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.

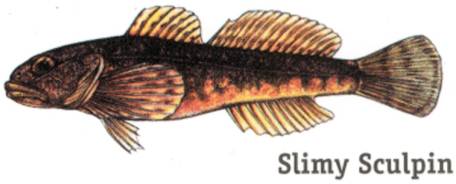
Rainbow Trout

Brown Trout

Brook Trout

Blacknose Dace

Longnose Dace



Slimy Sculpin

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.

Fallfish

Logperch

Creek Chub

Common Shiner

White Sucker

Smallmouth Bass

WARMWATER FISH

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

Margined Madtom

Largemouth Bass

Bluegill

Redbreast Sunfish

Rock Bass

Brown Bullhead

Channel Catfish

Key to Macroinvertebrate Life

Shells

Single Shell

spiral, opening on left

Pouch Snail

spiral, opening on right

Gilled Snail

coiled

Orb Snail

conical

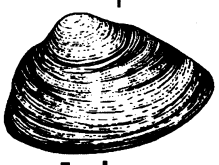
Limpet

Double Shell

tiny white

Fingernail Clam

2 to 8 inches



Freshwater Mussel

Legs

With Tentacles, Brushes or Tails

long breathing tube

Rat tailed Maggot Larva

two fringed tails

Water Snipe Fly Larva

smooth, "stiff", small head

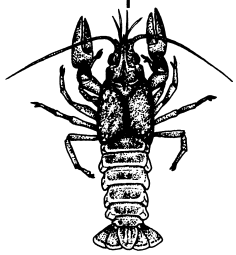
Horsefly Larva

large, grey with tentacles

Cranefly Larva

10+ Legs

lobster-like



Crayfish

shrimp-like, swims on side

Amphipod or Scud

walks on bottom

Isopod or Aquatic Sowbug

Four Pairs of Legs

tiny, swims in water

Water Mite

runs on top of water

Fishing Spider

No Wings

small, crawls on bottom

Riffle Beetle

swims moving hind legs alternating

Water Scavenger Beetle

No Obvious Tails

green, tan, orange or white body

Caddisfly Larva

six legs and prolegs on abdomen

Pyralid Caterpillar

suction cup-like

Water Penny

large, hinged mouth

Dragonfly Nymph

lives in stone house

Caddisfly Larva

lives in stick house

Caddisfly Larva

One or Two Tails

dark head, green or tan body

Caddisfly Larva

small, spines on side

Alderfly Larva

large mouthparts, spines on side

Dobsonfly or Fishfly Larva

No Shells

No Legs

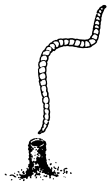
Worm-Like

Microscopic

Suckers, expands and contracts

Leech

reddish brown



Tubifex Worm

glides along bottom

Planaria or Flatworm

tan to brown, long

Horsehair Worm

red or greenish

Midge Larva

small, hairlike, swims in S shape

Threadworm

white or grey with tentacles

Cranefly Larva

big "head," active

Midge Pupa

small, black, attaches to rocks, etc.

Blackfly Larva

apostrophe shaped

Copepod or Cyclops

round

Ostracod or Clam Shrimp

swims with antennas

Daphnia or Water Flea

Three Pairs of Legs

Wings

Beetle-Like, Wings Hard

Leathery Wings

back legs move at same time

Predaceous Diving Beetle

swims on surface

Whirligig Beetle

"Crawls" through water, spotted

Crawling Water Beetle

lives on suface

Water Strider

grasping front legs, up to three inches

Giant Water Bug

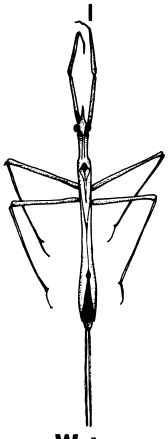
swims on back, back white

Backswimmer

swims right side up, back black

Water Boatman

long, "stick-like"



Water Scorpion

Three Tails

tails long and stiff

Stonefly Nymph

flat gills on abdomen

Mayfly Nymph

long tails, gills on abdomen

Mayfly Nymph

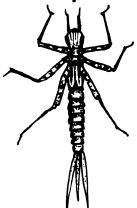
long tails, gills on abdomen

Mayfly Nymph

large legs, feathery gills

Mayfly Nymph

Plate-like tails, no gills on abdomen



Damselfly Nymph

Dissolved Oxygen (DO) *Dissolved Oxygen Requirements by Fish Community*

Cold Water Fishes: 6 mg/l and above **Warm Water Fishes:** 5 mg/l

Solubility of Dissolved Oxygen

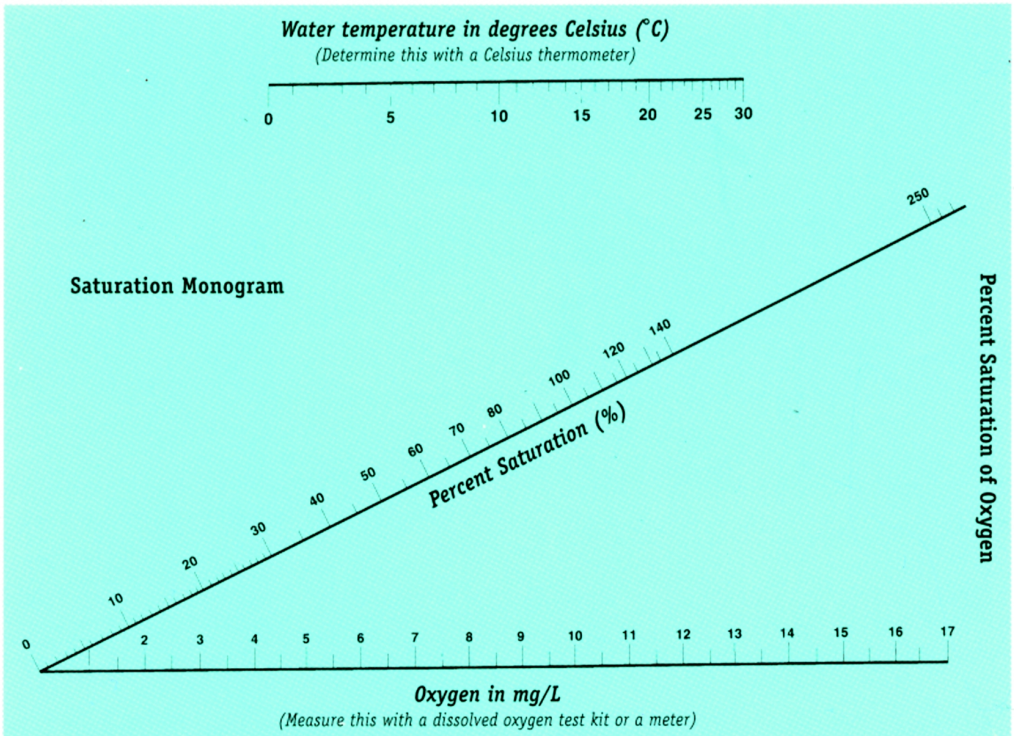
Solubility: Amount of dissolved oxygen that distilled water can hold at given temperature

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

Directions

1. Determine water temperature in degrees C, and find that value on upper (temperature) scale. *To convert F to C: [(F-32) x 5]/9= C
2. Determine dissolved oxygen and find that value on the lower (DO) 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.



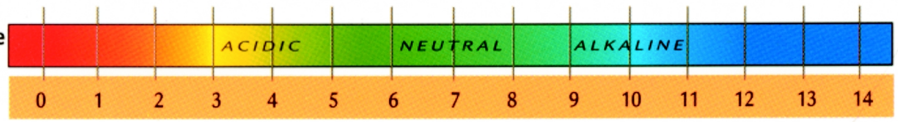
Example:
Water sample at 15 C containing 11 gm/l of DO would be 110% saturated.

% Saturation Values & What They Mean

125% and greater: Too high, may be dangerous to fish
80-124%: Excellent 60-79%: Okay Below 60%: Poor

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

pH and Aquatic Organisms



Tolerant ranges for certain species

Mayfly	5.5 to 7.5	Brown trout	5.0 to 9.5	Carp	5.0 to 9.0
Caddisfly	5.5 to 7.5	Brook trout	4.5 to 7.5	Catfish	5.0 to 9.0
Stonefly	5.5 to 7.5	Yellow perch	4.5 to 7.5	Bullfrog	4.5 to 7.5
Snails, clams, mussels	6.0 to 9.0	Smallmouth bass	5.5 to 7.5	Wood frog	4.0 to 7.5
Crayfish	5.5 to 7.5	Pumpkinseed	5.0 to 7.5	American toad	4.5 to 7.5
Rainbow trout	5.5 to 9.5	Fathead minnow	6.0 to 7.5	Spotted salamander	5.0 to 7.5

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