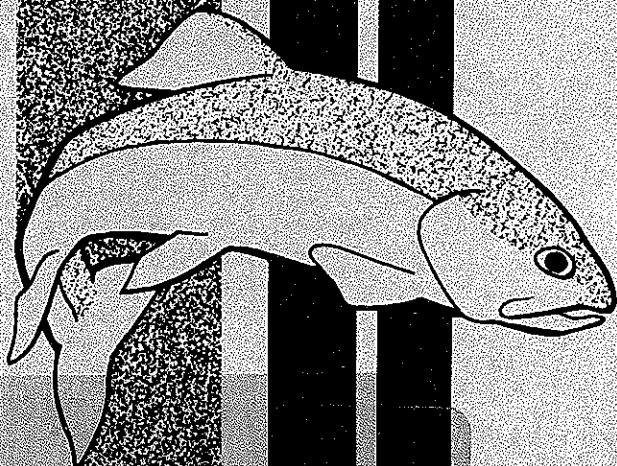


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KOOTENAY LAKE SPORT
FISHERY, 1974-75
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KOOTENAY LAKE SPORT FISHERY
1974-1975

H. ANDRUSAK and M.A. CROWLEY.



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ACKNOWLEDGEMENTS

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KOOTENAY LAKE SPORT FISHERY

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INTRODUCTION

Kootenay Lake lies between the Selkirk Mountain range and the Purcell Range in the southeast corner of British Columbia. This lake is approximately eighty miles long and is fed by three major rivers. The Kootenay River enters the south end of the lake at Creston whereas the Duncan and Lardeau Rivers flow into the north end of the lake (Figure 1). The single outlet of Kootenay Lake is the West Arm which forms the lower Kootenay River below Nelson. The Kootenay River flows into the Columbia River at Castlegar. Additional description of the physical-chemical aspects of Kootenay Lake can be reviewed in papers by Larkin 1951, Cartwright 1961, Zyblut 1967 and Northcote 1973.

Kootenay Lake supports one of the province's finest and most unique sport fisheries. Major fisheries are evident for rainbow trout, Dolly Varden, whitefish, ling and kokanee. Less popular but somewhat unique is a limited sturgeon fishery at the north and south ends of the lake. The quality and abundance of all these fisheries provide a year 'round sports fishery which is attractive to all types of fishermen.

In recent years the popularity of fishing Kootenay Lake has increased considerably. Demands for regulatory changes have been steady and by 1974 resident dissatisfaction of ever increasing numbers of non-Canadians (particularly at Balfour) had grown to conflict proportions. It became apparent that conventional methods of managing

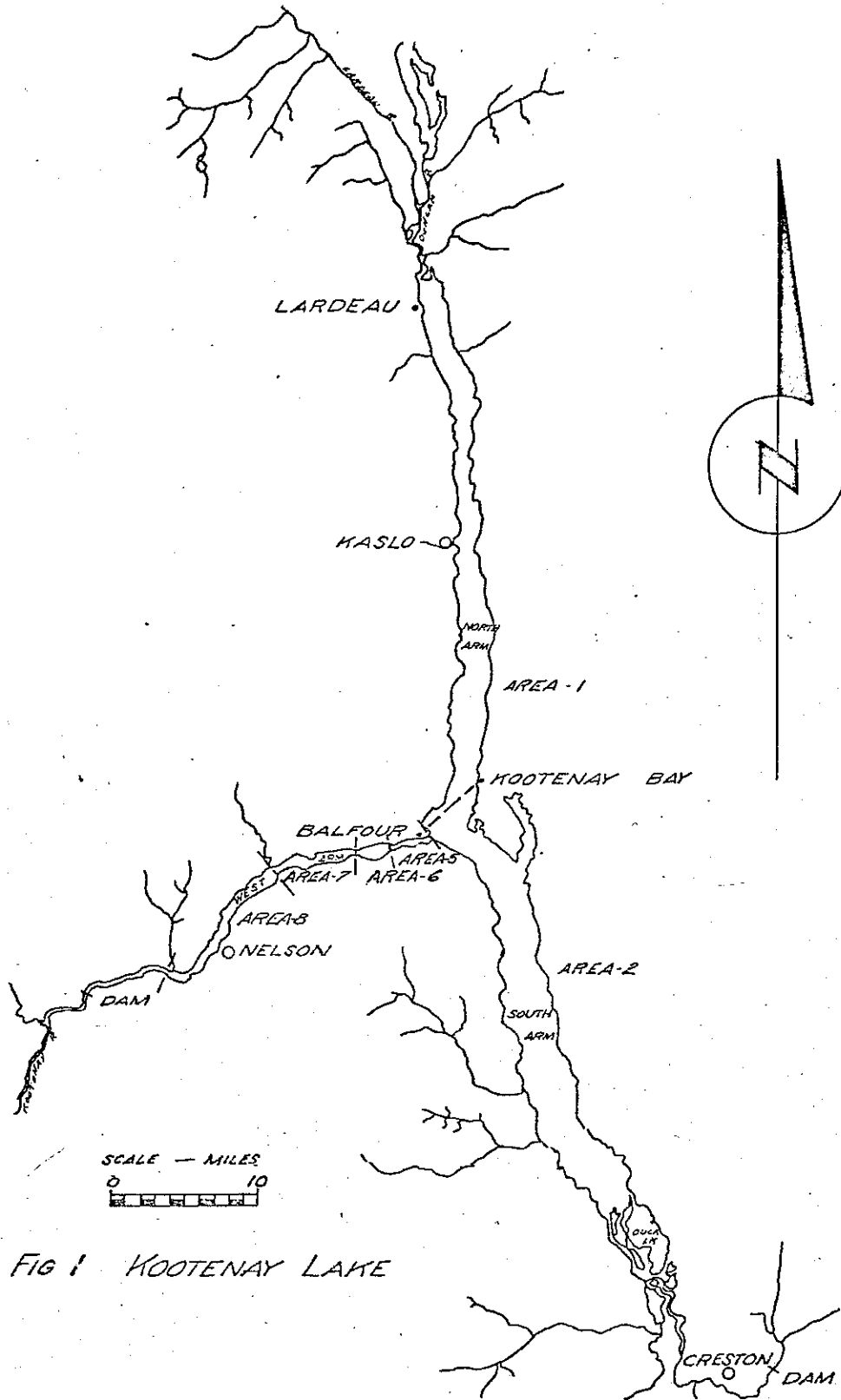


FIG 1 KOOTENAY LAKE

Kootenay Lake such as season or bag limit changes were inadequate in view of the type of complaints received from residents. The complaints were directed at number of anglers rather than lack of fish.

In addition to the fact that the fishery is one of the best, it also has a very real economic value. The best account of this fishery in terms of its value and socio-economic considerations can be found in Pearse and Laub's (1969) publication titled The Value of the Kootenay Lake Sport Fishery. Net present worth of the Kootenay Lake sport fishery to British Columbia in 1967 was \$1.78 million from non-Canadian fishing and \$3.99 million from resident fishing.

Effective 1974, the Fish and Wildlife Branch imposed a Special Lakes licence on Kootenay Lake. Initially this licence has been directed only at the non-Canadians. Except for the months of mid-June - September 30th (on the main lake) a non-Canadian must have a non-Canadian licence (\$15) plus a Special Lakes tag (\$15). The three day \$6 licence is available on the main lake only (ie., excluded the West Arm) from mid-June to September 30th.

The purpose of the Special Lakes licence was twofold. The prime objective of this licence was to provide special status to Kootenay Lake and recognize it for its uniqueness. Essentially it was felt that on the basis of Pearse and Laub's economic evaluation and the fact that Kootenay Lake consistently produces trophy type fish, there was a desire to obtain an appropriate price for a unique and limited resource. The second objective of the Special Lakes licence was to partially reduce the number of non-Canadians who were angling at Balfour. For this reason the three day licence is not available on the West Arm. A separate report on the results of two years of special regulations on Kootenay Lake is available.

The Fish and Wildlife Branch has monitored almost the entire Kootenay Lake fishery since 1966 by means of an annual creel census program. Previous to 1966 the fishery was regularly checked by Fish and Wildlife personnel and this program enabled estimates to be made of annual catches from the main lake. Since 1967 a full time fishery officer has been employed to conduct the annual census on the north, south and west arm. Four check days per month are scheduled for the north and south arms and five days per month on the west arm. The following report summarizes 1974-1975 data and compares recent catches with previous estimates. It must be emphasized that reported statistics are underestimates of actual total catch and effort by approximately twenty percent. This is particularly the case in the west arm in a year such as 1975 when it was virtually impossible for the fishery officer to check one hundred percent of the anglers on an assigned day. Unless stated to the contrary effort is expressed in rod hours.

Kootenay Lake Sport Fishery - North, South and West Arm

The main lake (north and south arms) fishery is primarily directed at large rainbow trout and trolling with heavy tackle is the general rule. Main lake fishing pressure has remained relatively constant from year to year. In July and August light spinning tackle and some fly fishing is becoming increasingly popular, but the greatest percent of fishing effort on the main lake is for large fish during October - May. It is this aspect of the Kootenay Lake fishery which is and will be in future the centre of direct fisheries management activity.

The West Arm fishery has grown enormously in the last decade and that small stretch of water from Balfour to Harrop now accounts for the majority of effort and catch. A whole host of fisheries management problems exist in this area.

Minimum estimates of catch and effort for the majority of Kootenay Lake are shown in the following table:

what kind?

<u>Year</u>	<u>Effort</u>	<u>Catch</u>
1967	76,630	38,151
1968	136,300	84,581
1969	149,434	77,079
1970	132,651	48,175
1971	144,549	100,233
1972	164,000	86,000
1973	182,500	79,900
1974	146,300	102,200
1975	190,000	122,464

units of fish? total species?

How many fish/day?

Despite some fluctuations in effort from one year to the next there is continual growth of Kootenay Lake's sport fishery.

Fluctuations in effort between 1973-1975 in part reflect changes in the licence fees for non-residents. This argument may be partially valid for changes between 1973 and 1974. However, the large increase from 1974 to 1975 effectively negates the argument that fee increases have been detrimental to the sport fishery. The significant point is the continual growth of the Kootenay Lake sport fishery - particularly the West Arm fishery. In 1975, for example, 70% of the total effort was in the west arm with the north arm accounting for about 23% and the south arm a mere 7%.

Trophy size fish caught in 1974-1975 worthy of mention include rainbow trout of 30 lbs., 28 lbs. and numerous others between 25-27 lbs. Several kokanee caught at Balfour were between 8-9 pounds. A 28 lb. Dolly Varden was landed near Kaslo in the fall, 1974.

NORTH ARM

For the purposes of creel census the north arm of Kootenay Lake is defined as that part of the lake north of the ferry crossing between Balfour and Kootenay Bay.

Large rainbow trout¹ are most highly sought in the north arm with kokanee of secondary importance and Dolly Varden only lightly exploited. In terms of catch kokanee represent about 90% of the total. Angling for large rainbow and Dolly Varden has traditionally been with plugs and spoons - particularly during the spring, fall and winter months. Trolling and spinning outfits are used to catch kokanee and small rainbow in the summer months. The major limiting factor anglers are faced with at all times of the year is strong north or south winds. Due to this fact most of the fishing tends to be clustered around and near sheltered areas such as Kaslo Bay, Riondel and Schroeder Creek point.

The following table summarizes recent estimates of north arm catch and effort:

Estimated Minimum Catch And Effort

NORTH ARM - KOOTENAY LAKE

<u>Year</u>	<u>Effort</u> <i>hours</i>	<u>Catch</u> <i>fish</i>
1967	36,873	11,199
1968	46,224	13,990
1969	46,069	7,093
1970	47,000	7,223
1971	40,739	12,178
1972	47,513	10,773
1973	54,036	15,816
1974	43,300	16,125
1975	46,361	15,516

¹Large rainbow, for the purposes of this report, are defined as fish fifteen pounds and larger.

The relatively constant fishing effort recorded year after year is a reflection of a traditional fishery aimed primarily at the trophy rainbow trout. Extremely low success rates for these fish results in attraction of a limited, specific segment of the angler population. For example, this type of fishery is not attractive to the "family type" anglers. The gradual increase in north arm catch is a reflection of the increased interest in the kokanee fishery.

Rainbow Trout

North arm rainbow continue to be highly sought by a large number of anglers. These fish grow to an enormous size and are commonly caught weighing between twenty to twenty-five pounds with some ranging to thirty pounds. Catch statistics for the past two years yield some unusual information:

Estimated Minimum Catch And Effort

NORTH ARM - KOOTENAY LAKE - RAINBOW

<u>Year</u>	<u>Effort</u> <i>Hours or days?</i>	<u>Catch</u>	<u>Success</u>
1968	28,100	1,955	0.07
1969	28,560	1,763	0.06
1970	36,650	1,816	0.05
1971	29,950	1,623	0.05
1972	37,750	943	0.03
1973	37,600	837	0.02
1974	21,774	706	0.03
1975	23,100	1,438	0.06

→ The rather substantial decline in angler effort in 1974 and 1975 is significant. It is believed that the continual decline in success rates which started in 1968 provides the explanation for reduction in effort. The trophy fishery in the Kaslo area has been

suffering for a number of years. Essentially what appears to have happened in 1974 and 1975 is that while some anglers have lost interest, the more obvious point is a shift in interest from that of large trout to large Dolly Varden. This suggestion is supported by the substantial increases in effort for Dolly Varden in 1974 and 1975. It is evident - particularly in the winter and early spring months of 1974 and 1975 - that anglers have turned their interest and angling methods towards catching Dolly Varden. This is discussed in more detail below.

Monthly catch statistics for each area are tabulated at the end of this report. It is significant to note that in 1974 the highest success rate for rainbow trout was only 0.09 in July when the majority of the fish caught were two and three year olds. In 1975 rainbow fishing success did improve even though effort was much lower than normal. The C/UE^2 for the spring and fall months of 1975 improved to 0.05 compared to 0.02 in 1974. The months of April, May and June are still the most popular months for "trophy" rainbow fishing despite low success rates.

Kaslo Marina Data

NORTH ARM - Rainbow

The general decline of the north arm rainbow fishery can best be seen by reviewing data collected by the Kaslo Marina. Collection of fisheries data by the Kaslo Marina has continued daily since 1959 and although this census covers only 60-75 percent of the total fishing effort, it does serve as a good indicator of the fishery due to the consistency of records.

²C/UE - that ratio determined by dividing effort (rod hours) into catch.

Anglers fishing out of the Kaslo Marina primarily seek large rainbow. Since 1962 records from Kaslo indicate consistent fishing pressure as shown in the following table:

Actual Data Recorded by
Kaslo Marina (NORTH ARM - Rainbow)

<u>Year</u>	<u>Total Hours (All Species)</u>	<u>Rainbow < 14"</u>	<u>Rainbow > 14"</u>	<u>Total Rainbow</u>	<u>Rainbow > 15 lbs.</u>
1962	23,472	829	979	1,808	115
1963	26,353	1,222	976	2,198	158
1964	29,547	1,037	1,443	2,480	169
1965	26,028	839	1,255	2,094	93
1966	32,133	569	1,156	1,725	70
1967	34,339	617	838	1,455	102
1968	29,172	733	847	1,580	81
1969	32,789	508	900	1,408	61
1970	33,376	916	700	1,616	46
1971	29,168	534	620	1,154	101
1972	30,200	662	601	1,263	72
1973	34,118	278	333	611	44
1974	34,104	185	388	573	74
1975	34,401	242	419	661	88

It is quite evident from Kaslo Marina and Fish and Wildlife Branch data that rainbow catches in recent years have declined significantly. The catch of trophy fish (15 lbs. and larger) is particularly discouraging with 1971 being the only year in the last eight in which one hundred trophy fish have been recorded at Kaslo. On a slightly optimistic note the late fall and winter of 1975 closed quite strongly.

A plausible explanation for the downward trend in the north arm rainbow fishery can be seen by reviewing catch data and spawning run information. Presumably most of the north arm rainbow fishery is dependent upon the Gerrard stock of rainbow trout. A quick analysis

of the Gerrard rainbow spawning runs indicates a contradiction in trend. Whereas the north arm fishery is declining, the Gerrard spawning runs have been particularly good in the last four years.

Gerrard Rainbow Peak Counts³ Compared
With Total Rainbow Catch Recorded At Kaslo

<u>Year</u>	<u>Peak Count</u>	<u>Catch</u>
1957	44	
1958	107	
1959	210	
1960	152	
1961	214	
1962	258	1,808
1963	251	2,198
1964	234	2,480
1965	377	2,094
1966	249	1,725
1967	180	1,455
1968	178	1,580
1969	237	1,408
1970	203	1,616
1971	176	1,154
1972	238	1,263
1973	258	611
1974	287	575
1975	347	661

During the mid 1960's (62-66) sizeable runs were recorded at Gerrard. Consistent and coinciding with those large runs was a period of excellent fishing as reflected in the Kaslo data. This trend was not apparent for the period 1972-1975 when large runs were recorded at Gerrard. Indeed the poorest catches in fourteen years have been from 1973-1975.

³Peak counts at Gerrard generally reflect the magnitude of the total spawning population in any given year.

The low catches of rainbow trout in the vicinity of Kaslo cannot be entirely attributed to anglers switching their interest to Dolly Varden as previously discussed. The Gerrard data suggests that the downward trend observed at Kaslo is unrelated to long-term fishing exploitation. As discussed in the 1972-1973 census report (Andrusak, 1974) it is apparent that there has probably been a change in distribution of the fish perhaps in response to changes in water currents, temperature and/or flood distribution. These changes have occurred as a result of changes in discharge patterns of the Duncan and Kootenay Rivers due to the existent dams.

The theory that the fish have redistributed themselves is supported when the south portion fisheries are analyzed. During the fall of 1975 a highly unusual number of large trout were caught in the Queens Bay, Pilot Bay and Crawford Bay areas. For example, in the last week of November 1975 some ten fish were caught all in excess of twenty pounds. Most of these fish were recorded as north arm caught fish which explains the reason for the wide variance in estimated catch by the Fish and Wildlife Branch census for 1975 as compared to the Kaslo data. Good fishing was evident in the north arm but it is not reflected in the Kaslo data primarily because the catches were made in the southern part of the north arm, i.e., that area covered by the Fish and Wildlife census but not by the Kaslo data.

The decline in the north arm rainbow fishery can also in part be attributed to the loss of the Duncan River spawning run. Although no really good estimates were ever made of this run it appears that it probably ranged between 100-150 fish per year. The loss of this run has affected the trophy fishery to some degree.

Regardless of the extent of loss it has become evident that improvements are needed. Thus several releases of original Duncan River stock have been made into the lower Duncan River (thence into Kootenay Lake). These fish were progeny of spawners returning (1970-1971) to the Duncan River. It is hoped that the young fish will eventually return to the Duncan River for egg collection purposes. Also in 1975 some 11,000 Duncan River stock trout were artificially raised at Meadow Creek and released in the fall (1975). Provided that Duncan stock trout are available in the future this work at Meadow Creek will become an annual program. The purpose of this program is to artificially induce a spawning run of these large trout into the Meadow Creek spawning channel. This long-term program should ultimately make available more trout to anglers fishing on Kootenay Lake. The question remains as to where they will distribute themselves.

Dolly Varden

Dolly Varden fishing on the north arm of Kootenay Lake provide some excellent recreation, particularly during winter and spring months when large rainbow trout fishing is poor. Similar to the rainbow trout situation recent Dolly Varden catch statistics also indicate a decline in success rates.

Estimated Minimum Catch And Effort

<u>Year</u>	<u>Effort</u>	<u>Catch</u>	<u>Success</u>	<u>Incidental⁴ Catch</u>	<u>Total Catch</u>
1962					977
1963					515
1964			NOT AVAILABLE		876
1965					1,033
1966					1,015
1967					505
1968	9,200	520	0.06	518	1,038
1969	3,100	239	0.08	206	445
1970	2,550	305	0.12	395	700
1971	2,500	350	0.14	215	565
1972	2,024	138	0.07	375	513
1973	3,425	258	0.08	443	701
1974	8,193	369	0.05	158	527
1975	14,228	654	0.05	22	676

As mentioned previously there were significant increases in fishing effort for Dolly Varden in 1974 and 1975. It is believed the increased effort for this species was due to the continued poor success for rainbow trout - particularly at Kaslo. In fact this change in interest was expressed by numerous anglers interviewed in 1975. Although fishing methods for Dolly Varden are similar to that for rainbow trout there are some differences. Trolling for Dolly Varden is usually very close to the shoreline and the types of plug used are different from those used for rainbow.

Kaslo Marina Data

Dolly Varden

Catch records from Kaslo Marina indicate a gradual decline in Dolly Varden catch. In view of increased angling effort for Dolly Varden catches since 1968 have not been very good. The exception to

⁴Incidental catch - Those Dolly Varden caught by anglers specifically fishing for other species such as rainbow and kokanee.

this trend was the fall and winter of 1975 when a significant number of Dolly Varden were caught. This increase does not show however due to the very poor spring fishing in 1975.

Actual Data Recorded by

Kaslo Marina - NORTH ARM - Dolly Varden

<u>Year</u>	<u>Dolly Varden <14"</u>	<u>Dolly Varden >14"</u>	<u>Total Dolly Varden</u>	<u>Dolly Varden > 15 lbs.</u>
1962	44	657	701	N.A.
1963	42	566	608	N.A.
1964	99	745	844	14
1965	36	580	616	16
1966	113	588	701	15
1967	37	591	628	18
1968	25	686	711	31
1969	15	497	521	14
1970	59	636	695	12
1971	60	373	433	10
1972	87	542	629	10
1973	87	503	590	22
1974	180	485	665	20
1975	97	535	632	12

Without question the decline in the Dolly Varden catch is related to the construction of the Duncan dam. The Duncan River was the major producer of Dolly Varden for Kootenay Lake and substantial numbers can still be observed below the dam. The decline in the Dolly Varden fishery can be directly attributed to the loss of spawning habitat in the Duncan River system.

Fisheries management has no immediate plans for improvement to Dolly Varden stocks. In the near future some attempts may be made to restock two or three selected streams damaged by logging but a more intensive program will have to be conceptualized.

Kokanee

The most productive fishing on Kootenay Lake is the kokanee fishing on the north arm. The best fishing occurs from mid-June to mid-August with success usually over one fish per hour. The majority of angling effort is during July with virtually no fishing between September-May. Total estimated minimum catch in 1974 of 14,470 was the highest estimate in ten years.

The drop in fishing effort in 1975 is difficult to explain, particularly compared to 1973 and 1974. Further, with the availability of the three day licence for an additional 1.5 months in 1975 compared to 1974, it was expected that effort would greatly increase for kokanee. Certainly the 1.43 fish per hour ratio, the highest in ten years, wasn't a deterrent.

Estimated Minimum Catch And Effort

NORTH ARM - KOKANEE

<u>Year</u>	<u>Effort</u>	<u>Catch</u>	<u>Success</u>
1966	N.A.	7,610	
1967	5,500	8,900	1.35
1968	10,700	10,700	1.00
1969	6,100	4,900	0.80
1970	7,772	4,308	0.55
1971	7,392	9,372	1.27
1972	7,425	8,138	1.10
1973	12,990	12,489	0.96
1974	13,325	14,470	1.09
1975	9,056	12,957	1.43

The north arm kokanee stock is very lightly exploited. Almost all north arm fishing is by means of trolling with red magic, gang trolls and wedding rings being the most popular methods. Spin

casting for kokanee, which is very popular in the west arm, is uncommon on the north arm even though places such as Campbell Creek, Fry point and the Kaslo River offers kokanee in the late spring months.

The late summer of 1975 on the north arm was the site of a major kill of juvenile and sub adult kokanee. In the order of one-half million fish died probably as a result of severe wind action and temperature changes (ie., limnologically related kill). This kill is not expected to have any major effect on the north arm kokanee fishing.

SOUTH ARM

The south arm of Kootenay Lake for the purposes of the creel census program is that area south of the ferry crossing between Balfour and Kootenay Bay. Similar to the north arm, rainbow trout are the most sought after species in the south arm; Dolly Varden are of secondary importance but kokanee fishing to date has been relatively insignificant. Improved access and more resorts with better service on the south arm should result in substantial increases in fishing effort in future.

Estimated Minimum Catch And Effort

SOUTH ARM - KOOTENAY LAKE

<u>Year</u>	<u>Effort</u>	<u>Catch</u>
1967	7,500	2,334
1968	15,800	2,491
1969	20,200	3,230
1970	16,400	3,300
1971	22,600	4,260
1972	15,150	2,006
1973	22,500	5,254
1974	18,875	3,258
1975	15,600	3,258

Fishing methods on the south arm are similar to that on the north arm. During the spring, fall and winter large rainbow and Dolly Varden are sought by means of trolling large plugs and spoons. In recent years rainbow and Dolly Varden catches have improved and many fish have been caught exceeding twenty pounds. According to resort owners this was not the case just a few years ago. South arm fishing is severely restricted because of prevailing south winds and

limited numbers of wind sheltered areas. This limitation probably accounts for the fluctuations in effort from year to year. Fishing activities center around Boswell, Midge Creek and Crawford Bay.

Rainbow Trout

Rainbow trout fishing in 1974 and 1975 on the south arm could not be considered as being very good. Success ratios in the past four years have not been high compared to the late 1960's. It is too early to speculate whether or not a declining trend is evident. It is possible, for example, that discharge changes in the Kootenay River due to the Libby reservoir have caused changes in the fishing success of south arm anglers.

Estimated Minimum Catch And Effort

SOUTH ARM - RAINBOW

<u>Year</u>	<u>Effort</u>	<u>Catch</u>	<u>Success</u>
1968	12,300	2,350	0.19
1969	15,769	2,035	0.13
1970	12,635	2,163	0.17
1971	17,932	2,839	0.16
1972	13,137	1,442	0.11
1973	19,244	2,662	0.14
1974	14,843	1,664	0.11
1975	13,281	1,514	0.11

Catch levels from the south arm now appear to have levelled off, ie., in the early 1970's increased catches were noticeable and significantly more rainbow trout were caught in the south arm than the north arm.

The early spring fishing in 1975 was particularly poor both from a weather point of view as well as low success rates. In 1974 and 1975 the summer months of July-September provide the best opportunity for good rainbow fishing. The best areas for trophy rainbow fishing on the south arm in 1974 and 1975 were Pilot Bay, Cape Horn, Boswell, Blake and Midge Creek point.

Dolly Varden

On the south arm Dolly Varden are only lightly exploited with the majority of effort occurring from November-May. Most of the Dolly Varden fishing takes place in the area from Pilot Bay to Cape Horn and from Irvine Creek to Wilson Creek on the west side. Silver and gold Alaskan plugs seem to be the most successfully used plug.

Estimated Minimum Catch And Effort

DOLLY VARDEN - SOUTH ARM

<u>Year</u>	<u>Effort</u>	<u>Catch</u>	<u>Success</u>	<u>Incidental Catch</u>	<u>Total Catch</u>
1968	2,800	200	0.07	270	470
1969	3,360	391	0.12	74	465
1970	2,970	382	0.10	84	366
1971	3,960	587	0.15	53	640
1972	1,666	192	0.12	92	284
1973	1,139	128	0.11	204	332
1974	2,398	156	0.07	115	271
1975	1,062	81	0.08	101	182

The above catch statistics for Dolly Varden from the south arm illustrate two points:

1. That effort is very low.
2. Total catch is low and closely proportional to effort expressed. Again, as with the rainbow trout situation, there is a hint of a declining trend.

Kokanee

Unlike the north arm, the south arm kokanee fishing has been of little importance to date. Most of the fishing for kokanee is of the casual, summer-time trolling variety.

Estimated Catch And Effort

SOUTH ARM - KOKANEE

<u>Year</u>	<u>Effort</u>	<u>Catch</u>
1967	53	315
1968	718	414
1969	1,070	680
1970	784	636
1971	670	365
1972	339	190
1973	1,722	1,604
1974	1,631	848
1975	1,247	1,289

There is considerable potential for kokanee fishing on the south arm and anglers should be encouraged to utilize this particular species. For example, there is a good opportunity for kokanee fishing from the Balfour area along the shoreline to Irvine Creek.

Kootenay River Sturgeon Fishery

A unique sturgeon fishery exists on the Kootenay River from the Idaho border to the confluence of Kootenay Lake. This fishery has existed for many years but little information has ever been gathered on it. The only known information was that a few fishermen would place set lines in the river during the spring months. Reports of fish caught up to 300 lbs. occasionally trickled back to district Fish and Wildlife offices.

Until 1973 the only regulations which applied to sturgeon were a minimum size of 36 inches and one fish per day, two possession. Effective 1973 the regulation was changed so that any angler wishing a sturgeon must obtain a free permit. In 1974 it became compulsory to report results of the year's fishing. Due to the compulsory card return, it is now possible to obtain desired biological information. The following table summarizes data gathered thus far on the Kootenay River sturgeon fishery:

<u>Year</u>	<u>No. Permits</u>	<u>Average No. Days Fished</u>	<u>No. Fish</u>	<u>Percent Return</u>
1973	35	?	7	?
1974	64	12	10	78
1975	52	7.8	16	68

The 1973 results are incomplete because return information was not compulsory. The 1974 results are complete. The percent return figure means that 78% of the permits issued were correctly reported, ie., 22% of the permit holders did not report their results. The 1975 data is not quite complete since a few late reports were expected at the time of writing.

In 1974 most sturgeon fishermen used set lines and fished from early June to mid-August. Of the ten fish caught, the average size was 71 inches with a range of 48-96 inches. Mean weight was 125 lbs. with a range of 40-250 lbs.

During 1975 more fish were caught (16) including two caught by angling. Mean length was 72 inches with the range being 48-79 inches. Average weight was only 84.5 lbs. compared to 125 lbs. in

1974. The range of weights recorded in 1975 was 50-130 pounds.

No age analysis has been conducted on these fish since there has been little contact between Fish and Wildlife staff and the anglers. In future some age determination will be required and comparison of catches between Idaho and British Columbia would be useful.

WEST ARM

The west arm of Kootenay Lake extends from the Proctor lighthouse near Balfour downstream to the Corra Linn dam. The creel census however only covers that area between the Proctor lighthouse and the Harrop ferry. In some years other sections of the west arm are checked merely to gauge the growth of local fisheries such as the Nelson bridge winter kokanee fishery and/or the nine mile narrows summer kokanee fishery.

Considering that the annual creel census is confined to that area from the Proctor lighthouse to the Harrop ferry it must be realized that this small stretch of water is extremely productive. Indeed this area is probably the most intensively fished section of water in the interior of British Columbia. The uniqueness of the Balfour fishery is in that it not only provides intensive recreational opportunity but also quality. While fishing for burbot and kokanee is extensive, the rainbow and spring kokanee fishing can truly be a quality experience. Five sport fish species are available every month of the year; rainbow during the summer and fall, burbot in the fall, winter and spring, Dolly Varden in the late spring and kokanee every month of the year.

Until 1974 angling pressure at Balfour had been increasing at a phenomenal rate. Institution of the Special Lakes licence in April, 1974 combined with poor weather and Spokane's Expo caused a twenty-one percent decline in effort. This decline was short lived with fishing pressure in 1975 growing far beyond expected levels. The 133,700 hours recorded for 1975 was an incredible sixty percent increase over the 1974 fishing level and a fifty-four percent increase

over the 1968-1973 average. This increase in effort is more significant when it is realized that the 1975 estimates were very conservative due to the Fish and Wildlife Branch staffs' inability to cope with the tremendous increase in numbers of anglers. Normally census coverage is approximately eighty-five percent but in 1975 it was probably only 70-75 percent.

Growth of the West Arm fishery is illustrated in the following table:

Estimated Minimum Catch And Effort

WEST ARM (AREA 5 AND 6) KOOTENAY LAKE

<u>Year</u>	<u>Effort</u>	<u>Catch</u>
1968	72,500	68,100
1969	91,400	66,900
1970	68,300	37,700
1971	81,250	83,800
1972	100,600	73,400
1973	106,000	59,000
1974	84,100	82,800
1975	133,700	104,150

Fishing pressure at Balfour cannot continue to grow at rates of even twenty-five percent per year let alone 50-60 percent (1974 to 1975) per year without severe social conflicts. Also, it is doubtful that the exploited fish stocks can sustain this intensity of fishing much longer. Despite the measure to reduce angler effort by means of the Special Lakes licence, angling pressure apparently continued to increase. It may be necessary to institute further restrictive measures at Balfour in the near future. Seasonal closures, increased licence fees, limited entry fishery and gear regulation changes will

have to be contemplated. As an example, in 1976 one line per one angler will be imposed. This change will not affect numbers of anglers who fish at Balfour.

Areas 5 and 6

Within that area from the Proctor lighthouse to the Harrop ferry are two distinct sections of water which support two different types of fishing for kokanee, burbot and rainbow trout. Methods of fishing, seasonal differences in catch and perhaps even distinct fish populations are reasons for separating the area into two sections called area 5 and area 6. The Proctor lighthouse to the lower reaches of Fraser Narrows is known as area 5 while that section of water from Fraser Narrows to Harrop ferry is known as area 6.

Rainbow Trout - Area 5

Some very enjoyable fishing can be experienced during the summer months for west arm rainbow trout. Most of these trout are caught by fly fishermen in the warm months of August and September. These fish are usually 2-5 lbs. in size but it is not uncommon to catch them up to twelve pounds. These trout are racially separate from the Gerrard stock which inhabit the main lake. The west arm rainbow are known for their fighting quality and are often compared to steelhead. They are usually caught very early in the morning or at dusk with little success during midday.

Estimated Minimum Catch And Effort

RAINBOW - AREA 5

<u>Year</u>	<u>Effort</u>	<u>Catch</u>	<u>Success</u>
1967	17,200	4,000	0.23
1968	15,100	3,000	0.20
1969	12,500	2,050	0.16
1970	15,600	3,600	0.23
1971	11,460	2,610	0.23
1972	11,420	1,380	0.12
1973	17,150	2,650	0.15
1974	17,086	3,632	0.21
1975	21,488	2,957	0.14

A closure of January-June 30th was imposed in 1974 and 1975 to protect trout which spawn in the west arm. Also, the limits were dropped to five per day and ten possession. Neither regulation has had any significant effect on catch and/or effort. The closure is important in that it protects vulnerable spawners.

The 1974 rainbow fishery was very good particularly as the summer progressed. In fact success rates progressively improved from July to September. Effort for rainbow in 1975 rose considerably but there was not a concomitant increase in catch. In 1975 success was best in July with the typical late summer fishing never really materializing. Lack of insect hatches in August was very noticeable and this caused reduction in fly fishing success.

It is still evident that a converse relationship exists between kokanee and rainbow fishing. That is, when the kokanee fishing extends into August then a conflict occurs between trolling kokanee fishermen and boat drifting rainbow fly fishermen. When kokanee fishing finishes early as it did in 1975 (finished by end of July)

then rainbow effort is higher than it would otherwise be. This trend is a reflection on anglers preference for uncrowded fishing conditions when seeking rainbow trout.

Rainbow Trout - Area 6

Unlike rainbow fishing in area 5 which is predominately fly fishing, anglers fishing in area 6 tend to troll or shorefish with float and bait. The exception to this was in August, 1974 when fly fishing was very popular immediately below Fraser Narrows on the Proctor side.

A relatively new area which is receiving increased fishing effort is the Harrop narrows. In 1974 and 1975 some excellent fishing was reported in this area.

Estimated Minimum Catch And Effort

RAINBOW TROUT - AREA 6

<u>Year</u>	<u>Effort</u>	<u>Catch</u>	<u>Success</u>
1967	620	123	0.19
1968	2,050	484	0.24
1969	1,500	440	0.29
1970	1,069	324	0.31
1971	1,293	253	0.20
1972	1,775	486	0.27
1973	590	203	0.34
1974	1,227	385	0.31
1975	1,295	327	0.25

Fishing effort in area 6 remains surprisingly low considering the high success which anglers consistently achieve from year to year. It is apparent that anglers prefer to fish the traditional spots within area 5 despite lower success rates. As crowding increases in area 5, more effort will be directed into area 6.

Kokanee - Area 5 and 6

The kokanee fishery at Balfour is unquestionably the most productive sport fishery in the interior of British Columbia. Total catch is now edging upwards into the vicinity of 100,000 fish per year.

Estimated Minimum Catch And Effort

KOKANEE - AREAS 5 AND 6

<u>Year</u>	<u>Effort</u>	<u>Catch</u>	<u>Success</u>
June-December 1966	4,000	3,300	0.83
January-December 1967	12,550	9,950	0.79
" 1968	37,650	36,430	0.97
" 1969	56,600	30,050	0.53
" 1970	37,000	22,850	0.62
" 1971	48,600	58,500	1.20
" 1972	59,270	52,000	0.88
" 1973	80,228	48,700	0.61
" 1974	54,500	68,000	1.25
" 1975	103,650	92,300	0.89

Some changes have occurred in the timing of the fishery. Local anglers have been successfully exploiting kokanee during the winter and spring months. All of this fishing is by means of spin casting using a "deadly dick" lure plus maggots or corn. The summer fishing is predominately trolling with gang trolls and a new multiple lure called a "wedding ring".

In the spring of 1975 a highly productive kokanee fishery developed in the vicinity of the Harrop ferry. Average success was over two fish per hour but on many occasions individual success was close to ten/hour.

Until 1975 the "peak" of the kokanee fishery had consistently been during mid-July. In 1975 the peak was in the latter part of June.

It is possible that this change was caused by intensive fishing pressure and also due to more effort expressed earlier in the year. This trend will have to be watched closely in the future.

Despite the considerable growth of this fishery within the short span of ten years the kokanee population to date does not show any symptoms of being unable to sustain itself. Even in 1975 when the catch rose dramatically there was no indication of over fishing. Very close scrutiny of the 1975 catch was made including age determination at various times of the year. Three key points require emphasis:

1. A substantial fishery at the outlet of the lake near the "ling beds" was in fact exploiting north arm kokanee. Age analysis indicates these kokanee, most of which were caught in June and early July, were four year olds and have growth increments characteristic of north arm stock. It was roughly estimated that some 15,000 of these fish were caught in 1975.

2. Small kokanee (15-20cm) caught below Fraser Narrows during July were in fact II+ fish with first summer growth characteristic of west arm kokanee. These fish were in fact mature fish.

3. The great majority of west arm kokanee caught in any given year are three years old. The very large kokanee appear to be four and five year olds but certainly the majority of fish are spawning as three year olds. Analysis of the catch statistics reveals a cyclical pattern based on a three year life cycle, i.e., year class strength appears to be reflected in the catch statistics.

While several assumptions have to be made and oversimplification is necessary, the following analysis of catch success ratios is worthy of consideration.

<u>Year</u>	<u>Year Class A</u>	<u>Year Class B</u>	<u>Year Class C</u>
1966			0.83
1967	0.79		
1968		0.97	
1969			0.53
1970	0.62		
1971		1.20	
1972			0.88
1973	0.61		
1974		1.24	
1975			0.89

Year class A appears to be a "weak" year class compared to year class B and C. Year class C evidently is at least of "average" strength while year class B appears to be "strong".

Escapement to tributary streams also provides some information on year class strength. Visual estimates and actual counts have been made on Redfish Creek and Kokanee Creek for several years.

The following is a summary of these observations:

<u>Year</u>	<u>Year Class</u>	<u>Spawning Runs in Redfish and Kokanee Creeks</u>	<u>Redfish Creek Peak Counts</u>
1969	C	poor	
1970	A	average	
1971	B	good	
1972	C	good	4,500
1973	A	poor	1,300
1974	B	very good	5,300
1975	C	very good	3,850

Evidently year class A is associated with poor-average runs.

Year class B according to the spawning run data can be rightfully

classified as a strong year class. It is also evident that year class C is fairly strong. Escapement to Redfish Creek in 1974 and 1975 was very good. The 1975 run was also significant in that some 3,000 fish (peak count) also spawned in Harrop Creek which normally does not support any number of kokanee.

In summary it is apparent that the Balfour kokanee fishery is to a large degree dependent upon year class strength. It can be expected that the 1976 fishery will be mediocre. Despite the fact that all data indicates the fishery is sustaining itself it is not realistic to expect this to continue indefinitely. Ever increasing fishing pressure and continual degradation of spawning habitat - particularly at Redfish Creek - will soon cause a decline in British Columbia's best sport fishery. The unknown factor is the contribution of the vast north arm stock to the west arm fishery.

West Arm Whitefish - Area 5

The only area on Kootenay Lake where whitefish are actively sought is in the vicinity of the Fraser Narrows and the Government ferry dock. During 1975 a few whitefish were caught in area 6 but the majority are caught in area 5.

The whitefish fishery can be highly productive with success ratios as high as eight/hour. However this fishery, which was quite popular in the late 1960's, has virtually disappeared now. The well published die-off of 1969 has been primarily responsible for the decline in interest. Prior to the die-off fishing effort rose to 5,500 hours (1969) and a catch of 17,000 fish in 1968. Since the die-off angler effort has been reduced to virtually nothing despite the fact that whitefish are quite abundant at Balfour.

Estimated Minimum Catch And Effort

WHITEFISH - WEST ARM AREA 5

<u>Year</u>	<u>Effort</u>	<u>Catch</u>	<u>Success</u>
1967	1,400	5,500	3.75
1968	4,550	17,000	3.74
1969	5,472	11,000	2.00
1971	1,687	3,933	2.33
1972	877	887	1.01
1973	759	819	1.08
1974	162	72	0.44
1975	1,124	903	0.80

The increase in fishing effort during 1975 cannot be considered with any optimism. Most of this fishing took place in August when the kokanee were finished and rainbow trout fishing (mid-afternoon) was poor. The traditional winter fishery for whitefish has not returned. Considering that winter kokanee fishing in 1974 and 1975 was so good it is not surprising that anglers show little interest in whitefish. It will be interesting to observe any renewed interest in 1976 when the kokanee fishery is not expected to be very good.

West Arm - Areas 5 and 6

Dolly Varden

Dolly Varden inhabiting the west arm are sought by a few local people during May and June. In areas 5 and 6 this species is available during high water just below Seventeen Mile Narrows, at the Government wharf near Balfour and also at the outlet of the main lake in the vicinity of the "ling" beds. Total catch in recent years has been less than two hundred although many local people report that this species was considerably more abundant in the 1950's.

In the latter part of 1975 two large Dolly Varden (15 and 20 lbs.) were caught at Balfour. These fish were likely north arm stock.

West Arm - Area 5

Burbot

Burbot (ling) fishing at Balfour is a unique experience for freshwater anglers. Ling are jigged in approximately 60-100 feet of water in a small, restricted area at the outlet of the main lake. Boats are found anchored in this area from February-June and anglers can be seen jigging for ling using worms on large triple hooks. Often red wool and/or painted hooks appear to improve anglers' success.

Good fishing success also seems to be related to high water conditions in May-June. For example, the lake never attained normal high water levels in 1973 and angler success was low. Similarly in 1975 high water was late (early June) thus success was low until mid-May.

Estimated Minimum Catch And Effort

BURBOT - WEST ARM - AREA 5

<u>Year</u>	<u>Effort</u>	<u>Catch</u>	<u>Success</u>
1967	7,500	7,567	1.00
1968	12,700	10,575	0.83
1969	14,550	21,600	1.48
1970	13,200	7,400	0.56
1971	17,971	17,206	0.96
1972	26,400	15,775	0.60
1973	6,900	1,921	0.28
1974	9,100	9,177	1.01
1975	6,048	5,668	0.94

Of any exploited fish population inhabiting Kootenay Lake the burbot population is the one most potentially vulnerable to over fishing. The mean age of fish captured in the fishery has been seven years old with a mean length of 70-75 centimeters. Because these fish are relatively old and slow growing caution must be exercised in the harvest of this species. As a precaution the fishery since 1972 has been closed from July 1st - September 30th each year to ensure escapement.

Reduction in angler effort in 1974 and 1975, despite high success ratios, was probably due to new licence fees for non-residents imposed April, 1974. Perhaps reduced effort and concomitant catch reduction is a blessing in disguise until the dynamics of the population are better understood.

West Arm Angler Composition

The following table provides information on residence of angler fishing at Balfour:

<u>Year</u>	<u>No. Anglers Checked</u>	<u>Percent Non-Canadian</u>	<u>Percent Non-Resident Canadian</u>	<u>Percent Resident</u>
1968	3,319	45.0	4.0	51.0
1971	4,762	60.2	3.5	36.3
1972	5,158	70.2	3.8	26.0
1973	5,636	66.8	4.7	28.5
1974	4,455	30.7	7.9	61.3
1975	5,950	34.5	10.0	55.5

The effect of the Special Lakes licence is reflected in the composition of the 1974 results, ie., the non-Canadian composition fell from 60-70 to thirty-one percent. Conversely of course the

resident composition increased. The gradual increase in non-resident Canadians is not surprising and this percentage will very likely increase in future.

Gradual acceptance of the Special Lakes licence is anticipated. The increase from 1974 to 1975 in non-Canadian use at Balfour was predicted. Further increases are likely particularly if the burbot fishery starts early in 1976.

West Arm Area 8 - Nelson Bridge Kokanee Fishery

A very productive kokanee fishery has developed in recent years below the City of Nelson highway bridge. It was first observed in 1971 and the fishery usually starts in mid-December and continues until about mid-March. A scheduled census check was conducted in 1973 and periodic casual checks in 1974 and 1975. In 1974 and 1975 there were usually 5-8 boats per weekday and 10-15 boats per weekend day. Limit catches were consistently achieved in 1-2 hours. Taking this information into account plus census checks the following catch estimates have been made.

<u>Year</u>	<u>Month</u>	<u>Estimated Effort</u>	<u>Estimated Catch</u>
1970	December-March	Nil	Nil
1971	" "	?	12,500
1972	" "	?	?
1973	" "	1,655	1,650
1974	" "	?	10,000
1975	" "	?	19,000

The kokanee captured in this fishery are 2+ fish characteristic of West Arm stock. They ranged in size from 20-25cm. but occasionally a 2-3 lb. fish is caught.