

Copy to: Sidney A. Walden

INSTITUTE FOR FISHERIES RESEARCH
UNIVERSITY MUSEUMS
UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN

RECEIVED
AUG 25 1931
FISH DIVISION

July 26, 1931

Report No. 87

SECOND REPORT ON INVESTIGATION OF TROUT STREAMS, BLACK RIVER RANCH,
MONTMORENCY COUNTY (JUNE, JULY, 1931)

Report No. 34 (October 23, 1930) covers the subject of the Black River Ranch trout waters in a preliminary manner. The present report is intended to give additional information based upon visits to the property made during May and June (by Dr. Hubbs) and during July (by Dr. Greeley and Mr. Salyer). The stream improvement work which is now in progress under the direction of Mr. Tarzwell will be reported upon at a later date when this work is completed.

Dr. Hubbs made two visits to the streams May 30-31 and June 24 and investigated conditions in wild waters and in the nursery. On July 1, Mr. Tarzwell and Mr. Salyer arrived and commenced general survey work preparatory to the improvement of the stream pool conditions. Mr. Salyer devoted most of his efforts from this time until his departure (July 9) to collection of fish predators (watersnakes, kingfishers, turtles, and burbot). Dr. Greeley arrived July 3 and spent the time until July 9 in study of the trout streams. Dr. Snyder, Col. Walden, and Mr. Webster cooperated with the Fisheries Institute party in the examination of the waters. The present report summarizes the work done by all parties.

The investigation may be subdivided under several headings: (1) General survey of conditions for trout in the streams (2) Investigation of conditions in

the trout nursery (3) Survey and advisement regarding improvements (4) Investigation of fish predators.

(1) General survey of conditions for trout in the streams. The hot weather, coupled with low-water conditions during July, made it possible to obtain valuable temperature data on the streams. The readings obtained during this period (see attached temperature data) make it clear that the streams reach much higher temperatures than had been suspected from previous work. Report No. 34, is erroneous in classing these streams (on the basis of temperature readings taken by Mr. Webster) as "very cold waters". It was reported that readings during the previous summer did not exceed about 62 degrees Fahrenheit. As last summer had many hot days, it seems probable that either the readings were not taken late afternoons during the peak of the hot weather or that the thermometer used was not accurate.

The July readings indicate that both the East Branch and the Black River reach temperatures which are commonly regarded as dangerously high ones for brook trout. Afternoon temperatures on hot days are above 70 degrees on both streams for all readings taken. On exceptionally hot days (July 15, 16, 17) the East Branch reached 80 degrees by late afternoon. The Main Black River runs very close to the East Branch in temperatures, but is a slight amount cooler (reading of 79.9, against 80.0 for the East Branch at 5 P.M. on July 15). However, both streams indicate favorable conditions in their tendency to quickly drop in temperature during nights. Morning temperatures were in the 60's with the exception of a few readings on exceptionally hot days (temperature of 70.5 on the East Branch at 9:30 A.M. July 16). The quick recovery of these streams from the effect of the sun is due to their spring water supply and saves them as trout streams. If the temperature were to remain long at the peak which is reached during late afternoon of a hot day, trout would doubtless disappear.

The effect of temperature upon trout streams involves complexities which it is

necessary to hold clearly in mind. Exceedingly high temperatures are directly lethal to trout, even when continued for only a short time. However, we have noted brook trout feeding at 75 degrees in the East Branch of the Black River and have noted (both here and elsewhere) that wild brook trout can withstand a temperature of at least 80 degrees for at least a short period. It appears then that there is little chance of loss of wild trout from direct effects of high temperatures on these streams. The more complex considerations regarding trout and high temperatures lie elsewhere. Warm water favors disease and this secondary effect of high temperature is potentially dangerous in a trout stream. It is particularly dangerous under conditions where trout are crowded and loss to disease in hatcheries and rearing stations is well known to be augmented by warm conditions. Under wild conditions, another secondary and unfavorable condition which is caused by high temperatures is that of the development of a large population of warm-water fishes which compete with trout for food. Very cold streams seldom have many suckers, chubs, and other fishes which are, on the other hand, characteristic inhabitants of warm waters. The temperatures of the Black River and East Branch are not sufficiently low to suppress such fishes, and there is a high number of competing species, such as horned dace, black-nosed dace, sticklebacks etc. (see list of fishes) as well as a considerable number of burbot, which are suspected of being serious trout predators.

Both the main Black River and the East Branch enter the property of the Black River Ranch at temperatures about as high as they reach anywhere on this property.

It is clear that both streams are rather exposed in the upper areas, which are not under control of the Ranch. On July 6, temperatures were taken on the main Black River at least ten miles above this property. At the Beaverdam Club the temperature was 76° at 5 P.M. and this is fully as warm a reading as could have been obtained on the Black River Ranch on this date (compare East Branch reading of same date). A similar trip up the East Branch was not made. However, this stream had a

temperature of 69° at 10:30 A.M. on July 7 at the road above the Ranch property (compare with other readings given for July 7).

At present, there does not seem to be great possibility of decreasing stream temperatures to any great extent as this would involve a great amount of improvement work above the Ranch property. There is a possibility that both streams may be cooled a few degrees by improvements on the property, however. Shade is generally good along the streams but there are ^{many areas where the streams are} too wide and shallow to be effectively shaded by bank vegetation. The stream improvement work now under progress is being planned with consideration to temperature conditions and many shallow wide stretches will be made less exposed to warming by having the current concentrated into a deeper and more narrow space, on the shady side of the stream wherever possible.

A number of other considerations, in addition to that of temperature, were held in mind during the survey work. General notes on food conditions were contained in the previous report (No. 34). It is not possible to determine the basic productivity of the streams without careful quantitative determinations. However, it is clear that both streams can support at least a fair population of trout as there are fair numbers of aquatic insects and other trout food animals. Neither stream may be called particularly rich in food organisms. Among the lower plants (the basic food supply for all animal life) the dominant organism is a species of lime-incrusting alga which does not appear to be as valuable a food producer as certain other diatoms and algae (there is practically no available information on this point, however). There are excellent beds of Chara or musk grass in both streams. Parts of the main Black River have good growths of Potamogeton pectinatus or sago pondweed, and ^{an} other leafy species of Potamogeton. There are also beds of a slender plant which resembles wild celery but is apparently the young stage of a Sparganium or burr reed, which is a common marginal plant there. There seem to be no

advisable recommendations to make regarding improvement of food conditions at present. There is slight hope of improving food conditions by planting of fresh-water shrimp, since at least two species are already present but naturally rare, due to some unknown reason. Dr. Hubbs collected shrimp of the genus Hyaella. No Gammarus were located. Possible spawning beds were sought during the examinations of the streams. Without special search during the spawning season of the trout, it is difficult to evaluate spawning facilities. However, it is fairly well established that brook trout always seek spring waters which are warmer than 40 degrees during the time of spawning and which will not form ice in the winter (brook trout eggs remain in the gravel over the winter and development will not take place in freezing water). The fact that these streams warm considerably on a hot day would lead one to believe that they would become very cold during cold weather and it is doubtful if brook trout could spawn successfully in water so remote from the spring source. However, there are several small springs which enter these streams and it is possible that some reproduction may occur about these. A spring feeder entering the main stream was very cold 55° (July 4) and though but about 55 paces long contained at least one to two hundred trout (seventy-five were actually counted when they had collected at the lower part after being disturbed). These were all less than three inches. Neither the main Black River nor the East Branch were found to be heavily populated with young trout, yet there are as high as 3200 trout to the mile in the East Branch, according to counts made in sections there (see attached count sheets). A part of the East Branch was fly-fished on the afternoon of July 7 and as many as 4 trout were taken from one good pool. In two hours fishing (wet-fly) eleven trout were taken, 4 being over 7 inches. The main Black River was cruised in a boat from the property line down to "The Hoist" and comparatively few trout were seen. It is possible that they are less numerous here than in the East Branch. No trout counts have been made in the main river. Dr.

Hubbs found that young trout were rather scarce in both streams. The trout counts made in July by the survey party on the East Branch disclosed a fair number of small trout but since fish had been planted here it was not possible to say that the stream was naturally supplied with these.

(2) Investigations of conditions in the trout nursery. As has been mentioned, temperatures in the East Branch ran very high during July. Due to restricted flow, the trout nursery temperature reached a slightly higher mark than the stream itself. The highest reading taken was 81.6 on July 15 in late afternoon (stream 80.8). The possible success of a trout nursery reaching such a high temperature is problematical. Certainly trout will not stand a great amount of crowding at this temperature and it may be dangerous to attempt feeding under warm weather conditions, due to decomposition of unconsumed food. For this reason a suggestion that some feeding of the trout be attempted was advised against. The trout in the nursery have had nothing but natural food since they were placed there. On June 24 Dr. Hubbs seined in the nursery to determine approximately how many trout remained there and found only two in making several seine hauls. On July 5 the nursery was again sampled by the survey party. Because of the deep water in part of the pond, it was impossible to collect in all regions. Trout were found in both the upper and lower area of the nursery but no large concentration of trout were located at any one place. The first 5 seine hauls at the upper end (eight foot seine) yielded 5 trout (average of 1 per haul). About a half dozen hauls just below the upper end yielded no trout at all. Out of 5 hauls at the lower end 1 trout was caught. These were fish from 2 to 3 inches long, and appeared healthy. It would be merely a guess to attempt to say how many trout remain in the area but it may be possible to see more trout as they become larger.

The seining on July 5 disclosed three burbot in the nursery, and it seems likely that the dynamiting of the pond to kill large fish was only partially

successful. There are large numbers of sucker fry in the pond as well as black-nosed dace, horned dace, sticklebacks, johnny darters. Notes on stomach examination of some of these fish are appended to this report. These fish are competitors of the young trout and it is likely that the burbot may eat large numbers of them. It is safe to say that a high production of trout will not be obtained unless the other fish can be controlled because of competition for the available food. Another measure that would be necessary before trout could be effectively gathered from the nursery if successfully produced, is the clearing and grading of the bottom. It is impossible to effectively seine out the fish there, due to snags and uneven bottom.

(3) Survey and advisement regarding improvements. Both the East Branch and the Black River were carefully cruised by Mr. Tarzwell who made notes on the condition of various sections of stream with reference to possible improvement of trout pools. He was accompanied by Mr. Snyder on boat trips down these areas, and has made note of the regions which are most in need of improvement. Work on the East Branch from the upper dam downward has been in progress since July 6 and long areas of this stream have been effectively improved, with the aid of four men and a team. Suitable pool habitats for large trout are being created and there will be more good fishing water as a result of this work. Placing of pools too close together has been avoided, because it is advisable to leave each trout pool with a large space for raising food. Also it is advisable to leave some shallow waters for young trout habitats.

Advice was requested in regard to the two dams contemplated on the East Branch of the Black River. In view of the recently-gathered temperature information, it is necessary to point out that, under no circumstances should the stream be caused to flatten out in a shallow pond. Since there is slight fall

at the site of either of the proposed dams it would be difficult to get much depth of water behind either dam without backing the water well over the present stream banks. If this is done a flat sheet of water will be placed over the meadow in each case and will cause serious warming of the stream during hot weather. This must be avoided, hence we advise that either no dams be built or that only sufficiently low dams to allow the stream to remain in a narrow channel be built.

Tentative recommendations regarding stocking with trout may be made on the basis of the survey work. Streams which have large numbers of minnows and other competing species should not be stocked with trout fry. This is generally a wise rule to follow and would apply to all parts of the main Black and East Branch which were examined. On the other hand, fingerling trout of a size of three inches or more should stand some chance of survival in these streams at practically any point examined. The most favorable sections in which to plant trout would seem to be on the East Branch from the upper dam to the open stretch near the trout nursery, and on the main Black from the upper line of the Ranch property down to "The Hoist". When trout are planted they should be well scattered, a few in each pool.

Although particular search was made for good planting places for small fish, there are few that would seem to be safe places. The two beaver ponds, on a small feeder below Seward Creek, showed dangerously high temperatures (July 6, see attached temperature data). cursory examination disclosed no trace of the plants of trout made there. A few small springs enter both streams but there were none found which would take care of any large plant of small trout. Spring no. 2 on the Main Black is about 55 paces long and is supporting from 100 to 200 wild fingerlings at the present time, all that it can be expected to care for. The best spring pool found on the East Branch (about 1/2 mile above the nursery, in the woods)

is only 15 paces long and has about a dozen wild fingerlings in it (July 7). The best planting place for small trout which was located was Seward Creek. The lower part of this had a fair number of trout, up to about 6 inch size. This stream may be able to accomodate more trout; at any rate it is the best place located. In lieu of the scarcity of small feeders, the main streams are the only places capable of receiving large plantings.

No more trout should be placed in the nursery because of the burbot and other fish there.

(4) Investigation of fish predators. In connection with a general, state-wide survey of natural enemies of fish, Mr. Salyer collected specimens of kingfishers, watersnakes, burbot, and painted turtles while at the Black River Ranch. Because of their rarity and interest to members of the Black River Ranch, the several loons there were not molested. Examination of the stomachs of all predators will be made after the present field season. No great concentration of natural enemies was noted in the rearing station. No birds were seen feeding there and the burbot were not more numerous than in adjoining areas of wild stream.

Temperature Data for Black River and Tributaries

July 3-9, 1931, John R. Greeley

<u>Location</u>	<u>Air</u>	<u>Water</u>	<u>Time</u>	<u>Date</u>	<u>Remarks</u>
Main Black, entering Ranch	72	64	9:45 A.M.	July 4	
Spring run, 55 paces long, (No.2)		55	10:45 A.M.	"	Young trout
Spring pool (No.3)		70 (surface)		"	
" " "		48 (bottom)		"	
<hr/>					
Main Black, Vanderbilt Bridge	87	75	2:30 P.M.	July 6	
Steward Creek, lower part	"	70	2 P.M.	"	Young trout
Small Beaver Dam, Seward	"	"	"	"	" "
Feeder below Seward, upper Beaver dam (trout planted here earlier)	"	81 (surface)		"	
	"	77 (outlet)		"	
Lower beaver dam (trout planted)	"	81 (edges)		"	
" " " " "	"	77 (surface)		"	
" " " " "	"	70 (bottom)		"	
Feeder to Black near Kings (above Ranch)	"	73	3 P.M.	"	
Main Black, Beaverdam Club	-	76	5 P.M.	"	
Main Black, Ponemah Club (a natural beaver dam between these two points)	-	73	5:20 P.M.	"	
Main Black, old R.R. bridge above last locality.	-	72	5:30 P.M.	"	
Little McMaster Creek	-	67	6 P.M.	"	
<u>Main Black (lower), Clark Bridge</u>	-	75	6:15 P.M.	"	
East Branch, at rearing station	87	76	3 P.M.	July 3	
Lower end rearing station pool	"	"	"	"	
<u>Main Black at "the Sand Bar"</u>	"	76	4:30 P.M.	"	
East Branch, at rearing station	72	64	9:30 A.M.	July 4	
East Branch, upper dam (on flats)	77	76	3:45 P.M.	"	
" " " " (midstream)	"	74	"	"	
East Branch nursery	77	66	11 A.M.	July 5	
<u>East Branch, 1/4 mile above nursery</u>	"	69	4:15 P.M.	"	
East Branch, "The Ford"	-	66	10 A.M.	July 6	
East Branch, between "Ford" and lower dam (about halfway)	-	67	10:30 A.M.	"	
" " " "	80	69	12 P.M.	"	
<u>Small spring here</u>	"	56	"	"	
East Branch, above Ranch, on Atlanta-Vanderbilt road.	-	69	10:30 A.M.	July 7	
Canada Creek, upper part, on S. line of 14,000 acre tract	-	78	10:45 A.M.	"	
Canada Creek, lower part, on state reserve.	80	72	12 P.M.	"	
East Branch, at nursery	84	74	3 P.M.	"	
" " 1/2 mile above	"	75	4 P.M.	"	
Small spring here	"	58	"	"	
<u>Spring pool, 15 paces long, here</u>	"	65	"	"	Young trout
East Branch, near "The Ford"	77	65	11 A.M.	July 8	

Temperature data on Black River

July 1931, C. M. Tarzwell

East Branch, Black River Ranch property:

<u>Date</u>	<u>Time</u>	<u>Remarks</u>	<u>Air</u>	<u>Water</u>	<u>Trout nursery</u>
July 2	12:30 P.M.			73.2 F.	73.2 F.
" 3	12 "			73.6	
" 5	4:15 P.M.		79.5	71.5	
" 6	5 "		81.3	75.9	
" 7	8:15 A.M.		75.9	65.5	
" "	12:30 P.M.		81.3	72.7	
" "	5 "			75.9	
" 8	4:45 P.M.		71.8	74.5	
" 9	8 A.M.	Cool night	69.1	64.2	
" "	4 P.M.		75.9	74.1	
" 10	8 A.M.	" "	63.3	60.6	
" "	6 P.M.			70.5	
" 14	7:30 A.M.		66.	60.5	
" 15	9:15 A.M.		84.9	70.5	
" 15	10:30 A.M.		86.7	70.5	
" "	1:30 P.M.		92.1	77.2	
" "	3 P.M.		95.7	79.5	
" 12	4:20 P.M.		95.7	80.8	81.6
" "	5:00 P.M.			80.8	
" 16	9:30 A.M.		79.	70.5	
" 16	4:30 P.M.		88.5	75.9	
" 17	7 A.M.		84	69.6	
" 17	1:30 P.M.		96.6	78.6	
" "	4:30 P.M.		94.8	82.2	
" 18	7:30 A.M.		74.1	69.6	
" 18	4:30 P.M.		84.9	81.3	
" 20	7:30 A.M.	Cloudy, rain*	72.3	68.7	
" "	4 P.M.		79.5	79.5	
" 21	10:45 A.M.	Cold night	81.3	71.8	
" "	4:30 P.M.		75.9	75.4	
" 22	7:30 A.M.		63.3	63.3	
" "	1 P.M.		77.7	71.4	
" 23	7:15 A.M.		63.7	62.8	
" "	4:15 P.M.		70.5	70.	
Main Black, Black River Ranch property:					
" 3	12: P.M.			72.7	
" "	2: P.M.			74.1	
" "	5: "			76.8	
" 4	9:45 A.M.		74.5	66.5	
" "	10:40 "			71.	
" 15	5 P.M.			79.9	

* Rained night of July 19.

Trout counts made on East Branch of Black River
(each made on 100 foot section, screened off)

No. 1, July 4

Location: about 1/4 mile below the upper dam.

Width: 33 feet. Depth: 3 inches to 1 1/2 feet. Bottom: mostly gravel.

Pools: fair trout pools along one bank, snags and overhanging bank. Section predominantly shallow, with strong current.

Seine hauls: 55 made with 8 foot seine to clear of practically all fish.

Total fish taken: 121. Crayfish: 27 (not exact count, a few discarded without being counted). Frog tadpoles: 2. Total count: 150.

Itemized list: brook trout 62. Sizes: 2-3 inch (57), 5-6 inch (2), 6-7 inch (1),
7-8 inch (1).
Horned dace 7 2-3 inch (6), 3-4 inch (1).
Black-nosed dace 32 1-3 inch (32)
Common shiner 2 2-3 inch (2)
Red-bellied dace 1 2-3 inch (1)
Stickleback 1 2-3 inch (1)
Johnny darter 9 1-3 inch (9)
Muddler 7 2-3 inch (7)

Calculations: trout per mile 3200 plus. Legal trout (1.6%): 52 per mile.

Trout per seine haul: 1.1 per haul (55 hauls).

No. 2, July 5

Location: about 1/2 mile above rearing station.

Width: 28 feet. Depth: average 18.5 inches. Bottom: gravel, muck.

Pools: good trout pools along one bank, snags and overhanging bank. Section with more deep water than No. 1. Strong to moderate current.

Seine hauls: 55 made with 8 foot seine. Fishing: trout were rising well (just before a storm) and 6 trout were caught in area on wet fly, just before count was made. Weather: barometer falling 28.60, S.W. wind, 4:15 P.M., water 69 F. air 77 F.

Total fish taken: 84. Crayfish: 106. Total count: 190.

Itemized list: brook trout 15. Sizes: 1-2 inch (1), 2-3 inch (8), 4-5 inch (1),
5-6 inch (3), 6-7 inch (2).
Horned dace 11 1-4 inch (11)
Black-nosed dace 56 1-3 inch (56)
Burbot 5 10 inch (1), 7 3/4 inch (2), 6 inch (2)
Muddler 1 3-4 inch (1)
Johnny darter 4 1-3 inch (4)
Common shiner 1 3-4 inch (1)
Common sucker 1 3-4 inch (1)

Calculations: trout per mile 800 minus. Legal trout: none in section.

Trout per seine haul: .15 per haul (9 trout in 55 hauls). If no trout had been removed by hook and line figure might have been .27 (taking 15 trout).

No. 3, July

Location: about 1/4 mile above "The Ford", in woods section.

Width: about 30 feet. Depth: about 4 inches to about one foot. Bottom: mostly gravel.

Pools: poor. A small pool under alders at one side.

Strong current. Section resembling No. 1 but with less favorable pools.

Seine hauls: 56 made with 8 foot seine. Fishing: tried fly before seining but no trout rose.

Total fish taken: 60. Crayfish: 25. Total count: 85.

Itemized list: brook trout 13 Sizes: 2-3 inch (10), 3-4 inch (3)

horned dace	5	2-3 inch	(5)
Black-nosed dace	22	1-3 inch	(22)
Long-nosed dace	17	2-4 inch	(17)
Muddler	1	3-4 inch	(1)
Common sucker	2	3-4 inch	(2)

Calculations: trout per mile: 700 minus. Legal trout: none. Trout per seine haul: .23.

July 2, 1931

J. R. Greeley

Stomach examinations of trout etc., collected Black River Ranch Nursery

June 24, 1931, J. R. Greeley

Rhinichthys atronasmus meleagris (black-nosed dace) Three specimens:

No. 1-total length 43 mm., standard length 36 mm. Stomach full: insects 100%; midge larvae (Chironomidae) 26 estimated at 92% and black-fly larvae (Simuliidae) 2 est. at 8%.

No. 2-total l. 50 mm., st. l. 42 mm. Stomach full: insects 100%; 30 Chironomidae larvae.

No. 3-total l. 45 mm., st. l. 38 mm. Stomach 3/4 full: insects 100%; 14 Chironomidae larvae est. at 90% and 1 may-fly nymph (Ephemera) 10%.

Summary of dace: 100% aquatic insects (immature stages)

Percentage totals: midges 94%, black flies 2.6%, may-flies 3.3%.

Eucalia inconstans (brook stickleback) Two specimens:

No. 1-total l. 46 mm., st. l. 40 mm. Stomach 1/2 full; insects 100%; fragments at least one mayfly nymph (Ephemera) (5 parasitic trematodes).

No. 2-total length 41 mm., st. l. 36 mm. Stomach full: insects 100%; 5 Ephemera nymphs est. at 93%, 6 Chironomidae larvae est. at 6%, 1 Simuliidae larvae est. at 1%.

Summary of sticklebacks: 100% aquatic insects (immature stages).

Percentage totals: midges 3%, black flies. 5%, may-flies 96.5%.

Salvelinus f. fontinalis (brook trout) Two specimens:

No. 1.-total l. 38 mm., st. l. 32 mm. Stomach full: insects 100%; 2 adult flies (Diptera) est. at 30% (flies of two different families, about size of midge and one slightly larger), 1 stone-fly nymph (Flecoptera) est. at 35%, 1 may-fly nymph (Ephemera) est. at 35%.

No. 2.-total l. 43 mm., st. l. 36 mm. Stomach full: insects 100%; 1 aphid nymph (Apidoidea) est. at 10%, at least 3 adult aphids est. at 36%, 1 adult fly (Diptera) est. at 30%, at least two adult insects (fragmentary, unidentifiable) est. at 24%.

Summary of trout: 100% insects (aquatic and terrestrial forms both, adult as well as immature insects represented).

Percentage totals: adult flies 30%, aphids 23%, may-flies 17.5%, stone-flies 17.5%, unidentified adult insects 12%.

List of Fishes Collected in Black River and Tributaries

	E. Branch	Black River
Trout family:		
Brook trout (<u>Salvelinus f. fontinalis</u>)	X	X
Minnow family:		
Horned dace (<u>Semotilus a. atromaculatus</u>)	X	X
Black-nosed dace (<u>Rhinichthys atronasus meleagris</u>)	X	X
Long-nosed dace (<u>Rhinichthys cataractae</u>)	X	X
Common shiner (<u>Notropis cornutus frontalis</u>)	X	X
Red-bellied dace (<u>Chrosomus eos</u>)	X	X
Northern dace (<u>Margariscus margarita nachtriebi</u>)		
Fine-scaled dace (<u>Pfritille neogaea</u>)		X
Hankinson's minnow (<u>Hybognathus hankinsoni</u>)		X
Fat-head minnow (<u>Pimephales p. promelas</u>)	X	
Sucker family:		
Common sucker (<u>Catostomus c. commersonii</u>)	X	X
Stickleback family:		
Brook stickleback (<u>Eucalia inconstans</u>)	X	X
Mud minnow family:		
Mud minnow (<u>Umbra limi</u>)		X
Darter family:		
Johnny darter (<u>Boleosoma n. nigrum</u>)	X	X
Least darter (<u>Microperca punctulata</u>)		X
Sculpin family:		
Muddler (<u>Cottus b. bairdii</u>)	X	X
Northern muddler (<u>Cottus cognatus</u>)	X (1925)	
Codfish family:		
Burbot (<u>Lota maculosa</u>)	X	X
Lamprey family:		
Brook lamprey (<u>Entosphenus appendix</u>)	X	X
Reighard lamprey (<u>Ichthyomyzon fossor</u>)	X	X
(neither are parasitic species; the parasitic lamprey does not appear to be present, fortunately).		

By John B. Seelye
Assistant Director

Copy sent to Col. Sidney D. Waldon
4612 Woodward Ave.
Detroit, Michigan