Using Historical Ecology to Guide Restoration and Management Planning at Point Conception’s Dangermond Preserve

Client:
The Nature Conservancy

Proposers:
Brad Anderson - Master’s Candidate 2019, banderson@bren.ucsb.edu, (805) 689-2815  
Michael Bell - Director, Dangermond Preserve, mbell@tnc.org  
Mark Reynolds - Lead Scientist, Dangermond Preserve and CA Migratory Bird Program, mreynolds@tnc.org, (415) 281-0441

Faculty Sponsors:
Steve Gaines - Dean; marine ecology and conservation, sustainable fisheries, impact of climate change on ocean ecosystems  
Frank Davis - Professor, landscape ecology and conservation planning; Director, LaKretz Research Center at Sedgwick  
Kelly Caylor - Professor, hydrology, terrestrial ecology, coupled natural-human systems

Objective:
The overall objective is to compile and synthesize historical data and information that can support TNC management and restoration planning for the new Dangermond preserve. Thus, TNC is proposing a project to explore the historical ecology of the Point Conception region and the new Dangermond Preserve to determine what conservation goals are appropriate for the terrestrial or marine ecosystems. Bren students will engage in the conservation management planning process and other data & analytic approaches to inform management approaches that promote climate resilience. TNC has amassed a great deal of ecological data relevant to the property, but is lacking historical baseline information and guidance for how historical information can best inform management planning.

- Analyze current ecosystem conditions at the Dangermond Preserve and combine with historical knowledge and data-driven approaches to provide a frame of reference for assessing modern patterns and processes.
- Provide guidance for using historical information in management planning, monitoring and change detection (e.g. resampling of survey plots and repeat photography) in support of a climate resilient preserve.

Background:
The Nature Conservancy’s recent establishment of the Dangermond Preserve (Los Angeles Times 2017), a 25,000 acre protected area at Point Conception, presents a rare opportunity to engage historical information in designing effective protection, restoration, and management. With many sacred Chumash sites and its unique location at Point Conception where the cold Pacific current meets the warmer waters from Baja California, the Preserve represents an area of exceptional natural and cultural value. Site surveys show it is home to over 50 endangered and rare species, making it a hotspot for biodiversity. The land was previously known as the Cojo and Jalama Ranches, or collectively, the Bixby Ranch. Starting as a Spanish land grant, the property was ranched for over 100 years and is home to oak woodlands, coastal prairies, and eight miles of untouched...
coastline. Furthermore, the preserve has a large public interface: ""The property is at the intersection of many interests" — the Chumash, the military, surfers, ranchers and developers, Bell said. "It makes this land a conservation puzzle"" (LA Times).

**Significance:**
The project represents an unparalleled opportunity to work with TNC to combine historical ecological information with leading conservation science during the creation of the Dangermond Preserve Management Plan. The use of historical information to study past ecosystem characteristics is a broad interdisciplinary field referred to as “historical ecology” (Swetnam et al. 1999, Rhemtulla and Mladenoff 2007, SFEI 2017). Historical ecology is a critical component in identifying locally appropriate restoration targets (Jackson and Hobbs 2009). Similarly, historical ecology can help us design and manage more flexible, resilient future ecosystems (Safford and Weins 2012). The study of historical landscapes can provide clues to how ecosystems were adapted to a highly variable climate regime, buffering the effects of environmental extremes. This research will inform planning uncertainties that TNC has regarding the creation the management plan for the preserve. We aim to address questions such as historic species distributions, fire history, land use changes, coastal change, etc.

**Available Data:**
TNC has amassed a great deal of data relevant to the property:

- 75+ GIS layers from both public and private sources in the following categories with example data types (not exhaustive)
  - Wildlife – including surveys for mammals, bats, birds, herptiles, camera traps, mist nets, traplins, acoustic sensor arrays, etc
  - Vegetation – fine scale (1:12,000) vegetation maps, rare plant locations
  - Infrastructure – ranch buildings, roads, gates, fences, oil and gas features
  - Archeological sites from the Central Coast Information Center (CCIC)
  - Aquatic – streams, wetlands, springs, monitoring locations
  - Boundaries – Parcels, adjacent public lands, overlapping jurisdictional zoning (e.g. Vandenberg, CA Coastal Commission)
  - Geology – soils, country rock, landslides
  - Imagery – Archival ground photos, air photos, and satellite imagery
- Previous Biological Studies and Survey Reports (not exhaustive)
  - Wieslander Vegetation Type Mapping (http://vtm.berkeley.edu/#/home)
  - Biological surveys by WRA Environmental Consultants Inc.
  - Biological Assessment 2008 from Texas A&M
  - Monarch Butterfly survey A&M
  - Others including: Fire history, grazing history, human history
- Photo & Video Archive – hundreds of photos and video from TNC staff site visits
- Map Archive – ~100 hardcopy (non-interactive) maps including themes like regional conservation planning, public facing communications maps, parcels, etc.
- TNC has several large-scale climate-change and species redistribution analyses currently underway that could inform management

Bren students will be responsible for the assembly of relevant historical documents, photographs, maps, railroad surveys, historic ecological and biological data, etc. Sources will include:
Possible Approaches:
We will begin by assembling a rich dataset of relevant historic ecological information. To do this we will assist TNC in the creation of a geodatabase of relevant archival documents, photographs, early surveys and traditional knowledge of Cojo and Jalama ranches. There are many technical challenges to conducting an historical ecological analysis and it is critically important to know what specific questions are being addressed. After the initial data exploration, we will work with TNC to define and produce a set of focal questions to guide the group's work, and identify specific appropriate methods for data and information assembly and analysis to address those questions. For each of these questions, there are methods that have been developed by groups like the historical ecology group at the San Francisco Estuary Institute, landscape ecologists, etc. Possible questions may include:

- How has human occupation and use of the land changed prior to and since the Mission Era?
- How has the vegetation of the area changed through time since the beginning of ranching?
- What was the fire regime prior to 19th century ranching and how has it changed over the past 200 years?
- What factors are associated with the distribution and abundance of species and communities of concern? How have those factors changed through time and how might they change in the future?

Deliverables:
- Provide recommendations for appropriate restoration strategies to meet preserve goals
- Adapting existing frameworks for using historical ecology information in management planning, monitoring and change detection (e.g. resampling survey plots, repeat photography, and photogrammetry).
- Assist TNC Geodesign Team in the creation of a searchable database of relevant historical information on terrestrial, freshwater and coastal-marine ecosystems, land uses, and cultural activities
- Creation of map products, cartography, and GIS geodatabases.
- Summary document/communications piece on the history of the property

Internships:
The Nature Conservancy will support the project with three internships at $5,000 each for a total of $15,000 to facilitate Bren students to continue working closely on this project over the summer.

Budget:
Beyond the cost of the internships, this project can be completed with the funding provided from Bren ($1,300). Costs include travel to preserve location and local area data sources, and printing materials for posters and reports.
Partners and Resources:

The Nature Conservancy

Matt Merrifield - Chief Technology Officer and Director of Geodesign, TNC California, mmerrifield@tnc.org
Mary Gleason - Acting CA Oceans Director; Director of Science, CA Oceans Program, mgleason@tnc.org
Dick Cameron - Director of Science, CA Land Programs, dcameron@tnc.org

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Kevin Lafferty - kevin.lafferty@lifesci.ucsb.edu; marine science; USGS / MSI / NRS
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Hank Pitcher - hank.pitcher@ccsucsb.edu; central coast landscapes and art; CCS (college of creative studies)
Lynn Gamble - gamble@anth.ucsb.edu; chumash archaeology; Anthropology
Katja Seltmann - seltmann@ccber.ucsb.edu; biodiversity; CCBER (director, cheadle center for biodiversity & ecological restoration)
Carla D’Antonio - dantonio@es.ucsb.edu; botany, ecology, ecosystem ecology; Environmental Studies (director)

References:


January 26, 2018

To:
Group Project Committee
Bren School of Environmental Science and Management
Bren Hall, 2400 University of California, Santa Barbara, CA 93117

From:
Mark Reynolds, Ph.D.
Lead Scientist, Dangermond Preserve
The Nature Conservancy
mreynolds@tnc.org

On behalf of The Nature Conservancy (TNC), I am pleased to endorse the proposed master’s project proposal concerning the newly formed Dangermond Preserve. The Conservancy is excited to utilize the interdisciplinary skills of Bren School students and faculty to explore historical ecological baseline data of the Preserve in order to create a management plan that will be resilient in the face of great change. Bren students will work to explore and solve environmental issues at this unique, newly created flagship preserve.

This letter serves to highlight The Nature Conservancy’s support for the Bren Group Project and for funding support for three internships at $5,000 each for a total of $15,000 to facilitate Bren students to continue working closely on this project over the summer.

We look forward to your favorable consideration of our proposal.

Sincerely,

Mark D. Reynolds, Ph.D.
Lead Scientist, Dangermond Preserve
The Nature Conservancy of California