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FISHERY LEAFLET 496

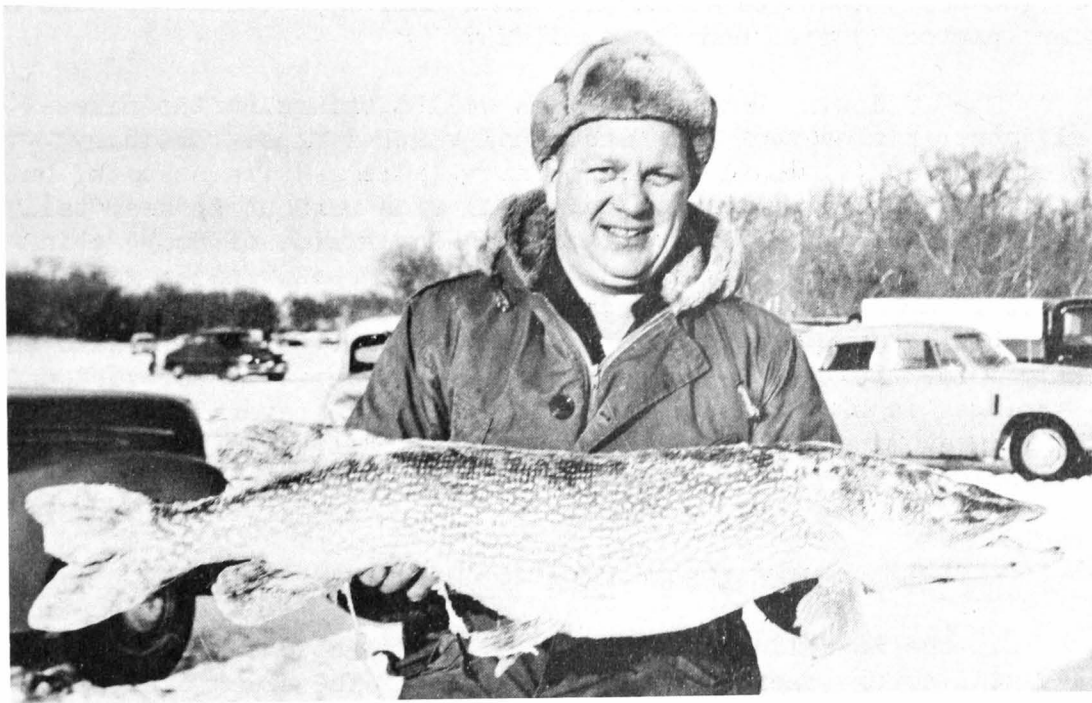
Washington 25, D. C.

April 1960

THE TRUE PIKES

by

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District Game Warden McKeague displays the record for the winter season, a 22-pound Northern pike, caught on February 5, 1955.

Perhaps no other common names of fresh-water fishes are so confused as pike and pickerel. The true pikes all belong to one family (Esocidae) and to one genus (Esox). In North America there are five species: Esox masquinongy (muskellunge), Esox lucius (northern

pike, pike, pickerel, jack), Esox niger (chain or eastern pickerel), Esox vermiculatus (grass, mud, or little pickerel), and Esox americanus (redfin, banded, barred, or bulldog pickerel). The fishes with which the true pikes are confused so far as their names are concerned all belong to the perch family (Percidae); these so-called pikes would be more properly called pike-perches. They include three species: Stizostedion v. vitreum (walleye pike, yellow pike or pickerel or pike-perch, pickerel), Stizostedion v. glaucum (blue pike), and Stizostedion canadense (sauger, sand pike).

Pike-perches (Stizostedion) are readily distinguished from true pikes (Esox) by their two well-separated back (dorsal) fins, the first (forward) of which is spinous. True pikes are easily recognized by their long, broad, flattish snout shaped like a duck's bill and by the position and shape of the single back and anal fins, both of which are far back on the body near the tail directly opposite each other and are rounded in outline. The mouth of the pikes is very large, extending about halfway the length of the head; the lower jaw projects beyond the upper, and both have broad bands of sharp teeth of different sizes. The belly (ventral) fins are about halfway between the size or shoulder (pectoral) fins and the anal fin.

The following characteristics will distinguish the pikes from all other fishes that have abdominal ventral fins: ordinary scales on body and sides of head; no fatty (adipose) fin on back, but only a single back fin with soft rays; all fins without spines; tail (caudal) fin forked; side fins attached on lower side of body; chin without barbels; gill slits extended far forward below head; gill membranes not attached to the prolongation (isthmus) of the body between the gill openings; upper jaw not protractile, that is, its forward end is firmly joined to the snout; both jaws have sharp teeth of various sizes arranged in broad bands; face ducklike. The several species of pikes vary anatomically and also according to their localities and life histories.

MUSKELLUNGE (ESOX MASQUINONGY)

In the muskellunge the lower half of each cheek (usually) and each gill cover (operculum) is scaleless. The sides of typical specimens are marked with scattered round or square black spots of various sizes on a background of silvery gray (dark spots on light background), although some individuals are barred vertically rather than spotted and may even have a solid color. The fins are spotted with black except in the spotless variety. The membranes that close the gill cavity below each contain from 16 to 19 bony rays (branchiostegals). The dorsal fin has 16 to 21 rays. There are 130 to 157 scales in the (lateral) line along each side of the body. Muskellunge

taken by anglers averaged about 3 1/4 feet or 15 pounds; the present-day maximum size is beyond 5 feet and 70 pounds, 4 ounces. Some authorities regard the three more or less distinct color forms as subspecies or distinct species. This division is also recognized by the local common names: spotted or leopard musky, barred or tiger musky, and spotless or green or silver musky. Color and color patterns are, however, so variable that they alone cannot be used to differentiate varieties of muskellunge. Muskellunge are known to spawn with northern pike and produce hybrids that have characteristics of both species.

Muskellunge are scatteringly distributed in the Great Lakes and St. Lawrence basins, including Lake Champlain, and in some lakes of northern Ontario westward to Lake of the Woods and the upper Mississippi Valley; they occur also in the Ohio River Valley north to Chautauqua Lake, New York. The species prefers clear, cool waters, and commonly lurks among or near the weed beds or stumps and logs at the edge of channels of the larger streams, or along the shores of the larger lakes. Nowhere are they abundant.

Muskellunge breed in shallow water of lakes and streams usually among logs, stumps, dead brush, and driftwood rather than in weed beds. It is said that this species prefers a bottom covered with soft decomposed vegetable matter or mud usually in bays and marshes. They begin to spawn a few days after the ice is out, continue throughout April, and in some regions throughout May and even in June. Muskellunge reach sexual maturity in the fourth, fifth, or sixth year of life. Thirty-five-pound females deposit over 250,000 eggs. Most of the females average nearly 100,000 eggs in some localities. The eggs hatch in 2 or 3 weeks. The young may remain until late fall or winter in the marshes and streams where they were hatched. During the first few weeks the young feed on small aquatic fleas and insects, but after about 5 weeks, at a length of approximately 2 inches, they feed almost entirely on fish and continue to do so to a large extent throughout life.

Muskellunge grow rapidly in most waters. The following figures may be accepted as approximating typical growth in most regions. They also give some idea of the length-weight relation.

Age (years)	Total length (inches)	Weight (pounds)	Age (years)	Total length (inches)	Weight (pounds)	Age (years)	Total length (inches)	Weight (pounds)
I	8	1/8	VIII	40	16	XV	52	34
II	16	1	IX	43	19	XVI	53	35
III	23	3	X	45	23	XVII	54	36
IV	28	6	XI	46	25	XVIII	55	37
V	32	9	XII	48	28	XIX	56	38
VI	35	12	XIII	49	31	XX	58	39
VII	38	14	XIV	51	33			

Although the maximum age recorded is between 30 and 35 years and the maximum weight nowadays is 70 pounds, 4 ounces, muskellunge most commonly taken by the sportsmen today range from about 6 to 9 years in age and from 33 to 44 inches in length or from 10 to 21 pounds in weight; the average size is around 39 inches or 15 pounds. The average sizes, however, vary with lakes and localities. The largest muskellunge on record was reported to have weighed 110 pounds and measured 7 feet 4 inches in length and 51 inches in girth. It was taken about 1914 in Intermediate Lake near Bellaire, Michigan.

NORTHERN PIKE (ESOX LUCIUS)

Northern pike are differentiated from the other pikes as follows: cheeks fully scaled; lower half of each gill cover without scales; sides of body marked with irregular horizontal rows of numerous whitish or yellowish spots (light spots on dark background), which in the small young often are joined to form vertical bars; all fins except side fins are spotted; dorsal rays range from 14 to 16 in number; bony rays (branchiostegals) of the gill-cavity membrane vary from 14 to 16; the number of lateral line pored scales average about 123; length of the angler's fishes average about 21 inches; the present maximum above 4 1/2 feet and the weight 49 pounds.

Northern pike occur throughout the northern parts of the Northern Hemisphere. In North America their range extends from Alaska to Labrador and south to northern New England, the Hudson River drainage of eastern New York, the northern part of the Ohio Valley, the entire Great Lakes district, Missouri, and eastern Nebraska. The species prefers clean water in lakes and streams, its favorite haunts being the weed beds in a sluggish current or in the shallow water of a lake. In winter the larger fish seem to descend into deeper water.

Northern pike spawn in March and April, although the season may extend to the middle of May in the far northern waters. Before the ice melts, pike begin to approach the shores, and breeding individuals in particular head toward the inlets. When the lakes and inlets are partially free of ice and the marshes and low-lying meadows around the shores are under water, the adult pike make their way to the shallow, inundated, weedy places and inlets and begin to spawn. In general, this species attains sexual maturity in the second, third, or fourth year of life, although some fast-growing individuals may mature when yearlings. In the far northern waters most of them mature in the fifth year. Large females produce over 100,000 eggs; the average is about 35,000. The eggs usually hatch in about 2 weeks. The young may remain as long as 3 months in the marshes where they were hatched. A detailed study indicated that less than one percent of the eggs survived from

the time of egg laying until the young left the spawning area. The high mortality was largely caused by competition for food, predation, and cannibalism. During the first few weeks the young feed on small water fleas and aquatic insects, but at a length of about 2 inches they are ready for a diet of tadpoles, crayfishes, and fish.

Northern pike grow rapidly as is indicated by the following tabular material which represents the typical rate of growth in many areas. The data also provide information on the approximate length-weight relation.

<u>Age</u> <u>(years)</u>	<u>Total</u> <u>length</u> <u>(inches)</u>	<u>Weight</u> <u>(pounds)</u>	<u>Age</u> <u>(years)</u>	<u>Total</u> <u>length</u> <u>(inches)</u>	<u>Weight</u> <u>(pounds)</u>
I	10.1	0.4	VII	28.3	4.7
II	16.7	0.8	VIII	30.6	5.7
III	19.0	1.1	IX	33.5	8.1
IV	21.0	1.8	X	36.8	10.6
V	24.0	2.6	XI	39.7	13.9
VI	27.7	3.5	XII	42.4	14.3

Maximum age recorded for northern pike is 24 years and the maximum weight 49 pounds. In general, age groups II to V predominate the sportsmen's catch with an average length of about 21 inches and an average weight of nearly 2 pounds.

CHAIN PICKEREL (ESOX NIGER)

Chain pickerel have both cheeks and gill covers fully scaled. A greenish body is covered with dark chainlike reticulations (resembling network), although the young still have vertical bars. A dark streak runs vertically downward below the eye. There are usually from 14 to 16 bony rays (branchiostegals) in each of the membranes that close the gill cavity below, an average of 14 dorsal rays, 13 anal rays, and about 125 pored scales in the lateral line along each side of the body. Further, chain pickerel have a relatively long snout (2.2 to 2.4 times in head) and reach a size up to 3 feet.

Range of the chain pickerel extends from New Brunswick and the St. Lawrence River and Lake Ontario drainages southward, east of the mountains, to Florida and into the Mississippi Valley to Texas, southern Missouri, and the Tennessee River system in Alabama. The species lives primarily in the shallow water of lakes and streams in dense vegetation, although at times the adults also frequent the deeper waters to a lake.

Chain pickerel have the same feeding habits as northern pike subsisting on other animals, mainly fishes, on which they begin to prey very early in life. The two species have the same spawning behavior, selecting similar types of breeding places. The chain pickerel spawns sometime during March to early May. It attains sexual maturity during its second, third, or fourth year. A 2-pound female produces about 30,000 eggs. The eggs hatch in about 6 to 12 days. The data indicate that chain pickerel grow much slower than muskellunge and northern pike.

<u>Age</u> <u>(years)</u>	<u>Total</u> <u>length</u> <u>(inches)</u>	<u>Weight</u> <u>(pounds)</u>	<u>Age</u> <u>(years)</u>	<u>Total</u> <u>length</u> <u>(inches)</u>	<u>Weight</u> <u>(pounds)</u>
I	7	0.1	V	18	1.4
II	10	0.2	VI	20	2.0
III	13	0.5	VII	22	2.7
IV	16	0.9	VIII	24	3.7

Maximum age recorded for chain pickerel is 9 years, although the average longevity appeared to be 3 to 4 years. It has attained a length of nearly 3 feet and a weight of 9 1/2 pounds although fish of 2 pounds are about the average in the angler's catch.

GRASS PICKEREL (ESOX VERMICULATUS)

Grass pickerel have both the cheeks and gill covers completely scaled. The body color is variable, sometimes nearly plain. Typically the body is a grassy to grayish green, heavily barred or streaked with a darker color. No spots occur on the sides or fins. A dark streak runs downward and backward from the eye. Each membrane below the gill covers contains 11 to 13 bony rays (branchiostegals). The dorsal fin has 11 or 12 rays. The lateral line contains from 103 to 108 pored scales. Grass pickerel practically never exceed a length of 14.8 inches (about 11.5 ounces), the average being about 8 inches (1 1/2 ounces). They are therefore seldom taken by anglers.

Grass pickerel are found in eastern Iowa, southern Wisconsin, Illinois, southern Michigan, southern Ontario, St. Lawrence River, Lake Champlain, and in the upper Mississippi Valley from Nebraska to Pennsylvania and southward to the Gulf Coast from Alabama to Texas. This species is primarily a creek fish, although it may also be common in ponds, lakes, and sluggish rivers. It has a noticeable preference for quiet, muddy waters with abundant vegetation and a soft mud bottom--hence they are sometimes called mud pickerel. (For further notes see redfin pickerel below.)

REDFIN PICKEREL (ESOX AMERICANUS)

Redfin pickerel, like the chain and grass pickerel, have both cheeks and gill covers entirely scaled. Redfin and grass pickerel have not yet been satisfactorily differentiated by scientists. The most striking difference is the comparative length of the snout, grass pickerel having a longer one. In this species the snout measures from 2.5 to 2.7 times in the length of the head whereas in redfin pickerel this measurement varies from 2.8 to 3.1 times. As shown later the geographical distribution of the two species also differs. In color and maximum size they are similar.

Redfin pickerel are restricted to the area extending from southeastern New Hampshire and the Hudson River Valley south through the Atlantic Coastal Plain to Florida and the Gulf Coast. However, in 1944 the first record was reported in Canada in the St. Lawrence drainage basin. The species prefers habitats similar to those selected by chain pickerel, being found most commonly in the shallow water with dense vegetation.

Very little is known about the habits and natural history of either grass or redfin pickerel. They are said to spawn in early spring--March and April. They apparently attain sexual maturity at a small size as there is one published record of a mature female grass pickerel, 6.2 inches long, that contained some 4,800 presumably mature eggs. Another individual of the same size contained 15,732 eggs. There is some evidence to indicate that individuals of this species spawn more than once during a season, and sometimes may even spawn in early autumn. The food of both species seems to be of a purely animal nature including crustaceans, insects, and tadpoles but chiefly small fishes. Their rates of growth have not been investigated extensively. The few data indicate the following average total lengths (inches) of three age groups of mud pickerel: I - 5.5, II - 7.2, III - 11.0. A large female redfin pickerel, 13 inches in length, collected on Long Island, N. Y., was found to be in its sixth summer. As this size represents almost the maximum in both species, it is most probable that they rarely live beyond this age. The largest recorded grass pickerel of 14.8 inches weighed 11.5 ounces.

ARTIFICIAL PROPAGATION

Northern pike are hatched and reared artificially by the U. S. Fish and Wildlife Service and several of the north-central States. During the years 1954-56, the U. S. Government distributed an annual average of nearly $13 \frac{1}{3}$ million eggs, fry, and fingerlings. More than $10 \frac{4}{5}$ millions of this average were stocked as fry, more than one million as fingerlings, and 790 were pike 6 inches and larger.

Eggs and milt are stripped from ripe pikes in the spring and thoroughly mixed in containers. After the eggs are partially water-hardened they are transferred to standard hatching jars with circulating water where the final hardening takes place. The period of incubation and the percentage of hatching of the eggs vary with the temperature. At a constant temperature of about 42° F. the eggs eye in 15 days and hatch after an incubation period of 19 days. At a higher temperature hatching may occur in two weeks. When emerging from the eggs the fry average about 10 mm. (0.39 inch) long.

Newly hatched pike do not rise and pass over the edge of the jar. They have to be removed to a fry tank or they will die. Because they are difficult to hold, most of the fry are planted. A small percentage of the fry are transported to rearing ponds where they must be furnished zooplankton in order to survive. At a size of about 2 inches the pike must be supplied with fry and fingerlings of suckers, minnows, and other fishes or they become cannibalistic. However, in spite of furnishing forage fishes the northern pike still feed to some extent on their own species. The procedure to propagate muskellunge is generally similar to the one employed for the northern pike.

COMMERCIAL FISHERIES

In the 6-year period 1952-57, the annual commercial catch of pike in the United States averaged 235,000 pounds valued at \$29,000, of which 41 percent was produced in the Minnesota waters of the international Lake of the Woods and Rainy Lake, and 38 percent in the Great Lakes. The remainder averaging 54,000 pounds was taken from Red Lake, Minnesota, the Mississippi River in Iowa, Maryland, and North Carolina. Pike taken in the eastern states were chain pickerels (E. niger) and constituted only 4 percent of the annual yield, whereas the rest of the catch of all waters were northern pike (E. lucius).

During the same 6-year period the Ontario commercial fishermen took an average of 983,000 pounds of pike per year of which 515,000 pounds or 52 percent were produced from Lake of the Woods and Rainy Lake and about 10 percent from the Great Lakes. During this period the United States imported from Canada an average of 1,080,524 pounds of pike per year, valued at \$135,282, so that the annual consumption amounted to about 1,316,000 pounds. Pike are usually sold whole, although a small amount is filleted in the Great Lakes area (about 24,000 pounds average per year in United States).

SPORT FISHERIES

Sport fisheries for the true pikes are widespread and very important. The most successful methods of sport fishing are trolling and casting with plugs, spoons, or live minnow baits. Larger fish are easily taken through the ice with spears when decoyed with baits. Unknown thousands of pounds are caught and utilized by sportsmen. The predacious pike is believed in recent years to be an important factor in preventing the stunting of sunfishes and perch in warm waters by reducing their populations.

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