Fairbanks Fishery Resources Progress Report Number FY86-9

AERIAL SURVEYS FOR SUMMER AND FALL SALMON IN THE UPPER YUKON RIVER DRAINAGE, 1985

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ABSTRACT

Aerial surveys were completed on ten streams on the Yukon Flats National Wildlife Refuge (NWR), six streams on Kanuti NWR, three streams on Arctic NWR, and eight streams on Yukon-Charley Rivers National Preserve in 1985. New anadromous streams were identified and new upper limits were defined for spawning salmon. The new anadromous streams were: the Coleen River, for chum and chinook salmon; the Dall River, for chum salmon; the Hadweenzic River, for chum salmon; and the Christian River for chum and chinook salmon. New upper limits were found in the Chandalar, Hodzana, and the Black Rivers. Chinook salmon were also located, for the first time, in the Sheenjek River. The new information has been submitted to the Alaska Department of Fish and Game (ADF&G) to be included in the Anadromous Stream Catalog.

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INTRODUCTION

The U.S. Fish and Wildlife Service (USFWS) has the responsibility to protect and provide for the subsistence use of fisheries as mandated by Congress in the Alaska National Interest Lands Conservation Act (ANILCA) of 1980. Residents of villages within the Refuges on the Yukon River drainage rely heavily on the fishery resources of the Yukon River. The 1985 subsistence harvest was 555,532 salmon for the Alaska portion of the Yukon River and the preliminary figure for commercial harvest was 984,085 salmon (Anderson pers. comm.). Commercial and subsistence demands on the fishery of the Yukon River have more than doubled over the past 15 years (Geiger et al. 1982, Anderson pers. comm. 1986). Currently the use of many Refuge streams by anadromous fish is unknown and needs to be determined to allow for additional protection under State regulations. To comply with the terms of ANILCA all spawning streams must be located and Refuge Management Plans must include provisions for protection of the spawning areas and assure that escapement levels are maintained for subsistence harvest.

In 1984 the Fairbanks Fishery Resource Station, U.S. Fish and Wildlife Service initiated a three year aerial stream survey study designed to locate salmon spawning sites within seven National Wildlife Refuges (NWR's) in interior and western Alaska. Aerial surveys were determined to be the most expedient and economical method to provide the needed resource information. Aerial surveys were completed on ten streams in the Koyukuk NWR and two streams on the Nowitna NWR in 1984. During these surveys previously unknown summer chum salmon (*Oncorhynchus keta*) spawning areas in Billy Hawk Creek and the North Fork of the Huslia River (Hawkinson and Deschermeier 1985).

In 1985, development in the U.S./Canada Yukon River Treaty negotiations caused a shift to occur in the priorities of the study. These negotiations deal primarily with the allocation of Canadian origin chinook (*Oncorhynchus tschawytscha*) and fall chum stocks. Negotiations have been stalled, in part, because of a lack of escapement data for streams in the Upper Yukon drainage. Because spawning sites of all upper Yukon stocks were not known, the emphasis of this study was shifted to the Upper Yukon River and Porcupine River drainages.

METHODS

Reconnaissance surveys were conducted on all streams. These surveys are a method to locate salmon and spawning areas. They do not determine actual counts or escapement numbers as intensive surveys would. Surveys were concentrated on the upper portion of the Yukon and Koyukuk rivers (Figures 1 and 2). Most of the major tributaries to the Yukon River from the Dalton Highway east to the Canadian border were surveyed. Streams were flown twice; once for summer chums and chinook salmon and again for fall chum salmon. Four streams on Kanuti NWR, ten streams on Yukon Flats NWR, three on Arctic NWR and eight streams on Yukon-Charley Rivers National Preserve were surveyed.

Criteria used to select the streams were: those not presently identified as salmon spawning streams, areas of importance in the U.S./Canada Yukon River negotations, unsurveyed streams, and those with development potential. The selection of streams was conducted as a joint effort by ADF&G, the National Park Service (NPS) and U.S. Fish and Wildlife Service (USFWS) personnel.

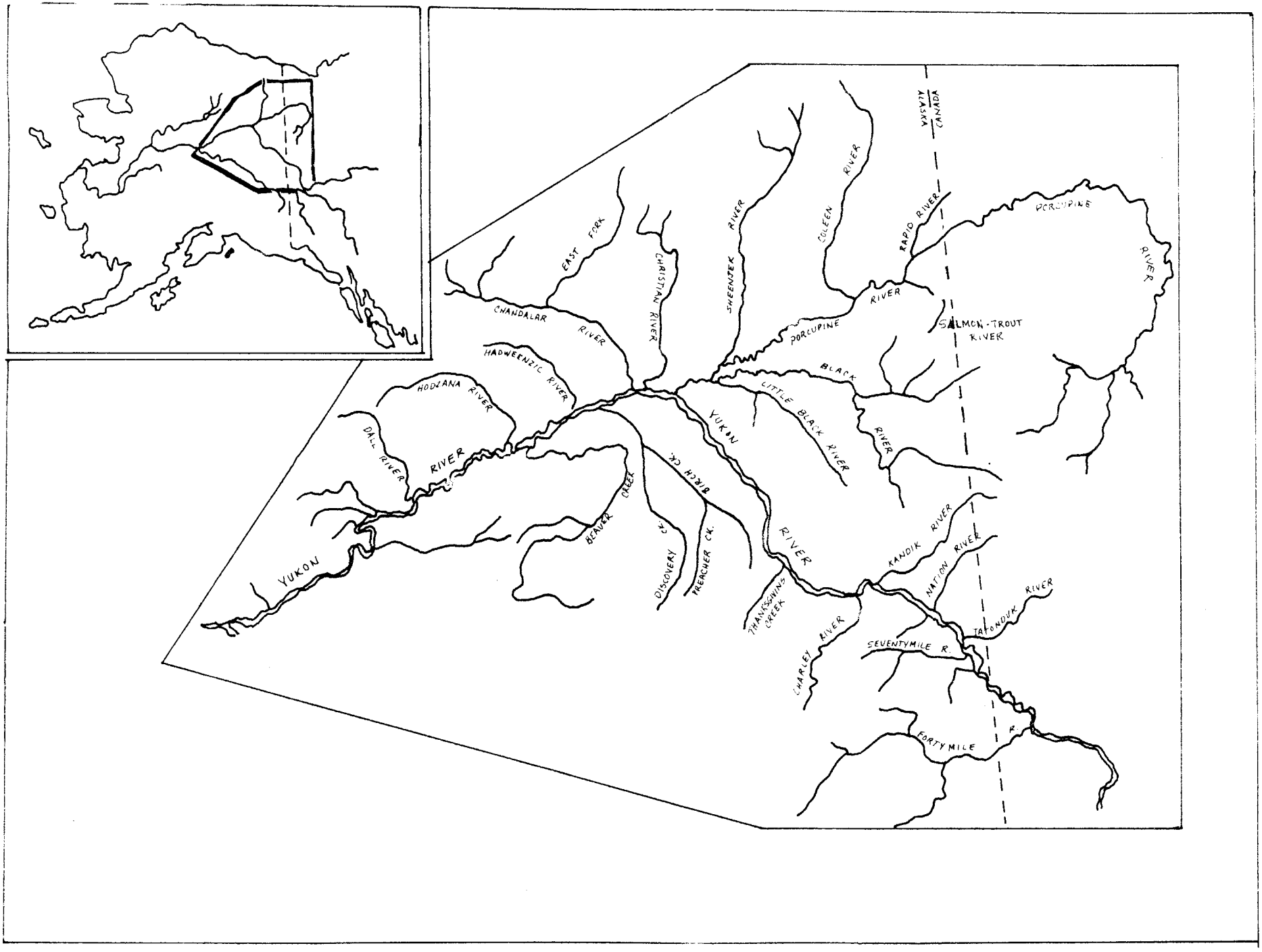

Figure 1. Drainages that were flown in the upper Yukon River and Porcupine River area.

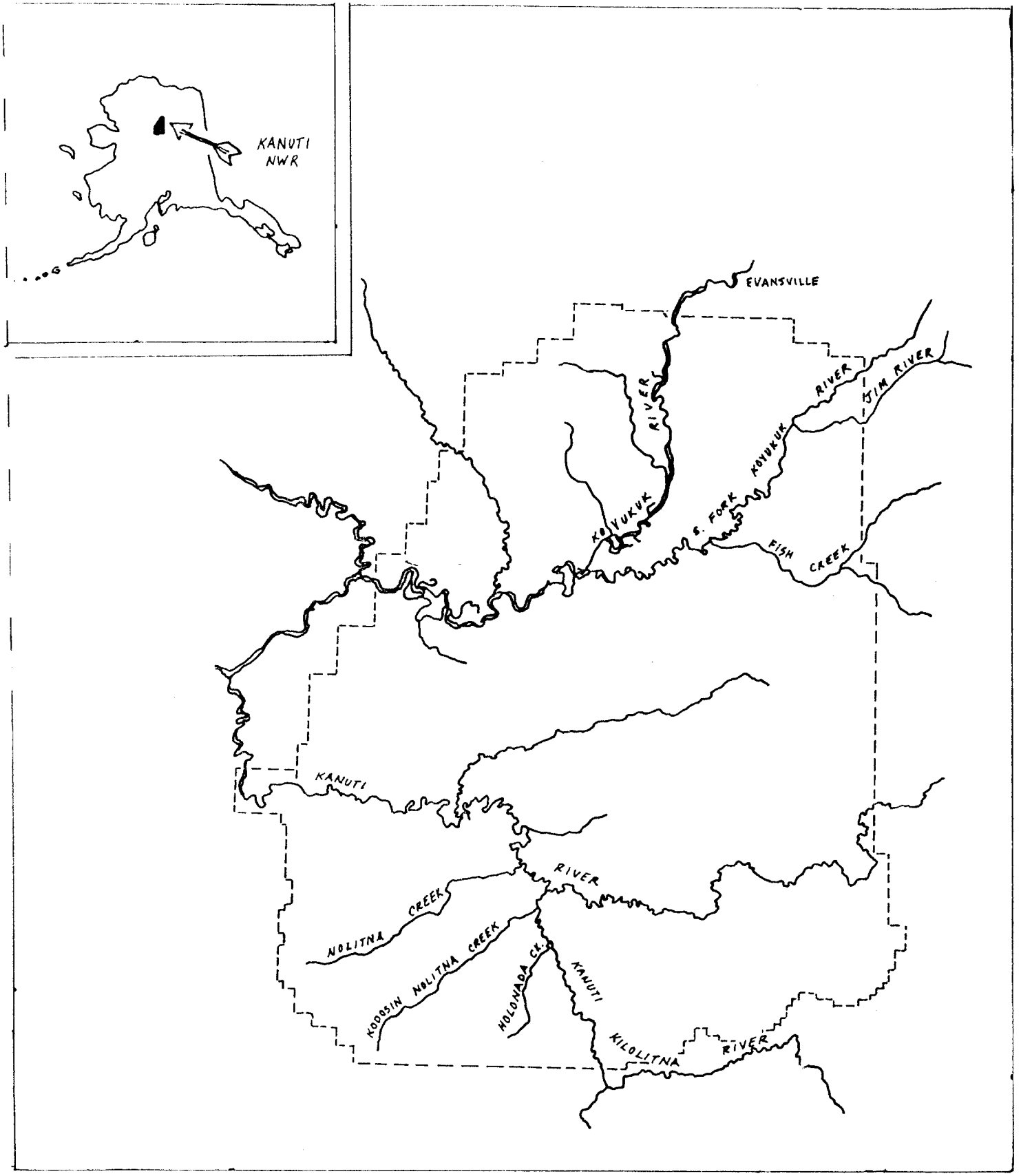

Figure 2. Drainages that were flown on Kanuti National Wildlife Refuge.

Surveys were scheduled to coincide with the peak summer chum, chinook and fall chum salmon runs. Peaks were determined by using available literature (Buklis 1981 and Barton 1984), and in season monitoring of run strength by ADF&G (Barton, pers. comm.).

Aerial surveys were flown by three crews concurrently to insure that estimates were made during the peak runs and to take advantage of good weather. Aircraft utilized were a Supercub, a Cessna 185, and a Helio Courier. An altitude of 200-300 feet and airspeed of 55-90 mph was maintained during the surveys, depending on the aircraft (Barton, pers. comm.). Aircraft utilized had long-range fuel capacities, making it possible to fly several streams without refueling. Streams were followed in a fairly straight line until fish were observed, then the stream channel was followed and fish counted. If large groups of fish were found the pilot circled the area until the biologist could make better estimates. The number of fish recorded was not intended to be a total count, but rather a relative estimate for comparison between streams for these surveys only. All observations were recorded on USGS 1:250,000 topographic maps. Most of the salmon observed were assumed to be on spawning grounds because of the timing of the surveys, with the exception of those in the lower Black River which were assumed to be migrating to their spawning grounds. ADF&G provided survey forms (Attachment 1) requesting the following information for each survey: date, aircraft type, weather conditions, water visibility, stream bottom coloration, where each stream survey began and ended, estimated counts of spawning fish, carcasses and migrating fish, and a rating of the overall effectiveness of the survey.

RESULTS

Reconnaissance aerial surveys were conducted on the Yukon Flats NWR the last week of July to locate summer chum and chinook salmon. The ten streams surveyed were Beaver Creek, Birch Creek tributaries, Dall River, Hodzana River, Hadweenzic River, Chandalar River, Sheenjek River, Christian River, Black River and the Little Black River (Appendix, Figures 3-11). Five of these rivers were resurveyed in mid-August due to a later than normal run of chinook salmon. Chinook were located in four streams with the largest concentrations in the Chandalar River. The fall surveys were conducted the last week of September. The water in some of the streams was very turbid due to heavy rains throughout the month of September making fish observations difficult. However, fall chum salmon were located in four of the ten streams; the Hodzana, Chandalar, Sheenjek and tributaries to the Black River.

In the Arctic NWR, three streams in the Porcupine drainage were surveyed. The Coleen, Rapid, and Salmon Trout Rivers were flown in late-July, mid-August and again in late September (Appendix, Figure 11). The Coleen River was identified as a new anadromous salmon spawning stream for both chum and chinook salmon.

The Kanuti NWR streams were more difficult to survey (Appendix, Figures 12 and 13). Water conditions were not clear enough in the main channel of the Kanuti River during the summer surveys to locate fish. The Kanuti River is normally stained by waters entering from large bog and muskeg areas.

This was also true in the three tributaries surveyed on Kanuti Kilolitna River. Chinook salmon were located in the main channel of the Kanuti Kilolitna River in late July, providing a new stream to the Anadromous Stream Catalog. The Jim River and the South Fork of the Koyukuk River were added to the fall survey list and fall chums were located in both streams. Fall chum salmon were not observed in the Kanuti River system, but survey conditions were again marginal due to the dark water.

Streams on the Yukon-Charley Rivers National Preserve surveyed for summer chum, chinook and fall chum salmon were: the Charley River, Seventymile River, Fortymile River, Kandik, Nation and Tatonduk Rivers and Fourth of July Creek and Thanksgiving Creek (Appendix, Figure 14). Although these streams all appeared to provide suitable salmon spawning and rearing habitat, fish were not observed during USFWS surveys. The fall surveys were terminated early due unsafe flying conditions. Personnel from ADF&G flew the Nation, Charley and Kandik Rivers in late August and located a chinook carcass on the Charley and the Kandik Rivers and five chinook carcasses on the Nation River (Barton pers. comm.). The results of all reconnaissance flights are shown in Table 1.

DISCUSSION

A total of 107 hours of survey were conducted during the summer and fall salmon runs. Four new streams were found to have anadromous salmon. Their names were submitted to ADF&G for inclusion in the Anadromous Stream Catalog. They were: the Coleen River, for chum and chinook salmon; the Dall River for chum salmon; the Hadweenzic River for chum salmon; the Christian River for chum and chinook salmon and the Kanuti Kilolitna River for chinook salmon. New upper limits of salmon spawning for inclusion in the catalog were identified: the Chandalar River - Middle and East Forks; the Hodzana River; and the Grayling and Salmon Forks of the Black River. Chinook salmon were also located for the first time on the Sheenjek River.

Our ability to effectively count salmon was reduced in the fall by poor observation conditions, such as cloud cover and poor lighting, and by naturally dark colored waters. Winds and turbulents reduced the number of streams that could be surveyed during the Yukon-Charley fall surveys.

New anadromous streams identified will be beneficial in the Yukon River Treaty negotiation process. Stock identification techniques need to be developed to separate these from Canadian origin stocks in the fishery before actual allocation goals can be established. All salmon locations will be used to provide better fishery input into Refuge Comprehensive Conservation Plans and Fishery Management Plans.

Reconnaissance and intensive surveys will be continued in 1986 and will concentrate on the upper Yukon River drainage. Reconnaissance surveys will also be conducted on tributaries of the Innoko and Nowitna rivers in 1986. Ground surveys using sonar equipment will begin in 1986 to monitor salmon escapement in the Chandalar River. NPS will also begin ground surveys, in part, to locate salmon streams in the Yukon-Charley Park.

Table 1. Fish counts from reconnaissance flights, 1985.

STREAM NAME	LIVE KINGS	KING CARCASS	LIVE CHUM	CHUM CARCASS	SURVEY[a] RATING
Kanuti Kilolitna River					
7-26-85	8	0	0	0	Fair
9-25-85	0	0	0	0	Fair
Kodosin Nolitna Creek					
7-26-85	0	0	0	0	Fair
Nolitna Creek					
7-26-85	0	0	0	0	Fair
Kanuti River					
7-26-85	0	0	0	0	Poor
9-25-85	0	0	0	0	Poor
Jim River					
9-25-85	0	0	14	1	Poor
South Fork - Koyukuk River					
9-25-85	0	0	954	0	Fair
Beaver Creek					
7-29-85	2	0	0	0	Good
8-14-85	2	1	0	0	Good
9-26-85	0	0	0	0	Fair
Birch Creek					
Preacher Creek					
7-29-85	0	0	0	0	Poor
Discovery Creek					
7-29-85	0	0	0	0	Poor
Dall River					
7-30-85	0	0	5	0	Fair
9-25-85	0	0	0	0	Poor
Hodzana River					
7-30-85	0	0	93	1	Good
9-25-85	0	0	11	0	Fair
Hadweenzic River					
7-30-85	0	0	10	0	Fair
9-25-85	0	0	0	0	Poor

Table 1. Continued.

STREAM NAME	LIVE KINGS	KING CARCASS	LIVE CHUM	CHUM CARCASS	SURVEY[a] RATING
Chandalar River (Lower)					
7-30-85	8	0	0	0	Fair
8-14-85	47	2	0	0	Poor
9-26-85	0	0	2535	0	Fair
Chandalar River (Mid Fork)					
7-30-85	1	0	0	0	Poor
8-14-85	12	2	10	0	Fair
Chandalar River (East Fork)					
7-30-85	1	0	0	0	Fair
Rapid River					
7-29-85	0	0	0	0	Fair
9-26-85	0	0	0	0	Good
Salmon-Trout River					
7-29-85	0	0	0	0	Fair
9-26-85	0	0	0	0	Good
Coleen River					
7-29-85	0	0	0	4	Poor
8-19-85	9	1	437	1	Good
9-26-85	0	0	0	0	Good
Sheenjek River					
8-14-85	43	2	700	0	Poor
9-25-85	0	0	14200	0	Fair
Christian River					
8-19-85	1	0	4	0	Good
9-25-85	0	0	0	0	Fair
Black River (Upper)					
7-29-85	0	0	0	0	Poor
9-26-85	0	0	0	0	Poor
Black River (Middle)					
7-29-85	0	0	0	0	Fair
Black River (Lower)					
7-29-85	0	0	200	0	Fair
9-26-85	0	0	0	0	Fair

Table 1. Continued.

STREAM NAME	LIVE KINGS	KING CARCASS	LIVE CHUM	CHUM CARCASS	SURVEY[a] RATING
Black River Tributaries					
Grayling Fork					
7-29-85	0	0	80	0	Good
9-26-85	0	0	0	0	Fair
Salmon Fork					
7-30-85	0	0	791	0	Fair
8-19-85	1	0	0	0	Poor
9-26-85	0	0	0	0	Poor
Kevinjik Creek					
9-26-85	0	0	300	0	Fair
Springs (Trib - Kevinjik)					
9-26-85	0	0	250	0	Fair
Tetthajik Creek					
9-26-85	0	0	4	0	Fair
Little Black River					
7-29-85	0	0	0	0	Poor
Seventy Mile River					
7-29-85	0	0	0	0	Fair
9-25-85	0	0	0	0	Poor
Seventy Mile River Tribs.					
Granite Creek					
7-29-85	0	0	0	0	Good
Mogul Creek					
7-29-85	0	0	0	0	Good
Bryant Creek					
7-29-85	0	0	0	0	Good
Tatonduk River					
7-29-85	0	0	0	0	Good
Tatonduk River Tribs.					
Fork A 7-29-85	0	0	0	0	Good
Fork B 7-29-85	0	0	0	0	Good
Fork C 7-29-85	0	0	0	0	Good
Fork E 7-29-85	0	0	0	0	Good
Fork F 7-29-85	0	0	0	0	Good
Charley River					
7-30-85	0	0	0	0	Fair
9-25-85	0	0	0	0	Good

Table 1. Continued.

STREAM NAME	LIVE KINGS	KING CARCASS	LIVE CHUM	CHUM CARCASS	SURVEY[a] RATING
Charley River (West Fork)					
7-30-85	0	0	0	0	Poor
Charley River Trib.					
Copper Creek					
7-30-85	0	0	0	0	Good
Fourth of July Creek					
7-30-85	0	0	0	0	Poor
9-26-85	0	0	0	0	Poor
Thanksgiving Creek					
7-30-85	0	0	0	0	Poor
9-25-85	0	0	0	0	Poor
Forty Mile River - North Fork					
9-25-85	0	0	0	0	Good
Kandik River					
7-30-85	0	0	0	0	Good
9-26-85	0	0	0	0	Poor
Nation River					
7-30-85	0	0	0	0	Good

[a] Subjective rating of overall effectiveness of survey, determined by each individual surveyor.

ACKNOWLEDGEMENTS

I would like to thank Dave Daum, Reed Glesne, John Hawkinson, Rich Johnson and Mike Smith for their assistance in flying several hours of surveys to locate salmon. Appreciation is extended to Dennis Miller, Don Ross and North Pole Flying Service for providing the aircraft support and skilled flying. Special thanks goes to Louis Barton and Fred Anderson, ADF&G, for their technical assistance in the survey techniques and their cooperation with USFWS to cover as many streams as possible in the limited survey time. Steve Ulvi, National Park Service, also provided me with run timing information in the Eagle, Alaska area. Thanks are also due to the Fairbanks Fishery Resources staff for their review and edit of the report.

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APPENDIX

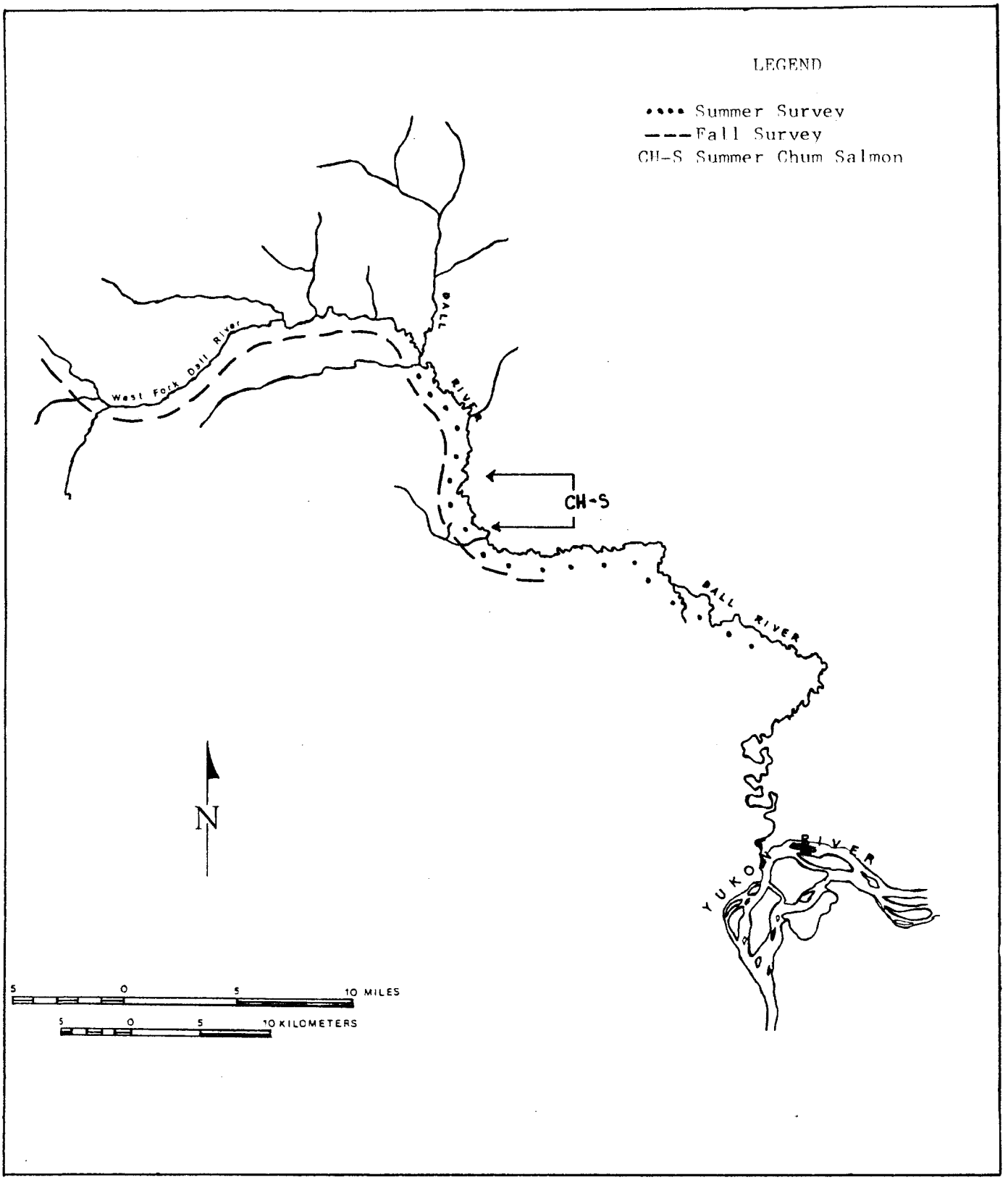

Figure 3. The Dall River, the survey routes and salmon locations.

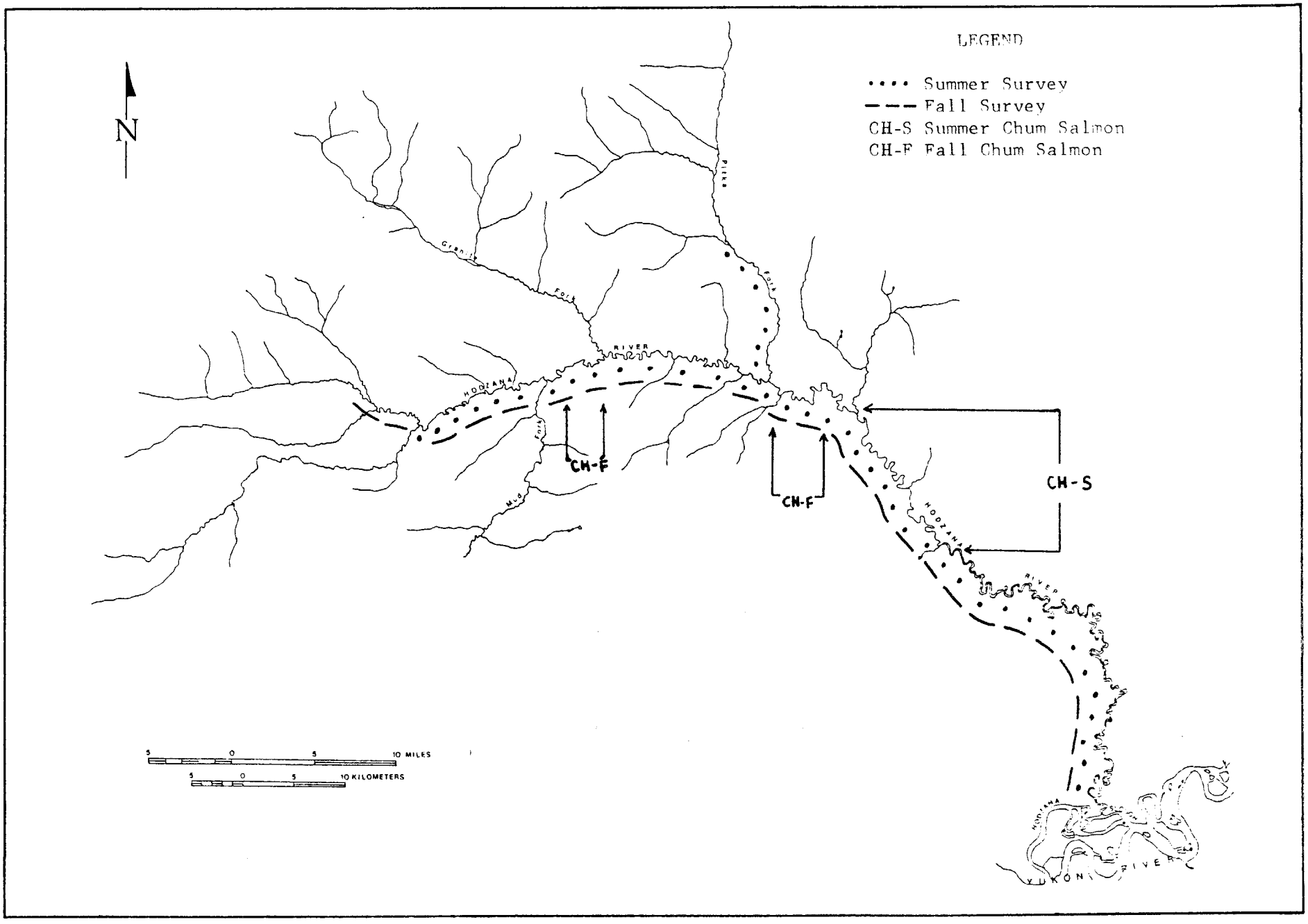

Figure 4. The Hodzana River, the survey routes and salmon observations.

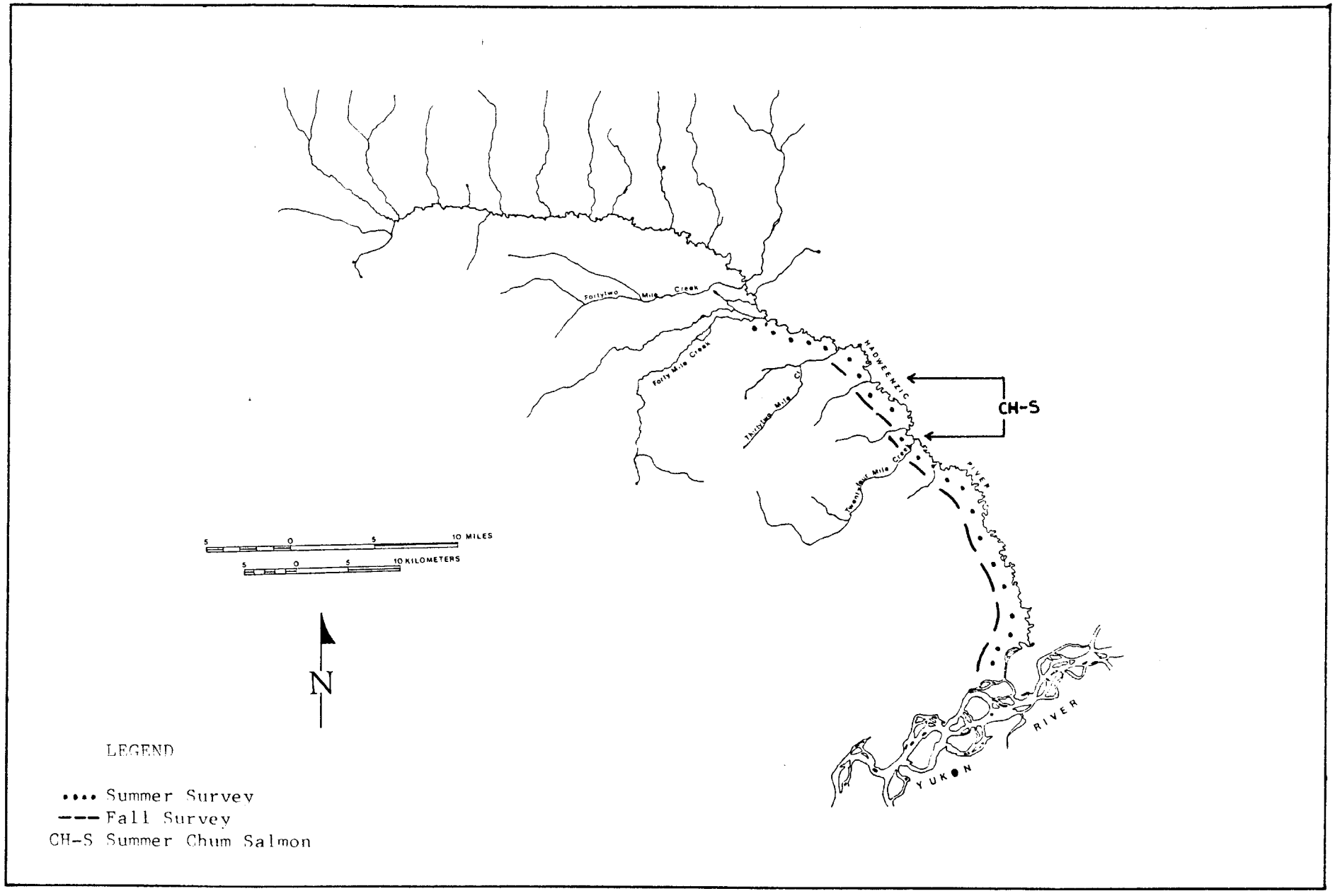

Figure 5. The Hadweenzic River, the survey routes and salmon locations.

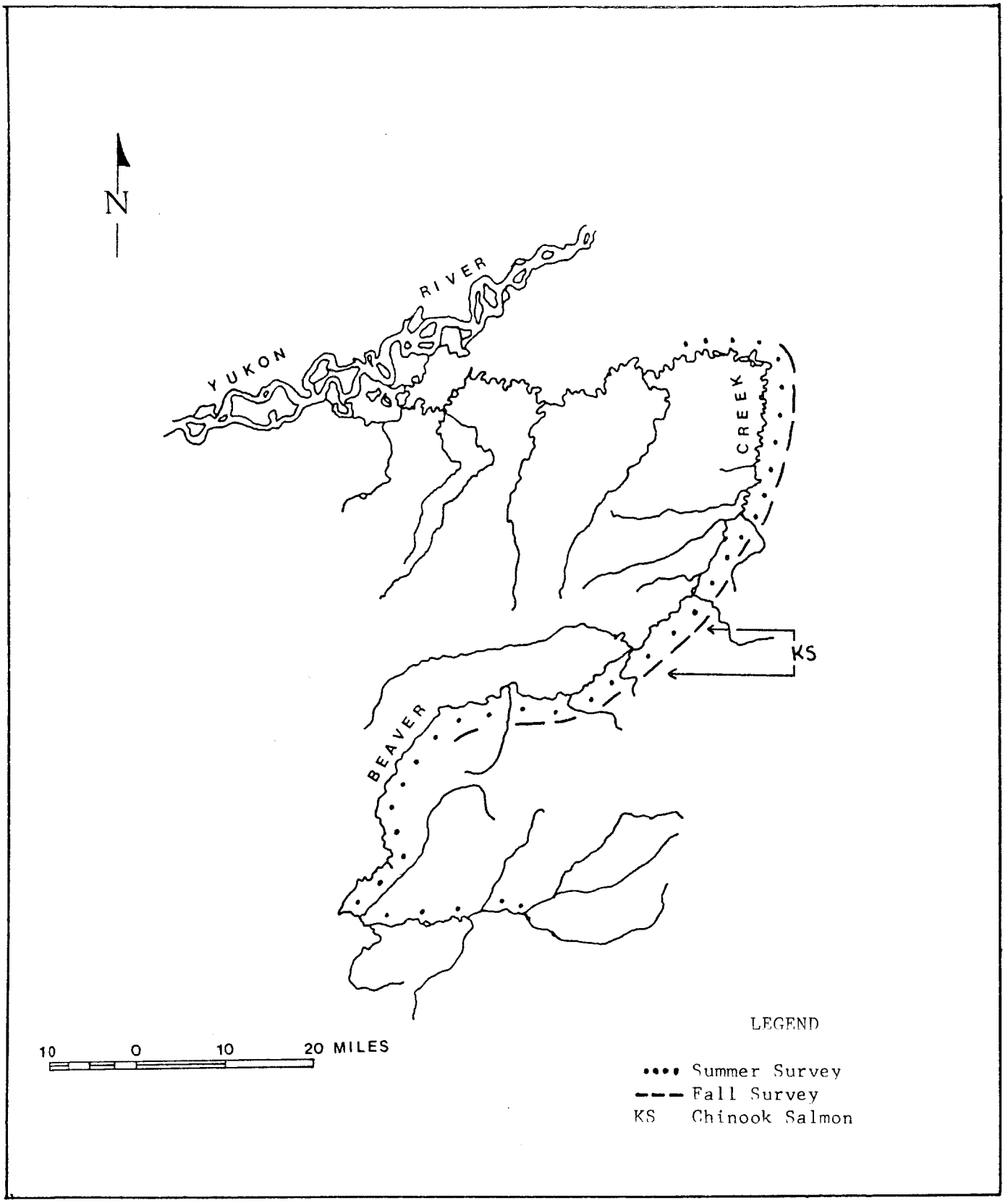

Figure 6. Beaver Creek drainage, the survey routes and salmon observations.

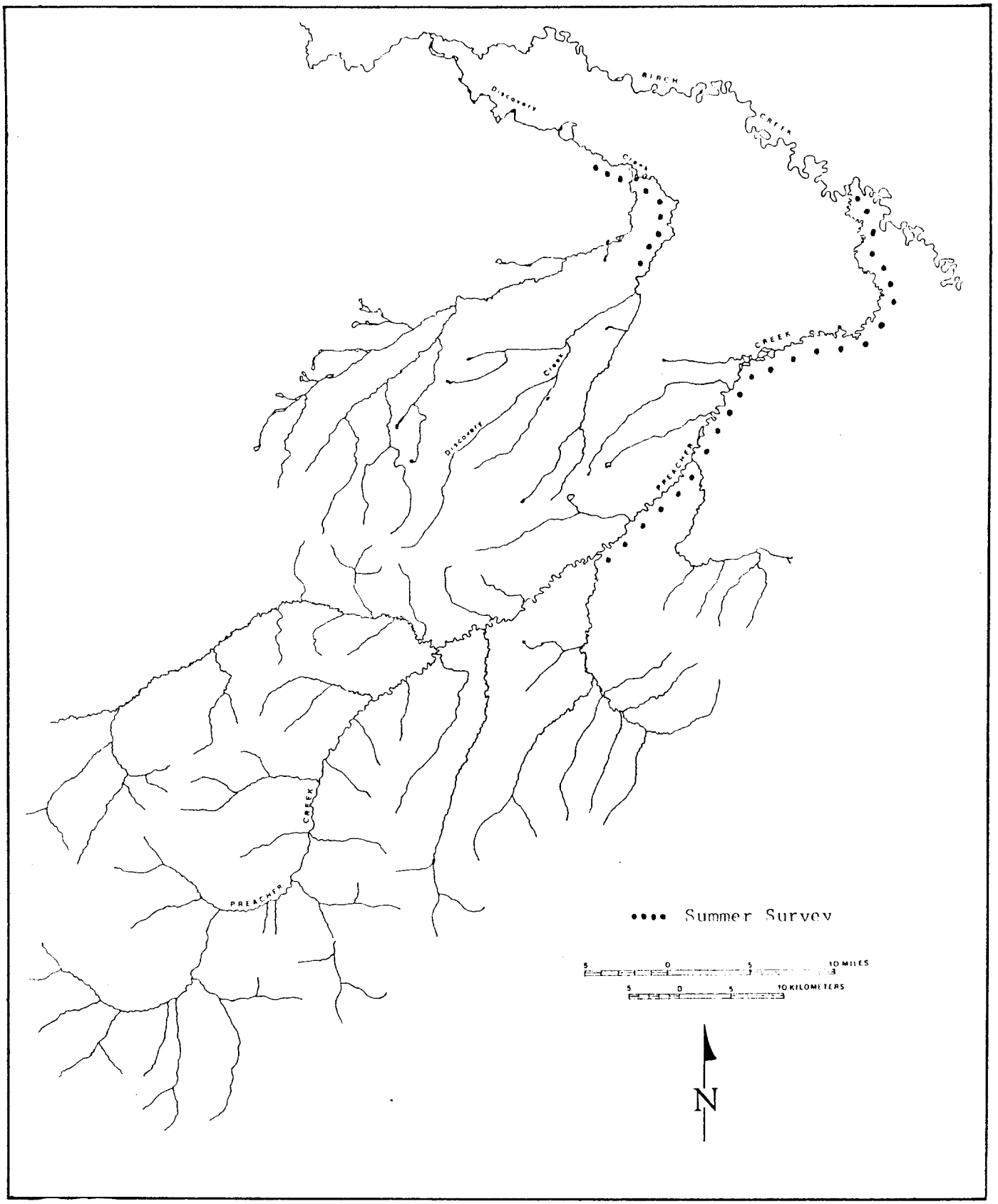

Figure 7. Birch Creek drainage, the survey routes.

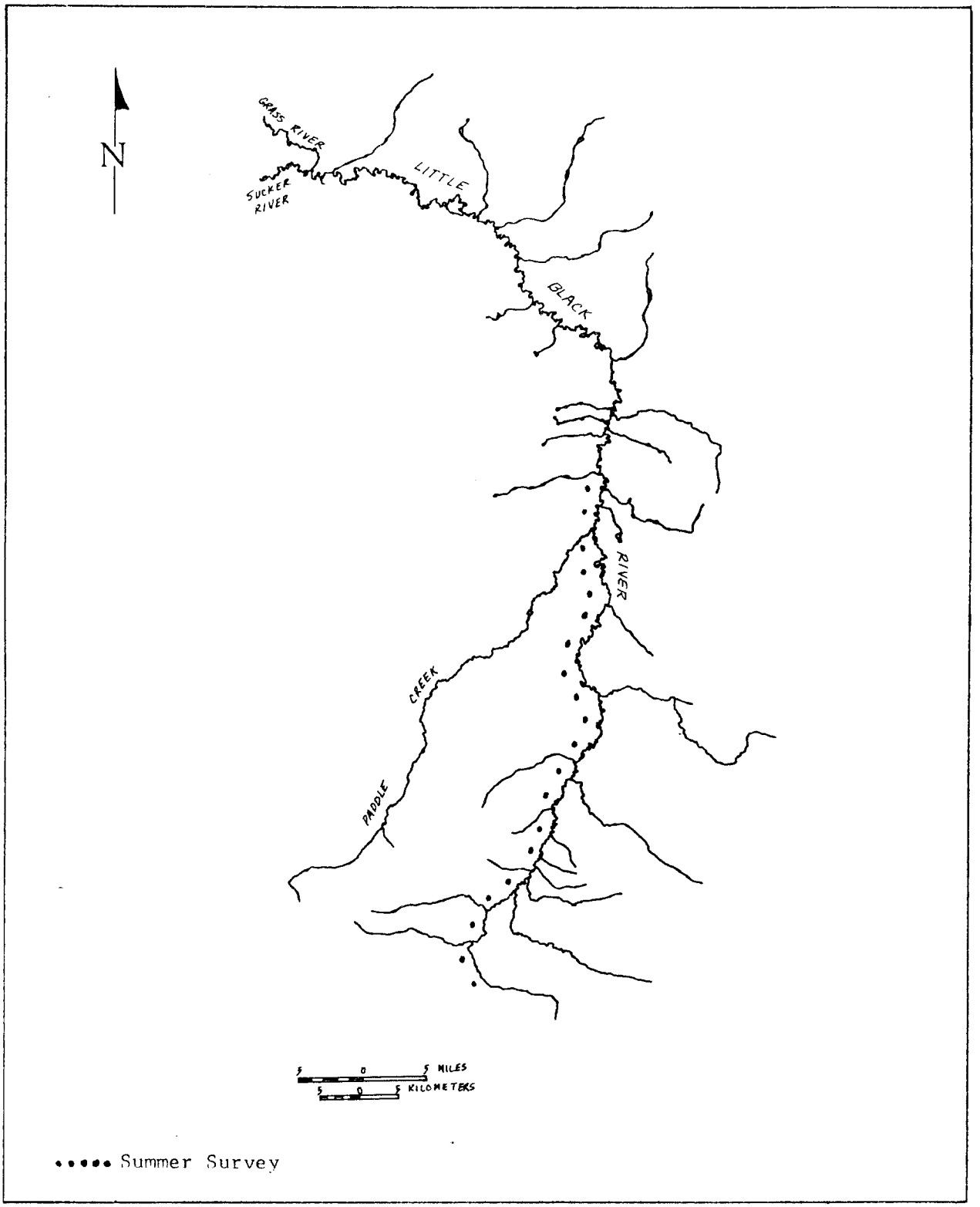

Figure 8. The survey route flown on the Little Black River.

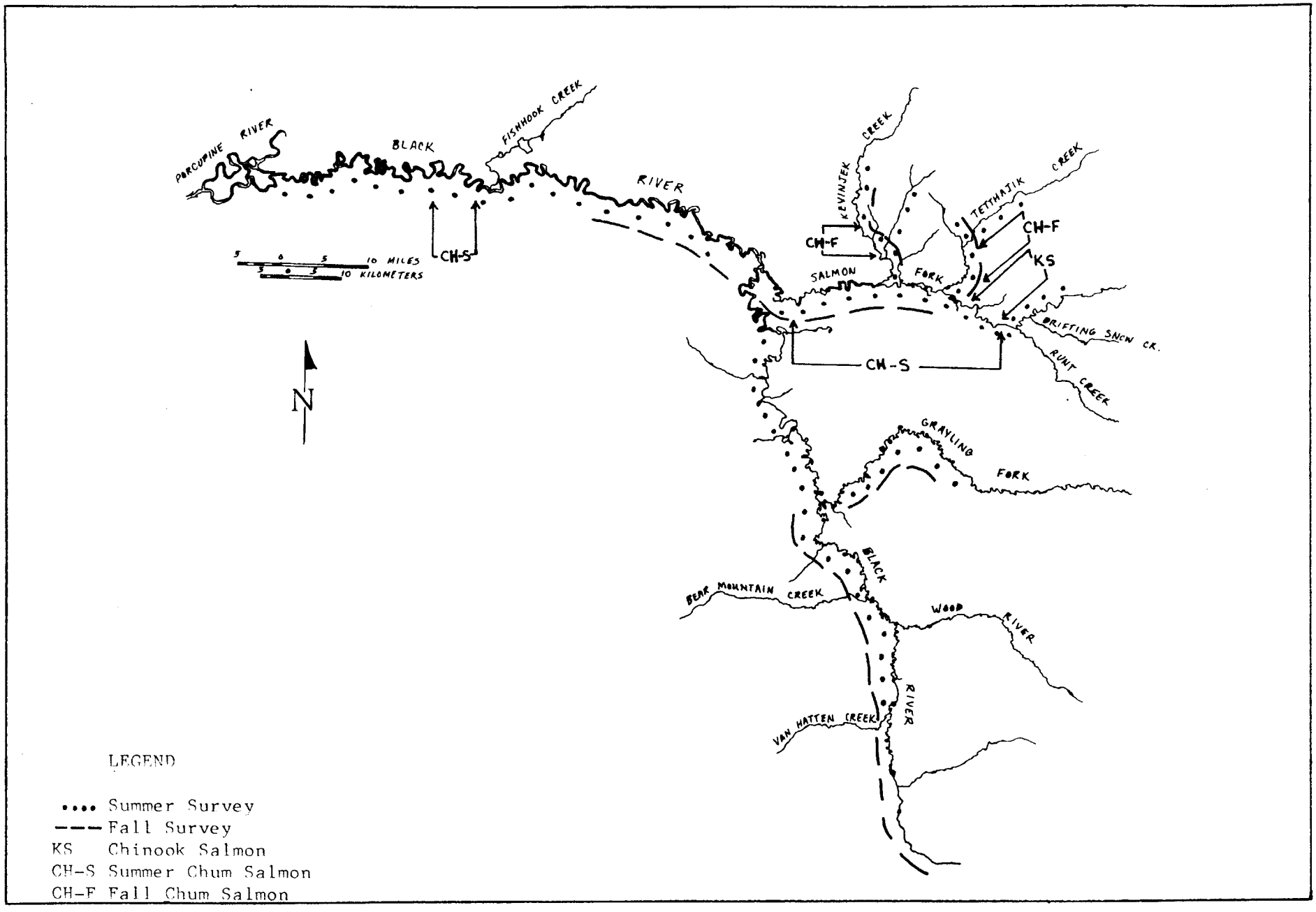

Figure 9. The Black River drainage, the survey routes flown and the salmon observations.

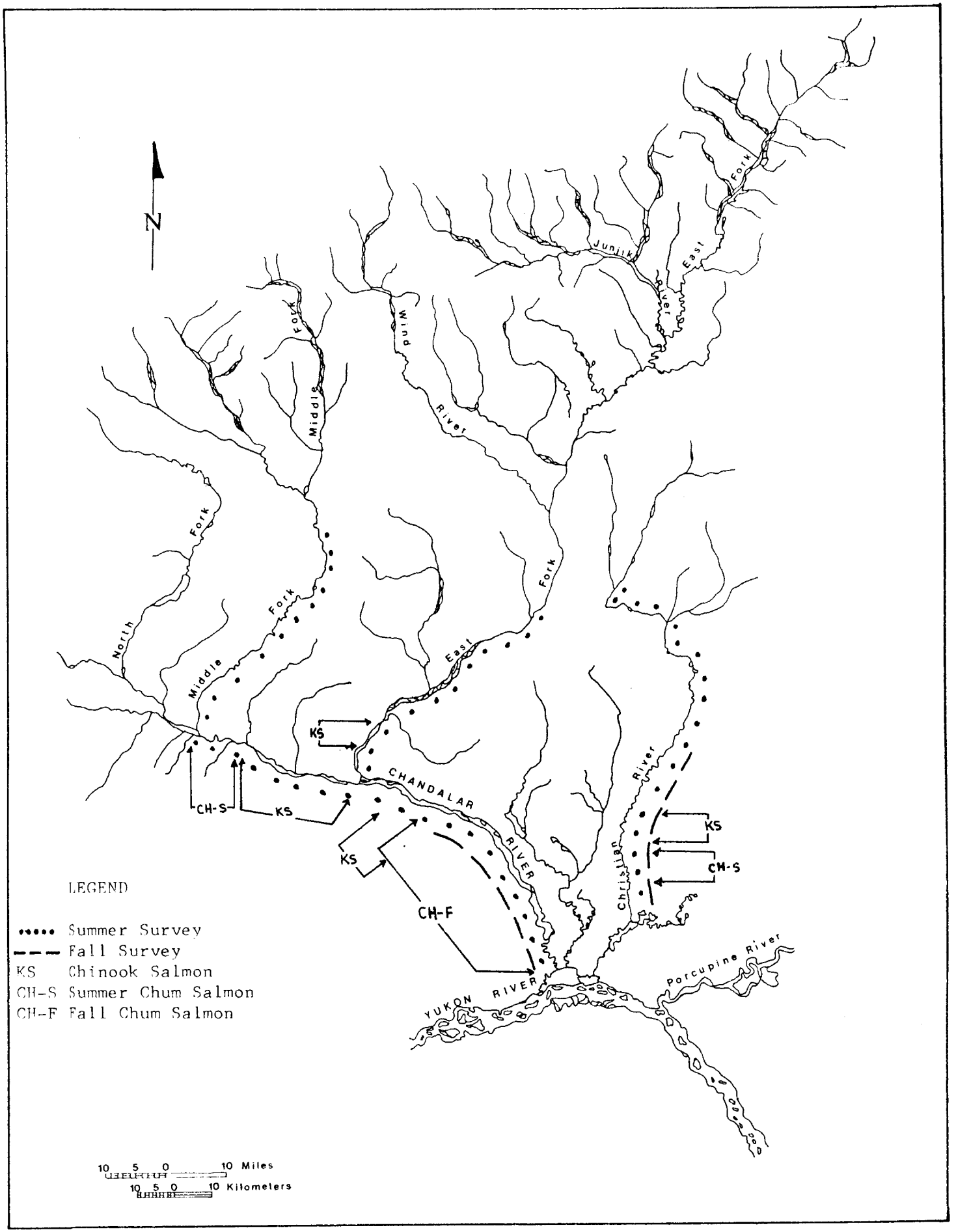

Figure 10. The Chandalar and Christian River drainages, the survey routes flown and the fish observations.

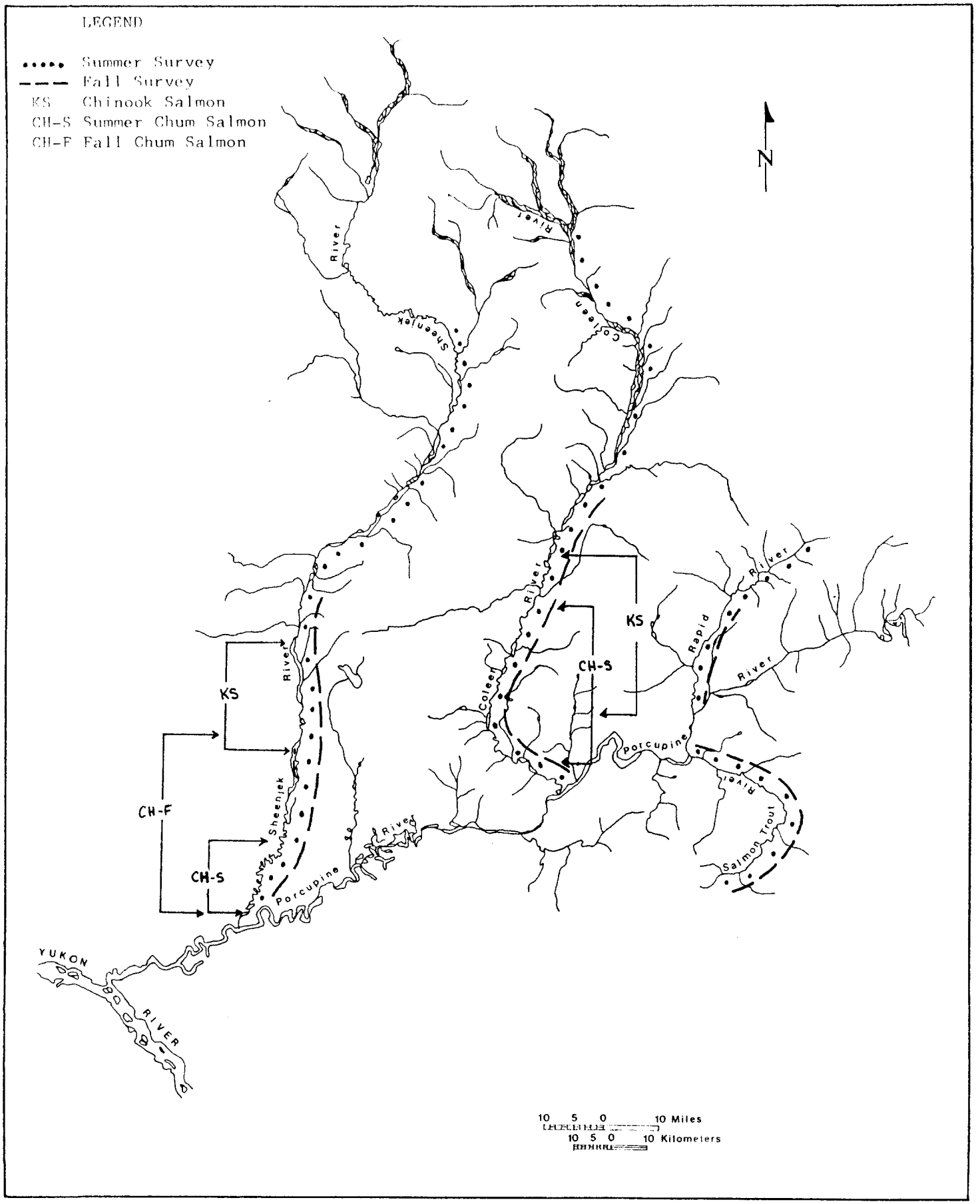

Figure 11. The Sheenjek, Coleen, Rapid, and Salmon-Trout River drainages, the survey routes flown, and the fish observations.

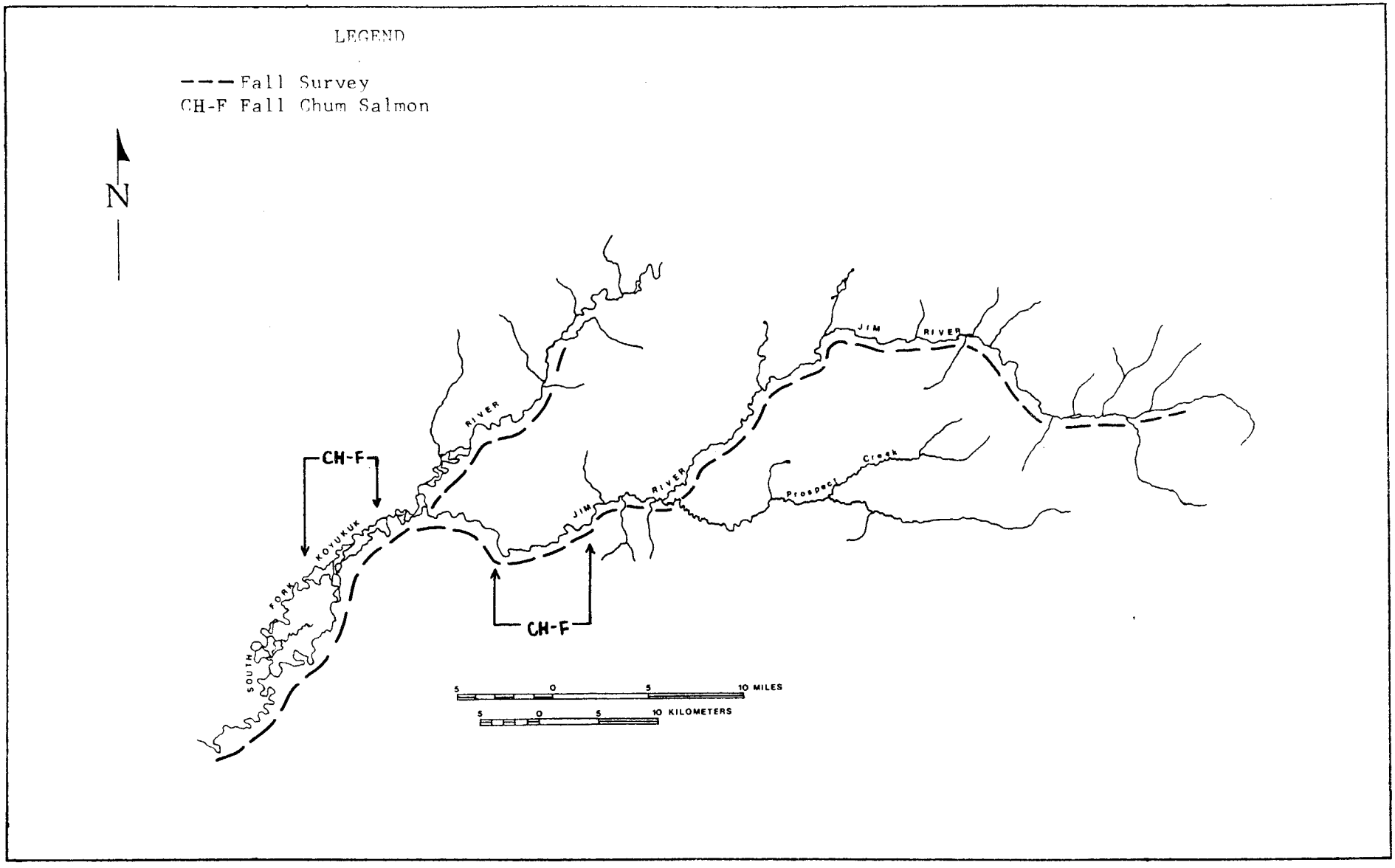

Figure 12. The South Fork of the Koyukuk River and the Jim River drainages, the survey route flown and the fish observations.

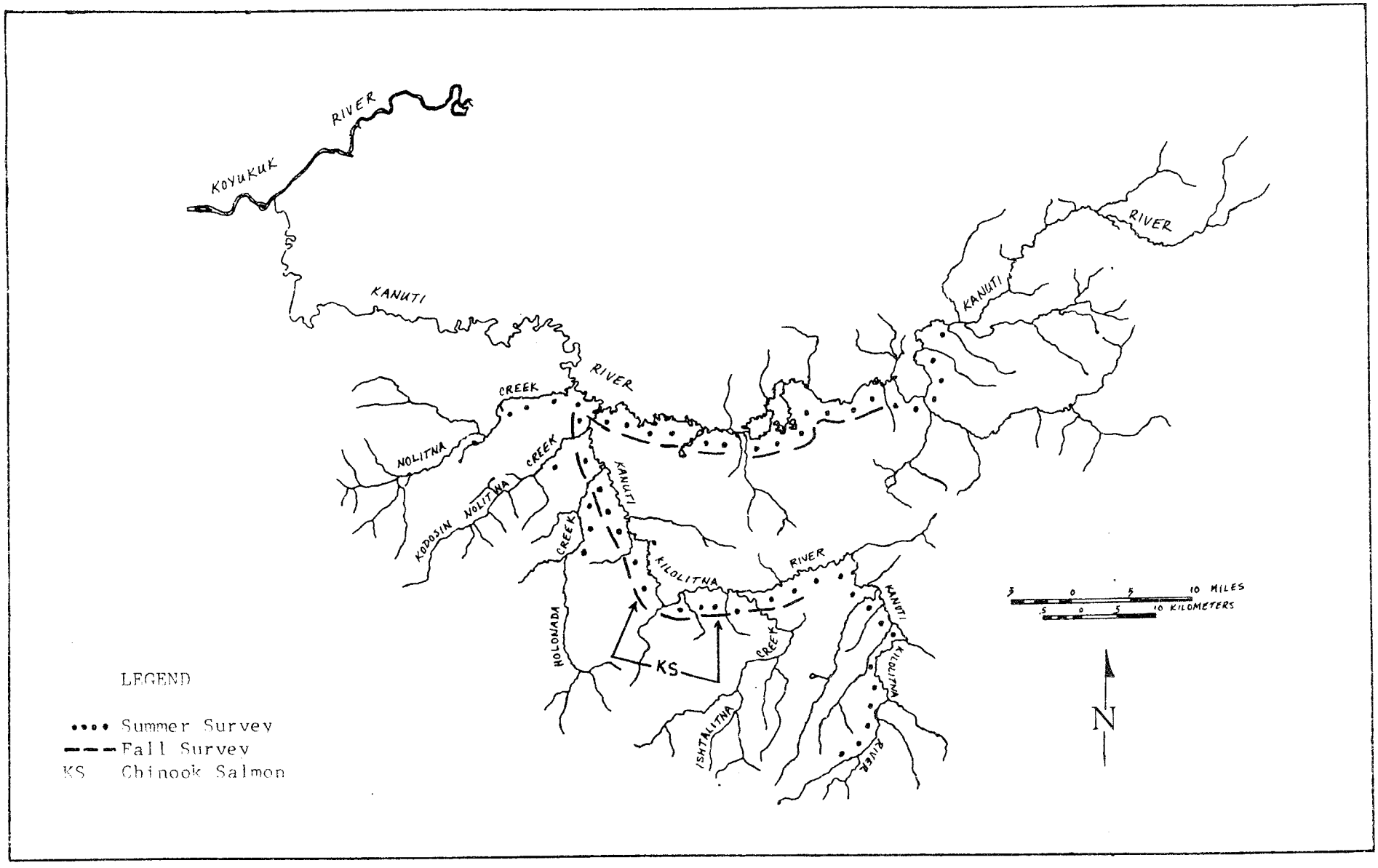

Figure 13. The Kanuti River drainage, the survey routes flown and the fish observations.

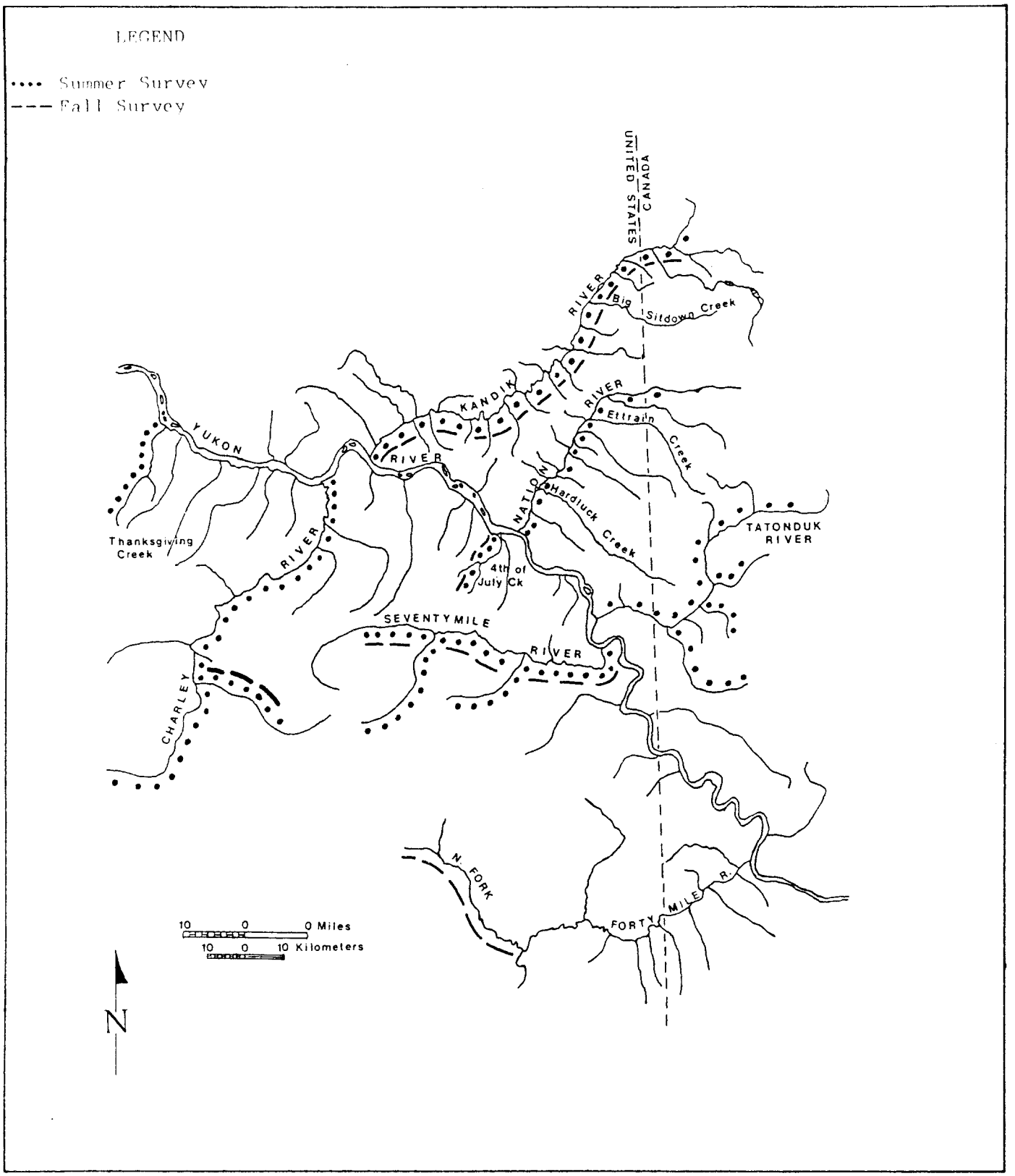

Figure 14. The drainages on the Yukon-Charley Rivers National Preserve and the routes flown.

A-Y-K SALMON ESCAPEMENT OBSERVATIONS

LATITUDE	LONGITUDE	DATE (M D Y)	STREAM NAME	DRAINAGE
N	W			

CARD NUMBER	LIVE KING	KING CARCASS	KING REDD	LIVE CHUM	CHUM CARCASS	LIVE PINK	PINK CARCASS	LIVE SOCKEYE	SOCKEYE CARCASS	LIVE COHO	COHO CARCASS
100											
101											
102											
103											
104											
105											
106											
107											
108											
109											
110											
111											
112											

CARD NUMBER	UNIDENTIFIED SALMON	SURVEY METHOD	WIND	WEATHER	WATER	WATER VIS.	BOTTOM	TIME	DISTANCE SURVEYED	SPAWN STAGE	RATING	OBSERVER	OBSERVING AGENCY
200													
300													
400													
500													
600													
700													
800													
900													
950													

REVISED [illegible]

AYK SALMON ESCAPEMENT OBSERVATIONS
Description of Codes for Card 200

Method - MS
0 = Float Equipped
1. PA18 Super Cub
2. C-185
3. C-180
4. Helicourier
5. Maule
6. Other Fixed Wing
7. Helicopter
8. Boat
9. Foot
10. Counting Tower
11. Weir
12. Sonar
13. Population Estimate (tagging)
14. Personal Interview
15. Literature Review

Wind - WI
1. No wind affect on counts
2. Slight riffle or turbulence, only slightly affecting counts
3. Moderate riffle or turbulence, affecting counts
4. Heavy riffle activity or turbulence, badly affecting counts

Weather - WE
1. Clear
2. Partial overcast. 5 - 30%
3. Overcast 31 - 70%
4. Heavy overcast, 70 - 100%

Water - WAT
1. Clear
2. Slightly turbid, bottom visable in most areas, deep pools obscured
3. Turbid. bottom visable only along gravel bars and in shallow areas
4. Extravely turbid, counts possible

Water Visibility - VIS
1. Good, Optimum conditions
2. Fair, counts partially obscured by glare, shadows, ice, etc.
3. Moderately adverse affect on survey

Bottom - BOT
1. No adverse affect on survey
2. Slightly adverse affect on survey
3. Moderately adverse affect on survey
4. Extremely adverse affect on survey

Time - TI
1. No adverse affect on survey
2. Slightly adverse affect on survey
3. Moderately adverse affect on survey
4. Extremely adverse affect on survey

Distance Surveyed = DIST = Number of miles surveyed
Spawn Stage = SPA 1-Before Peak, 2-At Peak, 3-After Peak
Rating = RAT = Overall effectiveness of survey 1-Good, 2-Fair, 3-Poor
Observer = OBS = Observers Initials
Observing Agency = AGY = Initials of Observing Agency

Attachment 1. ADF&G Survey form used for recording aerial survey information.