Food of the Coarse-Scaled Sucker (*Catostomus macrocheilus* Girard)

By G. Clifford Carl
Pacific Biological Station

(*Received for publication September 8, 1936*)

ABSTRACT

Examination of 167 specimens shows that immature fish feed upon planktonic forms while mature fish feed upon larger bottom organisms and bottom detritus. The diet varies with habitat and season, depending upon what is available. Since it eats the spawn of salmonids and takes much the same food organisms as they do, its presence in waters containing important salmonids is undesirable.

INTRODUCTION

The problem of the relation of so-called coarse fish to the production of game and commercial fish is one which calls for a great deal of careful investigation. A fundamental phase is the study of the foods and food-chains of all the species involved and the present report on the food of the coarse-scaled sucker, *Catostomus macrocheilus* Girard, is a contribution in this regard. As far as the writer is aware, no data are available on the food of this fish. For the eastern common or white sucker, *Catostomus commersonii* (Lacépède), a considerable amount of information is available as a result of the publications of Forbes (1890), Reighard (1915), Pearse (1918), Clemens and associates (1923), Bigelow (1923), Stewart (1926) and others.

MATERIAL

The material examined consists of the digestive tracts of 167 individuals, and the record of 31 specimens of the fine-scaled sucker, *Catostomus catostomus* (Forster), from Eagle river is given for comparison. The suckers were collected by Dr. D. McCaffrey from Blue lake, Princeton, in 1933 and 1934, by Mr. W. F. Baxter in Eagle river at Malakwa in 1932 and 1933, by Dominion fishery officers in various parts of the province and by Dr. W. A. Clemens in Shuswap lake and Okanagan lake (as well as Woods and Duck lakes). The data in regard to the latter fish (48 specimens) will be used in the report on the Okanagan survey but are presented here also, in order to give a more complete picture. Dr. C. McC. Mottley kindly supplied the data on the food of the Kamloops trout, *Salmo gairdneri kamloops* Jordan. The writer is greatly indebted to all these persons. The study was carried out in part in the Department of Zoology of the University of British Columbia and in part at the Pacific Biological Station and the facilities provided are much appreciated.

METHODS

Since the alimentary tracts contained numerous small organisms mixed with considerable quantities of sand and bottom ooze, it was impracticable to attempt to measure the food material or the actual volume of the individual constituents. Hence the investigation was confined to the identification of the organisms occurring, to actual counts of individuals in the case of young fish and to a record of the number of tracts containing each food item. In addition there was recorded the presence of bottom ooze (detritus) and sand, as indicating bottom feeding.

DISCUSSION OF RESULTS

The results of the examinations are given in tables I, II, III and IV.

TABLE I. List of food organisms and other materials found in the digestive tracts of the coarse-scaled sucker, *Catostomus macrocheilus*

	PLANTS
Filamentous algae:	*Nostoc, Spirogyra, Mougeotia, Ulothrix, Chara.*
Desmidiaceae:	*Closterium.*
Diatomaceae:	*Synedra, Navicula, Fragillaria, Surirella, Tabellaria, Melosira.*
Bryophyta:	*Selaginella, Sphagnum.*
	ANIMALS
Protozoa:	*Difflugia.*
Annelida:	*Lumbriculus.*
Bryozoa:	*Plumatella polymorpha.*
Ostracoda:	Two unidentified species.
Copepoda:	*Epischura nevadensis, Diaptomus ashlandi, Cyclops bicuspidatus, Cyclops viridis, Canthocamptus minutus.*
Cladocera:	*Daphnia longispina, Acroperus harpae, Scapholeberis mucronata, Pleuroxus denticulatus, Pleuroxus* sp., *Bosmina longispina, Eurycercus lamellatus, Chydorus sphaericus, Alona costata, Alona affinis, Leptodora kindtii, Leydigia quadrangularis.*
Amphipoda:	*Gammarus limnaeus, Hyalella azteci.*
Hydracarina:	Two unidentified species.
Insecta:	Plecoptera nymphs, Ephemerida nymphs, Odonata (including *Ischnura* sp. nymphs), Hemiptera (*Corixa* sp.), Trichoptera (*Setodes* sp., *Hydropsyche* sp., and other larvae), Simuliidae larvae, Culicidae (*Chaoborus* sp. larvae), Chironomidae larvae, Tipulidae larvae.
Mollusca:	*Planorbis* sp., *Gyraulus vermicularis, Valvata lewisi, Cochliopa* sp., *Musculium truncatum.*
	MISCELLANEOUS
	Insect eggs, fish eggs (*Oncorhynchus nerka kennerlyi*), wood fibres, seed capsules, conifer needles, organic detritus, sand, gravel.

TABLE II. Comparison of diet of immature and mature *C. macrocheilus*, based upon percentage of occurrences.

	Immature fish		Mature fish	
	Shuswap lake 42 stomachs	Okanagan lakes 22 stomachs	Blue, Fraser and Tabor lakes 43 stomachs	Okanagan lakes 20 stomachs
	%	%	%	%
Ostracoda	55	4	11	30
Copepoda	67	17	3	55
Cladocera	98	38	5	45
Amphipoda	0	0	12	5
Hydracarina	50	4	7	15
Aquatic insect larvae	94	85	80	85
Terrestrial insects	7	0	7	10
Mollusca	0	0	20	10
Plants, diatoms, algae	10	17	16	40
Detritus	72	61	85	80

TABLE III. Percentages of occurrences of various food items in the diet of *C. macrocheilus* from different localities and at different seasons, and also of *C. catostomus*.

	Lake fish			Stream fish	
	C. macrocheilus			*C. macrocheilus*	*C. catostomus*
	June-July Blue lake 32 fish	July-Aug. Okanagan 20 fish	Nov.-Dec. Cluculz 12 fish	Oct.-Nov. Eagle R. 20 fish	Oct.-Nov. Eagle R. 31 fish
	%	%	%	%	%
Ostracoda	19	35	0	0	13
Copepoda	0	60	8	0	6
Amphipoda	16	5	50	0	0
Trichoptera	50	45	33	15	19
Chironomidae	56	85	100	50	54
Other aquatic larvae	40	15	25	85	29
Mollusca	37	10	67	0	0
Fish eggs	0	0	58	20	0
Diatoms	22	10	0	25	10
Algae	12	5	25	85	42
Sand	0	55	33	15	42
Detritus	87	85	75	35	35
No food	0	0	0	20	19

TABLE IV. Comparison of diet of adult suckers (*C. macrocheilus*) and Kamloops trout (*Salmo gairdneri kamloops*)

	Percentage occurrence in 241 stomachs of Kamloops trout (Paul lake)	Percentage occurrence in 87 stomachs of coarse-scaled sucker (Blue, Cluculz and Okanagan lakes)
Hirudinea	5	0
Ostracoda	0	15
Copepoda	3	15
Cladocera	5	16
Amphipoda	55	14
Hydracarina	0.5	10
Aquatic insects	48	78
Terrestrial insects	15	4
Mollusca	10	25
Plants: diatoms, algae	6	38
Detritus	0	72

An examination of these results indicates that the food of the coarse-scaled sucker consists almost entirely of bottom forms and of organisms associated with bottom vegetation.

In the case of the immature fish the greater part of the food is made up of plankton organisms and aquatic insect larvae mixed with small quantities of bottom ooze. The planktonic forms include Cladocera, Copepoda, Hydracarina and Ostracoda, while the insect larvae are those of Chironomidae, Trichoptera and Ephemerida. The habitat of all of these organisms is on or near the bottom.

Stewart (1926) points out that in the development of the eastern sucker five periods may be distinguished on the basis of its feeding activities, namely, yolk-food period, top-feeding period, critical period, fingerling period and adult period. Some of these can be correlated with the change of the mouth from a terminal to an inferior position. This investigator presents data to show that after the yolk-sac is absorbed, the young feed on planktonic forms near the surface, then as the mouth descends the fish include organisms associated with the bottom until, in the fingerling stage, the diet is made up almost entirely of bottom animals and plants. The examination of the material from the immature Shuswap lake suckers shows that these fish are comparable to those of the fingerling stage as recognized by Stewart, inasmuch as the food of both species at this stage appears to be very similar.

The food of the mature coarse-scaled sucker resembles that of the young; the same types of organisms are found in the digestive tracts of both but in different relative amounts. Large quantities of bottom ooze and associated organisms such as Chironomidae larvae, Mollusca (snails, small clams) and Amphipoda are taken, while planktonic animals occur only in a few cases and in small numbers. The occurrence of the larger organisms as items of diet is no doubt related to the larger size of the fish. The quantities of bottom ooze in most of the specimens examined shows that the mature sucker feeds directly

off the bottom, and the character of the food materials indicates that it does not select its food.

The change in diet as between young and mature fish is shown in table II, which includes data from suckers from Shuswap, Blue and Tabor lakes, the Fraser river and some Okanagan lakes. In the case of the latter, the results do not show such a pronounced change as do those from the other localities because of the smaller size differences between the two groups of fish.

Variation of Diet with Habitat and Season

Since the sucker material was gathered from several different localities and at different seasons of the year, the contents of the alimentary tracts show corresponding differences. These variations are shown in table III, which also includes material from 31 specimens of the fine-scaled sucker for comparative purposes. The diet of the fish collected from the various lakes is very similar except for differences resulting from the seasonal variations of organisms. Seasonal forms such as ostracods, copepods and aquatic insect larvae are found more often in the fish collected during the summer months than in those taken later in the year. The diet of the lake fish differs considerably, however, from that of fish taken from streams. Stream fish appear to feed upon more algae, diatoms and aquatic insect larvae other than Chironomidae, while lake fish include Amphipoda and Mollusca. The differences are evidently not due to choice but to circumstance, since the organisms devoured by the fish are those which are peculiar to the habitat. This conclusion is substantiated by the fact that there is very little difference shown between the diets of the two species of suckers collected from Eagle river.

The Sucker as a Food Competitor

The food of the coarse-scaled sucker consists of organisms which also constitute part of the diet of commercial and game fishes. Foerster (1925) found that the food of yearling sockeye salmon, when migrating from lakes, consisted of chironomid and other insect larvae together with plankton organisms such as Copepoda and Cladocera. A similar diet has been shown for the Kamloops trout by Mottley and Mottley (1932). In table IV are presented data showing the overlapping of food materials taken by mature suckers and Kamloops trout, particularly evident in the cases of Amphipoda, Mollusca and aquatic insect larvae.

The Sucker as a Spawn Eater

Besides the competition for food which appears to exist between suckers and commercial and game fishes, there is also the spawn-eating habit of the former to be considered. Stewart (1926) concludes from his investigation that fish eggs are rarely taken by the Eastern species. However, Atkinson (1931) reports the destruction of the eggs of the grey trout, *Cristivomer namaycush* (Walbaum), by this species. The present data show that the coarse-scaled sucker feeds upon fish eggs on occasion. Over half of the specimens from Cluculz

lake contained one or more fish eggs and several fish collected in Eagle river were gorged with eggs, the gut of one containing 125 undigested as well as the remains of many more. The eggs in the latter case were probably those of the kokanee, *Oncorhynchus nerka kennerlyi*, since these fish were spawning at the time of collection (October and November). It is interesting to note that the fine-scaled suckers, which were collected at the same time and place, showed no evidence of having fed upon salmon eggs.

CONCLUSION

The common sucker of British Columbia does not appear to possess any qualities making it a desirable species. Analyses of the intestinal contents of both fingerlings and adults show that the sucker subsists upon food organisms which also constitute part of the diet of the more valuable fishes. It should therefore be recognized as a serious competitor with them for food. The analyses have also shown that the adult sucker feeds upon the eggs of some of these fishes to such an extent that it should also be considered as a predator. Consideration of these facts shows that the presence of this coarse fish in waters containing commercial and game fish is undesirable.

REFERENCES

ATKINSON, N. J. *Trans. Amer. Fish. Soc.* **61**, 183, 1931.
BIGELOW, N. K. *Univ. Tor. Stud. Biol. Ser.* **24**: *Pub. Ont. Fish. Res. Lab.* **21**, 1923.
CLEMENS, W. A. AND OTHERS. *Univ. Tor. Stud. Biol. Ser.* **22**: *Pub. Ont. Fish. Res. Lab.* **16**, 1923.
FOERSTER, R. E. *Contr. Canad. Biol.* **2** (2) 335-422, 1925.
FORBES, S. A. *Bull. Ill. State Lab. Nat. Hist.* **2**, 433-473, 1890.
MOTTLEY, C. McC. AND J. C. MOTTLEY. *Biol. Bd. Can. Prog. Rep. Pac.* **13**, 8-12, 1932.
PEARSE, A. S. *Bull. U.S. Bur. Fish.* **35**, 249-292, 1918.
REIGHARD, JACOB. *Bull. U.S. Bur. Fish.* **33**, 215-249, 1915.
STEWART, N. H. *Bull. U.S. Bur. Fish.* **42**, 147-184, 1926.