Coastal Estuary Field Trip Map

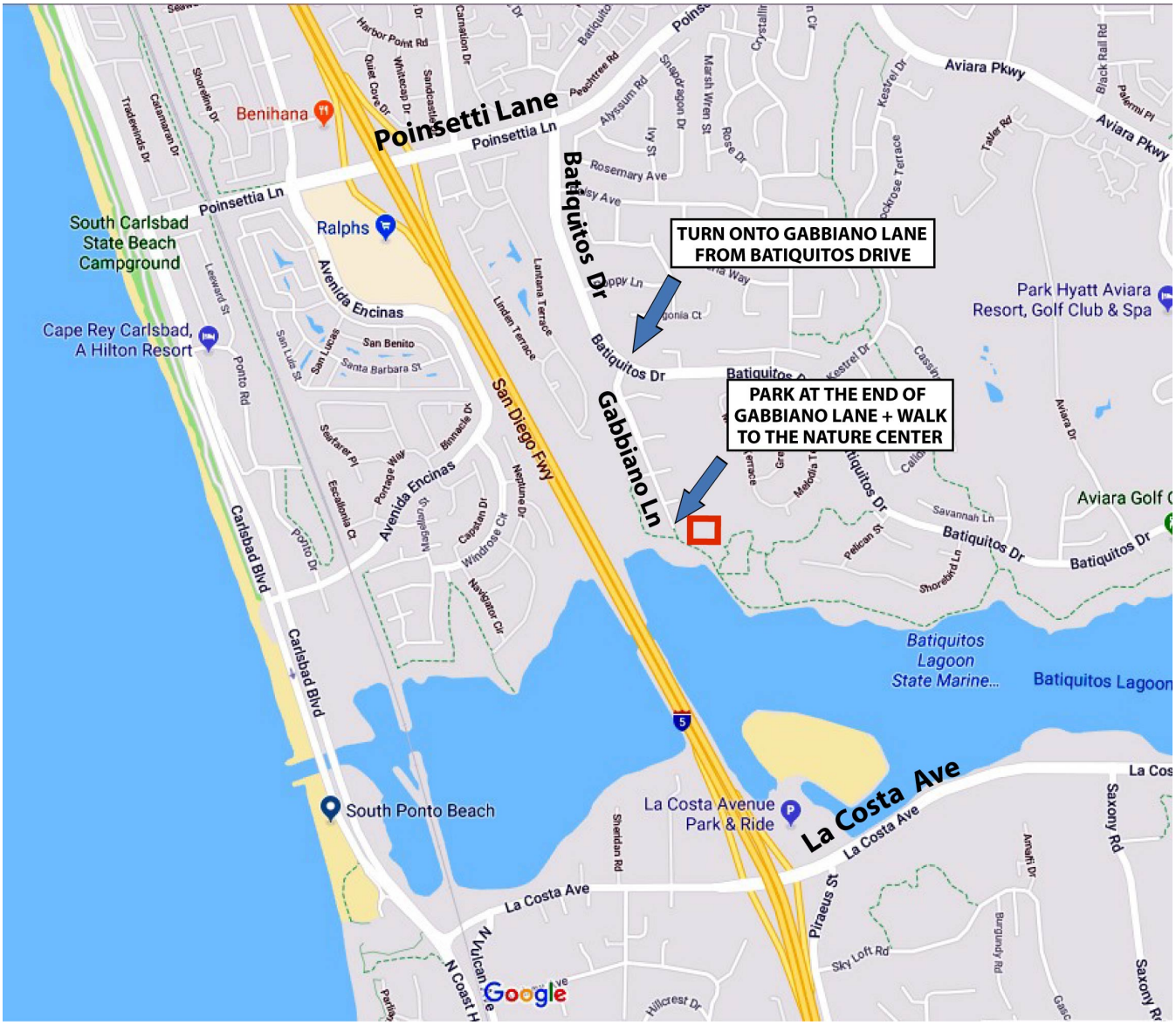
This trip will meet at **Batiquitos Lagoon** this semester. San Elijo Lagoon, the usual meeting place, is impacted by construction. We will meet outside the **Batiquitos Lagoon Nature Center**, located on the edge of the lagoon at the south end of **Gabbiano Lane** in Carlsbad.

Map location: **7380 Gabbiano Lane, Carlsbad, CA 92011.**

Travel time is about 20 minutes from either the Oceanside or San Elijo campuses.

You will be approaching through, and parking in, a residential area; please drive and act respectfully.

Restrooms are available in the Nature Center.



Name:_____

Coastal Estuary Field Trip

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

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. You 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?

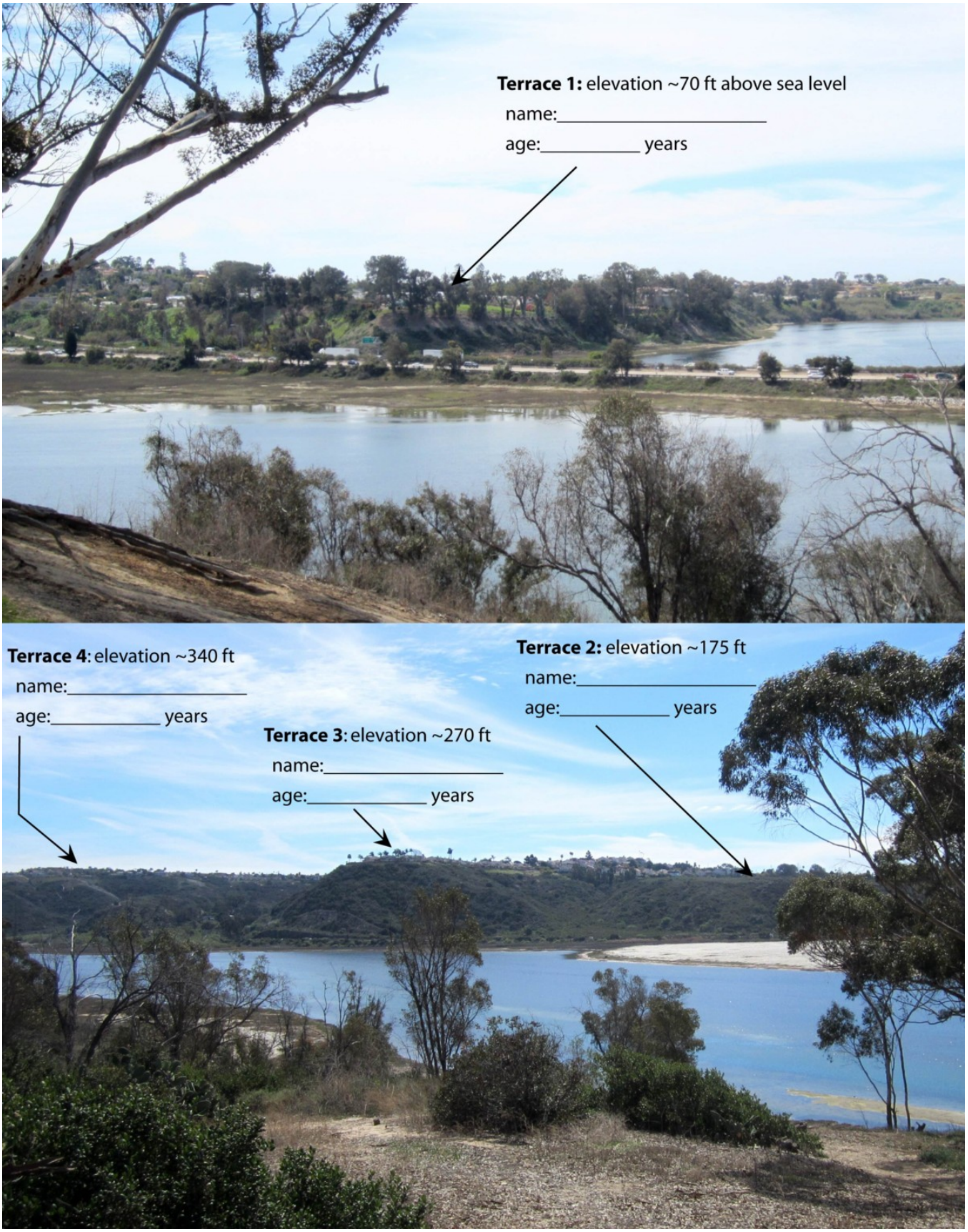
6. Sum up in a paragraph how the up-and-down cycles of the sea, along with erosion and sediment deposition by rivers, have created our coastal wetlands.

7. The photographs on the next page match views from a hilltop on the north side of the lagoon. It shows four **marine terraces**, with the elevation of each terrace listed. Each terrace marks a place where ocean waves were once breaking! Use the elevations along with the figure in your guidebook to identify each terrace's probable name and age, writing the information in the blanks on the photos.

8. From question 7 above, what's the connection between terrace age and terrace elevation?

9. Sum up in a clear paragraph how the up-and-down cycles of the sea, along with the slow tectonic rising land, have carved San Diego's marine terraces. Include in your explanation why older terraces are found at higher elevations, as shown by your answers on the photograph.

Terrace elevations from Google Earth



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. How are coastal wetlands important for fish, especially certain open-ocean fish species, including some that humans harvest for food?

5. Your answer to #4 is one example of how coastal wetlands benefit humans. What are some others? List as many examples you can think of showing how humans benefit from wetlands.

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

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

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

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

10. 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?

11. 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
Great Egret			
Northern Harrier			
Whimbrel			
Great Blue Heron			
Plover			
Willet			
Yellow-Breasted Chat			
Snowy Egret			
Marbled Godwit			
Oriole			
Osprey			
Pie-billed Grebe			
Western Sandpiper			
Least Sandpiper			
Pintail Duck			
Mallard Duck			
Northern Shoveler Duck			
Wigeon Duck			
Ridgeway's Rail			
Cormorant			
Black-Headed Grosbeak			

12. 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.

13. Pick two **resident** bird species seen today and learn more about each one using the guidebook.

Species 1 Name:_____

Distinctive attributes (body features, how it lives and feeds, etc.):

Species 2 Name:_____

Distinctive attributes (body features, how it lives and feeds, etc.):

14. Pick two **migratory** bird species and learn more about each one using the guidebook.

Species 1 Name:_____

Distinctive attributes (body features, how it lives and feeds, etc.):

Species 2 Name:_____

Distinctive attributes (body features, how it lives and feeds, etc.):