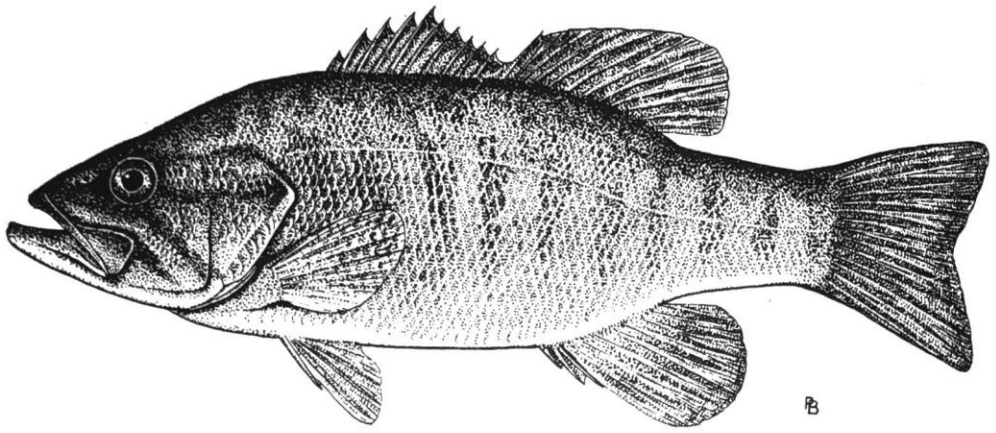
SMALLMOUTH BASS

Micropterus dolomieui Lacépède



Description A moderately large and robust fish, in the family only the largemouth is larger; body laterally compressed, less so than other sunfishes, cross section a narrow oval. Most individuals seen in Canada are 8–15 inches (203–381 mm) in length. The following percentages and counts are for individuals from Ontario and Quebec. Greatest depth, at origin to middle of first dorsal fin, 20.3–28.2% of total length; angle from snout to back low, back flat to rounded; caudal peduncle long and rather deep. Head large, long, 26.6–30.5% of total length, deep, moderately wide, dorsal surface rounded or with a shallow depression over the eyes, operculum bony to edge, pointed but not extended into a flap, usually a vague black spot near its tip; eye large, its diameter 14.1–30.0% of head length, larger in young; snout long, its length about 35% of head length, deep, bluntly pointed, scales on cheek in diagonal row, from eye downward 14–18 (9 or 10 in largemouth bass); mouth terminal, slightly oblique, lower jaw slightly longer than upper, gape reaching to near front of eye; maxillary long, 40.0–46.7% of head length, but usually reaching just to middle of eye (beyond eye in largemouth bass), posterior edge rounded; fine, brushlike teeth on both jaws, palatines, and vomer; lower pharyngeal teeth on long, narrow pad, numerous, fine, uniform in siz Gill rakers usually 8 on lower limb and 3 o upper limb. Branchiostegal rays 6, 6 and or 7. Fins: dorsals 2, but joined and appea more like one than do those of largemout bass, first dorsal rather low, with 10 stou spines not markedly different in length, the las appearing to be part of second dorsal; separa tion between dorsal fins not deep, shortes posterior spine longer than $\frac{1}{2}$ length of longes spine; second dorsal higher, 12–15 soft rays edge rounded; caudal not markedly long bu broad, moderately forked, tips blunt points t rounded; anal with base less than that o second dorsal fin, 3 graduated spines and 10- 12 (usually 11) soft rays, edge rounded pelvics thoracic, origin ahead of origin o dorsal fin, joined by membrane (not so i largemouth bass), less conspicuously joine to body by membrane than in largemoutl bass, pelvics not long, 1 spine and 5 rays, ti rounded; pectorals not long, but broad an rounded, 13–15 rays. Scales ctenoid, slightl smaller than in largemouth bass, usually 11- 13 rows from lateral line to dorsal origin an 19–23 rows from lateral line to anal origin, few minute scales on membranes of dorsa and anal fins; lateral line complete, high an little arched, 68–78 lateral line scales. Peri toneum silvery, intestine well differentiated

7–10 thicker pyloric caeca, few if any branched. Vertebrae 31 or 32.

No nuptial tubercles but colours darken on spawning males and colour pattern of females intensifies.

Colour Variable with size, condition and habitat. In clear, vegetated water or stained water they are darker with pronounced, contrasting markings, in turbid water lighter with vague markings; dorsal surface of back and head brown, golden brown through olive to green, sides lighter, more golden with golden flecks on most scales, ventral surface cream to milk-white; sides of adults with 8–15, pronounced to vague, thin, vertical bars, sometimes broken; head with dark bars radiating backwards from eyes, eye usually red or orange; fins dusky to amber, pectorals clear, others opaque with some black on rays, spines, or membranes.

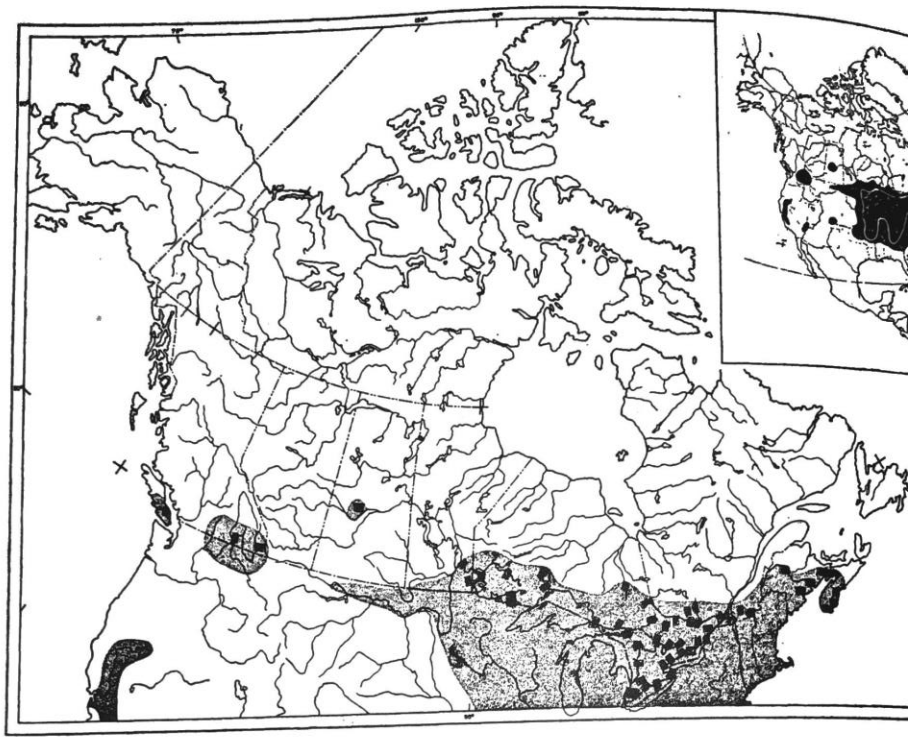
Young much like adults but vertical bars or rows of spots very prominent and caudal fin unmistakably marked orange at base, followed by a black band, and white to yellow tips. *See* colour illustration facing p. 730.

Systematic notes Canadian populations often included in a subspecies *M. d. dolomieui*, and southwestern populations are designated *M. d. velox*. The extent of introduction and artificial culture of this fish would now make it virtually impossible to detect morphometric trends in Canadian populations.

Distribution Originally the smallmouth bass was restricted to the fresh waters of eastern central North America. Its range was expanded starting in the mid-1800's until now it occurs almost everywhere in the United States, many places in England, Europe, Russia, and Africa. Its original range was limited to the Great Lakes–St. Lawrence system (apparently excluding Lake Nipigon but including nearby lakes tributary to the Nipigon River and the north shore of Lake Superior, Dymond 1926) and the systems of the Ohio, Tennessee, and upper Mississippi rivers (white line on inset map, from Hubbs and Bailey 1938). It now occurs generally from Nova Scotia south to Georgia and eastern Alabama, west to northeastern Oklahoma, north, through eastern Kansas to Minnesota, west through North Dakota, in central Saskatchewan, east from southern Manitoba to Quebec and Maine.

In Canada it occurs in lakes in southern Nova Scotia, southern and western New Brunswick, southern Quebec from Hull upstream in the St. Lawrence River and its tributaries, throughout the eastern townships including Lake Champlain, the Gatineau River, and the Ottawa River system as far north as Temiskaming; through Ontario approximately at the latitude of Timmins and Lake Nipigon (absent from that lake), Manitoba north to the south end of Lake Winnipeg, and in central Saskatchewan. It occurs in eastern British Columbia in lakes of the Columbia River system, and on Saltspring Island and southern Vancouver Island as a result of invasion from introductions in Washington State and by direct introduction. Dates of first Canadian introductions beyond the natural range are: Nova Scotia 1908 (Catt 1949), New Brunswick 1894 and 1901 (Cox 1896b; Dom. Dep. Fish. 1902), Ontario 1901 (MacKay 1963), Manitoba 1900–1942, Saskatchewan 1900–1942, Alberta early 1900's (failed) (Rawson 1945), British Columbia 1901 (Dymond 1936).

Biology Contrary to the case for many Canadian fishes, published information on the biology of the smallmouth bass in Canada is very extensive and dates from 1876. Some of these publications are Wilmot (1876), Loudon (1910), Bensley (1915), Tester (1930), Dymond (1931a), Tester (1932a, b), Rawson (1938), Doan (1939, 1940), Smith (1942), Fraser (1955), Fry and Watt (1957), Rowan (1962), Coble (1967), Turner and MacCrimmon (1970), and several unpublished manuscripts in the Great Lakes Library, Department of Zoology, University of Toronto, Toronto, Ont. A very extensive bibliography of the literature on this species exists in the Division of Research,



Ontario Department of Lands and Forests. The following information was derived from the works mentioned.

Smallmouth bass spawn, usually over a period of 6–10 days, in the late spring and early summer, most often late May to early July. Nest building and spawning (in some areas) commences over a range of temperatures 55°–68° F (12.8°–20.0° C) but egg deposition takes place mostly at 61°–65° F (16.1°–18.3° C). The male builds a nest 1–6 feet (30.5–183.0 cm) in diameter in 2–20 feet (61–610 cm) of water on a sandy, gravel, or rocky bottom, of lakes and rivers, usually near the protection of rocks, logs, or, more rarely, dense vegetation. Some males return to the same nest in subsequent years and over 85% of them return to within 150 yards of where they nested in previous years. After nest building, there is considerable pre-spawning activity, display, rubbing, and nipping. The male and female swim about the nest and eventually come to rest on the bottom, their ventral surfaces nearly in with the male vertical and the female angle. Actual egg deposition and fer takes place for about 5 seconds, and acts take place for a period of abou with intervening periods of nest-circ ing 25–45 seconds. Egg number in depending on size, apparently ran 5000 to 14,000 and is said to ap 7000 per pound of female. They amber to pale yellow in colour, adhesive, and 1.2–2.5 mm in diam are usually found attached to cl near the centre of the nest. After the female leaves the nest and ma another nest with another male. guards the nest, fans the eggs, and young after they hatch. Often 4 nests are failures and approximate result from most successful nes shifts of temperature upward or changes in water level, and funga kill many eggs. The larger the

guarding male, the greater the hatching success. Hatching usually takes place in 4–10 days over the temperatures common in Canadian situations. The young at this time are 5.6–5.9 mm in length. In an additional 12 days the young have absorbed the yolk and rise off the bottom. At this time they are 8.7–9.9 mm in length. After 5–7 days, they begin to leave the nest but are still guarded by the male for several days. Reighard (1906), Fish (1932), and Doan (1939) gave details of eggs, embryology, and development of young.

Growth is rapid at first and in Lake Nipissing, near the northern limit of distribution, they are 32.2–36.6 mm in length by July and are 2–4 inches (51–102 mm) in length by decline of temperatures in the fall. In Lake Erie, growth of young is 0.8–0.9 mm per day. The age–length and age–weight relations in various Canadian habitats are shown in the following table.

Rowan (1962) gave experimental length–weight relation at 74° F (22.5° C), a temperature common in Canadian habitats, as Log W(g) = −3.1176 + 3.0699 Log L(FL mm). Growth of older fish is variable from place to place and year to year. Sexual maturity is usually attained by males in their third to fifth year and females in their fourth to sixth year. Females probably spawn every year. Many factors, including summer temperature, water levels, wind, nest desertion, predation, angling, and the bass tapeworm greatly affect reproduction and survival of young, resulting in large and small year classes with vastly different contributions to the population and harvest (Fry and Watt 1957; White 1970).

Maximum age in Canada would appear to be about 15 years. Maximum known size in Canada is probably either a female 13 years old, 23 inches (584 mm) in fork length, 17¼ inches (437 mm) in girth, 9 pounds 2 ounces in weight, captured by an angler in McCauley Lake, near Madawaska, Ont., in September, 1951, or one said to be 9 pounds 13 ounces that was caught in Birchbark Lake near Kinmount, Ont., in 1954. A record of 11 pounds in Canada is probably an error. Fish over 23 inches (584 mm) were more common in 1906–1936, but prize winning fish of 5–7 pounds are taken almost every year. Those most frequently caught by anglers, however, are 8–15 inches (203–381 mm) in length and usually not over 3 pounds. Some supposed "records" are based on misidentifications as possibly was the 20-pounder reported speared in Ashbridges Bay, Toronto, in 1842 (*Canadian Sportsman and Naturalist* 1882, 2(4): 122). Trautman (1957) recorded fish to 22.5 inches (572 mm), and 6 pounds 10 ounces in Ohio, and said maximum weights of 10–14 pounds had been recorded elsewhere. The present *Field and Stream* angler record is one 27 inches (686 mm) long, 21⅔

		Age														
		0+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+	12+	13+	14+	15+
Potter's L., N.B. (Smith 1942)	FL *inches*	1.5	4.9	7.8	9.6	10.9	11.9	12.8	13.5	–	–	–	–	–	–	–	–
	mm	38	124	198	244	277	302	325	343	–	–	–	–	–	–	–	–
	Wt *oz*	0.03	1.0	4.5	8.2	12.2	14.2	16.7	20.4	–	–	–	–	–	–	–	–
L. Erie, Ont. (Doan 1940)	TTL *inches*	–	–	–	6.5	9.9	10.5	12.5	13.6	14.8	15.6	–	–	–	–	–	–
	mm	–	–	–	165	251	267	318	345	376	396	–	–	–	–	–	–
	Wt *oz*	–	–	–	2.9	9.8	23.1	27.3	29.9	32.5	34.4	–	–	–	–	–	–
Baie du Doré, L. Huron, Ont. (White 1970)	FL *inches*	–	5.5	7.0	8.3	9.7	10.8	12.0	13.0	13.8	14.5	15.4	15.6	16.2	16.3	–	18.0
	mm	–	140	178	211	246	274	305	330	351	368	391	396	411	414	–	457
	Wt *oz*	–	–	1.9	3.8	8.2	12.5	17.8	24.6	34.1	34.9	36.8	37.6	–	–	–	–
L. Nipissing, Ont. (Tester 1932b)	FL *inches*	–	–	8.1	9.4	10.9	11.7	13.4	14.0	14.8	15.5	16.2	16.3	–	–	–	–
	mm	–	–	206	239	277	297	340	356	376	394	411	414	–	–	–	–
	Wt *oz*	–	–	6	8	13	17	25	28	34	40.5	43.5	56	–	–	–	–

inches (549 mm) in girth and 11 pounds 15 ounces, caught in Dale Hollow Lake, Ky., in 1955.

Habitat varies with size and time of year. In the spring, adult fish congregate on the spawning grounds. Later they are usually found in rocky and sandy areas of lakes and rivers, in moderately shallow water. In the heat of summer they usually retreat to greater depth. Usually they are to be found around the protection afforded by the rocks of shoals and talus slopes, or submerged logs. They are much less often associated with dense growths of aquatic vegetation than are largemouth bass and they prefer a lower temperature than that species. Final preferred temperatures under experimental and field conditions have been given as 82.4° F (28° C), and 68.5°–70.3° F (20.3°–21.3° C) respectively in Wisconsin (Ferguson 1958). Average summer temperatures of many Ontario bass habitats was 70.6° F (21.4° C). Diet and seasonal movements are partly in response to attempts to remain in the preferred temperature. Upper lethal temperature has been determined experimentally to be as high as 95° F (35° C), but it is usually considered that this species cannot stand high environmental temperatures as well as the largemouth bass. Most studies have shown that movements are usually limited to ½–5 miles from place of capture. However, bass tagged in the Chateauguay River, Que., migrated up and down the St. Lawrence River for distances up to 30 miles (Cuerrier 1943). There is evidence of homing to spawning ground and summer territory. Hallam (1959) gave extensive details on physical, chemical, and faunal characteristics of the habitat of this species. In winter, smallmouth bass aggregate near the bottom, are very inactive, eat little, and are rarely taken by anglers. They begin feeding in the spring when water temperature reaches 47.3° F (8.5° C) (Keast 1968b).

In general, the food of adults of this species consists of insects, crayfish, and fishes. The smallmouth bass takes this variety of food from the surface, in the water mass, and off the bottom. There is a progression with increase in size from plankton, to immature aquatic insects, to crayfish and fishes. The importance of various items within size groups shifts, with availability, from place to place. Tester (1932a) gave an extensive summary of the food from several Ontario habitats by season, size, and location. By 20 mm length, insects replace the previous plankton dominance and by 50 mm fishes and crayfish are the important items. For adults in most habitats, crayfish form approximately 60–90% of the food volume, fishes 10–30%, and aquatic and terrestrial insects 0–10%. Frogs, tadpoles, fish eggs, and plant material are often present as well. If any particular fish can be said to dominate, it is the yellow perch. This may, however, be a result of the ease with which they are identified. Most cyprinids are listed simply as unidentified. The following are among those which have been recorded: yellow perch, johnny darter, Iowa darter, log perch, northern pike, sculpins, sticklebacks, white sucker, bluntnose minnow, emerald shiner, spottail shiner, cyprinids, yellow walleye, white bass, freshwater drum, trout-perch, sunfishes, rockbass, ciscoes, and smallmouth bass.

Young smallmouth bass are probably eaten by many predators. Groups of rock bass, as predators, apparently cause a significant loss of eggs and fry. While the guarding male is chasing one rock bass the others feed in or over the nest. Other predator species mentioned are yellow perch, sunfishes, catfishes, gar pike, suckers, and turtles.

Competition for food involves interaction with a wide variety of fishes with similar habitat requirements, but does not seem to be a serious limiting factor. Competition for nesting areas seems to be exerted by rock bass and, in shallower nests, by sunfishes.

Parasites of this species over the whole of its range, listed by Hoffman (1967) were: protozoans (12), trematodes (49), cestodes (12), nematodes (13), acanthocephalans (9), leeches (9), molluscs (1), crustaceans (9). Parasites of this species from Lake Erie, Algonquin Park, Ont., and Lake Huron were listed by Bangham and Hunter (1939), Bangham and Venard (1946), and Bangham (1955). Of these parasites, three are of the most concern to man: the bass tapeworm *Proteocephalus ambloplitis*, which can cause

or seriously limit reproduction of this and black-spot and yellow grub when present, often deter anglers from their catch. None of these parasites is to man.

smallmouth bass is known to hybridize ture with the spotted bass *M. latus*.

ation to man The magnitude and ity of interest in this bass is obvious in act that angling results were mentioned othergill's 1816–1837 *Account of the ral history of eastern Canada* (Black 4), that introductions in North America an in the 1850's, and fish culture practice Canada in 1884. Rawson (1930a) sum-rized the history of the fishery in Lake ncoe, Ont., from the time of Champlain to 30. Smallmouth bass in Canada were taken the ton by hook and line and by nets, at ast until 1936. It sold for as little as 6–¢/pound in 1898–1902. As early as 1893 complaints were made to the Dominion Fisheries Commission about the depletion in Lake Simcoe caused by the commercial catch. An International Anglers Commission meeting in Niagara Falls, Ont., in 1894 spoke of rapid extinction of the basses and recommended a closed season during spawning and prohibition of sale. After that, it was universally restricted as a sport fish and its capture is now controlled by season and bag limits.

Angler enjoyment, success, and harvest have been extensively studied (*see* Budd 1961).

Its attraction for anglers and its sporting quality are now almost legendary. That and techniques of its capture are the subject of many popular books and articles in sporting magazines. It suffices to say here that the smallmouth bass is still one of three or four fishes which are the mainstay of the gigantic sport fishery and associated tourist industries in eastern Canada. Good populations of bass still yield limit catches and, on average, 0.5–1.1 fish per man hour.

Smallmouth bass are usually taken still fishing with crayfish, minnows, or frogs as bait; by casting live bait, spinners, or plugs; by trolling live bait or artificial lures; or by fly fishing with wet or dry flies. The flesh of large or small individuals is white, flaky, and delicious when prepared in any of a variety of ways.

The most important areas of angler success for this species, Lake Erie, the Thousand Islands section of the St. Lawrence River, and Georgian Bay, are seriously threatened by domestic, industrial and possibly thermal pollution.

Nomenclature

Micropterus dolomieu	— La Cepède 1802: 324 (type locality unknown)
Bodianus achigan	— Rafinesque 1817b: 120
Cichla fasciata	— LeSueur 1822a: 216
Cichla minima	— LeSueur 1822a: 220
Cichla fasciata (LeSueur)	— Richardson 1836: 23
Cichla minima (LeSueur)	— Richardson 1836: 24
Grystes nigrisans	— Forelle 1857: 278
Gristes nigricans	— Roosevelt 1884
Centrarchus fasciatus	— Small 1865: 19
Micropterus dolomieu dolomieu Lacépède	— Hubbs and Lagler 1941: 78
Micropterus dolomieui dolomieui Lacépède	— Hubbs and Lagler 1958: 113
Micropterus dolomieui Lacépède	— Scott 1967: 89

Etymology *Micropterus* — small or short fin, a damaged second dorsal led Lacépède to think there was a short fin at the rear of it; *dolomieui* — after M. Dolomieu, a French mineralogist and friend of Lacépède, after whom dolomite was named.