Title: Freshwater Inflow and Phytoplankton Community Structure in the Mission-Aransas NERR (Kimberly Bittler)

The ecosystem dynamics of estuaries are dependent upon their freshwater inputs. In Texas, the magnitude and timing of these freshwater inputs tends to be highly variable. The Mission-Aransas National Estuarine Research Reserve is regarded as a relatively pristine estuary system from which baseline data for Texas estuaries can be developed. This estuary is characterized by relatively low river discharges throughout most of the year and drastically increased discharge during storm events. Studying the dynamics of the MANERR is important for understanding the impact that changes in the land use of the watersheds, increasing anthropogenic demand for freshwater and climate change will have on Texas estuaries.

The objective of my project is to study the impact of freshwater inputs to the MANERR system on a specific aspect of the base of the food web: phytoplankton. While other projects have focused on storm events and total chlorophyll as indicators of the phytoplankton community dynamics, I will focus on specific aspects of phytoplankton community structure and build seasonal comparisons between an unusually wet year (2010) and an unusually dry year (2009).

Proposed Method:

- Average each data from each SWMP station by season for 2009 (dry year) and 2010 (wet year)
    - Dinoflagellate Density (cells/mL)
    - Diatom Density
    - (or other phytoplankton community structure considerations such as size if available. I know that these indicators listed above are DEFINITELY available right now, or perhaps size-fractionated chlorophyll)
    - Salinity (as a biologically meaningful environmental effect of changing freshwater inputs)
    - Total Chlorophyll (aggregate biomass of the phytoplankton community)
- Interpolate each data (listed above) across all SWMP stations for each season in 2009 and 2010.
    - Not sure which method I will use, but have had issues in the past with interpolations of water resources. For instance, points that are close “as the crow flies” tend to disproportionately influence water areas that are not close in terms of the actual connectivity of the water body. When I use a polyline barrier for the land (so this artificial influence across land masses doesn’t happen), artificial “shadows” are created in my interpolation. I would like to figure out a method for interpolating data on water resources that could address this problem (I just don’t know how yet. Maybe with a least-cost path function?).
- Use Map Algebra to track meaningful changes between seasons for 2009 and 2010 (i.e. Dinoflagellate Density (cells/mL) in 2009 - Dinoflagellate Density in 2010)
- Plot seasonal averages of community indicators (i.e. Dinoflagellate Density) against Salinity at each SWMP station to test for correlations.

Data Sources:

- http://cdmo.baruch.sc.edu/ (central data management office for the NERR system)
- Mission-Aransas NERR (Jena Campbell, Cammie Hyatt, Rae Mooney, Ed Buskey)