Title: Informing Effective Restoration through Conservation Planning at the Land/Sea Interface

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Client: Morro Bay National Estuary Program, Morro Bay, CA
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Bren Faculty Sponsor: Dr. Ben Halpern, UCSB/Bren School Professor, bhalpern@bren.ucsb.edu, 805-893-2862

Proposed Project:

a. Objectives: The objective of this project is to analyze existing data about the Morro Bay estuary and watershed in order to develop a conservation plan. The plan will identify a network of interconnected lands for conservation efforts that focus on the following elements: critical habitat for sensitive species; biodiversity patterns; ecosystem services and functions (e.g. groundwater recharge and water purification); and opportunities for biodiversity to adapt naturally in a changing and variable environment.

Focus areas to be addressed as part of this project include the following:

- Ecosystem services
  - What ecosystem services should the program prioritize for inclusion? Services that provide ecological, social/cultural, and economic benefits should be included. The Estuary Program’s management plan addresses needs in all three areas.
- Habitat conservation, restoration, and protection
  - What species or habitat areas should be prioritized? Local expert opinion will be incorporated into the decision-making process.
- Existing data
  - What data gaps exist? Can these be addressed by including local knowledge? How will the group incorporate local knowledge? What assumptions will the group need to make in the model?
- Constraints to conservation planning
  - What are the political, economic, cultural and land-use constraints that will impact the final plan? How will the group address these constraints? What actions can be undertaken on private working agricultural lands? What actions can be beneficial in residential areas?

b. Significance: California estuaries and wetland areas have suffered tremendous losses in the past 150 years. The Morro Bay estuary is one of the last large, relatively undeveloped estuaries in Southern California (Wheelwright and Morro Bay National Estuary Program [Estuary Program] 2002). In the early 1990’s, a coalition of dedicated community members looked for a way to protect this important resource, and subsequently petitioned the Environmental Protection Agency (EPA) to designate the area as an estuary of national significance. In 1995, their proposal was approved and the Morro Bay National Estuary Program became part of a national network of programs implementing a collaborative, stakeholder-driven approach to protect estuaries. The Estuary Program is the driving force for conservation in the Morro Bay watershed. It has promoted the creation of open space "greenbelts" around urban areas to contain development and preserve critical habitat areas. It has also conducted various restoration projects to address human impacts.
to ecosystem health. In recent years, new tools have emerged to help managers develop strategies which focus ecosystem-based management efforts to address conservation concerns in a changing world. The Estuary Program is working to refine its approach to conservation in the watershed in order to utilize new tools and to be more strategic with the limited resources available to achieve its goals.

Facilitated by the Estuary Program, local citizens, government agencies, nonprofits, and landowners collaborate and leverage resources to facilitate effective management and increased scientific knowledge of the estuary and watershed. The organization and its partners are working to demonstrate real environmental results through restoration, protection, and education. Identifying a network of connected areas to focus future work will be vital for the future success of the effort.

Students working on this project will have the opportunity to contribute to a comprehensive conservation planning effort that will help the Estuary Program make more informed decisions about where to focus conservation efforts in order to facilitate the greatest overall benefits to the ecosystem and the community. While the project deliverables will be of greatest use to the Estuary Program, the resulting analysis and conservation plan will be beneficial to the program’s state government, local government, and nonprofit partner organizations. Conservation projects within the watershed are often accomplished through various partnerships. Some examples of organizations that will benefit as a result of this project include: the Land Conservancy of San Luis Obispo County, California State Parks, Coastal San Luis Resource Conservation District, the City of Morro Bay, the Los Osos Community Services District, and the County of San Luis Obispo.

c. **Background:** The Morro Bay National Estuary Program is located in Morro Bay, California in San Luis Obispo County. The Morro Bay National Estuary Program is non-regulatory, nonprofit organization working to protect and restore the Morro Bay estuary and watershed. In 1995, Morro Bay became part of the National Estuary Program (NEP), a federal program enacted by the Clean Water Act and administered by the EPA. NEPs are frequently highlighted as excellent examples of ecosystem-based management and collaborative community-based management at the land/sea interface.

The Morro Bay National Estuary Program conducts monitoring and research, restores natural habitats, and educates residents and visitors on how to keep Morro Bay clean and healthy. Since its beginning in 1995, the Estuary Program has protected over 3,000 acres and restored over 400 acres. Projects have been selected based on the projects’ ability to implement the Comprehensive Conservation and Management Plan (Estuary Program 2012), which outlines actions to address seven priority issues facing the Morro Bay estuary and watershed. The Estuary Program strives to address these issues with our conservation actions: accelerated sedimentation, elevated bacteria and nutrient levels, toxic pollutants, preserving biodiversity, reduced freshwater flow, and balancing economic uses. In the past, the Estuary Program also took an opportunistic approach with project site selection; project locations were chosen based on the level of landowner interest, cooperation, and support. Projects were also pursued if the project fit well with a specific funding source.

Federal and state funding sources for environmental restoration projects is continuing to decline, but the need to show concrete improvements in an ecosystem for specific projects increases. The Estuary Program has thus begun looking at conservation planning tools to help focus its limited resources to prioritize key geographic areas where it can demonstrate concrete improvements in water quality, ecosystem health, and other variables. Data, local knowledge, and past studies of the watershed will all be used to help inform the process.
To date, the Estuary Program has compiled the necessary data to undertake a conservation planning process and is working with the UCSB Conservation Planning course in Spring 2014 to assess gaps in available data and develop potential approaches.

d. **Available Data:** Data for this project has been compiled and is ready for student use. Currently, Bren students in the Conservation Planning course are using this data for class assignments. Data will be provided on a hard drive to the group at the start of the project. Other data may be obtained if available publicly or from partner organizations. The Estuary Program can help facilitate data acquisition with student direction. Current data available are listed in the attached support letter.

e. **Possible Approaches:** The Estuary Program is currently working with the Bren Conservation Planning course to develop some possible approaches to this project. The class’s results will be used to inform this project. The Estuary Program has also conducted some preliminary research on using a MARXAN-type approach to create a prioritized set of geographic areas for specific conservation goals. It is likely that any approach used will also require input from local experts, many of whom are already partners with the Estuary Program.

f. **Deliverables:** A conservation plan that will supplement the Estuary Program’s Comprehensive Conservation and Management Plan. The plan should contain, at minimum, maps outlining areas with highest opportunity for biodiversity and critical habitat conservation, ecosystems services and functions, and adaptation to changing climate conditions. The Estuary Program would also like to be able to prioritize areas based on greatest conservation outcome available. Since the Estuary Program was created through the Clean Water Act, opportunities to protect and enhance ecosystem services pertaining to water quality should be strongly highlighted in the document, among other priorities. The group project will help determine what other factors should inform prioritization.

g. **Internships:** The program will provide one summer internship for a student working on the project. This internship will run for 9 weeks (July-Sept) for a stipend of $3000-4300, depending on the schedule arranged between the student and the Estuary Program. The student’s focus would be to further work on the conservation plan. However, there will be opportunity for additional work assisting restoration staff and education and outreach staff, depending on the student’s qualifications and interests.

**References:** The following references may provide useful in evaluating this project proposal.


SLO Data Finder – County of San Luis Obispo GIS Portal: [http://lib.calpoly.edu/gis/browse.jsp?by=c&c=2](http://lib.calpoly.edu/gis/browse.jsp?by=c&c=2)

Clean Water Act Section 320 -


The U.S. EPA’s National Estuary Program: [http://water.epa.gov/type/oceb/nep/index.cfm](http://water.epa.gov/type/oceb/nep/index.cfm)
Land-Use in the Morro Bay Watershed and Past Conservation Projects:

The Morro Bay watershed is 48,000 acres. There are two urban areas in the watershed – Morro Bay and Los Osos – with an approximate combined population of 24,000. There are also extensive agricultural lands, ranching and row crops, as well as state and federal protected lands. Public landowners include: California State Parks, U.S. Forest Service, California Polytechnic University, the California National Guard, and California Department of Corrections and Rehabilitation, San Luis Obispo County. The map below documents past conservation and restoration projects in the watershed.
January 22, 2014

Group Project Committee
Bren School of Environmental Science & Management
2400 Bren Hall
UC Santa Barbara, CA 93106-5131

Dear Group Project Committee,

The Morro Bay National Estuary Program is seeking assistance with its conservation planning efforts through a Bren MESM group project during the 2014-2015 class year. We are pleased that Bren offers this type of practical application experience for students in their curriculum and look forward to the chance to work with students on a project. As federal and state resources for conservation decline, prioritizing key areas for our work is even more important than ever. Students involved in this effort will have a chance to contribute to the future of the program and help protect one of the most significant wetland and estuarine areas in the Central Coast.

The Estuary Program will support one summer internship associated with the project for approximately 9 weeks. The stipend available will be $3000-$4300, depending on the student's qualifications and agreed time commitment. The intern will be mentored by the Restoration Projects Manager and will have a chance to work on a variety of projects depending on their background and interest.

The Estuary Program anticipates minimal expenses for this project. In addition to the $1300 provided to groups from the Bren School, the Estuary Program will have some supply money available for the group (<$500) and can reimburse mileage for 1-2 trips to Morro Bay during the course of the project. If selected, we encourage the group to work with Estuary Program staff on an appropriate budget.

The Estuary Program has a wealth of GIS-based data and other data sets to aid the team in the conservation planning effort. This data has already been compiled and is currently being used by the conservation planning course at Bren for a class assignment. Data will be provided on hard drive. The Estuary Program is also willing to assist the group in obtaining any other necessary data from partner organizations. The current data includes:

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<thead>
<tr>
<th>Data Category</th>
<th>Description</th>
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<tr>
<td>Archaeology</td>
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<td>Biology and Ecology</td>
<td>- San Luis Obispo County Biology Reports from 1985 to 2007</td>
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<td></td>
<td>- Western Snowy Plover Critical Habitat 2012</td>
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<td>- San Luis Obispo County Hardwoods</td>
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<td>- Designated Terrestrial Habitat</td>
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<td>- Designated Marine Habitat</td>
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<td>- Morro Bay Shoulderband Snail Designated Critical Habitat</td>
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<td>- Tidewater Goby Critical Habitat</td>
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<td>- Designated Sensitive Resource Areas</td>
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<td>- Morro Bay 0.2 m Side Scan Sonar</td>
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<td>- Morro Bay 1m Color Shaded Relief</td>
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<td>Elevation</td>
<td>- USGS 1/9 Arc-second (~3m) Morro Bay Relief Clip</td>
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<td>- USGS 1/9 Arc-second (~3m) USGS Morro Bay DEM Clip</td>
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<td>Fisheries Distribution</td>
<td>Rockfish, Salmon, Spot Prawn, Squid – Central Coast Fisheries Assessment</td>
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<td>Flood and Sea Level</td>
<td>- Area inundated by MHHW – yr2100 (1.4 m Sea Level Rise) projection</td>
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<td>- FEMA Base Flood Elevations</td>
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<td>- Coastal 100 year flood - yr2100 (1.4 m Sea Level Rise) projection</td>
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<td>- Coastal 100 year flood – current</td>
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<td>- Dune and Bluff Erosion Hazard - yr2100 (1.4 m Sea Level Rise) projection</td>
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<td>- FEMA MHHW yr 2000 current</td>
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<td>- Wetland Migration Area by MHHW - yr2100 (1.4 m Sea Level Rise) projection</td>
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<td>- Ownership Boundaries for Biodiversity</td>
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<td>Marine Uses</td>
<td>Shellfish Leases</td>
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<td>Riparian and Wetland</td>
<td>*Central Coast Wetlands GIS Dataset including dominant and secondary flora</td>
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<td>NRCS Soils</td>
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Most data is public information and there are no restrictions for its use.

We look forward to working with Bren MESM students on this initiative.

Sincerely,

Adrienne Harris
Executive Director