1.5) INSTRUCTOR'S GUIDE TO NET PRIMARY PRODUCTIVITY AND BOD

Overview: For Part A; a good starting point for dissolved oxygen is between 6.5 and 8.5 ppm. If you are going to start your experiment late in the day (when dissolved oxygen levels are high), it is best to store your samples in the dark for one or three hours before the class.

Even when placed in beakers of water, the foil-wrapped flasks may not get as warm as the clear flasks after one hour. You might compensate for this by *carefully* adding a small amount of warm water to the water that is in the beaker so that the temperatures between all groups stay within 1 °C:

Green Water Dissolved Oxygen Dynamics Sample Data

	O_2 ppm at 0 min.	O_2 ppm at 30 min.	O_2 ppm at 60 min.	60 min. calculations
Light flask:	7.2 ppm	8.0 ppm	9.0 ppm	1.8 ppm produced
Dark flask:	7.2 ppm	6.4 ppm	6.2 ppm	1.0 ppm consumed
Light and dark flasks:	N/A	N/A	N/A	2.8 ppm total

Effect of Temperature on Dissolved Oxygen in Green Water Sample Data

Treatment	Storage Temperature	O_2 ppm at 0 hours	O_2 ppm at 1 hour	O_2 ppm at 2 hours	O_2 ppm at 24 hours
Refrigerator	8 °C	7.2 ppm	7.0 ppm	6.5 ppm	3.6 ppm
Room	25 °C	7.2 ppm	6.4 ppm	5.0 ppm	0.4 ppm
Warm bath	29 °C	7.2 ppm	6.1 ppm	4.0 ppm	0.2 ppm

Answers to Questions: 1) There is no primary productivity in tap water because it does not contain algae. 2) Much of the oxygen produced by the algae does not stay in the water. 3) Oxygen levels reach their lowest point at dawn. 4) Temperature is directly proportional to BOD. 5) Pond water has a higher BOD because it usually contains living organisms that consume oxygen. The BOD of tap water is essentially zero. 6) August, because this is when bodies of water are at their maximum temperatures. 7) You can probably skip oxygen readings in ponds with lower biomass and/or lower turbidity because these ponds usually have a lower BOD.

Logistics: Oxygen measurements that are one hour apart obviously cannot be accomplished during a 40-minute period. If you have only one period, you can have the students at least take the measurements that are 30 minutes apart if you start immediately. You or another group of students would take the 60-minute measurements. It also is a good idea to use the same oxygen meter for each data set. For Part B, you may also choose to skip the 1 and 2 hour readings and take readings only at 0 and 24 hours. This would allow participation of in classes the meet the next day. These 0 and 24 hours alone are enough to cover the main objectives of Part B.

Degree of Difficulty: 2—This lab requires moderate amounts of planning and rehearsal. The trickiest part is maintaining the dark flasks are at nearly the same temperature as the light flasks during Part A.

Product Guidelines: See the "Instructor's Guide" for Lab 1.2.

Materials: 1-liter sample of "green" water or aquarium water with about 10 grams of *Elodea* or *Spirogyra*; a dissolved-oxygen meter; four 250-mL flasks with rubber stoppers; aluminum foil; a fluorescent lamp with a bulb that is at least three feet long; and nine screw-top 100-200-mL bottles with plastic caps (no metal).