BIO 183 LAB SIGN OFF PAGE — UNIT 14

Name _____

Please staple all of your lab pages for this Unit together with this page as the top You will use this page to get your Labs for Unit 14 signed off by the Biology Learning Center staff You need to have all of the following steps initialed by a staff member before you can receive your 25 labs points for Unit 14 and be allowed to take the Unit 14 Exam.

After you have obtained all of your sign offs for this Unit, be sure that a BLC staff member indicates on your Lab Card that you are OK to take the Unit 14 Exam. Also, keep this sign off page, along with your completed lab worksheets, as proof of your lab completion If your Lab Card indicates that you have not completed the required Labs for this Unit and you believe that you have, it is up to you to provide proof that you have indeed completed the Labs. Keep this page!

_____ Unit 14, Step 2A: "Epipelagic Food Webs and Production" Lab Activity

_____ Unit 14, Step 2B: "Epipelagic Food Webs and Production" Lab Activity

*BLC Staff: After the student receives his/her last initial on this page, please indicate on his/her Lab Card that s/he is OK to take the Unit 14 Exam.

STEP 2: WORKSHEETS FOR "EPIPELAGIC FOOD WEBS AND PRODUCTION" LAB ACTIVITY

For lab points, do the lab activity entitled "Epipelagic Food Webs and Production." Directions are on the Biology 183 website. This lab can be done anywhere that you have internet access. When you have completed this lab activity, bring your worksheets up to the Front Desk of the Biology Learning Center to get your lab points.

PART A.

Look at the neritic food web below and answer Questions 1-8.

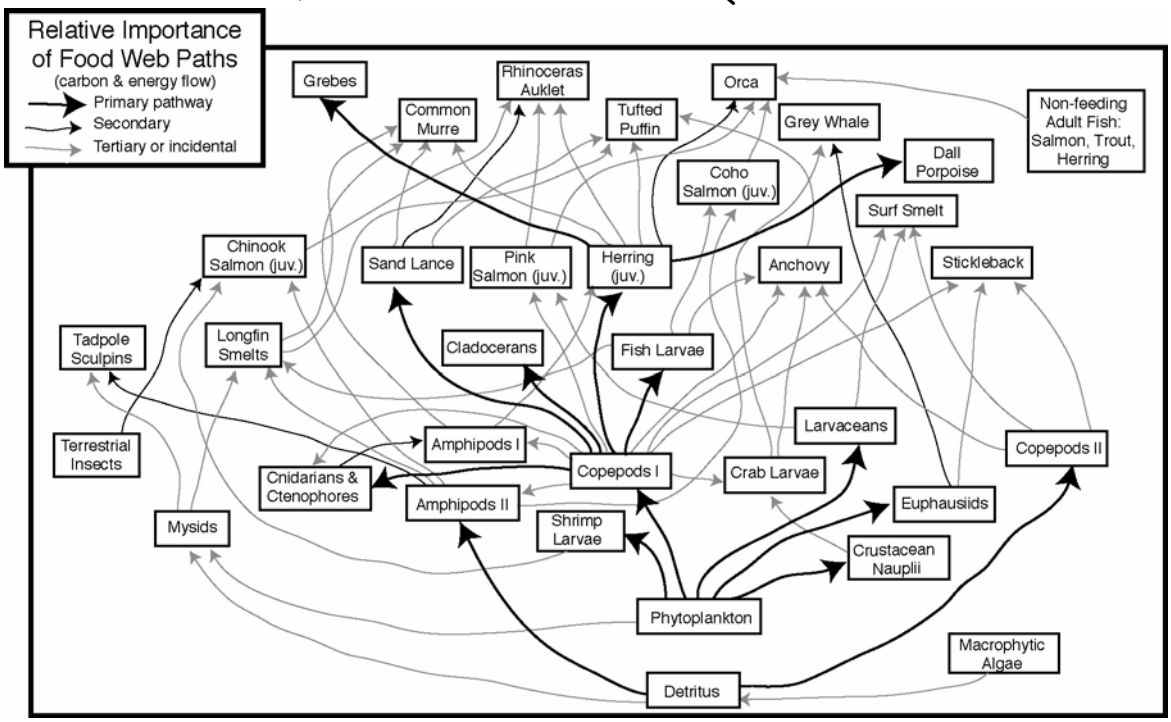

Figure 1. Neritic food web. Notice again the complexity of this food web with its many pathways of carbon flow through this shallow, water-column community.

1. What is a **neritic** food web? What is the difference between the terms "neritic" and "oceanic"? [Look in your textbook or on your worksheets if you can't remember this.]

2. Turn your attention to the pathways leading to gray whales. How many trophic levels are there from the base of the food chain (phytoplankton) to the grey whales? _____

3. Refer to Table 1 on the Unit 14 Step 2 website to complete the chart for the following organisms. If you don't remember what euphausiids are, refer to your Unit 14 worksheets and textbook assignment.

Organism	Trophic level	Feeding guild
Phytoplankton	_____	_____
Euphausiids	_____	_____
Gray whales	_____	_____

4. If the gray whales become extinct due to "overfishing" by whalers, what do you think would happen to the amount of euphausiids in this community?

5. What effect would this situation have on the amount of phytoplankton?

6. Many organisms consume phytoplankton. How many other consumers are there besides euphausiids?_____. Name them.

So, the euphausiids have competition with other species for their phytoplankton food. When more than one organism is consuming the same resource, competition develops and not all will be able to find food. This results in some deaths. However, food webs are extremely complicated and it is almost impossible to accurately predict which species will be the best competitors for phytoplankton if gray whales become extinct.

7. Now locate the sticklebacks in the neritic food web. Sticklebacks are fish that are not usually found in open water columns but they do play a role in this food web. Sticklebacks also consume euphausiids. What is the relative importance of the stickleback as a consumer in this food web?

   Primary / Secondary / Tertiary or incidental

8. Would consumption of euphausiids by the stickleback be likely to compensate for the diminished predation pressure on the euphausiids once the gray whale are gone? _____ Why? [There is no right or wrong answer to this question!]

Take your worksheets up to the Front Desk of the Biology Learning Center for your first set of lab points.

Bio 183 Unit 14 Step 2A

PART B.

For Part B, you will pretend that you are a marine biologist who has just come back from a year-long oceanographic research cruise in the North Atlantic Ocean. Your trusty lab assistant hands you a series of surface nitrogen (N) and phosphorus (P) measurements from your cruise. The data were collected every two months in micrograms of nutrient per liter of sea water. The data are as follows:

	Feb.	April	June	Aug.	Oct.	Dec.
N μg/l	210	140	84	28	56	91
P μg/l	29	19	8	4	8	16

You are interested in whether or not the surface waters are nutrient limited—that is, if a lack of nutrients limits the amount of photosynthesis performed by

phytoplankton—and if this varies seasonally. You remember from your very first Marine Biology class that phytoplankton use nitrogen and phosphorus in the ratio 7 N: 1 P. In other words, this ratio must be maintained (or exceeded) for photosynthesis to occur.

Let's look at the first month: Feb. In Feb., there was 210 μg of nitrogen per liter of sea water and 29 μg of phosphorus per liter of sea water. The ratio is 210 N: 29 P.

This can be simplified by figuring out how many units (μg) of nitrogen there are for every unit (μg) of phosphorus. You do this by dividing 210 by 29 (which equals 7.24). This means that there are 7.24 units (μg) of nitrogen for every unit (μg) of phosphorus. This exceeds the 7 N: 1 P ratio necessary for photosynthesis and means that in Feb. the surface waters are not nutrient limited.

1. **Calculate the N : P ratio for all the remaining months and fill in the table below:**

	February	April	June	August	October	December
N μg/l	210	140	84	22	52	114
P μg/l	29	19	8	4	8	16
N : P	7.24: 1					

2. **Are there any months when phytoplankton productivity would cease because phosphorus would be depleted before nitrogen? [When the N:P ratio is less than 7:1?] Which months?**

3. **Why do you think the nutrients levels are high in the winter and spring?**

4. The nutrient levels are high in the winter, meaning that during the winter the surface waters of the North Atlantic Ocean are not nutrient limited. However, there is very little or no photosynthesis occurring. Why not? What limits photosynthesis during the winter?

5. Why are the surface waters of the North Atlantic Ocean nutrient limited during the summer and fall months? There are two contributing reasons.

Take your worksheets up to the Front Desk of the Biology Learning Center for your second set of lab points.

Bio 183 Unit 14 Step 2B