



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



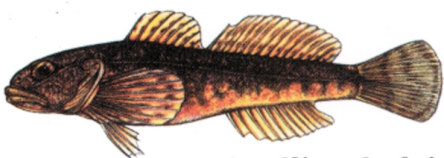
Brook Trout



Blacknose Dace



Longnose Dace



Slimy Sculpin

COOLWATER FISH

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



Fallfish



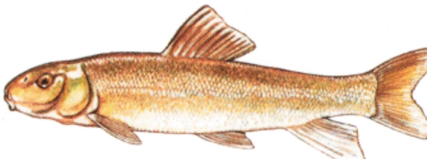
Logperch



Creek Chub



Common Shiner



White Sucker



Smallmouth Bass

WARMWATER FISH

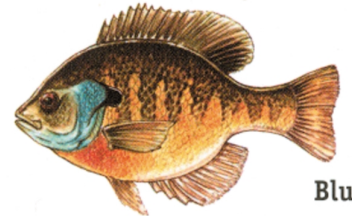
Fish that require water temperatures **higher than 75 degrees** to grow and reproduce.



Margined Madtom



Largemouth Bass



Bluegill



Redbreast Sunfish



Rock Bass



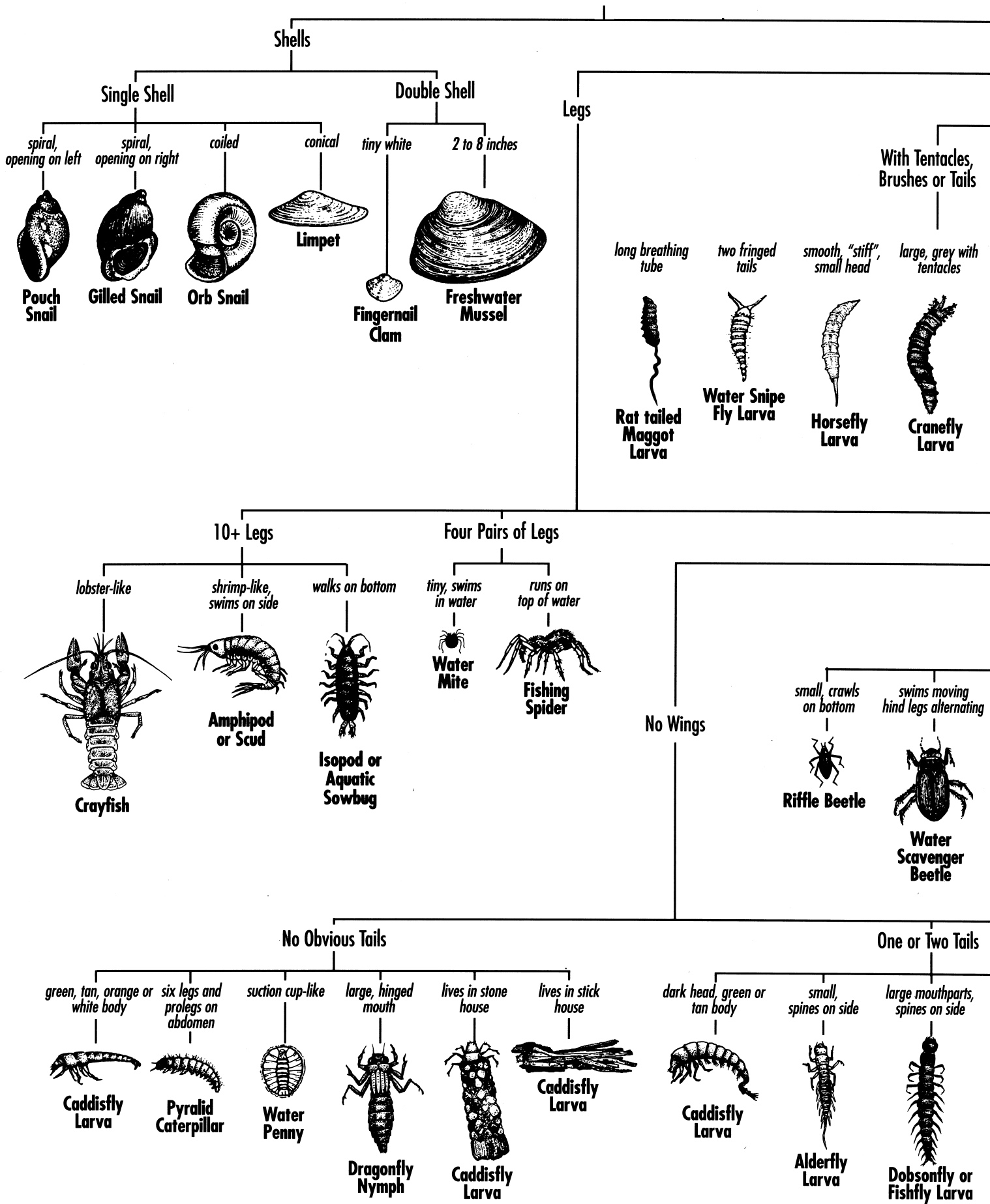
Brown Bullhead

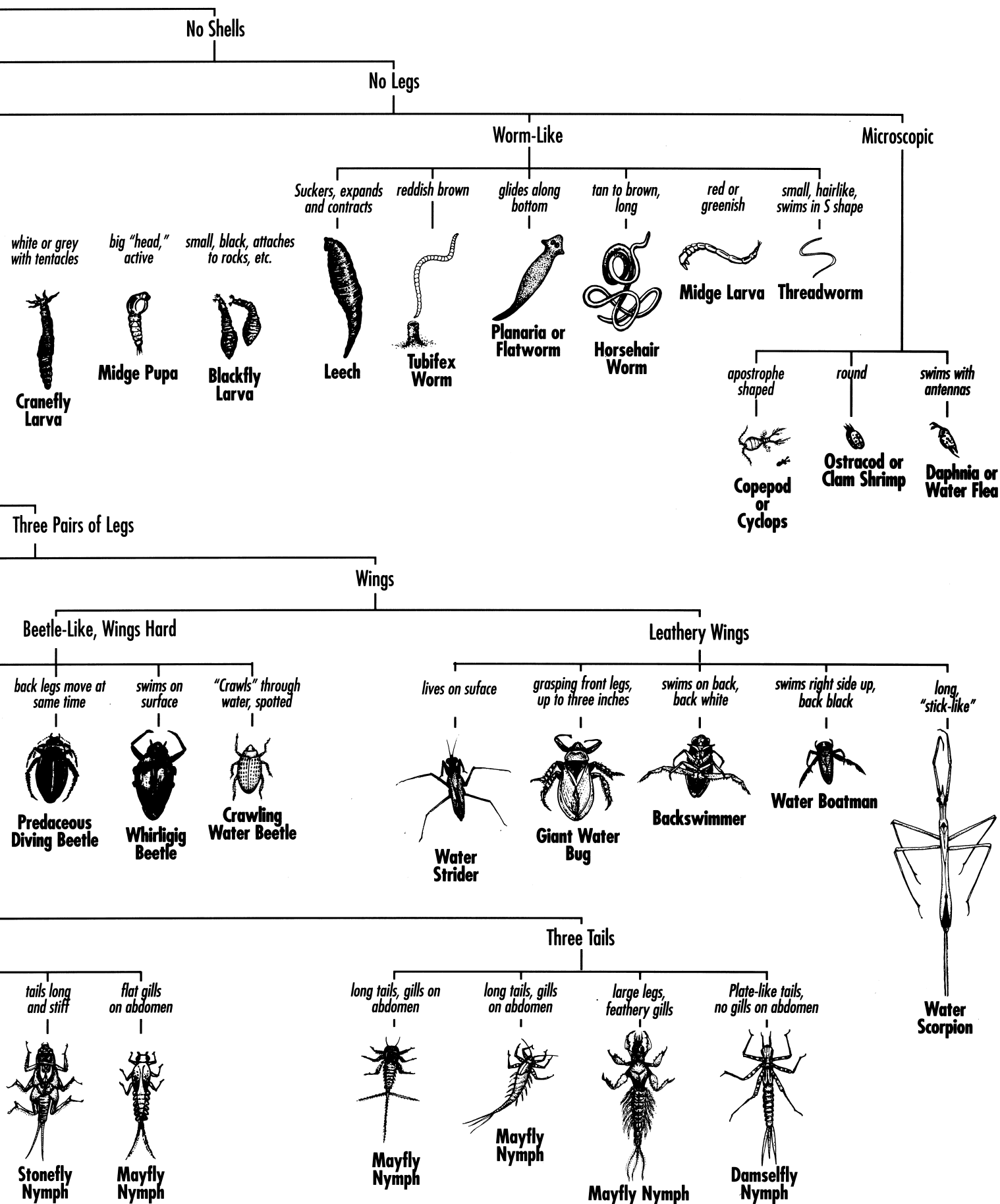


Channel Catfish

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

Key to Macroinvertebrate Life





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

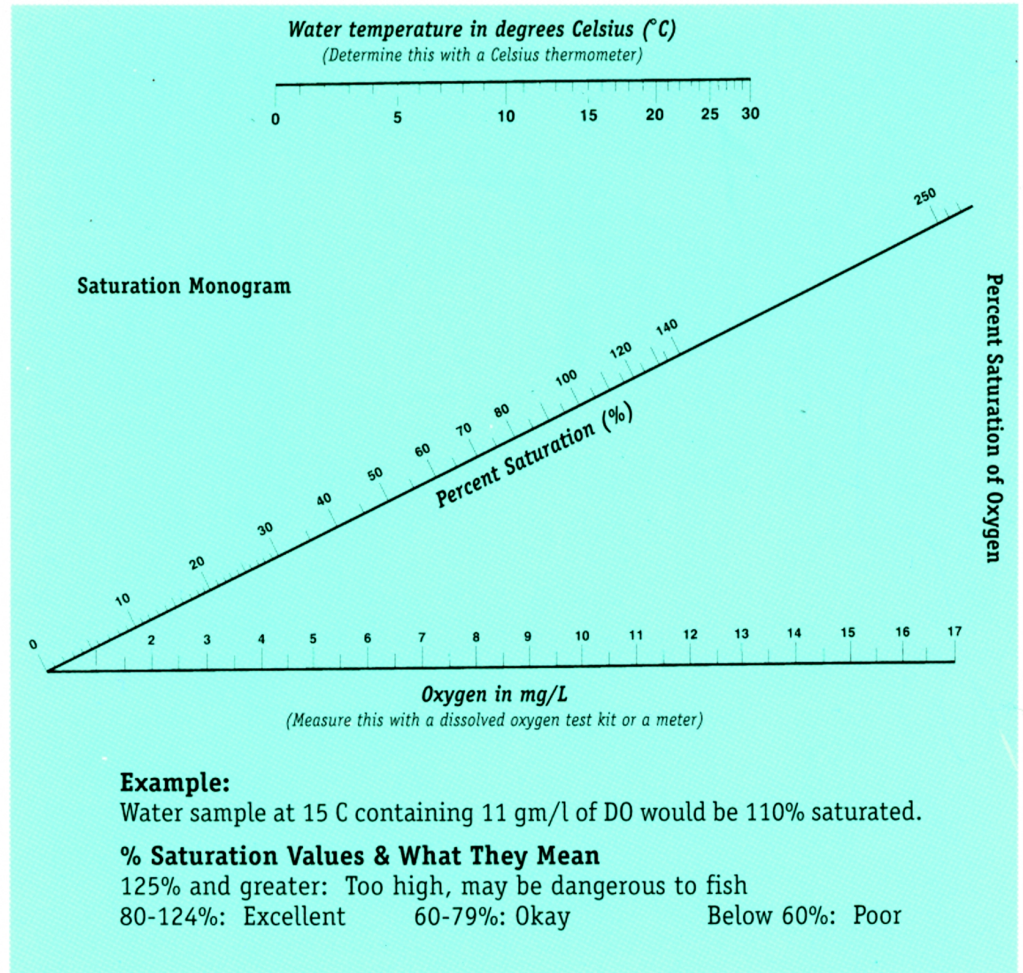
Temperature (C*): Solubility (mg/l)

| | |
|-----|------|
| 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

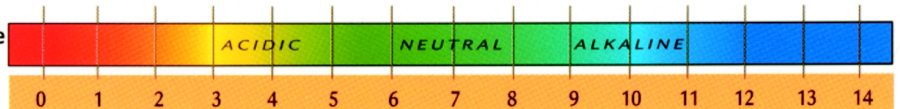
1. Determine water temperature in degrees C, and find that value on upper (temperature) scale. *To convert F to C: $[(F-32) \times 5] / 9 = C$
2. Determine dissolved oxygen and find that value on the lower (DO) scale.
3. Using a straight edge (ruler, piece of paper), draw a line from the temperature value to the dissolved oxygen value. The point at which the line crosses the middle (saturation) scale is the percent saturation of oxygen.



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 | 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