

Name _____

TA _____

Oceanography 200, Spring 2008

Assignment 6 (25 20 pts)

This assignment is based partly on your textbook reading and partly on lecture material. Please provide your answers in the space provided. Your work must be **original**—copied assignments will receive zero credit. Please **make sure your name and your TA's name are on EACH SHEET** and print/write as neatly as possible.

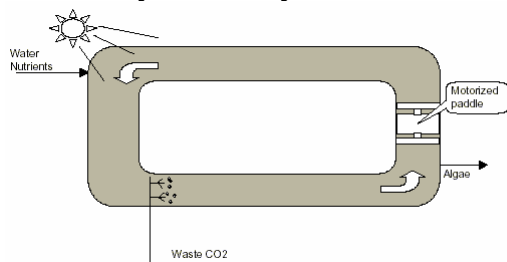
I. Biofuels (5 points)

1. [2.5 pts.] Answer the questions below by referring to the NREL Close-Out Report in your reading.

a. [0.5 pts.] Why are biofuels an appealing alternative to fossil fuels?

b. [0.5 pts.] Why would an algal biofuels company be interested in a partnership with a coal-fired power plant?

c. [0.5 pts.] Two major design proposals have been put forth for growing algae on a large-scale. Identify the first system shown below.



d. [1.0 pt.] What is the name of the second design proposed for growing algal biofuels? What is one advantage for using this system compared to the system identified in part b above?

2. [2.5 pts.] A recent article in Science caused a great deal of excitement in the biofuels community when the authors discussed the negative impacts of burning corn-based ethanol.

a. [1 pt.] Explain one reason why corn-based ethanol may not be the best alternative for burning fossil fuels.

b. [1.5 pts.] List three physiological reasons why algae may be superior to terrestrial oil seed crops as a source of biofuels.

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II. Estuaries (5 points)

1. [1 pt.] List the two essential features in the definition of an estuary.
2. [4 pts.] An oil tanker strikes a rock at **low tide** and sinks in the partially mixed estuary Pristine Bay and begins leaking petroleum products. The Coast Guard asks you, an expert who aced Oceanography 200, to help them track where to respond with cleanup equipment.

The tanker was carrying:

- A cargo of jet fuel with a density equivalent to a seawater salinity of 10 g/kg
- Fuel tanks filled with bunker fuel oil with a density equivalent to a seawater salinity of 40 g/kg

Assume the following:

- The surface salinity of Pristine Bay is about 20 g/kg
 - The bottom salinity of Pristine Bay is about 32 g/kg.
- a. [1 pt.] The crew assigned to cleanup the jet fuel needs to decide where to search for the plume a few hours after the sinking. Should they search close to the wreck, seaward or landward? Why?
 - b. [1 pt.] The crew assigned to cleanup the bunker fuel oil also needs to decide where to search for their plume a few hours after the sinking. Should they search close to the wreck, seaward or landward? Why?
 - c. [1 pts] The jet fuel crew runs into trouble and cannot conduct their search and cleanup for several days. Where would you tell them to look for it: close to the wreck, seaward or landward? What knowledge about the direction of tidal currents over this time interval supports this prediction?
 - d. [1 pt.] The bunker fuel oil crew also is delayed. Where would you tell them to look for it: close to the wreck, seaward or landward? What knowledge about the direction of tidal currents over this time interval supports this prediction?

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III. Puget Sound Shoreline Case Study (5 points)

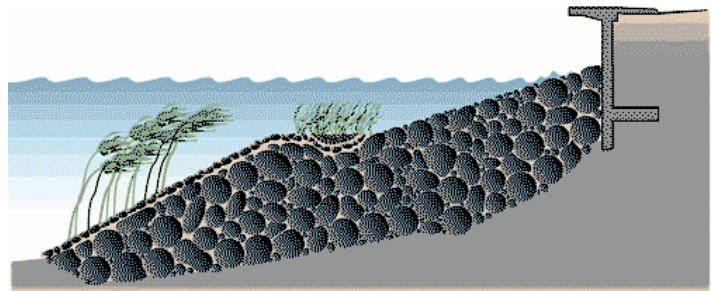
1. [3.5 pts.] Refer to the Seattle Times article “Beaches suffer as walls go up (5/12/08)” http://seattletimes.nwsourc.com/html/localnews/2004409777_growth_shorelines15m1.html in which the authors discuss the effects of concrete barriers on the shorelines of Puget Sound.
 - a. [0.5 pts.] What happens to the beach on the seaward side of these protective walls?

 - b. [1 pt.] What does the concrete barrier do to cause this?

 - c. [1 pt.] How do these modifications affect fish such as the sand lance and surf smelt?

 - d. [1 pt.] How does the removal of shoreline trees and bushes affect intertidal species? Provide a specific example.

2. [1.5 pts.] The figure below depicts a “soft approach” to restoring Puget Sound’s shorelines through the creation of artificial habitat. Choose 1 feature from this figure and describe **in your own words** how it will help to make Seattle’s waterfront more fish friendly. Figure taken from the Seattle Times (1/17/07). http://seattletimes.nwsourc.com/html/sculpturepark/2003528358_waterfront17m.html.



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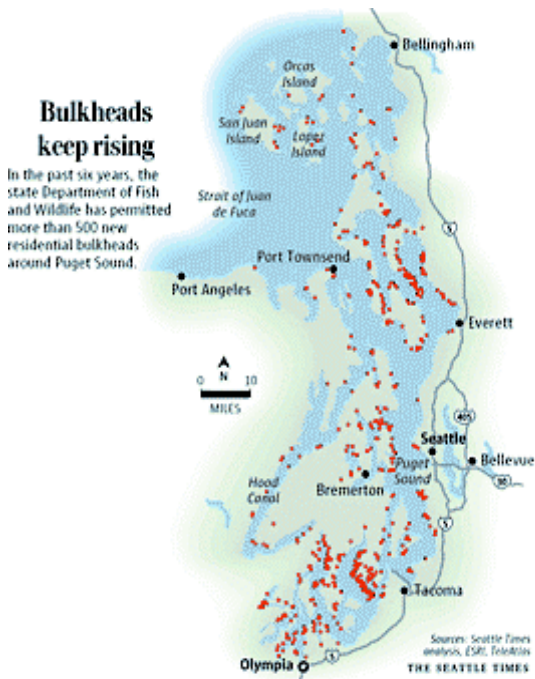
IV. Puget Sound Shoreline Interactions (5 pts.)

1. [3 pts.] Fill in the chart using the correct words/phrases below.

- Groins Built in estuaries underwater
- Bulkheads/Seawalls Builds up sand upstream of feature and starves beach downstream
- Breakwaters Built onshore and are parallel to shore
- Promotes longshore transport Built offshore and are parallel to the shore

Type	Location relative to shoreline	Negative consequences
	Perpendicular to shore	
		Sediment deposited and fills in inlet/marina area
		Lose intertidal zone

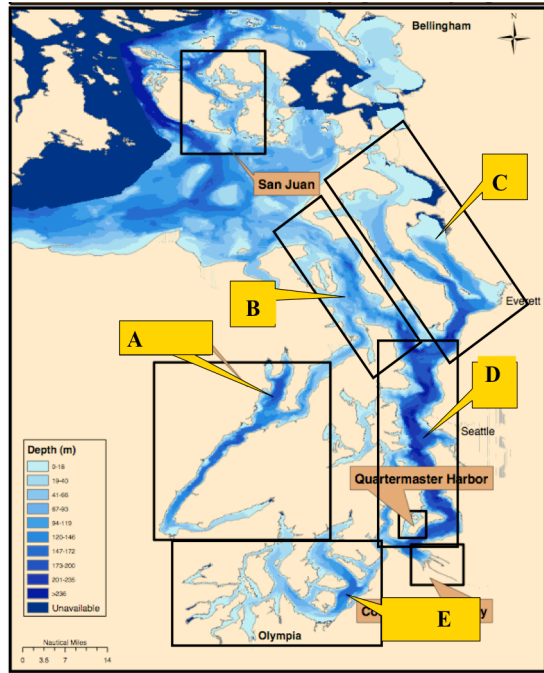
3. [2 pts.] This figure shows the increase in bulkhead construction in Puget Sound over the past 6 years. Using this figure, answer the questions below.



[1.5 pts.] Edna and Fred Sockeye moved to a house on the shores of Puget Sound 20 years ago. John and Suzie Coho moved to a waterfront house on Puget Sound 1 year ago. Considering the rapid growth of bulkhead construction in Puget Sound over the past 6 years and the association between bulkheads and impacts on the beach and its biota, who do you think would be more concerned about the increase in bulkhead construction, the Sockeyes or the Cohos? Explain your answer.

a. [0.5 pt.] The difference in perspective demonstrated between Edna/Fred and John/Suzie is an example of a _____. (2 words)

V. In-class activity (5 pts.)



1. [1 pt.] Using the map at left, select from the locations labeled A-E to identify the 4 major basins in Puget Sound using the map below.

Main Basin _____

Whidbey Basin _____

South Sound _____

Hood Canal _____

2. [4 pts.] For each of the 4 categories of estuary listed below, match the most suitable location on the map (A–E), and explain what about the basin shape and circulation at that location in Puget Sound make it fit into that category.

Type of estuary	Letter on map	Explanation
Salt wedge		DOES NOT COUNT
Fjord		SEE STUDY SHEET
Partially mixed		
Well mixed		