NOTES ON FISHES, AND STREAMS FISHED WITH SEINE, L.HURON.

SUMMER 1894, BEGINNING PORT HURON, MICH., JUNE 8, ending

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LIST OF STATIONS FISHED WITH SEINE.

1. June 8. Bunce Creek,tributary to St. Clair R.,3 m.below Port Huron, Mich.

2. June 9. Black River,tributary to St. Clair R.at Port Huron, Mich. Ascended the River 8 m.,and fished at various points from there to within 2 m.of Port Huron.

3. June 17. Cogshall Cr.,tributary to Lake Huron, 7 m.above St.Clair R.

4. June 19. Black Cr.,tributary to Black R.,near Lexington, Mich.

5. June 19. Black R.at the mouth of Black Cr.

6. June 19. Mill Cr.,tributary to L.Huron, 3 m.below Lexington, Mich.

7. June 23. Rock Falls Cr.,tributary to L.Huron, 2 m.below Sand Beach, Mich.

8. June 23. Small streams and bayous at Sand Beach Harbor, Sand Beach, Mich.

9. June 25. Sand Beach Harbor, Sand Beach, Mich.

10. June 26. Willow Cr.,tributary to Lake Huron at Huron City, Mich.

11. June 27. Birds Cr.,tributary to Saginaw Bay at Port Austin, Mich.

12. June 27. Saginaw Bay at Port Austin, Mich.

13. June 28. Pinnebog R.,tributary to Saginaw Bay at Port Crescent, Mich.,fished 5 1/2 m.above its mouth.

14. June 28. Rush Lake, about midway between Port Crescent, Mich.,and Caseville, Mich.,1 1/2 m.from Saginaw Bay.

15. June 29. Pigeon R.,tributary to Saginaw Bay at Caseville, Mich. Fished 1 m. above Caseville.

16. June 29. Ponds and bayous along Saginaw Bay at Caseville, Mich.

17. June 30. Saginaw Bay at Caseville, Mich.

18. July 2. Mud Cr.,tributary to Wild Fowl Bay, near Bay Port, Mich.

19. July 2. A small Lake with no visible outlet, 10 rods east of Wild Fowl Bay.

20. July 4. Shebeon Cr.,tributary to Saginaw Bay at Shebeon, Mich.

21. July 5. About the Docks, Wild Fowl Bay, at Bay Port, Mich.

22. July 9. 10 m.east of Bay City, Mich, Quannakissee R.at its mouth. Tributary to Saginaw Bay.

23. July 9. Ditch tributary to Quannakissee R.,fished 7 m.east of Bay City, Mich.

24. July 10. Ditches along St.Car R.R.,

near Wenona Beach, Bay City, Mich.

25. July 10. Kawkawlin River, tributary to Saginaw Bay at Wenona Beach. Fished near its mouth.

26. July 10. Saginaw Bay at Wenona Beach, Bay City, Mich.

27. July 12. A small land-locked Lake, Tawas Point, near East Tawas, Mich.

28. July 12. Tawas Bay along Tawas Point, near East Tawas, Mich.

29. July 12. Tawas River--sometimes called Silver Creek--seven miles from Saginaw Bay (Tawas Bay) N.E.from East Tawas, Mich.

30. July 13. Tawas River at its mouth, Tawas City, Mich.

31. July 13. Tawas Lake, east side, near E.Tawas, Mich.

32. July 14. Pine River, tributary to Au Sable River, fished near Handy, Mich.

33. July 14. Pine Lake, near Oscoda, Mich.

34. July 17. Channels along Au Sable River at Au Sable, Mich.

35. July 17. Lake Huron at Au Sable, Mich.

36. July 19. About the docks, North Point, Thunder Bay, in Lake Huron.

37. July 21. Outlet of Long Lake, 8 m. north of Alpena, Mich.

38. July 24. East Fork of Pine River, near West Harrisville, Mich.

39. July 25. Hubbard Lake, Mich., about 18 m. south-west of Alpena, Mich.

40. July 28. Mullet Lake at head of Cheboygan River, Topinabee, Mich.

41. July 31. Backwater from Cheboygan River through a slip at McArthur's dock, Cheboygan, Mich.

42. August 3. Rabbit's Back Creek, tributary to St. Martin's Bay, 5 miles from St. Ignace, Mich.

43. August 4. Mouth of Carp River, tributary to St.Martin's Bay, 12 miles from St. Ignace, Mich.

44. August 7. In the channels above Detour, Mich.,at Hay Point, Drummond Island.

NOTES ON ABOVE LIST OF STREAMS AND SEINING GROUNDS OF LAKE HURON BASIN.

I. Bunce Creek, June 8, 1894.

Bunce Creek is tributary to St.Clair River about 5 miles below the mouth of Lake Huron.

At this time of year it is a series of pools from two to three feet deep and a few rods long, connected by small and shallow streams of water. A few rods from its mouth are the remains of an old mill which, at this time of year, pretty effectually cuts off the creek from the river.

The present outflow of the creek is very small, and the passage of fish between the creek and the river seems almost impossible. In times of heavy rains, the creek may be a stream thirty feet wide and two or three feet deep.

The bed of the stream is of mud, quite deep in places.

An abundant vegetation is found in the water. It consists of myriophyllum, in greatest abundance, with chara and algae in abundance.

Fishing in the creek gave quite satisfactory results. The seine was drawn in the St.Clair R.at the mouth of the creek, but without result. The water of the St.Clair is quite cold, much colder than that of the creek.

II. Black River, June 9, 1894.

Black River rises in Sanilac County, Michigan, about ten miles from the shore of Lake Huron. It flows south, bearing somewhat to the east, flowing almost parallel to the Lake shore until within a few miles of its mouth, where it follows a very winding

course with its general direction more nearly east. It enters the St.Clair River about two miles below the mouth of Lake Huron. It flows through about fifty miles of territory.

For about a mile above its mouth the river is deeper than natural, having been dredged to admit boats. Above this part, the river is about fifty yards wide and five feet deep. It has quite a strong current until it nears its mouth, where the current is checked by backwater from the St.Clair.

There are no obstructions either natural or artificial in the lower course of the river and we learned of none in its upper course.

For one mile from its mouth the river is contaminated to some extent by waste from factories and from the sewage of the city of Port Huron, but this contamination is not of such amount that any difference is noticea-

ble in the character of the water above and below the source of contamination.

The surface of the river on the morning of June 9 was as smooth as glass, and I have never seen more perfect reflections than made by this surface. In many cases it was difficult to distinguish the line of separation between an object coming to the water's edge, and its reflection.

The water of the river, when examined in small quantities, is clear and transparent, but as seen in the river it is very dark. This dark color is also characteristic of the stream in its upper course where the water is very shallow.

This dark color is especially evident where the water of Black River joins the St. Clair. A strip of dark water several rods wide can be distinctly seen for more than half a mile below the mouth of Black River

along the St.Clair. The water of the St. Clair is exceptionally clear and the contrast is very marked.

The bed of the river in its lower course is of sand and mud. The banks are from thirty to thirty five feet high. They are composed of clay overlaid with a thin layer of sand. These banks border a flood plain about eighty rods in width. The alluvial banks are only a few feet above the present level of the river. They are composed of sedimentary clay and sand. Slides are of quite frequent occurrence. Heavy spring freshets raise the river above its alluvial banks and covers the flood plain.

The principal water plants of Black River are lily-pads (found in several places along the banks), sedges, grasses and rushes.

The principal forest trees along Black R. are oaks, pines, ashes, elms, maples, lin,

hickory and cherry, with an undergrowth of dogwoods, blue-beech, amalanchier, alder, elder and willow. Besides these there are other shrubby plants, such as huckleberry, five-leaved ivy, shrubby cinque-foil, blackberry, raspberry and others, among which are found a large number of herbaceous plants.

A small creek enters the river about two miles above its mouth. It is about thirty feet wide with a very sluggish current. It has such a heavy growth of lily-pads, water crowfoot and other water plants as to make it almost impossible to draw a seine. The bottom of the stream is of mud which is very deep. In this stream wherever we could fish we were sure to get an abundance of mud minnows, Umbra limi, no other fish being found in the creek, except near its mouth, where the

fish are about as found in the river.

III. Cogshall Creek, June 17, 1894.

Cogshall Creek is tributary to Lake Huron about seven miles above the head of the St. Clair River. It consists of a series of small pools several rods long and two or three feet deep, connected by small streams of water. The mouth of the creek at this time is so nearly closed by a sand bar that very little water is discharged into the Lake. Doubtless in times of high water considerable water enters the Lake through this channel.

The bottom of the creek is of sand. The banks are about eight or ten feet high and of sand, as the stream has cut its way through the sand ridge along the Lake shore.

An abundant water vegetation was found here consisting mainly of algae in such abun-

dance that it was sometimes necessary to remove the algae and then seine for fish.

We found crawfish quite abundant, and the fish life rather varied and interesting.

IV. Mill Creek, July 19, 1894.

Mill Creek is tributary to Lake Huron about twenty miles above the head of St. Clair R. At a distance of one mile from shore it is a very slender stream, scarcely more than a ditch. Near the Lake it pursues a very winding course. It consists of a series of pools ten or fifteen feet wide, and two or three feet deep, connected by streams of water only a few inches deep. The bottom is covered with small bowlders with a number of quite large ones. The banks are of sedimentary clay lying over bowlder clay which frequently crops out along the banks. The banks are about twenty five feet high. In

the bottom are also many sticks and snags which makes it difficult to seine the stream.

The fish taken from here seem to be diseased, as they are covered with many small black spots.

V. Black Creek, June 19, 1894.

Black Creek is tributary to Black River at a point almost opposite the mouth of Mill Creek. We entered the stream about a half mile above its mouth and followed it to Black River.

This stream is about twenty feet wide with an average depth of ten inches. Every ten or twenty rods is a pool a few rods long and from two to four feet deep. The current between the pools is quite strong. The character of the water of this stream is very like that of Black River. The Creek, as well as the River, is well named.

The bed of the stream is entirely of bowlders, usually small--from four to eight inches in diameter--with occasional large bowlders.

The banks are of sedimentary clay with much outcropping bowlder clay beneath. The banks are from forty to fifty feet high. The flood-plain is boggy and about thirty rods wide.

The water vegetation in Black Creek is very scarce. The banks are covered with trees, the principal kinds of which are poplars, birch, maple, lin, oaks and pines, with an abundant undergrowth of blue-beech, willow and alder. The ground is also covered with a very luxuriant growth of ferns and grasses.

Crawfish were quite abundant. The fish life is also quite abundant in species, but more abundant as to number of individuals.

VI. Black River, June 19, 1894.

We fished in Black R.at the mouth of Black Creek. The river pursues a very straight course here as compared with its lower course.

At this point Black R.is about fifty feet wide and eight or ten inches deep with quite a strong current. The water here has the same black appearance as at its mouth.

The bottom, banks and vegetation are as in Black Cr. Fish both as to species and numbers are fewer than in Black Cr.

VII. Rock Falls Creek, June 23, 1894.

Rock Falls Creek is tributary to Lake Huron two miles below Sand Beach Harbor. We went about a half mile above its mouth and fished to the Lake.

The stream is about twelve feet wide and of varying depth. It is made up of pools

about ten rods long and two or three feet deep, with about ten rods between the pools where the water is only a few inches deep, hardly allowing the passage of small fish from one pool to the other.

The bottom of the stream is covered with bowlders of various sizes. The banks are from eight to ten feet high, and of clay.

Fish were found here in goodly numbers in almost every pool, but they did not seem to be in a healthy condition. Nearly every specimen was covered with black blotches, making it appear as if it were struck by a blight. The water seems to be very impure on account of its being so low that hardly any movement of water takes place from pool to pool. Doubtless in times of heavy rains the water rises sufficiently to produce a good current.

VIII. Streams, &c., about Sand Beach Harbor, June 23, 1894.

Along Sand Beach Harbor are several small streams with little current flowing into the harbor. Also some small pools of water cut off from the main body. These pools and streams are muddy in the bottom and have an abundant water vegetation of chara and other water plants.

Several species of fish were found here, but the most abundant was the Brook Stickleback, Eucalia inconstans, which was taken in large numbers.

IX. Sand Beach Harbor, June 25, 1894.

The shore of Sand Beach Harbor is composed of bowlders at its south-east point and of sand and gravel further in the harbor. There is very little vegetation at any place in the harbor. Along the docks are found

large numbers of minnows which are caught for bait.

Considerable fishing with hook and line is done in the harbor, the principal catch being perch.

X. Willow Creek, June 26, 1894.

Willow Creek is tributary to Lake Huron at Huron City, Mich. We fished the stream one-half mile from its mouth. Here it is about twenty feet wide and six inches deep where flowing. There is an old dam at Huron City just a few rods above where we fished, but it does not now interfere with the flow of water. Above this dam the water is three or four feet deep, but without current. This deeper water is filled with logs and snags in great abundance. The water is very black. The bottom is of bed-rock over which are scattered small bowlders. The banks are of

rotten shale.

The fish life, so far as we were able to determine, is very scarce. Tadpoles were found in great numbers.

XI. Birds Creek, June 27, 1894.

Birds Creek is tributary to Saginaw Bay at Port Austin, Mich. We fished the stream for about eighty rods from its mouth.

It is about fifteen feet wide and fifteen inches deep, with very little current.

There are numerous sand dunes about Port Austin, and the creek has kept open a channel through them, hence the bottom and banks of the stream are of sand.

The water vegetation is quite abundant, consisting of chara, algae and other water plants.

XII. Saginaw Bay, June 27, 1894.

We fished in the Bay eighty rods below the mouth of Birds Creek, where the beach is entirely of sand.

We also fished a half mile above the mouth of the creek, where the shore and bottom are of solid rock. Here we caught a few young perch, and great numbers of a large shining minnow.

The bay at this point was covered with the empty shells of the larvae of a "fish-fly," and large quantities of these insect shells had sunk to the bottom, so that, when the seine was drawn, it became completely filled with these insect remains. At various places on the surface of the Bay great patches of many square feet of these brown insect remains could be seen. Along the shore these empty shells had been washed ashore in large quantities.

XIII. Pinnebog River, June 28, 1894.

The Pinnebog River empties into Saginaw Bay at Port Crescent, Mich. At its mouth it is filled with logs, snags and other trash from rafts. At three miles from its mouth we found the same thing to be true. At five and one-half miles from its mouth there were hardly any obstructions in the river.

The river at this point is about forty five feet wide, and three feet deep, with a very slow current.

The bottom is of mud. The banks are about twenty five feet high.

The water vegetation is very abundant, consisting of chara, myriophyllum, algae and other water plants.

XIV. Rush Lake, June 28, 1894.

Rush Lake is situated in Huron County, Mich., about midway between Port Austin,

Mich.,and Caseville, Mich.,one and one-half miles from Saginaw Bay. It is about two and one-half miles long and one and one-fourth miles wide. We had been told that this lake has neither inlet nor outlet. A large map of Huron Co.shows neither, but while fishing in this lake a man who lives near the lake told us that it has a small outlet into Pigeon River. We had no time to investigate this point for ourselves.

We fished the lake on the side nearest the Bay. The bottom of the lake is of soft, fine mud, quite deep, so that seining was made quite difficult. We were told that in parts of the lake a pole can easily be pushed into the mud bottom for many feet.

All the land between the Bay and the Lake is of sand piled into ridges from fifty to seventy five feet above the level of the Lake. It is but a short distance from the

opposite side of the Lake back to clay land.

In the water near the shore there is an abundant growth of rushes which forms the chief vegetation of the Lake. The immediate shore of the lake is covered with a dense undergrowth of shrubs. A few rods from the lake begins the vegetation common to a sand ridge region. It consists of pines, oaks, juniper, tamarack, &c.,with many plants common to sandy soil and low,wet places which are sometimes found.

XV. Pigeon River, June 29, 1894.

Pigeon River is tributary to Saginaw Bay at Caseville, Mich. We fished the stream about one mile above its mouth. Here it is from twenty to thirty five feet wide and eight inches deep with a slight current. At a distance of a mile or more above its mouth the banks are of clay. Nearer its mouth the

bottom and banks are of sand. The river is wider and deeper near its mouth and has in it many logs that were rafted down when the water was high in the spring.

In the sand in the bottom of the stream about one-half mile from its mouth were found some bivalves which look very much like those previously seen in whitefish stomachs. They were buried in the sand and by some searching a number of living specimens were found. These are in the collection.

In driving across the country from Caseville to Bay Port, we saw the Pigeon R. at several points. At this time of year it is a very slender stream with hardly a perceptible current.

We were told that in the spring it was quite high and swift, making it possible for much rafting to be done.

XVI. Ponds, &c.,June 29, 1894.

We fished several small ponds and bayous along Saginaw Bay near the mouth of Pigeon River. Some of these are supplied with river water in times of hard rains, others from the Bay during"blows;" and others from small streams.

Some of these ponds are cut off from the Bay by narrow bars of sand but little higher than the level of the water. Others farther back have sand ridges from eight to fifteen feet high between them and the Bay. Some of these are supplied by small streams.

In the small pools nearest the shore the bottom is covered with slabs and sticks of wood from the mills; in the others the bottom is of sand and mud.

XVII. Saginaw Bay, June 30, 1894.

We fished in Saginaw Bay about one mile

above Pigeon River. The water is only from one to three feet deep for twenty or thirty rods out. A sand bar is forming about twenty rods from shore. The bottom is entirely of sand. There are some rushes growing in patches in some parts of the Bay here. Among these rushes we caught large quantities of small fish, mainly perch, but in the clear water we caught very few fish.

XVIII. Mud Creek, July 2, 1894.

Mud Creek enters Wild Fowl Bay from the east. It is about ten feet wide and eighteen inches deep, almost without current. The bottom is of mud. There are no banks, the water spreading out over the flat marshy border of the Bay. The creek is filled with lily-pads and other water vegetation.

XIX. A small lake, July 2, 1894.

About one-half mile north of Mud Creek and ten rods from shore of Wild Fowl Bay is a small lake about eighty rods long and forty rods wide. We could discover no outlet to the lake. Its margin and bottom near the shore is a marshy bog with water standing between the hillocks of turf. The bottom near the margin is so muddy and marshy that one sinks quickly in attempting to wade.

Further east in the lake we found some sand bottom which continued for a few rods, to be replaced again by a deep mud.

XX. Bay Port Docks, July 5, 1894.

In Wild Fowl Bay about the Bay Port docks the water is from one to three feet deep. The bottom is of sand. Along the edges rushes, chara and other plants are found growing. Among these numerous specimens of the short-

nosed gar pike were taken. No vegetation was found except along the margin.

XXI. Shebeon Creek, July 4, 1894.

Shebeon Creek is tributary to Saginaw Bay at Shebeon, Mich. There is no water in the creek at this time of year above three-fourths of a mile from its mouth.

Near its mouth the creek is about fifteen feet wide and from two to four feet deep. The direction of the current depends on the direction of the wind, sometimes it is up stream and sometimes down. The bottom is of mud. Great quantities of algae are found here. Fish are very scarce.

XXII. Quannakissee River, July 9, 1894.

The Quannakissee River rises about five miles from the shore of Saginaw Bay. It flows south-east for about five miles, then

north-east for five miles and empties into Saginaw Bay twelve miles east of the mouth of Saginaw River.

It has quite a good channel along the last three or four miles of its course. In its lower course its channel is about fifty yards wide and seven feet deep. The current depends on the direction of the wind. The current may change several times in a single day.

The bottom is of sand and mud. There are no banks, and the water spreads out over the adjacent country.

In the water towards the edge of the channel lily-pads, wild rice and pickerel weed are quite abundant. The adjoining country is covered with an abundant growth of tall grass of a kind common to marsh land.

We obtained only a very few fish by seining, but an old citizen of the region report-

ed the following as having been found in the river:

1. Perch.
2. Suckers.
3. Bullheads.
4. Channel Cat.
5. German Carp (few).
6. Oswego or Green Bass.
7. Black Bass.
8. Sheepshead (few).
9. Gar Pike.
10. Wall eye.
11. Grass Pike.
12. Eel (occasional).

During the winter season fishing is carried on, and about a dozen nets, mainly fyke nets, are set in the river from its mouth to one and a half miles above.

The winter catch is maindly perch and suckers in the proportion of 2/3 perch and

1/3 suckers.

XXIII. A Ditch, July 9, 1894.

The country for three or four miles on either side of the Quannakissee R. is so low that it is very wet and cannot be cultivated. Many large ditches fifteen or twenty feet wide and from six to ten feet deep are being dredged through the country in various directions.

One of these ditches runs from a few miles east of Bay City along the roadside to the Quannakissee R. We fished this ditch at a point three or four miles from its mouth.

It is about twenty feet wide with twelve inches of water and no perceptible current. The bottom is very muddy.

In the water there is an abundant growth of water plants, chara and algae in abundance.

Doubtless the fish are quite abundant, but we were unable to get many on account of the vegetation in the water. Turtles and frogs are very numerous along this ditch.

XXIV. Ditches, July 10, 1894.

In running from West Bay City to Wenona Beach along Saginaw Bay, the St.Car Ry.passes for about a mile through low,marshy ground not under cultivation. In building the track for the Ry.ditches were cut on each side. These ditches are about ten feet wide and three feet deep. At this time of year there are pools of water in the ditches, but they are for the most part dry. Two days previous, numbers of Esox lucius were seen in shallow pools. To-day the pools were dry and the fish lying dead on the mud.

In either ditch near the beach there is water about two feet deep and fifteen rods

in length. In these pools there is an abundant growth of water plants. In these pools we found fish, frogs, turtles and snakes quite abundant.

XXV. Kawkawlin River, July 10, 1894.

Kawkawlin River is made up of two forks or branches which unite about one mile west of the town Kawkawlin. The river then flows east five or six miles and enters Saginaw Bay about one and one-half miles west of the mouth of Saginaw River.

We were told that the character of the stream is very much the same throughout its course. We fished it at its mouth. Here the river is about one hundred feet wide and eight feet deep. The bottom and banks are of sand. Chara, rushes and grasses are found in the water. Sunfishes were very abundant.

XXVI. Saginaw Bay, July 10, 1894.

We fished in the Bay from the mouth of Kawkawlin River, east for a half mile. The bottom and beach are of sand. The water is very shallow, from a few inches to eighteen inches six or eight rods from shore. In the shallowest water rushes and grasses are quite abundant, and among these we found many sunfishes and minnows.

XXVII. Small Lake on Tawas Point, July 12, 1894.

This lake is a small land locked body of water with an area of four or five acres. One of the men at the U.S.Life Saving Station near by says it has had no direct communication with the Bay (Tawas Bay) for eight years or more. He thinks it obtains a water supply through the sand from the Bay, as its level is always that of the Bay, while other

land-locked lakes and ponds farther from the shore of the Bay are gradually drying up. There is about ten rods of sand beach between the Lake and the Bay. This barrier is four or five feet higher than the water's level.

The bottom of the lake is of sand for from fifteen to thirty feet from the water's edge. Beyond this it is of a fine, soft mud.

The plant life in the water of the lake is chiefly of myriophyllum and rushes. The land vegetation is very scarce on the immediate lake shore, but in the near vicinity, on Tawas Point, there is an abundant vegetation. The principal forest trees of Tawas Point are oaks, pines, maples and birch, with a very dense undergrowth of shrubs. Some of the shrubs in the more open places are dogwood, willow, huckleberry, low blackberry, steeple-bush and others. Among this growth

of trees and shrubs is found a very interesting list of other plants, among which are the bearberry, wintergreen, lambkill, pitcher plant, cinque-foils, some orchids and others. More than twenty five species of herbaceous plants were observed on Tawas Point.

The fact that this lake, or pond, is completely land locked adds interest to the fish found in its waters. A few species of minnows were found, the bullheads and perch were also common. The grass pike is said to be found here.

One species of minnow (Fundulus diaphanus) which we have heretofore found only in moderate numbers was found here in very great numbers. It was much more abundant than any other species here. Hundreds were caught in a very short time.

XXVIII. Tawas Bay, July 12, 1894.

Tawas Bay was fished along Tawas Point. The Bay is quite shallow and the bottom is of very fine sand. A few grasses and some rushes near the shore is about the only vegetation in the water. The shore and shore vegetation as given above for XXVII, as the two fishing points are but fifteen rods apart.

XXIX. Tawas River.

Above L.Tawas, July 12, 1894.

In L.Tawas, July 13, 1894.

Below L.Tawas, July 13, 1894.

Tawas River rises about ten miles northwest of the head of Tawas Bay. It flows in a north-easterly direction through the first half of its course and south-easterly through its last half, flowing about thirteen miles through its entire course and emp-

tying into the head of Tawas Bay.

This stream is divided into three parts:

1. Its upper course of nine miles, commonly known as Silver Creek.

2. Tawas Lake, two and one-half miles long.

3. Its lower course, Tawas River about one and one-half miles long.

We fished this stream at three places:

1. Upper Tawas River (Silver Creek) about three miles above the lake, July 12, 1894.

2. On east side of Tawas Lake, July 13, 1894.

3. At the mouth of Tawas River, July 13, 1894.

Tawas River above the lake is said to have the same character of water and of bottom throughout its course. At a point about

three miles above the lake it is about twenty feet wide and eighteen inches deep, with a very strong current, flowing at about four miles per hour.

The bottom is of clay, sand and gravel at different places. The banks are of clay and sand. They are eight or ten feet high with a flood plain thirty rods wide between them.

The water is very pure and clear. It is said to be one of the best streams in this locality for trout.

Nine miles below its source Silver Creek enters Tawas Lake. The direction of the lake is north-east and south-west. It is two and a half miles long and three-fourths of a mile wide.

On the east side of the lake the shore is eight or ten feet high and of sand. Elsewhere the country immediately surrounding the lake is but little higher than the level

of the lake. It is a black, marshy soil.

We fished on the east side of the lake. Here the bottom is of sand from twenty to sixty feet from shore, then it becomes a fine, soft mud in which lily-pads thrive.

Tawas River below the lake is about forty five feet wide and six feet deep, with quite a strong current, but not so strong as in Silver Creek above the lake. We fished the river near its mouth. The bottom is of sand and mud. For the last eighty rods of its course the river runs not farther than from twenty to thirty rods from the shore of Tawas Bay, at places running nearly parallel with the Bay shore. The bank of the river nearest the Bay shore is entirely of sand, the opposite shore is largely of clay with some sand. The banks from the lake to the bay are from six to ten feet high.

The character of water in the three parts

of the stream is worthy of note. In Silver Creek with clear sand, gravel and hard clay bottom, is pure and so clear that the bottom can be seen every-where. The same is true of other smaller streams entering the lake if they have a sand or gravel bottom. As the stream nears Tawas Lake it flows through a black, loamy soil. Out in the lake the water appears black. This color is characteristic of the stream during the rest of its course. Small streams flowing along the roadside have this same black appearance, however shallow the stream. This color is due in part, doubtless, to the fact that the water is seen over a black bottom. It seems that it may also be due, in part, to the fine particles of the very fine black soil through which the stream flows being held in suspension, not in sufficient quantities as to make the black color noticeable in small

quantities of water, but quite evident in large quantities.

The black streams that we have noted seem to be of the same general character. That the black color is not due alone to the color of the bottom seems to be most evident, as already noted--where Black R. joins the St. Clair. The water of the two rivers, after they meet, must, it seems, flow over the same character of bottom, but the waters of the two rivers are very definitely marked by a difference in color for a long distance below the mouth of Black R.

The water vegetation varies greatly in the different parts of the stream. Above the lake, in Silver Creek, we saw only a tuft of algae, whose opportunity for remaining in place was accidental rather than otherwise. In the lake there is quite an abundant water vegetation consisting of rushes,

pretty well distributed throughout the lake; lily-pads most abundant in the central and eastern parts of the lake; and chara very abundant on ths bottom where we fished.

XXX. Channels along Au Sable R., July 17, 1894.

We fished in channels cut for log booms along the Au Sable River at Au Sable, Mich. These channels are connected both with the river and lake. They are about twenty feet wide, and eight feet deep with about four feet of water in them. The bottom is of mud, and the banks of sand and clay. The water vegetation is of small amount. In places where the water is quiet and undisturbed are found lily-pads, rushes and flags.

XXXI. Lake Huron, July 17, 1894.

We fished in Lake Huron at Au Sable. Saw

mills occupy the shore and docks are numerous. The bottom of the lake is of sand, but in the vicinity of mills it is covered with a thick layer of sawdust and bark. Two species of fish were found among this material--the perch, one about one-half pound, and a minnow (probably Notropis hudsonius) which was found quite abundant.

XXXII. Pine River and East Fork of Pine River.

Pine River, July 14, 1893.

Vanettan Lake, July 14, 1894.

East Fork, July 24, 1894.

Pine River rises about ten miles northwest of the mouth of Au Sable River. It flows south-east for about ten miles and empties into the Au Sable River one mile from Lake Huron. Pine River is formed by the

union of three branches, the East, West and South Forks of Pine River, each of which is about ten miles in length. The South Fork joins the East and West Forks about one mile below their junction.

Vanettan Lake is formed in the lower course of Pine River. It is about three miles long and one mile wide. About two miles of the river's course lies below the lake.

On July 24 we fished in the East Fork of Pine River about five miles above where it joins the West Fork. Here the stream is about thirty feet wide and eighteen inches deep, with quite a swift current. The water is quite cold, 58°, 60° and 61° at different places. A small creek tributary to the East Fork registered 55°, and a spring which supplies water for this creek registered 44°. The water is very clear and pure.

The bottom of the stream is of sand and gravel. The banks are mainly of sand. They are about fifty feet high.

The water vegetation is quite abundant, and consists of water crowfoot, myriophyllum and chara, growing in large mats in the river, and making excellent hiding places for trout.

The banks are covered with a growth of cedar, birch, ash, few beech, pines and oaks, with a very dense undergrowth of poplars, dogwoods and other shrubs. Back from the immediate vicinity of the river the country is pine lands, having been lumbered and burned by forest fires. Many of the old charred trunks are still standing. The ground is covered with a dense growth of so-called "sage-bush" with many Bracken ferns.

The fish natural to this stream are suckers, in greatest numbers, with minnows,

sticklebacks and millers thumbs (called locally "Cockadush").

Speckled trout were planted in this stream about six years ago, and another lot of fry were put in four years ago. They seem to be flourishing, as this stream now furnishes a great deal of trout fishing. With the seine we caught one about seven inches long, and a number of small ones about four inches long. A gentleman who was fishing with a hook and line caught a dozen in a few hours.

On July 14 we fished Pine River about seven miles above its mouth and three miles below the South Fork of Pine River. Here the river is about fifty feet wide and ten inches deep when we visited it. It has quite a strong current. Many little creeks enter the river, and after a heavy rain its waters rise rapidly. We were told that two weeks

previous to our visit the river had been much higher than on July 14, and many cedar logs were rafted down the river immediately after a heavy rain at that time.

The bottom of the river is of sand, but the creeks and inlets of the river have mud bottoms. The banks of the river are about fifty feet high.

There is no vegetation in the river proper, but the inlets were filled with an abundant growth of rushes, flags, chara and other water plants.

Crawfishes were very abundant in the inlets. A muskallonge about fifteen inches in length was taken, but not put in the collection.

Vanettan Lake is said to have a depth of twenty two feet. Its bottom and shores are of sand. Some water plants were found near the shore, but they were not abundant. We

were unable to get more than a few species of fish with the seine, but the keeper of the lake reported the following as being caught in the lake with hook and line: Catfish, Bullhead, Black Bass, Rock Bass, Sunfish, Dogfish, Perch and Pike.

XXXIII. Lake Huron at North Point, Thunder Bay, July 19, 1894.

The bottom of the Lake and the beach are of sand. The water about the docks is from three to five feet deep, and very clear. In patches there is an abundant growth of a tall, coarse water plant. Among these small fish, especially young perch and two species of minnows, could be seen in immense numbers. Specimens of these and a few other species were taken.

XXXIV. Outlet of Long Lake, 8 m.north of Alpena, Mich.,July 21, 1894.

We fished in this outlet between two dams and below the lower one. In both places the current is very swift. No fish were taken or seen between the dams. Below the lower dam a minnow and a few sunfish were caught. On the stones in the bottom of the stream below an abundant growth of some algae was found. A bottleful in the collection.

XXXV. Hubbard Lake, July 25, 1894.

Hubbard Lake is situated in Alcona County, Mich.,about twelve miles from Lake Huron.

It is about nine miles long and five miles wide at its widest part. It has a number of small streams emptying into it. Its outlet is Hubbard River, which flows into Thunder Bay River. The lake where we visited it has no sand beach. The water of the

lake has for its margin a marshy soil covered to the water's edge with a heavy growth of trees and underbrush. The character of the margin seems to have been changed by a dam across the mouth of the lake. This dam has been built to raise the level of the lake, so that, when needed, the water of the lake can be let out for floating logs in the rivers below. This dam raises the level of the lake four or five feet, and in this way has increased the area of the lake considerably, covering with several feet of water any sand beach that may have once been along the margin of the lake.

Along the margin of the lake the water is quite shallow. About eighty rods from shore the water is twelve feet deep.

Growing near the lake are cedar, birch, basswood, elm, oak, pine and ash with a very heavy undergrowth of dogwoods, red raspberry

lake has for its margin a marshy soil covered to the water's edge with a heavy growth of trees and underbrush. The character of the margin seems to have been changed by a dam across the mouth of the lake. This dam has been built to raise the level of the lake, so that, when needed, the water of the lake can be let out for floating logs in the rivers below. This dam raises the level of the lake four or five feet, and in this way has increased the area of the lake considerably, covering with several feet of water any sand beach that may have once been along the margin of the lake.

Along the margin of the lake the water is quite shallow. About eighty rods from shore the water is twelve feet deep.

Growing near the lake are cedar, birch, basswood, elm, oak, pine and ash with a very heavy undergrowth of dogwoods, red raspberry

and blackberry. Water vegetation is very scarce.

We obtained only a few species of fish. Perch abound in great numbers. It is said that pickerel, pike and whitefish are found here.

XXXVI. Mullet Lake, head of Cheboygan River, July 28, 1894.

Between Petoskey on Lake Mich., and Cheboygan on Lake Huron, is a waterway consisting of a series of lakes with connecting rivers. The current is from L.Mich. toward L.Huron. This waterway is about forty miles in length.

We ascended the Cheboygan River, entered Mullet Lake and fished about the docks at Topinabee, Mich. The bottom and beach are of sand. A few rushes is the only vegetation in the water. Most of the fish were found along the dock.

The main inlet of Mullet Lake is Indian River. Its outlet is Cheboygan River, which is about eight miles long, from one hundred to two hundred fifty feet wide, and eight feet deep.

XXXVII. Backwater from Cheboygan River through a slip at the dock, Cheboygan, M., July 31, 1894.

This backwater covers two or three acres and is quite shallow, about eight inches deep, except along the dock, where it is six feet deep.

A good deal of grass and rushes are growing in the water. Fresh water sponge is common. A globural alga fastened to grass or floating free was found in great abundance. Fishing was quite good here.

XXXVIII. Rabbit's Back Creek, August 3, 1894.

Rabbit's Back Creek enters St.Martin's Bay about five miles from the Straits of Mackinac. We fished this stream near its mouth and also in little bayous along the Bay near the mouth of the stream.

The stream is about twenty feet wide and eighteen inches deep with quite a strong current. The bottom and banks are of sand.

Chara is quite common on the bottom.

The minnow of the collection was found in great numbers in a little inlet of the Bay.

A small bayou, about thirty feet long, seven feet wide and four inches deep, was found near the Bay, but entirely cut off from it. Here we found one species, Fundulus diaphanus, in great abundance, there were few adults and great numbers of fry and small specimens. We have found this species

in many places, but it is most abundant and in greater numbers compared with other species in bodies of water cut off from the main body. e.g. In Rush Lake we found them more abundant than any other fish, though not in great numbers. In the small land locked Lake on Tawas Point (See XXVII) this species was found in great numbers, and here in a mere pool it and no other fish seems to thrive and raise young in great numbers.

Besides the fish we caught here, we were told that Black Bass are very plentiful in July, Bullheads during the summer, and Perch in September.

XXXIX. Carp River, August 4, 1894.

Carp River is tributary to St.Martin's Bay about twelve miles from the Straits of Mackinac. We fished near the mouth of the river and made a few hauls in the Bay.

The river is about forty feet wide and six feet deep with a moderately strong current.

The bottom is of sand and mud. The banks are about five feet high. The river at its mouth is filled with lumber, snags and boom logs.

Rushes and grass grow in the water near its edge.

Frogs are very abundant and fish are very scarce, at least where we fished.

Fishing in the lake also yielded poor results.

Temperature of water: River 64°. Bay 66°.

XL. Hay Point, Drummond Island, August 7, 1894.

This place is 13 m.N.E.of Detour, M. The bottom is literally covered with bowlders of

various sizes. The water near the dock is about 4 or 5 feet deep, with many rushes growing in it.

Minnows and small perch were very numerous.