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CONCENTRATIONS OF DUCKS ON SOME OF THE TROUT STREAMS OF THE NORTHERN PART OF THE LOWER MICHIGAN PENINSULA DURING THE 1934 - 1935 WINTER.

Winter investigations — During the 1934-1935 winter several field trips were made by various members of the Institute for Fisheries Research staff into the trout stream country of the lower Michigan peninsula. Most of the investigations centered about the North Branch of the Au Sable at Lovells, Crawford County; the South Branch of the Au Sable from the Chase bridge upstream 3 miles (R. 2 W., T. 25 N.) Crawford County; Pigeon River from Lansing Club north 5 miles (R. 1 W., T. 32 N.) Otsego County; Canada Creek, 3 miles of stream (R. 2 E., T. 33 N.) Presque Isle County; and West Branch of the Sturgeon from Wolverine upstream 10 miles, Cheboygan County.

Purpose — The general purpose of these investigations was to continue the evaluation already begun on the known factors which influence trout and trout streams, and to discover new factors which may influence, adversely or otherwise, trout and trout streams in winter.

Particular attention was paid to the three following factors:

1. Brook trout spawning especially in North Branch Au Sable.

2. Possible effects of surface and anchor ice on the trout, trout streams and improvement devices.

3. Winter concentrations of ducks.

While much valuable information was obtained upon the first two factors they will not be reported upon, as the accumulated data is still too preliminary to permit drawing conclusions. It is, therefore, only the third factor, namely winter duck concentrations, which will be discussed in this report.

Former investigations — A former report* by the Institute for Fisheries Research and based upon three successive winters prior to the 1934-1935 one presented evidence that:

1. During these winters (especially the 1933-1934 one) the American Merganser concentration on some of the better trout streams of both peninsulas was quite great.

2. When the shallow bays of the Great Lakes and mouths of the large rivers freeze over, the mergansers are forced to leave these non-trout, though productive waters, and are apt to concentrate on the trout streams in numbers as great as 500 birds per mile.

3. The stomach analyses of mergansers taken from the best trout streams showed that more than 70% of the food was trout.

4. The mergansers are therefore a serious and deleterious factor on trout streams and especially on those of four feet or less in depth.

5. The other wintering species of duck such as the American Goldeneye, gave no evidence of being serious predators of trout.

1934-1935 winter duck concentrations — Two trips, one from February 5-9, 1935 (M. B. Trautman and David S. Shetter) and the other from March 10-15, 1935 (M. B. Trautman and J. W. Leonard) were made to the streams mentioned above. These dates and localities were chosen because in previous years duck concentrations (especially American Mergansers) had occurred at these periods and localities. Table 1 gives the results of the observations of duck species and numbers.

Discussion of Table 1 — It can be noted from Table 1 that the area studied this winter contained only a few American Mergansers, by no means a sufficient number to justify control measures. Verbal statements from various conservation officers and hatchery men wholly support the above evidence, namely

* Report 268 "An index to the food habits of the American Merganser on Michigan trout streams and other waters".

Table 1. Species and numbers of ducks.

Species	Date	Locality	Miles of stream investigated	Amt. of surface ice-covered	Depth snow inches	Extreme temperature	Hours of observation	No. ducks seen	Total no.
American Merganser	2/5	N. Br. Au Sable	2 1/2	1/3; ~~few open holes~~	14	+3-+10	11:30-6P.M.	9	
"	2/6	" " "	5	entirely few open holes	"	-30-+17	8A. - 6P.	0	
"	2/7	S. Br. Au Sable	4	1/3	"	-16-+20	10A.-6P.	3	
"	2/8	Pigeon R.	5	1/2	"	+10-+22	8A.-5:45P.	0	
"	2/9	Canada Creek	3	3/4;bottom 1/2 anchor ice	"	+6-+28	9A.-1P.	0	
"	"	W. Br. Sturgeon R.	5	1/3	"	+20-+28	2:30A-6:30P.	1	
"	3/10	N. Br. Au Sable	2	1/25	6	+35-+45	4:30-6:30P	5	
"	3/11	" " "	5	1/25	6	+20-+28	8A.-6P.	7	
"	3/12	S. " " "	4	0	"	+20-+28	9A.-1:30P.	0	
"	"	Pigeon R.	2	1/12	7	+20-+28	3:30-6:30P.	0	
"	3/13	"	4	1/12	"	+18-+25	8A.-1:30P.	1	
"	3/13	Sturgeon R. east of Vanderbilt	1	trace	"	+25-+35	2A.-5:30P.	0	
"	3/14	Canada Creek	3	"	"	+10-+32	12-4:30P.	0	
"	3/15	Sturgeon R. W. Br.	9	0	9	+36-+60	8:30A.-2:30P.	0	
"	"	Mouth of Sturgeon R.	1	0	"	+40-+60	3:30A-6P.	0	26
American Goldeneye	2/5	N. Br. Au Sable	2 1/2	1/3	14	+3-+10	11:30A-6P	50+	
	2/6	" "	5	entirely	"	-30-+17	8A-6P.	50+	
"	2/7	S. " "	4	1/3	"	-16-+20	10A.-6P.	12	
"	2/8	Pigeon R.	5	1/2	"	+10-+22	8A.-5:45P.	134+	
"	2/9	Canada Creek	3	3/4;bottom 1/2 anchor ice	"	+6-+28	9A.-1P.	1	
"	"	W. Br. Sturgeon	5	1/3	"	+20-+28	2:30-6:30P.	14	
"	3/10	N. Br. Au Sable	2	1/25	6	+35-+45	4:30-6:30P.	53+	
"	3/11	" "	5	1/25	"	+20-+28	8A.-6P.	140+	
"	3/12	S. " "	4	0	"	+20-+28	9A.-1:30P.	4	
"	"	Pigeon R.	2	1/12	7	+20-+28	3:30A-6:30P.	9	
"	3/13	"	4	1/12	"	+18-+25	8A.-1:30P.	7+	
"	3/13	Sturgeon R.east of Vanderbilt	1	trace	7	+25-+35	2A.-5:30P.	4	
"	3/14	Canada Creek	3	"	"	+10-+32	12-4:30P.	1	
"	3/15	W. Br. Sturgeon R.	9	0	9	+36-+60	8:30A-2:30P.	1	
"	3/15	Mouth of Sturgeon	1	0	"	+40-+60	3:30A-6P.	1	477+
Black Duck	2/5	N. Br. Au Sable	2 1/2	1/3	14	+3-+10	11:30A-6P	22	
	2/7	S. " " "	4	1/3	"	-16-+20	10A.-6P.	35+	
"	3/10	N. Br. Au Sable	2	1/25	6	+35-+45	4:30-6:30P	3	
"	3/11	" "	5	1/25	"	+20-+28	8A.-6P.	5	65
Mallard	2/5	N. Br. Au Sable	2 1/2	1/3	14	+3-+10	11:30A.-6P.	2	
"	2/6	" "	5	entirely	"	-30-+17	8A.-6P.	1	
"	2/7	S. " "	4	1/3	"	-16-+20	10A.-6P.	14	
	3/12	S. " "	4	0	6	+20-+28	9A.-1:30P.	2	19
Old-Squaw	2/6	N. Br. Au Sable	5	entirely few open holes	14	-30-+17	8A.-6P.	1	
							Grand total		588

that the American Mergansers were few in number on the trout streams of the lower Michigan peninsula during the 1934-1935 winter and that at no time before, between or after these two trips were the merganser numbers anything other than few.

Verbal statements of local residents (not always reliable) on the whole supported the above evidence. However an occasional local resident was encountered who insisted that the "fish ducks" were quite numerous. Further questioning invariably disclosed that these individuals had mistaken the American Goldeneye for the American Merganser. It is not difficult to understand why this mistake was made; for the male American Goldeneye, like the male American Merganser, has a dark greenish head, white under parts, black and white back and a white speculum, while the female American Goldeneye, like the female American Merganser has a dull cinnamon head, light mottled gray under parts and asky gray back and white speculum. There is a marked difference in the shape of the two species as the American Goldeneye is a stocky, compactly built bird while the American Merganser is quite "rakish" having a long neck, snake-like head and rather long pointed wings. However, this difference in shape is only obvious under the more favorable conditions, while under the less favorable ones when only color pattern can be noted, identification is not only difficult for the average person but may be impossible. This is especially so when the birds are flying directly away from the observer or when tree branches are between the observer and the flying birds.

American Goldeneye

Further research on this species was conducted since many persons still insist that the American Goldeneye is a direct predator of trout (in fact they state that it eats large quantities of trout of all sizes), and since this bird was the dominate winter duck of the area this research was divided into two parts; 1. analyzation of stomach contents and 2. observations of feeding birds (with 8× glasses).

In order to study the stomach contents 20 goldeneyes were collected from all types of feeding grounds on trout streams. Table 2 gives a resume of the food found in these 20 stomachs.

Table 2. Stomach contents of 20 American Goldeneyes, winter 1935[1].

Date	Serial no.	Location	Time of day		Vegetable matter	Aquatic insect larvae[2]	Crustacea and crayfish	Molluscs
2/5	6	N. Br. Au Sable Imp. sec.	2:30A.M.	practically empty	-	xx[3]	-	-
"	4	" " " "	2:30P.M.	" "	-	xx	-	-
2/6	3	" " "	Noon	Almost nothing	-	xx	x	-
"	5	" Unimproved section	5:15P.M.	Very full	-	xx	x	x
2/8	1	Pigeon R. Imp. sec.	9:15A.M.	Fairly empty	xx	x	x	-
"	2	" " "	9:35A.M.	Moderate	-	xx	x	-
"	10	" " "	10:30A.M.	Practically empty	-	xx	-	-
"	19	" " "	11:00A.M.	Entirely empty	-	-	-	-
"	9	" " "	11:15A.M.	Moderately empty	-	xx	xx	-
"	8	" " "	1:00P.M.	Fairly empty	-	xx	xx	-
2/9	7	" " "	3:10P.M.	Moderately full	-	xx	-	-
3/10	15	N. Br. Au Sable " "	5:00P.M.	" "	xx	x	x	-
3/11	17	" " Unimproved "	2:30P.M.	" "	x	x	xx	-
3/12	13	Pigeon River " "	4:30P.M.	" "	xx	x	-	x
3/12	20	" " " "	" "	Empty	-	-	-	-
3/13	18	Sturgeon R. " "	9:00A.M.	Nearly empty	-	xx	-	-
"	11	" " "	5:00P.M.	Moderately full	x	xx	-	x
"	16	" " "	"	Nearly empty	x	xx	-	x
3/14	12	Canada Creek " "	3:30P.M.	"	-	xx	-	-
3/15	14	W. Br. Sturgeon R. " "	10:30A.M.	" "	x	xx	-	-

[1] Stomach contents analyzed by J. W. Leonard.
[2] Includes related invertebrates.
[3] Bulk of material indicated with 2 crosses.

Discussion of Table 2

It can be noted from Table 2 that aquatic insect larvae (and related invertebrates) formed the bulk of the goldeneye's food. Crustacea (principally crayfish) came next, then vegetable matter and mollusca (bi-valves and snails). No fish were found in the stomachs, not even newly hatched trout fry. That trout fry were not included in the diet is rather surprising as they appear to be readily available to the birds and were rather abundant in some of the streams, especially the North Branch of the Au Sable.

Observations of feeding birds

Observations of undisturbed feeding birds gave the following results:

1. Most of the ducks' feeding appeared to be done in fast water where moderate-sized gravel was dominant.

2. The birds apparently noted among the gravel for the larger insects, crayfish and rhizomes of plants, in fact on several occasions the birds were actually observed rooting among the stones. The dislodging of these stones with the bill and forehead of some of the birds had worn the feathers of the forehead down to their bases, leaving the bare skin exposed.

3. As stream improvement devices had exposed more gravel than was to be found in the unimproved sections, the birds were obviously concentrated in these improved sections. For instance, the improved sections of the Pigeon River contained approximately 15.59 birds per mile while the unimproved sections contained 10.22 birds per mile; the improved sections of the North Branch of the Au Sable contained approximately 27.87 birds per mile while the unimproved contained approximately 10.77 birds per mile; Canada Creek and the South Branch of the Au Sable, both unimproved streams, contained approximately only one bird for three miles (0.37 bird per mile).

4. Large, light-colored areas on the riffles of the streams consisting of recently disturbed stones may have been due to the ducks disturbing these stones. The evidence on this is not conclusive. Several other factors may have caused this disturbance, such as movement by anchor ice, or disturbance by spawning brook trout

during the preceding fall.

5. While many large insects and crayfish were observed being eaten by goldeneyes, no fish were seen caught or eaten.

Conclusions on the American Goldeneye

There is no doubt that the American Goldeneye is a food competitor to trout. Any concentration of birds which remain on one area of stream over several weeks of winter must remove a large quantity of potential trout food. This duck species is of fair size and weight (average weight about two pounds) and like all birds living in such cold and seemingly adverse conditions must daily consume prodigious quantities of food. However, there appears to be a sufficient food supply for both trout and ducks in those duck concentration areas studied. Furthermore the American Goldeneye is a sporting duck and one which from a conservation standpoint cannot be considered a liability (except by some of the most narrow-minded trout fishermen who do not hunt ducks).

Under certain conditions when small fish are particularly easily procured and other food scarce, the goldeneye will undoubtedly eat fish, or when large dead and somewhat decomposed fish are present they will undoubtedly eat upon them, just as every species of North American duck does to a greater or less degree.

Some persons claim to have seen the American Goldeneye catch large active trout from 12 to 20" in length. This certainly is open to question, for while a goldeneye may be sufficiently active to catch a large trout, this ducks' bill appears entirely too small to enable it to hold and kill so large a fish. That the goldeneye can swallow a whole trout that is longer than 10 inches seems impossible, for unlike the American Merganser, the gape of this bird is moderately small. Furthermore repeated observations on goldeneyes by the writer has shown that, while large crayfish are frequently captured and brought to the surface they are eventually rejected as the birds find them too large to swallow, while the smaller crayfish, 2 1/2 inches or less in length, are always eaten.

Conclusions on the duck concentration, especially American Mergansers

Research conducted by the Institute during the three years prior to the 1934-1935 winter has definitely shown that the American Merganser at times concentrates on the trout streams of Michigan in such numbers as to seriously menace the trout population.

The research of the 1934-1935 winter has shown that during this winter the American Merganser was not a menace to the trout population (in the Lower Peninsula at least).

Research work upon wintering merganser concentrations must be continued to determine whether the 1933-1934 winter or the 1934-1935 winter represented the extreme conditions, or whether one of them was the average condition.

Since there is this variation of winter concentration of mergansers it appears logical that a yearly winter drive with its attendant expense on these birds in the trout stream country is unnecessary. Rather it appears more logical to make full preparations each winter and then conduct drives only when and where necessary.

Until definite proof is established that the American Goldeneye is a serious menace either as a predator or competitor of trout this sporting duck must be rigidly protected and extreme care taken that none are accidentally shot during merganser drives.

No black ducks or mallards were collected as it is assumed that these two important water fowl feed largely upon the rhizomes of plants and upon aquatic invertebrates. No great winter concentrations of these species have been reported in the trout stream sections.

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