BIOLOGY 183 MARINE BIOLOGY
PIMA COMMUNITY COLLEGE, DOWNTOWN CAMPUS

WORKSHEETS FOR UNIT 11

UNIT 11 LEARNING OBJECTIVES

See the Unit 11 website for the learning objectives.

UNIT 11 ACTIVITIES

Step 1: Read Chapter 11 in your textbook (*Marine Biology*, 7th ed., by Castro and Huber) and answer the questions in these worksheets. For hints or to double-check your answers, go to the Biology 183 website.

Step 2: For lab points, do the lab activity entitled "Ecobeaker: Keystone Predator." There are worksheets for this activity later in this packet. Directions are on the Biology 183 website. This lab must be completed at the Biology Learning Center. When you have completed the lab activity, take your results to the front desk in the Biology Learning Center to receive lab points.

Step 3: Optional Extra Credit Assignment: For up to 6 extra credit points, do the extra credit assignment "Playing God in a Tide Pool." The worksheets for this extra credit assignment can be downloaded from the Unit 11 web page. This activity must be completed at the Biology Learning Center. When you have completed the extra credit assignment, turn in your worksheets at the front desk in the Biology Learning Center. You instructor will grade them and return them in a few days.

Step 4: Optional: Check out the "Tidal Seas" DVD from the front desk at the Biology Learning Center and watch it on one of the computers in the Center. The DVD cannot be taken out of the BLC. The show is a little less than an hour long and you can watch as little or as much of it as you want. Be sure to use headphones while watching so as not to disturb your neighbors! The program is part of an 8-episode series created by the British Broadcasting Service in 2002 called "The Blue Planet."

Step 5: Prepare for the Unit 11 exam. The exam will consist of 40 multiple-choice questions. Thirty-seven questions will be "factual" in nature (to assess whether you learned the facts in this unit). Some of these 37 questions may come from material you learned during your lab activities. To prepare for the 37 "factual" questions, try the multiple-choice practice quiz for Unit 11. Go to the Biology 183 website for the link to this practice quiz. The answers are at the end of the practice quiz.

The remaining 3 questions will assess your deeper understanding of the themes and concepts of the material in this unit (to assess whether you have "synthesized" the information, not just memorized the facts). The critical thinking questions at the end of your worksheets will help you study for the remaining 3 questions. [**HINT**: You may want to review Unit 9's information on Tides.]

Step 6: Come in to the Biology Learning Center to take your Unit 11 exam. The exam will consist of 40 multiple-choice questions.

STEP 1: TEXTBOOK WORKSHEETS

BIOLOGY 183 MARINE BIOLOGY
UNIT 11

TEXTBOOK WORKSHEETS

1. Review: What is the intertidal zone?

2. Why is the intertidal zone unique among marine environments?

3. What is the difference between emersion and immersion?

4. What is the substrate? Why is it important in the intertidal zone?

5. What are the two types of substrate that are most common in intertidal zones?

6. Review: What is a community? (p. 71)

Rocky Shore Intertidal Communities

7. Where do rocky shores usually occur?

8. What is epifauna? What is its significance on rocky shores?

Rocky Shore Intertidal Communities: Exposure at Low Tide

9. How does emersion time vary with depth in the intertidal zone?

10. Review: What is a spring tide? A neap tide? Tidal range? (p. 60)

11. What is the significance of spring tides for intertidal organisms?

12. What are four challenges that organisms in the intertidal face as a result of exposure at low tide?

13. Why is water loss a challenge to intertidal organisms?

14. What are two strategies that intertidal organisms use to deal with water loss?

15. Why is temperature variability a challenge to intertidal organisms?

16. What are two strategies that intertidal organisms use to deal with temperature variability?

17. Why is salinity variation a challenge to intertidal organisms?

18. What are two strategies that intertidal organisms use to deal with salinity variations?

19. Review: What are deposit feeders? What are filter feeders? (p. 116, Fig. 7.1)

20. Why is restriction of feeding time a challenge to intertidal organisms?

21. How does restriction of feeding time influence rocky intertidal organisms?

Rocky Shore Intertidal Communities: The Power of the Sea

22. Describe the influence of wave energy in the rocky intertidal.

23. How does wave refraction influence the impact of waves on headlands versus bays? (Figs. 11.9 and 11.10)

24. What are three strategies used by intertidal organisms to cope with wave shock? (Figs. 11.11 and 11.12)

Rocky Shore Intertidal Communities: The Battle for Space

25. What is often the single most limiting factor on rocky intertidal shorelines?

26. Is food availability a limiting factor on rocky intertidal shorelines?

27. What is the dominant biological interaction on rocky intertidal shorelines?

28. What are three strategies for successfully competing for space in the rocky intertidal?

29. Explain the interaction of physical and biological factors in determining where an organism is found in the intertidal zone by using the blue and California mussels as examples.

Rocky Shore Intertidal Communities: Vertical Zonation of Rocky Shores

30. What is vertical zonation?

31. What are the three zones of the rocky intertidal? (Fig. 11.19)

32. What typically limits the upper distribution (closest to land) of rocky intertidal organisms?

33. Why typically limits the lower distribution (farthest from land) of rocky intertidal organisms?

34. Describe the upper intertidal zone with respect to physical conditions and typical types of organisms.

35. Describe predators in the upper intertidal zone.

36. Describe the middle intertidal zone with respect to physical conditions and typical types of organisms.

37. What is a keystone predator? Give an example. (Fig. 11.22)

38. What is ecological succession? (Fig. 11.23)

39. What are the typical steps of ecological succession in the middle intertidal zone of a rocky shoreline?

40. How does disturbance increase the diversity of the middle intertidal zone?

41. Describe the lower intertidal zone with respect to physical conditions and typical types of organisms.

42. *Enteromorpha*, a green seaweed, outcompetes Irish Moss (*Chondrus crispus*, a red algae) in rocky lower intertidal tidal pools. However, Irish Moss is more common than *Enteromorpha*. Why?

43. Why do some tide pools still have *Enteromorpha*, instead of being dominated only by Irish Moss?

Soft-Bottom Intertidal Communities

44. What is the distinguishing characteristic of soft-bottomed intertidal communities?

Soft-Bottom Intertidal Communities: The Shifting Sediments

45. What is a consequence for organisms of a constantly shifting bottom?

46. Define the term "infauna"?

47. Which stays suspended in water longer: fine sediments like silt and clay or coarser sediments like sand?

48. Where are finer sediments more common? Where are coarser sediments more common? In high or low energy environments?

Soft-Bottom Intertidal Communities: Living in the Sediments

49. What is an advantage of living in muddy bottoms?

50. What are three challenges to organisms that live in soft-bottomed intertidal areas?

51. What factors influence oxygen availability in soft sediments?

52. How does the amount of detritus influence oxygen availability in soft sediments?

53. How does the grain size of the sediment influence oxygen availability in soft sediments?

54. Define the term "interstitial".

55. What is the term used to describe sediments with absolutely no oxygen.

56. Describe anaerobic respiration.

57. How do infauna cope with low oxygen levels in muddy bottom areas?

58. Describe how organisms move through soft-bottomed sediments. (Fig. 11.30 and 11.31)

59. Describe how organisms feed in soft-bottomed sediments.

60. Does the soft-bottomed intertidal exhibit zonation? (Fig. 11.34)

Critical Thinking Questions

61. There are marked difference in the type of organisms found at four different locations at the same tidal height along a rocky shore. What might account for this? Offer at least three possible explanations.

62. Most marine biologists hypothesize that space, not food, limits populations in the rocky intertidal. What kind of experiments could be performed to test this hypothesis?