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Ministry of
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OKANAGAN SUB-REGION
SOUTHERN INTERIOR REGION

by—

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Technical Report—

SURVEYS & INVENTORY

CHRISTINA LAKE CREEL SURVEY

1974

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Introduction

Christina Lake is a large lake but historically has provided a moderate to poor fishery. Early complaints indicate fish size was not satisfactory to fishermen; more recently size and success has become a problem.

Christina Lake is a fairly unique body of water as it contains both warmwater and coldwater fisheries. Sunfish, smallmouth bass and large mouth bass are sought by anglers during most the year; while rainbow fishing is limited, to spring and fall. Some freshwater ling (burbot) may also be taken at certain times. Kokanee are also sought actively by anglers.

There are several factors to consider in evaluating the potential fishery and the past fishery of Christina Lake. The drainage area of the lake is relatively small, and the climate fairly dry most of the year; which produces a limited run-off, and reduced nutrient and particulate loading into the basin. The flushing rate of the lake has been estimated at 3-4 years which is a small time period for a large body of water. Consequently, Christina Lake is very unproductive, having a T.D.S. of 42 ppm, and relatively low biological productivity. The *bio-index rating given to Christina Lake by Northcote and Larkin is 3, compared to Kalamalka 15, Oyama 9, Cultus 7, Garabaldi 3, (Northcote and Larkin, 1956). Though this type of comparison is limited in scope, it does indicate relative productivity, showing Christina to be one of the most unproductive lakes of its size.

The dry climate and limited run-off also create low flow and no flow conditions

* The sum of 10 classes of relative abundance of specific physical, chemical and biological factors.

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in some influent lake tributaries. Stream spawning fish populations in this case, will have varied mortality, depending on flow conditions during and after spawning. Kokanee and rainbow trout utilize Christina tributaries for spawning; recruitment from these streams is probably directly controlled by instream flows. Beach spawning kokanee offer an alternative recruitment source, and are present in Christina Lake. Historically, a commercial fishery has concentrated on shore spawning kokanee from the turn of the centry until the 1960's.

Stringer reports commercial catch records indicate a peak yield of 17,000 lbs. of kokanee just prior to 1928. More recent statistics report 1954 - 2,000 lbs, 1955 - 90 lbs. and 1956 - 15 lbs. were taken.

Methods

An active census was carried out during July and August, the peak tourist season for Christina Lake. Survey days are outlined in Table 1 for each of the lake divisions. Christina Lake was divided into two sections, Area I, south, Area II, north with the boundary at Texas Point.

Fishermen were interviewed while angling, and data was recorded in Branch creel survey booklets; later month end summaries were completed for angler use, success and yield. No weight-length data was collected during this survey, as equipment was not available. Further, bass were not separated into species due to field identification errors.

Results and Conclusinns

Due to the time span encompassed by this survey, it should be realized that

these results do not indicate annual fish yield and angler behaviour, but only the peak angler period. Overall, angler totals are lower than would be expected for lake size (Table 2). Several factors may influence this phenomenon:

a) intense utilization of Christina Lake by high speed power boats would detract from angling experience

b) Canadian anglers are mainly trout and salmon oriented, since bass and sunfish make up most of the summer harvest, this fishery may not be as attractive to anglers

c) the small size of fish and low harvest numbers may not attract anglers.

Angler success increased with time during summer months in both lake areas (Table 3). This is probably a temperature dependant factor, in part, as feeding activity increases with water temperature.

Differences in catch success between areas may, be affected by species composition differences. Sunfish are harvested in Area I, but this harvest component does not appear in Area II statistics (Table 4). Warmwater fish generally prefer littoral, weedy habitat; since most littoral development exists mainly at the outlet, and north end, angling for these fish is spatially selective. Changes in bass yield over time may indicate angler behaviour (Table 4); the relatively remote north end becomes less attractive due to speed boat competition on the lake. The shallow south end is less attractive to large boats and water skiers.

Changes in rainbow and kokanee catch may also reflect effects of angler behaviour and/or water temperature. Warmer water increases salmonid feeding, to a point; then adversely affects feeding behaviour, causing these fish to seek more comfortable habitat (i.e. deeper, colder water). As indicated

in Table 4, salmonid yield decreases with time in Area I, yet increases in Area II. A shift in angler behaviour from bass seeking to salmonid seeking patterns could create these results, however angler selectivity was not documented.

Past records of Kokanee growth indicate a fluctuating pattern. Stringer suggests this growth variation is related directly to population size. If small size of individual fish is due to over abundance; an apparent size increase would be expected after this commercial fishery activity. Comparisons of mean lengths support this postulate (Table 5); commercial cropping of this kokanee population has likely produced an increase in size. The consistency of this growth ten years after any concentrated commercial harvesting may indicate low population size through decreased recruitment. In this situation, factors limiting growth would probably relate directly to lake productivity. If fish size has reached a maximum set by the productivity of lower production levels; fish size at age should be constant through present day. As no length-weight samping was conducted during the 1974 survey this must remain as speculation.

Summary and Recommendations

1. Data presented indicates summer harvest only, spring and fall fishery performance is not measured. Fishing during these periods has been reported as better for salmonids, than during the summer. This creel survey then does not estimate annual harvest for Christina Lake.

2. Christina Lake contains warm water species, Centrarchids; and cold water species, Salmonids; both groups being actively sought and successfully taken by anglers.

3. Overall productivity of Christina Lake is very low, and is probably the main limiting factor in fish production.

4. Spawning habitat for salmonids has been reduced and altered by man's activities; Centrachid spawning habitat has also been threatened by industrial activity. Landfill, nutrient loading through septic waste, and stream channelization are the main reducers of habitat. This reduction in spawning habitat must also affect production.

5. Conflicts between anglers and other recreational uses of water exist, and tend to detract from angling during periods of other boat use.

6. Future fisheries management of Christina Lake could include:

   (i) attempts at increasing lake productivity (i.e. fertilization) mysid production has proven successful, but has not established as dense a population as Okanagan Lake (Fig. 1). Some pitfalls of fertilization may prove detrimental to recreational use (i.e. algae blooms) and must be seriously considered before being undertaken.

   (ii) protection and enhancement of spawning tributaries and spawning grounds within the lake through:

      (a) minimum flow recommendations during spawning and incubation.

      (b) water quality protection in spawning tributaries.

      (c) removal of fish barriers (i.e. highways culverts).

      (d) shoreline and tributary spawner identification and enumeration.

      (e) protection from urban and industrial encroachment of critical lake spawning areas.

   (iii) acquisition of land adjacent critical spawning tributaries (i.e. Sandner Creek).

Table 1. Survey Days on Christina Lake in 1974

	July	August	Total
Area I	19	18	37
Area II	9	7	16
	28	25	53

Table 2. Angler Use on Christina Lake in 1974 (# rods)

	July	August	Total
Area I	122 (75)	155 (90)	277
Area II	86 (25)	137 (31)	223
Total	208	292	500

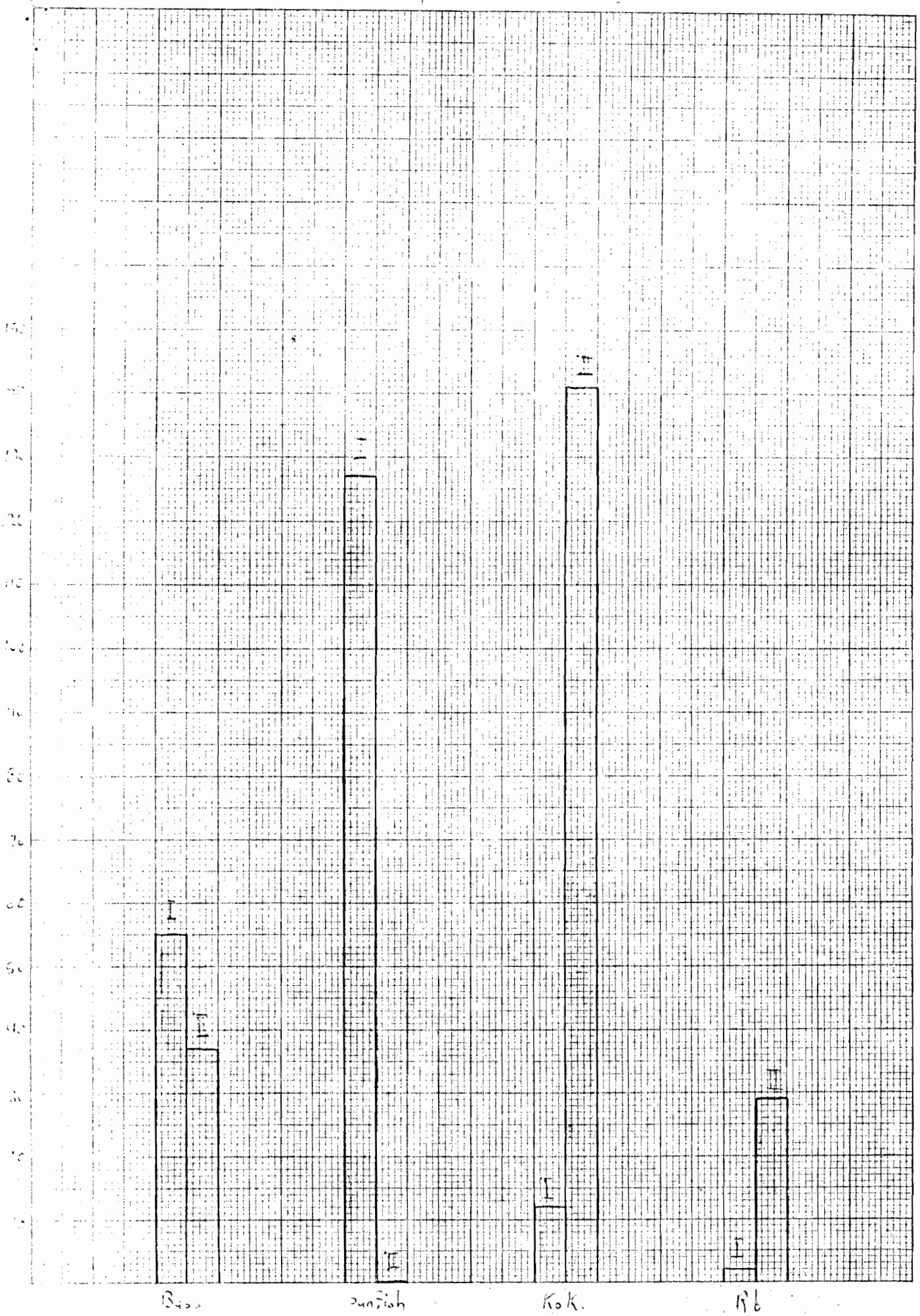
Table 3. Angler success on Christina Lake in 1974 (all fish)

	July	August	Total
Area I	.51	1.15	.79
Area II	.42	1.04	.72
Average	.47	1.09	.76

Table 4. Harvest Analysis from Christina Lake in 1974

		July	August	Total
Area I	Bass	21	55	76
	Sunfish	20	127	147
	Kok.	74	12	77
	Rb.	2	2	4
	Total	117	196	313
Area II	Bass	62	37	99
	Sunfish	—	—	—
	Kok.	38	141	179
	Rb.	—	29	29
	Total	100	207	307
Total	Bass	83	92	175
	Sunfish	20	127	147
	Kok.	112	153	265
	Rb.	2	31	33
	Total	217	403	620

Christina Lake. Harvest composition for August 1974



Christina Lake. Harvest composition for July. 1974

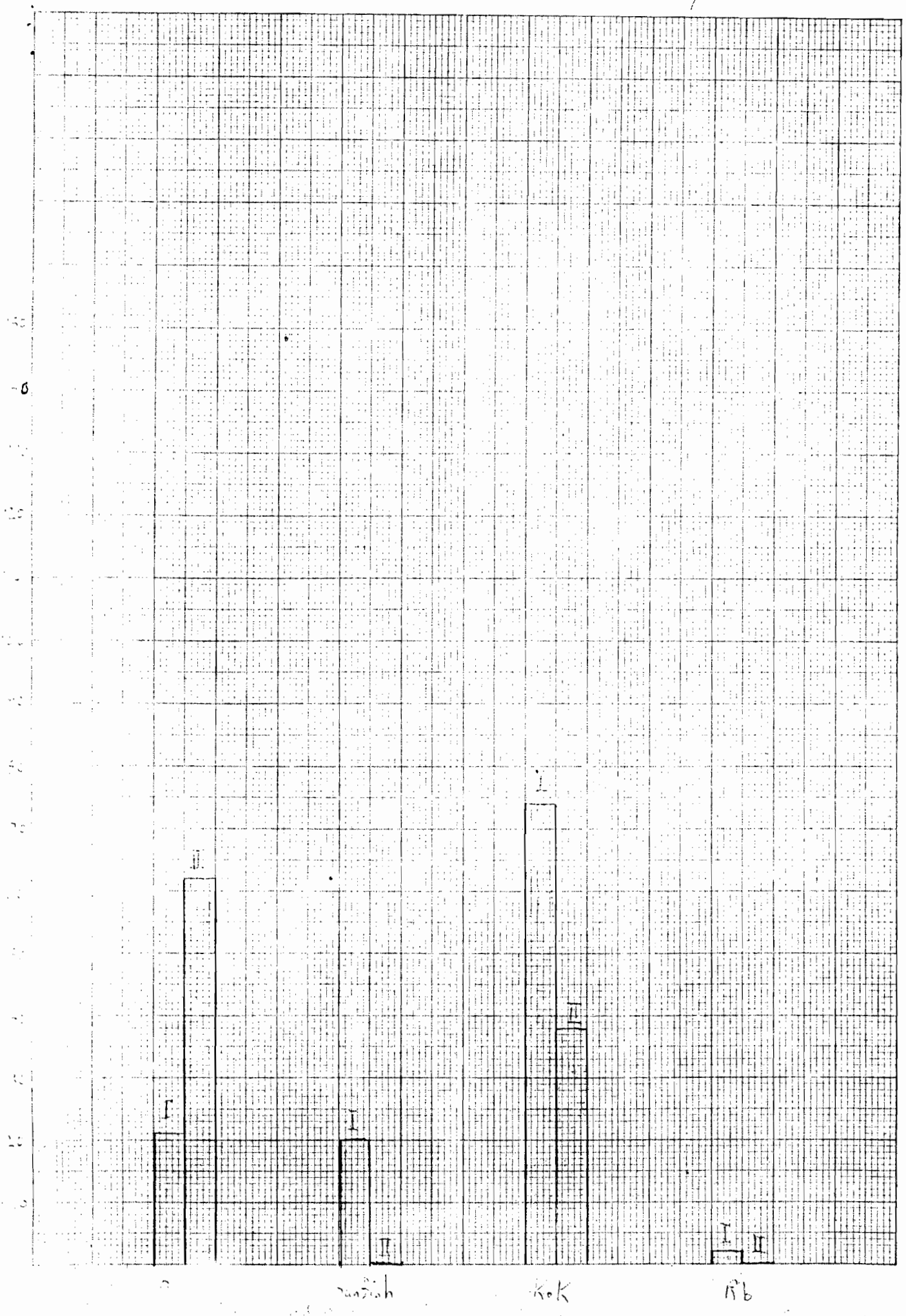


Table 5. Kokanee mean length in Christina Lake (from commercial catches - shore spawners)

Dec. 1952	16 individuals	mean length 18.3 cm.	
Dec. 1953	100 individuals	mean length 20.0 cm.	(18.8 cm. - 21.4 cm.)
Dec. 1964	75 individuals	mean length 29.4 cm.	(27.3 cm. - 31.8 cm.)

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SUBJECT: Mysis tows in Christina Lake

Finally, we have analysed the plankton tows done in April , 1974 for Christina Lake. Following are the summarized results:

Christina Lake

Texas Creek - south shallow net - 172 Mysis
Texas Creek - south deep net - 185 Mysis
Texas Creek - north shallow net - 274 Mysis
Texas Creek - north deep net - 160 Mysis

Okanagan Lake

- average shallow net - 2350 Mysis
- average deep net - 11301 Mysis

Skaha Lake

- deep net only - 63 Mysis

The beasts seem to be everywhere!

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DRS:dm

References:

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