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Evidence of the natural propagation of goldeye, *Amphiodon alosoides*, in the upper South Saskatchewan River.

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INTRODUCTION

The consensus of opinion among local sports fishermen along the upper reaches of the South Saskatchewan River is that fishing is becoming progressively poorer each year. Many complaints have been forwarded to the Provincial Departments from angling clubs and individuals which outline the decline in availability of fish and in most instances point to the Saskatoon dam as the causal factor. Evidently it is felt that the dam acts as a barrier to the upstream movement of certain species and thus, limits repopulation of the waters above the dam, and that natural propagation in the area is insufficient to maintain the population at the present fishing intensities.

An extensive research programme would be required to assess accurately the importance of this dam in the apparent depletion of fish in the upper reaches of the South Saskatchewan River. On the other hand, a brief survey could determine whether natural propagation above the dam was sufficient to sustain a regulated sport fishery.

With regard to the latter, a series of seine hauls was made along 130 miles of the Red Deer and South Saskatchewan Rivers between Atlee, Alberta and Pennant, Saskatchewan. The survey was carried out between July 18 and 23, 1948 in company with Dr. K. H. Doan, Acting Director of the Central Fisheries Research Station, Winnipeg, Manitoba. The principle followed was to determine the availability of fry of one specific species, which was reported to be decreasing in abundance in the area, and to compare the data with that obtained for the same species

in other areas where more extensive surveys had been completed. For this purpose the goldeye, Amphiodon alosoides, was chosen, as this species filled the requirements outlined above.

SURVEY DATA

Several sweeps with a 30-foot 1/2-inch mesh seine were made at Atlee Ferry located on the Red Deer River 40 miles upstream from its junction with the South Saskatchewan River, at Estuary, situated 5 miles below the junction of the rivers, and at Pennant Ferry which is approximately 90 miles below the junction. In addition, seine hauls were taken in both the Red Deer and South Saskatchewan Rivers at the town of Empress which stands between the rivers 2 miles above their junction.

A total of 14 species of fish was obtained during the survey comprised of goldeye, pike, Esox lucius, pike-perch, or pickerel, Stizostedion vitreum, sauger, Stizostedion canadense, common sucker, Catostomus commersonii, northern redhorse, Moxostoma aureolum, quillback sucker, Carpiodes cyprinus, lake shiner, Notropis atherinoides, spot-tail minnow, Notropis hudsonius, flat-head chub, Platygobio gracilis, trout-perch, Percopsis omiscomaycus, brook stickleback, Eucalia inconstans, longnose dace, Rhinichthys cataractae cottid, Cottus ricei. The species obtained and the relative abundance of the species differed at each locality (table 1.). This was to be expected since the areas which could be seined satisfactorily at each locality differed slightly in the type of bottom present, depth

of water, and rate of flow. Goldeye fry were obtained at four of the six localities where seine hauls were made, and were present in all but one individual haul made in the four localities where they were found.

Sixty goldeye fry were obtained during the survey and these ranged from 27 to 44 millimeters in fork length and from 0.1 to 0.9 grams in weight (table 11.). The average length of the specimens was 36.4 millimeters and the average weight was 0.41 grams.

DISCUSSION

In the sections of the Red Deer and South Saskatchewan Rivers investigated, the distribution of goldeye fry was related directly to the turbidity of the water. The water of the Red Deer River at Atlee Ferry and Empress, Alberta was very muddy, while the South Saskatchewan River at Empress was much clearer. The two rivers joined just below Empress and for several miles downstream the waters maintained their identity with a band of muddy water flowing along the north shore and a band of clearer water flowing along the south shore. The lines of demarcation gradually diffused downstream and the widths of the shore bands decreased. The separation of the waters was obvious at Estuary which was five miles below the junction, while mixing was complete at Pennant Ferry situated 90 miles below the junction.

Goldeye were obtained in the muddy Red Deer River at Atlee Ferry and Empress, but no spedimens were obtained in

the clearer South Saskatchewan River at Empress. At Estuary, goldeye were seined along the muddy north shore but were not found along the clearer south shore. At Pennant Ferry, specimens were taken in the thoroughly mixed water along the south shore.

The presence of goldeye fry in the upper reaches of the South Saskatchewan River system in mid-July showed that successful spawning occurred above the dam at Saskatoon. Goldeye spawn in June in this region and it is improbable that the fry could have originated below the dam, ascended the fish ladder in the dam and travelled between 200 and 300 miles to the Alberta border by mid-July. It must be assumed that either some adults ascend the ladder each spring and spawn above the dam, or more likely, that there is a permanent goldeye population above the dam which is propagating itself successfully.

It has been brought to the author's attention on several occasions that because the goldeye of Western Canada has become popularized as "Lake Winnipeg Goldeye" people are led to believe that this lake is the normal habitat of the species and that specimens obtained in other localities have migrated from this region. Further, some people have considered that this is an annual spring spawning migration. This has been disproved in many instances by data obtained across the Prairies during the past three years. However, it is possible that this misconception of the habits of goldeye has led many sportsmen to assume a plausible cause and effect between the dam and the

recent decrease in availability of goldeye in the waters above the dam.

Local residents in the areas visited during the survey were not in complete agreement regarding changes in the availability of fish in recent years. Some considered that fish were less abundant immediately following construction of the dam, and some were not sure when the dam had been built, but felt that it was responsible for the observed decrease in availability. Others stated that the number of fish in the rivers was declining rapidly, even prior to construction of the dam, and that there was no noticeable change which could be attributed directly to the dam. This disagreement indicates that factors other than the dam may have played a significant role in the apparent depletion of fish in the waters of the Alberta-Saskatchewan border region.

The goldeye fry were obtained more readily in this survey than in several other areas where extensive seining operations have been carried out. For example, numerous seine hauls have been made in the Saskatchewan River from the Pas, Manitoba to Cedar Lake, a distance of approximately 100 miles. The availability of goldeye fry in this region is much lower than was found in the Red Deer and South Saskatchewan Rivers, and yet considerable numbers of adults are taken each year and a small commercial fishery is sustained in The Pas district.

CONCLUSIONS

The results of the present survey can not be used to clarify the problem of the direct importance of the dam at Saskatoon as a barrier to the upstream movement of fish. In fact, proof that this problem exists should be irrevocably substantiated before any extensive research programme is inaugurated. However, it has been shown that at least one species, namely goldeye, which is an important fish in the fishery of the upper South Saskatchewan River is being maintained by natural propagation and be considered to be independent of the dam. It is probable that natural propagation of goldeye above the dam is sufficient to sustain a suitable population for a regulated sport fishery and that the dam is of not more than minor importance as a causal factor in the apparent depletion of goldeye in the area.

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Table 1. The contents of seine hauls made in the Red Deer and South Saskatchewan Rivers from Atlee, Alberta to Pennant, Saskatchewan between July 18 and 23, 1948.

Locality	Number of hauls	Species													
		Goldeye	Northern pike	Pike-perch	Sauger	Common sucker	Redhorse sucker	Quillback sucker	Lake shiner	Spottail minnow	Flathead chub	Trout-perch	5-spined stickleback	Long-nose dace	Sculpin
Atlee Ferry, Alberta (Red Deer River)	5	19	✱	✱	1	✱	1	1	✱	✱	✱	✱	✱	1	✱
Empress, Alberta (Red Deer River)	5	14	1	1	-	8	-	-	47	9	73	-	-	9	-
Empress, Alberta (S. Saskatchewan R.)	5	0	-	-	-	-	-	-	147	22	28	1	-	4	-
Estuary, Saskatchewan (S. Saskatchewan R.) North shore	3	19	-	1	-	-	-	-	241	11	4	19	-	-	2
South shore	3	0	-	-	-	-	4	-	253	1	35	-	-	2	-
Pennant Ferry, Sask. (S. Saskatchewan R.)	3	8	-	5	-	17	13	-	12	-	-	-	1	-	-
Total	24	60	1	7	1	25	18	1	483	33	140	20	1	16	2

✱ Other species were obtained but were not recorded from this locality.
1 Large numbers of these species were obtained in one haul and were not counted.

Table 11. Analysis of the length and weight of goldeye fry taken in seine hauls made in the Red Deer and South Saskatchewan Rivers between July 18 and 23, 1948.

Locality	Date	Number of specimens	Fork length in mm's. Range	Total	Average	Weight in grams Range	Total	Average
Atlee, Alberta (Red Deer River)	July 18	19	31-40	673	35.4	0.2-0.5	6.0	0.32
Empress, Alberta (Red Deer River)	July 19	14	27-43	478	34.1	0.1-0.7	4.6	0.33
Estuary, Saskatchewan (S. Saskatchewan R.)	July 19	19	33-45	703	37.0	0.3-0.9	9.1	0.48
Pennant, Saskatchewan (S. Saskatchewan R.)	July 23	8	37-44	328	41.0	0.5-0.8	4.9	0.61
Total		60	27-45	2,182	36.4	0.1-0.9	24.6	0.41