two (Table 8).

Igushik Lakes

Complete aerial and partial ground surveys were made in the Igushik Lake system (Figure 2). Ground surveys were confined to the Lake Amanka and Kathlene River areas. Aerial and ground counts for the Igushik Lake system are shown in Tables 2. Lakes Amanka and Ualik and the interconnecting Kathlene River make up the major spawning areas. Peak aerial estimates for the lakes in 1963 and 1964 and ratios for these two years are given in Table 2.

The spawning population of 3,100 in Lake Amanka was higher than 1963 but below the previous four years average (6,700). The bulk of spawning in the Kathlene River occurred in the upper reaches and in the tributary, Ongoke River (Table 2) (Figure 2).

Lake Ualik, the upper lake, as in previous years, obtained the bulk of the Igushik River systems escapement. An estimated 20,000 fish were located along the west beach. The west shore creeks received the largest count in five years (Table 2).

Lake Nunavaugaluk

Lake Nunavaugaluk originates at the head of the Snake River. The one lake and its tributaries constitute the system (Table 2) (Figure 2).

The lake during the early 1900's reportedly was a major salmon producer. One cannery is said to have secured 400,000 salmon from the system (Anonymous, 1908). Special consideration has been shown the Snake River system for several years in an attempt to rebuild the run. In 1961 a special fishing boundary was designated for the protection of red salmon in the Snake River system. A continued closure of the area has been in effect since that time. The system in 1964 contributed less than 1 percent of the districts total escapement (Table 5).

A slight decrease in the creek spawning population was noted over the 1963 escapement (Table 8). Killian Creek was utilized by 1,500 spawners - a decrease of approximately 60 percent from the 1963 escapement. Important spawning beaches were the West shore and East shore. Beach spawners contributed 78 percent of the total population.

Tikchik Lakes

The Tikchik Lakes system is located in the Nushagak River drainage and is composed of six major lakes: Tikchik, Nuyakuk, Chauekuktuli, Chikuminuk, Upnuk and Nishlik (Figure 3). Only the first three lakes in the system are utilized by spawning salmon. Of the approximately 47 miles of Tikchik River, only the lower 12 miles were utilized by spawning salmon in 1964 (Figure 2). A total of 103,200 salmon were counted into the system. The peak aerial survey accounted for about 50 percent of the total spawning escapement (Table 7). Approximately 8 percent of the district red salmon escapement spawned in these lakes (Table 5).

In Tikchik Lake red salmon spawning is conducted entirely in three creeks with Creek B being the most important stream (Table 3). Approximately 7 percent of the total 1964 Tikchik Lakes system spawning occurred in the three creeks of Tikchik Lake (Table 3).

The Nuyakuk Lake red salmon spawning population in 1964 was considered all beach spawners with exception of the Rapids between Nuyakuk Lake and Lake Chauekuktuli. The 17,700 spawners observed were an increase of 85 percent over the previous four year average (Table 3). The North and South shore beaches were the most heavily utilized for spawning purposes (Table 7).

Lake Chauekuktuli occasionally receives the largest segment of the Tikchik Lakes spawning population. In 1964 about 53 percent of the system

spawning escapement utilized this lake. Most of the spawning occurred along the Allen River Beach and the North shore (Figure 3).

Major rivers in the Tikchik Lakes system are the Tikchik and Allen (Figure 3). River spawners accounted for about 7 percent of 3,700 of the total spawning population (Table 8), a 43 percent decrease over the 1963 escapement. The creek spawning populations in this lake dropped to 5 percent (Table 8).

Nushagak and Mulchatna Rivers

Red salmon spawning in the Nushagak-Mulchatna River system is conducted solely in rivers with the exception of beach spawning in the Okstukuk Lakes located at the head of the Kokwok River, and some springs along the main Nushagak River. Approximately 1 percent of the district total red salmon spawning escapement entered this system (Table 5). Peak estimate ratios, preliminary and adjusted population estimates for red salmon are shown in Table 5.

Surveys in the Mulchatna and its tributaries accounted for over 58 percent of the estimated 18,700 spawning red salmon in the Nushagak-Mulchatna River system (Table 5) (Figure 4).

The Nushagak-Mulchatna Rivers are the principal spawning area for the other four salmon species in Bristol Bay. In most years, the catch of these species made significant contributions to the Nushagak district economy. Information on the escapement of king, chum, pink and coho salmon is necessary for the management of these species.

Partial surveys have been made over the Nushagak-Mulchatna area since 1956 (Table 9 and 10). An attempt to obtain a complete survey of the king, chum and pink salmon spawning populations was made in 1964. Enumeration of coho salmon was not attempted due to other management activities.

The Nushagak and its tributaries, primarily the Nuyakuk River, receives most of the even year pink salmon returns - the odd year run is negligible. In the upper Nushagak River drainage, a total of 875,870 pink salmon were enumerated by tower and aerial counts in 1964.

In 1964, king and chum salmon were observed in greatest number in the Mulchatna River. Over one-half of the king salmon observed during the survey of the Nushagak River drainage were in this system.

TOGIAC DISTRICT

The Togiak district is subdivided into six sections for purposes of stock separation and catch statistics; Kulukak, Ungalikthluk, Togiak, Matogak, Osviak and Cape Peirce. Virtually all the commercial fishing effort and harvest take place in the Togiak section, by far the most important red salmon producer in the district.

Togiak Lakes

Beach shoal areas along the Togiak Lakes are used extensively by spawning red salmon. The area between Middle Point and Sunday Creek (Figure 7) received the bulk of the spawners (Table 4).

Aerial estimates for Togiak Lakes and estimate ratios for 1963 and 1964 are given in Table 6. The aerial survey estimate accounted for 47,700 or 50 percent of the salmon in these lakes (Table 7).

The Upper Togiak Lake spawning escapement was comparable to that of 1963. Dispersion of the spawners was also comparable. The beach area between Zwischen River and Budole Creek was as in past years heavily utilized by spawning red salmon. Togiak Creek beach received 5,500 red salmon, the largest spawning population in four years.

Togiak Tributaries

The Togiak tributary system estimates of red salmon were lower than the escapement for 1963 (Table 6). The most noted salmon decrease was in Gechiak Lake. Lakes were utilized for spawning to a larger extent than the creeks (Table 8). River spawners dropped in numbers from the four year average (Table 8). The escapement of 9,800 red salmon to the tributary systems accounted for 8 percent of total Togiak district escapement.

Kulukak River Systems

Kulukak River enters Kulukak Bay from the east near the entrance to Togiak Bay. Aerial estimates for the area are given in Table 4. Estimate ratios for 1963 and 1964 are shown in Table 6.

Tithe Creek is one of the two main spawning areas for this section, and is tributary to the Kanik River. Spawning occurs in springs and sloughs at the headwaters of Tithe Creek (Figure 6). The escapement of 3,600 red salmon was approximately one-half the 1963 escapement (Table 6).

The majority of the red salmon spawning in the Kulukak system spawned in Kulukak River and Lake. An estimated 6,200 salmon were observed utilizing this system (Table 6).

Quigmy River, Matogak, Osviak and Cape Peirce Sections

Important chum and pink salmon spawning areas in Togiak Bay were aerial surveyed for the purpose of acquiring information on the magnitude of these runs. During 1964 the salmon runs into Quigmy, Matogak, Osviak and Cape Peirce sections were excluded from any commercial harvest due to lack of any effort. Figure 7 shows the approximate location of the rivers and sections in relationship to the Togiak Bay.

Quigmy River enters Togiak Bay along the western edge between the Togiak and Matogak Rivers (Figure 7). A total of 10,000 chum and 800 pink salmon were enumerated in the approximately 20 miles of stream surveyed. Spawning was considered near its peak.

Matogak River, located about midway along the western edge of Togiak Bay drains a tundra area a few miles west of the Quigmy River drainage (Figure 7). An estimated 8,200 chum salmon were observed spawning in the river July 27. Spawning was estimated to be near its peak.

Osviak River is located about three miles west of the Matogak River (Figure 7). The river originates along the south edge of the Ahlun Mountains. In a survey of its entire length on July 27, an estimated 15,000 chum salmon were enumerated. Spawning was estimated near its peak.

Hagemeister Island is the largest island of a five-island group in Togiak Bay (Figure 7). Two small streams, one flowing to the north, the other to the south, were surveyed. An estimated 3,800 chum salmon were observed spawning in the two streams on July 27. The survey was conducted several days after the peak on the basis that more carcasses than live fish were observed.

Slug River enters Newenham Bay along the outermost westerly extremity of Togiak Bay (Figure 7). The river's meandering course was aerial surveyed for about ten miles. A total of 5,300 chum salmon were counted on July 27. Several large schools of salmon were observed off the mouth and in the inlet. Due to turbid waters an aerial count could not be made. Spawning was estimated to be about 70 percent complete.

A total of 42,300 chum salmon were counted in the four areas along the western edge of Togiak Bay. In addition, 800 pink salmon were observed in the Quigmy River.

SUMMARY

1. Surveys in 1964 were made on red salmon spawning populations in the Nushagak and Togiak districts. Included in the Nushagak district surveys were counts on king, chum and pink salmon.
2. Lake Aleknagik received the largest red salmon escapement since 1959.
3. Lake Nerka was the main recipient of spawning red salmon in the Wood River Lake system.
4. Lake Beverly received about 29 percent of the total Wood River Lake system escapement.
5. The 1964 spawning escapement in Lake Kulik was approximately twice the four year average.
6. The dispersion of spawners in the Wood River Lake system by creek, beach and river areas was 19, 54 and 27 percent respectively.
7. In the Igushik Lake system, beach spawners comprised 39 percent of the total population.
8. Lake Nunavaugaluk beach spawning areas were utilized more than in the previous four years.
9. More red salmon spawned in Nuyakuk Lake (Tikchik Lake system) than in the past four years.

10. Lake Chauekuktuli received the majority of the Tikchik Lake spawners.
11. The Mulchatna River of the Nushagak River system received over one-half of the systems red salmon escapement.
12. A total of 875,870 pink salmon were enumerated in the upper Nushagak River drainage.
13. The Mulchatna River system received the largest spawning populations of king and chum salmon in the Nushagak district.
14. The Togiak Creek spawning populations were lower than the previous four years.
15. The Kulukak section of the Togiak district received 9 percent of the red salmon escapement.
16. Chum and pink salmon spawning streams were observed along the western shoreline of the Togiak district for the purpose of acquiring information on the magnitudes of salmon utilizing the area. A total of 42,300 chums and 800 pink salmon were enumerated.

LITERATURE CITED

Anonymous. 1908. Observations in Wood River, 1908. Alaska Fishery and Fur Seal Ind. 1904-1910. Bur. of Fish. Doc. No. 645.

Church, Wilbur, 1961. Red Salmon Spawning Ground Survey in the Nushagak and Togiak Districts, Bristol Bay, 1961. Alaska Dept. of Fish and Game Informational Leaflet #30, 8 pp.

Gilbert, John. 1946-1958. Red Salmon Spawning Ground Survey in the Nushagak District, Bristol Bay, 1946-1958. Univ. of Wash. Publ. in Fish. Unpubl. Cir. 104 pp.

Nelson, Michael L. 1963. Red Salmon Spawning Ground Surveys in the Nushagak and Togiak Districts, Bristol Bay, 1963. Alaska Dept. of Fish and Game, Informational Leaflet #61, 24 pp.

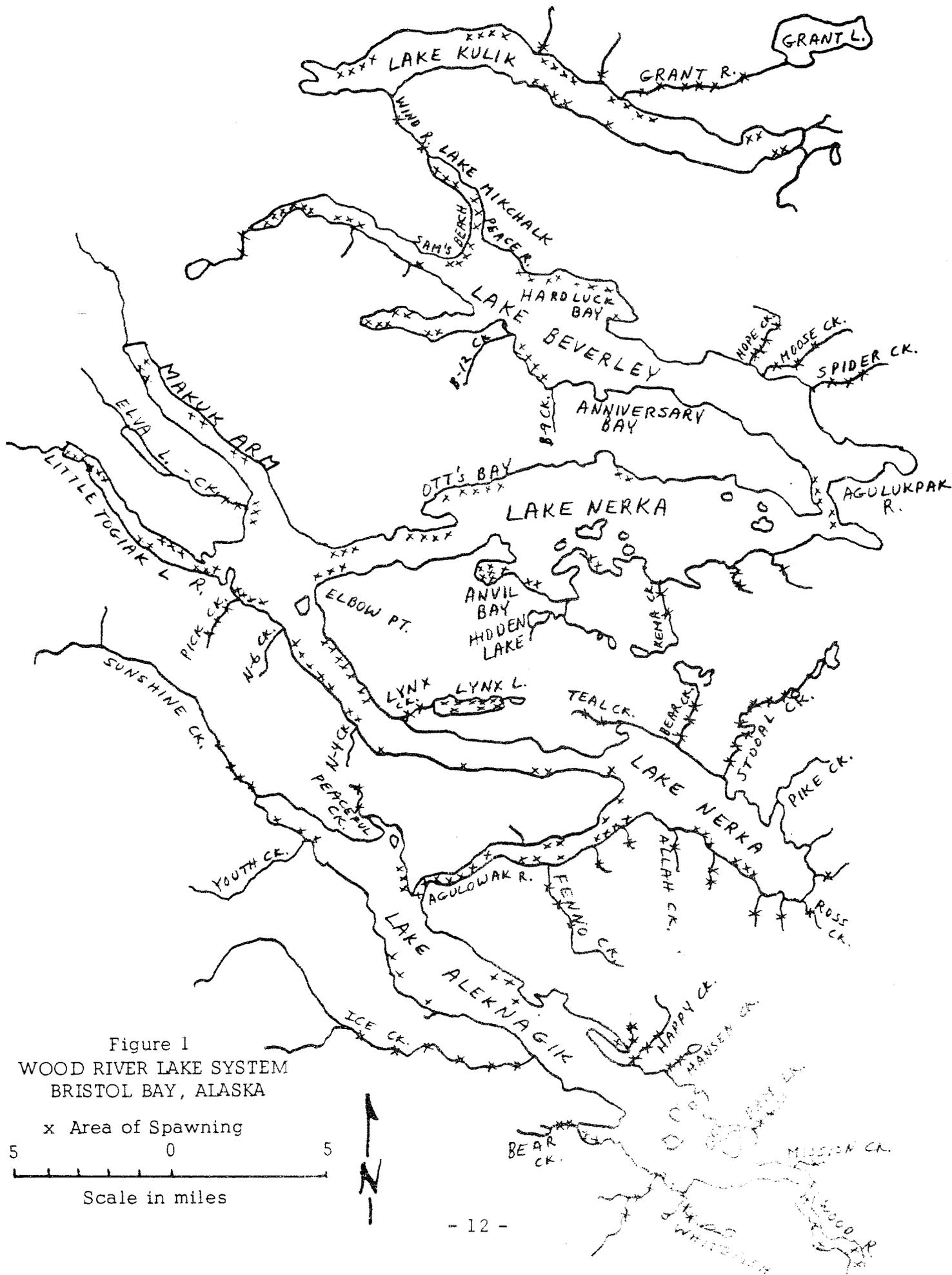
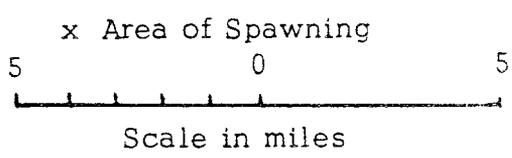


Figure 1
WOOD RIVER LAKE SYSTEM
BRISTOL BAY, ALASKA



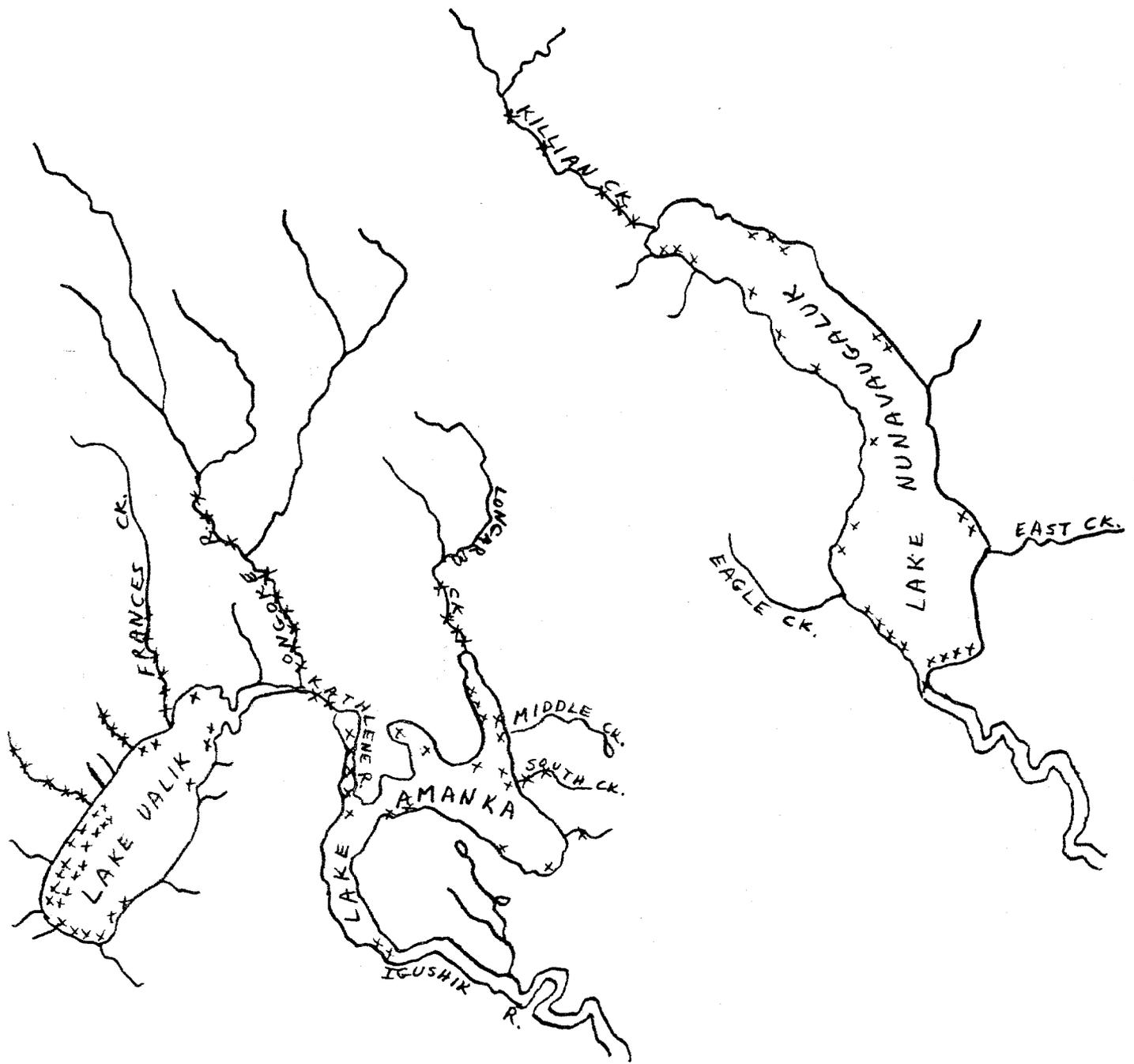


Figure 2
 IGUSHIK AND NUNAVAUGLUK LAKE SYSTEMS
 BRISTOL BAY, ALASKA
 x Area of Spawning

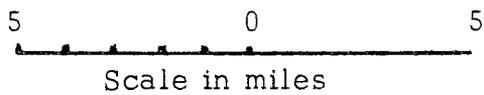
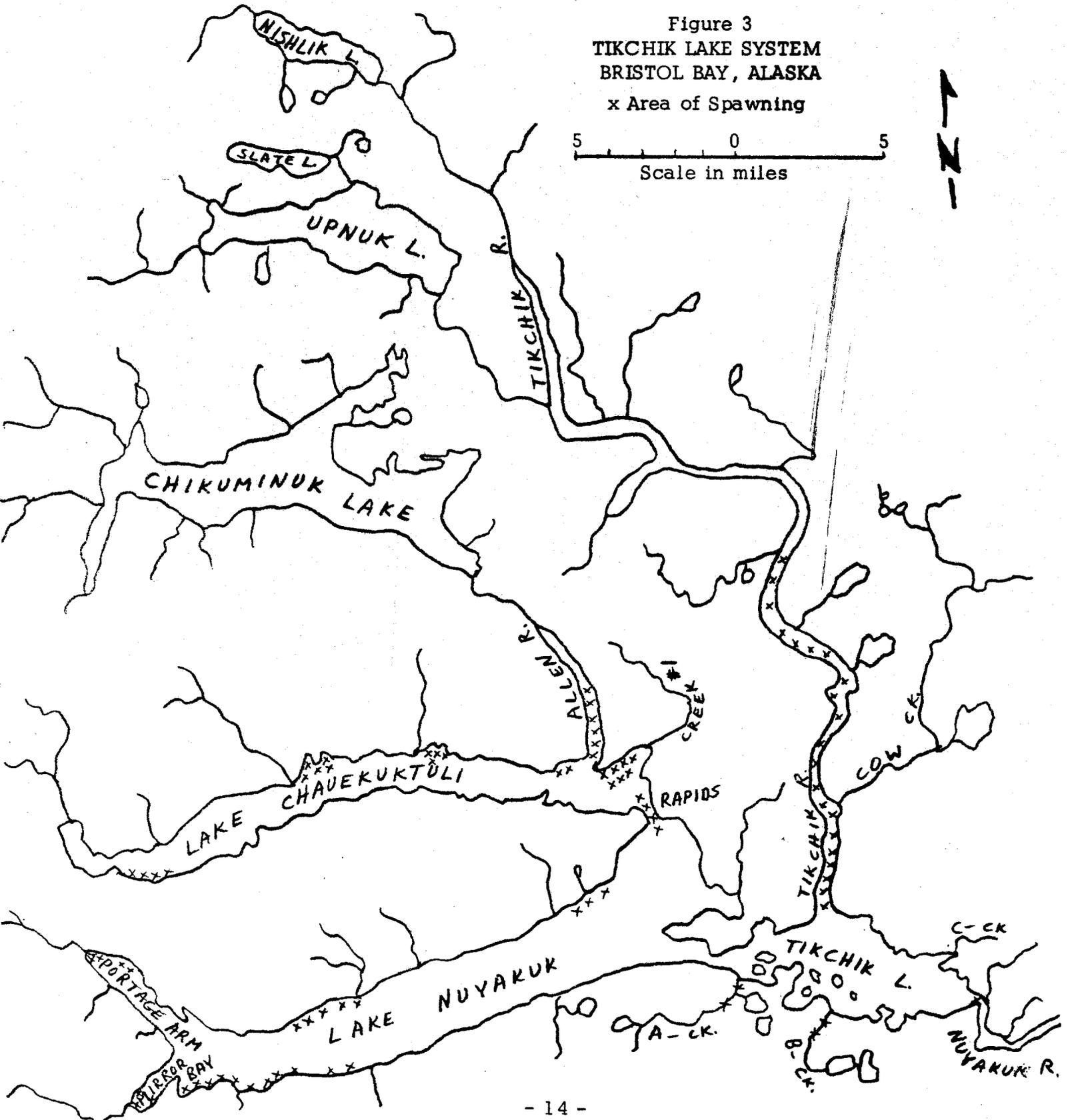
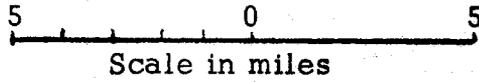


Figure 3
TIKCHIK LAKE SYSTEM
BRISTOL BAY, ALASKA
x Area of Spawning



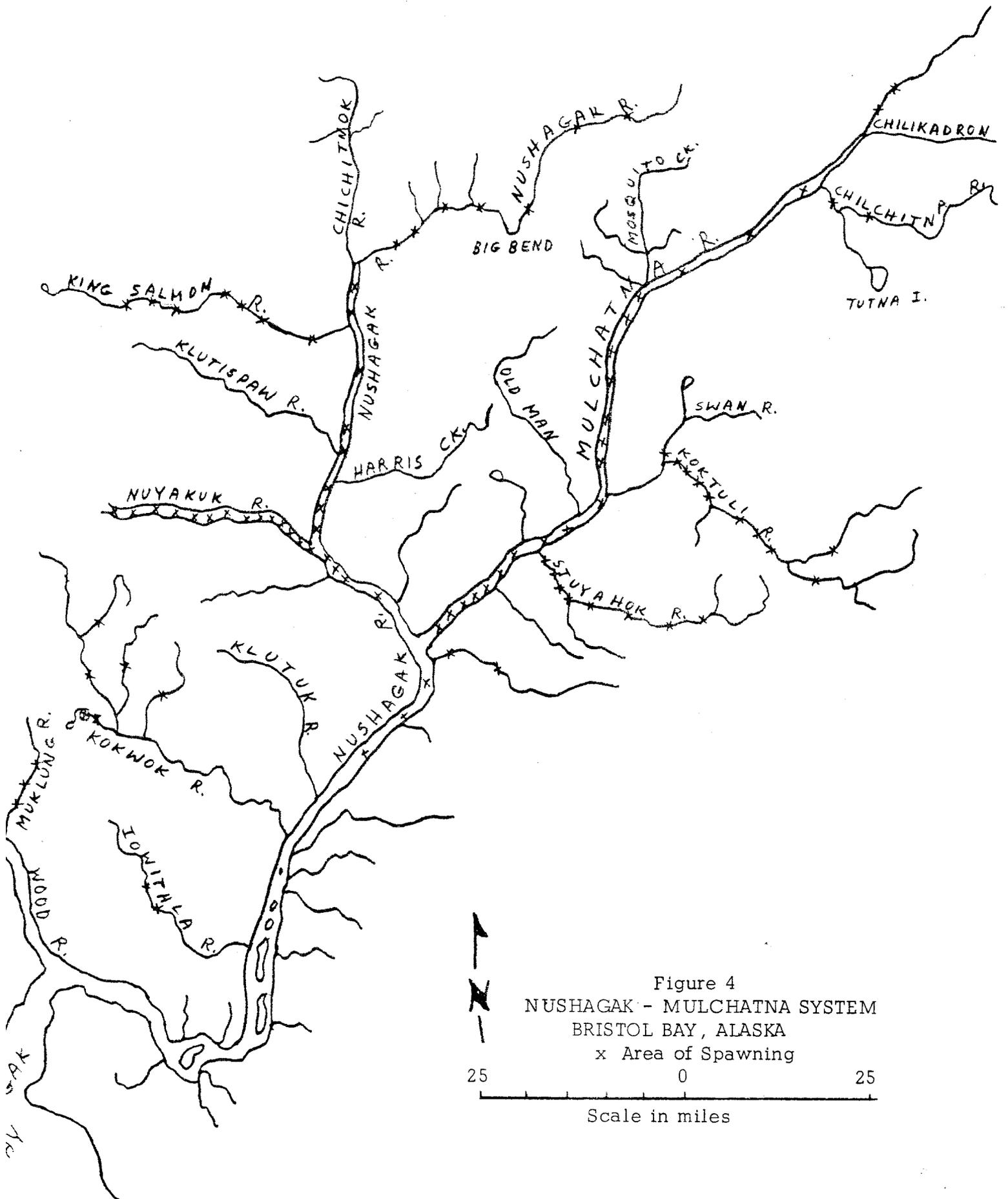


Figure 4
 NUSHAGAK - MULCHATNA SYSTEM
 BRISTOL BAY, ALASKA
 x Area of Spawning

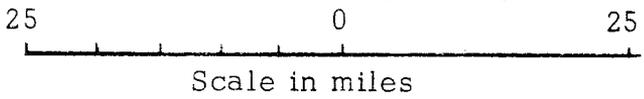


Figure 5
TOGIAK RIVER SYSTEM
BRISTOL BAY, ALASKA

x Area of Spawning

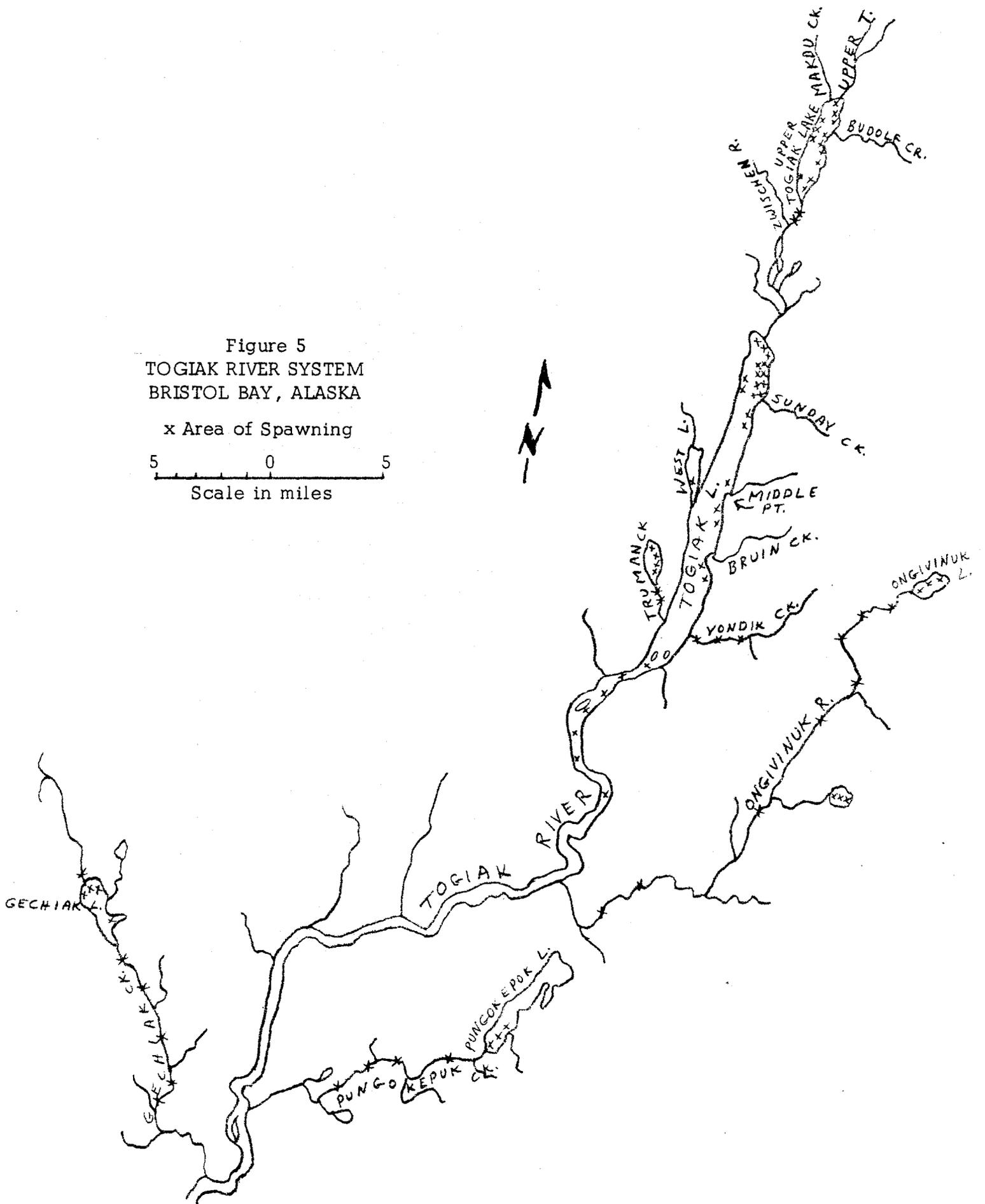
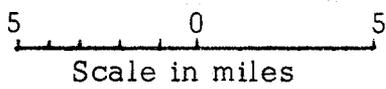
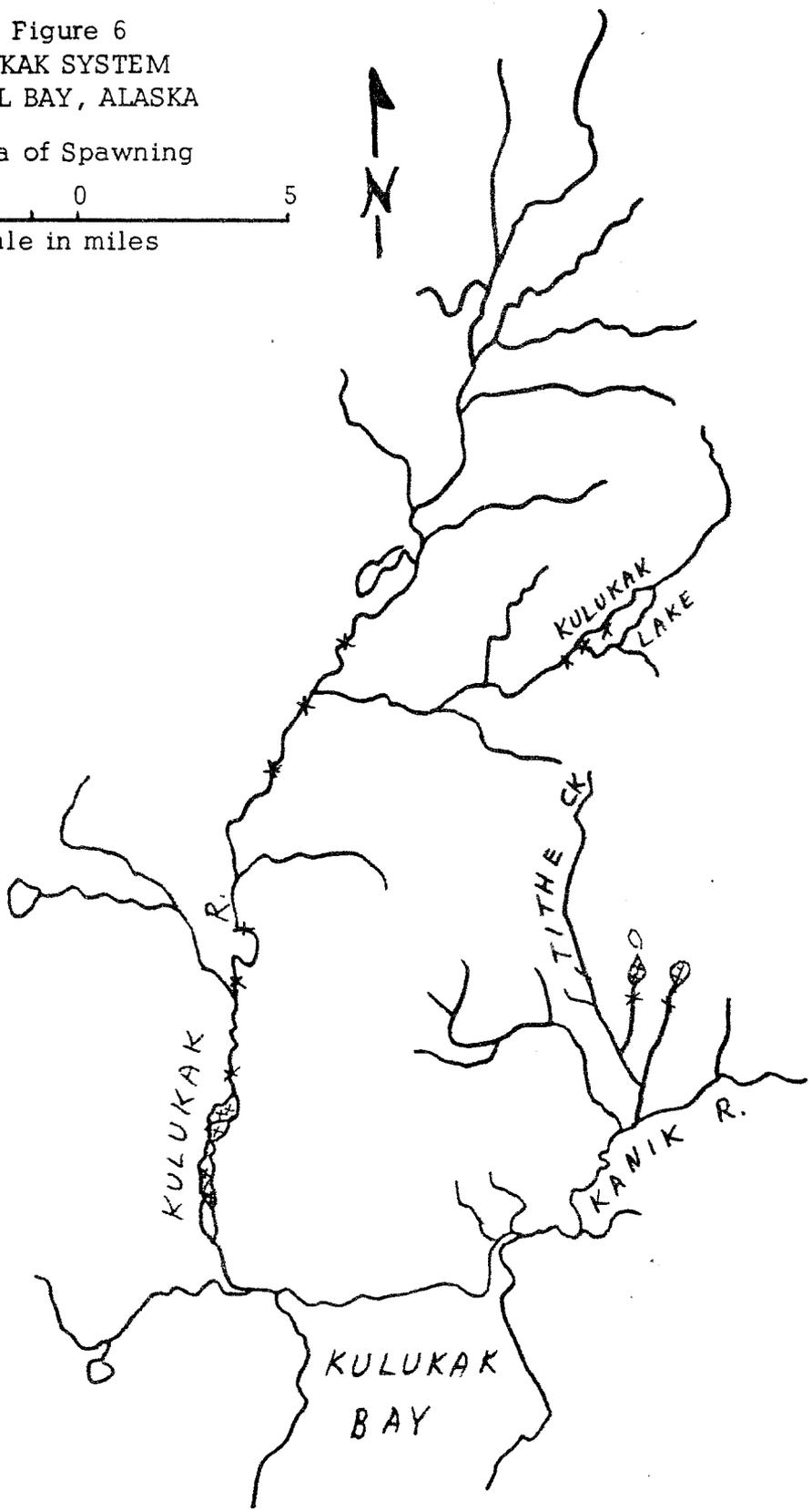
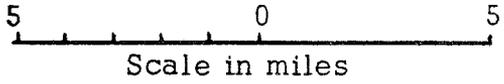


Figure 6
KULUKAK SYSTEM
BRISTOL BAY, ALASKA

x Area of Spawning



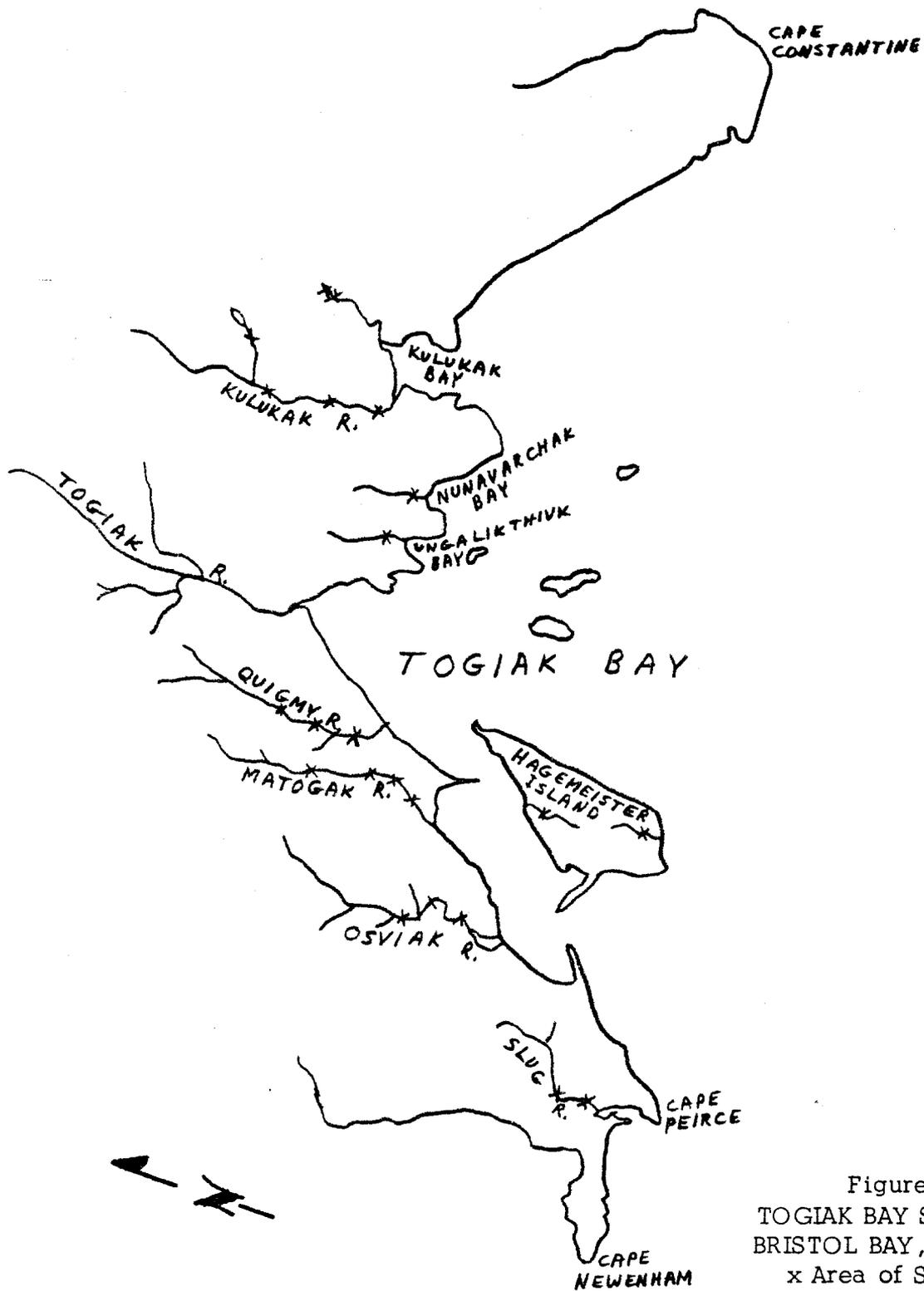


Figure 7
 TOGIAK BAY SYSTEMS
 BRISTOL BAY, ALASKA
 x Area of Spawning
 0 5 10 20
 Scale in miles

Table 1. - Spawning escapement of red salmon in the Wood River Lake system, estimated by aerial and ground counts, 1964

Area	Aerial Count Date	Estimated Percent of Spawning Completed	Live Count	Dead Count	Schooled Off Mouth And Beach	Ground ^{1/} Count Date	Ground Count	Total Aerial Live Count
<u>WOOD RIVER LAKE SYSTEM</u>								
Wood River	8/12	100	11,300	-	-	-	-	11,300
<u>LAKE ALEKNAGIK:</u>								
Whitefish Creek	8/12	100	1,100	-	-	8/1	452	1,100
Yako Creek	8/12	100	1,100	400	-	8/2	552	1,100
Yako Beach	8/12	100	500	-	-	-	-	500
Bear Creek	8/12	98	2,400	1,000	800	8/3	2,795	2,400
Bear Creek Beach	8/12	100	200	-	-	-	-	200
Ice Creek	8/12	100	4,800	600	-	8/4	5,078	4,800
Ice Creek Beach	8/12	100	200	-	-	-	-	200
Youth Creek	8/12	100	20	-	-	8/8	25	20
Southshore Beaches	8/12	95	1,400	-	-	-	-	1,400
Sunshine Creek	8/12	100	800	600	800	-	-	800
Peaceful Creek	8/12	100	1,200	700	-	-	-	1,200
Agulowak R. Beach	8/12	100	3,400	-	-	-	-	3,400
Northshore Beaches	8/12	100	900	300	-	-	-	900
Happy Creek	8/12	100	1,700	-	-	-	-	1,700
Hansen Creek	8/12	100	2,600	1,700	-	8/1	7,639	2,600
Dam Creek	8/12	100	3,500	900	-	-	-	3,500
Mission Creek	8/12	100	100	-	-	-	-	100
<u>LAKE ALEKNAGIK TOTAL</u>			25,920	6,200	1,600		16,541	25,920
Agulowak River and Lower River Bay	8/28	100	42,400	-	-	-	-	42,400
<u>LAKE NERKA:</u>								
Femno Creek	8/13	100	1,800	2,500	-	8/16	3,063	3,060 ^{5/}

Table 1. - (Continued)

Area	Aerial Count Date	Estimated Percent of Spawning Completed	Live Count	Dead Count	Schooled Off Mouth And Beach	Ground ^{1/} Count Date	Ground Count	Total Aerial Live Count
Upper River Bay N.W.	8/28	100	2,800	-	-	-	-	2,800
Upper River Bay S.E.	8/28	100	5,700	-	-	-	-	5,700
Allah Creek Beach	8/13	99	5,300	-	600	-	-	5,300
Ross Creek-								
Pike Creek	8/13	100	500	-	-	-	-	500
Pike Creek	8/13	100	3,400	-	-	-	-	3,400
Stovall Creek								
and Lake	8/13	100	11,300	-	-	-	-	11,300
Bear Creek	8/13	100	1,800	-	-	-	-	1,800
Teal Creek	8/13	100	2,400	500	-	-	-	2,400
River Bay-N4 Beach	8/24	100	1,800	-	-	-	-	1,800
N4-N6 Beach	8/24	100	10,000	-	-	-	-	10,000
Pick Creek Beach	8/24	100	8,700	-	-	-	-	8,700
Pick Creek	8/15	100	12,400	2,500	-	8/14-15	15,784	12,400
Elva Creek Beach	8/15	100	1,600	-	-	-	-	1,600
Elva Creek	8/15	100	700	-	500	-	-	700
Amakuk Arm	8/28	100	1,900	-	-	-	-	1,900
Lynx Creek	8/13	100	2,100	-	-	8/26	1,565	2,100
Lynx Lake	8/13	99	4,500	-	600	-	-	4,500
Amakuk Arm-								
Ott's Bay	8/24	100	4,400	-	-	-	-	4,400
Ott's Bay	8/15	100	1,700	-	-	-	-	1,700
Ott's Bay-								
Agulukpak R.	8/24	100	3,000	-	-	-	-	3,000
Kema Creek	8/22	100	2,500	-	-	8/25	3,464	3,460 ^{5/}
Hidden Lake Creek	8/22	100	3,800	3,000	-	8/18	7,831	7,830 ^{5/}
Anvil Bay	8/28	97	32,800	-	3,200	-	-	32,800
Anvil Bay-								
Elbow Point	8/28	100	9,100	-	-	-	-	9,100
Elbow Point-								
Lynx Creek	8/20	100	<u>5,800</u>	<u>-</u>	<u>-</u>	-	-	<u>5,800</u>
LAKE NERKA TOTAL			141,800	8,500	4,900		31,707	148,050

Table 1. - (Continued)

Area	Aerial Count Date	Estimated Percent of Spawning Completed	Live Count	Dead Count	Schooled Off Mouth And Beach	Ground <u>1/</u> Count Date	Ground Count	Total Aerial Live Count
Little Togiak River	8/15	100	15,000	-	-	-	-	15,000
Little Togiak Lake	8/24-9/15	98	15,210	-	1,400	-	-	15,210
Agulupak River	8/24	95	38,900	-	-	-	-	38,900
<u>LAKE BEVERLEY</u>								
Hardluck Bay	8/24	100	25,400	-	-	9/20	21,500+ ^{2/}	25,400
Sam's Beach	8/21	100	300	-	-	-	-	300
Golden Horn Beach	8/21	100	2,200	-	-	-	-	2,200
Golden Horn Creek	8/21	100	2,600	-	-	-	-	2,600
Silver Horn	8/24	90	69,500	-	9,000	9/21	71,300+ ^{3/}	69,500
B-12 Beach	8/24	98	9,900	-	-	8/26	10,000	9,900
B-9 Beach	8/24	98	1,000	-	-	-	-	1,000
Anniversary Bay	8/24	100	500	-	-	-	-	500
Moose Creek	8/21	100	3,500	7,500	-	8/19	12,657	12,660 ^{5/}
Hope Creek	8/14	100	15,000	-	-	-	-	15,000
Miscellaneous	8/21	100	<u>1,300</u>	<u>-</u>	<u>-</u>	-	<u>-</u>	<u>1,300</u>
LAKE BEVERLEY TOTAL			131,200	7,500	9,000		115,457	140,360
Peace River	8/21	100	16,800	-	-	-	-	16,800
Lake Mikehalk	8/21	100	9,500	-	-	-	-	9,500
Wind River	9/5	100	3,600	-	-	-	-	3,600
<u>LAKE KULIK:</u>								
North Shore	9/5	100	44,300	-	-	-	-	44,300
West Shore	8/21	100	5,600	-	-	9/17	3,600 ^{4/}	5,600

Table 1. - (Continued)

Area	Aerial Count Date	Estimated Percent of Spawning Completed	Live Count	Dead Count	Schooled Off Mouth And Beach	Ground ^{1/} Count Date	Ground Count	Total Aerial Live Count
South Shore	9/5	98	<u>1,100</u>	<u>-</u>	<u>500</u>	-	<u>-</u>	<u>1,100</u>
LAKE KULIK TOTAL			51,000		500		3,600	51,000
Grant River	8/22	100	<u>18,400</u>	<u>2,500</u>	<u>-</u>	8/22	<u>18,400</u>	<u>18,400</u>
WOOD RIVER LAKE TOTAL			521,030	27,200	17,400		188,768	<u>536,440</u>

- 1
2
1
- 1/ Lake Aleknagik red salmon ground counts were conducted by Alaska Department of Fish and Game personnel. Ground counts made on Lake Nerka, Beverley and Kulik were conducted by Fisheries Research Institute personnel.
 - 2/ The count of 21,500+ is a comparative ground and boat estimate on observations made in 1963 and 1964 by Fisheries Research Institute.
 - 3/ The ground and boat counts in Silver Horn Bay were considered 1/4 to 1/3 larger than the 1963 estimated population of red salmon of 71,300.
 - 4/ Ground and boat counts along the west shore of Lake Kulik were considered as large as the 1963 red salmon population of 3,600.
 - 5/ Ground counts were used as they more accurately reflected the total spawning population at the time of survey.

Table 2. - Spawning escapement of red salmon in the Igushik Lakes and Lake Nunavaugaluk system, estimated by aerial and ground counts, 1964

Area	Aerial Count Date	Estimated Percent of Spawning Completed	Live Count	Dead Count	Schooled Off Mouth And Beach	Ground ^{1/} Count Date	Ground Count	Total Aerial Live Count
<u>IGUSHIK LAKES</u>								
Igushik River	8/11	100	50	-	-	-	-	50
<u>LAKE AMANKA:</u>								
Longarm Creek	8/11	100	600	800	-	7/30	1,879	600
Middle Creek	8/11	100	50	-	-	-	-	50
South Creek	8/11	100	1,300	-	-	7/30	1,310	1,300
Amanka Beaches	8/11	100	<u>1,150</u>	<u>400</u>	-	-	-	<u>1,150</u>
LAKE AMANKA TOTAL			3,100	1,200			3,189	3,100
<u>KATHLENE RIVER:</u>								
Lower River	8/11	100	9,000	-	-	7/31	8,800	9,000
Upper River	8/11	100	11,000	-	-	-	-	11,000
Ongoke River	8/11	100	<u>7,800</u>	<u>3,900</u>	-	7/31	<u>2,478</u>	<u>7,800</u>
KATHLENE RIVER TOTAL			27,800	3,900			11,278	27,800
<u>LAKE UALIK:</u>								
Frances Creek	8/11	100	4,000	-	-	-	-	4,000
West Shore Creeks	8/11	100	2,500	-	-	-	-	2,500
West Shore	8/11	67	20,000	-	15,000	-	-	20,000
East Shore Creeks	8/11	100	100	-	-	-	-	100
East Shore	8/11	100	<u>1,700</u>	-	-	-	-	<u>1,700</u>
LAKE UALIK TOTAL			<u>28,300</u>		<u>15,000</u>			<u>28,300</u>
IGUSHIK LAKES TOTAL			59,250	5,100	15,000		14,467	<u>59,250</u>

Table 2. - (Continued)

Area	Aerial Count Date	Estimated Percent of Spawning Completed	Live Count	Dead Count	Schooled Off Mouth And Beach	Ground ^{1/} Count Date	Ground Count	Total Aerial Live Count
<u>LAKE NUNAVAUGALUK</u>								
Snake River	8/11	100	50	-	-	-	-	50
Snake River- Eagle Creek	8/11	90	1,500	-	-	-	-	1,500
Eagle Creek	8/11	100	50	-	-	-	-	50
West Shore	8/11	78	3,000	-	1,000	-	-	3,000
Killian Creek	8/11	100	1,500	-	-	-	-	1,500
East Shore	8/11	79	1,300	-	500	-	-	1,300
East Shore Creeks	8/11	100	100	-	-	-	-	100
South Shore	8/11	100	<u>400</u>	-	<u>-</u>	-	-	<u>400</u>
LAKE NUNAVAUGALUK TOTAL			7,900		1,500			7,900

^{1/} Ground counts were conducted by Alaska Department of Fish and Game personnel.

Table 3. - Comparison of red salmon spawning ground aerial estimate counts in the Tikchik Lakes and Nushagak-Mulchatna system, 1960-1964

Area	1960		1961		1962		1963		1964	
	Date	No. Est.	Date	No. Est.	Date	No. Est.	Date	No. Est.	Date	No. Est.
Nuyakuk River	-	-	-	-	8/10	160	-	-	8/24	100
<u>TIKCHIK LAKE:</u>										
Creek A	8/10	2,000	8/12	800	8/10	600	8/18	5,000	8/21	800
Creek B	8/10	5,650	8/12	1,400	8/10	620	8/18	10,000	8/24	2,000
Creek C	8/10	<u>50</u>	8/12	<u>50</u>	8/10	<u>10</u>	-	<u>-</u>	8/24	<u>30</u>
TIKCHIK LAKE TOTAL		7,700		2,250		1,230		15,000		2,830
Tikchik River	8/10	12,000	8/12	10,000	8/10	1,840	8/4	50,000	8/11	2,750
<u>NUYAKUK LAKE:</u>										
North Shore Beach	8/10	820	8/22	1,070	8/31	420	9/5	320	9/6	6,500
Coffee Bay Beach	-	-	-	-	-	-	-	-	9/6	100
Portage Arm Beach	-	-	-	-	-	-	9/5	200	9/6	1,100
South Shore Beach	8/10	100	8/22	970	8/31	600	8/26	300	9/6	7,100
Mirror Bay Beach	8/10	900	8/22	730	8/31	230	9/5	650	9/6	2,300
Rapids (River)	8/29	<u>300</u>	8/22	<u>50</u>	8/10	<u>1,750</u>	8/18	<u>1,500</u>	8/11	<u>600</u>
NUYAKUK LAKE TOTAL		2,120		2,820		3,000		2,970		17,700
<u>LAKE CHAUEKUKTULI:</u>										
Creek #1	8/10	150	8/12	10	8/10	30	8/18	100	8/24	50
Allen River Beach	8/29	17,500	8/22	10,500	8/31	8,400	8/26	21,000	8/10	20,500
Allen River	8/10	250	8/12	500	8/10	390	8/18	200	8/11	250
North Shore Beach	8/29	4,760	8/22	800	8/31	670	8/26	2,900	8/24	6,400
South Shore Beach	8/29	<u>1,100</u>	8/22	<u>500</u>	8/31	<u>170</u>	9/5	<u>240</u>	8/24	<u>900</u>
LAKE CHAUEKUKTULI TOTAL		23,760		12,310		9,660		24,440		28,100
TIKCHIK LAKES TOTAL		45,580		27,380		15,730		92,410		51,480

Table 3. - (Continued)

Area	1960		1961		1962		1963		1964	
	Date	No. Est.								
<u>NUSHAGAK-MULCHATNA:</u>										
Mulchatna River	-	-	8/13	1,900	8/20	1,760	8/27	3,300	8/14	4,700
Kuktuli	-	-	8/13	1,800	8/20	1,130	8/27	2,100	8/14	800
Stuyahok River	-	-	-	-	-	-	-	-	8/5	100
Nushagak River	-	-	8/12	400	8/23	310	8/27	1,100	8/2	2,600
King Salmon River	-	-	8/12	4,500	8/23	300	8/5	800	8/2	200
Iowithla River	-	-	8/13	1,500	8/23	210	8/27	1,000	8/15	200
Kokwok River & Lakes	-	-	-	-	8/23	550	8/26	15,000	8/15	1,100
Chikchitna River	-	-	-	-	-	-	-	-	8/14	100
NUSHAGAK-MULCHATNA TOTAL		-		10,100		4,260		23,300		9,800

Table 4. - Comparison of red salmon spawning ground aerial estimate counts in the Togiak district, 1960-1964

Area	1960		1961		1962		1963		1964	
	Date	No. Est.								
Togiak River	8/29	1,000	8/22	850	8/14	150	8/11	200	9/3	300
<u>TOGIAK LAKE:</u>										
Jondik Creek Beach	8/29	3,500	9/8	730	9/4	250	9/6	970	9/3	1,300
Jondik Creek	8/8	5,000	8/11	3,000	8/8	1,500	8/11	890	9/3	800
Jondik Creek to Bruin Creek Beach	8/29	14,300	9/8	1,800	9/4	1,070	9/6	3,950	9/3	4,200
Bruin Creek to Middle Point Beach	8/29	3,400	9/8	1,020	9/4	910	9/6	3,500	9/3	2,500
Middle Point to Sunday Creek Beach	8/29	18,950	9/8	20,730	9/4	1,860	9/6	7,800	9/3	15,000
North Shore Beach	8/29	3,800	9/8	2,100	9/4	860	9/6	1,650	9/3	3,000
West Shore Beach	8/29	1,200	9/8	2,010	9/4	350	9/6	8,600	9/3	3,300
West Creek and Lake	8/8	100	8/11	1,250	8/8	670	9/6	350	9/3	100
Truman Creek	-	-	-	-	-	-	-	-	-	-
TOGIAK LAKE TOTAL		50,250		32,640		7,470		27,710		30,200
Zwischen River	8/29	7,650	8/22	5,150	9/4	6,950	9/6	5,560	9/3	3,000
<u>UPPER TOGIAK LAKE:</u>										
Zwischen R. to Budole Creek Beach	8/29	3,800	9/8	1,650	9/4	2,340	9/6	9,400	9/3	5,000
Budole Creek to Upper Togiak Creek Beach	8/29	2,000	9/8	1,360	9/4	2,630	9/6	2,200	9/3	5,500
North Shore Beach	8/29	1,000	9/8	150	9/4	970	9/6	3,700	9/3	2,500
Makoo Creek	8/24	-	9/8	150	9/4	100	9/6	600	9/3	400
Upper Togiak Creek	8/29	-	9/8	150	9/4	100	9/6	120	9/3	200
West Shore Beach	8/29	200	9/8	350	9/4	190	9/6	1,650	9/3	600
UPPER TOGIAK LAKE TOTAL		7,000		3,810		6,330		17,670		14,200
TOGIAK LAKES TOTAL		65,900		42,450		20,900		51,140		47,700

Table 4. - (Continued)

Area	1960		1961		1962		1963		1964	
	Date	No. Est.	Date	No. Est.	Date	No. Est.	Date	No. Est.	Date	No. Est.
<u>TOGIAK TRIBUTARIES:</u>										
Gechiak Lake	8/8	7,650	8/11	7,480	8/8	5,160	8/11	2,640	7/27	600
Ongivinuk Lake	8/29	3,200	8/22	3,750	9/4	900	9/6	2,700	8/11	2,500
Pungokebuk Lake	8/8	950	8/11	400	8/8	230	8/11	580	7/27	200
Tributaries to the Lake	-	-	-	<u>300</u>	-	<u>150</u>	-	<u>180</u>	8/11	<u>800</u>
TOGIAK TRIBUTARIES TOTAL		11,800		11,930		6,440		6,100		4,100
<u>KULUKAK RIVER SYSTEM:</u>										
Kulukak River and Lake	-	-	8/11	500	8/8	2,170	8/11	2,150	7/29	2,800
Tithe Creek	-	-	8/11	<u>2,100</u>	8/8	<u>2,050</u>	8/11	<u>2,900</u>	8/11	<u>1,600</u>
KULUKAK TOTAL				2,600		4,220		5,050		4,400

Table 5. - Population escapement estimates of red salmon in the Nushagak district, 1963-1964

Area	1963 Total Pop. Adj. Est.	Ratio 1964/1963	1964 Preliminary Estimate	1964 Observed Adj. Est.	Percent of Observed Adj. Total	Percent of Nushagak District Total
Wood River	800	22.60	18,080	19,000	1.76	1.42
Lake Aleknagik	15,700	2.61	40,977	46,000	4.27	3.44
Agulowak River	14,200	3.39	48,138	50,100	4.65	3.74
Lake Nerka	167,900	2.19	367,701	384,700	35.75	28.73
Little Togiak River	15,000	1.67	25,050	26,000	2.42	1.94
Little Togiak Lake	21,100	.83	17,515	19,500	1.81	1.46
Agulukpak River	47,500	.86	40,850	42,900	3.99	3.20
Lake Beverley	251,500	1.21	304,315	317,300	29.49	23.70
Peace River	19,300	.92	17,756	18,800	1.75	1.40
Lake Mikchalk	19,400	.60	11,640	13,000	1.21	.97
Wind River	5,000	.80	4,000	4,500	.42	.34
Lake Kulik	111,100	.96	106,656	111,600	10.37	8.33
Grant River	<u>32,900</u>	<u>.66</u>	<u>21,714</u>	<u>22,700</u>	<u>2.11</u>	<u>1.70</u>
WOOD RIVER LAKES TOTALS	721,400		1,024,392	1,076,100	100.00	80.37
Snake River	500	.20	100	100	.81	.01
Lake Nunavaugaluk	<u>37,400</u>	<u>.46</u>	<u>17,250</u>	<u>12,300</u>	<u>99.19</u>	<u>.92</u>
LAKE NUNAVAUGALUK TOTALS	38,000		17,350	12,400	100.00	.93
Igushik River	80	1.25	100	100	.08	.01
Lake Amanka	3,510	1.83	6,423	6,500	5.06	.49
Kathlene River	46,100	1.31	60,391	60,400	47.00	4.51
Lake Ualik	<u>42,510</u>	<u>1.38</u>	<u>58,664</u>	<u>61,500</u>	<u>47.86</u>	<u>4.59</u>
IGUSHIK LAKES TOTALS	92,200		125,578	128,500	100.00	9.60
Tikchik Lake	32,500	.19	6,175	7,200	6.98	.54
Tikchik River	80,400	.06	4,824	5,000	4.84	.37

Table 5. - (Continued)

Area	1963 Total Pop. Adj. Est.	Ratio 1964/1963	1964 Preliminary Estimate	1964 Observed Adj. Est.	Percent of Observed Adj. Total	Percent of Nushagak District Total
Lake Nuyakuk	6,100	5.96	36,356	36,400	35.27	2.72
Lake Chaukuktuli	<u>47,600</u>	<u>1.15</u>	<u>54,740</u>	<u>54,600</u>	<u>52.91</u>	<u>4.08</u>
TIKCHIK LAKES TOTALS	166,600		102,095	103,200	100.00	7.71
Nushagak River	2,100	2.36	4,956	5,000	26.74	.37
King Salmon River	800	.25	200	200	1.07	.01
Iowithla River	1,900	.20	380	400	2.14	.03
Kokwok River	30,000	.07	2,100	2,100	11.23	.16
Mulchatna River	6,600	1.42	9,372	9,400	50.27	.70
Koktuli River	<u>4,300</u>	<u>.38</u>	<u>1,634</u>	<u>1,600</u>	<u>8.55</u>	<u>.12</u>
NUSHAGAK-MULCHATNA RIVER TOTALS	45,700		18,642	18,700	100.00	1.39
NUSHAGAK DISTRICT TOTAL	1,063,900		1,288,057	1,338,900		100.00

Table 6. - Population escapement estimates of red salmon in the Togiak district, 1963-1964

Area	1963 Total Pop. Adj. Est.	Ratio 1964/1963	1964 Preliminary Estimate	1964 Observed Adj. Est.	Percent of Observed Adj. Total	Percent of Nushagak District Total
Togiak River	400	1.50	600	600	.63	.52
Togiak Lake	55,100	1.09	60,059	60,100	62.86	52.40
Zwischen River	11,500	.54	6,210	6,500	6.80	5.67
Upper Togiak Lake	<u>35,400</u>	<u>.80</u>	<u>38,320</u>	<u>28,400</u>	<u>29.71</u>	<u>24.76</u>
TOGIAK LAKE TOTALS	102,400		95,189	95,600	100.00	83.35
Gechiak Lake	5,900	.23	1,357	1,400	15.05	1.22
Ongivinuk Lake	6,000	.93	5,580	5,600	60.22	4.88
Pongokepuk Lake	1,500	.34	510	500	5.38	.44
Tributaries to Lakes	<u>400</u>	<u>4.44</u>	<u>1,776</u>	<u>1,800</u>	<u>19.35</u>	<u>1.57</u>
TOGIAK SECTION TOTALS	13,800		9,223	9,300	100.00	8.11
Kulukak River & Lake	4,800	1.30	6,240	6,200	63.64	5.40
Tithe Creek	<u>6,600</u>	<u>.55</u>	<u>3,630</u>	<u>3,600</u>	<u>36.36</u>	<u>3.14</u>
KULUKAK SYSTEM TOTALS	11,400		9,870	9,800	100.00	8.54
TOGIAK DISTRICT TOTALS	127,600		114,282	114,700		100.00

Table 7. Comparison of total population with the total sum of survey estimates in the Nushagak and Togiak districts, 1964.

Area	Total Pop. Est. by Tower Counts	Total Sum of Survey Estimates	Percent Acct. for by Estimates
Wood River Lakes	1,076,100	536,440	49.85
Lake Nunavaugaluk	12,400	7,900	63.71
Igushik Lakes	128,500	59,250	46.11
Tikchik Lakes	103,200	51,480	49.88
Togiak Lakes	95,600	47,700	49.90
TOTAL	1,415,800	702,770	49.64

Table 8. Comparative percentage distribution of red salmon in three major types of spawning areas during the years 1959-1964 in the Nushagak, Togiak districts.

Year ^{1/}	Spawning			Total Pop. Estimate by Tower Counts
	Creek	Beaches	Rivers	
<u>WOOD RIVER LAKES</u> ^{2/}				
1959	32.75	50.30	16.95	2,209,300
1960	27.37	55.50	17.13	1,016,100
1961	11.43	32.31	56.26	460,700
1962	23.97	65.23	10.80	873,900
1963	12.15	68.48	19.37	721,400
1964	<u>18.65</u>	<u>54.06</u>	<u>27.29</u>	<u>1,076,100</u>
Geo. Average	19.59	52.84	21.33	1,059,600
<u>IGUSHIK LAKES</u>				
1959	34.30	48.20	17.50	643,800
1960	35.50	52.90	11.60	495,100
1961	39.34	34.54	26.12	294,300
1962	43.40	31.55	25.05	15,700
1963	6.21	44.81	48.98	92,200
1964	<u>27.59</u>	<u>38.57</u>	<u>33.84</u>	<u>128,500</u>
Geo. Average	26.61	41.11	24.55	278,300
<u>LAKE NUNAVAUGALUK</u>				
1959	41.70	57.60	0.70	140,000
1960	44.30	50.70	5.00	16,600
1961	24.12	71.99	3.89	4,900
1962	29.35	63.04	7.61	1,800
1963	22.69	76.13	1.18	38,000
1964	<u>20.89</u>	<u>78.48</u>	<u>0.63</u>	<u>12,400</u>
Geo. Average	29.44	65.46	4.44	35,600
<u>TIKCHIK LAKE SYSTEM</u> ^{3/}				
1959	24.10	37.90	38.00	48,900
1960	19.40	53.10	27.50	145,500
1961	11.19	49.63	39.18	79,800
1962	9.49	64.66	25.85	37,900
1963	19.69	29.95	50.36	166,600
1964	<u>5.59</u>	<u>87.22</u>	<u>7.19</u>	<u>103,200</u>
Geo. Average	13.27	50.70	26.98	97,000

Table 8 (Continued)

Year ^{1/}	Spawning			Total Pop. Estimate by Tower Counts
	Creek	Beaches	Rivers	
<u>TOGIAK LAKES</u>				
1959	12.80	82.59	4.61	178,700
1960	12.30	74.56	13.14	162,800
1961	15.89	69.97	14.14	95,500
1962	11.39	54.64	33.97	47,400
1963	4.35	84.03	11.62	102,400
1964	<u>3.14</u>	<u>89.94</u>	<u>6.92</u>	<u>95,600</u>
Geo. Average	8.55	74.99	11.51	113,700
TOTAL	17.70	55.85	14.86	

1/ The average creek, beach and river spawners for the six years is a geometric mean.

2/ River spawning populations include the Wood, Agulowak, Little Togiak, Agulukpak, Peace, Wind and Grant.

3/ Spawners in rapids between Nuyakuk Lake and Lake Chauekuktuli are included as river spawners.

Table 9. - Aerial surveys of streams in the Nushagak district, 1956-1964

Date	River	Partial or Complete	Fish Count by Species			Remarks
			Kings	Reds	Chums	
<u>1956</u>						
8/6	Muklung	Complete	150	400	-	
8/6	Iowithla	"	103	-	Numerous	Conservative Est.
8/6	Kokwok	"	Few	Few	-	Scattered
8/15	Iowithla	Partial	15	-	-	
<u>1957</u>						
7/29	Iowithla	Partial	50	Few	Few	
7/29	King Salmon	"	125	-	-	Conservative Est.
7/29	Muklung	"	-	150	-	
7/29	Nushagak	"	-	150	300	
8/16	Muklung	"	82	-	-	Visibility good
8/16	Kokwok	"	2	-	-	
8/16	Nushagak	"	-	950	Numerous	
8/16	King Salmon	"	72	-	-	Vis. fair - Lake
<u>1958</u>						
8/14	King Salmon	Partial	-	-	-	
8/15	Iowithla	"	21	-	-	Vis. poor, Hi. water
8/15	Muklung	"	42	Few	-	Vis. poor
<u>1959</u>						
7/28	Old Stuyahok	Partial	655	-	-	Visibility poor
7/28	Iowithla	"	176	-	-	Visibility poor
7/30	Klutispaw	"	518	-	-	Vis. excellent
7/30	King Salmon	Complete	737	-	-	
7/30	Old Man Creek	"	51	-	-	
7/30	Mulchatna	Partial	414	-	-	
8/10	Muklung	Complete	352	-	-	Vis. excellent
8/10	Iowithla	"	263	-	-	Vis. excellent
8/10	Koktuli	"	431	-	-	Past peak
8/10	Old Stuyahok	"	597	-	-	Past peak
8/10	Chichitnok	"	60	-	-	Visibility poor
<u>1960</u>						
7/28	Koktuli	Complete	704	-	-	Visibility poor
7/28	King Salmon	"	137	-	-	Visibility poor
7/28	Klutispaw	"	158	-	-	Visibility good
<u>1962</u>						
8/1	King Salmon	Complete	497	-	-	Visibility fair
8/1	Klutispaw	"	80	-	-	Visibility fair
<u>1963</u>						
8/5	King Salmon	Complete	67	-	-	Vis. poor to good
8/5	Old Stuyahok	"	234	-	-	Vis. poor to good

Table 9. - (Continued)

Date	River	Partial or Complete	Fish Count by Species			Remarks
			Kings	Reds	Chums	
<u>1964</u>						
7/20	Nushagak	Complete	6,740	1,300	4,400	
7/20	Chichitnok	"	400	100	200	
7/20	King Salmon	"	700	200	-	
7/20	Mulchatna	"	2,150	300	2,500	
7/31	Kokwok	"	-	1,100	-	Spawning in Lake
7/31	Muklung	"	1,000	-	-	
8/14	Mulchatna	"	1,900	4,250	1,000	
8/14	Koktuli	"	2,800	1,100	-	
8/14	Chilchitna	"	-	100	-	
8/14	Chilikadrotna	"	200	100	-	
8/14	Miscellaneous	"	100	-	-	
8/15	Nushagak	"	-	1,000	-	
8/15	Kokwok	"	-	-	-	
8/15	Iowithla	"	100	200	-	

Table 10. Float surveys of streams in the Nushagak district, 1957-1964

Date	River	Fish count by Species						Remarks
		Kings			Reds	Chums		
		Live	Dead	Total				
<u>1957</u> 8/7-9	King Salmon	287	137	424	50	220	4	Good survey
<u>1958</u> 8/5-10	Iowithla	531	26	557	28	41	363	Poor visibility
8/19-20	King Salmon	3	5	8	-	-	-	Past peak - Late
<u>1959</u> 8/2-5	King Salmon	3,122	160	3,282	67	600	316	Good visibility
8/7-13	Iowithla	748	292	1,040	37	80	584	Vis. poor to good
8/15-22	Koktuli	118	116	243	-	-	-	Past peak - Late
<u>1960</u> 8/6-8	King Salmon	169	5	174	24	-	7	Poor visibility- High water
<u>1961</u> 8/3-6	King Salmon	473	28	501	20	1,000	129	Fair visibility
8/10-13	Iowithla	301	57	358	-	1,500	2,078	Variable vis.
<u>1962</u> 8/3-7	King Salmon	514	29	543	-	125	-	Poor visibility
8/10-12	King Salmon	224	38	262	13	500	51	Excellent vis.
<u>1963</u> 8/4-6	King Salmon	493	47	540	15	603	12	Good visibility
8/6-8	Old Stuyahok	422	11	433	-	207	-	Vis. fair to poor
<u>1964</u> 8/5-8	Old Stuyahok	1,661	27	1,688	14	50	5,000	Vis. good to Ex.
8/12-14	King Salmon	254	81	335	13	223	none	Vis. good

The Alaska Department of Fish and Game administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information please write to ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, Suite 300 Webb, Arlington, VA 22203 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

For information on alternative formats for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-6077, (TDD) 907-465-3646, or (FAX) 907-465-6078.