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STATE OF ALASKA

Walter J. Hickel, Governor

ANNUAL REPORT OF PROGRESS, 1966 - 1967

FEDERAL AID IN FISH RESTORATION PROJECT F-5-R-8

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME
Urban C. Nelson, Commissioner

Wallace H. Noerenberg, Deputy Commissioner

Alex H. McRea, Director

[Alaska Department of Fish and Game] Sport Fish Division

Louis S. Bandirola, Coordinator

INTRODUCTION

This report of progress consists of findings and work accomplished under the State of Alaska Federal Aid In Fish Restoration Project F-5-R-8, "Sport Fish Investigations of Alaska."

The project during this report period is composed of 20 separate studies. Some are specific to certain areas, species or fisheries, while others deal with a common need for information. Each job has been developed to meet the needs of various aspects of the State's recreational fishery resource. Seven jobs are designed to pursue the cataloging and inventory of the numerous State waters. These are divided into logical utilization areas and are jobs of a continuing nature. It will be many years before an index of the potential recreational fishing waters is completed. Six jobs are directed toward specific sport fish studies. These include special efforts toward the anadromous Dolly Varden of Southeastern Alaska, silver salmon in Resurrection Bay, king salmon stocks on the lower Kenai Peninsula, king and other salmon stocks in Upper Cook Inlet, and Arctic grayling and sheefish in Interior Alaska. Special reports have been prepared on specific phases of the Dolly Varden life history and appear in the Department's special "Research Report" series.

The Statewide access evaluation remains one of the most important jobs conducted under this Federal Aid Program. It provides the Department with a tool to recommend withdrawal of suitable access sites on potential recreational fisheries throughout the State.

The remaining jobs include creel census efforts on specific fisheries in high use areas of the State, an egg-take program directed toward locating suitable indigenous stocks, perfecting advanced techniques in taking, handling and rearing species that are not normally associated with standard fish cultural practices, and continuation of the evaluation of the Fire Lake System.

The material contained in this report is often fragmentary in nature. The findings, evaluations and interpretations contained herein are subject to re-evaluation as the work progresses and additional data are collected.

RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.
Project No: F-5-R-8 Title: Sheefish Investigation in the Minto Lake Drainages.
Job No: 17-B

Period Covered: July 1, 1966 to June 30, 1967.

ABSTRACT

This reporting segment covers the initial phase of the sheefish study during which the major portion of the time was spent on familiarization with the various study locations. Seven major rivers were checked and sampled during the season and timing of the migration runs is given for each stream. Although Department personnel were unable to sample the study streams during migration peaks, information was acquired from each of the study areas which will make possible more advantageous timing of future operations. Emphasis during the 1967 season will be on furthering knowledge of migration times, as well as tagging of the migrant fish.

A total of 87 scale samples was collected, read, and illustrated for length-age relationship.

A small section on food habits and parasites is also presented.

The sheefish's size, fighting ability, and table qualities, together with its limited accessibility to the sportsman, make it a unique and highly desirable sport fish.

Although at present commercial and subsistence fishing account for the major portion of the sheefish harvest, there is good indication that sport fishing pressure on this species will increase considerably in the near future. Research will be called upon to play an increasingly important role in the management of this species.

RECOMMENDATIONS

1. The information obtained in 1966 indicates that an extensive program on sheefish tagging is needed. The erratic timing of sheefish migrations in individual streams should be checked closely for comparisons with previous years' runs.
2. Population estimates of various important sheefish waters should be made to provide information for future management needs. On streams with higher sheefish populations, the total harvest by natives for commercial and subsistence purposes should be tabulated along with sport-caught fish.
3. Spawning and rearing areas should be located and the number of spawning fish recorded to aid in estimating reproductive success. Notes on spawning behavior should also be made at this time.
4. It is recommended that an experimental egg take be conducted and the eggs incubated at the Fire Lake Hatchery. The resulting fry should be stocked in a landlocked lake to assess survival, growth, and competition with other predaceous species of fish.
5. It is also recommended that information for the management of other fish species (i.e., pike and whitefish) be collected whenever large populations of such fish are encountered incidental to the sheefish study.

OBJECTIVES

1. To become familiarized with the study areas and to investigate the patterns of movements and migration.
2. Compare age and growth rates from different waters including the northwestern part of the state.
3. Determine spawning dates, areas, pre- and post-spawning migrations, and rearing areas.
4. Determine various aspects of the life history as far as possible.
5. Physical and chemical characteristics of various watersheds will be evaluated to determine, if possible, factors influencing local distributions.
6. Assess the desirability of the sheefish as a sport fishery.

These objectives encompass the entirety of this study and, logically, certain of the objectives must be accomplished prior to attempting others. Therefore, operations during the initial study season were devoted primarily to gaining familiarity with the various study areas, obtaining information on timing of migrations, and exploring the feasibility of various collection methods.

TECHNIQUES USED

Familiarization

The initial familiarization with areas where sheefish are available was accomplished by riverboat and aircraft. The time and expense involved in traveling to the more remote rivers by boat make it feasible to go only by aircraft. The only disadvantage of air travel is the limited amount of equipment and supplies that can be carried. An example of travel time difference between aircraft and riverboat is the Minto Flats trip - it requires 5.5 to 6 hours to reach the Flats by vehicle and boat from Fairbanks, whereas aircraft time is 35 minutes. Study areas were selected on the basis of presence and accessibility of known sheefish populations.

Tagging and Migration

To investigate migration patterns, sheefish captured by hook and line were tagged with numbered 5/8-inch diameter Peterson disc tags. The tags were all colored red and inscribed with the legend "ADF&G, Juneau," and were attached through the musculature directly below the dorsal fin. Information recorded at the time of tagging included tag number, fork length, weight, area where tagged and date.

Information relating to the approximate time of sheefish migrations in various streams was also acquired through personal communication with long-time fishermen of the area and with local residents. Although Department personnel were not able to sample the streams during the peak of the migration runs, valuable information relating to time, magnitude, and duration of the runs was gained.

Age and Growth

Scale samples were collected from all sheefish captured by hook and line or gill net. Sheefish taken for subsistence purposes by natives added greatly to the sample collections. Length and weight were recorded for each fish, and sex, maturity and stomach contents were also recorded for some specimens. Scale samples were taken from the area below the dorsal fin and above the lateral line.

All scales were cleaned and mounted on plastic by the impression method using a roller press.

FINDINGS

Familiarization

Rivers investigated as possible study areas include the following: Tanana tributaries - Tolovana, Chatanika, Nelson Clearwater; Yukon tributaries - Nowitna and Koyukuk; Kuskokwim tributaries - Holitna and Hoholitna (Figure 1). Each of the above rivers was sampled with hook and line. Gill net sampling was done on the Tolovana, Chatanika, and Holitna Rivers. The seven rivers all appear to have fair to good populations of sheefish, according to local residents of the various areas and fishermen interviewed. All streams are accessible by riverboat and/or aircraft.

Movement and Tagging

The patterns of movement could not be determined because of the lack of tagged fish, although it is generally believed that these movements upstream are prespawning migrations (Fuller, 1947).

One sheefish was tagged at the junction of the Tolovana and Chatanika Rivers. Because fairly good populations of sheefish were reported from the Nowitna, Holitna, Koyukuk and Tolovana Rivers, more emphasis will be placed on tagging in these areas next year.

In 1966 the field crew, upon receiving reports of large numbers of sheefish in a particular area, would use all haste in getting to the area. In spite of this, the crew could in no case capture or observe sheefish in numbers as reported. The reasons for this are not clear at the present time.

Although no fish were caught or tagged in the Sleetmute area during 1966, eight fish were tagged on the Hoholitna River and four by the mouth of the Holitna River during September 15-18, 1964. Of these twelve tagged fish, one seven-pound 28.3-inch fish tagged in the Hoholitna was recovered in the Kuskokwim River at Oscarville, seven miles below Bethel, approximately 300 river miles from where it was tagged. The fish was captured by a subsistence fisherman on May 26, 1965, eight months after tagging. No information was received as to whether this was a mature or spawning fish, nor was a scale sample available to assess growth.

The approximate timing or dates when these migrations occurred in 1966 have been recorded for each of the seven rivers mentioned above. The majority of the migration runs occurred in July, although presence of sheefish was reported as early as June 25 in the Nelson Clearwater River on the Fort Wainwright bombing range. Initially, the following rivers and dates of migration are presented: Nelson Clearwater River, June 25-July 12; Tolovana River, July 8-16; Chatanika River, last of August to September 28; Holitna River, July 1-10; Hoholitna River, July 6-16; Nowitna River, September 12-30; Koyukuk River, September 25-October 10.

Age and Growth

A total of 87 scale samples was collected during the 1966 field season. Fish from the Koyukuk River provided 61 samples, 17 samples came from the Nowitna River, 6 from the Minto Flats area, 2 from the Holitna River, and 1 from the Nelson Clearwater River. An additional 5 scale samples collected from the Hoholitna and Holitna Rivers in September, 1964, were used for the age and growth study.

The Koyukuk sample consisted of 52 percent females. Figure 2 illustrates the length frequency of the 61 sheefish taken from the Koyukuk River. The mean length of all Koyukuk fish was 32.0 inches with females averaging 33.4 inches and males 30.6 inches. The mean weight of all fish was 11.0 pounds with females averaging 12.4 pounds and the males averaging 9.5 pounds. The difference in weight is probably due partially to the larger size gonads found in females. Alt (1967) mentioned that the gonads may represent as much as 20 percent of the total body weight in females.

The mean length of the 87 fish was 31.0 inches with a range from 22.5 inches to 38.0 inches. Of the 75 fish from which weights were obtained, the mean weight was 10.5 pounds with a range from 4.25 pounds to 23.5 pounds. The ages of 84 fish ran between 6 and 12 years. Figure 3 illustrates the age and length relationship with maximum and minimum lengths of various age classes. No sheefish in age classes 0 through 5 were observed or collected during the year.

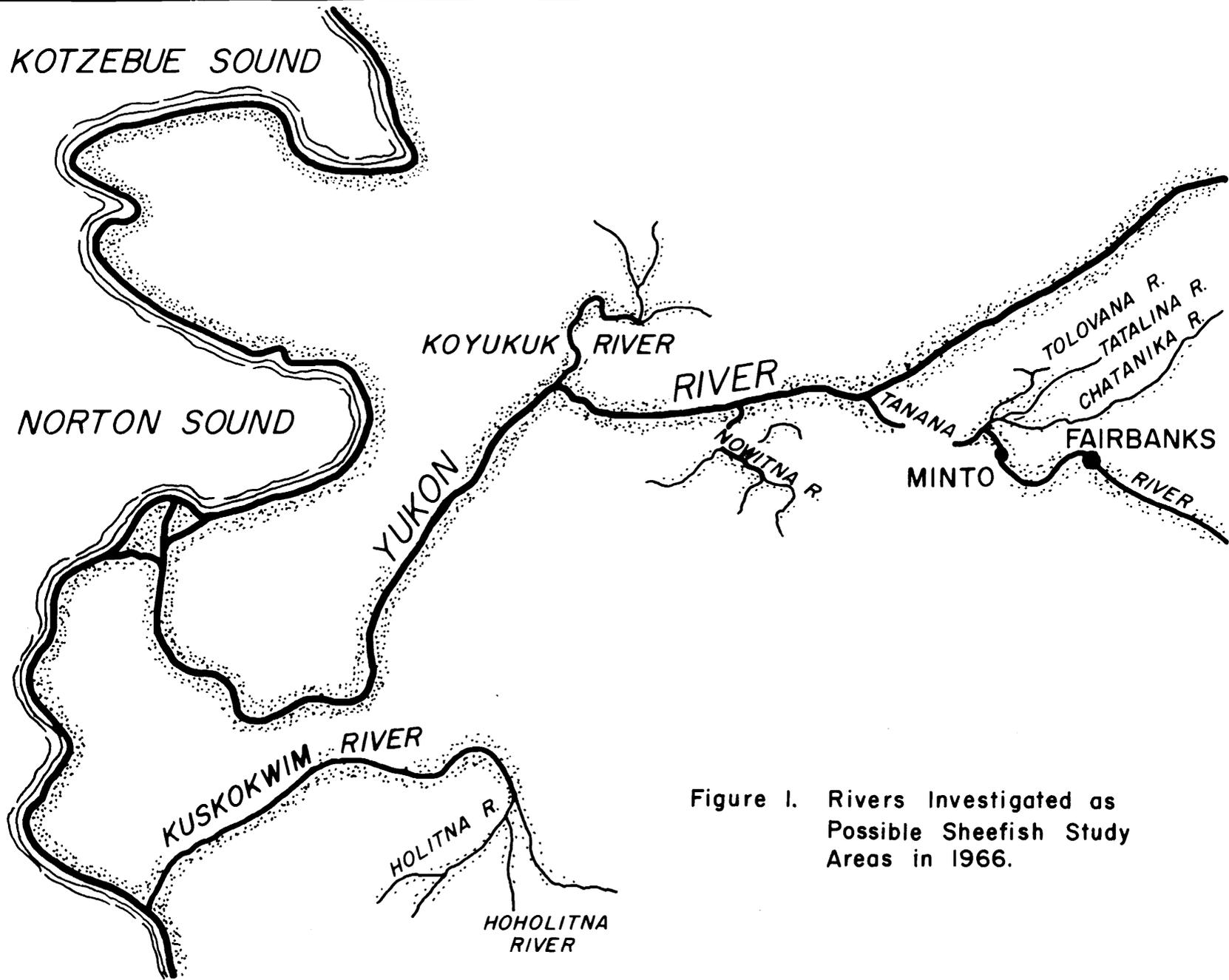


Figure 1. Rivers Investigated as Possible Sheefish Study Areas in 1966.

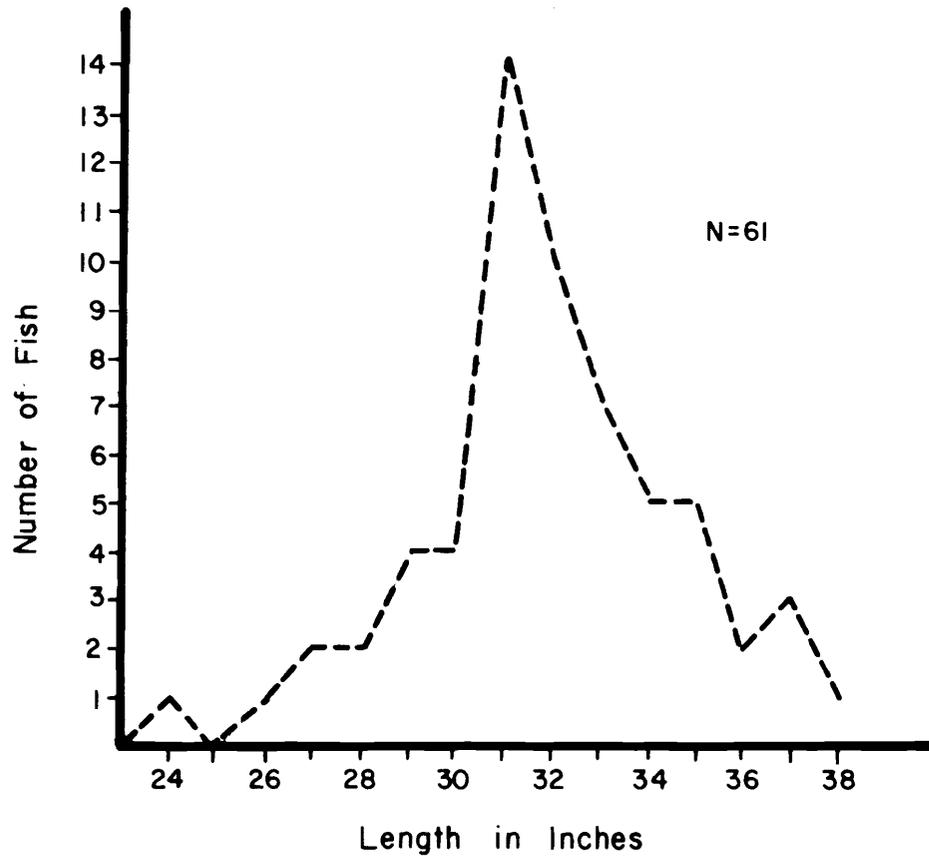


Figure 2. Length-Frequency of Sheefish from the Koyukuk River.

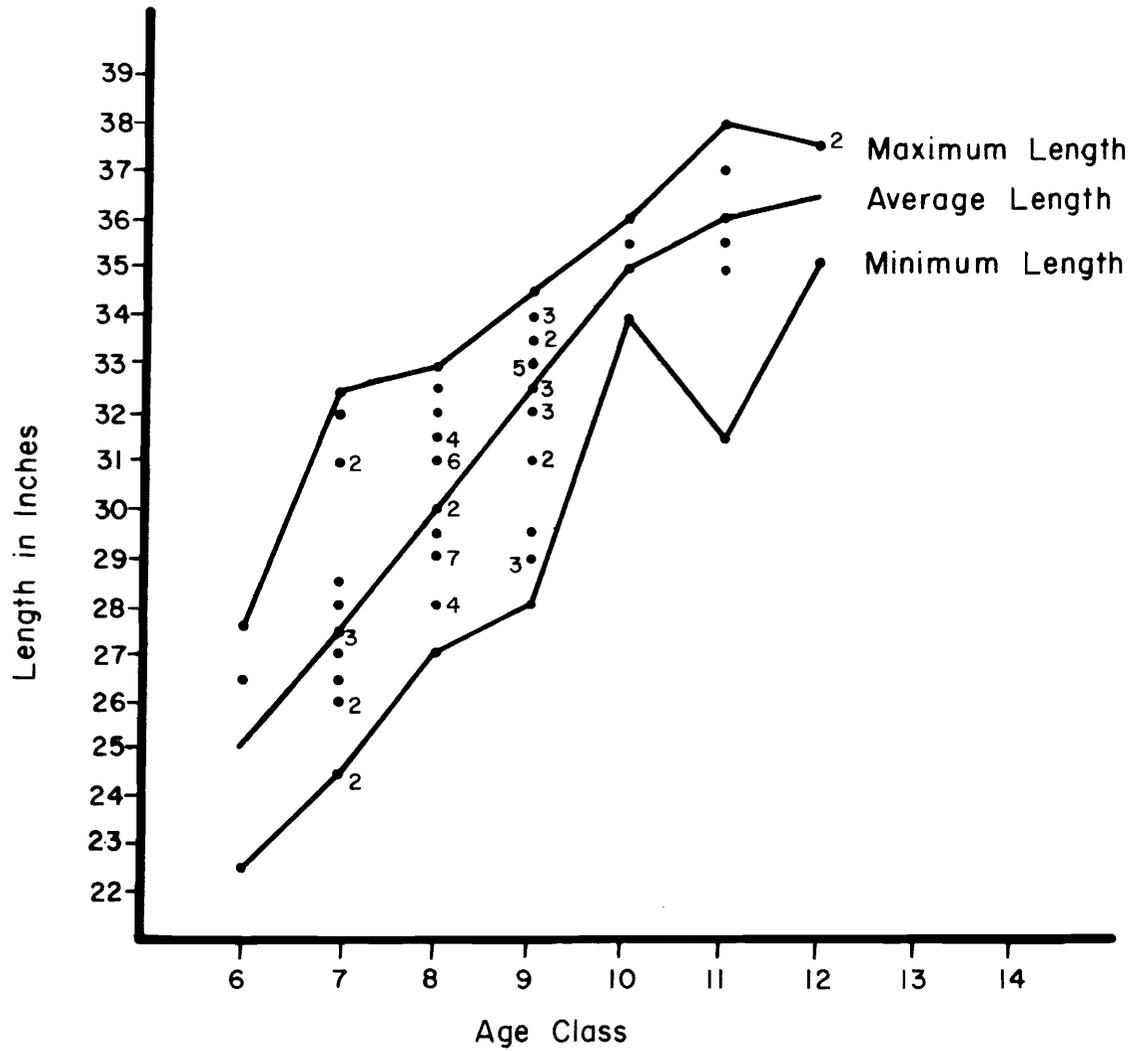


Figure 3. Age-Length Relationship of 84 Sheefish Collected During the 1966 Field Season.

An Attempt was made to check the validity of otolith age determination as compared to scales. This proved unsuccessful, however, as heavy calcareous matter prevented the observation of annual rings.

Spawning

With the information obtained during the last field season, the Koyukuk River was selected initially to study the spawning phases of the life history. Indications are that sheefish spawn here from the last part of September to mid-October. A trip taken to the Koyukuk River at Hughes on October 5 revealed that most of the sheefish were ripe or had already spawned.

Because its water is generally clear, the Koyukuk appears to be the best choice for this study. One disadvantage may be the large size of the river. An experimental egg take is planned for this location in 1967. It is hoped that sheefish fry can be planted experimentally in several land-locked lakes to study early phases of the life history.

Food Habits

Larger sheefish appear to be strictly piscivorous, feeding mostly on cisco, Coregonus sardinella, and small northern pike, Esox lucius, in the study areas. Twelve stomach samples were collected. Of these twelve samples six were empty, four contained cisco, one contained small northern pike, and one contained both species. Of the four stomachs containing cisco, two came from the Tolovana River, one from the Nowitna River, and one from the Nelson Clearwater River. The stomach containing pike and the stomach containing both pike and cisco were also from the Tolovana River. Although this represents a small sample, it does agree with work done by Alt (1967) and Fuller (1947). The cisco and northern pike are not necessarily the main diet of sheefish. These fish appear to be advantageous feeders and will take any forage fish available. Alt mentions king salmon fingerlings, Oncorhynchus tshawytscha, broad whitefish, Coregonus nasus, and brook lamprey, Entosphenus lamottei lamottei, as other species found in the diet of larger sheefish. In Canada (Great Slave Lake), Fuller mentions cisco, sucker, and small sheefish as the main diet of adults, while smaller sheefish in rivers tend to feed almost exclusively on invertebrates.

Parasites

Six visceral samples were stored in the freezer for future examination for parasites by Ken Neiland, Department parasitologist. No large internal parasites were observed, but minute forms could have been overlooked. Although this is a very small sample, it appears to have some validity since the fish came from three different rivers, the Nowitna, Tolovana, and Nelson Clearwater.

Fuller reported that a nematode, unidentified, was found in the air bladder of 2 out of 30 fish with a few unidentified nematodes also found in the body cavity. He also reports that unidentified cestodes were found in 1 out of 30 fish, and unidentified proteocephalus were found in a few specimens.

No external parasites were observed during the field season, although some sportsmen claimed they saw leeches on sheefish in the Nowitna River during September. Department personnel visited the Nowitna River during the latter part of September but no leeches were observed on the fish captured.

LITUREATURE CITED

Alt, Kenneth T. 1967. Taxonomy and ecology of the inconnu, Stenodus leucichthys nelma, in Alaska. Master of Science Thesis, University of Alaska, College, Alaska, 106.

Fuller, William A. L. 1947. The inconnu, Stenodus leucichthys mackenzii, in Great Slave Lake and adjoining waters. Master of Science Thesis, University of Saskatchewan, Saskatoon, Saskatchewan, Canada.

Prepared by:

Approved by:

Thomas Nagata
Fishery Biologist

s/ Louis S. Bandirola
D-J Coordinator

Date: April 1, 1967

s/ Alex H. McRea, Director
Sport Fish Division