Southern California Fishing:

Finding the best locations.

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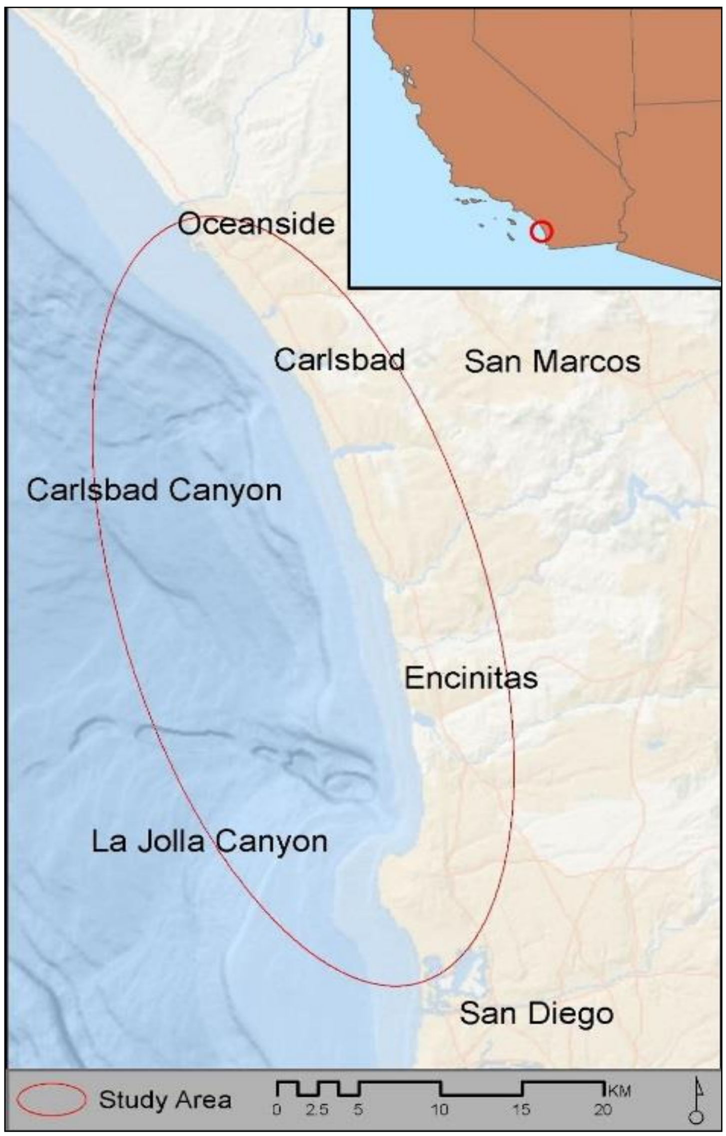
GSP 270

Abstract:

Southern California is home to beautiful beaches, gorgeous weather, and millions of people. All of these people produce copious amounts of wastewater. In addition to that the few times a year when rain actually occurs the concrete jungle does little to capture this precipitation and the majority of rain flows directly into that blue gem we call the pacific ocean. My desire in this project is to determine the best location to fish off the coast of Southern California between the terrestrial land marks of La Jolla point and Oceanside. Summer time is the best time of year to fish as the threat of waste water is limited. The ocean in near coastal locations should be avoided for up to 272 hours after a precipitation event. The best places to fish were found to be directly NW of La Jolla point and between Bantiquitos Lagoon and Swami's reserve.

Introduction:

Sport fishing is not only fun, but it’s a great way to obtain a highly nutritious food source that often isn’t found in stores. I am an avid fisherman and have been since I was a child. I even worked as a deckhand on a charter boat for many years. In the very near future I am moving to Carlsbad Ca, and I want to know where the fishing locations are.



Map: 1 Map of study area

There are 3 species of fish that are of particular interest to me. They are *Semicossyphus pulcher* (California Sheepshead), *Paralabrax clathratus* (Calico Bass), and *Atractoscion nobilis* (White Sea Bass). These fish are quite delicious and they live in a Kelp dominated habitat that is located inshore enough that I can reach it by stand up paddle board. These two factors are what led me to focus on Calico Bass, Sheepshead, and White Sea Bass.

California is a landscape which is heavily modified by human presence. It can be assumed that this modification extends well away from our terrestrial boundaries. Two ways we as humans affect our ocean ecosystems is through runoff and wastewater outfalls. I focused my data analysis on these two methods as this is the primary way terrestrial contaminants reach the ocean.

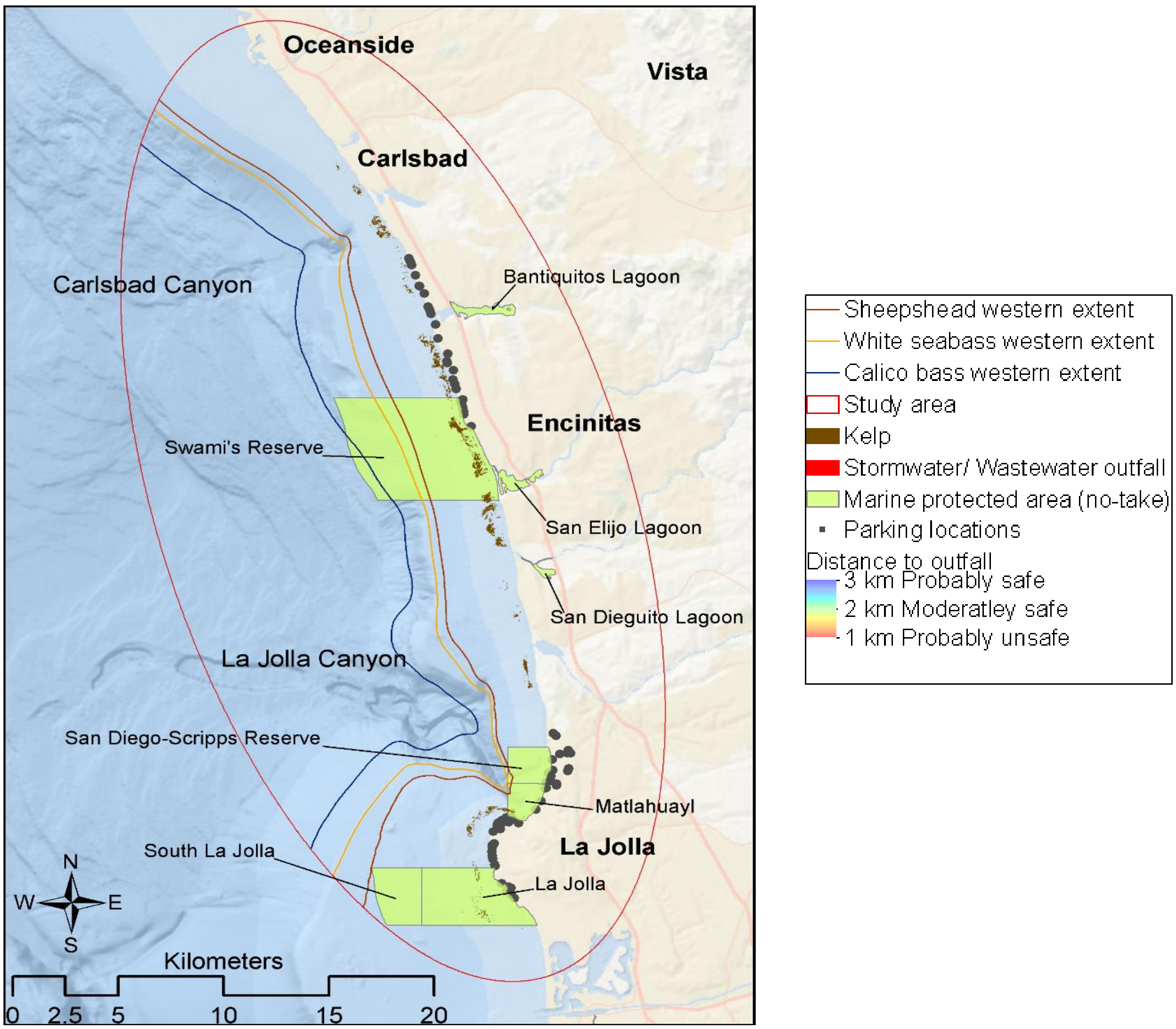
Wastewater outfalls are the major means liquid wastes are disposed of. Approximately 1.35 Billion gallons are dumped into the Pacific Ocean by Californian's every day (Azzuro 2007). Granted this is spread over a large geographic area, but the implications are clear. Our waste is entering the ocean. The results vary in severity but the fact remains that waste water changes both the species make up and the habitat surrounding wastewater outfalls. Physical disturbance through sedimentation, temperature change, lessened salinity, increased ammonia, and localized turbidity define the outfall zones (Fairweather 1990, and Azzuro 2007). These effects have relatively limited ranges of effect. For example in 1992 a sewage line broke off the coast of La Jolla and a massive spill occurred. Effects of this spill were only observed as distances of less than 1 KM from the spill site (Tegner 1995). Additionally the USGS completed a study that found most water from wastewater discharges is constrained by the thermocline and do not contribute to pollution observed from inshore locations (Xu 2004). This rapid mixing and physical containment result in fairly localized impacts of increases in blue green algae and decreases in species richness near outfall locations (Littler 1975).

Storm water runoff unlike Wastewater undergoes little to no treatment before exposure to the ocean. Additionally most storm water outfalls are located at beach locations and dump directly into surface water. This poses significant issues as contaminated, untreated water is introduced directly into the photic zone which is the most productive area in our near shore ocean ecosystems. The contaminants in storm water include but are not limited to human wastes, industrial chemicals, agricultural chemicals, soluble inorganic compounds, insoluble inorganic compounds, microorganisms, and pathogens. All of these things are to be avoided and my recommendation is to stay out of the water for at least 2-3 days after a storm. If this is not possible I recommend a standoff distance of at minimal 2 Km from storm water outfall sites. (Nezlin 2005).

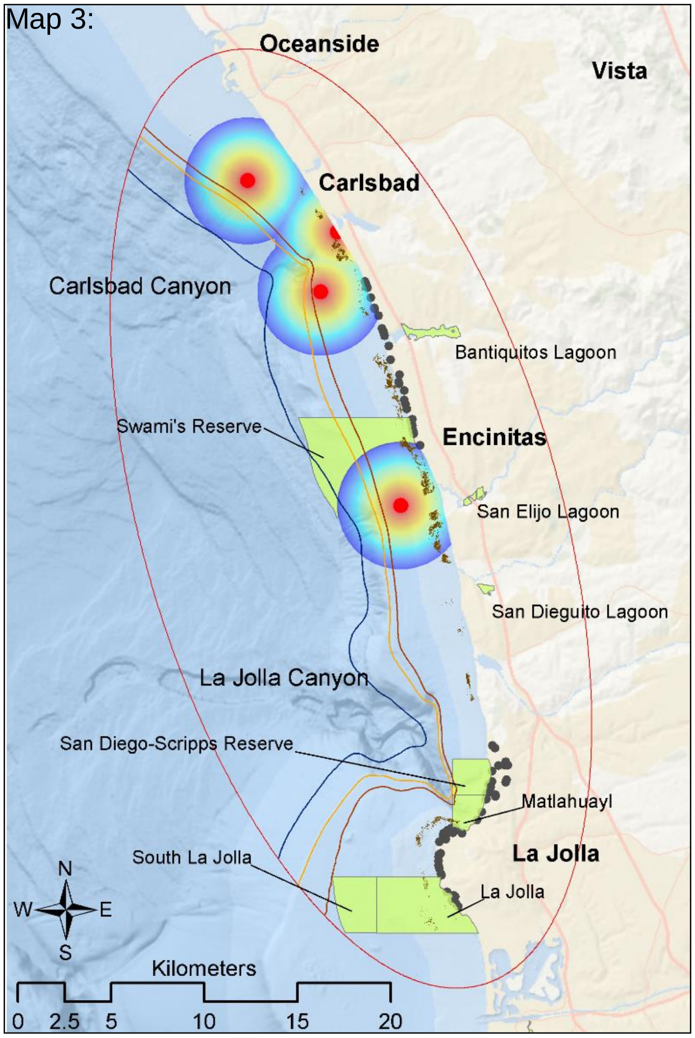
Methods:

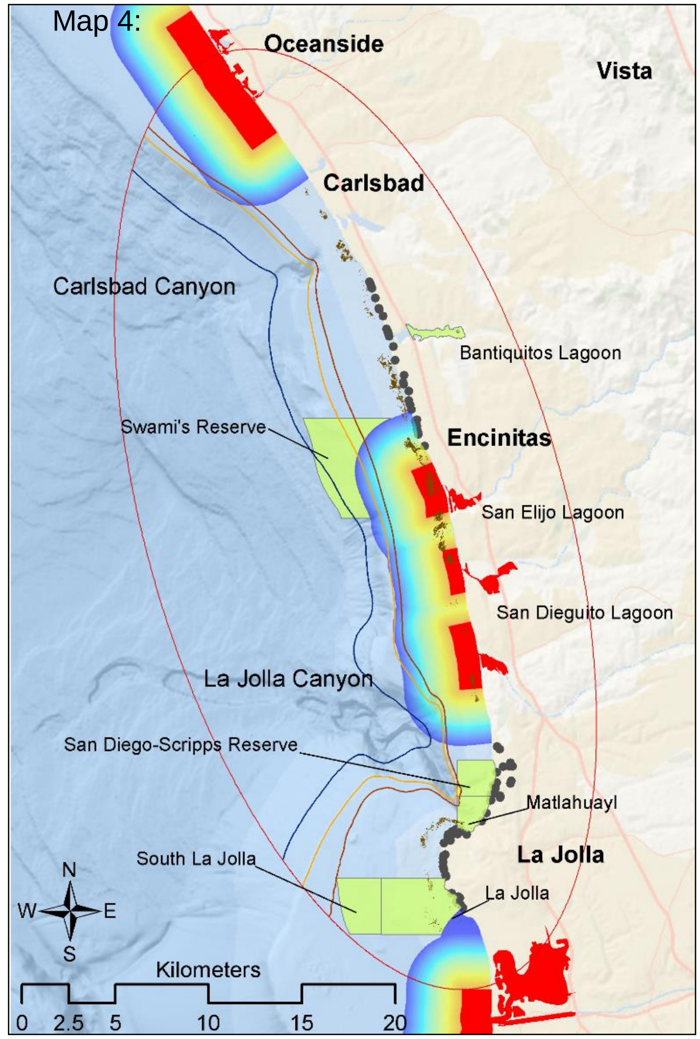
In constructing this analysis the main process included, but was not limited to, the manipulation of large data sets to give me useable results. I used 5 major data sources to complete my analysis. These data sources were a map of *Macrocystis pyrifera (*Bull kelp) locations, wastewater outfall locations, storm water outfall locations, *Semicossyphus pulcher* (California Sheepshead) habitat,*Paralabrax clathratus* (Calico Bass) habitat, *Atractoscion nobilis* (White Sea Bass) habitat, and marine protected areas. After all the data was collected the study area was determined. As I want to fish primarily between the terrestrial landmarks of Oceanside and La Jolla Cove I constrained the North/ South boundaries to those locations. All three focus species live in shallow water ≦ 60 m. A bathymetry layer was consulted and the East/West boundary was set to primarily include depths which were less than 60 meters. However the Oceanside canyon and La Jolla canyons are in included and they house depth which are far deeper than 60 Meters. After the study extent was set all data layers were added to the map and clipped to the study area extent layer. This reduced extraneous data and made load times significantly quicker. The next step was to buffer both the Storm water Outfalls and the Wastewater outfalls to 1 KM, 2 KM, and 3 KM. This buffer allowed me to create a color gradient which aids in the visualization of my maps. The last step of analysis I did was to select the kelp locations which were outside my buffered areas and designate them as areas of prime fishing opportunity. As I have to get to the beach to go fishing I digitized parking locations close to the areas of prime fishing opportunity. Lastly in an effort to be compliant with federal and state laws marine protected areas in the vicinity were added and fishing in those areas is prohibited.

Results:



Map 2: Overview of the study area with Marine protected areas and western habitat extent of focus species shown. All Marine protected areas can be considered “no-take” zones. Focus species can be assumed to inhabit any area east of their western limit line, however all focus species reside in Kelp habitats and efforts to locate populations should be limited to areas in which kelp is found.





Map 3 and 4: Overview of the study area with Wastewater (Map 3) and Stormwater (Map 4) outfalls and Marine protected areas shown. Areas on the map not overlaid with colors are safe and recommended to fish in. Regions which are red are not recommended for fishing at any time of the year as they are very close to outfall sites. Areas overlaid in orange and yellow are probably safe and fishing could be considered during the summer months. Areas overlaid in green and blue could be considered safe, but should not be fished in the 48 hours following a winter rain event. Marine protected areas cannot be fished in due to either state or federal regulation.

Figure 1: Legend for Map 3 and 4

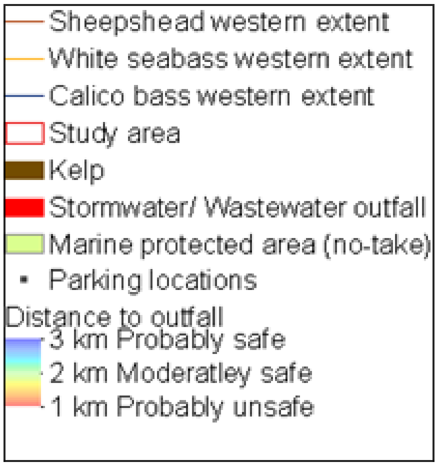
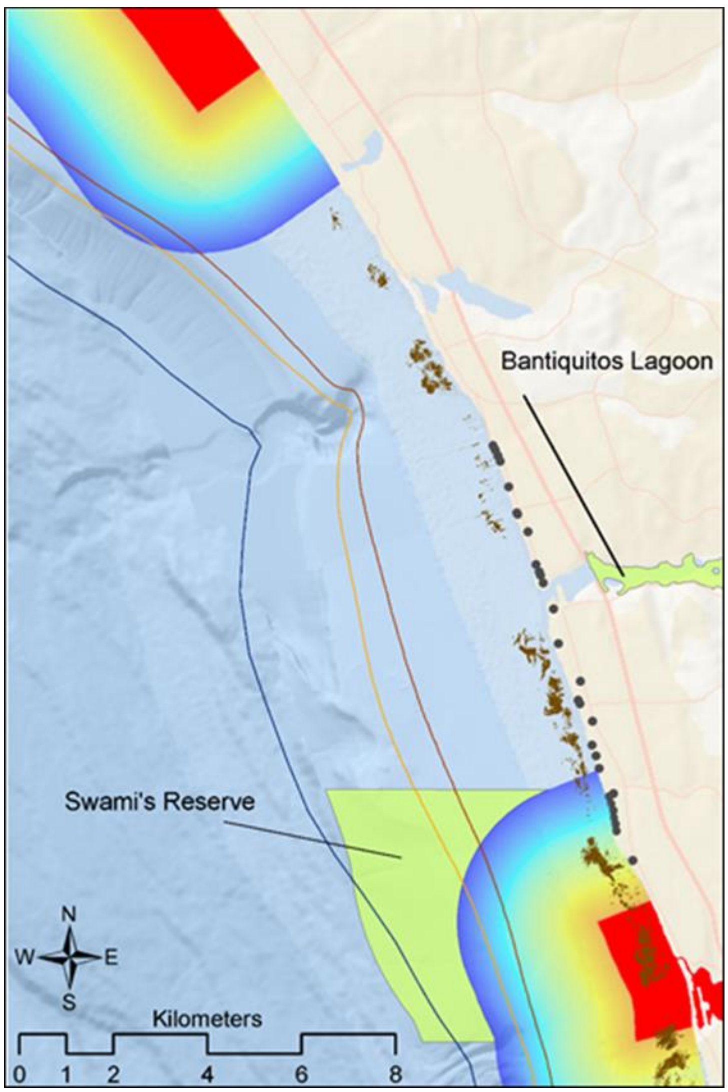
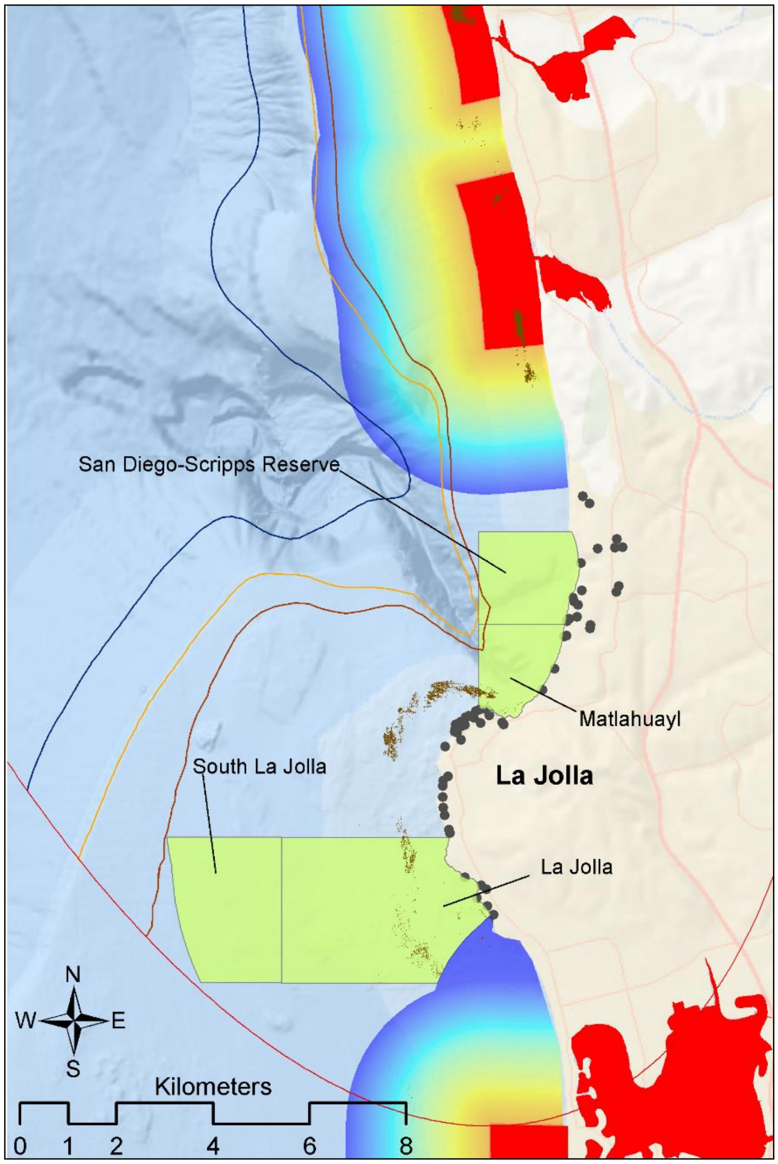


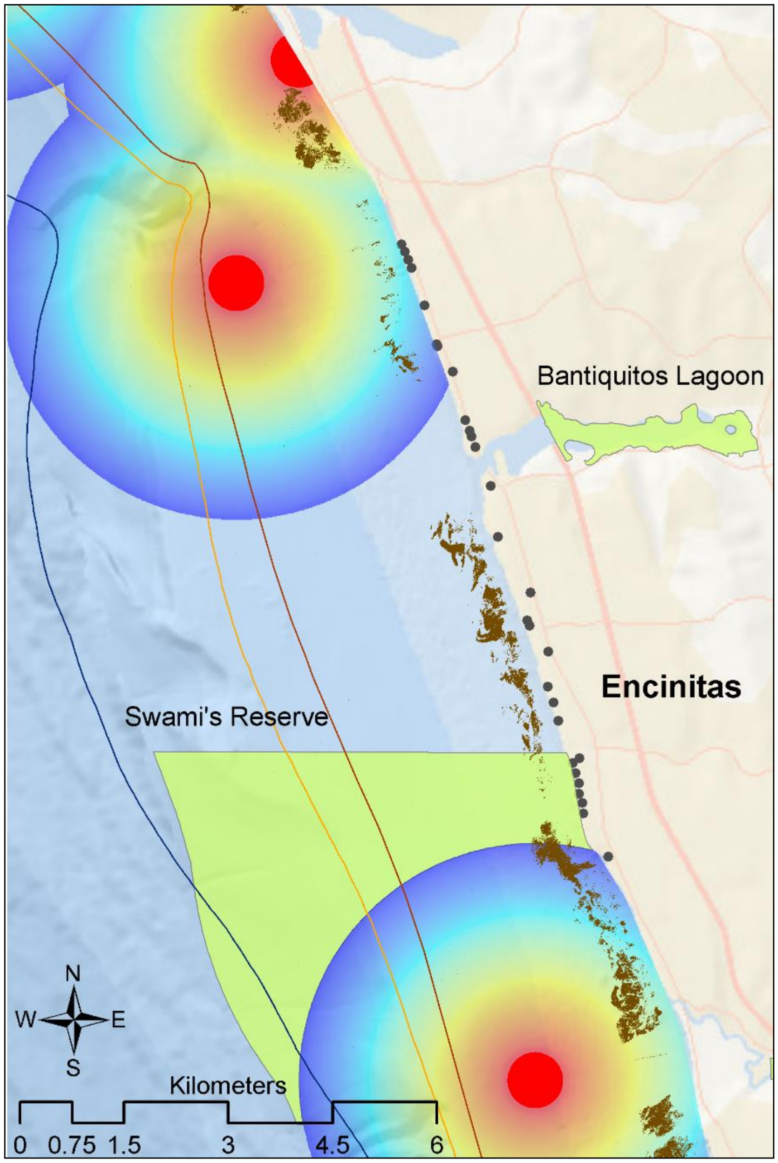
Figure 2: Legend for Maps 5-8



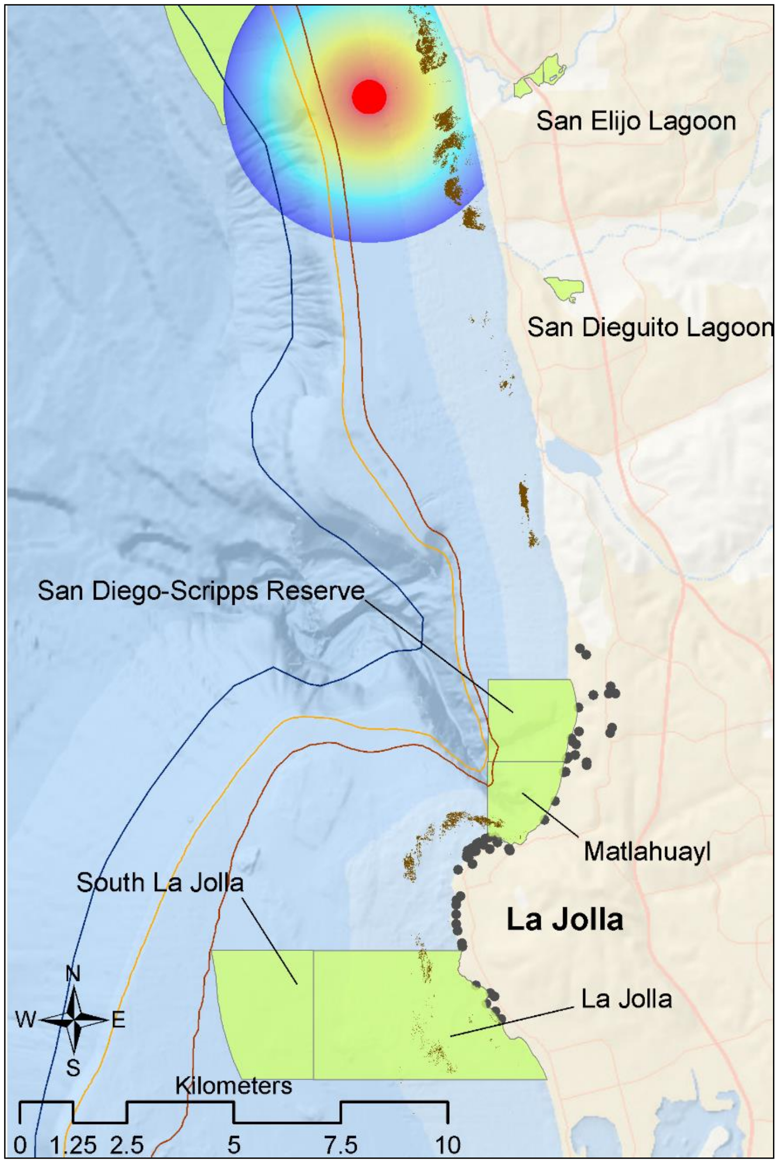
Map 5: Northern extent of the study area showing stormwater outfall locations.



Map 6: Southern extent of the study area showing stormwater outfall locations.



Map 7: Northern extent of the study area showing Wastewater outfall locations.



Map 8: Southern extent of the study area showing wastewater outfall locations.

Conclusion:

The Best places to fish would be directly west of La Jolla point, and between Bantiquitos Lagoon and Swami's reserve. As the sites for storm water outfalls are generally most active in the winter time I generally will not be using those maps. If I do venture into fishing adventures in the rainy season I will go off La Jolla point and west of Carlsbad. Both the wastewater and storm water outfall maps highlight those areas as where I should fish. The next step in this study of finding the best fishing locations in northern San Diego County would be to get out on the water and determine the accuracy of my assumptions.

Sources:

Azzurro E., Matiddi M., Fanelli E, Camilleri, J.,. Giordano P, Scarpato A., Axiak V. (2007). EFFECTS OF SEWAGE DISCHARGES ON COASTAL FISH ASSEMBLAGES IN MALTA, STRAIT OF SICILY, MEDITERRANEAN SEA, *Rapp. Comm. int. Mer Médit*, 38

DiGiacomo P. M Nikolay P. N. (2005). Satellite ocean color observations of stormwater runoff plumes along the San Pedro Shelf (Southern California) during 1997–2003. *Continental Shelf Research*, Volume 25, Issue 14, 1692–1711.

Fairweather, P.G. (1990). Sewage and the biota on seashores: Assessment of impact in relation to natural variability, *Environmental Monitoring and Assessment*, Volume 14, Issue 2-3, pp 197-210.

Xu, J. ,Noble, M.,Rosenfeld, L., Largier, J., Hamilton, P., Jones, B., (2005). Bacterial Contamination at Huntington Beach, California—Is It From a Local Offshore Wastewater Outfall?, USGS Factsheet.

Littler, M. M., Murray,S. N. (1975). Impact of sewage on the distribution, abundance and community structure of rocky intertidal macro-organisms. *Marine Biology*, Volume 30, Issue 4, 277-291.

Nezlin, N.P., DiGiacomo, P.M., (2005). Satellite Ocean Color Observations of Stormwater Runoff Plumes Along the San Pedro Shelf (Southern California) During 1997–2003. *Continental Shelf Research*, volume 25 issue 14, 1692-1711

Swartz, R.C., Schults, D.W., Ditsworth, G.R., DeBen, W.A., Cole, F.A., “Sediment toxicity contamination, and macrobenthic communities near a large sewage outfall.” Validation and Predictability of Laboratory Methods for Assessing the Fate and Effects of Contaminants in Aquatic ecosystems. *American Society for Testing and Materials*. Philadelphia. 1985, 152-175

Tegner, M.J., Dayton, P.K., Edwards, P. B., Riser, K.L., Chadwick, D.B., Dean, T. A., Deysher, L. (1995). Effects of a large Sewage Spill on a Kelp Forest Community: Catastrophe or Disturbance?. *Marine Environmental Research.* Volume 40, Number 2, 181-224.