

Fish Biology



Lake Trout (*Salvelinus namaycush*)



Distinguishing features:

- Deeply forked caudal fin (tail)
- Dorsal & caudal fin, body and head covered with small, light spots
- Body never brightly coloured with orange or red

www.lakegeorgeassociation.org

Lake Trout

Salmoninae subfamily

- Other local salmoninae: rainbow trout, brown trout, brook trout, chinook & coho salmon in L. Ontario
- Other common names: mackinaw trout, laker, grey trout, freshwater char
- Top predator
- Cold water species, adult optimum growth occurs at water temperatures of 9-13C, lethal at 23C

Lake Trout Spawning

- Fall, October to early November once water temperatures drop to 9-13C
- Photo period also initiates spawning
- Spawn at night, move on to spawning shoal at ~ 7pm & most depart by 10 pm
- Suitable substrate, large boulder or rubble bottom at depths less than 12 m (40 ft)

Lake Trout Spawning

- 1-2 males to each female
- Fertilized eggs fall into crevices
- Large eggs thus relatively low numbers, 400-1200 per pound female
- Eggs remain in substrate over winter for 4-5 months, hatching in March-April
- Young seek deeper water within a month of hatching
- Adults disperse after spawning up to 100 miles away
- Some evidence of homing in some populations not in others

Lake Trout

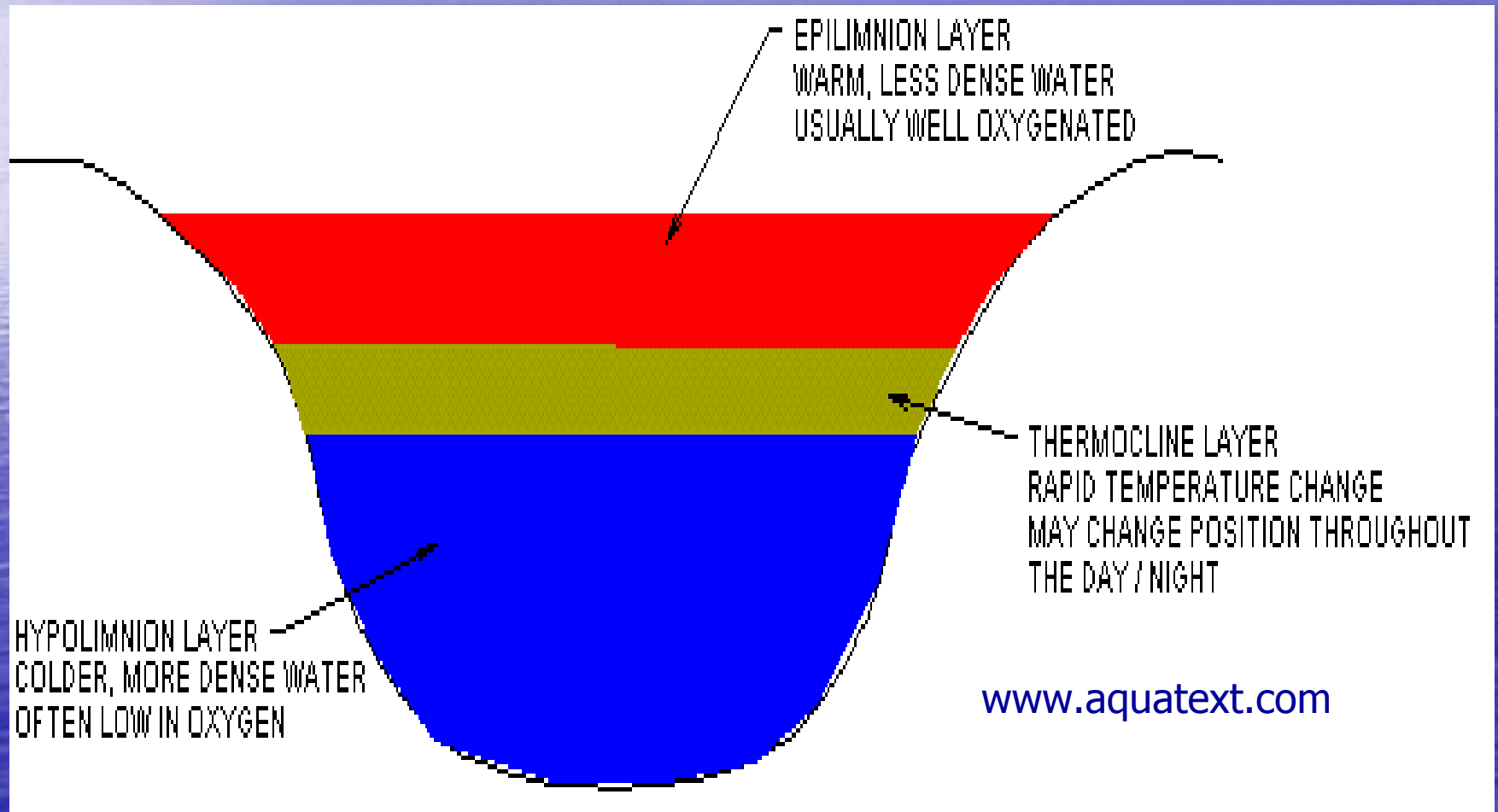
- Maturity is reached by age-5 to age-6
- Slow growing
- Long lived fish, not uncommon to reach age-20 to age-35 but closer to maximum age-20 in S. Ont.
- In S. Ont., average total length at age for lake trout:

Age	1	2	3	4	5	6	7	8	9	10
Average Length cm (in)	22 (9)	29 (11)	35 (14)	41 (16)	45 (18)	48 (19)	53 (21)	59 (23)	65 (26)	70 (28)

Lake Trout Habitat

- In S. Ont., occur only in deep lakes
- Depth distribution varies with season:
 - Move shallower in fall to spawn then disperse throughout water column for winter until spring surface water warms
 - Spend most of summer below thermocline in the hypolimnion

Thermal stratification in lakes



Lake Trout Habitat

- Optimum growth occurs at depths with temperature less than 10C & dissolved oxygen greater than 6 mg/L
- Can utilize portions of water column with temperature less than 15.5C & oxygen greater than 4 mg/L **BUT,**
- Activity levels (growth) decrease with lower oxygen:
 - 1/4 of usual activity with oxygen 4 mg/L
 - 1/2 of usual activity with oxygen 5 mg/L
 - 3/4 of usual activity with oxygen 6 mg/L
- In 2005, new guideline for average oxygen in hypolimnion during late summer period (late Aug-mid Sept), 7 mg/L should allow for uninhibited growth

Lake Trout Habitat

- Larger adults occupy best habitat and will cannibalize juveniles of same species
- Juveniles will make forays up in water column at night under cover of darkness for food
- Adults will move up into thermocline at night for food
- Yellow perch and ciscos are important food item of adults but will utilize other food items based upon availability

Lake Trout Recruitment

- Natural recruitment (juveniles surviving to adults) is good to excellent when average late summer hypolimnion oxygen is 7-8 mg/L
- Natural recruitment is average to poor at less than 6 mg/L

Natural Recruitment in Bancroft, Minden, Mazinaw, Bracebridge lakes

Natural Recruitment	MVWHDO (mg/L)
Good	6.8 to 8.0
Average	5.8 to 7.2
Poor	5.5 to 6.2
Very Poor	4.4 to 5.6
Extinct	2.0 to 4.0

Potential Lake Trout Productivity

Lake	Area (ha)	Total Dissolved Solids (mg/L)	Safe Fishing Effort (hrs/yr)	Safe Harvest (kg/yr)	MVWHDO (mg/L)
Buck (South)	491	93	2230	570	5.9 to 6.2
(North)	264	67	1317	330	2.3 to 4.7
Brule	571	83	2558	645	??
Buckshot	439	65	2041	510	??
Crow	436	160	1975	532	6.0 to 6.4
Desert	382	128	1770	466	7.5 to 8.3
Eagle	646	83	2850	717	2.3 to 6.6
<i>Bobs (Green Bay)</i>	<i>534</i>	<i>123</i>	<i>2390</i>	<i>625</i>	<i>2.8 to 6.9</i>
Knowlton	182	160	920	250	??
<i>Loughborough</i>	<i>738</i>	<i>152</i>	<i>3173</i>	<i>850</i>	<i>3.4 to 4.8</i>
Sharbot	684	134	2983	773	2.7 to 4.3

Smallmouth Bass (*Micropterus dolomieu*) & Largemouth Bass (*Micropterus salmoides*)



www.usbr.gov



www.dfw.state.or.us



[/jrscience.wcp.muohio.edu](http://jrscience.wcp.muohio.edu)



www.fish.state.pa.us

Smallmouth & Largemouth Bass

Centrarchidae [sunfish] family

- Other local centrarchidae: sunfish, rock bass, crappie
- Both top predators
- Smallmouth is cool water species
- Largemouth is warm water species

Bass Species	Water Temperature	
	Optimum Growth	Lethal
Smallmouth	20 to 26 C	35 C
Largemouth	26 to 30 C	36 C

Bass Spawning

Trait	Smallmouth	Largemouth
Male begin building nest	Water temp 13C	Water temp 15C
Egg deposition begins	Water temp 16-18 (little later, deeper exposed sites)	Water temp 16-18 (earlier, shallow quiet back bays, warm quicker)
Nest size	1 to 6 ft diameter	2 to 3 ft diameter
Nest location	Sand, rock, gravel, near cover male	Sand, rock, gravel, mud, near cover male
Guarding eggs & young		
Egg numbers	~7000/lb female	~2000-7000/lb female
1. Egg hatching	4 to 10 days	3 to 5 days
2. Young rise, yolk absorbed	12 days	6 to 7 days
3. Young begin leaving nest	5 to 7 days	Can remain for 31 days
# fry resulting from nest	~2000	~5000 to 7000

Bass Misc Facts

- Generally, bass need to reach size of thumb to survive their 1st winter
- Cover can improve survivability of young bass
- Male mature by age- 3 to age-5 & females by age-4 to age-6
- Maximum age is ~ 15 years
- Movements limited to ½ to 5 miles
- In winter, aggregate near bottom, very inactive and feed little (largemouth more active), begin feeding again once water warms to 8.5C

Bass Growth

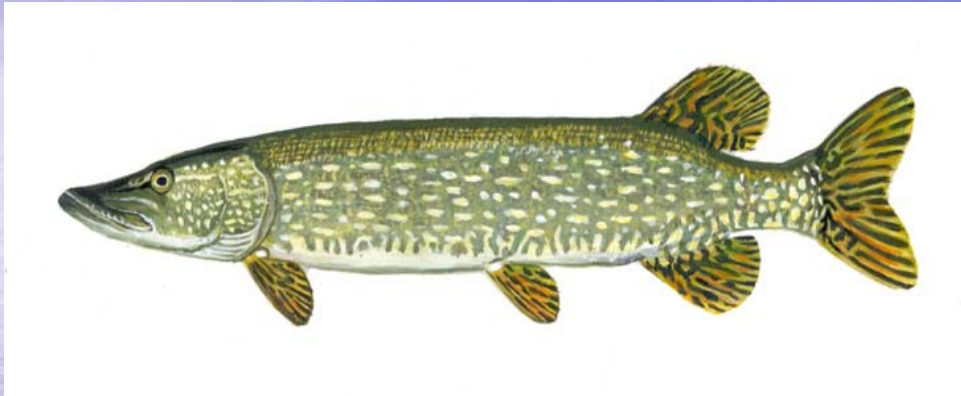
Total Length at age

Age	1	2	3	4	5	6	7	8	9	10	11	12
SMB cm (in)	11 (4)	16 (6)	20 (8)	26 (10)	29 (11)	34 (13)	38 (15)	41 (16)	44 (17)	45 (17)	47 (18)	47 (18)
LMB cm (in)	12 (5)	18 (7)	23 (9)	28 (11)	31 (12)	34 (13)	36 (14)	39 (15)	41 (16)	43 (17)	45 (17)	47 (18)

More Bass Misc Facts

- Food of adults is insects, crayfish and fish
- Largemouth more cannibalistic than smallmouth
 - Some studies show up to 10% diet of largemouth is fry of same species
- Smallmouth tend to live at greater depths than largemouth thus habitat rarely overlap
 - Largemouth rarely caught deeper than 20 ft

Northern Pike (*Esox lucius*)



www.dnr.state.wi.us/fish



www.dfg.ca.gov

In most areas these fish have minimum size restrictions, maximum possession limits, and special open seasons... Consult local fishing regulations for specific details.

Location of submandibular pores on underside of lower jaw

Muskellunge
6 to 9 pores

Northern Pike
5 or fewer pores



Note: Hybrids have 5 to 8 pores on each side of lower jaw.

Muskellunge
Upper half of cheek and operculum with scales



Northern Pike
Entire cheek and upper half of operculum with scales



Note: Hybrids have 2/3 or more of cheek and upper half of operculum with scales.

Please release non-trophy muskies to help improve our muskellunge fishing quality!

www.myfishingnetwork.com

Northern Pike

Esocidae (Pike) family

- Other local esocids: muskellunge, redbfin & grass pickerel (tributaries of St. Lawrence R. & L. Ont. as far west as Belleville)
 - two pickerel species are usually only 6-8 inches
- Other common names: jack, jackfish, pickerel
- Cold water species with optimum growth at water temperatures of 17-21C
- Water temperatures lethal at 32C

Northern Pike Spawning

- Spring, April to May immediately after ice melts at water temps of 4.4-11C
- Generally spawn during daylight hours on heavily vegetated floodplains of streams, marshes and bays
- One female and 1-2 males swim together through and over vegetation in water sometimes no deeper than 7 inches
- Eggs are released, male fertilizes them and thrust tail to spread eggs
- Eggs stick to vegetation

Northern Pike Spawning

- ~9000 eggs per pound of female spread through numerous spawning acts at 5-60 per act
- Estimated 99.8% mortality rate from egg to young leaving spawning grounds
- Eggs hatch in 12-14 days at average spring temperatures or 4-5 days at above normal temps
- Eggs remain attached to vegetation for 6-10 days while they feed on yolk sac
- Young remain in shallow spawning areas for several weeks

Northern Pike Misc Facts

- Early growth (1st 1-3 years) in length is fast but slows after sexual maturity then weight increases
- Females mature at age-3 to age-4 and males at age-2 to age-3
- Maximum age is ~10-12 years
- Habitat is generally shallower water in spring and fall but move to deeper cooler water at height of summer
- Fish dominate diet of young pike within 1 month of hatching

Northern Pike Growth

Age	2	3	4	5	6	7
Average fork length cm	44	50	54	58	62	65
(in)	(17)	(20)	(21)	(23)	(24)	(26)