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STATE OF ALASKA

*Jay S. Hammond, Governor*



Annual Performance Report for

A STUDY OF CUTTHROAT-STEELHEAD  
IN SOUTHEAST ALASKA

by

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## RESEARCH PROJECT SEGMENT

State.:	ALASKA	Name:	Sport Fish Investigations in Alaska
Study No.:	AFS-42	Study Title:	A STUDY OF CUTTHROAT- STEELHEAD IN ALASKA
Job No.:	AFS-42-7-B	Job Title:	<u>Development of Techniques for Enhancement and Manage- ment of Anadromous Cutthroat Trout in Southeast Alaska</u>

Period Covered: July 1, 1978 to June 30, 1979

## ABSTRACT

This report covers the third year of study on the development of techniques for management and enhancement of the anadromous cutthroat trout, *Salmo clarki* Richardson, in Southeast Alaska.

Work during the reporting period included gathering information and writing Phase II of the cutthroat management and enhancement plan, surveying potential cutthroat brood stock sources, and developing techniques for the assessment of cutthroat harvest in Southeast Alaska.

Information in Phase II of the cutthroat plan is presented on the selection of brood stocks for the two races of cutthroat trout. Once a suitable source of cutthroat has been located these trout will be cultured at one of the hatcheries in Southeast Alaska. Selection of the proper rearing site will involve disease considerations, location in relation to areas scheduled for enhancement, and the location of the facility in relation to brood sources of wild fish.

The next section of the plan deals with the proposed enhancement of existing cutthroat populations and also the creation of new fisheries. The last section of the plan deals with the planned evaluation of the enhancement program once this program is under way. Appendix A to the cutthroat management and enhancement plan consists of a selected bibliography of references dealing with the coastal cutthroat throughout its range from Northern California to Central Alaska. References covering research, management and enhancement can be found in this appendix.

Surveys were made of Hamilton River and Klawak River to determine their suitability as sources of cutthroat brood stock. The Klawak River and lake system appear to meet all necessary criteria as a source for cutthroat brood stock. Klawak River is also the site of a new State hatchery that has been tentatively selected as the primary rearing facility for cutthroat brood stock. Hamilton River also meets most criteria for a cutthroat

brood stock source. Hamilton River will be logistically more expensive to develop than will Klawak River; however, it is considered as the prime source for cutthroat brood stock for the Crystal Lake Hatchery.

Two mail surveys of cutthroat fishermen were conducted during late 1977 and 1978. Obtaining harvest estimates for widespread cutthroat fisheries has proven difficult in Southeast Alaska. Voluntary mail surveys were tested on eight area lakes in 1978 in an effort to test this type of technique for obtaining needed information. Response to the questionnaire ranged from zero for two lakes to over 25% for three lakes. Harvest of cutthroat was low on some lakes and quite high on others. A statewide sport fish harvest survey was completed in late 1977. Cutthroat trout harvest rates were found to be heaviest in the Ketchikan and Petersburg areas and lightest in the Haines and Yakutat areas. Total area harvest of cutthroat for the year was found to total an estimated 23,058 fish.

#### BACKGROUND

Life history research on the sea-run cutthroat trout at Petersburg Creek from 1971 through 1975 provided many answers about sea-run cutthroat in a typical lake-stream system in Southeast Alaska.

A steady decline in the numbers of sea-run cutthroat was noted during the years of study at Petersburg Creek. This decline was probably caused mostly by the annual harvest of more than 300 cutthroat by sport anglers. Studies at Lake Eva (Armstrong, 1971), a stream only lightly fished at that time, showed no marked fluctuations from year to year in the sea-run cutthroat population.

Comprehensive data on the majority of the cutthroat systems in Southeast Alaska is not presently available. Angler harvest of sea-run cutthroat has shown a steady increase throughout Southeast Alaska. This harvest is presently concentrated around population centers; however, there are increasingly larger numbers of anglers with the time and resources to reach out to the more remote cutthroat systems. Expanded logging road access is also beginning to cause pressure on cutthroat systems that were relatively inaccessible 10 years ago. Increased fishing pressure on some populations will make it difficult to maintain sizeable wild populations. Present bag limits are too liberal near population centers and probably adequate in areas not receiving extensive angling pressure. More restrictive bag and possession limits may be necessary on some systems in order to maintain or preserve a viable fishable cutthroat population.

The development of techniques for the management and enhancement of cutthroat trout in Southeast Alaska has now taken on an organized form with the completion of the cutthroat management and enhancement plan. This plan has set out guidelines for the management of both resident and sea-run cutthroat and has established recommendations for enhancement.

The Crystal Lake Hatchery at Petersburg was the key element in the original enhancement planning for cutthroat brood stock. Disease problems associated with various salmon species at Crystal Lake resulted in the complete eradication of all fish stocks on hand and a shutdown of the facility for disinfection.

This action has caused a good deal of rethinking of the original enhancement plans for Southeast Alaska cutthroat. It is obvious that it is desirable and even necessary to have more than one hatchery raising brood stock.

New and remodeled hatcheries at Klawak and Ketchikan are potential alternate sites for cutthroat brood stock development. Attempts to locate a stream system for the development of cutthroat brood stock is continuing with Klawak River and Hamilton River as the most likely candidates.

A list of common names, scientific names and abbreviations of all species mentioned in this report is presented in Table 1.

## RECOMMENDATIONS

### Management

1. The sea-run cutthroat bag limit should be reduced to four fish daily with a possession limit of two daily bag limits.

Studies of sea-run cutthroat at Lake Eva (Armstrong, 1971), Petersburg Creek (Jones, 1977) and Helm Creek (Baade, Unpublished) have shown that cutthroat populations are not large for any given stream system, usually numbering between 800 and 1,500 annually. Angling mortality at Petersburg Creek exceeded 300 annually during the period of 1971-1975 and is responsible for the decline in abundance of sea-run cutthroat in that system. Angling mortality at other popular sea-run cutthroat systems has not been documented; however, a general decline in cutthroat abundance has been recorded throughout Southeast Alaska. A bag reduction to four fish seems to be the only management option that will allow for a harvest in tune with annual production for sea-run cutthroat.

2. Trophy cutthroat waters should be established in Southeast. The bag limit on these waters should be ten fish daily only one of which may be longer than 406 mm (16 inches).

Investigations on lakes throughout Southeast Alaska have shown certain landlocked populations of cutthroat with good numbers of large trophy fish. Additional studies have shown that these fish are old--8 to 12 years. Removal of large numbers of these old fish will tend to reduce the fishing quality of these bodies of water. It is recommended that this reduction be enacted to preserve these trophy fisheries.

Table 1. A List of Common Names, Scientific Names and Abbreviations found in this report.

Common Name	Scientific Name & Author	Abbreviation
Cutthroat trout	<i>Salmo clarki</i> Richardson	CT
Steelhead	<i>Salmo gairdneri</i> Richardson	SH
Dolly Varden	<i>Salvelinus malma</i> (Walbaum)	DV
Coho salmon	<i>Oncorhynchus kisutch</i> (Walbaum)	SS
Pink salmon	<i>Oncorhynchus gorbuscha</i> (Walbaum)	PS

## Research

1. Guidelines should be developed for the establishment of a brood stock of sea-run cutthroat.

The use of hatchery reared cutthroat to enhance or create new fisheries for sea-run cutthroat has occurred throughout the Pacific Northwest. These programs have met with varying degrees of success. It is recommended that work be undertaken to select a proper brood source for cutthroat and that these findings be turned over to the FRED Division for action.

2. Additional background data on sea-run cutthroat streams in Southeast Alaska should be gathered .

Additional information will be needed on cutthroat systems throughout Southeast Alaska in order to make sound management recommendations to the Forest Service and other land use agencies. This information will also be necessary to evaluate systems for future enhancement with hatchery produced cutthroat.

3. The development of techniques for harvest estimates for both sea-run and resident cutthroat populations should continue.

The rate of cutthroat harvest from both sea-run and resident populations throughout Southeast Alaska is not well defined. Techniques need to be developed to determine base line harvest rates so that management programs can be implemented.

## OBJECTIVES

1. To write an enhancement plan for cutthroat in Southeast Alaska.
2. Determine freshwater systems that may be suitable for obtaining cutthroat eggs for developing a hatchery brood stock.
3. Develop techniques for determining the harvest rates of both anadromous and resident cutthroat populations in Southeast Alaska.

## TECHNIQUES USED

Information was gathered for Phase II of the cutthroat management and enhancement plan for Southeast Alaska by:

1. Preparing a section on the enhancement of cutthroat brood stock selection and possible donor streams.

2. Preparing a section on the development of facilities for rearing cutthroat, the enhancement of existing cutthroat fisheries and the establishment of new cutthroat populations.
3. Writing a section on the evaluation of the various programs and formulating an enhancement manual complete with selected references on cutthroat management and enhancement.

Foot surveys, hook and line, and baited minnow traps were used to determine the suitability of Hamilton and Klawak Rivers as possible donor sources for sea-run cutthroat brood stock. Each system was surveyed for weir sites or other physical attributes that would facilitate capture of adult cutthroat. Logistical support necessary for each system was calculated.

The determination of the harvest rates of anadromous and resident cutthroat in Southeast Alaska was obtained by:

1. Summarizing the statewide mail sport fishing questionnaire for all known anadromous cutthroat fisheries in Southeast Alaska.
2. The use of a questionnaire survey of anglers using selected recreational cabins at Hasselborg, Turner, Kah Sheets, Salmon Bay, Salmon (Karta system) Virginia, Wilson and Humpback lakes to determine the harvest of resident cutthroat trout.

## FINDINGS

### Cutthroat Management and Enhancement Plan for Southeast Alaska

To effectively manage and enhance anadromous and resident cutthroat trout in the streams, rivers and lakes of Southeast Alaska, a management, research and enhancement plan establishing goals and objectives needs to be formulated.

At present there is insufficient and unconsolidated data on the many different populations of cutthroat in Southeast Alaska. This lack of data has made it difficult for the Department of Fish and Game to adequately manage the area's cutthroat for the highest return to angler while maintaining viable populations of spawners. The development of this plan will bring together in an organized form all the known data on the cutthroat systems in Southeast Alaska. This plan will also consolidate all published data on anadromous and resident coastal cutthroat. Once these data are collected, a working manual will be put together identifying areas that require management and enhancement and help establish priorities for future work.

Phase I of the management, research plan for cutthroat in Southeast Alaska has been completed (Jones, 1978). Phase II of the cutthroat plan will cover the enhancement of cutthroat throughout Southeast Alaska.

## Phase II Cutthroat Management and Enhancement Plan for Southeast Alaska Literature Review

A search of various libraries has been conducted to secure listings on publications of the life history, habitat requirements, hatchery techniques, enhancement efforts and various management programs for coastal cutthroat trout.

In addition, state and federal agencies involved in coastal cutthroat management, enhancement and research have been contacted to obtain a current file on ongoing research and management. A bibliography on coastal cutthroat was published by Jones (1978); however, additional references have been added and the bibliography is presented in Appendix A of this report.

### Southeast Alaska Cutthroat Brood Stock Development

The selection of a cutthroat brood stock for enhancement use in Southeast Alaska must meet several criteria.

Southeast Alaska contains two races of cutthroat, anadromous and resident, with resident fish distributed throughout the area. Anadromous cutthroat are more or less abundant throughout the region. It has been found that both races occur in the same stream system and for the most part are indistinguishable at spawning time. It has also been demonstrated that sea-run populations in some systems are recruited from resident races above migration barriers.

The ideal source of cutthroat for hatcheries would be from a population with a large enough annual run to support the removal of 50-75 females for a period of three or four years. The source should also come from a system with proven numbers of the anadromous form and should be more or less centrally located so that transplants to northern or southern Southeast Alaska would not be too much of a geographical displacement.

With the above criteria in mind, it is recommended that Hamilton River and Klawak Creek be selected as sources for cutthroat brood stock development.

### Development of Facilities for Cutthroat Production

At present there are three State hatcheries in Southeast Alaska capable of raising cutthroat for extended rearing; none are presently raising cutthroat.

The Crystal Lake Hatchery at Petersburg has just undergone a complete sterilization process to rid it of various diseases. Crystal Lake is starting over with disease-free brood stocks and therefore would require a clean bill of health on any cutthroat placed in the facility. Crystal Lake is centrally located and should be considered as a potential site for cutthroat brood development.

Klawak River Hatchery at Klawak was completed in late 1978 and is currently incubating salmon eggs. Klawak Hatchery is located on the prime donar system for cutthroat, and it is recommended that the initial brood source for anadromous cutthroat be developed at this facility.

Additional hatcheries throughout Southeast are being built or are in the planning stages. Once these facilities become operational, they should be evaluated for possible rearing facilities for cutthroat. Additional brood sources will need to be developed or, if Klawak Hatchery proves out, cutthroat brood should be transferred to it to eliminate the potential loss of the entire brood should the Klawak Hatchery lose its fish due to disease or mechanical failure.

The use of saltwater pens for the raising of brood stock has had some success in Washington State (Johnston, 1976). This type of rearing facility must still be considered experimental and should not be considered as a production facility. It is recommended that once cutthroat smolts are available experimental saltwater rearing be conducted either in the Klawak or Ketchikan area.

#### Enhancement of Existing Fisheries and Establishment of New Populations

The enhancement of existing depleted populations and the creation of new populations of cutthroat has and is occurring as a management tool in Oregon and Washington. These enhancement programs have been quite successful for resident cutthroat and somewhat less successful for anadromous cutthroat. In Southeast Alaska, all cutthroat populations are wild native fish, and management has been aimed at perpetrating these populations. Increased popularity of cutthroat together with increased numbers of anglers with more money and time and better means of access (logging road construction) have caused declines in cutthroat numbers near population centers and in some more remote locations. To offset this increased pressure on cutthroat, bag limits have been reduced and some areas put into a roadless land classification. In the long run, these may not be enough to preserve cutthroat populations and artificial enhancement will be necessary.

When sufficient cutthroat smolts become available, the following existing cutthroat fisheries are recommended for enhancement: the Montana Creek-Mendenhall River system near Juneau, Indian River near Sitka, Petersburg Creek and Blind Slough near Petersburg, and Ward Creek near Ketchikan. In addition to the above streams, it is recommended that Twin Lakes and selected waters in the Mendenhall area near Juneau be planted with cutthroat.

Additional systems throughout Southeast Alaska undoubtedly would benefit from enhancement with cutthroat. These systems will be identified, surveyed and cataloged. Results of the initial plants of cutthroat will determine the timetable on which additional systems can be enhanced with hatchery produced fish.

## Evaluation of Cutthroat Enhancement Programs in Southeast Alaska

Basic to any cutthroat enhancement program is the evaluation of the results. At the time this plan is being compiled, no cutthroat are in hatchery production; however, evaluation concepts must be formulated now for future implementation.

All cutthroat leaving the various rearing facilities should be marked so that they are recognizable when they enter the sport fishery. Evaluations of enhanced fisheries should be by angler contact and various surveys.

Evaluations of rearing facilities and brood stocks in the various facilities should be made on an annual basis with a continuing program of upgrading both rearing techniques and brood stocks.

Last but not least, an evaluation should be made to see how well hatchery cutthroat do in multi species systems and in one specie systems.

### Cutthroat Brood Stock Development

In order to enhance cutthroat fisheries in Southeast Alaska, it will be necessary to develop brood stocks of cutthroat at one or more hatcheries.

Surveys of two systems were made in 1978 to determine their suitability and potential as sources for cutthroat eggs for brood stock development.

The Klawak Lake system, located on the west coast of Prince of Wales Island, was surveyed during late June 1978. Klawak Lake (Figure 1) is a large anadromous system with four major inlets and several minor ones. The Klawak River flows approximately 3 km from Klawak Lake to salt water. Three of the major inlets to Klawak Lake were surveyed in 1978 to assess their potential for cutthroat brood stock.

Half-Mile Creek, located .8 km from the outlet end of the lake, was found to be a highly unstable stream strewn with numerous logjams and windfalls (Figure 2). An impassible falls of 13 m is located approximately 1 km above Klawak Lake. Minnow trap surveys showed that rearing cutthroat, rainbow, coho salmon, and Dolly Varden, use this tributary. Some spawning gravel is present, and it is suspected that adult cutthroat use this stream for spawning. An old weir site is present on one of the two channels emptying into the lake.

Three Mile Creek enters Klawak Lake approximately 5 km from the outlet (Figure 3). Three Mile Creek appears to have an unstable channel where it enters Klawak Lake that is not suitable for weir construction.

Spawning gravel is adequate throughout and the system and appears to have habitat favorable to cutthroat. Minnow trapping yielded only coho salmon and Dolly Varden.

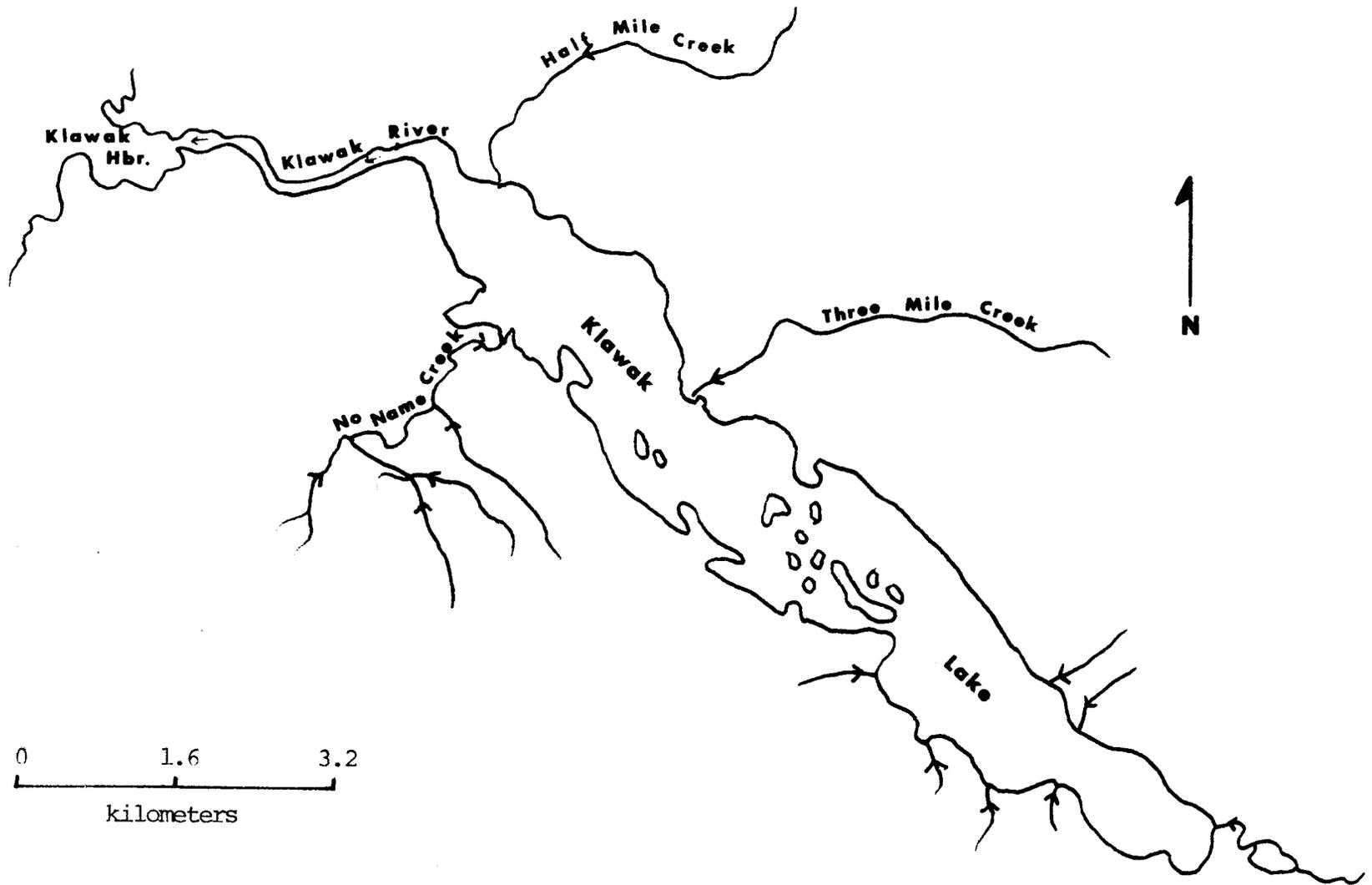


Figure 1. Klawak Lake System

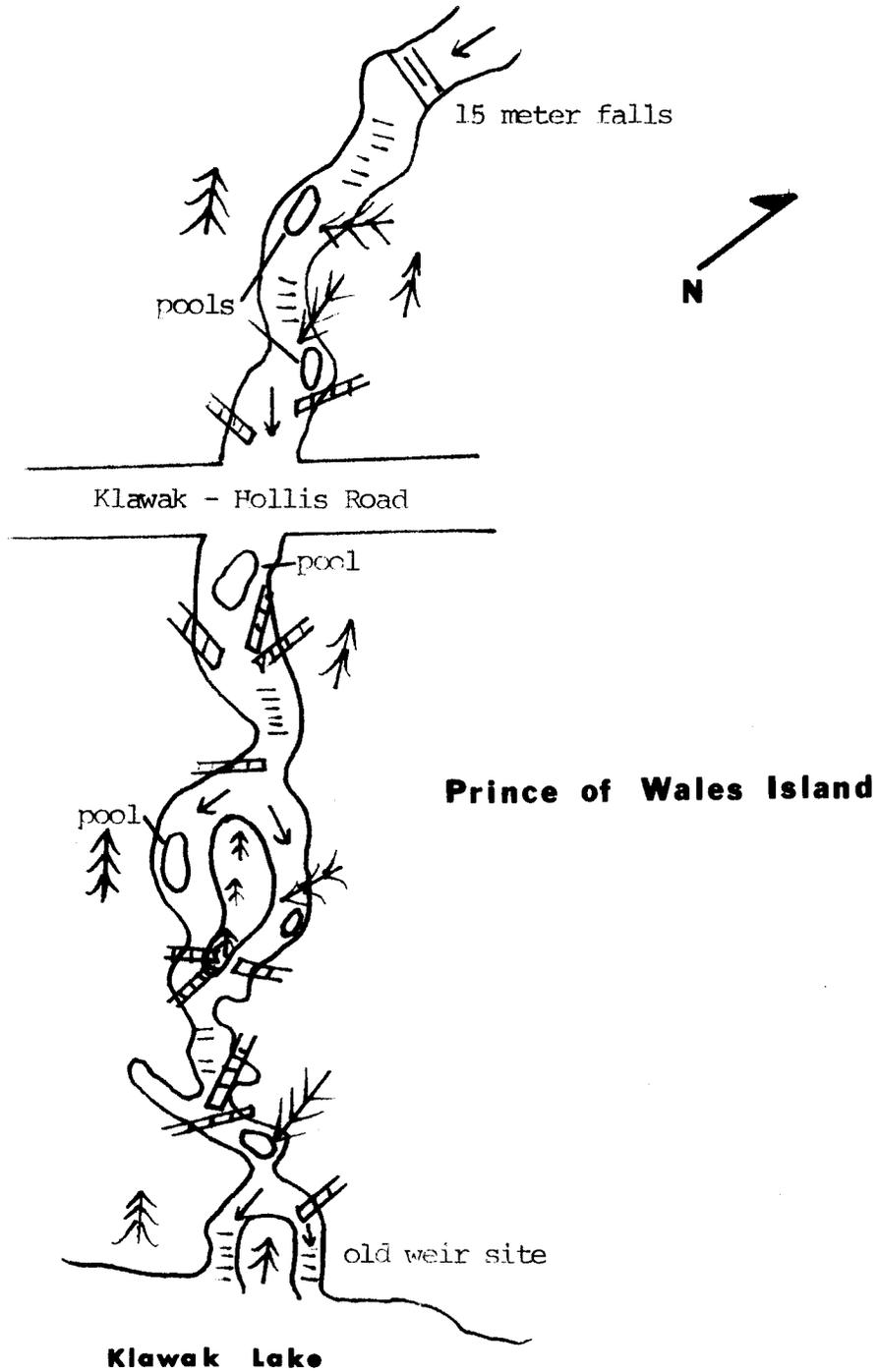


Figure 2. One-Half Mile Creek

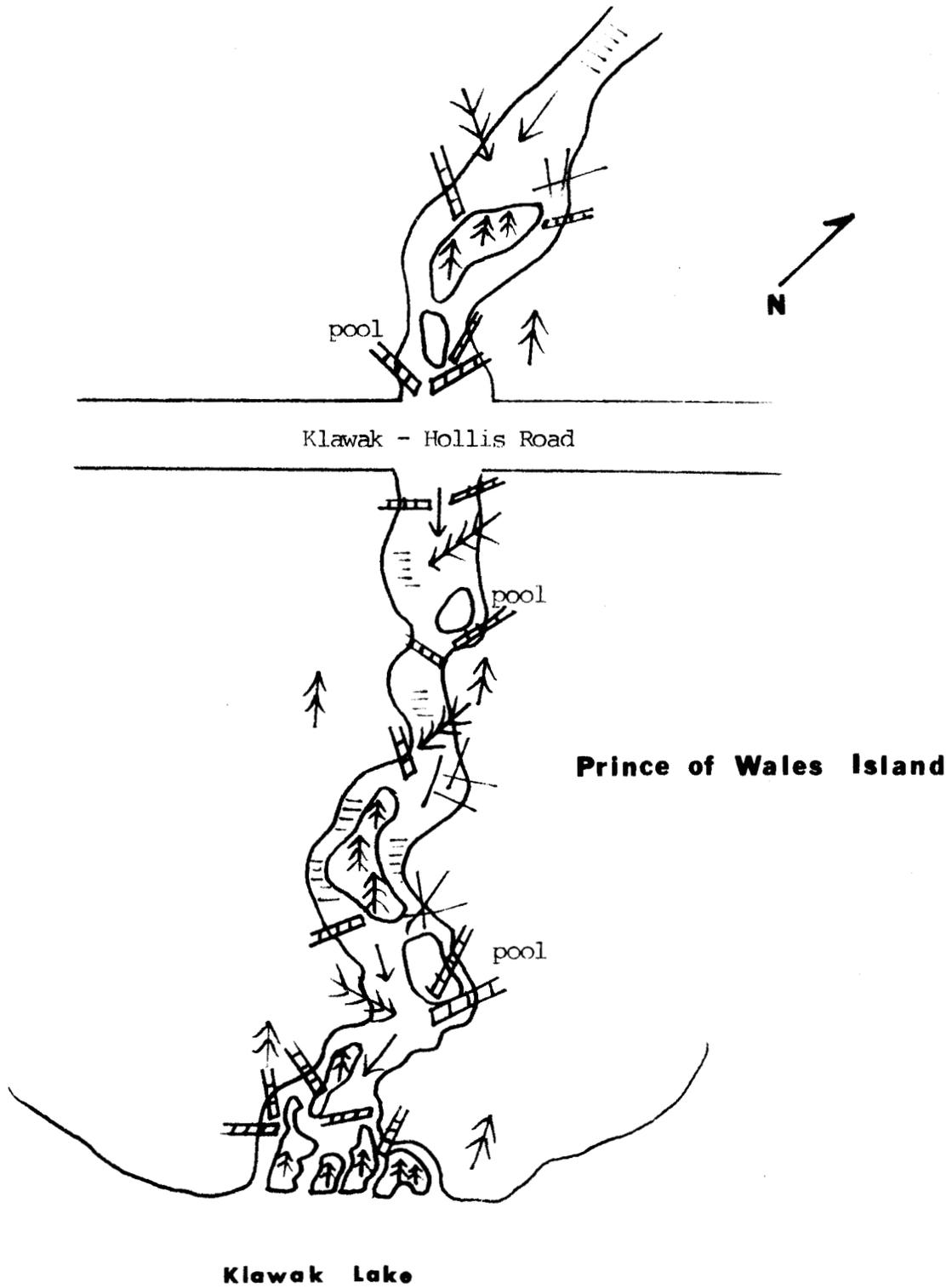


Figure 3. Three Mile Creek

A large unnamed tributary enters Klawak Lake on the southwest side approximately 4 km above the outlet (Figure 4). Surveys of the stream were conducted for a distance of 1.6 km up from Klawak Lake. This system appeared to be more productive than the two previously surveyed tributaries. The stream for the first .8 km is flat and meandering with straight cut banks and a bottom composed of pea gravel, sand and detritus. Numerous coho salmon, cutthroat trout, and Dolly Varden were observed in this area. Approximately 1.2 km above Klawak Lake the stream forked with most of the flow coming from the right fork. Minnow trapping of both forks for an additional .5 km yielded numerous cutthroat, coho salmon and Dolly Varden. Weir sites are present in the lower stream; however, the flat nature of the stream may present some high water problems. Spawning areas upstream are adequate for cutthroat, and it appears that this stream is the main spawning area for cutthroat in the Klawak system.

Hamilton River system, located on northwest Kupreanof Island, is one of the largest river systems on the islands of Southeast Alaska with respect to number of river kilometers open to anadromous fish (Figure 5). Hamilton River drains a vast area comprised mostly of muskeg, which stains its waters a dark brown.

Hamilton River does not contain any sizeable lakes in its drainages that are utilized for overwintering by anadromous fish. Cutthroat and Dolly Varden have been found utilizing the larger pools of the main river just below the forks as wintering areas. These wintering areas are approximately 19 river km above tidewater.

Hamilton River has been surveyed on an annual basis since 1976. These surveys have been concentrated in the area just below the forks (Figure 6) to determine the most suitable capture method for obtaining cutthroat brood stock. Hamilton River, in the area surveyed, averages 70 m in width with an average depth of 0.5 m. High water drift indicates that this system is subject to extreme high water flows, which would make weiring the main river difficult. The presence of sunken logs, limbs and large rocks in the large pools make the use of seine gear difficult.

Surveys of Hamilton River above the forks revealed that weir sites are present on both forks. The right and left forks are approximately the same size with the left fork averaging 20-25 m in width while the right fork averages less than 20 m wide. Placement of temporary weirs on the two forks may prove to be the most suitable capture method for adult cutthroat as they move upstream out of the main stem wintering areas.

Hook and line sampling of the large pools of Hamilton River was found to be an effective capture method with up to 10 cutthroat per hour captured per rod. This type of capture method does have its drawbacks, as there is no selection in the fish captured and some mortality will occur due to handling. Hook and line does have the advantage of being highly mobile, inexpensive, and adaptable to changing river conditions.

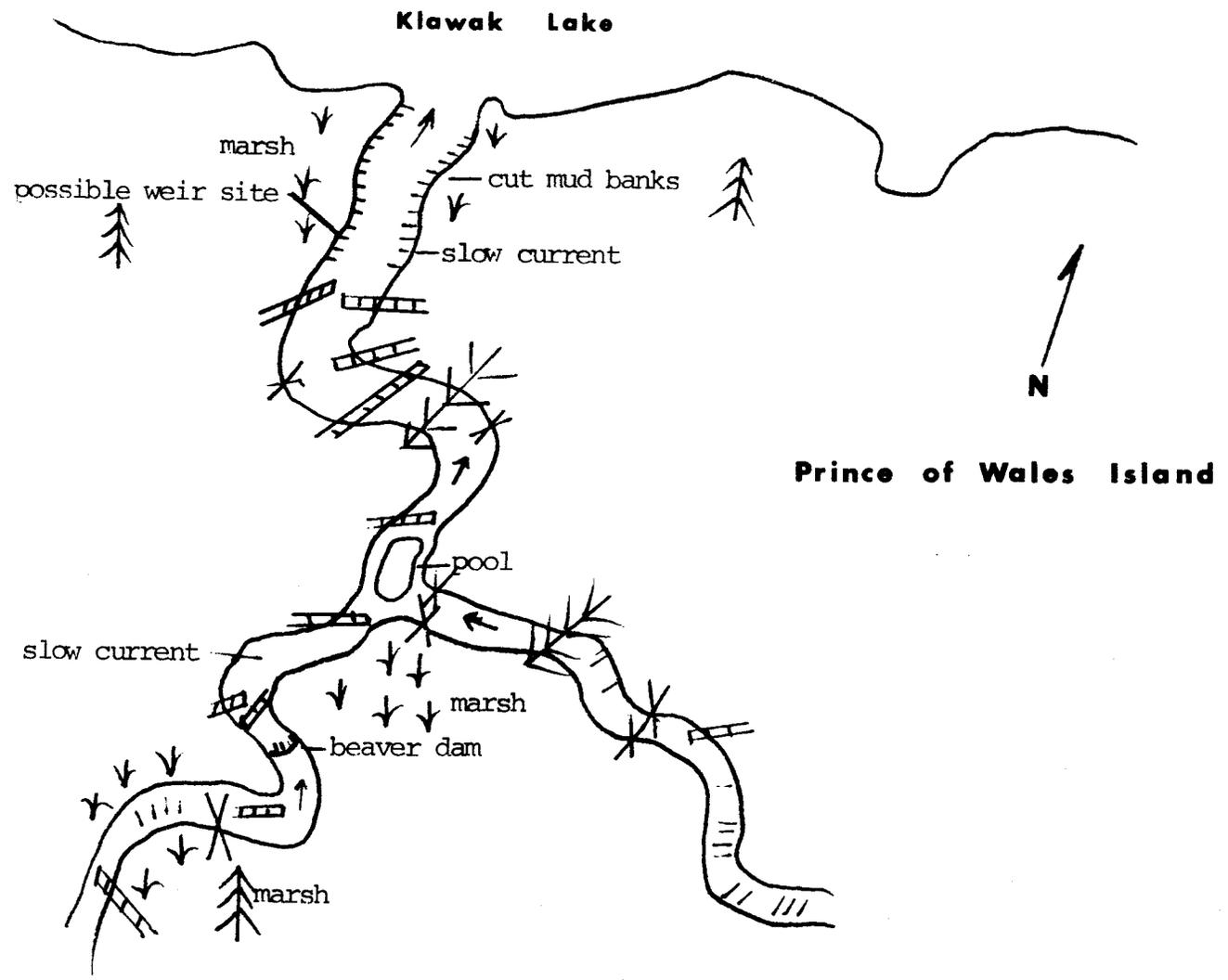


Figure 4. No Name Creek

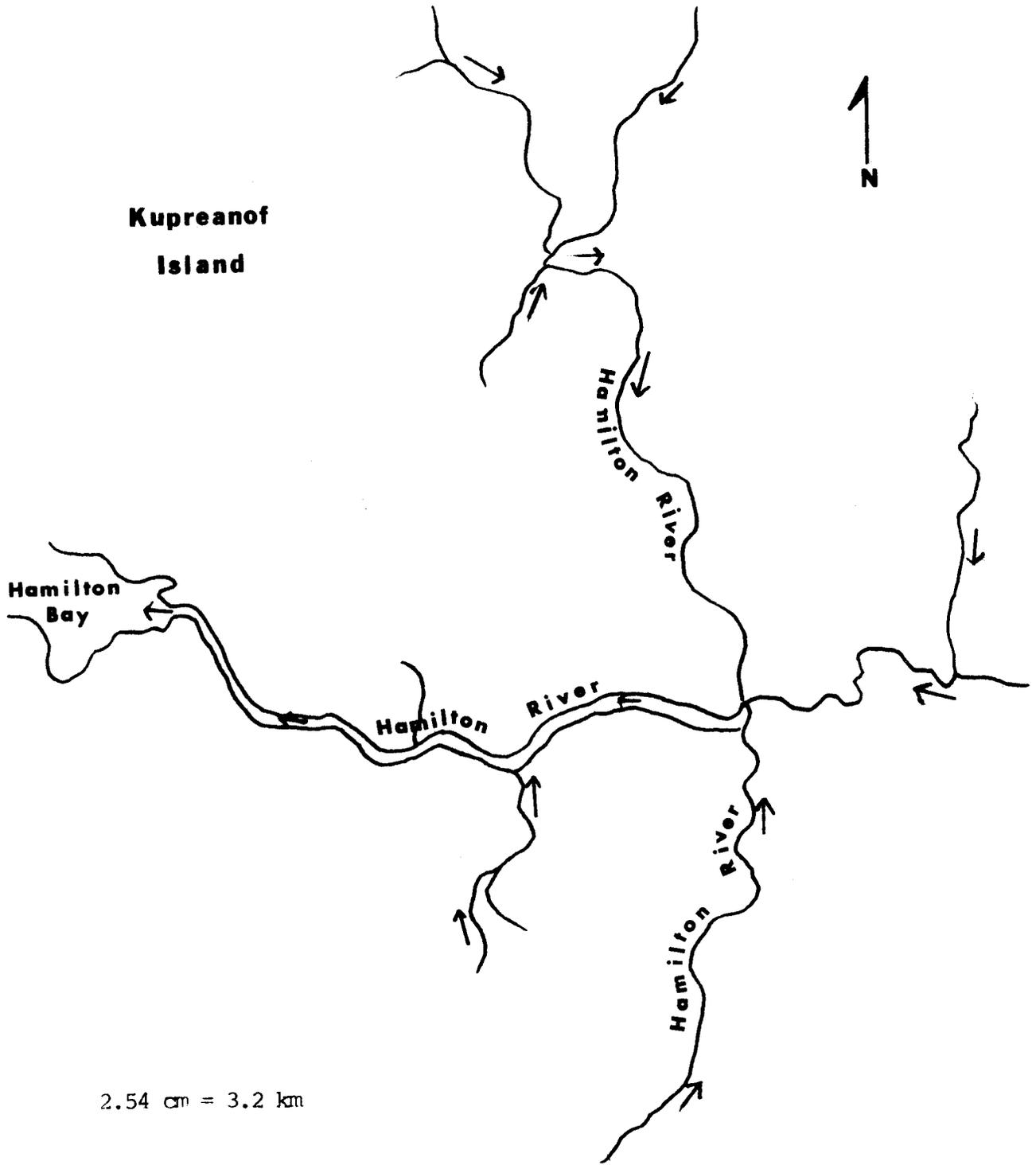


Figure 5. Hamilton River

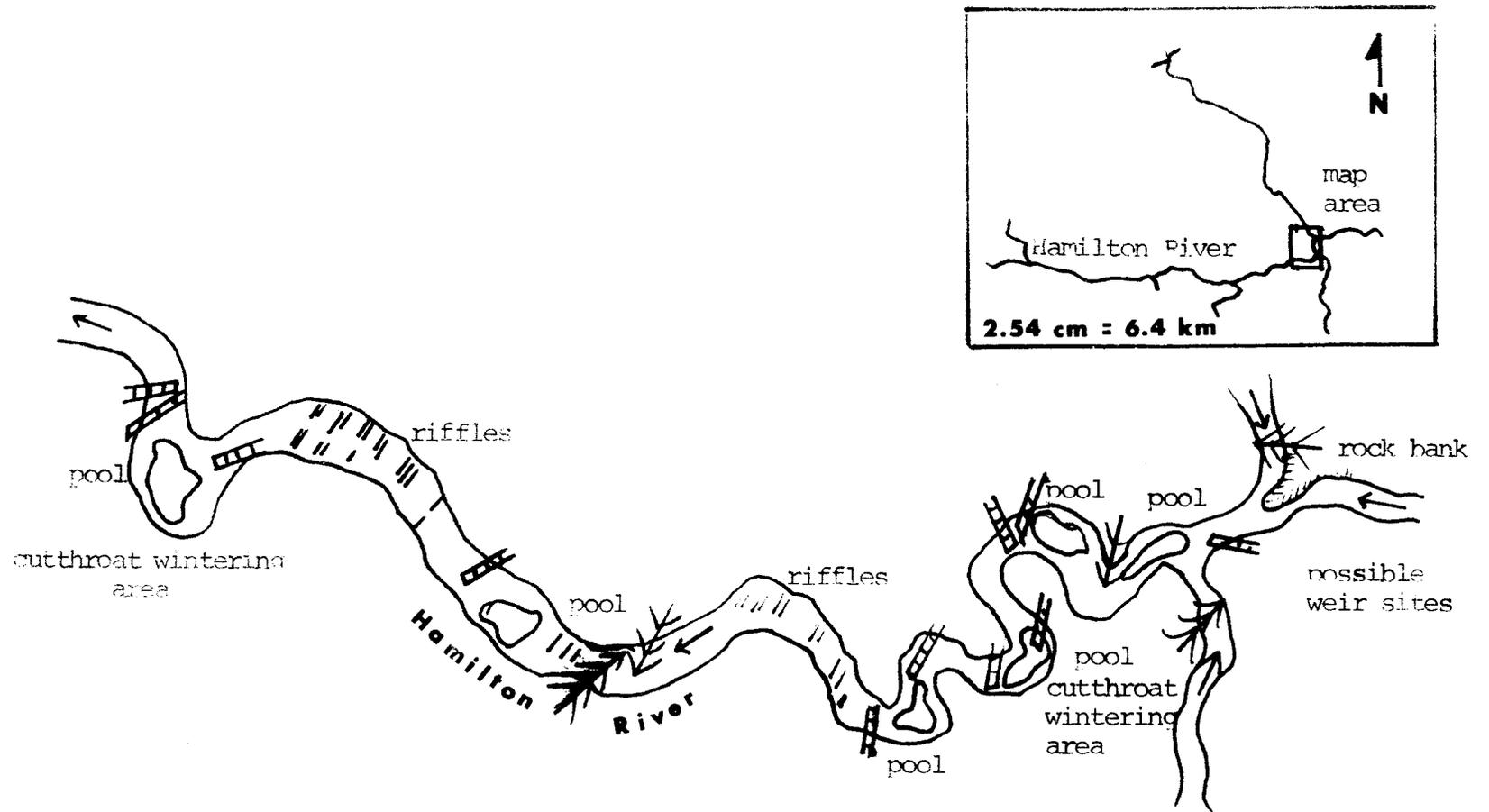


Figure 6. Hamilton River Cutthroat Brood Stock Study Area.

## Development of Techniques to Determine Harvest Rates of Cutthroat in Southeast

The annual harvest of cutthroat trout from the area's streams and lakes has been largely unknown. Specific studies at Lake Eva (Armstrong, 1971) and at Petersubrg Creek (Jones, 1977) have given an insight into the harvest rates for two types of cutthroat fisheries. While these studies have been informative and have aided management, they have not given an overall harvest picture for Southeast. In addition, these studies dealt with sea-run cutthroat and did not deal with resident or non-migratory cutthroat.

Due to the wide spread of the cutthroat waters in Southeast Alaska and the shortage of manpower, it is impractical to attempt a physical creel census on most waters. In order to obtain the needed information, two types of mail censuses were conducted during 1978. One of these surveys was directed toward obtaining information on resident cutthroat and the other toward the harvest of sea-run cutthroat from selected systems throughout Southeast Alaska.

Many of the better resident cutthroat lakes in Southeast Alaska have developed recreational cabins constructed and maintained by the U.S. Forest Service. Use of these cabins requires the payment of a fee and usually limits the number of people on a particular lake at any one time to the renting party.

A questionnaire (Figure 7) was developed to obtain harvest information from anglers utilizing cabins on eight lakes throughout Southeast. These lakes were pre-selected on the basis that they contain excellent populations of resident cutthroat and, in some cases, are considered as trophy fish waters for cutthroat. Locations of these eight lakes is presented in Figure 8. Harvest questionnaires were issued to each party of fishermen when they picked up their cabin permits at the various Forest Service offices throughout the area.

Questionnaires were issued to parties beginning in July and were continued through September. Completed questionnaires began to be received in early July and continued on a sporadic basis into October. In late October, a copy of the Forest Service cabin rental records was obtained. Returned questionnaires were then cross referenced to obtain an estimate of response from anglers (Table 2).

Angler response to the harvest questionnaire ranged from 2.6% from Wilson Lake to 33% from Humpback Lake. No responses were received from Salmon Bay Lake and Virginia Lake even though a total of 24 parties utilized the recreational cabins on these two lakes. It is believed that the lack of response was due to the cabin rental agent in Wrangell failing to issue questionnaires rather than a total disregard by the anglers fishing these two lakes.

Presented in Table 3 are the summaries of fish harvested and released by anglers fishing eight area lakes. Catches of cutthroat ranged from a low of five at Kah Sheets Lake to a high of 312 at Humpback and Hasselborg lakes.

**DEPARTMENT OF FISH & GAME**

Sport Fish Division  
P.O. Box 667  
Petersburg, Alaska 99833

1978

Dear Angler:

The Alaska Department of Fish and Game is currently formulating a management plan for the sport fishery on selected waters in Southeast Alaska.

Your assistance in providing information for this plan is requested by filling in this questionnaire. Results of this survey will help the Department of Fish and Game provide continued high quality angling in Southeast Alaska.

Lake Fished \_\_\_\_\_ Date \_\_\_\_\_

- 1) Number in party \_\_\_\_\_
- 2) Anglers in party \_\_\_\_\_
- 3) Number of days fished \_\_\_\_\_ Hours per day \_\_\_\_\_
- 4) Fish caught & kept :
  - Number of cutthroat \_\_\_\_\_
  - Number of Dolly Varden \_\_\_\_\_
  - Number of rainbow \_\_\_\_\_
  - Number of salmon \_\_\_\_\_
- 5) Fish caught & released:
  - Number of cutthroat \_\_\_\_\_
  - Number of Dolly Varden \_\_\_\_\_
  - Number of rainbow \_\_\_\_\_
  - Number of salmon \_\_\_\_\_

Figure 7.

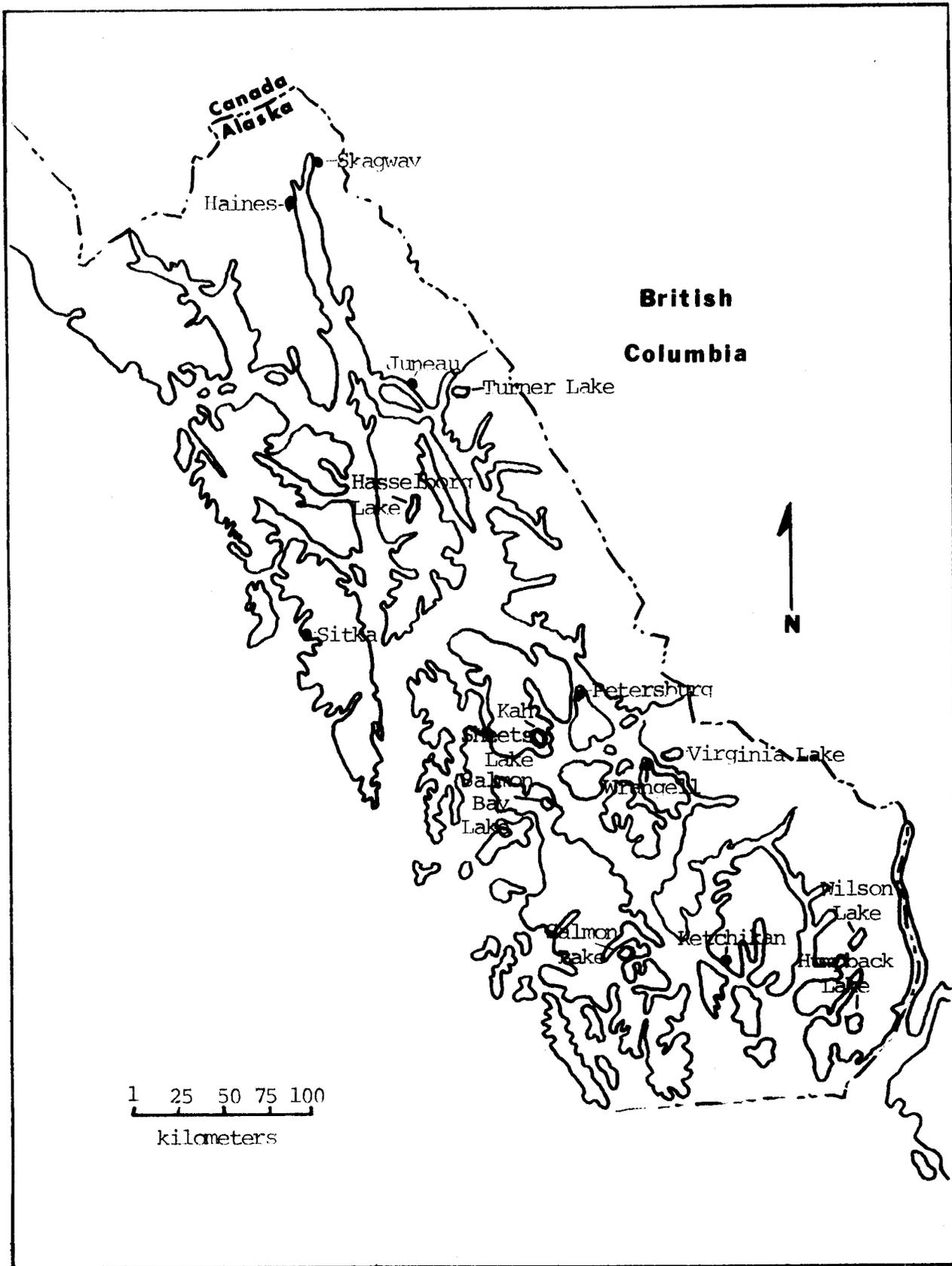


Figure 8. Area Lakes Censused in 1978

Table 2. Angler survey response from eight area lakes 1978.

<u>Lakes</u>	<u>No. Survey Forms Issued</u>	<u>No. Forms Returned</u>	<u>Percent Returned</u>
Wilson (2 cabins)	38	1	2.6%
Humpback	15	5	33.3%
Salmon Lake (Karta) (2 cabins)	25	6	24.0%
Salmon Bay	9	0	0.0%
Virginia	15	0	0.0%
Kah Sheets	8	2	25.0%
Hasselborg (2 cabins)	33	5	15.2%
Turner (2 cabins)	41	8	19.5%
Total	184	27	14.9%

Table 3. Harvest summaries for eight area lakes 1978.

<u>Lakes</u>	<u>No. of Anglers</u>	<u>Angler Hours</u>	<u>Fish caught &amp; kept</u>				<u>Fish caught &amp; released</u>			
			<u>CT</u>	<u>DV</u>	<u>RB</u>	<u>SS</u>	<u>CT</u>	<u>DV</u>	<u>RB</u>	<u>SS</u>
Wilson	2	84	20	-	-	-	60	-	-	-
Humpback	18	252	112	4	-	-	200	-	-	-
Salmon (Karta)	22	530	77	106	7	28	37	73	16	44
Kah Sheets	10	22	1	5	-	3	4	-	-	5
Hasselborg	20	361	284	1	-	13	28	1	-	-
Turner	25	407	117	88	-	62	83	71	-	85

## Area Wide Cutthroat Harvest

A statewide sport fish harvest survey was conducted in late 1977. Results of this survey became available in 1978. The design of this survey can be found in a report by Mike Mills (1979).

Cutthroat trout harvest rates were found to be high in the Ketchikan area where 7,908 fish were reported harvested in 1977. The Yakutat area reported the low for the region with only 204 cutthroat reported. The total harvest of 23,058 cutthroat from all areas of Southeast ranks this species in fourth place in total harvest by area sport anglers. Only coho salmon, pink salmon and Dolly Varden are harvested more frequently than cutthroat throughout Southeast Alaska.

## DISCUSSION

Cutthroat populations have shown a decline in abundance throughout Southeast Alaska with streams adjacent to population centers showing the most decline. A comprehensive management and enhancement plan for cutthroat in Southeast Alaska is now complete with the enhancement section presented in this report.

The management and enhancement plan will remain flexible to enable the addition of new data or the deletion of some sections as new information and data dictate. The success of cutthroat enhancement in Southeast will depend to a great extent on how soon and how successful efforts are to create a brood source of cutthroat. Once a reliable yearly source of cutthroat is available enhancement can forge ahead on a region wide scale.

The initial attempt to assess cutthroat harvest by mail questionnaires was only a limited success in 1978. The approach is good; however, techniques for securing the needed information need to be improved if this type of survey is to yield data that will be useful for the management of the area's cutthroat populations.

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APPENDIX A

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