



COMMONWEALTH OF PENNSYLVANIA
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 BUREAU OF WATER STANDARDS AND FACILITY REGULATION

LAKE/RESERVOIR FIELD DATA SHEET

Lake Name _____ County _____
 Station _____ Lat. _____ Long. _____
 Date _____ Time _____ Collectors _____
 Weather _____
 Cloud Cover (%) 0 25 50 75 100 Comments (Hazy/Foggy)
 Wind Conditions: None Light Moderate Heavy Direction _____
 Rain Conditions: None Drizzle Light Moderate Heavy
 Surface Turbulence _____
 Air Temperature (°C) _____ Surface Area (acres) _____
 Station Depth (meters) _____
SECCHI DISK READING (TENTHS OF A METER) _____

FIELD MEASUREMENTS

| DEPTH (meter) | TEMP (°C) | D.O. (ppm) | pH | Sp. Cond. (Umhos) | DEPTH (meter) | TEMP (°C) | D.O. (ppm) | pH | Sp. Cond. (Umhos) |
|---------------|-----------|------------|----|-------------------|---------------|-----------|------------|----|-------------------|
| 1M | | | | | 11M | | | | |
| 2M | | | | | 12M | | | | |
| 3M | | | | | 13M | | | | |
| 4M | | | | | 14M | | | | |
| 5M | | | | | 15M | | | | |
| 6M | | | | | 16M | | | | |
| 7M | | | | | 17M | | | | |
| 8M | | | | | 18M | | | | |
| 9M | | | | | 19M | | | | |
| 10M | | | | | 20M | | | | |

(cont. on back)

SAMPLES COLLECTED

| TYPE | SAMPLE VOLUME | VOLUME FILTERED | TIME COLL. | COLL.# (SURFACE) | COLL.# (BOTTOM) |
|--------------------|---------------|-----------------|------------|------------------|-----------------|
| WATER QUALITY | | | | | |
| OTHER (blank/dup.) | | | | | |
| CHLOROPHYLL A | | | | | |
| PLANKTON TOW | | | | | |
| | | | | | |

GENERAL COMMENTS: _____

| | | | | | | | | | | | | | | | | | | | |
|--------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Depth | | | | | | | | | | | | | | | | | | | |
| 1 m | | | | | | | | | | | | | | | | | | | |
| 2 m | | | | | | | | | | | | | | | | | | | |
| 3 m | | | | | | | | | | | | | | | | | | | |
| 4 m | | | | | | | | | | | | | | | | | | | |
| 5 m | | | | | | | | | | | | | | | | | | | |
| 6 m | | | | | | | | | | | | | | | | | | | |
| 7 m | | | | | | | | | | | | | | | | | | | |
| 8 m | | | | | | | | | | | | | | | | | | | |
| 9 m | | | | | | | | | | | | | | | | | | | |
| 10 m | | | | | | | | | | | | | | | | | | | |

Temperature:

| | | | | | | | | | | | | | | | | | | | |
|--------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Depth | | | | | | | | | | | | | | | | | | | |
| 1 m | | | | | | | | | | | | | | | | | | | |
| 2 m | | | | | | | | | | | | | | | | | | | |
| 3 m | | | | | | | | | | | | | | | | | | | |
| 4 m | | | | | | | | | | | | | | | | | | | |
| 5 m | | | | | | | | | | | | | | | | | | | |
| 6 m | | | | | | | | | | | | | | | | | | | |
| 7 m | | | | | | | | | | | | | | | | | | | |
| 8 m | | | | | | | | | | | | | | | | | | | |
| 9 m | | | | | | | | | | | | | | | | | | | |
| 10 m | | | | | | | | | | | | | | | | | | | |

**Dissolved Oxygen
(ppm):**

| | | | | | | | | | | | | | | | | | | | |
|--------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Depth | | | | | | | | | | | | | | | | | | | |
| 1 m | | | | | | | | | | | | | | | | | | | |
| 2 m | | | | | | | | | | | | | | | | | | | |
| 3 m | | | | | | | | | | | | | | | | | | | |
| 4 m | | | | | | | | | | | | | | | | | | | |
| 5 m | | | | | | | | | | | | | | | | | | | |
| 6 m | | | | | | | | | | | | | | | | | | | |
| 7 m | | | | | | | | | | | | | | | | | | | |
| 8 m | | | | | | | | | | | | | | | | | | | |
| 9 m | | | | | | | | | | | | | | | | | | | |
| 10 m | | | | | | | | | | | | | | | | | | | |

pH:

QUANTITATIVE PLANKTON SAMPLING METHOD (MODIFIED STANDARD METHOD 1002A)

1. Anchor boat over sampling location and record the following information on the *Lake/Reservoir Field Data Sheet* (3800-FM-WSFR0050) available on DEP's website.

| | |
|----------------------------------|---|
| Station Number | Dissolved Oxygen profile (Hydrolab or equivalent) |
| Date | Temperature profile (Hydrolab or equivalent) |
| Time | Meteorological conditions |
| Water depth | Air temperature |
| Water transparency (Secchi Disk) | Wind speed/direction |
| | Percent cloud cover |

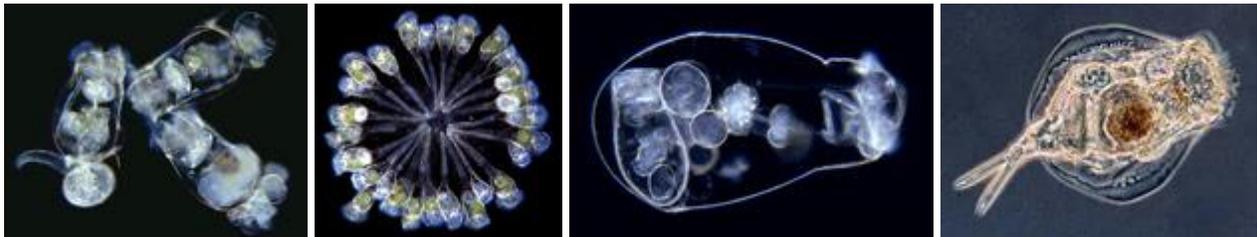
2. Execute two vertical plankton tows with a simple conical or Wisconsin style net (5" diameter opening) rigged with No. 20 (76 micron) nylon mesh. Each tow should be initiated at lake bottom and traverse the entire water column at a rate of approximately 0.5 meters/second (hand retrieval speed).
3. Organisms collected are washed into the sample container after each tow. Both tows are composited into one sample preserved with Lugol's solution applied at the rate of one milliliter per 100 milliliters of sample.
4. Properly label sample and forward to the Bureau of Laboratories in Harrisburg via courier service. The sample should be accompanied by a completed Bacteriological Analyses form with the note "Plankton Sample" entered in the comment block.
5. Calculate the volume of lake water filtered during the two tows by multiplying (lake depth) x (2) x (area of plankton net opening) and enter that figure on the *Field Data Sheet Tissue Sampling* form.
6. Field observations, including the temperature and Dissolved Oxygen profile, should be forwarded to WSFR's Division of Water Quality Standards, within 30 days of sample collection.

The three major groups of freshwater zooplankton

This section deals with general aspects of zooplankton taxonomy. The focus is on the three most common types of lake zooplankton -- rotifers, cladocerans, and copepods. The descriptive information provided below is adapted from Thorp, J.H. and Covich, A.P. (1991). *Ecology and Classification of North American Freshwater Invertebrates*. Academic Press, NY. If you are interested in detailed information about zooplankton taxonomy, biology, and ecology, I recommend this book as your primary reference.

Rotifers (Phylum Rotifera)

These are small zooplankton, typically 100 to 500 μm (microns) in length, with two distinctive features. First, they have a ciliated region at the apical or head end called a corona. This is used for locomotion and for gathering of food particles from the water. Second, rotifers have a muscular pharynx (mastax) made of two hard jaws called trophi. These tiny structures are used to identify rotifers to the species level. When a rotifer is viewed from the anterior end, the corona makes it look like a rotating wheel. That is the basis for the name of this Phylum. There are various taxonomic keys that can be used to identify freshwater rotifers, of which there are more than a thousand species. A good key for species commonly found in lake plankton is Stemberger, R.S. 1979. *A Guide to Rotifers of the Laurentian Great Lakes*. US Environmental Protection Agency (available from the National Technical Publication Service, PB80-101280).



Photos of four common rotifers: *Brachionus*, *Conochilus* (colony), *Asplanchna*, and *Lecane*.

Cladocerans (Phylum Arthropoda, Subphylum Crustacea, Order Cladocera)

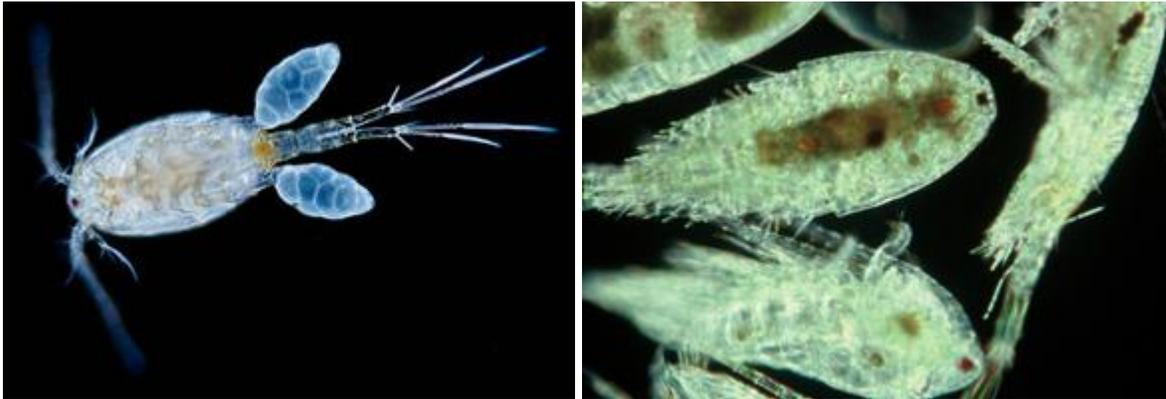
Cladocerans include species ranging in size from less than 500 μm (microns) to over 1 mm. They commonly are referred to as "water fleas," and perhaps the best known genus is *Daphnia*. Cladocerans are microscopic crustaceans that have a single compound eye and a bivalve carapace that functions as a brood chamber. In most species the carapace wraps around the entire body except the head. Four to six pairs of thoracic legs beat in rhythm to generate a current that carries food particles to the animal's mouth. The first pair of legs (antennae) are enlarged and are used for swimming. Cladocerans are generally identified on the basis of body shape and size, and specifically identified by examining an abdominal structure called the postabdominal claw. Larval cladocerans develop inside the maternal brood chamber and when they are released, they closely resemble the adult. Thorp and Covich (cited above) provide a good general key for the Cladocera. There also exist keys for particular genera, such as *Daphnia* (Brooks, J.L. 1957. *The Systematics of North American Daphnia*. Yale University Press).



Photos of three common cladocerans, from left: *Eubosmina*, *Daphnia*, and *Diaphanosoma*.

Copepods (Phylum Arthropoda, Subphylum Crustacea, Order Copepoda)

Copepods range in size from less than 500 um (microns) to over 2 mm in length. They have a cylinder-shaped segmented body with many small appendages on the head and thorax and two caudal setae at the end of the abdomen. They have a prominent exoskeleton, a large pair of first legs (antennae) that are used for swimming, and a single eye. The two most common types of copepods in lakes and ponds are Calanoida (calanoids) and Cyclopoida (cyclopoids). Most copepods are transparent or gray/brown in color, although it is common to observe bright red and orange colors due to accumulated lipid droplets inside the body. Copepods feed on a wide range of food, ranging from small zooplankton to algae and bacteria. They are truly omnivores when one considers their position in the food web. Female copepods carry their eggs externally. Eggs hatch into a larval stage called a nauplius (pleural nauplii), which grows through six stages, followed by six copepodite stages. There is a pronounced metamorphosis between the nauplius and copepodite stages, with the latter having an appearance similar to the adults. There are numerous taxonomic keys for freshwater copepods. Thorp and Covich (cited above) provide a good general key. For North American taxa the following key is useful for identification to the species level: Smith, K. and C.H. Fernando. 1978. A Guide to the Freshwater Calanoid and Cyclopoid Copepod Crustacea of Ontario. Department of Biology, University of Waterloo, Ontario, Canada.



Photos of representative cyclopoid (left) and calanoid (right) copepods -- *Cyclops vernalis* and *Diaptomus pallidus*.

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