**Lab 14**

The Newport bay system is an important place. It is home to a variety of wetland birds, plants, marine mammals, and fish. It also a popular recreational area with a thriving tourism industry, home to many people, and a large safe harborage for recreational and commercial boats. The Newport bay XX is concerned about the future of Newport harbor, the safety of the surrounding citizens, and effects that climate change might bring to their city. To help them plan they have hired an engineering consulting firm to help them understand the processes and future and risks that they might encounter. Consulting firms essentially solve difficult problems for anyone who is willing to pay them. They assemble diverse teams to help them solve the specific types of problems they specialize in. For this problem assume you are the geologist on a team with three civil engineer, an urban planners, and a hydrologist. Your role as the geologist is to work though the initial questions that a geologist might think about, and then use your knowledge to add a geologic perspective to the issues raised by the team.

Also there is a topo map online http://moderngeology.com/topo.jpg

14.1 Point A on the map is what distance along the river? *(Helpful hint: Recall from lab 12 how we measure rivers. Let’s decide that the mouth of Newport bay is the end of the San Diego Creek river. You might find it helpful to mark every 1 km along the river.)*

14.2 Which places within the last 6 km of the river are most likely to become places of deposition for the river?

14.3 If sediment continues to be deposited in these areas, what might change in this bay?

14.4 Put into writing (2-4 sentences) a statement about the influence of the sediment on the bay.

The hydrologist is worried about extreme weather events on the system. Assume that an exceptional “El Niño” year causes an enormous rainfall event. The higher water levels result in high velocity flows.

14.5 Look up storm surge and storm tides to learn what these are. Then explain these two topics to the rest of the team (1-2 sentences).

14.6 What might the combined effect of a storm surge and high flows down the San Diego creek cause?

14.7 How might this reshape Newport bay? Assume that human houses are mostly made of sticks, gypsum, and concrete, which is built upon loose sediments of sand.

Longshore drift is already a problem that Newport bay must contend with.

14.8 Which direction is the long shore drift? (Assume the waves travel from West to East)

14.9 If longshore drift moves a grain of sand moves 4.2 m along the cost per year, how long would it take a grain of sand to move from point B to point C?

14.10 What if the sand moves 420 m per year?

14.12 Assuming that the sediment inflow is 50% less than necessary (Fun Fact: most California beaches are currently getting about 50% less sand then they historically did), and sea level remains the same, draw a picture of Newport bay after 420 years of sediment erosion and longshore drift.

14.13 If you could go back in time and redesign the mouth of Newport bay, would you move where it is? Why or why not?

14.14 What makes moving the mouth of the bay a nearly impossible idea in modern times?

14.15 Take a look at the bathymetry visible in the online topo. Is there anything peculiar about the bathymetry? (If all you write is “yes” you will be fired from your consultancy job!)

14.16 What does this peculiar feature tell you about the previous shape of Newport bay?

14.17 To stop your answer to 14.4, large catchment basins were created to catch the sediment, which is currently collected annually and taken to a dump on land. Do you have a different recommendation for the Newport bay managers?

14.18 Now assume that sea level rise will continue, but sediment inflows will be sufficient. In the next 300-500 years sea level is estimated to rise between 2 to 5 meters. Let’s pick 5 to understand a worst case scenario. What sections of the Newport bay system will be impacted?

14.19 Now you are going to make a risk map. Using the big map, draw 3 different regions based on risk, and color them different colors. It is up to you to decide how you perceive risk, but make sure it is related to the geology, and make sure it is clearly labeled. Give a short explanation for each color, and add it to your map.

14.20 Give your team 6 bullet points of the most important (or concerning) facts about Newport bay and how it relates to the risk map you made.