

Pond and Stream Study Guide

Interpreting Physical and Chemical Factors

Water Temperature and Fish-Fish Commonly Found in Aquatic Field Studies and Temperature Preferences

COLDWATER FISH

Fish that require water temperatures less than 70 degrees to grow and reproduce.



Rainbow Trout



Brown Trout



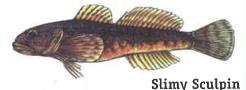
Brook Trout



Blacknose Dace



Longnose Dace



Species shown are not in proportion to each other, but are enlarged to

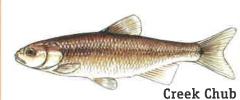
facilitate identification.

COOLWATER FISH

Fish that require temperatures higher than 65 degrees but less than 75 degrees to grow and reproduce.



Logperch







White Sucker



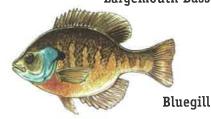
Smallmouth Bass

WARMWATER FISH

Fish that require water temperatures higher than **75 degrees** to grow and reproduce.

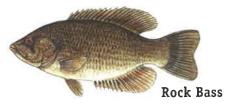


Largemouth Bass





Redbreast Sunfish





Brown Bullhead



Dissolved Oxygen (DO) Dissolved Oxygen Requirements by Fish Community

Cold Water Fishes:

6 mg/l and above

Warm Water Fishes: 5 mq/l

Solubility of Dissolved Oxygen

Solubility: Amount of dissolved oxygen that distilled water can hold at given temperature

Temperature (C*): Solubility (mg/l)

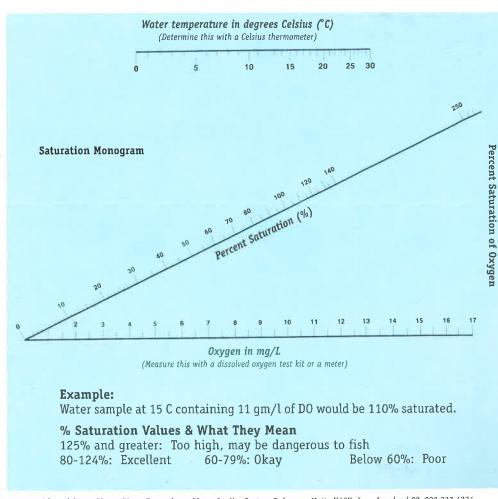
emperature (C*):	Solubility	(mg/t)
0:	14.6	
1:	14.2	
2:	13.8	
3:	13.5	
4:	13.1	
5:	12.8	
6:	12.5	
7:	12.2	
8:	11.9	
9:	11.6	
10:	11.3	
11:	11.1	
12:	10.9	
13:	10.6	
14:	10.4	
15:	10.2	
16:	10.0	
17:	9.8	
18:	9.6	
19:	9.4	
20:	9.2	
21:	9.0	
22:	8.9	
23:	8.7	
24:	8.6	
25:	8.4	
26:	8.2	
27:	8.1	
28:	7.9	
29:	7.8	
30:	7.7	

Dissolved Oxygen Percent Saturation

1. Determine water temperature in degrees C, and find that value on upper (temperature) scale. *To convert F to C: $[(F-32) \times 5]/9 = C$

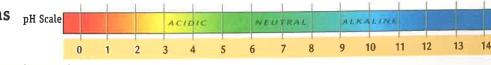
2. Determine dissolved oxygen and find that value on the lower (D0) scale.

3. Using a straight edge (ruler, piece of paper), draw a line from the temperature value to the dissolved oxygen value. The point at which the line crosses the middle (saturation) scale is the percent saturation of oxygen.



Adapted from: Water, Water Everywhere: Water Quality Factors Reference Unit, HACH, Inc., Loveland CO, 800-227-4224.

pH and Aquatic Organisms pH Scale



Tolerant ranges for certain species

Mayfly	5.5 to 7.5	Brown trout	5.0 to 9.5
Caddisfly	5.5 to 7.5	Brook trout	4.5 to 7.5
Stonefly	5.5 to 7.5	Yellow perch	4.5 to 7.5
Snails, clams, mussels	6.0 to 9.0	Smallmouth bass	5.5 to 7.5
Crayfish	5.5 to 7.5	Pumpkinseed	5.0 to 7.5
Rainbow trout	5.5 to 9.5	Fathead minnow	6.0 to 7.5

Spotted salamander	5.0 to 7.5
American toad	4.5 to 7.5
Wood frog	4.0 to 7.5
Bullfrog	4.5 to 7.5
Catfish	5.0 to 9.0
Carp	5.0 to 9.0

Alkalinity

(Calcium carbonate:)CaCo3

Freestone Streams

10 mg/l or less: Very sensitive to acid precipitation 10-20: Somewhat sensitive to acid precipitation 20mg/l or greater: Not sensitive to acid precipitation

Limestone Streams 75 mg/l or greater

Key to Macroinvertebrate Life Shells No Shells Double Shell No Legs Single Shell 2 to 8 inches Microscopic tiny white Worm-Like spiral, With Tentacles opening on right Brushes or Tails Suckers, expands reddish brown glides along red or small, hairlike, and contracts Limpet long breathing tube two fringed tails white or grey with tentacles small, black, attaches to rocks, etc. **Gilled Snail Orb Snail** Freshwater Midge Larva Threadworm **Fingernail** Mussel Planaria or Horsehair Worm Flatworm Tubifex Worm Midge Pupa Leech apostrophe shaped swims with Blackfly Water Snipe Fly Larva Larva Cranefly Rat tailed Horsefly Cranefly Maggot Larva OF Ostracod or Clam Shrimp Daphnia or Water Flea Copepod or Cyclops Three Pairs of Legs Four Pairs of Legs 10+ Legs Wings lobster-like shrimp-like, walks on bottom tiny, swims in water top of water swims on side Beetle-Like, Wings Hard **Leathery Wings** Water Mite swims right side up, back black Fishing Spider grasping front legs, up to three inches swims moving small, crawls back legs move at "Crawls" through swims on back, swims on lives on suface "stick-like" Amphipod or Scud **No Wings** Isopod or Aquatic Sowbug Crayfish **Water Boatman** Crawling **Backswimmer** Predaceous Whirligig Beetle Water Water Beetle **Giant Water Diving Beetle** Scavenger Beetle Bug Water Strider No Obvious Tails Three Tails One or Two Tails suction cup-like long tails, gills on abdomen Plate-like tails, lives in stick green, tan, orange or six legs and large, hinged tails long and stiff long tails, gills on lives in stone green or small, prolegs on Water spines on side Scorpion Caddisfly Caddisfly Larva Pyralid Caddisfly Water Mayfly Nymph

Stonefly

Mayfly Nymph

Dobsonfly or Fishfly Larva

Alderfly

Dragonfly Nymph

Caddisfly Larva

Mayfly Nymph

Damselfly