

Student Name:

Grade:

## Field Trip to Coastal Estuary (Lagoon)

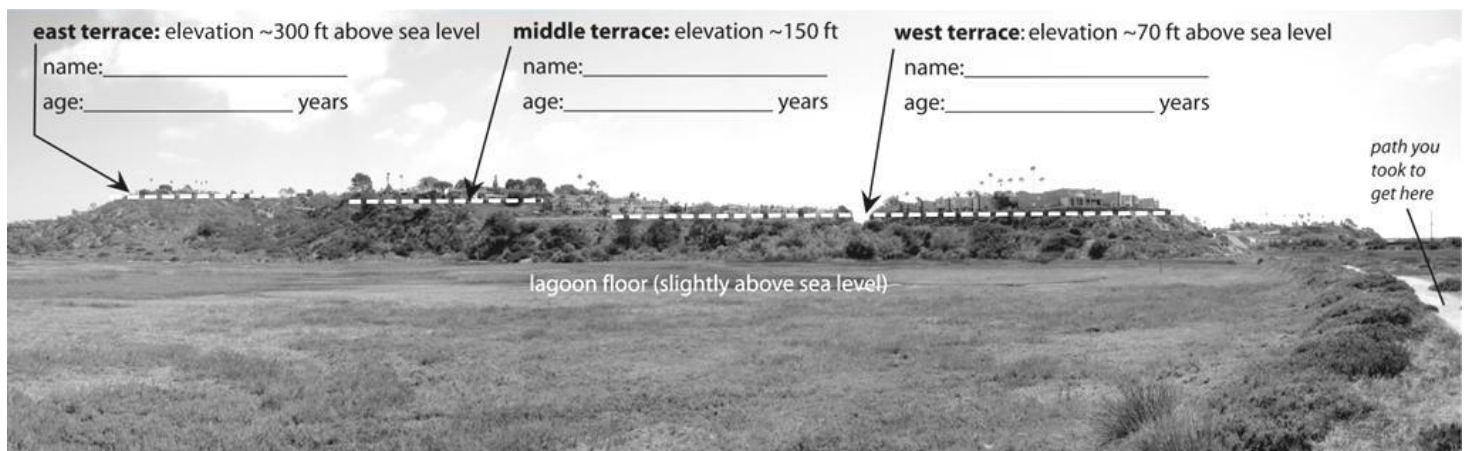
### OBJECTIVES

- describe the geological processes responsible for forming marine terraces
- describe the geologic processes responsible for forming coastal estuaries
- summarize the major ecological attributes of coastal estuaries
- identify common wetland plant and bird species and their adaptations

*Note: the questions will not necessarily be covered in the order listed here.*

### GEOLOGY

1. What happens to world sea level during...  
...glacial periods when large ice caps grow at the poles? \_\_\_\_\_  
...interglacial periods when the polar ice caps melt? \_\_\_\_\_
2. Compared to today, how much lower was world sea level 20,000 years ago during the Last Glacial Maximum? \_\_\_\_\_ feet
3. How many major glacial-interglacial cycles have occurred during the last 500,000 years? \_\_\_\_\_
4. About how much (in vertical feet) did world sea level rise and fall during the biggest of these glacial-interglacial cycles? \_\_\_\_\_ feet
5. We have seen how sea level has gone up and down during the last few hundred thousand years. What about the land in Southern California? Has the land been mostly rising upward, subsiding (sinking downward), or staying in place? Why has it done this?
6. This photograph matches the view south from one of our stops. It shows three marine terraces, labeled as east, middle, and west terrace, with the elevation of each listed. Use the elevations to identify each terrace's name and age, writing the information in the blanks on the photo.



7. From question 6 above, what's the connection between terrace age and terrace elevation?
8. Sum up in a paragraph how the up-and-down cycles of the sea, along with the slowly rising land, have carved San Diego's marine terraces. Include in your explanation why older terraces are found at higher elevations.
8. Sum up in a paragraph how the up-and-down cycles of the sea, along with erosion and sediment deposition by rivers, have created our coastal wetlands.

# ECOLOGY

1. Southern California's coastal wetlands are commonly called lagoons, but technically, they are estuaries. What is an estuary?

2. Why do coastal wetlands have high primary productivity? List three reasons:

a: \_\_\_\_\_

b: \_\_\_\_\_

c: \_\_\_\_\_

3.

What year was the railroad causeway constructed? \_\_\_\_\_

What year was Pacific Coast Highway constructed? \_\_\_\_\_

What year was Interstate-5 constructed? \_\_\_\_\_

What affect do these features have on water circulation and primary productivity in the wetlands?

4. List examples, as many as you can think of, showing how humans benefit from coastal wetlands. One example is described in your guidebook (hint: it relates to fish), but can you think of others?

5. The plants that dominate coastal wetlands are halophytes. What is a halophyte?

6. Identify cordgrass. Where does this halophyte grow in the lagoon? How does it deal with excess salt?

7. Identify pickleweed. Where does this halophyte grow in the lagoon? How does it deal with excess salt?

8. Identify saltgrass. Where does this halophyte grow in the lagoon? How does it deal with excess salt?

9. Bird species in the wetlands are either resident or migratory.

Which type (resident or migratory) has the greater number of species? \_\_\_\_\_

What is the Pacific Flyway?

10. Check the box to identify each bird as either resident, migratory: winter visitor, or migratory: spring/summer visitor.

Species	Resident	Migratory: Winter	Migratory: spring/summer
<i>Great Egret</i>			
<i>Northern Harrier</i>			
<i>Whimbrel</i>			
<i>Great Blue Heron</i>			
<i>Plover</i>			
<i>Willet</i>			
<i>Yellow-Breasted Chat</i>			
<i>Snowy Egret</i>			
<i>Marbled Godwit</i>			
<i>Oriole</i>			
<i>Osprey</i>			
<i>Pie-billed Grebe</i>			
<i>Western Sandpiper</i>			
<i>Least Sandpiper</i>			
<i>Pintail Duck</i>			
<i>Mallard Duck</i>			
<i>Northern Shoveler Duck</i>			
<i>Wigeon Duck</i>			
<i>Ridgeway's Rail</i>			
<i>Cormorant</i>			
<i>Black-Headed Grosbeak</i>			

11. In the table, circle the names of all the birds that we have spotted today. Did we see any species not in the table? If so, list them below.

**POST TRIP REFLECTION:**

**1. What did you learn on this trip?** \_\_\_\_\_

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**2. What did you find most interesting, enjoyable and/or important?** \_\_\_\_\_

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**3. What did you find most difficult or challenging?** \_\_\_\_\_

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