



**Morro Bay National Estuary Program
Community Project Application Cover Sheet**

Project Title:

Applicant:

Address:

Contact Person(s):

Phone:

Fax:

Email:

Amount Requested (cannot exceed \$5,000):

Total Estimated Project Cost:

Amount & Source of Other Funding (if relevant):

Project Description Summary (fill in here or attach additional document; word limit 300):



Check off the Comprehensive Conservation and Management Plan Priority Issue(s) addressed by the proposed project:

Sedimentation.

Bacterial contamination.

Elevated nutrient levels.

Toxic pollutants.

Scarce freshwater resources.

Preserving biodiversity.

Environmentally balanced uses.

Briefly describe how your project addresses the priority issue(s) you checked above.

The proposed project must work to implement at least one of the Action Plans that address the Priority Issues listed above. The Action Plans are detailed beginning on page 23 of the Management Plan, which can be found at MBNEP.org.

In the space below, please list the relevant Action Plan(s) and briefly describe how they will be addressed by this project.

Documenting Large and Medium-Sized Mammals in the Morro Bay Watershed Using Automatic Wildlife Cameras

Principal Investigator: John D. Perrine, PhD, Associate Professor,
Biological Sciences Department, California Polytechnic State University

Amount Requested: \$4,400 over 2 years

Full Project Description

Large and medium-sized mammals are an important and highly visible component of the biodiversity of the Morro Bay watershed. These species have well-documented ecological functions (such as their roles in nutrient cycling, energy flow, and ecosystem structure) and relevance to the local human community. Large predators (such as mountain lion and black bear) may be indicators of ecosystem health and play an important role in determining the abundance and distribution of prey (such as deer and feral pigs); these large prey species may in turn affect the vegetation structure and disturbance; both groups can be symbols of “wild nature” for the general public. Medium-sized predators and scavengers (including badgers, bobcats, coyotes, feral cats, foxes, opossums, raccoons, and skunks) play similar roles, especially in regard to trophic cascades and in regulating prey species. Some members of these groups are not native (specifically, feral pigs, red foxes, and feral cats), and can have negative impacts upon native biodiversity (through predation and competition) and ecosystem functions (by affecting erosion and disturbance regimes or by facilitating the establishment and spread of invasive plants). The distribution and abundance of these species in the Morro Bay watershed can therefore have direct impacts upon Morro Bay itself.

I propose to document the distribution, activity and relative abundance of large and medium-sized mammals in the Morro Bay watershed using automatic camera stations (sometimes called “game cameras” or “camera traps”). I would supervise a small team of Cal Poly undergraduate students, primarily from the “wildlife conservation” programs in the Biological Sciences, Natural Resource / Environmental Management, and Animal Science departments, to collect and analyze these data. In short, I propose that we would purchase 10 automatic camera stations, which would be deployed in pairs for 4 6-week sampling periods annually for 2 years.

This project would provide important information to MBNEP staff on the abundance and distribution of these species in the watershed, allowing additional management directives to be developed (such as addressing problematic invasive species), and would also give valuable “Learn By Doing” educational opportunities to future conservation professionals. The results of the project, including photographs, maps, and analyses, can also be used for public education and outreach on the wild species of Morro Bay.

If funded, the project would consist of three phases:

1. Planning

- a. Obtain and organize key GIS (geographic information system) datalayers, including topography, vegetative community, habitat classification (via a crosswalk from vegetation community to the California Wildlife Habitat Relationship System communities), roads and property boundaries.
- b. In conjunction with MBNEP staff, develop deployment strategy and specific timelines.
- c. Purchase equipment and supplies.

2. Data Collection

a. Deploy and monitor cameras: 8 cameras (4 pairs, with individual cameras in a pair spaced 200-800m apart) would be deployed for each session. (The remaining 2 cameras would serve as backups in the event of theft, damage, or other failure.) A deployment session will consist of 6 weeks (42 days) of data collection at a site. Cameras will be checked every 2 weeks to recover photographs and ensure that the equipment is in good working order (batteries not dead, data card not full, camera still aimed correctly, etc.). There will be one deployment session per season (corresponding to Cal Poly's quarter schedule), for a total of 4 sessions per year, for 2 years.

b. Data Management: After each check, the photographs will be stored on a computer in the PI's lab at Cal Poly, in accordance with our existing workflow protocols. All data and photographs will be backed up regularly onto external hard drives, at least one of which will be stored offsite, to prevent data loss in the event of computer failure and to facilitate data transfer to MBNEP staff.

3. Data Analysis and Reporting

Cal Poly students will analyze the data and prepare summary reports to MBNEP staff. Analysis and reports will address the following:

a. Location, habitat associations and timeline of operation for specific cameras.

b. Camera performance (proportion of deployed nights that the camera operated correctly).

c. Camera results: the species documented at each location, with particular emphasis on large mammals (4 species: black bear, mountain lion, deer, and feral pigs*) and medium-sized carnivores (9 species: badger, bobcat, feral cat*, coyote, gray fox, red fox*, opossum, raccoon, and striped skunk). * *denotes non-native species that may have significant ecological impacts to native biodiversity and ecosystem function.* The results will also include the level of activity of each focal species at each site during each session; activity will be quantified as the number of visitation events by that species per survey night. The number of individuals present per visitation event will also be quantified; the group size multiplied by the activity rate will give the overall "utilization intensity" of each site by each species. This standardized approach allows direct comparison between species, sites and seasons. (It is not possible to calculate an estimate of the actual number of individuals of each species at each site, so the "utilization intensity" metric is a common and useful substitute.)

The team will develop three types of reports for MBNEP staff:

a. Brief periodic progress reports by the end of each academic quarter.

b. More detailed quarterly reports, by the middle of the following quarter.

c. Comprehensive final report at the end of the project.

Community Engagement

The primary means of community engagement for this project is by the involvement of local undergraduate students at Cal Poly who are enrolled in the "wildlife conservation" curriculum. This project will give them more familiarity with MBNEP and its conservation mission, and also valuable "Learn By Doing" opportunity to learn pre-professional technical skills such as data collection, data analysis, technical writing, and public presentation skills. I estimate that the project will directly incorporate 10-15 undergraduates during the 2 year period. Their involvement will also increase the visibility and awareness of MBNEP and its conservation mission among other students and faculty in the Biological Sciences, Natural Resources / Environmental Management, and Animal Sciences programs at Cal Poly, and may lead to additional projects of mutual benefit.

Audience

This project is primarily a biodiversity assessment to facilitate management, so its primary audience is the MBNEP management staff and the students who are involved in implementing the project.

However, although public education is not the primary objective of this project, there are several important routes by which this project can help MBNEP educate the public about its conservation mission and the wildlife that uses the Bay and its watershed:

- a. In coordination with MBNEP staff, we will have students give at least 2 presentations open to the general public. These presentations will summarize the project objectives, methodology, and general findings, and how they relate to MBNEP's conservation mission. Possible venues include public lecture series organized by the Central Coast Biological Society and the California Central Coast Chapter of The Wildlife Society; I am a member of both groups.
- b. The students will also make at least 2 on-campus presentations on the project. Likely venues include the College of Science and Mathematics annual student research symposium and presentations for the Cal Poly Wildlife Club. I am a faculty member in COSAM and the faculty advisor for the Wildlife Club.
- c. Students can work with MBNEP staff to help develop additional public education and outreach materials related to this project. For example, students could write articles about their experience, which could be published in Cal Poly's outreach magazines or the MBNEP public education materials. The students could also develop displays or other interpretive materials which could be used at MBNEP's office, the Morro Bay Natural History Museum, the Cal Poly library, or other public venues. I have coordinated similar projects with the SLO Land Conservancy's "Life Among the Oaks" public education project.
- d. The periodic and final reports will contain information that can be useful for public education.
- e. All images and data collected by this project will be provided to MBNEP to use in its other reports and outreach materials.

Benefits:

This project will improve the health of the estuary and its watershed by documenting the presence and distribution of important wildlife species in the watershed. These species can be indicators of native biodiversity and positive correlates of ecosystem function (e.g., mountain lion, black bear, badger, bobcats), or may represent potentially problematic non-native species that may have a negative effect upon native biodiversity and ecosystem function (e.g., feral pigs, feral cats, red fox). Documenting the distribution and relative abundance of these species in the watershed will help MBNEP staff assess the health of the watershed ecosystem and to develop specific management actions (such as targeted removal of feral pigs) to benefit native biodiversity and ecosystem function.

The project will also indirectly benefit the ecosystem by increasing the visibility of MBNEP on Cal Poly campus, especially in the Biological Sciences, Natural Resources / Environmental Management, and Animal Science programs, and develop a framework for future partnerships on additional projects.

The project may also provide a route by which MBNEP staff can identify promising new interns or staff to assist with its conservation mission.

The data from this project can also be used in larger, regional analyses of mammal distribution and activity, such as comparison with areas with less human impact (e.g., Diablo Canyon lands).

Project Budget

<u>Equipment</u>		<u>unit price</u>	<u>Qty</u>
\$2,475	Browning Strikeforce HD Pro game camera security package (includes camera, security box, cable lock, 2 SD cards)	\$ 225	10
\$ 250	PanaVise ball-mounting stem	\$ 25	10
\$ 200	SeaGate 4TB external hard drive (for data backup and transfer)	\$ 100	2
<u>Supplies</u>			
\$ 400	lithium AA batteries (60-pack)	\$ 100	4
\$ 75	Master-Lock padlocks	\$ 25	3
\$ 100	misc. hardware (screws, bolts, etc.)		
<u>Mileage</u>			
\$ 800	\$100 per quarter, not to exceed * 8 quarters (30mi / trip * 22x/yr * 2 yr @ 0.60/mi)		
<u>Misc.</u>			
\$ 100	Poster printing		
\$ 4,400	Total project costs requested from MBNEP		

These expenditures will be leveraged against the following in-kind contributions, provided by Cal Poly:

<u>Personnel</u>	
\$ 2,880	Field Technicians: (2 persons / team @ \$12/hr/person * 3h/trip * 20x/yr * 2 yr)
\$ 2,880	Lab technicians: (3hr/wk * 4 qtrs * 10 wks/qtr * 2yr @ \$12/hr)
\$ 8,000	Supervision, training: (2hr/wk * 4 qtrs * 10wks/qtr * 2yr @ \$50/hr)
\$13,760	Total in-kind contribution by Cal Poly

Note that the in-kind contributions provided by Cal Poly represent an approximately 3:1 contribution toward this project.

Evaluation

We will determine the success of the project via the following metrics:

- a. The number of sites surveyed.
- b. The amount of data collected, analyzed, and reported to MBNEP staff. For each site, these data shall include the camera location and deployment dates, the species detected, and the activity level of each focal large and medium-sized mammal species.
- c. The number of Cal Poly undergraduate students who participate in the project, thereby gaining pre-professional training and experience, as well as learning more about MBNEP's conservation mission.
- d. The number of public presentations (both on-campus and off-campus) about this project, and the attendance at these presentations.

Schedule of activities

Planning and Purchasing: Within 30 days of initiating the project, all equipment will be purchased, all key layers will be acquired, the first field team will be assembled and a preliminary deployment plan developed.

Data collection: Camera deployment will occur each academic quarter. Each deployment session will require several visits to the site: 1) an initial investigation or reconnaissance of the site, 2) deployment of 4 pairs of cameras, 3) first visit after 2 weeks of data collection, 4) second visit after another 2 weeks of data collection, 5) third visit after the last 2 weeks of data collection; a 6th visit may be required if the data collection period needs to be extended to reach 42 survey days (due to dead batteries, full SD card, damage, etc.) After each visit, data will be entered into a project database which summarizes each camera's location, dates of operation, overall performance, the species detected and the activity level of the focal large and medium-sized mammal species.

Reporting: A brief preliminary report will be submitted by the end of each academic quarter; a more detailed quarterly report will be submitted by the middle of the following academic quarter; and a comprehensive final report will be submitted at the end of the project.

Qualifications

I have extensive experience using game cameras to document wild mammals; I have been doing this since 1997 (the days of 35mm film!). I developed and teach a workshop for The Wildlife Society – Western Section on using automatic cameras for wildlife research.

I have conducted several major projects similar to this one, including an extensive examination of wildlife distribution and activity in the Cuesta Grade / Tassajara Creek portion of Highway 101 (24 cameras deployed for 5 years). I have established protocols, workflows, and infrastructure such as a research lab facility on the Cal Poly campus and an approved field safety training protocol.

Some of these projects have been directly related to public education and outreach about local wildlife and their habitats. Specifically, I am a technical advisor for the “Life Among the Oaks” program by the SLO Land Conservancy, which uses game cameras on local nature trails to educate elementary schools about local wildlife. We currently have projects associated with the Santa Margarita Ranch and the Pismo Preserve, and are in the process of developing new projects at Laguna Middle School and Belvue Santa Fe Elementary School (in Avila).

I also have extensive (>10 years) experience supervising undergraduates in projects such as this, including data collection, data analysis, and preparation of interim and final reports. There are numerous students in the “wildlife conservation” programs in the Biological Sciences, Natural Resources / Environmental Management and Animal Sciences programs who are interested in participating in field projects such as this, both to gain pre-professional training and experience and to fulfill graduation requirements such as Senior Project.

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