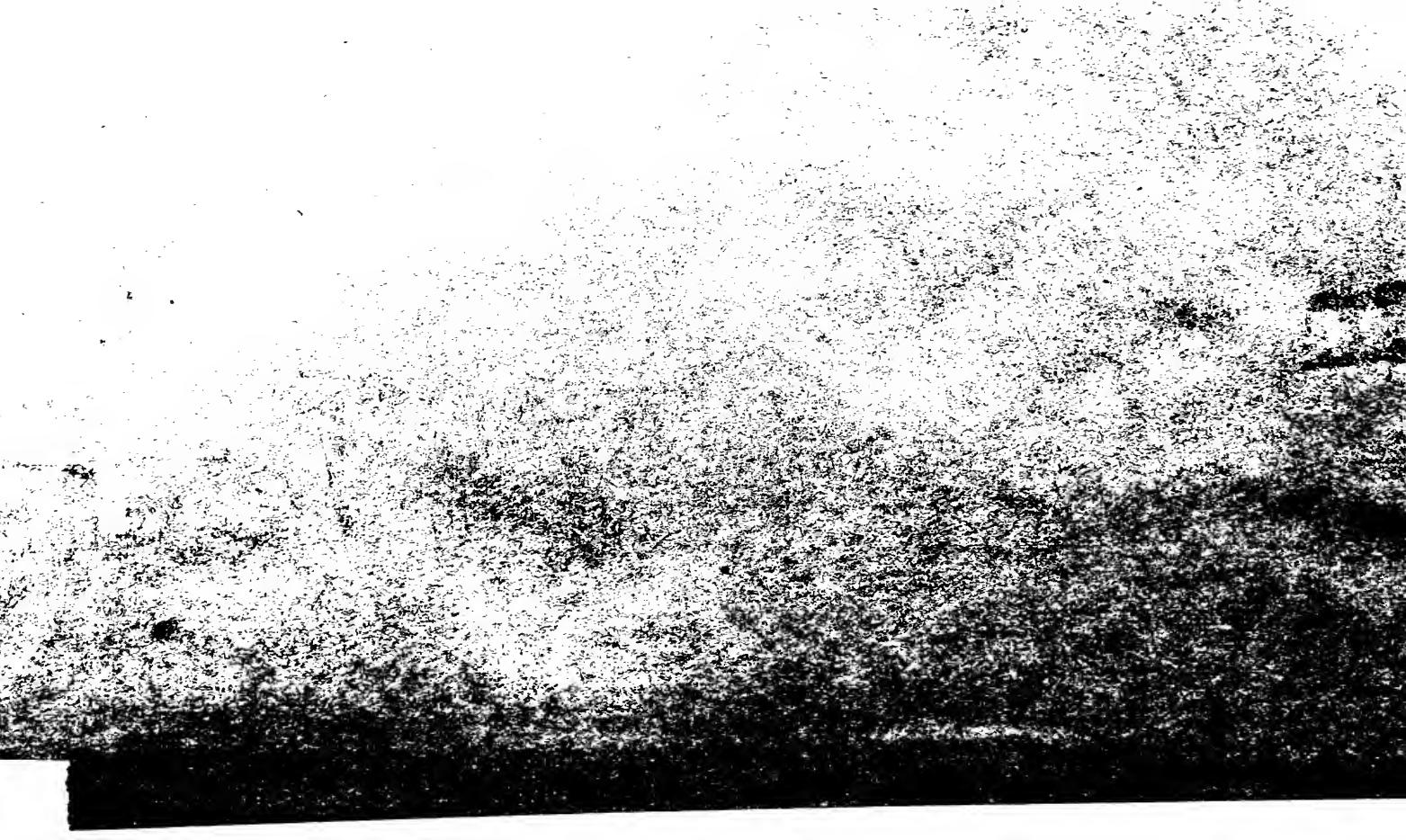
# THE WHITE-TAILED DEER

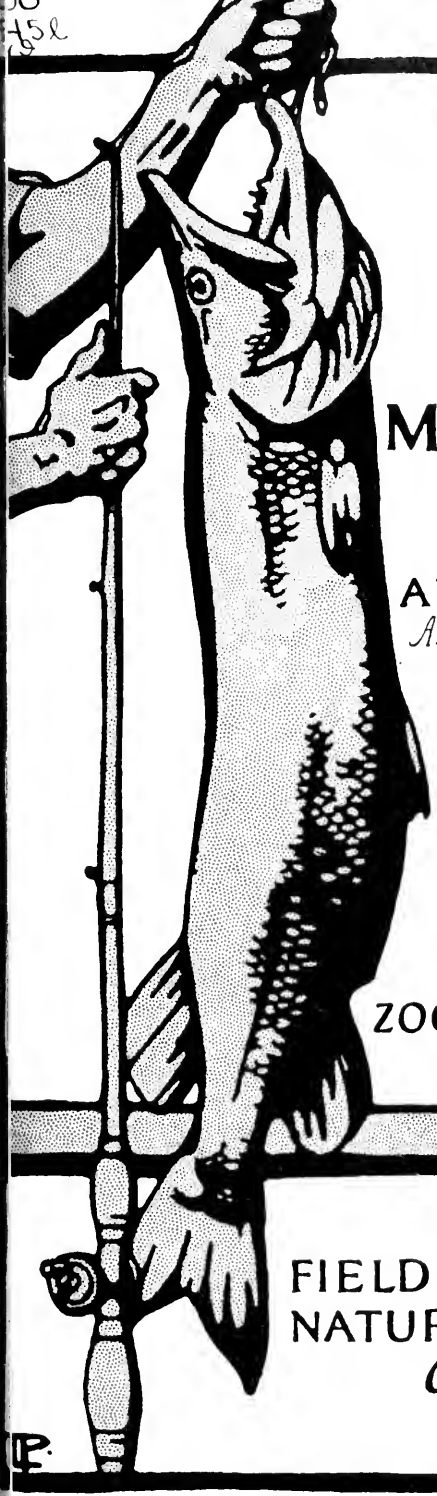


FIELD MUSEUM OF NATURAL HISTORY

CHICAGO

1922





# PIKE PICKEREL AND MUSKALONGE

*by*
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ZOOLOGY LEAFLET
9

FIELD MUSEUM OF
NATURAL HISTORY
*Chicago*
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The Zoological Leaflets of Field Museum are devoted to brief, non-technical accounts of the history, classification, distribution and life habits of animals, with especial reference to subjects shown in the Museum's exhibits.

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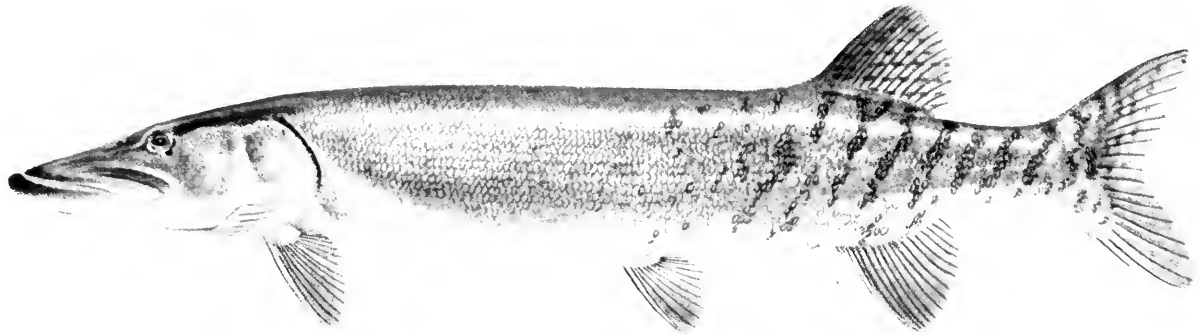

NORTHERN MUSKALONGE.

*Esox immaculatus* Garrard.

FIELD MUSEUM OF NATURAL HISTORY
DEPARTMENT OF ZOOLOGY
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LEAFLET NUMBER 9

# Pike, Pickerel and Muskalonge

Freshwater anglers have many general points of discussion, not the least of which is the question of the proper names of Pike, Pickerel and Muskalonge. There are few questions carrying more possibilities of argument, difference of opinion and general misunderstanding than this. The fish concerned are mostly of large size and have high qualities both as food and game. They belong in two groups, the true Pikes, genus *Esox* of the pike family, Esocidae; and the so-called Walleyed Pike and the Saugers, which belong to the perch family, Percidae.

The trouble would be quite serious enough if we were only concerned with members of the true pike family, of which there are six species in North America. These, using the names considered preferable, are the Chain Pickerel, Trout Pickerel, Pickerel, Northern Muskalonge, St. Lawrence Muskalonge and Chautauqua Muskalonge. Unfortunately many of the same names have been applied to the walleyes and saugers which are members of the perch family. These are very different in essential points of structure although similar in habits and general appearance. The extent of the difficulty may be imagined from the fact that there are as many as eighty names for one fish and seven fish for one name.

In the present paper an attempt is made to solve the difficulty by giving descriptions and pictures of all

the fishes involved, together with a list of names which have been or are applied to each. The list is, of course, not complete. New names are all the time being brought to the author's attention, but it is hoped that it is complete enough so that two fishermen may talk together without having to spend too much time arguing about the names of the fish they are discussing.

The colored plates are the work of Mr. Leon L. Pray, Fish Taxidermist of Field Museum, and with three exceptions are from his own studies from life. The plate of the St. Lawrence Muskalonge (Plate 3) is adapted from a colored plate prepared by S. A. Kilbourne and published by Charles Scribner's Sons in 1879. The Trout Pickerel (Plate 7, lower figure) is adapted from a specimen mounted by Francis West. The outline of the Chain Pickerel (Plate 5) is from a photograph and the coloring adapted from a colored plate by Mr. Louis Rhead.

A large part of the value of this work is due to the assistance of Mr. George P. Engelhardt, Mr. Louis Rhead, the New York State Conservation Commission and the Wisconsin Conservation Commission in furnishing many of the specimens used in preparing both the text and the colored plates.

## COLOR OF THE PIKES

Few persons have a clear idea of the color of fishes. In our ordinary associations we see few things that have the power of changing color or color pattern at will. The Bobolink is a beautiful black and white bird as he sings over the meadows in early summer. A few weeks later he changes to the streaked brown color of his mate for the journey south. The Snow Bunting when it comes to us in early winter has various shades of buff and tan. When it goes north in early spring it is plain black and white, with no buffy markings at all. There are few

birds or mammals which can produce more complete or sudden changes than these. Lizards have more power over their color and some of the changes have been widely advertised. The power of the Chameleon in this respect has even formed the basis of one of Æsop's fables. In New Orleans as the sun comes out after a sudden shower we may see a bright green lizard crawl off a banana leaf onto a fence. In a few seconds it has changed to the exact color of the wet wood. A little later, when the wood has dried to a silvery gray we may find the lizard still there and still the exact color of the board on which it is sunning itself.

It is not at all well known that many, if not most, fishes have greater power over not only their color but even their color pattern than the Chameleon. This is especially true of the fishes that live in rather shallow water and hide among rocks, logs or other objects. Those that live about mud banks or in muddy water do not need this power and usually do not have it. A fish which is showing all its most brilliant colors for the purpose of attracting attention may suddenly meet another a trifle larger and stronger. The smaller one will turn pale even while it is starting to escape.

Few fish have greater power of changing color and color pattern with every passing mood or every change in surroundings than the pikes and pickerels. Moving from the shelter of a mass of bright green *Myriophyllum* to a mass of *Potamogeton* with the stems and under sides of the leaves red or brown, one of these fishes will change from a pattern of bright green and greenish silver with plain fins to a pattern of browns with red fins. Under the *Myriophyllum* the markings may be very fine, the light and dark streaks less than the width of a scale. Moving to the shelter of a willow bush on the bank, the dark and light bands

may change so that the fish will be almost as coarsely barred as a Yellow Perch.

There are a few basic patterns which are fairly constant, but the variations are without number. All young pikes and the adults of several species have a rather regular cross barring as is shown on Plates 1, 2 and 7. This pattern is hardly ever as simple as is shown in the lower figure of Plate 7. That pattern is almost unknown except in the New England region, where the fish commonly live under the shade of bushes which fringe the banks of small streams. Young specimens often have a similar pattern, with the cross bars divided by a horizontal light stripe along the middle of each side. A further variation might be to move one set of blotches a short distance so as to produce a checker-board pattern.

The blotches in the straight or the checkered pattern may split vertically and produce a zigzag pattern or a pattern of much narrower cross bars. In very young specimens, the pattern of the lower figure on Plate 7 may be still farther reduced so as to form blotches, almost square, on the sides. This latter pattern is seldom seen in fish more than three to four inches long. A Trout Pickerel, about eight inches long, from Gainesville, Florida, has as well marked a reticulate pattern as is shown for the hybrid pickerel on Plate 6. Another, about eleven inches long, has varied in another direction. The narrow cross stripes shown on the middle figure of Plate 7 are divided again vertically and then spread out until all that is left is a series of fine diagonal lines, parallel with the edges of the scales, forming a network of which each mesh encloses two or four scales. It should be remembered that all the patterns shown on Plate 7 can be produced at will by any of those fish. The one at the bottom is not often produced in just that form except by the Trout

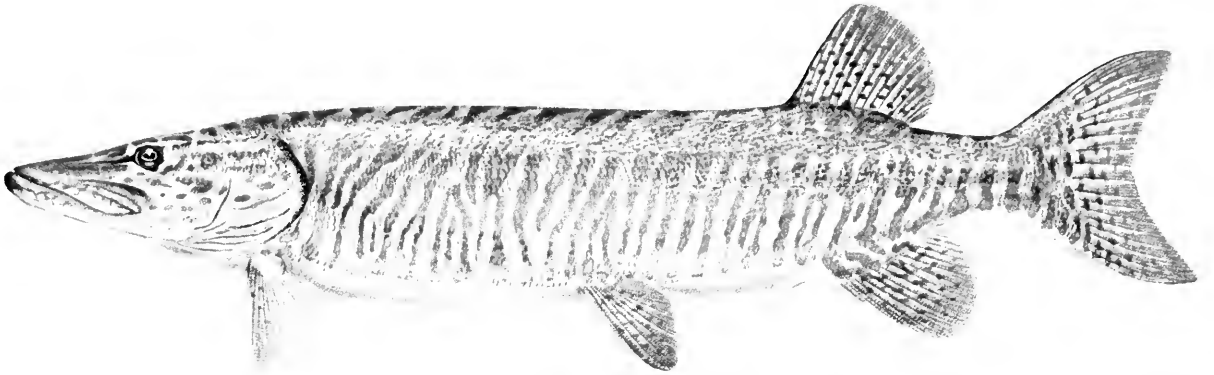
Pickerel but the individual carrying that pattern could have changed in a fraction of a second to either of the other patterns shown. It could have changed also to a pattern of bright greens or to a combination of dark and silvery greens.

Color changes among the members of this group are quite as startling as the changes of pattern although they are, perhaps, not quite so common. Any of the fish shown on Plate 7 could assume the color of any of the others at will. However, the *usual* color of any of these fish is, probably, more constant than the color pattern. The fish adapts its color to its surroundings and sticks pretty closely to one locality. A Pickerel may be found in one place day after day for weeks at a time. It is very exact in its placing, always headed the same way and always the same distance from a certain stick or tuft of weeds. Thus its eye is in position to watch through the same water lanes.

The color of any of this group may vary from almost plain silvery to a moss green so dark as to be practically black, with all the greens and yellows and some of the reds in between. In all cases, the color and color pattern are so arranged that they give the fish a close resemblance to some natural object nearby. It is usually a stick or log that the fish resembles and the arrangement of light and dark will look like spots of sunlight and shade. The Pickerel lies in wait in rather open places and his spots look like the little specks of sunlight shining on the bottom through the ripples at the surface. The Grass Pickerel hides in the shade of the water plants and his cross bars are like the shadows of the long, narrow leaves. When the Northern Muskalonge lurks in an old tree top his cross bars are like the shadows of the dead limbs.

The Trout Pickerel usually lives in water stained brown with the leaves of the forest and swamp trees

and plants. Also most of the water plants have brownish leaves or stems or both. It arranges its color accordingly. The color of the lower figure of Plate 7 would indicate that the fish was taken in a swampy stream or pond where the water was quite brownish and that the fish usually stayed in the shelter of a tree top or of bushes that hung over the bank. If the same fish had been in the habit of watching for food from the shelter of a mass of bright green water plants with fine leaves, it would have shown about the same color and pattern as the middle figure of Plate 7, or even with finer markings and a brighter green color. The finer markings of the Grass Pickerel show that it is more a creature of the open bay than of the bushy stream. There is no real point of difference by which we can separate the Trout Pickerel of New England from the Grass Pickerel of Lake Ontario. They are found all the way from Maine to Florida, across the Gulf coast to Texas, up the Mississippi to southern Wisconsin and down the Great Lakes to the St. Lawrence. There is a rather regular variation all the way around but no dividing point between one and the other. They can probably be divided into several geographic races or varieties which are well marked enough to receive separate names. The form in the Great Lakes seems to be different from the one in the Ohio River. The one in New England is different from the one in the Chesapeake Bay region. The Florida group is different from either and there will probably be other groups that can be recognized. The differences between any one group and its near neighbors are very slight and can be seen only in the average of a large number of specimens, but the differences between the two ends of the series are very well marked as is seen in the two lower figures of Plate 7. The middle figure of that plate represents a common pattern



CHAUTAUQUA MUSKALONGE.

*Esox ohioensis* Kirtland.

as seen in Sodus Bay, New York, one of the largest bays along the south shore of Lake Ontario, while the lower figure represents a common pattern on Long Island and northeastward.

The group of Muskalonge seems to have pretty nearly the primitive color and color pattern of the pikes. In the Chautauqua Muskalonge, Plate 2, the pattern of the adult fish is practically the same as in the Trout Pickerel or the Grass Pickerel. The main difference is that the markings are larger in actual size, if not proportionately, because the fish is so much larger. There is the added difference, that, in the smaller species, very large adults show a great tendency for the dark streaks to break up into a very intricate and irregular pattern, which gave one scientific name to part of the group from their resemblance to worm tracks. The Northern Muskalonge (Plate 1) carries the same pattern but shows a decided tendency for it to break up into roundish or elliptical spots. This fish also shows a very strong tendency to lose all color markings and become simply a green, golden or silvery bronze, usually with some traces of cross barring on the tail. The St. Lawrence Muskalonge (Plate 3) has carried this tendency a step farther and has reduced the color pattern to a series of roundish or elliptical spots. The color of the three is also different. The Northern Muskalonge lives in water which is often stained almost as red as the liquor of the tan vats. So the fish is more or less of a golden bronze, varying to green tones where it lives in masses of weeds in clear water. The St. Lawrence Musky lives in very clear streams and lakes and is gray and silvery to match. The Ohio River fish lives in water not quite so clear and may be more partial to the weed beds. Its color is largely a mixture of beautiful greens.

The color pattern of the Pickerel (Plate 4) is a rather regular arrangement of light spots on a darker background. The spots may be greenish-golden, pearly or yellowish and the background may vary from silvery to various shades of green. However great may be the changes in color, the pattern of the adult remains constant; that is, when it is spotted there are about the same number and size of spots in the same location. The spots do not seem to change place or size. When young, the Pickerel has about the same color pattern as all other young fish of the genus, as is shown in the upper figure of Plate 7. When it reaches a length of a little more than a foot, the bars on the flanks between the pectoral and ventral fins (see p. 13) begin to break up and lose their regularity. Finally they enclose light colored spots. This change spreads over the body rather rapidly, the bars disappearing on the tail last.

The color pattern of the Muskalonge, where it differs from that of the young, seems to be produced mainly by the closing of some color cells. It is quite probable that an adult St. Lawrence Muskalonge could, on occasion, show quite as strongly barred a color pattern as any from the Ohio River. The pattern of the Pickerel seems to be produced in a similar way. The oval light spots are produced by widening the light bars in some places and narrowing them in others. An adult Pickerel with the barred color pattern may have been in the habit of lying in a place where the lights and shadows are of that kind. A beautiful example of this was seen not long ago in the aquarium at Lincoln Park, Chicago. A tank of Pickerel from Homer, Minnesota, was being watched carefully to determine whether certain barred specimens were Pickerel or Northern Muskalonge. One of the specimens at first showed a plain barring about like that in

the upper figure of Plate 7. As it swam toward the front of the tank, it began to show ghostly traces of the ordinary spotting of the others. These faded again, leaving the fish barred. A few minutes later the fish suddenly changed its color pattern to the regularly spotted one shown on Plate 4. This specimen was then lost in the crowd, but it is likely that it changed back again because the number of barred individuals in the tank was seen to vary from two to four at different times that day.

These changes are produced by changes in the expansion of the color cells or "chromatophores" in the skin. These strange groupings of black coloring matter behave almost as though they were separate living creatures. They can contract until they become very small dots which can hardly be seen with a microscope, or they can spread out until they meet and produce a solid black. The changes are under control of the fish and can occur in a very short time.

The color pattern of the Chain Pike (Plate 5) may be considered as simply an exaggeration of that of the Pickerel, although it is produced in a rather different manner. If we consider the light spots of the Pickerel opened out until they practically cover the body, leaving only narrow, reticulated lines between, we shall have the ordinary color of the Eastern Pickerel or Chain Pike. The change from the barred to the network pattern seems to be produced by an actual migration of the color cells. It usually begins on the flanks between the pectoral (see page 13) and ventral fins. The cross bars change their direction, twist around irregularly and finally arrange themselves in the new pattern. This change extends rather quickly to the rest of the body and in a few weeks the pattern is entirely different.

If we considered the color pattern of the Chain Pike derived from that of the Pickerel we might think that the St. Lawrence Muskalonge had gone farther and discarded all but the knots of its pattern. It does not seem to get its spots in that way, however, but by the more simple method of merely pinching off small parts of the cross bars of its baby coloration.

## HYBRIDS

There has been much discussion of the possibility of hybrids between the various species of pikes and pickerels. Largely on theoretical grounds, many have denied the possibility of such specimens in nature. Lately, however, there has accumulated a large body of evidence showing that hybridization is not only possible but is comparatively common among wild animals. In the region around Washington, D. C., hybridization seems to be the only explanation possible to account for the many specimens which seem to be intermediate between the Chain Pike and the Trout Pickerel. Indeed, there it seems likely that it is quite a common occurrence among many groups of fishes.

Several years ago two specimens were caught in the Dead River at Beach, Illinois, a short distance north of Chicago. It is known that Muskalonge have been planted in that stream. These two specimens are like ordinary Pickerel except that the scaling on the head is like that of the Muskalonge. It is quite possible that they are hybrids.

One specimen of Chautauqua Muskalonge sent to Field Museum from Bemus Point, N. Y., had a distinct patch of scales on the cheeks. It is possible that this may have been a hybrid.

In Cayuga Lake, N. Y., the Pickerel is native and very common. The Chain Pike is also very common in that lake. As the latter fish is not found in Lake

Ontario, it is supposed it came into the Finger Lakes region after the building of the Erie Canal. Occasionally specimens are found in that lake which do not seem to belong to either species. One of these was recently collected by Mr. George McNeill and is exhibited in Field Museum (Plate 6).

This specimen is so unusual in many ways that it is worthy of a special description. It is a male, 32 inches in total length and 26 inches to the base of the tail. It is reported that it weighed 7½ pounds. There were 120 scales in a row from the upper angle of the gill opening to the middle of the tail. There were 14 fully developed dorsal (see p. 13) rays and 12 fully developed anal rays. It also had a dark bar under the eye and a black horizontal line through the eye. This is like the Chain Pike. In color of body it was mixed. There were small round spots like those of the Pickerel, but smaller. These were partly hidden by a faint barring like that of the Chautauqua Muskalonge. The body color had a brassy tint like that of the Chain Pike. The fins were bright red as in highly colored specimens of the Chain Pike. The shape of the body was not like either but much deeper and more rounded. The Chain Pike and the Pickerel are more or less square-sided, many of them being nearly rectangular in cross section. In shape, this fish resembles large, mature specimens of the Grass Pike. The color pattern, also, is like the one we might expect to find on very large Grass Pike. Specimens a foot long show some spotting on the flanks which is just like the spotting all over the body of this fish. All the pikes which are spotted begin to change pattern just where the Grass Pike usually stops. This supposed hybrid has the shape of a very mature fish. Except for the scaling on the gill covers and the size, this fish might have been identified as a very mature specimen of Grass

Pike; but there are no Grass Pike in Cayuga Lake. The supposed hybrid has the cheek scaling of the Pickerel except that there is a double row of scales down the front edge of the opercle, just behind the cheek. This is just the same arrangement of scales as was found in some hybrids which Professor George C. Embody of Cornell University produced artifically.

It is not possible to prove that the Ithaca specimen is or is not a hybrid. If Professor Embody can produce some more hybrids and raise them to the age where they will change to the color pattern of the adult we shall know more about the matter. At present we can only say that this specimen is one of the most gorgeously colored pickerels ever seen, that it has the appearance of a very old fish, that it combines distinctive characters of the two species which are found in the same waters and that it does not belong to any known species. A traveler returning from the interior of Africa or South America with so well marked a form would have no hesitation in describing it as a new species. We can hardly do the same because the fishes of Cayuga Lake have been studied so carefully for so many years that it seems necessary to find another explanation.

## TECHNICAL TERMS

There are a few technical terms for which definitions may be desirable. The fish has five groups of fins: dorsal, caudal, anal, ventral and pectoral. The dorsal, caudal and anal are called "vertical fins." The ventral and pectoral are the "paired fins." The position of these fins is shown in the diagram (Fig. 1). In the pikes there is a single dorsal, anal and caudal fin. Other fishes may have more than one, although it is rather unusual to have more than one anal or caudal fin. In the Walleye (Plate 8) there are two dorsals,

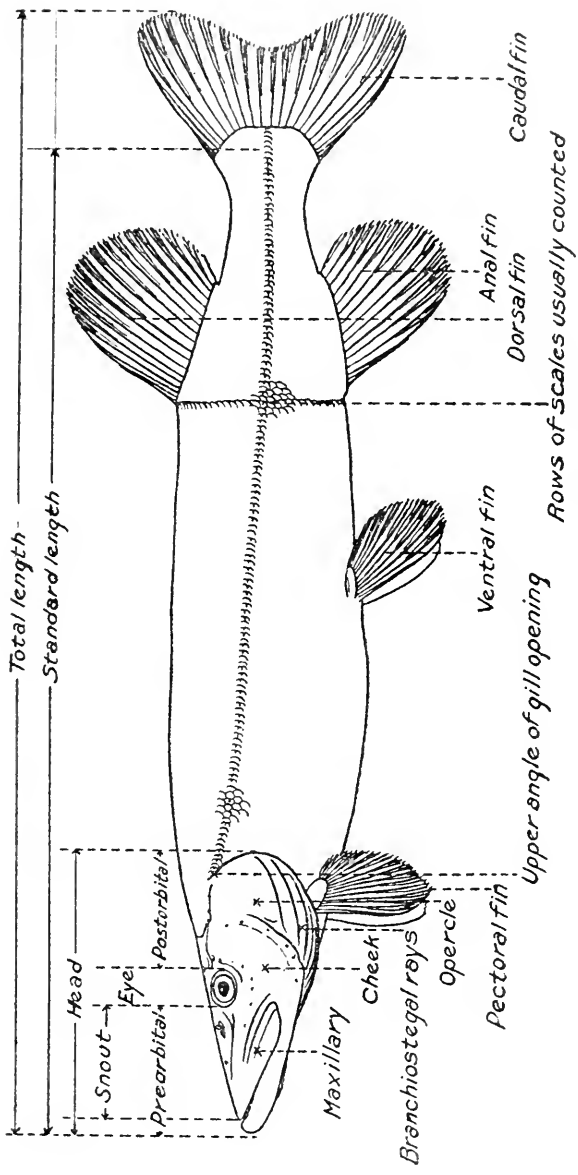
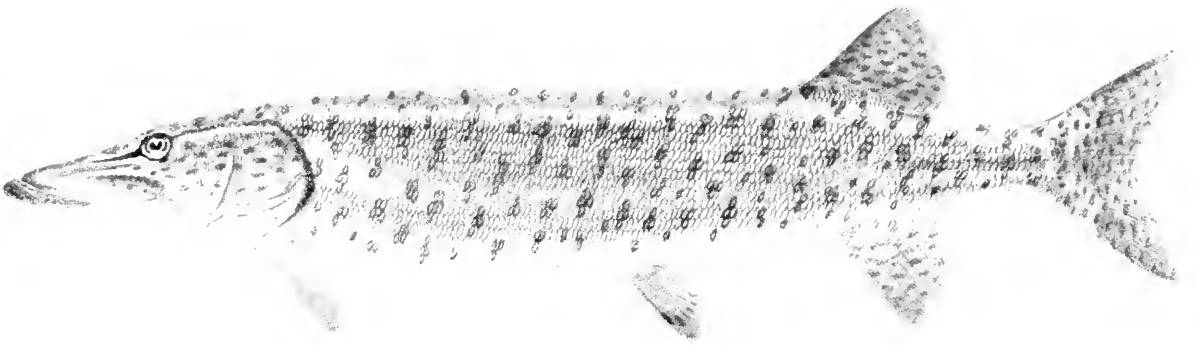



Fig. 1. Diagram of Pickerel, showing parts mentioned in description of fishes.

the first of "spines," the second of "soft rays" and one "spine."

The "total length" of a fish is the distance from the extreme front of the head, whether that is the tip of the lower jaw or the tip of the snout, to the end of the longest caudal rays. Because the tip of the tail is so easily broken off, it is usual in a scientific description to use the "standard length," which is measured to the end of the last vertebra or segment of the "backbone." In most fishes that is about opposite the very first rays of the caudal fin. The length of the head is the distance from the tip of the snout or of the lower jaw, whichever extends the farthest forward, to the end of the bony part of the opercle. The "snout" is the length from the front of the eye to the tip of the upper jaw. Where the lower jaw projects as it does in the pikes, the length of the snout is less than the preorbital part of the head. The "preorbital" is all that part of the head in front of the eye. The postorbital is all that part of the head which is behind the eye. The "cheek" is that part of the side of the head which is just behind and below the eye. It is part of the movable structure which makes up the side of the mouth and the gill cover. The "opercle" is the true "gill cover." It is that part of the side of the head which is behind the cheek and is usually marked off from it by a distinct groove.

The branchiostegal rays, more commonly called branchiostegals, strengthen and support the gill membranes below the cheeks and opercles. There must be great flexibility at that point to permit the swallowing of large prey and at the same time there must be stiffness to prevent collapse when the mouth opens in the act of breathing. Their number is quite uniform in the different species and furnishes one of the most reliable characters in separating groups.



ST. LAWRENCE MUSKALONGE.

*Esox masquinongy* Mitchill.

The number of rays in the paired fins is not usually counted in this group because it is difficult to do so satisfactorily and the final result seems to have little meaning. In the dorsal and anal fins, the short rays at the front are not counted. Only those are considered that reach to or nearly to the top of the fin. In practice this usually means that all the branched rays are counted and one or two of those which are jointed but not branched. In some specimens the front of the fin is gradually rounded so that it is hard to tell just where to stop. In such a case, even experts will not always count just the same.

There are two rows of scales which are usually counted. The first starts at the upper angle of the gill opening, or just above the pectoral fin in fishes where the gill opening does not extend so high, and follows the course of the "lateral line" to the base of the caudal fin. The other row starts at the front of the dorsal fin and extends diagonally backward to the anal fin. In either case, what is really counted is the number of rows of scales which cross the real or imaginary line which is being followed. In the pikes the lateral line is not often developed as a complete and single line of sense organs but the count is made where the line should be.

## TEETH AND FOOD

Fishes have more tooth-bearing bones in the mouth than any other group of animals. The upper jaw is made up of maxillary and premaxillary. In the pikes, the premaxillary bears a row of small teeth. The maxillary is above and behind the premaxillary and forms most of the upper edge of the mouth opening. The pikes have no teeth on the maxillary and this is the only tooth-bearing bone in this group which is not so armed. In the center of the roof of the mouth just behind the premaxillaries is a long patch of teeth on the

vomer. On each side of the vomerine teeth and parallel with the maxillary bone is another patch of teeth on the palatine bones. All these teeth are hinged so that they offer no resistance to anything which is moving in the direction food is intended to go. When something intended for food tries to return, the teeth stand up against it.

On each side of the lower jaw is a row of several big, sharp teeth set firmly in the bone. These teeth are shed whenever they become worn or broken and it is this set which is supposed to be shed every summer when the Muskies are said to have "sore mouth" and to be "off their feed." However that may be, a big Northern Muskalonge in aquariums in Chicago has been in the habit of fasting for several weeks every summer.

There is a patch of hinged teeth on the base of the tongue of the pickerel and another similar patch on each joint of the gill arches. Behind the gill arches, at the entrance of the throat, is a broken ring of bony pads called "pharyngeal bones." Each of these also has a patch of fine, sharp, hinged teeth.

The shape and position of the teeth have a very definite relation to the kind of food a fish eats and to the manner of eating it. Students of evolution may (and do) discuss cause and effect, whether the kind of food determines the character of the teeth, whether the kind of teeth determines the character of the food or whether both are developed together and each determines the other.

A large Northern Muskalonge has been in aquariums in Chicago for several years. Small fish are eaten so quickly that it is not possible to watch the process, but a carp weighing between one and two pounds is not put out of the way so soon. When first seized, the carp is held across the mouth of the Musky,

pressed between the toothless maxillaries and the strong, solid teeth of the lower jaw. Then the Muskalonge returns to its usual resting place before taking the next step in the process. The fish is turned by a quick movement so that its head points down the throat of the big fellow. Then it is held between the tongue and the patches of teeth on vomer and palatines. In this position there can be very little sideways pressure and the fixed teeth are not needed for holding. The lower jaw is dropped so that the big teeth are out of the way and the prey is moved down the throat by a series of quick gulps until it finally disappears.

A small Grass Pickerel in the Lincoln Park aquarium had a slightly different method. Perhaps the small Goldfish was larger in proportion, although the relative sizes seemed to be about the same. The Pickerel was quicker and more positive in its movements. The Muskalonge was slower and more deliberate. The Pickerel seemed to try to catch the fish in the proper position at the beginning. It did not carry it away to a regular resting place. The motion in turning its prey was about the same except that it made two or three attempts before it got the Goldfish in just the right position. When the position was right, the first gulp took the smaller fish almost out of sight. The most noticeable difference was that the big teeth of the lower jaw were in use as long as there was any part of the Goldfish that they could grasp, and were released only at the moment of making another swallowing movement.

Some large Pickerel swallowed their prey in a similar manner. They seemed to have difficulty in turning their fish and often lost them if not secured in just the proper manner at the first attempt. One or two were swallowed tail first. Others were tried tail first and later rejected.

## THE GROUPS OF PIKES

In North America there are three groups of "true pikes," belonging to the genus *Esox*, which makes up the family Esocidæ, as distinguished from the Pike-

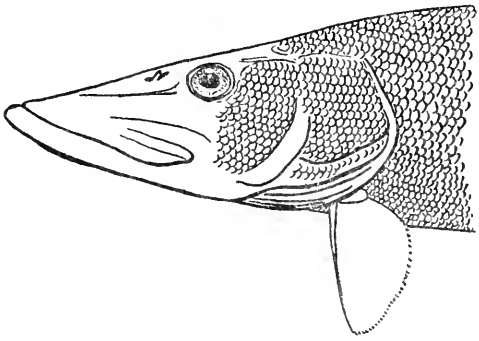


Fig. 2. Head of Grass Pickerel. Cheeks and opercles fully scaled.

Perch or Walleyed Pike, belonging to the genus *Stizostedion*, closely related to the European and Asiatic Pike-Perch or Sander, belonging to the genus *Lucio-*

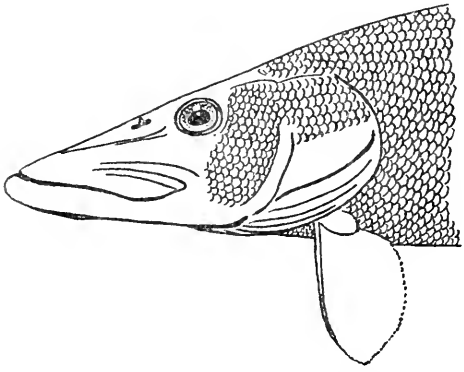


Fig. 3. Head of Pickerel. Cheeks scaled, opercles naked below.

*perca*, both of them belonging to the family Percidæ, which also includes the common Perch of Europe and Asia, our common Yellow Perch and the American

darters. The three pike groups may be conveniently separated by the distribution of the scales on the sides of the head as shown in the diagrams.

The first group includes two species, the Chain Pickerel (*Esox niger*) and the Trout Pickerel or Grass Pickerel (*Esox americanus*). They are small fish, mostly southern and eastern, which have the cheeks and opercles fully scaled (Fig. 2). None of these fish often reach a weight of more than five pounds and they are generally very much smaller. Along the Atlantic

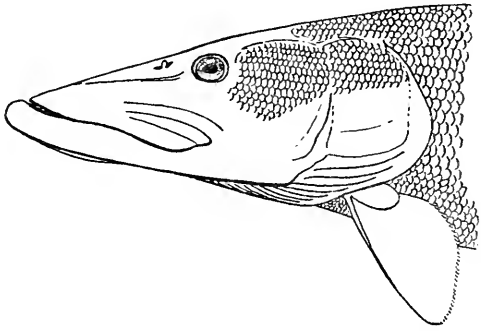


Fig. 4. Head of Muskalonge. Cheeks and opercles naked below.

coast, in Maine and New Brunswick, they may extend as far as 46° north latitude. They are found from there to Florida, west into Texas, up the Mississippi valley into southern Wisconsin, in Lake Michigan and the lower part of the Great Lakes.

The second group includes only one species, the Pickerel,* *Esox lucius*. This is a larger fish, frequently

* It may be worth while to note that the author began this investigation with the belief that there was some popular basis for following the lead of professional writers on angling subjects since "Frank Forrester" and calling this fish "Pike" as is done in England and Canada. Careful reading of many sporting magazines and much discussion with sportsmen has shown conclusively that, in the United States, *Esox lucius* is known universally as Pickerel and the word Pike, where used alone in ordinary conversation, always or almost always means Walleyed Pike.

weighing more than ten pounds, with the cheeks fully scaled and the lower half of the opercles naked (Fig. 3). This fish is found entirely around the world north of about 40° north latitude.

In the third group are found three closely related species: the Northern Muskalonge, St. Lawrence Muskalonge and Chautauqua Muskalonge, which have the lower part of the cheeks and opercles naked (Fig. 4). They are still larger fish, a weight of forty-five pounds being not uncommon and there seems to be some reason for believing that occasional specimens weighing more than twice that amount have been taken. Members of this group are found from northern Alabama to James Bay, east of the Mississippi River.

KEY TO SPECIES OF *Esox*

A. Cheeks and opercles fully scaled.

B. Size small, seldom over one foot in length or a pound in weight. Scales large, usually less than 115 transverse rows between upper angle of gill opening and base of caudal rays. Dorsal rays 12-17. Anal rays 11-16. Branchiostegals 10-14.
*americanus* p. 21.

BB. Size larger, but seldom exceeding two feet in length or three pounds in weight. Scales smaller, usually more than 120 transverse rows between upper angle of gill opening and base of caudal rays. Dorsal rays 13-17, generally more than 14. Anal rays 13-16. Branchiostegals 12-17, generally more than 13.
*niger* p. 24.

AA. Cheeks fully scaled, opercles naked below the level of lower edge of eye. Size large, frequently reaching a weight of ten pounds or more. Scales about the same size as in *Esox niger*, 115-145 transverse series between upper angle of gill opening and base of caudal rays. Dorsal rays 15-20, mostly over 17. Anal rays

11-17, generally more than 13. Branchiostegal rays 13-16.

*lucius* p. 27.

AAA. Cheeks and opercles both naked below the level of lower edge of eye. Size large, frequently reaching a weight of thirty pounds or more. Scales small, usually more than 150 transverse rows between upper angle of gill opening and base of caudal rays. Dorsal rays 16-21. Anal rays 14-18. Branchiostegal rays 13-16.

C. Preorbital part of head equal to or longer than postorbital. Body heavily marked with dark cross bars. Ohio River and tributaries.

*ohioensis* p. 29.

CC. Preorbital part of head shorter than postorbital.

D. Body heavily marked with round, dark spots. Lower Great Lakes and St. Lawrence drainage, eastern Ontario, western Quebec, Vermont and northern New York.

*masquinongy* p. 29.

DD. Body marked with spots or cross bars or both. Markings usually very faint, stronger on the rear half of body and on tail. Upper Mississippi valley in Minnesota and Wisconsin, Lake of the Woods and northward to James Bay.

*immaculatus* p. 30.

## LITTLE PICKEREL, TROUT PICKEREL, GRASS PICKEREL, ETC.

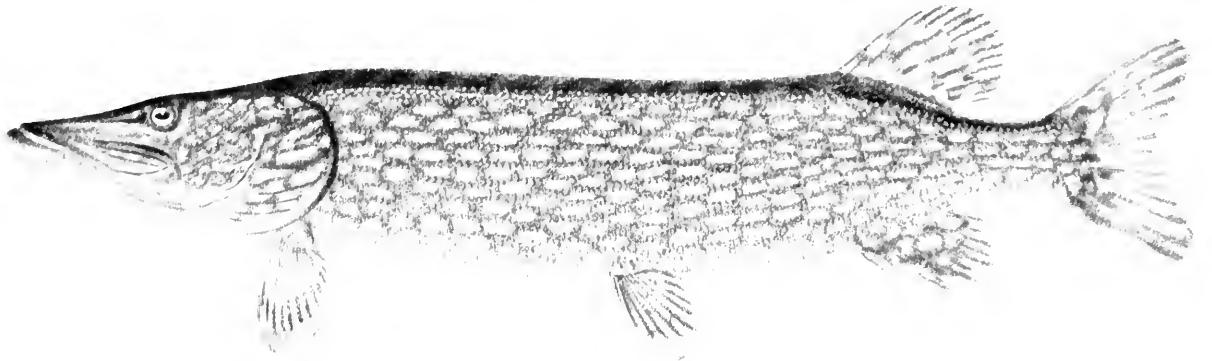
*Esox americanus* Gmelin—PLATE 7, Middle and Lower Figures.

EASTERN UNITED STATES

Small fishes, seldom over a foot in length or a pound in weight. Scales large, usually less than 115 transverse rows between upper angle of gill opening and base of caudal rays. Cheeks and opercles

fully scaled. Dorsal rays 12-17, not counting rudiments. Anal rays 11-16, not counting rudiments. Branchiostegal rays 10-14. Head variable, rather shorter than in other species. In all species of *Esox* the length of the postorbital part of the head is fairly constant, approximately 0.14 of the standard length. Variations in the total length of the head seem to be produced almost entirely by changes in the prolongation of the mouth parts. These changes are extreme in the present species. Specimens from the New England states (*Esox americanus americanus*) may have the postorbital length exceed the preorbital by as much as the length of the eye, while specimens from Lake Ontario (*Esox americanus umbrosus*) generally have the preorbital and postorbital lengths practically equal. The body and especially the head is usually noticeably deep and robust. The profile of the head in front of the eyes is straight or convex, rarely slightly concave. The color pattern is extremely variable, beginning in the young with dark blotches on the sides, varying to cross bands or narrow streaks, which may become irregular in width and direction and finally produce fairly even reticulations or become obsolete. Old specimens in certain locations are frequently almost solid very dark green above with irregular dark spots on the belly. These are often called Black Pike and supposed to belong to a distinct species.

*Esox americanus* is found from somewhere in Maine or New Brunswick southward into Florida, westward into Texas, up the Mississippi valley into southern Wisconsin and down the Great Lakes into western New York. It has been divided into two species, *americanus* and *vermiculatus*, largely on the supposition that there was a definite faunal boundary between them somewhere in the southern states. Since this has been shown not to be true and since there are



PICKEREL.

*Esox lucius* Linnæus.

no salient characters separating them at any point, the two groups must be united. Specimens from the two ends of the range in Massachusetts and western New York are sufficiently distinct to be readily separated by average measurements but each of these groups is much less distinct from others in neighboring localities and these from others until there is found a fairly regular gradation from one to the other. The whole group can be divided, on the basis of average measurements, into a number of subspecies, varieties or local races of which might be mentioned *Esox americanus americanus* in the New England States and southeastern New York, *Esox americanus umbrosus* in the Great Lakes and *Esox americanus vermiculatus* in the Ohio River and its tributaries. There will be several others in the South Atlantic and Gulf States.

The most numerous pickerel in North America is, apparently, the least known. Where it is seen it is probably usually considered to be the young of one of the larger species. In its wide distribution from the cold streams of southern Wisconsin to the swamps of Florida there are naturally some slight differences in structure which may have some relation to variations in habits.

All the way from Maine to Florida these fish seem to have a great liking for small streams. In the vicinity of Washington, D. C., they are found far up some small brooks. On Long Island they live in the trout brooks. Along our western streams and lakes they are found mostly in muddy sloughs in the marshes. Sometimes they may be seen in small streams but not often above the first bit of swift water.

Within recent years a number of anglers have reported that the Trout Pickerel is good game for the fly fisherman. Mr. Louis Rhead tells of catching them in the trout brooks of Long Island and says that they seem

just as game as the Brook Trout of the same waters. Other writers are not quite so favorable. A few say that it might be a good game fish if larger. One or two call it "delicious." The majority, however, agree with the writer who says that this fish, on Long Island, often causes trout fly fishermen much trouble by taking the fly intended for "nobler" fish. Two specimens, received at Field Museum, were caught by Mr. Rhead. In the letter accompanying them, Mr. George P. Engelhardt, of the Brooklyn Museum quoted Mr. Rhead as saying: "These fish readily rise to a fly and are equally as game as a Brook Trout." Again he says: "Mr. Rhead told me that both were caught on a fly while fishing for trout and that the larger of the two specimens jumped at least a foot out of the water in taking the fly." In a letter to the author, Mr. Rhead says: "It is a gamey little fish, rises to the fly, sometimes leaps above the surface, quite as active as a trout."

It is not at all likely that this fish anywhere reaches a length greater than twelve to fifteen inches or a weight which will go much above a pound. The statement in Goode's "American Fishes" (page 282) that the "Western Pickerel" has been known to attain the weight of twenty pounds but at the present day never exceeds seven or eight must, almost certainly, refer to the Ohio Muskalonge. Specimens nearly fifteen inches in length have been taken in the Illinois River and neighboring bayous at Meredosia, Illinois, within the past few years.

## CHAIN PICKEREL, EASTERN PICKEREL, ETC.

*Esox niger* Le Sueur—PLATE 5.

EASTERN UNITED STATES

Larger than *Esox americanus,* but seldom exceeding 5 pounds in weight. Scales smaller than in *americanus,* usually more than 120 transverse rows between

upper angle of gill opening and base of caudal rays. Cheeks and opercles fully scaled. Dorsal rays 13-17, generally more than 14, not counting rudiments. Anal rays 13-16, not counting rudiments. Branchiostegal rays 12-17, generally more than 13. Head long, the extension of the preorbital part especially pronounced. In many specimens, especially northern, the preorbital part of head may exceed the postorbital by as much as the length of the eye. Southern specimens often have the preorbital part of head shorter. Young individuals may become almost indistinguishable from *Esox americanus*. In a few extreme cases it is difficult to separate very old specimens of *americanus* from small adults of the present species. The body and head are notably long and slender. The appearance of slenderness is increased by the concave profile of the top of head, in front of the eyes. The color pattern of the young is very similar to that of *americanus* but the markings are usually somewhat coarser. At a length somewhat less than a foot the markings change to a more or less regularly reticulate pattern on a lighter background. Southern specimens often become solid dark green in color above with irregular dark spots on the belly and are called Black Pike. Short-headed specimens in the dark phase or with rather fine reticulations are often very difficult to separate from similarly marked specimens of *americanus*.

*Esox niger* is found from somewhere in Maine or New Brunswick southward into Florida, westward to Texas and up the Mississippi to northern Arkansas or southern Missouri. It has not yet been recorded from any of the Great Lakes although it is in several of the streams flowing into Lake Ontario and the St. Lawrence River. Apparently it found its way into these streams through the extensive system of canals which was in use in New York state before the beginning of

railroad operation. From eastern Massachusetts to South Carolina this is an important game fish.

This fish is the largest species which has the cheeks and opercles fully scaled. In number of scales and of dorsal and anal rays it is very much like the Pickerel. The main points of difference in general appearance are that the jaws are decidedly longer, the body more slender and the color yellowish or brassy. The color pattern is similar except that the light spots are proportionately larger so that the impression is of a golden or brassy colored fish with dark lines forming a network over the body. In the Pickerel the impression is of a greenish, gray or silvery fish with golden, light green or pearly spots. The color change from youth to the adult condition occurs at a smaller size than in the Pickerel. Young specimens and those just starting to change may be very difficult to distinguish from Trout Pickerel of the same size. In that case the great length of the jaws and the slenderness of this species are the best characters to use.

As with all the rest, there is great difference of opinion with regard to its quality as food or game. Various writers in the "American Angler" between 1880 and 1890 claimed that the "Yellow Pickerel" of Oneida Lake, New York, was the best fish to eat and one of the best game fish they had ever seen. Other writers have been just as positive that the flesh of this fish is watery and tasteless. About thirty-five years ago, the Chain Pickerel seems to have been about as highly esteemed as the Black Bass in Greenwood Lake, of New York and New Jersey. In a recent letter Mr. Louis Rhead says: "The Chain Pickerel of Long Island, which I catch up to 24 inches, is a beautifully colored fish—also *leaps above the surface.* I never before got them anywhere on the northern continent either so gamey or highly colored in green and yellow."

Such a great difference must be other than accidental and is probably due to differences in the water or the food or both.

## PICKEREL, PIKE, JACK, ETC.

*Esox lucius* Linnaeus—PLATE 4; PLATE 7, Upper Figure.

### NORTHERN LAKES AND RIVERS

Large fishes, often exceeding a weight of ten pounds. Scales about the same size as in *niger*, 115-145 transverse series between upper angle of gill opening and base of caudal rays. Cheeks fully scaled. Opercles naked below the level of lower margin of eye. Dorsal rays 15-20, not counting rudiments, mostly over 17. Anal rays 11-17, generally more than 13. Branchiostegal rays 13-16. Head variable, American specimens (*Esox lucius estor*) having the preorbital part of head longer than the postorbital. The two are equal in European specimens (*Esox lucius lucius*). Changes in the body contour are very great in this species. Young specimens are very slender and are frequently called "Snakes" in Wisconsin and northern Michigan. Large, old specimens, which have been able to get plenty of food, often become very deep-bodied. The profile of the head in front of the eyes is usually straight but may be slightly concave or convex. In general, among the species of this family, there seems to be a tendency for the profile to be convex when the snout is short and concave when it is elongated. The color pattern is very uniform in this species. Young specimens have a pattern very much like that of young *americanus* of similar size, but slightly coarser. Older ones develop a pattern much like that of *ohioensis* or less spotted individuals of *immaculatus*. Still later the light cross bands become irregular along their edges and finally change into diagonal rows of horizontally elongated light spots on a darker background. The

shape of the spots makes them appear to be arranged in horizontal rows but a little careful measurement shows that this is an illusion. The spots are really the remnants of the cross bands of the color pattern of the young and are arranged in rows having the same slightly diagonal direction. The change in color pattern usually occurs when the fish is less than fifteen inches long but may be delayed until much later. There is some reason for believing that it is within the power of the fish to change back from the spotted to the barred coloration at will, especially while young.

*Esox lucius* is found entirely around the world, north of about 40° north latitude. The only extensive areas where it seems to be not known, in that region are Greenland, Iceland, Spain and Portugal. In North America it is found in streams flowing into Bering Sea, the Arctic Ocean, Hudson Bay, the Atlantic Ocean and the Gulf of Mexico. It has been planted in streams flowing into the Pacific. Throughout this wide range it is well known as a food and game fish and has received a host of names and nicknames.

Writers on fishing subjects have been telling about the Pickerel for hundreds of years and it would seem that there is little either of fact or fable to tell. The older writers, especially, were full of tales of the terrible ferocity of this fish. Modern writers seem to be more concerned with the question of the proper name by which to call it or else with the question of its possession or lack of game qualities. Opinion seems to be about equally divided between calling it one of the best or one of the worst game fishes. Heavier tackle is generally used for Pickerel than for the basses. This has much to do with an apparent lack of game qualities. Then, too, the Pickerel is very slender and lacks the great resisting surface of the bass. Its fight must be made by sheer muscular force.

## CHAUTAUQUA MUSKALONGE, OHIO MUSKALONGE, ETC.

*Esox ohioensis* Kirtland—PLATE 2.

OHIO RIVER AND TRIBUTARIES

Size large, weight frequently exceeding thirty pounds. Scales small, usually more than 150 transverse rows between upper angle of gill opening and base of caudal rays. Cheeks and opercles both naked below the level of lower margin of eye. Dorsal rays 16-21, not counting rudiments. Anal rays 14 to 18, not counting rudiments. Branchiostegal rays 13-16. Head moderate, the preorbital part equal to or longer than postorbital. Body slender in the young, becoming deep and robust with age. The color pattern at all ages is practically the same as that of *Esox americanus* except that there seems to be much less tendency for the cross bands to lose their straight course and become vermiculate or reticulate. In very old specimens there is some tendency for the dark cross bars to break up into vertical rows of dark spots as the similar light bars of *lucius* break up into light spots. In *lucius* this change seems to start on the flanks, between the pectoral and ventral fins. In all three species of Muskalonge the similar change starts on the tail.

*Esox ohioensis* is found in the Ohio River and its tributaries, from western New York to northern Alabama and western North Carolina. In the southern streams where this fish is called "Pike," the Walleye (*Stizostedion*) is generally called "Salmon."

## ST. LAWRENCE MUSKALONGE, SPOTTED MUSKALONGE, ETC.

*Esox masquinongy* Mitchill—PLATE 3.

GREAT LAKES AND ST. LAWRENCE

Size large, weight often more than forty pounds. Scales small, usually more than 150 between upper

angle of gill opening and base of caudal rays. Cheeks and opercles naked below level of lower margin of eye. Dorsal rays 16-21, not counting rudiments. Anal rays 14-18, not counting rudiments. Branchiostegal rays 13-16. Head moderate, preorbital part shorter than postorbital. Body deep, especially in old individuals. Young specimens of this species are not available for study but there is no reason to believe that they are different in color pattern from other species of the group. In adults, the dark bars have been reduced to rows of round or vertically elongate dark spots on a lighter background.

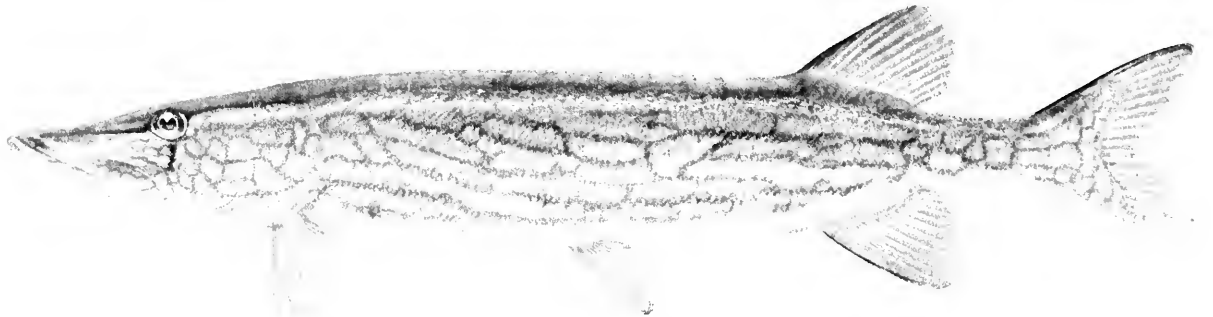
*Esox masquinongy* is found in the lower Great Lakes, in the St. Lawrence River, in the rivers of northern New York and Vermont flowing into Lake Ontario or the St. Lawrence north and east of Oswego and in the rivers and lakes of southeastern Ontario and southwestern Quebec.

## NORTHERN MUSKALONGE, UNSPOTTED MUSKALONGE, WISCONSIN MUSKALONGE, ETC.

*Esox immaculatus* Garrard—PLATE 1.

UPPER MISSISSIPPI AND NORTHWARD

Size large, weight often more than forty pounds. Scales small, generally more than 150 transverse rows between upper angle of gill opening and base of caudal rays. Cheeks and opercles naked below level of lower margin of eye. Dorsal rays 16-21, not counting rudiments. Anal rays 14-18, not counting rudiments. Branchiostegal rays 13-16. Head moderate, preorbital part shorter than postorbital. Body deep and robust in the adult, slender in the young. The color pattern is variable, sometimes consisting of cross bars like *Esox ohioensis*, sometimes of spots like *masquinongy* and sometimes of both spots and cross bars. Where spots



CHAIN PICKEREL.

*Esox niger* Le Sueur.

and bars are present they seem to have no relation to each other. A large fish market specimen showed spots when viewed from certain angles and bars from other angles. The spots might be in, between or on the edge of the bars. Occasional specimens, locally called "Tiger Muskalonge," may have the spots or bars very distinct but generally the markings are very indistinct except on the tail, where they can be easily seen. Over most of the body they can only be seen on careful examination in a good light and when viewed at a certain angle.

*Esox immaculatus* is found in the headwaters of the Mississippi above the junction of the Minnesota and in streams entering on the east side above the Illinois-Wisconsin line. Northward it occurs across the divide in Lake of the Woods and Rainy Lake. If the accounts of sportsmen are accurate, this species is found in suitable waters clear to James Bay.

Of all our freshwater game fish, the Muskalonge seems to be most difficult to recognize, apparently not because of any lack of distinguishing marks, but because the differences are of a kind that the fisherman usually overlooks. The two Black Basses really look more alike than the Pickerel and Muskalonge, yet the latter pair are much more often confused. Guides and resort hotel keepers have not always helped by their identifications of large fish. The actual capture of a fifteen pound Pickerel may have been just as difficult as the taking of a Muskalonge of the same weight but many fishermen would feel very differently if told the truth. In other words, the Muskalonge is fashionable and the Pickerel is not, even though it may fight just as hard.

There are three groups of Muskalonge, which, for convenience, we may consider three species. To understand their relationships and distribution we must

know a little about the past history of North America. There is very good evidence for believing that at several times in very recent geologic history the northern part of this continent, extending sometimes as far south as the Ohio River, was covered with a vast sheet of ice, a glacier, like those which now cover Greenland and the Antarctic continent. Just south of Lake Superior, in what is now the state of Wisconsin, was a curious island in the sea of ice. This island, called by geologists the "driftless area," included parts of the present courses of the Mississippi and Wisconsin Rivers, and the mouth of the Minnesota River.

It is evident that no fish could exist where the ice sheet covered everything, pushing the earth away from the bare rocks. All the fish that formerly lived there must have been destroyed or driven south. We believe that there were Muskalonge living in part or all of the region now included in the Great Lakes Basin and the upper Mississippi Valley. Some of them, no doubt, stayed in the "driftless area." The others must have been forced farther and farther south until they reached the Ohio and the lower Mississippi. There they survived until some change produced a warmer climate and the ice began to "retreat." Retreat is not a good word for the process; there was no sliding back of the ice on its rocky foundation. It continued to advance during the whole retreat. The only difference was that the heat of each summer or the average of all the summers melted more of the ice than the glacier pushed forward during the whole year. Thus the ice front retreated although the ice itself was pushing forward all the time.

As the warm weather pushed back the front of the glacier it finally passed over the divide into a region which slopes to the north. Still the ice was so thick that the water could not escape in that direction and

was backed up until it could flow over the divide and into some stream flowing southward. Such an overflow channel formerly existed where the south end of Chicago is now, the water going into the Illinois River. Many others are known but the one most interesting to us just now is the one where the water from the valley of the Red River of the North flowed over into the Minnesota River. The lake was many times larger than Lake Superior. It extended to the southeast to include Lake Winnipeg, Lake of the Woods and Rainy Lake. To the westward it included the lake region of central Saskatchewan. Thus there was an open water route for the Muskalonge of the "driftless area" to follow the glacier to the north. Also, the water from the glacier passed through a great settling basin so that there is little doubt that the Minnesota was at that time a clear cold stream. At present we find the Northern Muskalonge (Plate 1) living in streams flowing through the driftless area and in clear waters flowing away from the site of this former lake. It is not found in the Minnesota probably because that river is now a muddy prairie stream.

While the ancestors of the Northern Muskalonge were shut in the "driftless area" another part of the original group was forced southward ahead of the ice until they finally entered the Ohio River and its tributaries from the south. Some of the more important of these are the Kentucky, Green, Cumberland and Tennessee Rivers. As the ice melted back these fish found themselves in pleasant surroundings and stayed. They had to adapt themselves to changes of temperature and other conditions as the country was transformed from something which must have appeared much as northern Labrador does today. The Chautauqua Muskalonge or Ohio Muskalonge (Plate 2) is found in all parts of the Ohio River basin, from the headwaters of the Tennes-

see in the French Broad River at Asheville, North Carolina, and from northern Alabama on the south to Chautauqua Lake at the head of the Ohio on the north.

The third group, the St. Lawrence Muskalonge (Plate 3), is found now in northern New York, in eastern Canada and in the Great Lakes drainage from Lake Huron down. They are evidently descended from ancestors of one or both of the other groups for their country was covered by a heavy sheet of ice for a long time. As the ice melted back there were constant changes in the position of the streams that carried away the water; lakes were formed and abandoned; lake outlets were first into one stream and then into another. It was easy for fish to follow the glacier back and to cross the divides from one stream system to another until they reached the country where we find them now. It is probable that the fishes of Lake Erie and eastward are descended from those that lived in the old Ohio River. Those of Georgian Bay and parts of southeastern Ontario may have descended from either, or both.

It may seem that the limits of the range of the various species of Muskalonge are rather indefinite. The Chautauqua Muskalonge and the Northern Muskalonge are in different parts of the Mississippi basin. The Northern Muskalonge and the St. Lawrence Muskalonge are found in different parts of the Great Lakes basin. There is deep water which could permit free movement from one to the other. However, it does not seem that the fish do move so. No Muskalonge likes muddy water. Below the northern boundary of Illinois the Mississippi is so cloudy with the silt of the prairie rivers that it seems to form an effective barrier. On the other hand, the Muskalonge do not seem to like large lakes. They prefer small, shallow, sheltered

bays, where they can lurk under the shelter of water plants and not be disturbed by the pounding of heavy waves.

## WALLEYED PIKE, SAUGER, YELLOW PIKE, BLUE PIKE, DORY, DOREE, ETC.

*Stizostedion vitreum* Mitchill, *Stizostedion canadense* Smith, etc.

PLATE 8.

EASTERN NORTH AMERICA

Spiny-rayed fishes with two dorsal fins, the first with 12 to 15 spines, the second with 1 spine and 17 to 21 soft rays. Anal fin with 2 spines and 11 to 14 soft rays. Ventral fins thoracic (close to the pectorals), with 1 spine and 5 soft rays. Scales ctenoid (having small sharp spines along their edges). Color variable, yellowish, bluish or grayish, with or without dark spots or blotches or finer markings, sometimes decidedly pinkish in the saugers. The body is slender and the mouth large as in the pikes but in essential structures this fish is very close to the Yellow Perch.

One or more species of this group are found in all suitable waters from northern Louisiana and Texas northward to the lakes of the Barren Lands, east of the Rocky Mountains. They are exceedingly numerous in many of the larger lakes of Canada.

The differences between the Walleyed Pike and the saugers are very small, consisting of a little difference in shape of body, some differences in the extent of scaling on the head and a difference in the number and arrangement of the caeca or blind sacs attached to the stomach. Of these the Walleye has three, all about the same length and about as long as the stomach. The saugers have from 3 to 7 or more, usually of different lengths and none as long as the stomach. This is the only certain way of separating the species. The head of the sauger is usually broad and flat. That of

the Walleye is usually narrow and high. The sauger often has a pattern of dark saddle-shaped blotches on a pinkish background. The Walleye usually has a pattern of very fine dark markings on a background of yellow, blue or gray. That these differences are not constant may be seen from the fact that a fish has been seen to change from one color to the other in a fraction of a second.

These fish are related to the pikes only in name. They are true perches, with sharp spines in the fins and with rough, "ctenoid" scales. There are three groups of perches as there are three groups of pikes. The Yellow Perch, in three or four closely related species, is found all around the world in northern latitudes. The Pike Perches, in several species, are also found all around the world in northern latitudes. There are three or four species in North America, so closely related that fishermen who recognize the differences often make mistakes. The third group is that of the darters of our streams. This group of little fishes (only one out of a hundred or more species reaches a length of six inches) is found only in the streams and ponds of North America.

The Walleyed Pike (Plate 8) is like the Pickerel in having a similar shape, in eating mainly living food of large size and in living in similar places. In name, however, the two are so completely tangled that it is almost a hopeless task to try to separate them. When a Chicago angler says he caught a six-pound Pike, it often requires considerable discussion to find out whether he caught *Stizostedion* or *Esox lucius*. North of the Great Lakes the name "Pickerel" almost invariably means *Stizostedion*. On this side it is almost as invariably applied to *Esox lucius*. Some years ago the "American Angler" devoted many pages to a discussion of that point.

There are three or four species of *Stizostedion* in North America, the Walleyed Pike and two or three species of Saugers. The Walleye grows to a weight of more than fifteen pounds while the Saugers seldom pass two or three pounds. They are very similar in habits and habitat as well as in general appearance. Alive in the aquarium, they are usually fairly easy to separate but in the fish market or in the alcohol jar of the museum it frequently requires dissection and an examination of the internal organs to decide which species is represented by any particular specimen.

In the aquarium the Sauger is more often seen resting on the bottom while Walleyes of the same size will be found more often in mid-water. There is usually also a difference in color and color pattern. The Walleyes will have a bluish color produced by a fine-grained mottling of light and dark. These small fish are often called Blue Pike and are sometimes thought to be a distinct species. In the same lighting the Saugers will have a pinkish color with a rather regular arrangement of saddle-like dark blotches on the back. This is not an absolute character, however. A specimen has been watched in the aquarium, swimming slowly in a vertical circle, with a short rest on the bottom of the tank after each circuit. While resting on the bottom or swimming close to it, it had typical Sauger color. When it turned to swim upward it changed to the Walleye color, which it retained until it came back to within four or five inches of the bottom, when it changed back to the Sauger color. This regular succession of color changes, Walleye, when more than about five inches from the bottom and Sauger the rest of the time, was kept up for a half hour or more.

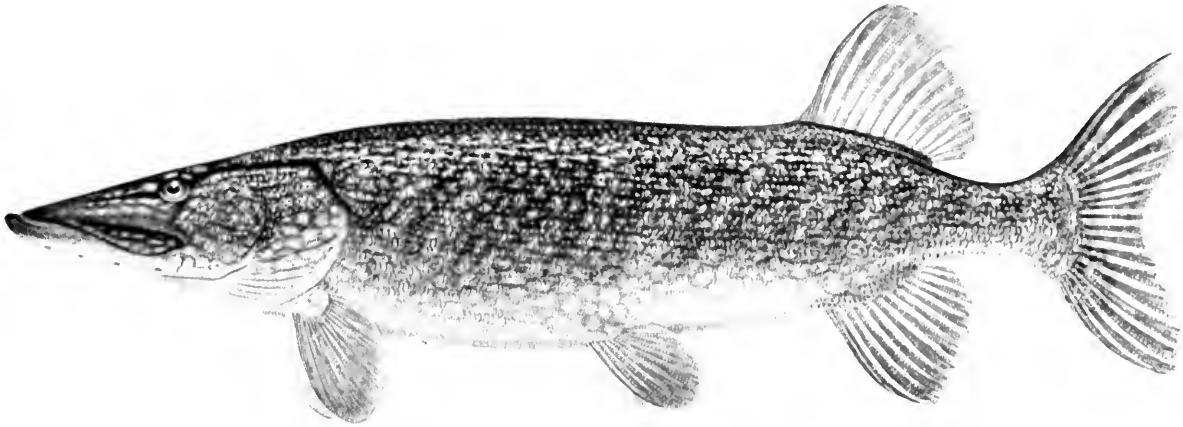
The Walleyed Pike is found in North America in practically all the suitable waters in the Mississippi basin, the Great Lakes and northward. Its northern

limit is not yet known. It is an important commercial fish in Lesser Slave Lake, Lake Winnipeg, Lake of the Woods and the Great Lakes. It is generally esteemed as a game fish in the waters where it can be caught by game fishing methods. There are many places where it is present in large numbers but can hardly be induced to take a baited hook. As a food fish it is one of the best.

### COMMON NAMES

In Chicago, a fisherman speaking of "Pike" usually means Walleyed Pike, *Stizostedion,* (page 35). If he says "Pickerel" he generally means *Esox lucius* (page 27), but may mean *Stizostedion, Esox niger* (page 24) or *Esox americanus* (page 21). If such a fisherman should tell of catching "Pickerel" and "Pike" he would probably refer to *Esox lucius* and *Stizostedion,* while his friend from some city in Canada, a short distance east of Detroit would use the same terms to mean *Stizostedion* and *Esox lucius.* If the same Chicago fisherman should use the term "Great Northern Pike" it would be almost impossible to tell whether he meant *Esox lucius* or *Esox immaculatus* (page 30). This is probably the worst mixup on record. Apparently about half the fishing population of northwestern Wisconsin and northeastern Minnesota use the name "Great Northern Pike" for large specimens of *Esox lucius,* especially those showing some red color in the fins, while the others give the name to a Muskalonge, *Esox immaculatus.*

The confusion of names has become so serious that fish dealers in Chicago have practically abandoned the names "Pike" and "Pickerel." For *Esox lucius* they use the name "Jack." *Stizostedion,* according to size, are "Yellows" or "Blues." Large specimens of Walleyed Pike generally have more or less of a brassy color



HYBRID PICKEREL.

and are known by the trade name "Yellow Pike." Smaller ones are bluish in general tone and are called "Blue Pike."

Another source of much discussion has been the name "Muskalonge." There are at least forty legitimate spellings divided into two general groups, those which derive it from Indian words which have been spelled "*Mas-kinonge*" or "*Mas-kenoza,*" and those which derive it from French words "*masque-allongé.*" Feeling free to choose any of these spellings we have selected "Muskalonge" because it comes the closest to the way it is generally pronounced, because it is one of the commonly accepted forms, and because it has relatively simple spelling.

There are two ways to consider common names of any objects with which people are familiar. One is to hold absolutely to the name first given. That is the way of scientific nomenclature. Some confusion has arisen because we do not always know which was the name first applied but such difficulties are being removed as fast as possible and will finally be taken care of by the establishment of a list of accepted scientific names. The other way is to hold that the name of an object is what folks call it. Many writers of books on this group have refused to accept this view and have tried to secure the use of unfamiliar or, even, newly made names. This has rather added to the confusion. Under either interpretation, the name "Pickerel" without any qualifying word is not available for the strictly American species with the cheeks and opercles (see p. 13) entirely scaled, because this name is not commonly so used in America and because it was first applied to *Esox lucius* before anyone in Europe knew that there was such a place as America.

The number of common names is a fairly reliable index of the extent to which a fish attracts public at-

tention. It is not necessary that the fish shall be present in great numbers but only that there shall be some quality which sets it off from others. The Gizzard Shad is present in incredible numbers in all the fresh and brackish water from Minnesota to Texas but it has hardly any name except Shad or Gizzard Shad in all that area. In the same region there is possibly not one fish of the Pikes and Pickerels for every million Gizzard Shad yet this smaller group numbers its names by the dozen, because Shad, no matter how numerous, are only a lot of silvery fish but the Pike or Pickerel, no matter how small, is unusual and must be noticed, if seen.

In this article an attempt has been made to bring together all the names that have been used for the pikes, pickerels, muskalonge, Walleyed Pike and saugers. The last must be brought in because about half the names of the group of Walleye and Sauger have the word pike or pickerel included in some way and nine of their names are among the commonest names of the pikes, pickerels or muskalonge. It is evident that this is not the entire list. Careful study would probably show that more than two hundred names have been or are applied to this group of seven or eight fish. The names are grouped in two ways. Under the scientific name of each fish is given a list of all the names belonging to that species. Under each common name is given a list of all the species to which it has been given.

The following list of names is presented in the belief that the name in common use is the correct one, where it is in common use; that is, where it is part of the language of every one. The man who has been taught all his life that a certain fish is a Pickerel must stop to think, at least a fraction of a second, before he can call it a Pike. If he has a dictionary which tells

him that a man from a certain other place always calls that fish Pike he can translate as the other man talks.

For the sake of uniformity it is necessary that the author express his preference in the matter of names for these fish. They are:

*Esox lucius:* Rivers and lakes around the world north of about 40° north latitude; PICKEREL, PIKE, JACK.

*Esox masquinongy:* Upper St. Lawrence River, lower Great Lakes, rivers and lakes of Ontario and western Quebec; MUSKALONGE, ST. LAWRENCE MUSKALONGE.

*Esox ohioensis:* Ohio River and its tributaries in New York, Pennsylvania, Ohio, Indiana, Illinois(?), West Virginia, Kentucky, Tennessee, Mississippi(?), Alabama, North Carolina and Virginia(?); CHAUTAUQUA MUSKALONGE, OHIO MUSKALONGE.

*Esox immaculatus:* Rivers and lakes of northern Wisconsin and Minnesota in the Mississippi basin and northward to Hudson Bay; NORTHERN MUSKALONGE, WISCONSIN MUSKALONGE, UNSPOTTED MUSKALONGE.

*Esox niger:* Rivers and lakes from New Brunswick to Florida, Louisiana, Texas and Arkansas; CHAIN PIKE, CHAIN PICKEREL.

*Esox americanus:* Rivers and lakes from Maine to Florida, Texas, Illinois, Michigan and down the Great Lakes to New York; TROUT PICKEREL and LONG ISLAND PICKEREL in the East, GRASS PICKEREL and LITTLE PICKEREL in the West.

*Stizostedion:* Rivers and lakes of North America east of the Great Plains and north of Texas; WALLEYE, WALLEYED PIKE, SAUGER. There are three species mixed up in this group, but they are so closely allied

that it is practically impossible to separate them. Anglers and fishermen will always call large specimens of both species Walleye and small ones Sauger, without much reference to which species is concerned.

LIST OF SCIENTIFIC NAMES WITH CROSS REFERENCES.

**Esox**

A few names found in the books and elsewhere clearly belong to this group but can not be referred to any one species.

Grass Pickerel; Mallett's Bay, Vermont.

Jackfish; Pond twelve miles north of Houston, Texas.

Long Face; Maine.

Silver Pike; Northern Michigan eastward to Georgian Bay.

Tiger Muskalonge; Wisconsin (probably usually *Esox immaculatus*, but occasionally surely *Esox lucius*).

**Esox americanus**

Banded Pickerel; Massachusetts to New Jersey and occasionally elsewhere.

Ditch Pike; New Jersey.

Grass Pickerel; general, especially western.

Grass Pike; general, especially western.

Humpbacked Pickerel; Waterford, Oakland County, Michigan.

Jack; North Carolina.

Little Pickerel; general.

Little Western Pickerel; general.

Long Island Pickerel; southeastern New York.

Mackerel Pike; a book name proposed from southeastern New York but not in use recently.

Mountain Trout; Spring Valley Creek, Shannon County, Missouri, R. E. Call.

Mud Pike; New Jersey.

*Piccanau;* Indian. This name is recorded by Goode in "American Fishes." Apparently that author was confused in his identifications and his "Western Pickerel," which is said to reach a weight of twenty pounds in Mississippi, was probably *Esox ohioensis.*

Pickerel; a book name which has wide circulation in literature but which has hardly come into the common speech of fishermen.

Pike; this seems to be a fairly well distributed common name from eastern Maryland to Florida.

Pond Pickerel; occasional from Maine to southern New York.

Pond Pike; reported by G. B. Goode in "American Fishes" but locality not given.

Red-Finned Pike; North Carolina.

Short-Billed Pike; New Jersey.

Smaller Pickerel; New England.

Trout Pickerel; New England States and western Pennsylvania.

Troutnose Pickerel; New England(?).

Varied Pickerel; southern New York.

Western Pickerel; general.
Western Trout Pickerel; western Pennsylvania.
Yearling Pickerel; Sodus Bay, New York.

### Esox immaculatus

Barred Muskalonge; Wisconsin.
Chauteaugay Lake Pike; This name was mentioned in the "American Angler," vol. 15, p. 17. It is probably a misprint for Chautauqua Lake Pike and may refer to *Esox ohioensis*.
Great Northern Pike; northwestern Wisconsin.
Longe; general.
Lunge; general.
Muskalonge; general, see under *Esox masquinongy* for about forty ways of spelling this name.
Musky; general.
Northern Muskalonge; substitute proposed for Unspotted Muskalonge.
Plain Muskalonge; name proposed by Becker.
Tiger; Wisconsin.
Tiger Muskalonge; Wisconsin.
Tiger Musky; Wisconsin.
Unspotted Muskalonge; Wisconsin.
Unspotted Pike; Lake Pepin; perhaps used as a description rather than a name. Quoted in "American Angler," vol. 9, p. 387.
*Wasserwolf;* name used by O. W. Smith for all the species of Muskalonge.
Wisconsin Muskalonge; Wisconsin.

### Esox lucius

*Brochet;* France.
Canada Pike; Ontario, Canada.
Channel Pickerel; Thousand Islands, St. Lawrence River.
*Chuk-Whuk;* Alaska Indians.
Common Pike; general.
Duck-Billed Pickerel; Illinois-Wisconsin.
Duck-Billed Pike; Illinois-Wisconsin.
*Eithinyoo - Cannooshœoo;* Creek Indians in Canada.
English Jackfish; Ontario, Canada.
English Pike; Ontario, Canada.
Grass Pickerel; Illinois.
Grass Pike; Western Pennsylvania (?).
Great Lake Pickerel; no locality (Thaddeus Norris).
Great Lakes Pike; northern United States.
Great Northern Lake Pickerel; no locality (Thaddeus Norris).
Great Northern Pickerel; northern North America.
Great Northern Pike; Wisconsin.
Great Pike; name proposed by O. W. Smith.
*Hecht;* Germany.
Jack; Chicago Fish Markets and parts of Canada where *Stizostedion* is called Pickerel.
Jackfish; Manitoba.
Lake Pickerel; Northern Ohio.
Lake Pike; Western Pennsylvania.
*Luccio;* Italy.
Marsh Pickerel; Thousand Islands, St. Lawrence River.
Luce; England.
Northern Lake Pike; No particular locality indicated.

Northern Pike; No particular locality indicated.

Pickerel; northern United States, Canada where *Stizostedion* is not called Pickerel, England (young fish).

Pike; general in northern United States and Canada where *Stizostedion* is not called Pike; England (adult fish). In North America it almost always is used as a book name. The angler generally has a local name which he uses unless he is "talking up" to a visitor.

Short Pickerel; Thousand Islands, St. Lawrence River.

Shovelnose Pike; northern Michigan and western Ontario.

Silver Pike; northern Michigan(?).

Slinker; St. Lawrence River region.

Snake; Wisconsin.

Snake Eater; Cheboygan, Michigan.

*Wasserwolf;* Germany.

Yearling Pickerel; Sodus Bay, N. Y. (young).

**Esox masquinongy**

Black-Spotted Pike; a name published in sporting magazines by General Garrard, perhaps intended more as a description than as a name.

Blue Pike; Western Pennsylvania(?).

Great Pike; general.

Kinongé; eastern Canada.

Longe; general.

Lunge; general.

Mascallonge;

Mascalonge;

Mascalongé

Mascanongy;

Maskalingé

Maskallonge;

Maskalonge;

Maskalongé;

Maskanonge;

Mas-ke-non-ge;

Maskenonza;

Maskenonzay;

Maskenosha;

Maskenozha;

Mas-Kinoje;

Maskinonge;

Maskinongé;

Maskinongy;

Maskinonje;

Masquallonge;

Masque-allongé;

Masquenougé;

Masquinongy;

Muscalinga;

Muscallonge;

Muscallunge;

Muscalonge;

Muscalunge;

Muskallonge;

Muskallunge;

Muskalonge;

Muskalunge;

Maskalungé;

Muskellonge;

Muskellunge;

Muskinlongé;

Muskinongé;

Musk-ka-lone;

Muskullunge;

Musquallonge;

Musquellunge;

Noscononge;

all these variations of the spelling of this name have been published and have received more or less recognition.

Musky; general.

Pike; the use of this name for a Muskalonge is probably entirely obsolete, except for *Esox ohioensis*.

Spotted Muskalonge; New York.

Wasserwolf; name used by O. W. Smith for all species of Muskalonge.

### Esox niger

Black Pike; Dismal Swamp and other regions of black water along the south Atlantic coast states.

Chain Pickerel; rather general, but has little currency outside of books.

Chain Pike; mostly a book name of rather wide application.

Common Eastern Pickerel; New Jersey.

Duck-Billed Pike; North Carolina.

Eastern Pickerel; New York.

Federation Pike; Oneida Lake, New York.

Green Pike; Pennsylvania.

Jack; North Carolina to Florida.

Jackfish; Hawkinsville, Georgia.

Lake Pickerel;

Lake Pike;

Pickerel; general.

Pike; general.

Pond Pickerel; Lake Champlain region.

Pond Pike; New Jersey.

Red-Finned Pike; North Carolina.

Reticulated Pickerel; a book name which never gained much recognition.

### Esox ohioensis

Alleghany River Pike; Alleghany River valley.

Barred Muskalonge; general.

Blue Pike; Wheeling, West Virginia.

*Brochet saumonne;* Ohio.

Chautauqua Lake Muskalonge; western New York.

Chautauqua Lake Pike; western New York.

Chautauqua Muskalonge; western New York.

Chautauqua Pike; western New York.

Jack; North Carolina.

Kentucky Pike; Kentucky River valley.

Kentucky River Pike; Kentucky River valley.

Longe; general.

Lunge; general.

Mahoning Pike; western Pennsylvania.

Muskingum River Pike; southeastern Ohio.

Musky; general.

Ohio Muskalonge; general.

Ohio Pike(?).

Ohio River Pike; southern Ohio.

*Picanau Blanc;* Ohio.

*Piccanau;* Ohio.

*Picareau Blanc;* Missouri.

Pickerel; western New York.

Pike; Ohio River valley.

Salmon Pike; Missouri.

Wasserwolf; a name applied by O. W. Smith to all species of Muskalonge.

White Jack; Missouri.

White Pickerel; Missouri.

White Pickerel of the West; Ohio.

White Pike; Missouri.

### Stizostedion

Common names of this group are so confused that no attempt has been made to

separate names belonging only to the Saugers from those belonging only to the Walleye. It is probable that practically all the names are applied to either.

Blowfish; Mississippi Valley (?).

Blue Pickerel; Ontario, Canada.

Blue Pike; general.

Brook Trout; North Carolina.

California Salmon; North Carolina.

Champlain Pike; Schroon Lake, New York.

Common Pike; Great Lakes.

Doré; Canada.

Doree; Canada.

Dory; Canada.

Glass-Eye; Great Lakes region.

Golden Perch; name given in the "American Angler," vol. 4, p. 357, apparently as a description rather than as a true name.

Golden Trout; North Carolina.

Grass Pike; Great Lakes region.

Gray Perch; Eastern Canada.

Gray Pike; New York to Ohio.

Gray Pike Perch; New York.

Green Pike; Great Lakes region.

Ground Pike; Lake Champlain.

Ground Pike Perch; Vermont.

Hornfish; Fur traders of British Columbia.

Horse-Eye Pickerel; Eastern Canada.

Horse-Fish; Great Lakes region.

Jack; Ohio Valley and western North Carolina.

Jack Salmon; Ohio valley.

Ohio Pike; Ohio.

Ohio Salmon; Ohio River valley.

*Okow;* Cree Indians.

Perch Pike; Eastern States.

*Picarel;* French Canadians.

Pickerel; Eastern Canada.

Pickering; Great Lakes region.

Pike; general.

Pike Perch; Eastern States.

River Trout; North Carolina.

Rock Pike; St. Johnsbury, Vermont.

Salmon; Susquehanna River; Kentucky River; Tennessee River.

Saltwater Pike; Pasquotank River, North Carolina.

Sand Pickerel; Eastern Canada.

Sand Pike; general.

Sauger; general.

Sauger Pike;

Spike Nose; Cape Vincent; New York.

Susquehanna Salmon; Pennsylvania.

Walleye; general.

Walleyed Pike; accepted as a common name in western New York; generally common as a book name.

White Perch; Vermont.

White Salmon; Ohio Valley.

Yellow Pickerel; generally common among market fishermen.

Yellow Pike; generally common among market fishermen.

Yellow Pike Perch; New York.

YOUNG PICKEREL *Esox lucius* Linnæus (upper figure).
GRASS PICKEREL *Esox americanus* Gmelin (middle figure).
TROUT PICKEREL *Esox americanus* Gmelin (lower figure).

LIST OF COMMON NAMES WITH CROSS REFERENCES.

Allegheny River Pike
*Esox ohioensis.*

Banded Pickerel
*Esox americanus,*

Barred Muskalonge
*Esox immaculatus,*
*Esox ohioensis.*

Black Pike
*Esox niger,*

Black Spotted Pike
*Esox masquinongy.*

Blowfish
*Stizostedion.*

Blue Pickerel
*Stizostedion.*

Blue Pike
*Esox masquinongy,*
*Esox ohioensis,*
*Stizostedion.*

*Brochet*
*Esox lucius.*

*Brochet saumonne*
*Esox ohioensis.*

Brook Trout
*Stizostedion.*

California Salmon
*Stizostedion.*

Canada Pike
*Esox lucius.*

Chain Pickerel
*Esox niger.*

Chain Pike
*Esox niger.*

Channel Pickerel
*Esox lucius.*

Champlain Pike
*Stizostedion.*

Chateaugay Lake Pike
*Esox immaculatus,* probably a misprint for Chautauqua Lake Pike.

Chautauqua Lake Muskalonge
*Esox ohioensis.*

Chautauqua Lake Pike
*Esox ohioensis.*

Chautauqua Muskalonge
*Esox ohioensis.*

Chautauqua Pike
*Esox ohioensis.*

*Chuk-Wuk*
*Esox lucius.*

Common Eastern Pickerel
*Esox niger.*

Common Pike
*Esox lucius.*
*Stizostedion.*

Ditch Pike
*Esox americanus.*

Doré
*Stizostedion.*

Doree
*Stizostedion.*

Dory
*Stizostedion.*

Duck-Billed Pickerel
*Esox lucius,*
*Esox niger.*

Duck-Billed Pike
*Esox lucius,*
*Esox masquinongy.*

Eastern Pickerel
*Esox niger.*

*Eithinyoo-Cannooshœoo*
*Esox lucius*

English Jackfish
*Esox lucius.*

English Pike
*Esox lucius.*

Federation Pike
*Esox niger.*

Glass-Eye
*Stizostedion.*

Golden Trout
*Stizostedion.*

Grass Pickerel
*Esox,*
*Esox lucius.*

Grass Pike
*Esox americanus,*
*Esox lucius,*
*Stizostedion.*

Gray Perch
*Stizostedion.*

Gray Pike
*Stizostedion.*

Gray Pike Perch
*Stizostedion.*
Great Lake Pickerel
*Esox lucius.*
Great Lakes Pike
*Esox lucius.*
Great Northern Lake Pickerel
*Esox lucius.*
Great Northern Pickerel
*Esox lucius.*
Great Northern Pike
*Esox immaculatus,*
*Esox lucius.*
Great Pike
*Esox lucius,*
*Esox masquinongy.*
Green Pike
*Esox niger.*
*Stizostedion.*
Ground Pike
*Stizostedion.*
Ground Pike Perch
*Stizostedion.*
*Hecht*
*Esox lucius.*
Hornfish
*Stizostedion.*
Horse-Eye Pickerel
*Stizostedion.*
Horse Fish
*Stizostedion.*
Hump-Back Pickerel
*Esox americanus.*
Jack
*Esox americanus,*
*Esox lucius,*
*Esox niger.*
*Esox ohioensis,*
*Stizostedion.*
Jackfish
*Esox,*
*Esox lucius,*
*Esox niger.*
Jack Salmon
*Stizostedion.*
Kentucky River Pike
*Esox ohioensis.*
Kentucky Pike
*Esox ohioensis.*
Kinongé
*Esox masquinongy.*
Lake Pickerel
*Esox lucius,*
*Esox niger(?).*
Lake Pike
*Esox lucius,*
*Esox niger(?).*
Little Pickerel
*Esox americanus.*
Little Western Pickerel
*Esox americanus.*
Longe
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*
Long-Face
*Esox.*
Long Island Pickerel
*Esox americanus.*
*Luccio*
*Esox lucius.*
Luce
*Esox lucius.*
Lunge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*
Mackerel Pike
*Esox americanus.*
Mahoning Pike
*Esox ohioensis.*
Marsh Pickerel
*Esox lucius.*
Mascallonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*
Mascalonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*
Mascalongé
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*
Mascanongy
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskalingé
*Esox immaculatus.*
*Esox masquinongy,*
*Esox ohioensis.*

Maskallonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskalonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskalongé
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskanonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

*Mas-ke-non-ge*
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskenonza
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskenonzay
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskenosha
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskenozha
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskinoje
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskinonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskinongé
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskinongy
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Maskinonje
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Masquallonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Masque-allongé
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Masquenougé
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Masquinongy
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Mountain Trout
*Esox americanus.*

Mud Pike
*Esox americanus.*

Muscalinga
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muscallonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muscallunge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muscalonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muscalunge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muskallonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muskallunge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muskalonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muskalunge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muskalungé
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muskellonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muskellunge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muskingum River Pike
*Esox ohioensis.*

Muskinlongé
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muskinongé
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Musk-ka-lone
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Musky
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Muskullunge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Musquallonge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Musquellunge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Northern Lake Pike
*Esox lucius.*

Northern Muskalonge
*Esox immaculatus.*

Northern Pike
*Esox lucius.*

Noscononge
*Esox immaculatus,*
*Esox masquinongy,*
*Esox ohioensis.*

Ohio Muskalonge
*Esox ohioensis.*

Ohio Pike
*Esox ohioensis*(?),
*Stizostedion.*

Ohio River Pike
*Esox ohioensis.*

Ohio Salmon
*Stizostedion.*

Okow
*Stizostedion.*

Perch Pike
*Stizostedion.*

*Picanau Blanc*
*Esox ohioensis.*

*Picareau Blanc*
*Esox ohioensis.*

Picarel
*Stizostedion.*

*Piccanau*
*Esox ohioensis*(?),
*Esox americanus.*

Pickerel
*Esox americanus,*
*Esox lucius,*
*Esox niger,*
*Esox ohioensis,*
*Stizostedion.*

Pickering
*Stizostedion.*

Pike
*Esox americanus,*
*Esox lucius,*
*Esox masquinongy,*
*Esox niger.*
*Esox ohioensis,*
*Stizostedion.*

Pike Perch
*Stizostedion.*

Plain Muskalonge
*Esox immaculatus.*

Pond Pickerel
*Esox americanus* (?),
*Esox niger.*

Pond Pike
*Esox americanus,*
*Esox niger.*

Red-Finned Pike
*Esox americanus,*
*Esox niger.*

Reticulated Pickerel
*Esox niger.*

River Trout
*Stizostedion.*

Rock Pike
*Stizostedion.*

Salmon
*Stizostedion.*

Salmon Pike
*Esox ohioensis.*

Saltwater Pike
*Stizostedion.*

Sand Pickerel
*Stizostedion.*

Sand Pike
*Stizostedion.*

Sauger
*Stizostedion.*

Sauger Pike
*Stizostedion.*

Short-Billed Pike
*Esox americanus.*

Short Pickerel
*Esox lucius.*

Short Pike
*Esox lucius.*

Shovelnose Pike
*Esox lucius.*

Silver Pike
*Esox lucius.*

Slinker
*Esox lucius.*

Smaller Pickerel
*Esox americanus.*

Snake
*Esox lucius.*

Snake Eater
*Esox lucius.*

Spike Nose
*Stizostedion.*

Spotted Muskalonge
*Esox masquinongy.*

Susquehanna Salmon
*Stizostedion.*

Tiger
*Esox.*
*Esox immaculatus.*

Tiger Muskalonge
*Esox,*
*Esox immaculatus.*

Tiger Musky
*Esox immaculatus.*

Trout Pickerel
*Esox americanus*

Troutnose Pickerel
*Esox americanus.*

Unspotted Muskalonge
*Esox immaculatus.*

Unspotted Pike
*Esox immaculatus.*

Varied Pickerel
*Esox americanus.*

*Wasserwolf*
*Esox immaculatus,*
*Esox lucius,*
*Esox masquinongy,*
*Esox ohioensis.*

Western Pickerel
*Esox americanus.*

Western Trout Pickerel
*Esox americanus.*

White Jack
*Esox ohioensis.*

White Perch
*Esox ohioensis.*

White Pickerel
*Esox ohioensis.*

White Pickerel of the West
*Esox ohioensis.*

White Pike
*Esox ohioensis.*

White Salmon
*Esox ohioensis.*

Wisconsin Muskalonge
*Esox immaculatus.*

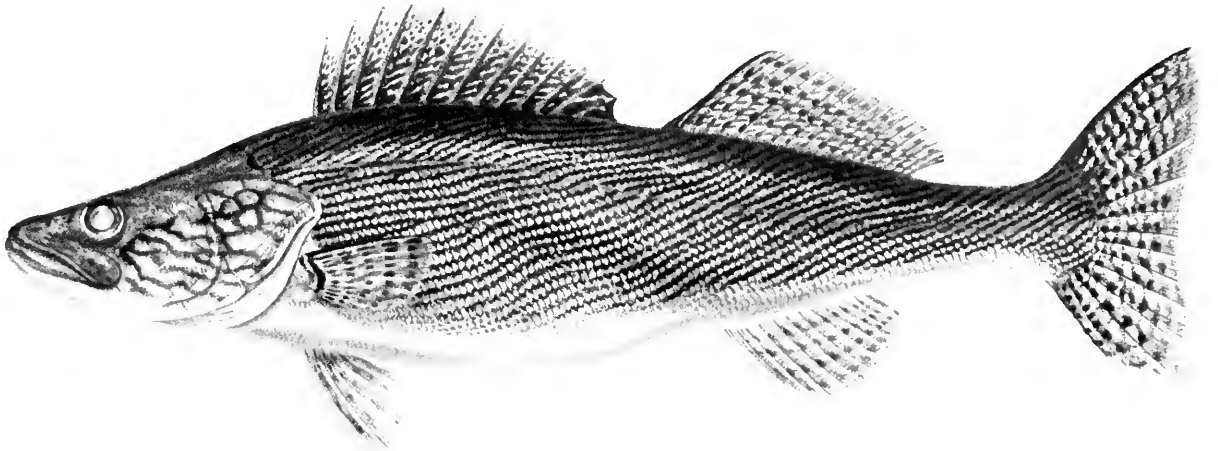
Yearling Pickerel
*Esox lucius,*
*Esox americanus.*

Yellow Pickerel
*Esox niger.*
*Stizostedion.*

Yellow Pike
*Stizostedion.*

Yellow Pike Perch
*Stizostedion.*

ALFRED C. WEED,
*Assistant Curator of Fishes.*



WALLEYED PIKE.

*Stizostedion vitreum* Mitchill.