

## 7.—NOTES ON THE FRESH-WATER FISHES OF WASHINGTON COUNTY, MAINE.

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The following notes are the result of a brief investigation of several lakes and fresh-water streams in Washington County, Me., conducted principally in October, 1893, with the assistance of Mr. B. L. Hardin. The collections made do not fully represent the fish fauna of the region, as the time spent in the field was very limited, the areas examined comparatively circumscribed, and the facilities for collecting necessarily imperfect. The work can therefore only be regarded as the initial step toward more thorough and extended operations in the future.

A part of this region has long been well known to sportsmen on account of the excellent opportunities it affords for both hunting and fishing, especially about the Grand Lakes. In some localities fishing is still carried on as an industry, in a small way, while in others, where this business was once conducted, it has been abandoned. Alewives are caught in Dennys River, and three salmon weirs are located in the salt-water portion of the same stream. Pickerel fishing affords employment in winter for a few fishermen on Schoodic River and Tomah Stream. In the lower lakes of the Grand Lake system a few white men and Indians make a business of fishing for white perch and pickerel. Whitefish are caught in considerable numbers in "the thorough-fare" at the upper end of western Grand Lake. The trout and landlocked salmon in Grand Lake and Grand Lake Stream afford unsurpassed angling. The salmon fishery of St. Croix River, once very important, has been almost entirely abandoned, though of late years it has shown slight improvement. The smaller fishes, though seemingly uninteresting from any other than a natural-history standpoint, are of considerable indirect economic importance. Those of the sucker and minnow families form not only a conspicuous item in the food supply of the more important fishes, but in turn they feed upon their eggs and young, thus helping to maintain the balance of nature by preventing an undue increase of either.

In this connection we may refer to the pickerel, the so-called enemy of nearly all other fishes, succumbing only to the black bass, and depending mainly upon the young of other fishes and frogs for its food, though young pickerel subsist to a great extent upon insects. If, through their own greed or by other means, their food supply is withdrawn, pickerel gradually degenerate in size and ultimately practically disappear. Many instances in support of this fact have been made known. Pickerel and black bass are certainly voracious and destructive fishes, but the writer questions whether they have not to some extent been unjustly accused. It is doubtful if trout ever

existed in large numbers in the waters of this county from which they are said to have been exterminated by pickerel; even if they did, it is probable that they had begun to diminish from other causes before pickerel were introduced to facilitate their destruction. Trout do not thrive in waters best suited to pickerel, while the latter species will not do well in the favorite habitat of the trout, and the appearance of an occasional pickerel in such places is no cause for alarm. Pickerel are lovers of quiet, muddy, weedy streams and lakes. Trout prefer cool, running water, with little of such vegetation. Whenever pickerel have existed contemporaneously with the smaller fishes, such as chubs, minnows, etc., there has seldom, according to our experience, been any scarcity of the latter. Trout, moreover, generally disappear from their former resorts far faster through human than through natural agencies. Excessive and destructive methods of fishing, pollution of the waters, and the destruction of forests are far more fatal to trout life than the natural enemies.

The writer, however, does not wish it understood that he advocates the introduction of pickerel into such waters, for they would afford an additional factor of destruction to those already in operation. Furthermore, it is well known that where pickerel or bass exist it is next to useless to endeavor to introduce and propagate the brook trout or any of its kin.

Among the fishes discussed in this paper are also included those salt-water species which occasionally or periodically enter the fresh waters for spawning or other purposes.

Local names are always more or less confusing, and they are especially so in many instances in Maine, where distinct species in neighboring localities are often known by the same name. The name "chub" is applied indiscriminately to the larger fishes of the family *Cyprinidae*; "young chubs" or "shiners" to the intermediate sizes, and "minnies" to the young *Cyprinidae* and to the *Cyprinodontidae*. The catfish, *Ameiurus nebulosus*, is known generally as "hornpout," as also in some places the sticklebacks, *Pygosteus*, *Gasterosteus*, and *Apeltes*. *Catostomus teres* is commonly designated as "sucker." *Semotilus bullaris* is widely known as "chub;" but the adult *Fundulus heteroclitus*, in places along the coast, are likewise called "chub," and the young of the same species "minny." *Salvelinus fontinalis* is everywhere recognized by the names "trout," "brook trout," and "speckled trout." *Salvelinus namaycush* is known as "togue," "lake trout," or "salmon trout;" *Salmo salar sebago* as landlocked salmon and "salmon trout." The brook trout, when large, also has sometimes been misnamed "salmon trout." *Salmo salar* is commonly known as "salmon" or "sea salmon."

The local names given in connection with the scientific ones in the lists accompanying this paper are those most often applied to the fishes in the localities to which the lists relate. Where the local name was not ascertained the name used in a neighboring locality has been inserted.

## BOYDEN LAKE, PENNAMAQUAN LAKE AND RIVER.

## BOYDEN LAKE.

Boyden Lake is about 3 miles long; its greatest width is 2 miles. It is situated in the northern part of Perry, extending also a short distance into the town of Robinston. The water has the red color usually caused by decaying vegetable matter. The shores are for the most part rocky, but there are numerous sandy places thickly grown with rushes, the lurking-spots of the young of the various fishes that inhabit the lake. This lake is the source of Little River, which empties into Passamaquoddy Bay a few miles north of Eastport.

On August 13, a visit was made to the southern end of the lake, where several hauls of a 25-foot Baird seine were made among the rushes. The following five species were taken in abundance: *Ameiurus nebulosus* (young), *Catostomus teres* (young), *Notropis megalops* (young), *Semotilus bullaris* (young), and *Fundulus diaphanus*. The occurrence of the latter species here considerably extends its eastern range, the coast of Massachusetts having heretofore been regarded as its limit in that direction. The young of *Lucius reticulatus* (2 specimens), *Anguilla chryssypa*, *Lepomis gibbosus* (1 specimen), and *Perca flavescens* were also captured.

Pickereel of small size are said to be common in the lake, and a few black bass and landlocked smelts are stated to occur there. It is affirmed that this lake once afforded excellent trout fishing, but pickereel were introduced and subsequently black bass. However, trout have not been caught here within the memory of any one with whom we conversed.

## PENNAMAQUAN LAKE.

Pennamaquan Lake, about 4 miles long and 1½ miles wide, is the source of Pennamaquan or Pembroke River, which empties into Cobscook Bay. It is situated in the southeastern part of the township of Charlotte. A small stream rising in Baring flows into it at its northern end and it receives the waters of Round Pond through a small brook. Crocker Lake is a neighboring small body of water, but has no connection with Pennamaquan Lake. Pennamaquan is connected with Boyden Lake by Boyden's meadow brook, which under certain circumstances (when higher water prevails in one or the other of the lakes) reverses its current, flowing at one time into Pennamaquan, at another into Boyden Lake. This brook is an ordinary sluggish meadow stream, full of cat-tails, water lilies, pickereel weed, bladder wort, and other fresh-water plants.

Pennamaquan Lake resembles Boyden Lake in its dark water, rocky, gravelly, and sandy shores, and luxuriant growth of rushes. We were informed that black bass were introduced into the lake about fifteen years ago, and Boyden Lake was probably supplied about the same time. Fair bass fishing is said to be found there now. A fresh breeze interfered with the success of our seining, but on August 30 the following fishes were taken in Pennamaquan Lake:

<i>Catostomus teres.</i> Young, few.	<i>Fundulus diaphanus.</i> Common.
<i>Notropis megalops.</i> Few.	<i>Lucius reticulatus.</i> Young, few.
<i>Semotilus bullaris.</i> Young, few.	<i>Lepomis gibbosus.</i> Young, common.
<i>Notemigonus chrysoleucus.</i> Young, few.	<i>Micropterus dolomieu.</i> Young, two specimens.
<i>Osmerus mordax.</i> Few.	<i>Perca flavescens.</i> Young, common.

In Boyden's meadow brook one specimen of *Lucius reticulatus* was obtained.

## PENNAMAQUAN RIVER.

Near the lake, Pennamaquan River is shallow, rocky, and rapid. Farther down it is more sluggish and boggy for the remainder of its course, and abounds in the common fresh-water plants. It has three milldams: one at Pembroke village, another about a half mile above, and a third about 3 miles up. The last we did not have the opportunity of examining. Salt water makes its way nearly up to the lower dam. No artificial fishways have been constructed, but when the water is sufficiently high fish can pass through some rude excavations in the rocks at the ends of the dams.

Alewives are said, at one time, to have run up the river in abundance, but since then the numbers have greatly diminished. Many young ones, however, were seen coming down this season. Pickerel up to 3 pounds in weight are reported to be common.

A small brook enters at Pembroke, in which trout are said to be caught, as well as in the brackish water at its mouth. On October 6 several hauls of the 25-foot seine were made in the river for about 1½ miles above the second dam. The common water plants, such as cat-tails, lily pads, pickerel weed, etc., were abundant, though dead at this time. Spiders, water bugs, insect larvæ, and snails were exceedingly numerous among the grass and weeds.

The temperature of the water was 62.5° F.

The fish taken were *Notemigonus chrysoleucus*, very common; *Lucius reticulatus*, common; *Lepomis gibbosus*, common; *Perca flavescens*, common.

The abundant fresh-water plants, muddy bottoms, coves, and lagoons supplied with pickerel weed and water lilies, afford an ideal home for pickerel.

Boyden and Pennamaquan lakes also seem more suited, in their general characteristics, to such fishes as pickerel, chubs, suckers, and hornpouts, than to trout, salmon, or other species of like habits.

*List of Fishes obtained in Boyden Lake and Pennamaquan Lake and River.*

<i>Ameiurus nebulosus</i> (Le Sueur). "Hornpout."	<i>Fundulus diaphanus</i> (Le Sueur). "Fresh-water Minnow."
<i>Catostomus teres</i> (Mitchill). "Sucker."	<i>Lucius reticulatus</i> (Le Sueur). "Pickerel."
<i>Notropis megalops</i> (Rafinesque). "Red-finned Minnow."	<i>Anguilla chryssypa</i> Rafinesque. "Eel."
<i>Semotilus bullaris</i> (Rafinesque). "Chub."	<i>Lepomis gibbosus</i> (Linnæus). "Sunfish."
<i>Notemigonus chrysoleucus</i> (Mitchill). "Shiner."	<i>Micropterus dolomieu</i> Lacépède. "Black Bass."
<i>Clupea æstivalis</i> Mitchill. "Alewife." *	<i>Perca flavescens</i> (Mitchill). "Yellow Perch."
<i>Osmerus mordax</i> (Mitchill). "Smelt."	

\* The specimens appear to be the young of *Clupea æstivalis*, agreeing with this species in the black peritoneum. In the somewhat larger eye and slightly higher dorsal fin, they differ, however, from the usual aspect of *C. æstivalis* and approach *Clupea pseudoharengus*.

## MEDDYBEMPS LAKE AND DENNYS RIVER.

## MEDDYBEMPS LAKE.

On October 8, with the object of making an examination of Dennys River, we went, with a guide and canoe, to Meddybemps, where some fishing was done in Meddybemps Lake, but with little success. This lake is about 12 miles long and 5 or 6 miles wide, of irregular shape, and contains several small, wooded islands and one of fairly large size. It has an area of about 20,000 acres. For the most part, so far as we could determine, the shores and bottom are rocky, composed of large and small bowlders, with some granite ledges along the shore. At the lower end the lake was shallow, but our visit was made during the low-water season, marks on the rocks indicating that at certain times the depth becomes 4 or 5 feet greater. The water is cool and fairly clear, and in our judgment would afford an admirable place for salmon, trout, or togue, were not black bass and pickerel common in the lake, there being, however, fewer pickerel than black bass. The other fishes said to inhabit the lake are white perch (*Morone americana*), yellow perch, eels, smelts, alewives, chubs, and suckers.

At the outlet of the lake is a dam about 20 feet long. The gate, about 6 feet wide, was closed, but is open, we were told, most of the season. A fishway exists at one end of the dam, but no water was flowing through it at this time. A few rods below is a bridge, with an aperture of about 20 feet, the latter being obstructed by a closely made slat fence, having a narrow gate opening into a short sluiceway, which extends into a box about 7 feet long by 3 feet wide, provided with a wire-netting end and bottom. This contrivance was used for catching eels, which are said to pursue the young alewives in great numbers as they move down from the lake into the river. About two dozen eels were in the trap at the time of our visit. At the end of a stone dam or wall, between the bridge and the other dam, stands an old mill, under which is another fishway into the lake. Above this is a broad, shallow, muddy pool in which the seine was hauled, but without securing any fish.

Several hauls were made along the west shore of the lake, with little success, as few suitable localities for seining could be found. About 2 miles from the dam, in a shallow place, with muddy bottom, containing rushes and lily pads, two pickerel were taken, together with some mollusks (*Planorbis*) and insects.

## DENNYS RIVER.

Dennys River, just below the dams and bridge, is about 25 feet wide, rocky, gravelly, and sandy, and contains many old water-logged slabs. Nine chubs, 4 to 11 inches long, were taken here. This river flows for about 20 miles from Meddybemps Lake to the village of Dennysville, through meadow land and low hills wooded with maple, low birches, etc., together with occasional tracts of spruce, fir, pine, and hardwood growths. Over a great extent the country bears evidences of the destruction of its forest by fire or other agency. For about 6 miles it is dead water, containing luxuriant growths of algæ, water grasses, weeds, water lilies, cat-tails, and many other fresh-water plants. Some places are very deep; others shallow. The bottom consists of mud and sand. Seining was nearly impossible on account of grass, weeds, and snags. Old sunken slabs were found for over a mile below the mill. About 1½ miles below the lake a bank of sawdust, overgrown with flags and rushes, occurs on an outward curve of the river bank. Pickerel were seen here. At every place along this tract

of dead water, where it was practicable to use the seine, hauls were made. Pickerel, measuring from 6 to 16 inches long, were common. The young ones were frequently observed rising to insects and leaves which had fallen into the water. One dead chub was taken. About 4 miles below Meddybemps the river is about 30 yards wide, the temperature of the water being 55.5° F. on October 9.

At the first quick water, about 6 miles below Meddybemps, a school of young alewives was seen, but none were secured. From this place frequent rips and rapids occur in the river along the remainder of its course. They are from a few yards to a mile in length, with intervening reaches of quiet water in which water plants grow profusely. Trout are said to be common in all these rips. Frequent unsuccessful trials were made with hook and line, using minnows and worms as bait. The seine also was used in suitable places, but with no success until about 12 miles below Meddybemps. The last 6 miles were, for the most part, unsuitable, the water being deep, with abrupt banks or very swift currents. On October 10, about 6 miles above Dennysville by river, a few young pickerel were obtained from among weeds and lily pads, where the bottom was boggy, and young chubs and red-finned minnows were taken on clay bottom with short grass and shallow water. Clark Rips are located about 5½ miles above Dennysville, at the foot of a long stretch of smooth, deep water. Over these rips the water flows with considerable force, forming deep pools and eddies with gravelly bottoms behind large boulders. In one of these eddies we succeeded with some difficulty in making a haul of the seine. Three specimens of trout were obtained, two of which were females about 10 inches long, with well-advanced but still immature ovaries; the other was about 6 inches long. The stomach of one contained a young alewife; the other caddis worms. Two young chubs were taken. The temperature of the water here was 50° F.

About a mile below Clark Rips, on Starters Rips, fine gravelly bottom, 1 young salmon, 4 inches long, and 1 red-finned minnow were obtained. At the entrance of a narrow arm of the river, which makes off a short distance below this place and rejoins the river somewhat farther down, there is a deep pool, with muddy bottom, lily pads, and boggy shore, from which numerous specimens of suckers, red-finned minnows, chubs, and a few young alewives, 2¼ to 2½ inches long, were taken. Near the lower end of Starters Rips, in a pool of a rivulet branching from the main channel through a gravel bed left dry by the low water of this season, we took many specimens of suckers, red-finned minnows, black-nosed dace, and chubs. At the foot of Starters Rips, in about 2½ feet of swift water, fine gravel bottom, 1 gravid female trout, about 13 inches long, and 1 young chub were caught, the former being liberated at once.

About 2 miles above Dennysville, in a small cove full of water plants, 5 pickerel, 4 to 12 inches long, were obtained, together with larval insects, water bugs, snails, etc. The temperature of the water was found to be 54.5° F. Just below here a jam of logs, about 200 yards long, was encountered, preventing further progress in the canoe. Below this there were short rips and another small jam of logs. The rest of the river is comparatively smooth, with occasional boulders in shallow water, until it reaches the millpond. Below the mill the water again becomes rapid, and this character obtains down to the salt water at Dennysville. The pond is about a half mile long and from 75 to 400 yards in width. We were informed that pickerel, hornpouts, "roach" or "hogbacks" (*Lepomis gibbosus*), and eels occur there. Large eels are said at times to be abundant in the river, following the young alewives down.

The upper 6 miles of Dennys River seems to be particularly adapted to pickerel; the remainder of the river is said to be, and ought to be, a fine trout stream. The gravel bottoms afford excellent spawning-grounds for both salmon and trout. Starters Rips are reputed to be the favorite spawning-ground of salmon. Alewives find their proper spawning-ground in the lake, and perhaps in the upper part of the river. The rips and rapids are always the favorite haunts of trout in the spring and summer, and they often congregate at the mouths of spring brooks, where insects and other trout food are likely to be washed in.

Fish have access to the river from below and from the lake. Pickerel are found along the entire length of the stream; they were probably introduced into the lake as well as into the mill pond at Dennysville. How much havoc they may have wrought among the trout and smaller fishes is hard to say, but the trout are still plentiful, and in certain localities there seems to be no dearth of smaller and less important fishes. The reported decrease of pickerel in Meddybemps Lake may possibly be due to the presence of black bass.

At Dennysville Mr. Benjamin Lincoln, a prominent resident, gave us some interesting and instructive information regarding the fishes of the locality. He said that, in the early history of the town, salmon were plentiful in the river, but were smaller and of different shape than at present, having more of a "mackerel shape," and not going beyond 12 pounds in weight. In 1845 a water mill was built a mile above the present one. No fishway was placed in the dam, so that the migration of salmon, shad, and alewives up the river was interrupted, and these species were unable to reach their spawning-grounds. Shad were once abundant in the Machias, Pembroke, and Dennys rivers, but at present only an occasional one is observed in any of those streams. A single specimen was taken at Dennysville this season. Alewives as well as salmon, however, are now increasing in abundance. In 1858 the above-mentioned mill and dam were destroyed by fire, and the passage of fish again made possible. Salmon and alewives resumed their migrations to some extent, with a little increase from year to year. The lower mill, built by Mr. Lincoln's grandfather, caused no obstruction in the river, as at one end of the dam a good natural fishway was left, and it still exists, somewhat improved.

In 1874 Mr. Lincoln began the planting of young salmon in the river, a work which he continued every season until 1890, obtaining his supplies of eggs from the State or U. S. Fish Commission and hatching them at his own expense. At the latter date, however, he discontinued this commendable undertaking, the indefatigable poaching carried on by some of the residents along the stream tending to defeat his efforts. Mr. Lincoln estimates that about 250,000 young salmon have been deposited in the river. The old run of "mackerel-shaped" salmon has disappeared and larger and proportionately deeper fish ("true Penobscot salmon"), attaining as great a weight as 33 pounds, have taken their place. The quantity of fish has also greatly increased.

According to Mr. Lincoln there are two runs of salmon in Dennys River every season, one from May 15 to July 30, or thereabouts, and the other from October 1 until November. Apparently only a few males are found with the summer run. The spawning season is in November, and hooked-nosed individuals are found only at that time.

Salmon have been seen spawning a short distance up the river from Dennysville and thence all along in suitable places to above Starters Rips. It is Mr. Lincoln's opinion that the destruction of the forest by the Saxeby gale, on September 4, 1869, and subsequently by fire, has been injurious to the welfare of the salmon, as the stream is now less protected from cold and in some places it freezes to the bottom, killing eggs and young.

Alewives have again become abundant, but the "bluebacks," which were deeper, proportionately shorter, and fatter fish, and once common, are no longer found. Alewives run upstream during May and June and after a few months the young, about 2 inches long, are seen coming down in abundance. They continue to descend until late in the season, after the ice has formed. Some do not get down until spring, when they are about 5 or 6 inches long. This species spawns in the dead water.

On the morning of October 7 Mr. Lincoln opened the gate in the fishway at his milldam in Dennysville. Thousands of young alewives were seen passing down tail first until they reached the turbulent water below, where they were tossed about until they found quiet water in the eddies and pools among the rocks. Several specimens were caught in our hands and were identified as *Clupea æstivalis*.

At the time the old upper mill was in existence the proprietor, being told that pickerel were fine edible and gamy fish, introduced some into his mill pond. They multiplied greatly, practically exterminating most of the other species, leaving only "roach" and hornpouts.\* Mr. Lincoln thought that the pickerel were brought from Massachusetts. They are now held in ill repute.

Cathance Lake is about 2 miles long and  $1\frac{1}{4}$  miles wide, situated about 8 miles northwest of Dennysville, on the boundary line of Charlotte and Cooper townships. It is a deep, clear, cool body of water, containing an abundance of brook trout ranging in size up to as high as 4 pounds. Landlocked salmon are also common, having been introduced there some years ago. They do not attain a greater weight than 5 pounds.

The Cathance River takes its rise in this lake and joins Dennys River about  $1\frac{1}{2}$  miles above Dennysville. It is a rocky stream, smaller and more turbulent than Dennys River. Brook trout are abundant, especially at its upper course.

*List of Fishes obtained in Meddybemps Lake and Dennys River.*

<i>Catostomus torus</i> (Mitchill). "Sucker."	<i>Salmo salar</i> Linnæus. "Salmon."
<i>Notropis megalops</i> (Rafinesque). "Red-finned Minnow."	<i>Salvelinus fontinalis</i> (Mitchill). Trout, Brook Trout, Speckled Trout.
<i>Rhinichthys atronasus</i> (Mitchill). "Black-nosed Dace."	<i>Lucius reticulatus</i> (Le Sueur). "Pickerel."
<i>Semotilus bullaris</i> (Rafinesque). "Chub."	<i>Percia flavescens</i> (Mitchill). "Perch," "Yellow Perch."
<i>Clupea æstivalis</i> Mitchill. "Alewife."	

\* Many small *Cyprinidae* were observed by us among the logs at the lower end of the pond. The "roach" was ascertained to be *Lepomis gibbosus*.



## THE WESTERN GRAND LAKE SYSTEM.

The Western Grand Lake System is the source of the West Branch of the St. Croix or Schoodic River. This system of rivers and lakes is about 50 miles long, through the Schoodic River, Leweys, Long, Big, Grand, Pocompus, and Sysladobsis lakes, with their connecting streams and thoroughfares; with a few short portages an almost continuous canoe passage can be made from Princeton, at the foot of Leweys Lake, to Passadumkeag, on the Penobscot River, a distance of over 85 miles.

Grand Lake, the largest of the chain, is about 12 miles long and in the widest place 6 miles broad. At its western end it receives, through "The Thoroughfare," the water of five or six small lakes lying to the northward, in the towns of Carroll and Kossuth, and in townships 5 and 6. Other connecting lakes are Pocompus, Sysladobsissis, Sysladobsis at the west, and Wabawsoos at the southwest. These tributary waters are said to be similar in their main characteristics to Grand Lake. Sysladobsis is the largest, being somewhat over 15 miles long, but it is narrow. It contains landlocked salmon and togue, but neither is at all abundant. Other fishes, such as suckers, chubs, pickerel, white perch, etc., are also present.

Grand Lake is deep in some places, having a depth of fully 20 fathoms, and its waters are clear and cool. The bottom and shores are composed of various-sized bowlders; there is little sand or grass, or in fact any character of bottom attractive to pickerel or other fish loving sluggish water. Landlocked salmon are plentiful, the adults ranging in weight from 1½ to 5 pounds. Togue (*Salvelinus namaycush*) reaching a weight of 30 pounds are common. Brook trout up to 2 pounds are abundant in the lakes, while the small tributary streams and brooks are well supplied with smaller individuals. A species of whitefish (*Coregonus labradoricus*), which is caught in gill nets after November 1, appears in "The Thoroughfare" at that season to spawn. This thoroughfare, situated at the head of Grand Lake, is about the only place where this fish is caught in quantities. None was obtained by us.

Grand Lake Stream is a rapid, rocky stream, with numerous gravelly pools. It is about 2½ miles long, and connects Grand Lake with Big Lake. Over most of its course the current is quite swift and two considerable rapids exist; one (called Great Falls) is about a half mile, the other (Little Falls) about 2 miles below the dam at Grand Lake. The remaining distance of half a mile has a smooth gravel bottom, which might afford spawning-beds for such fish as resort to that character of ground; but it is said few landlocked salmon are ever seen there. Just below the dam, at the foot of Grand Lake, is a deep pool with gravel bottom, and from this extend shallow rips, gradually deepening until they reach the swift current below. At the side of the rips are eddies and pools with sand and silt bottoms. Many landlocked salmon were seen spawning in the pool and beneath the bridge a short distance below. A canal, which serves as a sluiceway to the tannery, where landlocked salmon are also said to spawn, connects the lake with the stream. A few landlocked salmon were seen in the tannery end of the canal. On the rips and in the eddies young landlocked salmon, from 3 to 5 or 6 inches long, were very common.

The following fishes were taken with the seine in the above places on October 19:

*Catostomus torus*. Young; very common.  
*Notropis megalops*. Abundant.

*Rhinichthys atronasus*. Common.  
*Semotilus bullaris*. Young; common.

*Osmerus mordax*, young or very small translucent specimens, said to attain no larger size here, were common. In the lake, where they are abundant, landlocked salmon and togue feed upon them extensively. *Salmo salar sebago*, young, 3 to 5 inches long, were taken with the other fishes; one mature male, weighing 5 pounds, and one 8 inches long, were jigged below the bridge. *Fundulus diaphanus* were abundant. A few young pickerel (*Lucius reticulatus*) were taken in a small pool at the mouth of a rivulet which enters the stream near the rips; *Semotilus*, *Rhinichthys*, and young landlocked salmon were present with them. An occasional sea salmon (*Salmo salar*) has been taken in Grand Lake Stream. Mr. Rose, a resident of that place, has a drawing of one which weighed 9½ pounds, caught a few years ago.

There is a tannery, with a small sawmill adjacent, on the bank of Grand Lake Stream, just below the foot of Grand Lake. We were told that no refuse is now thrown into the stream from either of these establishments, although such was the case formerly. This statement is probably not entirely correct. Sawdust and tan bark were observed in some places along the river, and a large delta which was formed in Big Lake at the mouth of Grand Lake Stream was composed of the latter material.

On October 20, just above Little Falls, in a quiet place by the side of the rapids, where the bottom was composed of sand and sawdust, in several hauls of the seine made at short intervals, the following fishes were taken:

<i>Catostomus teres</i> . Two to 3 inches long; abundant.	<i>Osmerus mordax</i> . A few small specimens like those taken in the stream above.
<i>Notropis megalops</i> . Two inches long; common.	<i>Fundulus diaphanus</i> . Few.
<i>Rhinichthys atronasus</i> . Common.	<i>Pygosteus pungitius</i> . "Pinfish;" few.
<i>Semotilus bullaris</i> . A few small specimens.	
<i>Lucius reticulatus</i> . Small; common.	

Many landlocked salmon were seen in deeper water, and one young example, about 4 inches long, was caught. Some insect larvæ were taken with the fishes.

Gardiner Brook, flowing into Big Lake near the mouth of Grand Lake Stream, contains many small trout. Two were obtained about half a mile above the lake, a male 4 inches long and a female 6 inches long, both ripe and emitting spawn and milt.

Big Lake differs somewhat in character from Grand Lake, being shorter, narrower, and shallower, having a maximum depth of about 60 feet. The shores and bottom are rocky to a great extent, but the bowlders seem smaller than at Grand Lake. More weedy, muddy, and sandy places occur, especially about some of the islands which exist in both Grand and Big lakes. The water of Big Lake, as well as of the remainder of the chain below, is turbid and of a reddish hue. Hornpouts, suckers, minnows, chubs, smelts, white perch, etc., are said to abound. White perch are often seen in schools at the surface, pursuing smelts. Long and Lewey's lakes are smaller and more weedy and muddy than Big Lake, but contain about the same kinds of fish.

On October 18, about half a mile above the mouth of Grand Lake Stream, in shallow water, a few young chubs (*Semotilus bullaris*) were taken. On October 20 several hauls of the seine were made on an island at the upper end of Big Lake, on a small sandy beach overgrown with rushes. One perch (*Perca flavescens*) and some gastropods and fresh-water mussels were obtained. Again, on Stone Island, at the lower end of the lake, on sandy and gravelly bottom, one young *Fundulus diaphanus* was obtained. Fresh-water mussels were abundant. The temperature of the water at this place was 51.5° F. Just below the narrows in Big Lake one young sunfish (*Lepomis gibbosus*) and a few tadpoles were taken.

Huntley Brook is 10 or 12 miles long; it rises in Waite plantation and flows south into Leweys Lake. At the mouth it is about 50 feet wide and not very deep. The bottom is covered with a deep sediment of decayed wood. The shores are boggy, with small floating islands. This spot, we were told, is a favorite fishing-place in the proper season for white perch and chubs. Trout are said to be plentiful and of large size well up the brook, being first caught about 4 miles from the mouth. At the mouth of the stream, on October 17, young golden shiners (*Notemigonus chrysoleucus*) were seined in large numbers; chubs (*Semotilus bullaris*) of small size and sunfish (*Lepomis gibbosus*) were abundant. A few yellow perch (*Perca flavescens*) were also taken.

*List of Fishes taken in the Western Grand Lake System.*

<i>Catostomus teres</i> (Mitchill). "Sucker."	<i>Salvelinus fontinalis</i> (Mitchill). "Trout," "Brook Trout."
<i>Notropis megalops</i> (Rafinesque). "Red-finned Minnow."	<i>Fundulus diaphanus</i> (Le Sueur). "Fresh-water Minnow."
<i>Rhinichthys atronasus</i> (Mitchill). "Black-nosed Dace."	<i>Lucius reticulatus</i> (Le Sueur). "Pickerel."
<i>Semotilus bullaris</i> (Rafinesque). "Chub."	<i>Anguilla chrysypa</i> Rafinesque. "Eel."
<i>Notemigonus chrysoleucus</i> (Mitchill). "Shiner."	<i>Pygosteus pungitius</i> (Linnaeus). "Pinfish."
<i>Osmerus mordax</i> (Mitchill). "Smelt."	<i>Lepomis gibbosus</i> (Linnaeus). "Sunfish."
<i>Salmo salar sebago</i> Girard. "Landlocked Salmon," "Salmon Trout."	<i>Perca flavescens</i> (Mitchill). "Yellow Perch."

ST. CROIX RIVER.

WEST BRANCH OF ST. CROIX RIVER.

There are a sawmill and a tannery at Princeton, the refuse from the former being allowed to enter the stream. The sawdust chokes the river for 2 or 3 miles below, forming extensive banks, which in some places reach above the surface of the water. At the mouth of Georges Brook, about a mile below Princeton, the sawdust and other refuse form beds of considerable thickness. The region along the brook is boggy. Among the lily pads, in 2 or 3 feet of water, several young chubs (*Semotilus bullaris*), 3 shiners (*Notemigonus chrysoleucus*), and a pickerel (*Lucius reticulatus*) 1 foot long were taken. The temperature of the water at this place was 48.7° F. on October 21. At the foot of Black Cat Rips, half a mile below Georges Brook, on gravelly bottom with some water grass, we took 5 perch (*Perca flavescens*) and 1 pickerel (*Lucius reticulatus*). The temperature of the water was 48° F. One-half mile below Black Cap Rips the bottom was soft with a great deal of sawdust and river grass; several shiners (*Notemigonus chrysoleucus*) and red-finned minnows (*Notropis megalops*) were obtained. About a mile before reaching the mouth of Tomah Stream we obtained a young pickerel. The bottom here was composed of sawdust and refuse on which water weeds were growing. The temperature of the water was 48° F.

Tomah Stream flows southward into Schoodic River, near Squirrel Point, a few miles below Princeton. The stream is deep, with weedy margins, dark reddish water, and long bottom grass, up as far as the "Roll Dam," about 2 miles above its mouth. There is no fishway through this dam and probably no occasion for one. Trout are said to be caught at the dam, thence along the stream to its source. We seined in several places from the dam to the mouth of the stream, obtaining a few young hornpouts (*Ameiurus nebulosus*), pickerel (*Lucius reticulatus*) common, and a few perch (*Perca flavescens*).

## MAIN ST. CROIX RIVER.

On October 23 we seined in St. Croix River, about 2 miles above Baring. The bottom was composed of soft clay, silt, and "eelgrass." In several hauls in different localities we took *Notropis megalops* (1 specimen), the young of *Semotilus bullaris* (numerous specimens), a few young *Lucius reticulatus*, 7 to 10 inches long, and a great many water bugs, insect larvæ, *Planorbis*, etc. Here the river was full of logs.

About half a mile below Baring, on the New Brunswick side, the river runs through meadows in which small, shallow, muddy tributary streams, or creeks are common. The river and creeks are filled with a profuse growth of the long river grass. From one of these small streams we obtained the young of *Semotilus bullaris* (common) and *Notemigonus chrysoleucus* (common), *Lepomis gibbosus* (1½ to 3 inches long, common), *Lucius reticulatus* (12 to 13 inches), and a great abundance of insects and larvæ.

Maguerronock Stream, near Calais, runs for a long distance through bogs and meadows. It rises in the hills of Calais and flows north to St. Croix River. In its upper course trout are common. About a quarter of a mile from St. Croix River, among grass and lily pads, we took *Ameiurus nebulosus* (a few about 3 inches long); *Notemigonus chrysoleucus* (few, 3 inches long); *Lucius reticulatus* (few, young); *Lepomis gibbosus* (young, common, about 3 inches long).

## List of Fishes obtained in St. Croix River and its Tributaries.

<i>Ameiurus nebulosus</i> (Le Sueur). "Hornpout."	<i>Notemigonus chrysoleucus</i> (Mitchill). "Shiner."
<i>Catostomus teres</i> (Mitchill). "Sucker."	<i>Lucius reticulatus</i> (Le Sueur). "Pickerel."
<i>Notropis megalops</i> (Mitchill). "Red-finned Minnow."	<i>Lepomis gibbosus</i> (Linnaeus). "Sunfish."
<i>Semotilus bullaris</i> (Rafinesque). "Chub."	<i>Perca flavescens</i> (Mitchill). "Yellow Perch."

## LIST OF THE FRESH-WATER FISHES OF WASHINGTON COUNTY, MAINE.

This list includes, besides the fishes collected by us, all other species known to inhabit the region. Further investigation would undoubtedly add to the list.

<i>Ameiurus nebulosus</i> (Le Sueur). "Hornpout."	<i>Perca flavescens</i> (Mitchill). "Perch," "Yellow Perch."
<i>Catostomus teres</i> (Mitchill). "Sucker."	<i>Morone americana</i> (Gmelin). "White Perch."
<i>Notropis megalops</i> (Rafinesque). "Red-finned Minnow."	<i>Salmo salar</i> Linnaeus. "Salmon," "Sea Salmon."
<i>Rhinichthys atronaso</i> (Mitchill). "Black-nosed Dace."	<i>Salmo salar sebago</i> Girard. "Landlocked Salmon," "Salmon Trout."
<i>Semotilus bullaris</i> (Rafinesque). "Chub."	<i>Salvelinus namaycush</i> (Walbaum). "Togue," "Lake Trout," "Salmon Trout."
<i>Notemigonus chrysoleucus</i> (Mitchill). "Shiner."	<i>Salvelinus fontinalis</i> (Mitchill). "Trout," "Brook Trout," "Speckled Trout."
<i>Clupea pseudoharengus</i> Wilson. "Alewife."	<i>Fundulus heteroclitus</i> (Linnaeus). "Salt-water Minnow."
<i>Clupea astivalis</i> Mitchill. "Alewife."	<i>Fundulus diaphanus</i> (Le Sueur). "Fresh-water Minnow."
<i>Clupea sapidissima</i> Wilson. "Shad."	<i>Lucius reticulatus</i> (Le Sueur). "Pickerel."
<i>Osmerus mordax</i> (Mitchill). "Smelt."	<i>Anguilla chrysypa</i> Rafinesque. "Eel."
<i>Coregonus labradoricus</i> Richardson. "Whitefish."	<i>Pygosteus pungitius</i> (Linnaeus). "Pinfish."
<i>Gasterosteus aculeatus</i> Linnaeus. "Thornback."	
<i>Lepomis gibbosus</i> (Linnaeus). "Sunfish," "Female Perch."	
<i>Micropterus dolomieu</i> Lacépède. "Small-mouthed Black Bass," "Black Bass."	