BISHOP PEAK NATURAL RESERVE CONSERVATION PLAN
2015 UPDATE

City of San Luis Obispo
City Administration
Natural Resources Program
990 Palm Street
San Luis Obispo, CA 93401

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Bishop Peak Natural Reserve Conservation Plan 2015 Update

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MAP AND PHOTO CREDIT

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Special Note to Reader – 2015 Update Legislative Review Draft

The *Bishop Peak Natural Reserve Conservation Plan 2015 Update* is intended to supplement and amend the prior *Bishop Peak Natural Reserve Conservation Plan* that was adopted by the City Council in January 2004. It was presented for community and City Council review and consideration in Legislative Review Draft or "track changes" format in order for the reader to be able to quickly recognize what portions of the 2004 plan remain unchanged, and what portions of the plan were amended or recommended for deletion. The Legislative Review Draft has been archived and is available for review by contacting either the City Clerk's Office or Natural Resources Program.

2015 Updates

Bishop Peak Natural Reserve ("BPNR" or "the Reserve") is one of the most iconic and well-loved landmarks in the entire region offering spectacular panoramic views of the City below and the surrounding region beyond, remarkable plant and wildlife diversity, and pleasant hiking and passive recreational opportunities. The City's first ever conservation plan was prepared for BPNR and subsequently adopted by City Council in 2004. A conservation plan is generally intended to have a 7 to 10 year time horizon, at which time it should be updated.

Over a decade has passed since the plan's initial introduction and a number of new challenges have emerged, including continued natural resources protection; neighborhood compatibility in the areas around the two primary trailheads; increased use pressure leading to needs for trail maintenance and heightened levels of enforcement; and, continued investigation of emergency response access. With these issues in mind, this Conservation Plan Update serves as an opportunity to assess the current state of the Reserve, monitor the implementation of the existing plan, and to establish timely strategies for further protection and enhancement of the Reserve. For these reasons, BPNR is now the subject of a Conservation Plan Update process in order for the property to continue to be managed in accordance with the City's Open Space Regulations and the Conservation and Open Space Element of the City's General Plan, while incorporating new information and addressing the ongoing management concerns that have been identified by staff as well as members of the public.

New and Ongoing Management Issues or Concerns Associated with BPNR

The Bishop Peak Natural Reserve Conservation Plan 2015 Update provides a framework to address the continued long-term site stewardship of the property. In addition to issues identified in 2004, the Bishop Peak Conservation Plan Update places a renewed emphasis in the following areas:

1. **Natural Resources Protection.** In keeping with the principles of the Conservation and Open Space and Element of the General Plan, the plan prioritizes protection of Natural Resources, providing for passive recreation where compatible. Many of the issues addressed in the Conservation Plan Update stem from this objective, seeking to enhance natural resources while minimizing impacts of recreational uses. An updated biological inventory was completed by the local firm Terra Verde Environmental Consulting, *Summary and Results of a Plant Inventory and Wildlife Survey at Bishop Peak Natural Reserve, City of San Luis Obispo, California,* that identifies 201 botanical species, nine plant communities, and 54 wildlife species. Of those, two plant species, one plant community, and seven wildlife species are considered to be under some level of protective special-status. Of note, Terra Verde identified seven different bat species that were previously indistinguishable due to the advent of relatively new, full spectrum acoustic survey technology that was not available in the 2002-2004 timeframe when the prior conservation plan was underway; three of these are special-status species. In addition, a Cal Poly senior project undertaken by Ms. Jessica Engdahl under the guidance of Dr. John Perrine and City Biologist Freddy Otte, *Wildlife Survey and Identification of Game Trails, Bishop Peak Natural Reserve, Fall 2013,* revealed numerous terrestrial wildlife species using the Reserve at night with the use of remote-sensing wildlife game cameras deployed at several fixed monitoring stations.

2. **Trail Network Maintenance.** The existing trail network faces erosion, widening and trail cutting and expansion of unofficial trails, each presenting a threat to the experience of recreational users, as well as the protection of natural resources. Weathering and vandalization of signage and lack of adequate signage may further compound these issues. Recent counts of users accessing BPNR suggest that over 150,000 visitors a year enter the Reserve, and most of the trails within BPNR are approaching 20 years or more of continuous use since they were first installed.

3. **Neighborhood Compatibility Improvements.** With a high volume of visitors and access limited to residential trailheads with no off-street parking facilities, some impacts are felt disproportionately by surrounding neighborhoods. Outreach to neighboring residents indicates that issues include night hiking, camping, roadway safety conflicts and concerns, litter and noise. Lack of consistent enforcement of existing municipal code was also identified as an area of primary concern.

4. **Rock Climbing Management.** While climbing is an approved, historic use that pre-dates the City's ownership of the Reserve, new fixed anchor "bolted" routes and access trails have expanded over the last decade presenting a challenge to management objectives. Recent site visits identified establishment of an unpermitted stone and concrete bench, as well as unauthorized pruning and herbicide application to vegetation.

5. **Unauthorized Foothill Boulevard Access.** The trailhead on Foothill Blvd. is a very popular access to BPNR and yet it remains an unapproved trailhead that relies on a trail running through private ranch property. This creates a number of problems in terms of trespass, safety, aesthetics, resource protection and enforcement that are largely outside of City jurisdiction and control.

6. **Emergency Access and Ranger Patrol Improvements.** Current emergency access points limit the speed and response time with which City fire fighter-paramedics can respond to incidents at the Reserve. With an average of 2-3 calls for emergency response every month and an increase of fire hazard due to sustained drought conditions, a more efficient access point, to be further investigated and considered separately in the future, may increase safety for visitors to the Reserve and neighbors living in the wildland-urban interface zone.

2015 Update Recommendations

Active management of the Reserve is necessary to protect valued natural resources while facilitating approved activities where compatible. Updated wildlife inventories and photo monitoring analysis have shown that the BPNR is home to a wide variety of plants and animals and the Reserve requires continued management to protect these species. With over 150,000 visitors per year (Riggs et. al., 2015) and over 200 plant species and 54 wildlife species (Terra Verde, 2015), protection of natural resources at the BPNR relies largely on adequate management of human impacts. This entails the limitation of the recreational footprint by limiting the distribution and nature of uses and enforcing the laws that articulate these limitations. In addition to the issues and tasks outlined in the previous conservation plan, the 2015 Update calls for the consideration of the following initiatives to provide for the continued stewardship, restoration, and management of the Reserve.

1. **Natural Resources Protection.** Biological surveys are the basis for natural resource management at the Bishop Peak Natural Reserve. The City has conducted a biological inventory and an evaluation of photo monitoring points and aerial photography comparing 2004 to current conditions, and will continue to monitor the Reserve on a regular basis. The City will need to respond to these surveys by focusing on protection of habitat areas with an emphasis on sensitive species. While the biological inventory shows the presence of sensitive species such as the Townsend's big-eared bat and Pallid bat, further investigation will need to be done to identify their distribution and abundance throughout the cliffs and cave features within the Reserve. The City should also consider maintaining additional water in the stock pond by excavating silt that has accumulated in order to provide a water source for wildlife and insect prey-base for species such as bats.

   Garbage and dog feces present an issue for both resource protection and neighborhood compatibility. While "leave no trace" or "pack it in - pack it out" principles encouraging user-based management of litter are less resource intensive, they have not proven to be effective in a municipal open space setting such as

Bishop Peak Natural Reserve. In response, the City will install wildlife-friendly garbage receptacles at trailheads along with "mutt mitt" dispensers for dog owners.

2. **Neighborhood Compatibility.** With no dedicated parking for BPNR, the impacts of visitation volume are felt largely by surrounding residents. City staff will study and monitor the traffic patterns in the neighborhood and apply traffic management strategies where appropriate, consistent with the City's Land Use and Circulation Element (LUCE) policies found in Chapters 7 and 8 pertaining to residential street design standards, levels of service, and neighborhood traffic management. In keeping with the mission of reducing impacts on surrounding neighborhoods and complying with mode share split objectives of the LUCE, the City will advocate and work towards improved access by alternative modes of travel including transit, bicycle, walking and other forms as a demand-reduction strategy wherein the goal is for 50% of all trips to BPNR to be accommodated in this way (12% transit, 20% bicycle, 18% walking or other forms). At present, survey data indicates that open space visitors, in general, are comprised of 68% driving, 8% bicycle, 12% walking, and 12% other or multiple modes (Riggs et. al., 2015). There are several promising smartphone applications such as "Transit to Trails" that the City is currently exploring. The bicycle safety improvements planned for the Broad Street Bike Boulevard and the Foothill intersections will also facilitate Bishop Peak access, while additional bike racks will also be installed.

   Night hiking creates a disturbance to sensitive nocturnal wildlife within the Reserve and nearby residents and is expressly prohibited under the City's Open Space Regulations. Night hiking may be deterred by a combination of mechanisms including continued enforcement, neighbor and police partnerships, clearer articulation of fines on signage, and through employment of night time parking restrictions on Highland Drive and Patricia Drive.

   The Conservation Plan Update introduces the Good Neighbor Policy, below, for the first time as a means of articulating the City's pledge to both residential and agricultural ranch property neighbors:

   1. The City will ensure pro-active outreach and communications with neighbors.
   2. The City will promote partnership efforts with neighbors and other citizens to provide stewardship and care for the land and surroundings.
   3. The City will use best practices to educate open space users about the importance of respecting neighbors and private property, as well as adherence to Open Space Regulations.
   4. The City will actively address citizen concerns in a timely manner.
   5. The City will not actively promote Bishop Peak Natural Reserve as a tourist destination location through media outlets, advertisements, and publications.

3. **Trail Network Maintenance.** The BPNR is one of the most heavily visited open spaces in the City's open space network and the trail system bares much of the resulting pressures. The major issues facing the trail system are erosion, poor signage and presence of unofficial "use trails." The City will upgrade existing signage along the trail network, increase the availability of maps and other technological aids, and install two new informational kiosks to educate the public and improve wayfinding.

   Erosion is a significant problem throughout the Reserve, most notably at trail junctions and near the summit. The City will continue to implement trail rehabilitation projects and monitor their effects. Special emphasis should be placed on areas of high conservation value such as riparian areas and areas of very high use such as the summit trail. Qualitatively, Levels of Acceptable Change (LAC) have been exceeded in the upper reaches of the summit trail, and a reclassification of two areas from "Management / Trail

Corridor" to "Restoration" appears warranted pursuant to the *Conservation Guidelines for Open Space Lands of the City of San Luis Obispo* (2002; see pgs. 8-10). Unofficial use trails are present throughout the Reserve. This may be due in part to lack of clear signage, as referenced above. Trails that are redundant, unsustainable or that represent a threat to natural resources will be decommissioned and given proper signage to encourage rehabilitation.

4. **Rock Climbing.** While climbing is a historic and permitted use within the Reserve, climbing activities should not interfere with roosting areas for bats and raptors, rare plant protection, and overall management goals for the Reserve. Climbing areas should be identified, protected and monitored.

   Unauthorized installation of climbing bolts and establishment of climbing use trails should be addressed. For the most part, climbers are outstanding stewards of the rock and surrounding environment. At present it appears that there are just a few "bad actors" and increased attention to climbing areas is warranted in order to interact more with the climbing community and raise awareness of Open Space Regulations 12.22.050(N) pertaining to climbing activities, which are as follows:

   1. Rock-climbing is permitted only within specific designated areas on city open space lands. Said areas shall be identified by the [Parks and Recreation] director, who may also make reasonable rules concerning such use, including but not limited to requirements for waivers of liability as a condition of permission for such use.

   2. No person shall set or install climbing bolts in any designated climbing area without the written approval of the director.

   3. The director shall appoint a committee of persons interested in climbing to advise him or her on matters affecting designated climbing areas, including but not limited to reviewing requests for new climbing routes, inspections of climbing areas, climbing bolts installed therein, or other matters pertaining to the operation and maintenance of the area.

   The Conservation Plan Update introduces climbing management guidelines for the first time as a way of articulating specifically to the climbing community the City's expectations for resource protection and sustainable use of the Reserve's cliffs and rock faces. See Appendix D.

5. **Foothill Boulevard Trail.** Due to concerns of roadway safety at the unofficial trailhead at Foothill Blvd., conditions should be monitored for increases in roadway conflicts. The City will require a formalized trailhead and parking area consistent with Chapter 8 of the Land Use Element of the General Plan (See Program 8.15 North Side of Foothill [Bishop Knoll]: "Development shall provide a parking lot and trail access to Bishop Peak.")

   The junction of the bootleg trail originating at Foothill Blvd. continues to erode, presenting aesthetic concerns and trail management issues at multiple points of intersection with the summit trail. These junctions should be managed to reduce proliferation of use trails, reduce erosion, and limit impacts to surrounding vegetation. Ideally, the establishment of a new trailhead at the Bishop Knoll site would also provide an opportunity to restore and re-route sections of the upper trail as it approaches the Reserve. Any site work in this area will require close coordination with the County of San Luis Obispo.

6. **Emergency Response and Ranger Access.** The prior 2004 conservation plan included the consideration of emergency access as one of its goals:

3.27 The establishment of a connection road across the site for emergency and maintenance access that will eliminate the requirement for access through the Brittany Court development at the end of Highland Drive should be considered.

With the current average of 2-3 calls for emergency assistance per month to the Reserve, increasing fire danger associated with the current drought, and the need to facilitate enhanced Ranger patrol, vehicle access improvements for official uses were evaluated as part of this planning process. The range of emergencies in the Reserve managed by City firefighter-paramedics spans the spectrum from twisted ankles and mild dehydration to limb threatening fractures and heart attacks. At the same time, emergency access should be minimally invasive, with limited impacts to natural resources, aesthetics and surrounding neighborhoods.

With these goals in mind, staff identified a new trail section to facilitate emergency and Ranger access located just below the stock pond area of the Reserve and above Patricia Drive. This proposal entailed a new drive-able trail section that would be approximately 580 feet long and 8 feet wide, while decommissioning and restoring an approximately 620 foot section of adjacent trail switchbacks that are 4 feet wide, and re-grading a 600 foot section of existing trail that has become eroded over the years. This proposal was reviewed at the public workshop meetings, as well as by the Planning Commission. Numerous neighbors expressed strong concerns for this proposal, however, and the Planning Commission agreed. Their recommendation to the City Council is that this Conservation Plan Update should not reflect the Patricia Drive emergency access; rather, a study of different potential emergency access locations should be provided to the City Council that compares alternatives using evaluative criteria.

In summary, the Emergency Access Alternatives Study looks at six different options that are evaluated using six separate criteria. The preferred alternative appears to be formally establishing the Brittany Court access that the City has historically used by permission from the controlling property owner, Mr. Felton Ferrini. Both Fire Department and Natural Resources staff have met with Mr. Ferrini in the past year and he has been clear that he is no longer willing to accommodate emergency access through Brittany Court by permission. The City does have an access easement for utilities maintenance purposes only (to access the water tank above the pond), and it appears at this time that the City would need to pursue a real property negotiation to expand the scope of the existing easement, pursuant to future City Council authorization and direction regarding price and terms. The Emergency Access Alternatives Study is available under separate cover.

7. **Grazing.** Mr. Webb Tartaglia has been the long-standing cattle operator at the Reserve in collaboration with the Ferrini family that enjoys a reserved grazing right. Mr. Tartaglia stocks fourteen mother and calf pairs each spring season. The current grazing regime has been mostly successful, and two special status botanical species identified by Terra Verde Environmental (San Luis Obispo owl's clover and Cambria morning glory) have been prolific in grazed areas. These species appear to prefer a disturbance regime created through animal grazing impact and a decrease in competition from annual grasses and other forb species, as well as thistles and other weedy species. The prior 2004 conservation plan called for a fencing project to protect and restore the riparian area in the lower pasture. This plan includes a more clearly defined project area and planting palette in order set the stage for project implementation. Lastly, the excavation of the accumulated silt in the stock pond would not only be beneficial from a natural resources management perspective, as above, it would provide more reliable stock water supply from season to season, as well as a potential water supply source for active firefighting when aerial water drop tactics are employed.

1. Introduction

Bishop Peak Natural Reserve (BPNR) is a 352-acre open space located in the northwest part of the City of San Luis Obispo (Figure 1). The three-pointed summit is the tallest and most distinctive of the peaks that make up the string of Morros known locally as the nine sisters. BPNR is jointly managed by the City and County of San Luis Obispo. The Reserve is an important element of the local community's setting and character. It provides opportunities for enjoyment of the natural environment and is a favorite spot for hiking, picnicking, and rock climbing by local residents and students from nearby CalPoly University.

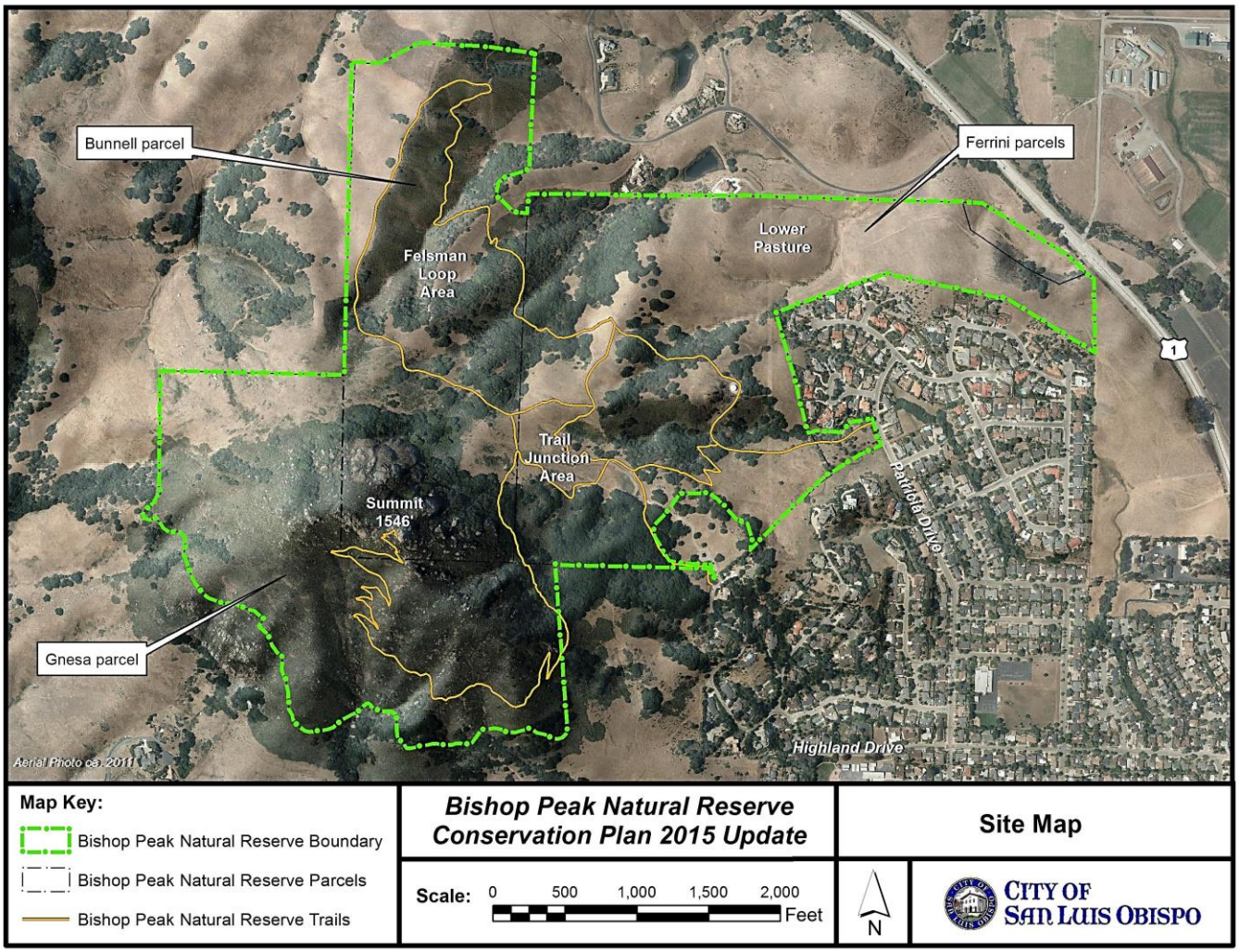
1.1 Background

The Morros are a series of intrusions into the overlying rock that formed approximately 25 million years ago as part of the Fransican Formation. They cover a 40-square-mile area from Morro Rock (to the northwest in Morro Bay) to Islay Hill on the southeast side of the City of San Luis Obispo. These formations cannot be considered true volcanoes, in that they did not erupt and spew lava or ash over the countryside. Instead, magma deep within the earth found a weak spot in the earth's crust, and pushed through the overlying rocks like toothpaste being squeezed out of a tube. The rocks of the Morros, a type of basalt known as dacite, are between 24 and 26 million years old. Since that time, the overlying rocks have eroded away and the hard, erosion-resistant dacite has remained, leaving the prominent Morros that we see today. This material, like most volcanic rock, is quite resistant to erosion and thus leaves very steep sides and other features that contribute to the striking quality of the City of San Luis Obispo skyline. Bishop Peak, tallest of the Morros, reaches an elevation of 1,546 feet above sea level.

1.2 History

Bishop Peak was first given that title by Spanish missionaries who perceived a resemblance between the peak and the cap or miter worn by the bishops of the time. The peak together with other Morros has always been an area landmark. It has also been a source of some economic exploitation over the years, principally for stone. At least two and possibly three small quarry operations have gone on at various locations around the base of the peak over the years. The mountain was quarried most heavily during the late 1800s and early 1900s, when rock was removed to build the breakwater at Port San Luis. To haul the rock from Bishop peak to the Port a narrow gauge railway was built from the Pacific Coast Line in San Luis Obispo, through the Avila valley to Port San Luis.

All quarrying activities were small or intermittent operations, and none succeeded in removing large quantities of material from the mountain. Bishop Peak has long been perceived as a community landmark, and many parties were interested in preserving the peak to provide public access and to preserve its natural beauties forever. In 1977 the heirs of the Gnesa Ranch donated the land above the 800-foot elevation (approximately 104 acres) to the State Parks Foundation; this land is now managed by the County of San Luis Obispo. In 1995, an additional 140 acres was donated to the City of San Luis Obispo as the Ferrini Ranch Open Space. In 1998, 108 acres were purchased from Ray Bunnell, and has brought the Bishop Peak Natural Reserve to its present size of approximately 352 acres. The property now has a trail that goes from the official access points at Patricia Drive and Highland Drive to the summit, a distance of two miles with an elevation gain of 1,000 feet. Another trail known as Felsman Loop, traverses several canyons in the northern part of the Reserve and provides interesting views of oak woodland, chaparral, and coastal sage scrub, as well as attractive views of the surrounding area. Management of BPNR is a joint program of the City and County of San Luis Obispo.


Bunnell parcel
Ferrini parcels
Felsman Loop Area
Lower Pasture
Trail Junction Area
Summit 1546'
Patricia Drive
Gnesa parcel
Highland Drive
Aerial Photo ca. 2011
1
Map Key:
Bishop Peak Natural Reserve Boundary
Bishop Peak Natural Reserve Parcels
Bishop Peak Natural Reserve Trails
Bishop Peak Natural Reserve Conservation Plan 2015 Update
Site Map
Scale: 0 500 1,000 1,500 2,000 Feet
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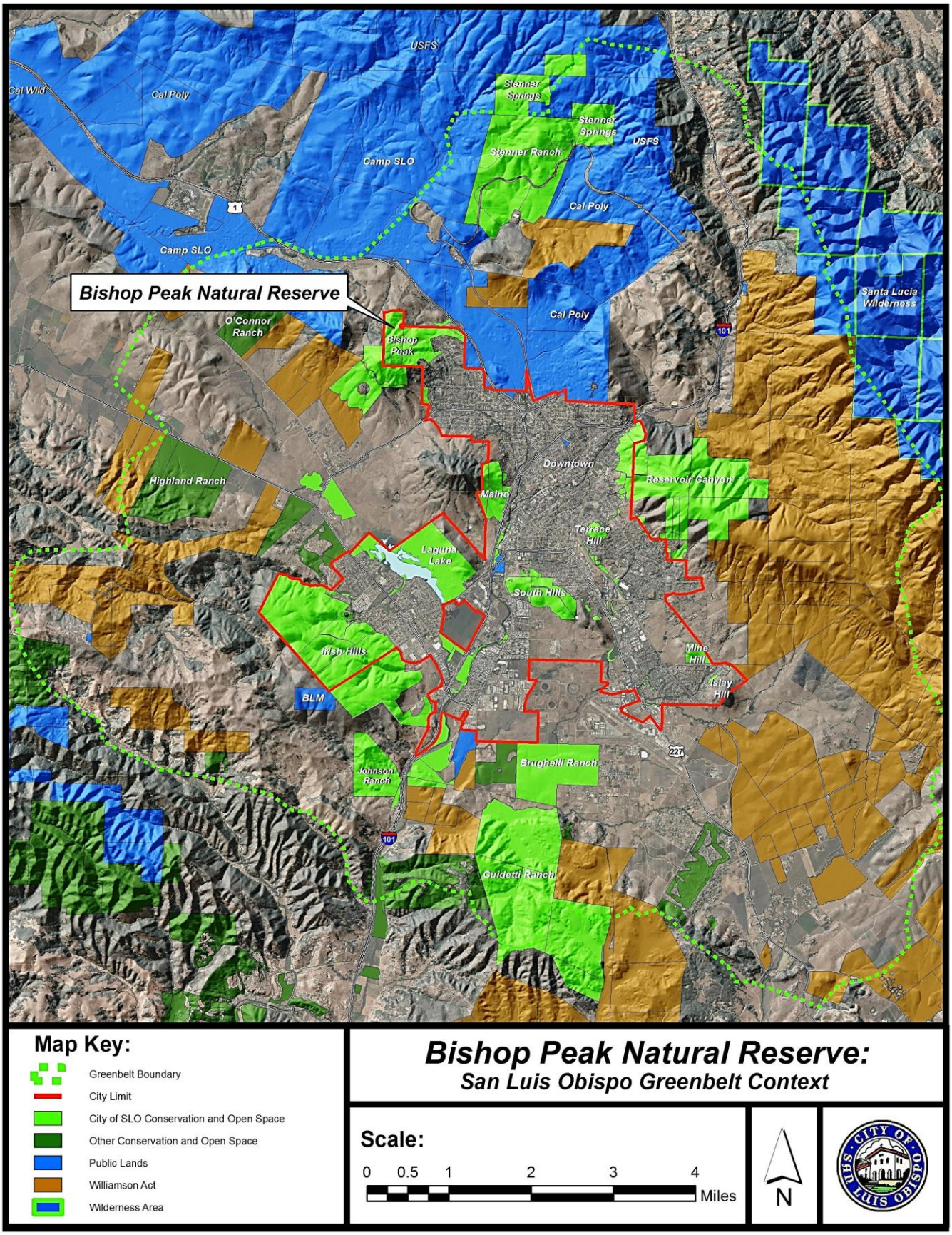
Bishop Peak Natural Reserve
USFS
Cal Wild
Cal Poly
Stenner Springs
Stenner Springs
USFS
Stenner Ranch
Camp SLO
Cal Poly
Camp SLO
Cal Poly
Santa Lucia Wilderness
O'Connor Ranch
Bishop Peak
101
Highland Ranch
Downtown
Reservoir Canyon
Maino
Terrace Hill
Laguna Lake
South Hills
Mine Hill
Islay Hill
Fish Hills
BLM
227
Johnson Ranch
Brughelli Ranch
101
Guidetti Ranch
Map Key:
Greenbelt Boundary
City Limit
City of SLO Conservation and Open Space
Other Conservation and Open Space
Public Lands
Williamson Act
Wilderness Area
Bishop Peak Natural Reserve:
San Luis Obispo Greenbelt Context
Scale:
0 0.5 1 2 3 4
Miles
N
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1.3 Legal Background

BPNR was acquired as several different parcels. Two of these parcels totaling 248 acres were acquired by the City of San Luis Obispo, the other 104 acres was a donation to the State of California which is managed by the County of San Luis Obispo. Several conditions were attached to these acquisitions, two of which were donations, and these conditions are legally binding upon the City and County in the management of the Reserve. Among the conditions are:

Ferrini Open Space

- Access
    - Emergency Services: Yes (lower area only)
    - BPNR Maintenance: Yes (lower area only)
    - Utilities: Yes
    - Horses: No
    - Mountain Biking: No
    - Foot Traffic: Yes
    - Grazing: Yes

Bunnell Open Space

- Access
    - Emergency Services: Yes
    - BPNR Maintenance: Yes
    - Utilities: Yes
    - Horses: Yes
    - Mountain Biking No.
    - Foot Traffic: Yes
    - Grazing: No

Gnesa Open Space

- Access
    - Emergency Services: No
    - Maintenance: No
    - Utilities: Not Required
    - Horses: No
    - Mountain Biking: No
    - Foot Traffic: Yes
    - Grazing: No

In addition, horses boarded at the stables on the former Bunnell property have a right of use of the trails on the portion of the Reserve purchased from Ray Bunnell (Figure 1) as said trails existed at the time of the March 1998 purchase (Note: the trail to the top of Bishop Peak was not in existence at the time of purchase and is therefore not covered by this condition). No access points other than the three agreed to under the *'Easement and Boundary Maintenance Agreement'* will be permitted.

1.4 Plants & Wildlife

The rocky soils derived from volcanic parent material have been undisturbed for a long time, and have retained their original vegetation in pristine form. Many woody plants are found in BPNR that are not found on the finer surrounding soils. Common vegetation types on the Reserve include oak woodland, grassland, coastal sage scrub, and chaparral. The most prominent tree species on the mountain are coast live oak and California bay, with an

occasional sycamore indicating the site of a spring or seep. Beneath the oaks is the ubiquitous poison oak, the most common shrub found on the peak. Together with California blackberry, this woodland understory creates some of the best wildlife habitat in the area. Common species of coastal sage scrub include coyote brush, black sage, monkeyflower, and California sagebrush. These plants are aromatic, with clearly recognizable odors of sage or other minty smells. The hard or true chaparral is generally found more in inland areas and is not so common near the coast. However, in certain areas of Bishop Peak and on the other Morros, chaparral species such as chamise, manzanita, mountain mahogany, toyon and ceanothus can often be found.

The varied plant cover and the existence of steep rocky cliffs provides attractive habitat for a wide variety of birds, mammals, reptiles and other wildlife. Over 200 species of birds are found within the San Luis Obispo area, and perhaps as many as half of these may be found on Bishop Peak. Among the more notable bird species are golden eagles, bald eagles (which are occasionally sighted during the wintertime) hawks, owls, vultures, kestrels and other birds of prey. More commonly seen are the numerous jays, and a wide variety of perching birds.

Deer are fairly common on the peak, and foxes, coyotes, bobcats and even mountain lions are occasionally encountered. At night, raccoons and opossums can often be seen around the base of the mountain or moving into urban areas from the cover provided by the dense brush of the mountain.

With the 2015 Update, a biological survey was completed by Terra Verde Environmental Consulting and their findings are included in Appendix 2.

1.5 Access

Highland Drive: - Parking: Use existing Street Parking only, no additional off street parking allowed
Pedestrian Traffic Only, Dogs on Leash, No Bikes, or Horses

Patricia Ave: - Parking: Use existing Street Parking only, no additional off street parking allowed
Pedestrian Traffic Only, Dogs on Leash, No Bikes, or Horses
Maintenance of Water Tank, Emergency services, and maintenance of trails as required.

Foothill Blvd: - Not a formal access point but is used heavily by the public
Work with Land owner to help redirect them to official access points on Highland and Patricia Drives. An opportunity for formal parking exists if adjacent property is annexed and developed in accordance with the Land Use and Circulation Element adopted in 2014 (See Program 8.15).

Bishop Peak Ranch Northern Gate: - Not open to public. Access for Bishop Peak Ranch only, horses, pedestrian Emergency Services, maintenance

Bishop Peak Ranch Southern Gate: - Not open to public. Access for movement of cattle only, pedestrian Emergency Services, maintenance

Bishop Peak Ranch Middle Gate: - Not open to public. Access for movement of cattle only, pedestrian Emergency Services, maintenance.

Highway 1 Gate: - Emergency services access only, and access for cattle.

The reader is referred to the trail guide in Appendix C for details on the trail system and designated access points.

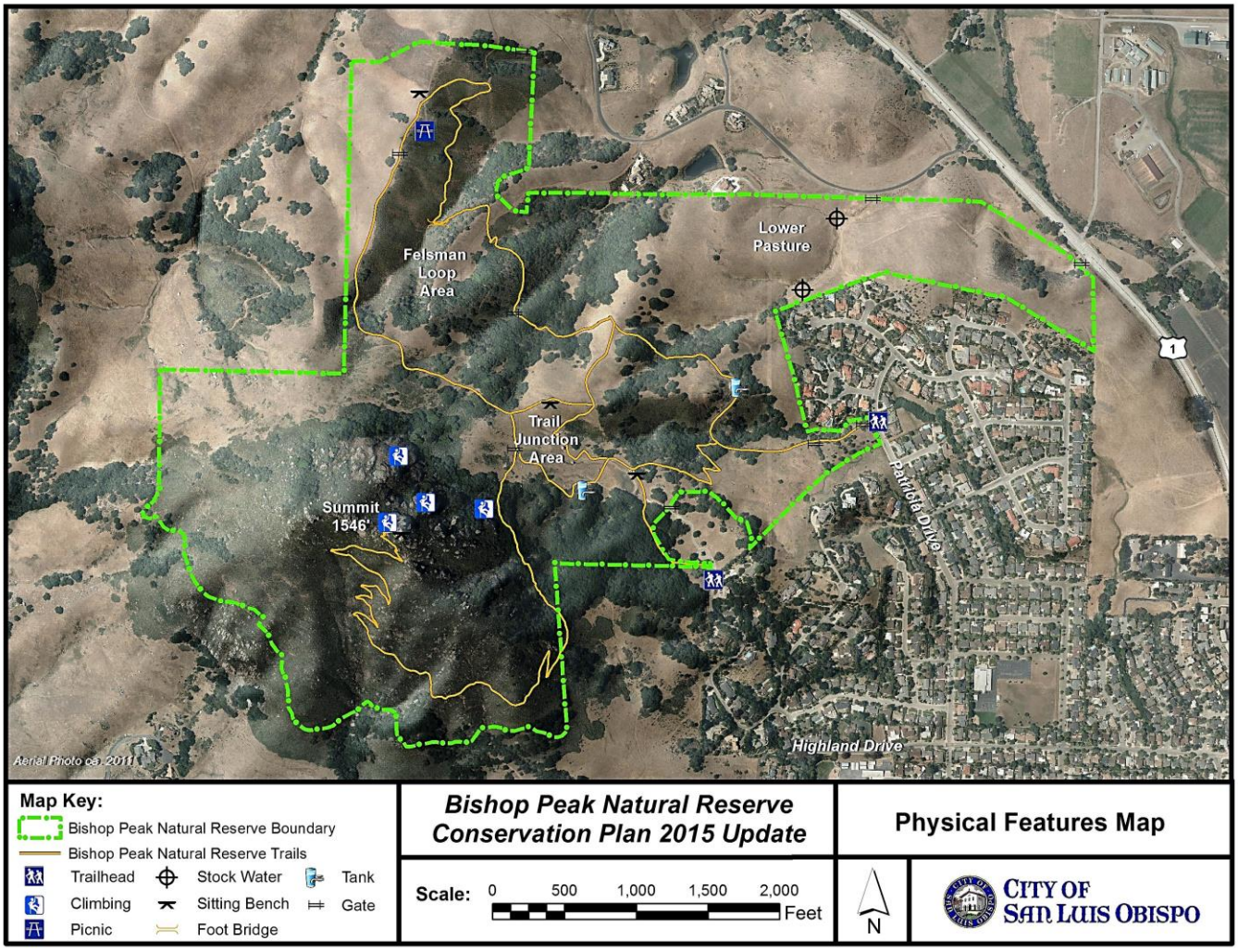
2. Inventory

2.1 Physical Features

The Reserve consists of the distinctive 1546 ft three-pointed peak to the southwest, with areas of chaparral and grassland below 800 ft lying to the north and east (Figure 2).

Physical changes to the landscape resulting from past and present human activities within BPNR include: 4.1 miles of established trail system; two water tanks; seven established rock climbing areas; two authorized access points at Patricia Drive and Highland Drive. Natural physical features include the 1546ft peak, and a small seasonal pond in the foothills east of the peak (see Figure 3).

Soils - Survey maps indicate that seven soil types are represented on BRNR (Figure 4). They are primarily dacite rock outcrops (63.25 acres), Lodo shale/clay loams (88.46 acres), Diablo complex soils (78.82 acres), and Gaviota fine sandy loams (63.50 acres). Smaller areas of Briones (20.75 acres), Los Osos (16.31 acres) and Salinas (2.72) soils are also present (see Appendix 1 for detailed soil descriptions).



2.2 Cultural/Historic Features

A rich and diverse assemblage of cultural and historic resources are present within the BPNR. Eleven separate cultural resources have been identified ranging in age from recent historic to prehistoric, possibly in excess of several thousand years. A report detailing the specifics of each site and its location has been prepared (Betrando and Betrando, 1997), a copy of which is available from the City of San Luis Obispo only by written request.

2.3 Biological Features

As part of the 2015 Update, a new biological inventory was completed by Terra Verde Environmental Consulting and the complete list of plants and wildlife they observed is included in Appendix 2. They documented 9 different plant communities, and recorded a total of 201 plant and 54 wildlife species. Of those, one plant community, two plant species and 7 wildlife species are considerd special-status. Terra Verde Environmental identified many of the same species that were present in 2004, as well as some new ones, while others were not present during the current survey. It is assumed that suitable habitat is still present for those species that were not present during the current survey; accordingly both the prior survey work, below, and the current survey work are included with the 2015 Upate.

BPNR encompasses a mosaic of woodland, grassland, and scrub habitats that encircle Bishop Peak and extend upward to merge with its rocky facade. These natural communities support a diverse assemblage of plants and animals. Wildlife surveys of BPNR were conducted between November 2002 and June 2003. Representative areas of scrub, live oak woodland, and grassland habitats were sampled using standard survey methods.

A variety of bird, mammal, reptile, amphibian, and invertebrate species were observed or detected during the surveys. Dense undergrowth of poison oak (*Toxicodendron diversilobum*) and/or thick scrub vegetation limited the areas above 800 feet in elevation that were accessible for surveying. Wildlife observations in these areas were made from footpaths and game trails. The detailed wildlife report in Appendix 2 presents a list of wildlife species identified during surveys and those described as occurring within or directly adjacent to BPNR in a report by Ostrowski (1979).

2.4 Dominant Vegetative Communities

Three broadly defined native vegetative communities are dominant habitat types within BPNR. These include live oak woodland, mixed scrub-chaparral, and grassland habitats. The locations and coverage of each of these communities is shown in Figure 5. Mixed scrub/chaparral habitat and grassland habitat occupy roughly equal areas of BPNR (37 and 36 percent, respectively). Approximately 27 percent of the area within BPNR is occupied by oak woodland habitat. The composition and abundance of dominant species within each community is variable.

Mixed Scrub-Chaparral Habitat - Scrub vegetation occupies nearly 129 acres of BPNR. This community is variable with observed differences likely resulting from differences in soil type, location/exposure, topography, and degree of disturbance (including fire). Scrub habitat recovering from recent brush fires is encountered along a ridge in the northeastern region of BPNR. Although the species composition, abundance, and density/height of the community varies, the dominant vegetative components within scrub-chaparral habitats generally include:

- California sagebrush (*Artemisia californica*)
- Black sage (*Salvia mellifera*)
- Coyote brush (*Baccharis pilularis*)
- Chamise (*Adenostoma fasciculatum*)
- Toyon (*Heteromeles arbutifolia*)

- Coast live oak (*Quercus agrifolia*)
- Deerweed (*Lotus scoparius*)
- Poison oak (*Toxicodendron diversilobum*)
- Monkeyflower (*Mimulus aurantiacus*)
- Wedgeleafceanothus/buck brush (*Ceanothus cuneatus var. cuneatus*)
- Wild buckwheat (*Eriogonum fasciculatum*)

A variety of less common flowering plants and shrubs were found during surveys of the scrub/chaparral habitat. These include fuchsia-flowered gooseberry (*Ribesspeciosum*), Indian paintbrush (*Castilleja sp*.), morning glory (*Calystegia sp*.), blue dicks (*Dichelostemmapulchella*), goldenrod (*Solidagooccidentalis*), and coast tassel bush (*Garryaelliptica*).

Coast Live Oak Woodland Habitat - Areas identified as coast live oak woodland occupy approximately 97 acres of BPNR and are present on many of the north and east facing hillsides and swales. Oak woodland habitat also extends up into the Reserve along a few of the drainage swales located on the scrub-chaparral dominated southern exposure of Bishop Peak. As with scrub-chaparral habitats, the species composition, density, and height of the coast live oak community is variable. Generally, coast live oak woodland along the eastern and northern exposures of the peak is dominated by a mixed coast live oak/California bay-laurel community. A mixed coast live oak/toyon community vegetates southern exposures and the drier (upper) areas within drainage swales. The dominant species identified within coast live oak woodland include:

- Coast live oak (*Quercus agrifolia*)
- California bay-laurel (*Umbellularia californica*)
- Toyon (*Heteromeles arbutifolia*)
- Poison Oak (*Toxicodendron diversilobum*)
- Coffeeberry (*Rhamnus californica*)
- Sycamore (*Platanus racemosa*)
- Monkeyflower (*Mimulus aurantiacus*)
- Blackberry (*Rubus ursinus*)
- Wood fern (*Dryopteris arguta*)
- Blue elderberry (*Sambucus mexicana*)

Understory vegetation is generally sparse beneath the oak canopy but includes poison oak, blackberry, monkeyflower, ferns, and grasses. Fuchsia-flowered gooseberry, hummingbird sage (*Salvia spathacea*), and shooting stars (*Dodecatheon spp*.) are among the flowering plants encountered in oak woodland habitats.

Grassland Habitat - Grassland habitat occupies a combined area of approximately 126 acres within BPNR. The grasslands consist of a variable mixture of native and non-native grass species, wildflowers, and forbs. Generally, grasslands along the lower slopes appear to be dominated by annual grasses. Purple needlegrass (Stipapulchra) is the most common native grass species in the Reserve and the following species are prevalent:

- Foxtail barley (*Hordeum murinum*)
- Ryegrass (*Lolium multiflorum*)
- Common wild oats (*Avena fatua*)
- Ripgut brome (*Bromus diandrus*)
- Hummingbird sage (*Salvia spathacea*)
- Mustard (*Brassica nigra*)
- Wild rose (*Rosa californica*)

A variety of native wildflowers are observed blooming in grassland areas. These include buttercup (*Ranunculus californicus*), Goldenstar (*Bloomeria crocea*), soap plant (*Chlorogalum pomeridanum*), mariposa lily (*Calochortus spp.*), California poppy (*Eschscholzia californica*), chocolate lilies (*Fritillaria biflora*), and blue dicks (*Dichelostemma capitatum*).

2.5 Wildlife Survey

The three broad habitat types identified within BPNR support a diversity of wildlife species. Most of the species observed or detected during wildlife surveys are relatively common inhabitants of scrub-chaparral, oak woodland, and grassland habitat however, five special-status wildlife species were encountered. These included the Cooper's hawk (*Accipiter cooperii*), white-tailed kite (*Elanus leucurus*), loggerhead shrike *(Lanius ludovicianus*), and San Diego desert woodrat (*Neotoma lepida intermedia*). Additionally, several species of local concern were encountered during surveys. These included the ringneck snake (*Diadophis punctataus*), western skink (*Eumeces skiltonianus*), yellow-rumped warbler (*Dendroica coronata*), Olive-sided flycatcher (*Contopus borealis*), greater roadrunner (*Geococcyx californianus*), rufous-crowned sparrow (*Aimophila ruficeps*), and monarch butterfly (*Dananus plexippus*). A summary of the wildlife species identified is presented in the following section.

Birds - The varied habitats within BPNR offer food, shelter, and roosting/nesting sites for a wide variety of bird species. A total of 55 bird species were identified during surveys including three special status species. Table 1 presents a list of the bird species identified. Undoubtedly many more resident and migratory bird species would be detected with a more extensive seasonal sampling effort.

A Cooper's hawk was observed on two occasions, once in oak woodland habitat near the Highland Drive access trail and once in an oak woodland area near the northern extent of the Reserve. On both occasions the hawk appeared to be hunting. A white-tailed kite was observed in both grassland (perching and foraging) and oak woodland (perching) habitats in the northeastern region of BPNR on several occasions. Nesting white-tailed kites and Cooper's hawks are listed in the CNDDB as fully protected in California and as migratory non-game birds of management concern by the United States Fish and Wildlife Service (USFWS). Another federal and state special concern species, the loggerhead shrike, has been observed in BPNR in recent years. A single loggerhead shrike was sighted in a sycamore tree near Highway 1 (across from Stenner Creek Road) in 2000. Additionally, BPNR supports a variety of warblers, wrens, vireos, flycatchers, and native sparrows that are considered local species of concern.

Table 1. List of birds identified during 2004 wildlife surveys of BPNR showing habitats in which the species were observed.

Scientific Name	***Common Name***	***Scrub and Chaparral***	***Live Oak Woodland***	***Grassland***
Accipiter cooperii	Cooper's hawk		√	
Aeronautes saxatalis	White-throated swift	√	√	
Aimophila ruficeps	Rufous-crowned sparrow	√		
Anas platyrhynchos	Mallard		in stock pond	
Aphelocoma californica	Western scrub-jay	√	√	
Buteo lineatus	Red-shouldered hawk		√	

Buteo jamaicensis	Red-tailed hawk	√	√	√
Callipepla californica	California quail	√	√	
Catherpes mexicanus	Canyon wren	√		
Calypte anna	Anna's hummingbird	√		
Carduelis tristis	American goldfinch	√		
Carpodacus mexicanus	House finch	√		√
Cathartes aura	Turkey vulture	√		
Catharus ustulatus	Swainson's thrush	√	√	
Chamaea fasciata	Wrentit	√		
Chondestes grammacus	Lark sparrow	√		
Colaptes auratus	Northern flicker		√	
Columba livia	Rock dove (pigeon)		√	
Contopus borealis	Olive-sided flycatcher	√		
Corvus brachyrhynchos	American crow		√	√
Dendroica coronata	Yellow-rumped warbler		√	
Dendroica townsendi	Townsend's warbler		√	
Elanus leucurus	White-tailed kite	√	√	√
Euphagus cyanocephalus	Brewer's blackbird			√
Falco sparverius	American kestrel		√	√
Geococcyx californianus	Greater roadrunner	√		
Hirundo pyrrhonta	Cliff swallow			√
Junco hyemalis	Dark-eyed junco	√	√	
Lanius ludovicianus	Loggerhead shrike			√
Meleagris gallopavo	Wild turkey			√
Mimus polyglottis	Northern mockingbird	√	√	
Parus inornatus	Plain (oak) titmouse	√		
Parus rufescens	Chestnut-backed chickadee		√	
Phalaenoptilus nuttalii	Common poorwill			√
Picoides villosus	Hairy woodpecker		√	
Pipilo crissalis	California towhee	√	√	
Pipilo erythrophthalmus	Spotted towhee	√	√	
Polioptila caerulea	Blue-gray gnatcatcher	√		
Psaltriparus minimus	Bushtit	√	√	
Regulus calendula	Ruby-crowned kinglet		√	
Sialia mexicana	Western bluebird		√	√
Sayornis nigricans	Black phoebe	√	√	
Selasphorus sasin	Allen's hummingbird	√		
Spizella passerina	Chipping sparrow	√		√
Sterna sp.	U.I. tern			
Sturnella neglecta	Western meadowlark			√
Thryomanes bewickii	Bewick's wren		√	
Toxostoma redivivum	California thrasher	√		
Turdus migratorius	American robin			√

Tyto alba	Barn owl		√	
Vireo huttoni	Hutton's vireo		√	
Vermivora celata	Orange-crowned warbler	√	√	
Zenaida macroura	Mourning dove	√		√
Zonotrichia atricapilla	Golden-crowned sparrow	√	√	√
Zonotrichia leucophrys	White-crowned sparrow	√		√

Mammals - A total of seventeen mammal species were observed during wildlife surveys (Table 2). Scrub/chaparral habitats appeared to support the greatest diversity of mammal species. Mule deer (*Odocoileus herionus*) were encountered in each of the habitat types sampled and woodrat nests were common in chaparral and oak woodland areas. Two species of woodrat, the dusky-footed woodrat (*Neotoma fuscipes macrotis*) and the San Diego desert woodrat, were identified in BPNR during small mammal trapping efforts. The San Diego desert woodrat is a federal and state species of special concern. Positive identification of the sub-species of dusky-footed woodrat encountered on Bishop Peak was not determined, however, it is not believed to be a special concern species. Bishop Peak is situated several miles to the southeast of the described range of the Monterey dusky-footed woodrat, which is a special concern species.

Bats - (Order Chiroptera) were detected by sound in a rock crevice near the top of Bishop Peak, however, their taxa could not be determined. Numerous rock crevices suitable for roosting bats are present in BPNR as well as an abundant prey base for special status species such as the pallid bat (*Antrozous pallidus*). With the updated biological surveys completed, Terra Verde biologists deployed a Pettersson D500x bat detector with the acoustic calls analyzed with SonoBat US West (Szewczak) and validated the presence of not only the special status pallid bat but also recorded Townsend's big-eared bat (*Corynorhinus townsendii*) calls. Hoary bat (*Lasiurus cinereus*) calls were also recorded and they are listed as a High Priority for protection through the Western Bat Working Group.

Table 2. 2004 List of mammals identified during wildlife surveys of BPNR showing habitats in which the species were observed or detected.

Scientific Name	***Common Name***	***Scrub and Chaparral***	***Live Oak Woodland***	***Grassland***
Canis latrans	Coyote	√		√
Order Chiroptera	Bat	√		
Didelphis marsupialis	Opossum		√	
Peromyscus boylei	Brush mouse	√	√	
Peromyscus californicus	California mouse	√		
Peromyscu smaniculatus	Deer mouse	√	√	
Procyon lotor	Raccoon		√	
Mephitis mephitis	Striped skunk	√		
Microtus californicus	California meadow mouse	√		√
Neotoma fuscipes macrotis	Dusky-footed woodrat	√	√	
Neotoma lepida intermedia	San Diego desert woodrat	√	√	
Odocoileus herionus	Mule deer	√	√	√
Sciuru sgriseus	Western gray squirrel		√	
Spermophilus beecheyi	California ground squirrel			√
Sylvilagus bachmani	Brush rabbit	√		
Thomomys bottae	Botta's pocket gopher	√		√
Urocyon cinereoargenteus	Gray fox	√	√	

Reptiles - Five reptile species were encountered during wildlife surveys including two species of local concern; the ringneck snake and the western skink. The reptile species identified during the survey are listed in Table 3. The western fence lizard (*Sceloporus occidentalis*) was the most commonly encountered reptile and was present in all of the surveyed habitat types. Western skink appeared to be relatively abundant in grassland areas on the eastern and northern exposures of the peak.

Table 3. 2004 List of reptiles identified during wildlife surveys of BPNR showing habitats in which the species were observed.

Scientific Name	***Common Name***	***Scrub and Chaparral***	***Live Oak Woodland***	***Grassland***
Diadophis punctataus	Ringneck snake		√	√
Elgaria multicarinatus	Southern alligator lizard			√
Eumeces skiltonianus	Western skink			√
Pituophis melanoleucus	Gopher snake			√
Sceloporus occidentalis	Western fence lizard	√	√	√

Amphibians - Two amphibian species, the Pacific tree frog (*Hylaregilla*) and the California slender salamander (*Batrachoseps attenuatus*) were encountered during surveys. Both species were encountered in greatest abundance in grassland areas, although they were also observed in oak woodland habitat. Pacific tree frog larvae and juveniles were present in the stock pond near the Highland Drive access point and in ephemeral pools associated with two of the larger watercourses that drain the northern areas of the peak.

Invertebrates - A variety of invertebrates were identified during surveys including the Big Sur shoulderband snail (*Helminthoglypta umbilicata*). A number of live Big Sur shoulderband snails, as well as empty shells, were found during surveys.

Table 4. 2004 List of invertebrates identified during wildlife surveys of BPNR showing habitats in which the species were observed.

Scientific Name	***Common Name***	***Scrub and Chaparral***	***Live Oak Woodland***	***Grassland***
Dananu splexippus	Monarch butterfly	√		
Eleodes sp.	Stink beetle	√		√
Gryllus pennsylvanicus	Field cricket	√		√
Helix aspersa	European garden snail			√
Helminthoglypta umbilicata	Big Sur shoulderband snail			√
Latrodectus mactans	Black widow spider			√
Lygaeus kalmii	Common milkweed bug	√		√
Nymphalis antiopa	Mourning-cloak butterfly	√		
Stenoplematus fuscus	Jerusalem cricket			√
Vespula sp.	Yellow jacket			√

Other invertebrates noted during surveys include various butterflies, bees, centipedes, millipedes, spiders, crickets, scorpions, and several ant species. Monarch butterflies were observed within the Reserve, however, no over-wintering sites were identified during surveys.

Goals & Recommendations

Goals 3.1-3.4 will be achieved by the identification and appropriate management of land use designations within BPNR as described in "Conservation Guidelines for Open Space Lands of the City of San Luis Obispo". Land use designations for BPNR are shown on the system map in Figure 7. The goals relevant to BPNR from the Conservatio Guidelines are:

3.1 To conserve, enhance, and restore natural plant communities; to protect sensitive and endangered plant species and their habitats; and to maintain biodiversity of native plants and animals.

3.2 To provide the public with a safe and pleasing natural environment in which to pursue passive recreational activities, while maintaining the integrity of the resource and minimizing the impact on the wildlife and habitats represented.

3.3 To preserve and restore creeks, wetlands and ephemeral seeps or springs in a natural state, and provide suitable habitat to all native aquatic and riparian species. To minimize the impacts of harmful activities, such as the release of pollutants, while maintaining the creek system as a means of conveying storm water within urban areas.

3.4 To conserve and protect native plant and animal species and enhance their habitats, in order to maintain viable wildlife populations within balanced ecosystems.

The Open Space Element of the General Plan has been updated since implementation of the 2004 Bishop Peak Natural Reserve Conservation Plan and is now called the Conservation and Open Space Element (2006). Because the Conservation Guidelines are based on the previous Open Space Element, relevant goals of the current, 2006 Conservation and Open Space and Element are included below to provide further guidance. The changes most relevant to BPNR, in general, are:

1. Monitoring programs for air and water quality, and for natural populations
2. Passive recreational uses of open space where compatible with other natural resource and neighborhood compatibility objectives
3. Exterior lighting design standards to prevent light pollution and preserve nighttime sky views
4. Increased emphasis on preservation of the Morros
5. Revised greenbelt boundary to expand open space buffers around the City and more closely reflect natural viewsheds, watersheds and geographic features like valleys, ridgelines and peaks

The following are new goals, policies, and programs from the Conservation and Open Space Element that are relevant to BPNR:

Sustainable Natural Populations (7.2): The city will maintain and enhance conditions necessary to enable a species to become self-sustaining. Within the San Luis Obispo planning area, the City will seek to achieve self-sustaining populations of the plants, fish and wildlife that made up the natural communities in the area when urbanization began.

Trees and other plants. (7.4): Protect, preserve and create the conditions that will promote the preservation of significant trees and other vegetation, particularly native California species.

Greenbelt.: Open space outside the urban area. Secure and maintain a healthy and attractive Greenbelt around the urban area, comprised of diverse and connected.

Open spaces access and restoration. (8.4.2): The city intends to allow public access to open space that fosters knowledge and appreciation of open space resources without harming them and without exposing the

public to unacceptable risk. The main goal is to protect open space and wildlife habitat, with a secondary goal of providing passive recreation where it will not harm the environment.

Passive Recreation. (8.5.5): The City will consider allowing passive recreation where it will not degrade or significantly impact open space resources and where there are no significant neighborhood compatibility impacts, in accordance with an approved open space conservation plan. Passive recreation activities may include: hiking, nature study, bicycle use, rock climbing, horseback riding or other passive recreational activities as permitted and regulated in the Open Space Ordinance.

Determination of appropriate uses for City-owned open space. (8.5.6): Determination of the appropriate land management practices and the recreational uses of City-owned open space lands shall be made on an area-specific basis, based upon the policies in the Conservation and Open Space Element, the Open Space Ordinance (SLOMC 12.22), and the adopted "Conservation Guidelines for City-Owned Open Space Lands." These policies will be applied through the public planning and review process specified in the Conservation Guidelines, and will guide the preparation and adoption of conservation plans for City-owned open space properties.

This Conservation Plan also aims to accommodate the desires and wishes of the general public for BPNR, as well as addressing the general goals of the City's Conservation and Open Space Element. The points detailed below are a result of input solicited from members of the public during workshops and other public meetings held in 2003 which led to the adoption of the Bishop Peak Natural Reserve Conservation Plan in 2004, as well as in 2015.

3.5 Wildlife habitat enhancements should be implemented whenever possible (enhancement to California quail habitat was specifically identified as requiring attention as local residents have noticed a reduction in quail numbers on the property in recent years).

3.6 Habitat information guides should be prepared informing local residents and users of the characteristics of the wildlife and habitats represented in BPNR, and measures that can be taken to preserve wildlife and habitat. A webpage dedicated to BPNR was agreed to be a suitable medium for the dissemination of this information.

3.7 The current ban on mountain biking on BPNR should be retained.

3.8 The City should encourage CalPoly University to address problems associated with the sports complex lights. There are concerns that the complex is currently a source of light pollution for BPNR.

3.9 The area of BPNR designated as 'Habitat' during the land use designation process should be maximized.

3.10 The City should explore methods of 'people management' (i.e. changes in user behavior) in addressing impacts to resources resulting from over use of BPNR.

3.11 Impacts on viewsheds both of and from BPNR should be avoided (e.g. the use of orange snow fencing to delineate restoration areas should be avoided).

3.12 Both grazing and fire preparedness plans should be prepared for BPNR.

3.13 Fuel management below the peak should be performed routinely. Cattle grazing and prescribed burning were suggested as appropriate means of fuel management.

3.14 Risks to the public from wildfire should be assessed and addressed. Suggestions for risk reduction included the establishment of a helipad close to the peak and the establishment of marked and maintained 'wildfire refuge areas'.

3.15 The prospect of armoring (by paving or other means) trails as a means of keeping users on designated trails should be explored as a means of addressing the erosion problems caused by bootleg trails, trail braiding and switchback cutting (the public response in 2004 to this suggestion was mixed with proponents for and against the idea).

3.16 Public support for addressing scenic problems associated with the 'P' which was painted on the rock face.

3.17 Photo-points should be established within the first year of implementation of the Conservation Plan to get a 'baseline' for resource condition as soon as possible.

3.18 Further outreach efforts should be made to CalPoly University to help with restoration efforts on BPNR and to educate students on proper conduct while using the Reserve.

3.19 Maintenance of the scenic quality of resources at the pond area should be preserved.

3.20 The City should be more diligent in management of brush on BPNR, this could cause a fire hazard.

3.21 Use of BPNR during hours of darkness should be discouraged due to issues with vandalism and potential for fires.

3.22 Vegetation along Highland Drive should be trimmed, this may have traffic safety implications due to a reduction in visibility resulting from overhanging vegetation. Suggestion to widen Highland drive to address parking issues associated with BPNR.

3.23 More Ranger staff hours should be added to manage the heavy user load on BPNR.

3.24 Rock climbing activities on BPNR should not interfere with raptor or bat nesting. Impacts on lichens and vegetation at access points to climbing routes should also be monitored.

3.25 There should be no increase in the current level of horse traffic in BPNR due to the detrimental impact of heavy use on the resource.

3.26 In grazing plans prepared for BPNR recovery of young oak trees and rare plants should be identified as an objective of grazing.

3.27 The establishment of a connection road across the site for emergency and maintenance access that will eliminate the requirement for access through the Brittany Court development at the end of Highland Drive should be considered.

4. Conservation Plan

The Conservation Plan describes how the City and County of San Luis Obispo intend to manage BPNR to fulfill adopted goals and recommendations of the community for the property. The land use designations proposed for BPNR are shown on the system map (Figure 7). The general day-to-day management of these areas will be in accordance with direction in the City-adopted document "*Conservation Guidelines for Open Space Lands of the*

City of San Luis Obispo". The Conservation Plan also describes a series of tasks that will be implemented in order to achieve more specific goals and recommendations.

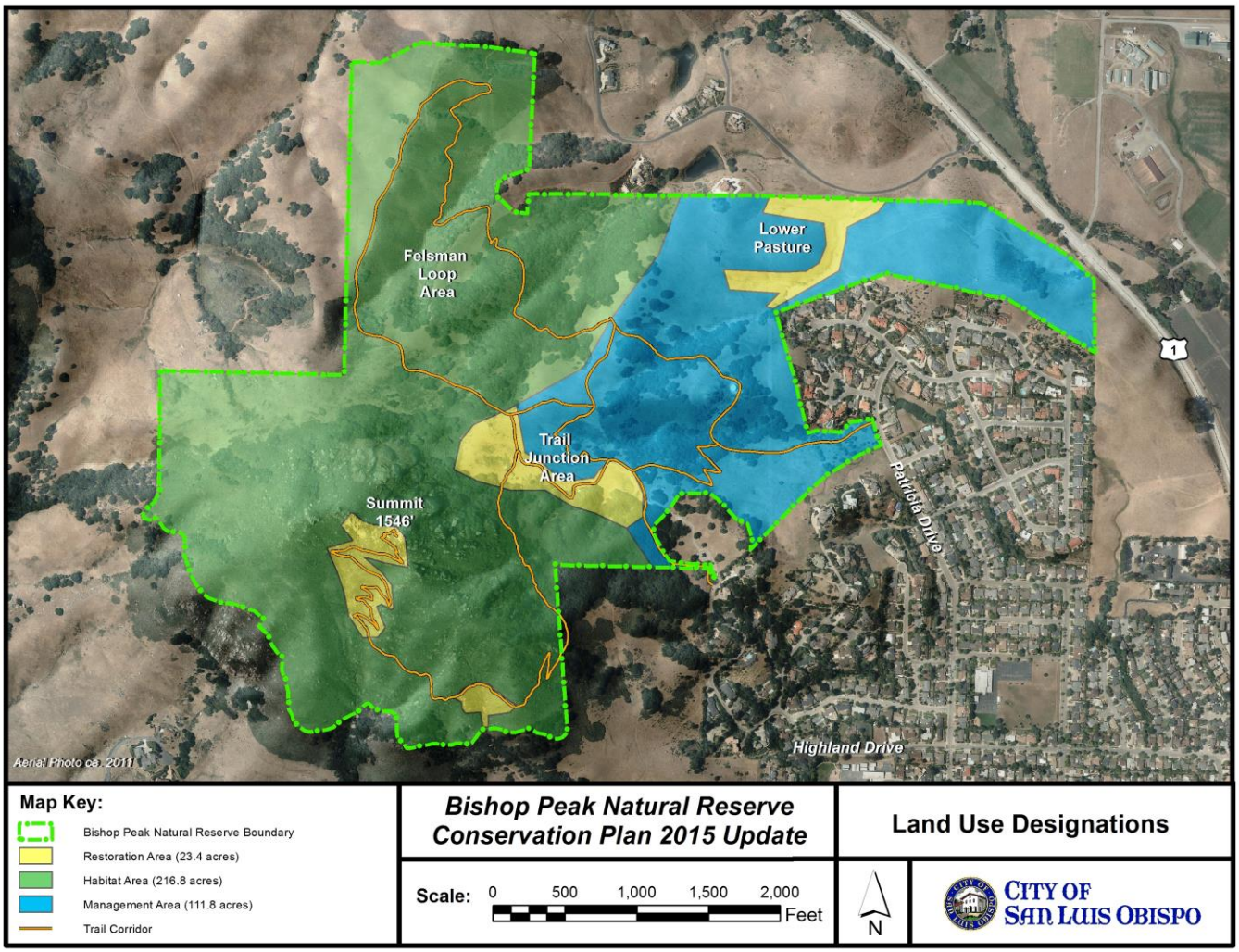
4.1 System Map

The land use designations proposed for BPNR are shown in Figure 7. Three designations are represented:

	2004		2015	
Habitat	225 acres	64%	216.8	61.6%
Management/Trail Corridor	110 acres	30%	111.8	31.8%
Restoration	20 acres	6%	23.4	6.6%
TOTAL	355 acres	100%	352 acres	100%

(The 'Agricultural' and 'Cultural/Historic' designations are not represented within the boundaries of BPNR)

In keeping with the City/County commitment to the conservation of native wildlife and vegetation, 61.6% of BPNR has been designated as 'Habitat'; this figure has decreased slightly as additional restoration project areas near the Summit and Trail Junction area have been identified for the 2015 Update.



4.2 Needs Analysis

The following tasks will continue to be undertaken over the next 7-10 years to accomplish goals that are not yet complete and address the recommendations described in Section 3.

To achieve goals 3.1-3.4 BPNR will be managed in accordance with City-adopted policies described in *"Conservation Guidelines for Open Space Lands of the City of San Luis Obispo"*. The reader is referred to this document for specific details of how these policies relate to land use designations identified on the system map (Figure 4), and an explanation of how policies are identified in the following discussion (e.g. LV7; HA12etc).

Many of the policies described in "*Conservation Guidelines for Open Space Lands of the City of San Luis Obispo*" are designed to be protective of City-owned resources by restricting activities that may have a negative impact (e.g. prohibition of trail construction in 'Habitat' areas [HA12]). Providing such limitations are observed, implementation of restrictions is primarily a passive affair requiring no active management or changes in prevailing conditions or activities. However, other recommendations do require active management and will result in changes in management practices or altered resource conditions. These are:

(Note: The specific goal or recommendation identified in Section 3 that is addressed by the proposed action is given in parentheses)

4.2.1 Restoration of wildlife habitat is considered an integral part of management, maintenance, and restoration of all City-owned open spaces. Habitat enhancements will be implemented as opportunities and funding arise. Special grant funding will be sought for habitat enhancement projects (3.5).

4.2.2 A ban on mountain biking is a legally binding condition of some of the parcels and the high usage by foot traffic makes it unsafe, prohibits a combined use, therefore the City/County shall continue to enforce the current ban on mountain biking in the Reserve (3.7).

4.2.3 The City's Conservation and Open Space Element has as "Its overarching goal to protect resources (such as air and water, wildlife habitat, scenic… lands, watershed and historic features) with a secondary goal of accommodating passive recreation where it will not harm the environment…" This shall be achieved by maximization of the area designated as 'Habitat' within BPNR (3.9).

4.2.4 City-adopted policy relating to the protection of viewsheds on City-owned open space is described by item HA12 in the document "*Conservation Guidelines for Open Space Lands of the City of San Luis Obispo*" (3.11; 3.19).

4.2.5 City-adopted policy relating to the development of grazing and wildfire management plans is described by items LV1 and LV9 in the document "*Conservation Guidelines for Open Space Lands of the City of San Luis Obispo*" (3.12; 3.20).

4.2.6 City-adopted policy relating to the management of vegetative fuel on City-owned open spaces is described by items LV8 and LV9 in the document "*Conservation Guidelines for Open Space Lands of the City of San Luis Obispo*" (3.13; 3.20).

4.2.7 The City of San Luis Obispo Municipal Code, item 12.22.050B states: '*Presence in Open Space Lands Restricted to Certain Hours - No Overnight Usage. Open space lands where public access is permitted shall be open to the public from dawn to dusk. It shall be unlawful to enter or remain within such lands between one hour after sunset and one hour before sunrise of the following day without approval from the director'*.

Presence in BPNR outside of stated hours of use is a violation of this regulation, and enforcement is a matter for the City's Police Department (3.21).

4.2.8 The City-adopted policy relating to the closure of rock climbing routes on City-owned open spaces is described by item HA9 in the document "*Conservation Guidelines for Open Space Lands of the City of San Luis Obispo*" (3.24).

4.2.9 Horses boarded at the stables on the former Bunnell property have a legal right of use of the trails on the portion of the Reserve purchased from Ray Bunnell. No other stable has rights to use the property, nor is there indication that horse traffic from the Bunnell stable will increase significantly above its present level. The City does not anticipate that the level of horse traffic using BPNR will increase significantly within the timeframe of this Conservation Plan (3.25).

4.2.10 The grazing plan for BPNR is described in Section 6 (3.26).

4.2.11 The letter 'P' painted on the east-facing slope of Bishop Peak during the 1960's is viewed as an eyesore by some local residents. However, others believe that it is now a part of the community's character and heritage. The City and County have explored the possibility of removing this graffiti with local rock climbers. There have been previous attempts to remove/alter it which were unsuccessful, including an ill fated attempt to haul up a compressor/sandblaster. From a safety perspective, removal of the graffiti would be a very dangerous task. Sandblasting would probably be the only viable means of removal. The compressor would have to be carried up to the summit with a gas-powered generator to run it. The work would have to be performed from the top down using ropes and harnesses. There are no commercial/heavy duty anchors above the 'P' to anchor from and a contractor would have to create his / her own anchor system. Due to the technical and dangerous nature of the process the prospect of a local climber volunteering to perform this task is low (3.16).

4.2.12 The City and County of San Luis Obispo have jointly published an information leaflet entitled "Bishop Peak Natural Reserve" (Appendix 3), this outlines rules of use of the Reserve and gives information on history, biology and geology. This information will be supplemented by the creation of a webpage dedicated to BPNR on which more detailed up-to-date information can be posted (3.6).

4.2.13 The City and County of San Luis Obispo will work with CalPoly to address problems relating to lighting from sports complex disturbing wildlife on BPNR (3.8).

4.2.14 BPNR is the most heavily used open space in the area and regular ranger patrols are essential to minimize user behavior that is detrimental to the resource. At present the City of San Luis Obispo commits approximately 500 man-hours annually to patrol/maintenance of BPNR, with an additional 150 hours being supplied by the County. As funding resources become available patrol hours should be increased to a minimum of 1000 man-hours annually (3.10; 3.23); with up to 1/3 of this labor being provided by the County.

4.2.15 The establishment of a helipad close to the peak has been investigated and was deemed to be infeasible due to the lack of a suitable location. However, the City and County in coordination with the City Fire Department and CDF will explore the feasibility of establishing signposted 'wildfire refuge zones' within BPNR (3.14).

4.2.16 Paving (hardscaping) of the trail may be evaluated as a method to address the user impact induced erosion problems in the pond area when all other reasonable methods (such as exclusion fencing and public education) have been exhausted. If the evaluation concludes that paving of the area is necessary

then all specifications regarding length of trail to be paved, materials used etc, will be identified in the next update of this conservation plan (3.15).

4.2.17 Photo-points have been identified (see Section 7) to establish a pictorial record of the status of the resource over time (3.17).

4.2.18 The City and County have produced a body of educational materials about BPNR, including: a color brochure, webpage (http://www.slocity.org), and trailhead signage. It is a concern of the public that the Reserve is not publicized in such a way as to attract large numbers of additional, non-local, tourists to an already heavily used resource. City Natural Resources staff are of the opinion that most of the information currently available strikes the appropriate balance between public education and active promotion of the Reserve, but will remain active in ensuring that tourism publicity through media outlets and advertising is eliminated.

Further efforts will be made to educate CalPoly students about responsible use of the Reserve. Campus media outlets such as the 'Mustang Daily' will be utilized for this process whenever possible (3.18).

4.2.19 The vegetation that overhangs Highland Drive is on private property. The City Arborist and Transporation Operations Manager will assess if this vegetation poses a safety risk to motorists using Highland Drive, and if so enforcement action may be taken to address the problem (3.22).

4.2.20 The development of a continuous emergency/maintenance road traversing BPNR with multiple access points is discussed in the 'Wildfire Preparedness Plan' in Section 6 (3.27).

4.2.21 The ongoing program to control infestations of Purple and Yellow Star thistle, and Distaff thistle will continue. The methods of control utilized will, ideally, be in accordance with the Integrated Pest Management (IPM) policy described in item LV12 of the appendix to the document "Conservation Guidelines for Open Space Lands of the City of San Luis Obispo" but the provisions of LV13 and LV14 may be necessary for effective control of these invasive species.

4.2.22 City staff will monitor public parking for access to Bishop Peak Natural Reserve at the Highland Avenue and Patricia Drive accesses. Problems or complaints continue to be raised by the adjacent neighborhoods, and staff has advised the neighborhoods about the City's parking permit district program and of other potential actions which may be pursued to address those concerns. Ongoing traffic studies and discussions with neighbors must occur to reach consensus on appropriate strategies.

4.3 Implementation Strategy

The priority and order in which tasks described in Section 4 will be implemented is detailed below. Each task has been designated to staff from the City's Natural Resources Program (NR), Parks and Recreation Department (PR), or other City/County staff. As of Spring, 2015 the current status of each task has been appended to provide clarity for the development and continuity of future management efforts.

Ongoing Tasks	**Status as of 2015 Update**
Tasks 4.2.1-4.2.11 are general maintenance activities or activities that the City has decided not to implement for the reasons stated. Maintenance activities will be implemented on a regular or 'as needed' basis throughout the next 7-10 years	

covered by this Conservation Plan Update (NR/PR).	
Specific Tasks	
Years 1-2	
• Create a webpage dedicated to BPNR (task 4.11; NR).	• Not yet complete, in development as part of Conservation Plan Update
• Discuss the issue of light pollution from the Cal Poly sports fields with the appropriate university representative (task 4.12; NR/PR).	• Complete
• Establish appropriate photopoints to monitor resource status over time (task 4.17; NR).	• Photopoints established, monitoring ongoing
• Assess the vegetation overhanging Highland Drive as a potential hazard to motorists and take action as appropriate (task 4.19; NR/City Arborist).	• Overhanging vegetation on private property, notices are sent periodically to request trimming by public works department.
• Outreach to CalPoly University using media such as the 'Mustang Daily' newspaper and by attending on-campus environmental awareness fairs (4.18; NR/PR).	• Ongoing as part of Week of Welcome to all new Cal Poly students, with additional outreach included in the Open Space work program for 2015-17.
• Develop a continuous emergency access/maintenance road with multiple points of access from the public highway system (task 4.20; NR/PR/County).	• Complete, although access through Brittany Circle is in question at present.
• Assess the feasibility of establishing wildfire refuge areas at the peak. If feasible, clearly signpost these areas (task 4.14; NR/PR/City Fire/CDF).	• Incomplete however conversations with City Fire and Cal Fire are ongoing.
Years 3-4	
• Install educational materials in the form of notice boards or informational booths at the trailhead (task 4.18; NR/PR/County).	• Partially complete.
• Create a two-pasture system to accommodate the modified grazing system as described in the grazing plan (task 4.10; NR. Section 6).	• Complete.
Years 5-7	
• Address the erosion and trail braiding problems currently existing at the pond area where trails originating at Patricia Dr. and Highland Dr. converge. Hardscape the trails in this region if deemed appropriate (task 4.15; NR/PR).	• Erosion and trail braiding problems were successfully addressed above the pond, but new problems in other areas have arisen.

As Funds/Opportunities Become Available	
• Increase annual Ranger patrol hours at BPNR to 1000 (task 4.14; PR); with up to 1/3 of time being provided by the County of San Luis Obispo.	City Ranger patrol hours have not met the annual hourly target of 1000 hours, however three newcity Ranger positions have been approved as part of the 2015-17 financial plan. County rangers provide occasional maintenance activity on the Gnesa parcel.

In addition to continued implementation of those tasks identified above, the following have been identified for additional work with the 2015 Update:

Years 1-2:

- Install new, updated signage at trailheads that provide wayfinding information, Open Space Regulations and associated costs of infractions thereof, and educational / interpretive elements
- Install new, updated signage throughout the trail network to identify official trails, decommissioned trails and climbing specific trails
- Continue monitoring and maintenance of switchbacks on Summit Trail, and implement restoration projects as appropriate (fencing, signage, revegetation, erosion control)
- Install new garbage receptacles at Highland Dr. and Patricia Dr.
- Establish additional new photo monitoring points consistent monitoring protocols for Restoration Areas
- Work with climbing community to identify designated climbing areas and refined management strategies
- Conduct additional research and surveys pertaining to bat populations using the cliffs and caves of the Reserve

Years 3-4:

- Pursue improvements of bootleg trail from Foothill Dr.
- Pursue multi-modal transportation strategies for trailhead access
- Implement lower pasture riparian fencing and restoration project
- Implement stock pond excavation project

Ongoing Specific Tasks:

- Continue education and enforcement of Open Space Regulations in the field
- Pro-active education and outreach with Cal Poly and other interested parties

- Monitor ecosystem health
- Monitor trailhead impacts
- Explore feasibility of fire, rescue and ranger access improvements
- Re-shoot photo monitoring points
- Monitor grazing regime, especially in riparian areas
- Maintain webpage for BPNR with management bulletin

4.4 Grazing Plan

Livestock grazing will be permitted on the Ferrini Open Space portion of BPNR.

The Ferrini Open Space was a donation to the City of San Luis Obispo. A condition of the donation was that the donor could continue his traditional use of the site for livestock grazing for continuing ten year periods, unless written notice is provided by the City. The next ten-year period will expire in summer 2015. At the present time the City does not intend to cancel the current tenancy arrangments. However, we will give notice of our intention to implement a new grazing plan as follows:

- The area will be divided by fencing into two pastures, lower pasture and upper pasture.
- Vegetation management objectives for upper pasture will be to control amount of residual dry matter (RDM) at the end of the growing season to approximately 1,500 pounds per acre. This will be accomplished by permitted livestock grazing from about March 15 to the end or near-end of the growing season (about June 15). Numbers of livestock will be based upon NRCS soils survey data for the area.
- Vegetation management objectives for the lower pasture will be to provide fuel reduction to the adjacent residential area, and to control amount of residual dry matter (RDM) at the end of the growing season to approximately 800 pounds per acre, with lower values near the boundary with private developed land, and higher values elsewhere. This will be accomplished by permitted livestock grazing from about March 15 to the beginning or near-beginning of the following growing season (about November 1). Numbers of livestock will be based upon NRCS soils survey data for the area. Current stocking rates are 14 mother / calf pairs.
- Livestock will not be within BPNR from approximately November 1 to approximately March 15, to allow full establishment of new growth and minimize soil damage from trampling during the winter. Livestock will not be within the upper pasture from approximately June 15 to March 15, to minimize potential conflict with recreational use and to allow full establishment of new growth and minimize soil damage from trampling during the winter.
- The overall acreage currently subject to grazing is about 140 acres; this includes about 40 acres of brush and woodland that is not contributing to the forage resource. About 30 of these acres would be fenced if necessary; however, they are currently only lightly used by livestock and this use would decline under the proposed program. Of the remaining 110 acres, about 30 would be in the lower, more heavily used pasture, and 70 in the upper pasture. RDM at the end of the grazing period under the proposal would be less than currently, and considerably less than currently in the upper pasture, which is estimated at between 600 and 800 pounds per acre at the end of the grazing period.

- Grazing use will be monitored to ensure that management objectives are being met. This will be done through ocular estimates of standing crop biomass, and the establishment and monitoring of permanent transects to estimate species composition within the pastures. A goal of the program will be to maintain native bunchgrasses and forbs, measured as a percent cover by the transect measurements.

- An exclosure will be constructed to control livestock access into the unnamed creek in the lower pasture, and permit revegetation of that feature with willows, oaks and other appropriate vegetation. (See Figure 5, below). The project area is approximately 2,270 linear feet and will feature a 30 foot upland buffer from the thalwag of the stream channel. The planting palette for this restoration project, based on species observation is the immediate vicinity of the project site, is anticipated to be as follows:

Riparian Area	
Arroyo willow	*Salix lasiolepis*
Bay laurel	*Laurus nobilis*
Black cottonwood	*Populus balsamifera ssp. trichocarpa*
Sycamore	*Platanus racemosa*
Mugwort	*Artemisia douglasiana*
Wetland Area	
Rushes spp.	*Juncus spp.*
Sedges spp.	*Carex spp.*
Common spikerush	*Eleocharis macrostachya*
Upland margins	
California sage brush	*Artemisia californica*
Coffeeberry	*Rhamus californica*
Coyote brush	*Baccharis pilularis*
Elderberry	*Sambucus mecicana*
Sticky monkeyflower	*Mimulus aurantiacus*
Toyon	*Heteromeles arbutifolia*
Ceanothus spp.	*Ceanothus spp.*

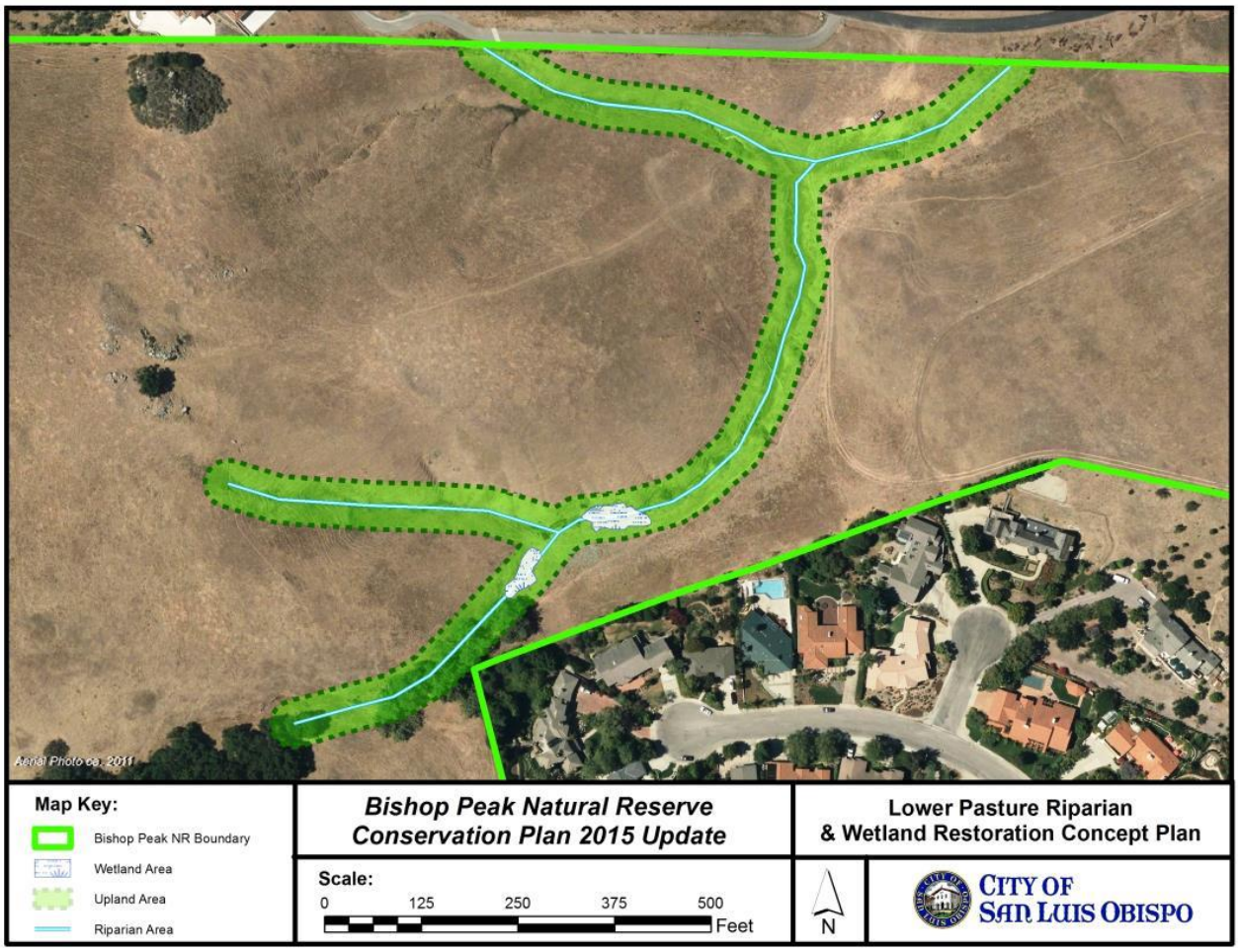
- The stock pond in the upper pasture will be partially fenced to permit establishment of appropriate vegetation on the banks, while still allowing livestock access to the water. It is recommended that the stock pond be excavated to remove silt that has accumulated over the years in order to provide a more reliable water source at this location, as well as habitat and firefighting benefits.

- The small spring above Anacapa Court will be fenced to preclude livestock access and encourage native vegetation establishment.

4.5 Wildfire Preparedness Plan

The City document "*Conservation Guidelines for Open Space Lands of the City of San Luis Obispo*" recommends that a Wildfire Preparedness Plan be developed for City open space lands. After consultation with the City's Fire Department and CDF, five areas have been identified that will receive specific treatment with respect to fighting wildfires and prescribed burning (Figure 6). The process of identification of these areas takes into account a number of factors, including: the topography of the land; proximity to urban developments; vegetation type; and the presence of sensitive species. The areas are:

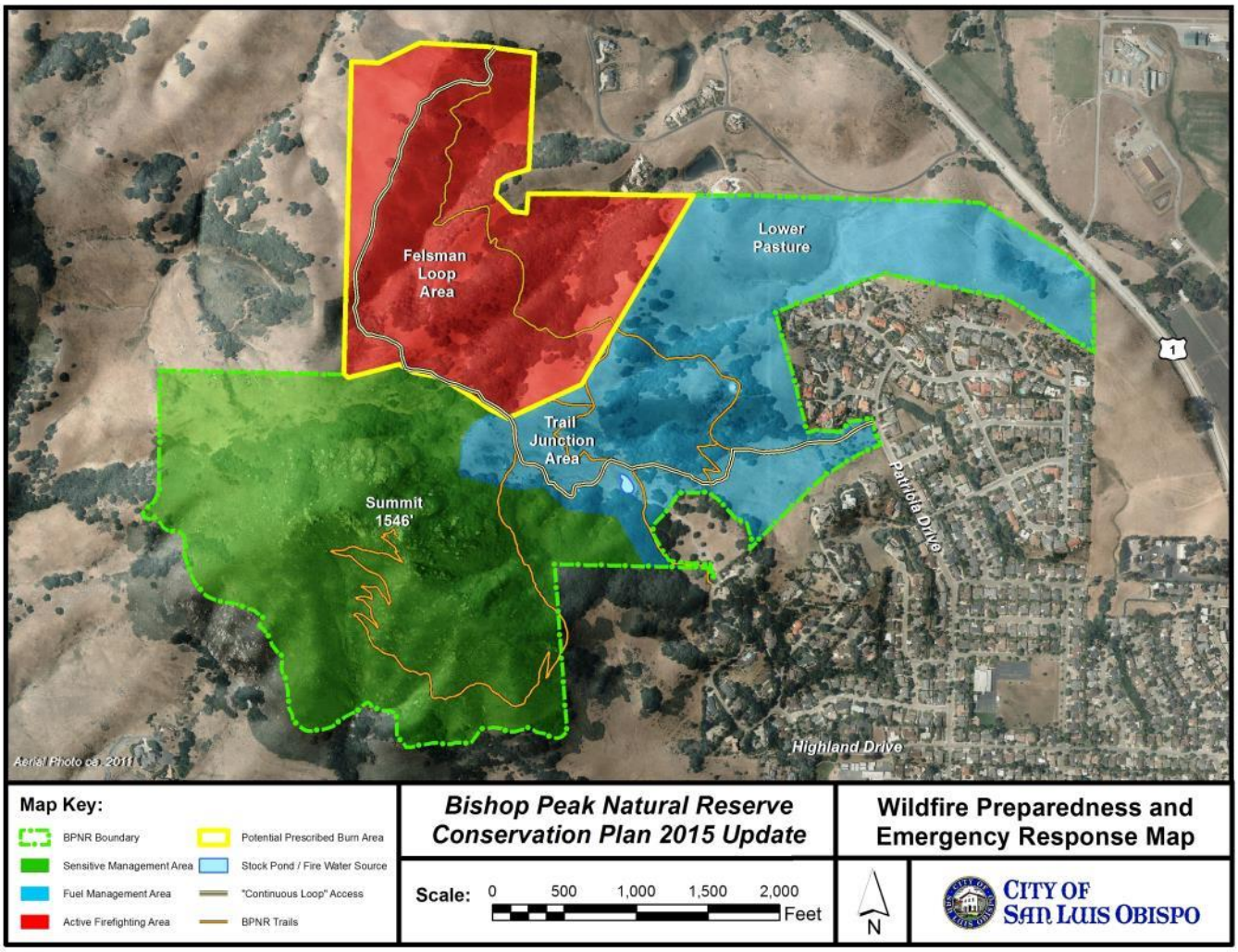
Potential prescribed burning area – areas identified as supporting a high load of vegetative fuel that could be safely reduced by burning under prescribed weather and wind conditions.



Fuel management area – areas adjacent to the urban/wildland interface that could not be safely burned in a controlled manner. These areas will require active pruning, mowing and/or other active management of the vegetation (including livestock grazing) to reduce fuel loads adjacent to developed properties.

Active firefighting area – areas acting as a buffer between the surrounding urban developments and the pristine habitat lying to the west but still within the BPNR.Active firefighting techniques such as the use of heavy machinery and cutting of fuel breaks can be utilized and property from an advancing wildfire. These areas have also been identified because the physical resources and topography are conducive to successful restoration efforts following a wildfire.

Passive (habitat sensitive) firefighting area – areas of important wildlife habitat, mostly on steep hillsides. These areas are also somewhat removed from urban development. They are particularly sensitive to aggressive firefighting techniques such as the use of heavy machinery. Therefore, wherever practicable, firefighting strategies in these areas should be limited to low impact, habitat friendly methods.



Construction of continuous emergency/maintenance road – Vehicular access to portions of BPNR which experience high maintenance and patrol needs and emergency access remains challenging. This is particularly problematic in the area of the pond. A ¼ mile of new jeep road connecting the upper Bunnell Road to the road from Brittany Court (Highland Drive), which reaches Highway 1, was constructed in 2005. This created a continuous emergency/maintenance road access across the property, but Brittany Court access has since been lost. Due to continued fire history in the open space and the level of heavy use the area receives, City staff believe

that continued investigation of emergency access alternatives is essential to ensure the continued safety of people using the Reserve. A separate Emergency Access Alternatives Study was prepared in counterpart to the 2015 Update for City Council review.

4.6 Fiscal Statement

The fiscal impact of the adoption of the Bishop Peak Natural Reserve Conservation Plan 2015 Update is expected to be substantive. It will consist of maintaining the patrol and maintenance of the property at an increased level, and the implementation of several small-scale capital improvements. The latter include:

- Revegetation and restoration of several portions of the Bishop Peak "Summit" Trail; and
- Revegetation of areas in the vicinity of the pond, the unnamed tributary to Stenner Creek, and other locations within the site.
- Excavation of accumulated silt in the stock pond for enhanced habitat value, stock watering, and use in the event of a wildland fire event for aerial suppression tactics.

None of these projects are considered costly, and would be paid out of maintenance funds available with the Open Space Maintenance CIP in the 2015-17 Financial Plan. Revegetation projects may be funded internally with Natural Resources Program and Ranger Service operating budgets or may utilize grant fund sources. Overall cost of the revegetation / restoration programs is considered to be in the $25,000 range. The stock pond excavation project is likely also in the $25,000 range.

The Wildfire Preparedness Plan has certain minor maintenance costs associated with it, specifically, periodic pruning of vegetation in a limited area, and the periodic removal of downwood within 200 feet of the Reserve boundary where it is adjacent to residential property. For the most part, however, the Wildfire Preparedness Plan would utilize livestock grazing as the primary management tool, as most of the lands identified as fuel management areas are non-native grasslands most appropriately managed by proper range management techniques.

There is strong continued interest in increasing Ranger presence at BPNR. Currently the City Ranger force expends about 6 hours per week at BPNR on patrol and an average of an additional 4 hours per week on maintenance. Three new Ranger positions were created in 2015, together with a revised strategy for deployment of the existing Rangers, creating enhanced overall Ranger patrol at BPNR for the first time in many years.

4.7 Photo-points and Monitoring

A series of 10 photo-points have been established at sensitive areas within the BPNR (Figure 7). The purpose of establishing such points is to build a pictorial record of how the status of the resource is changing over time. This will allow managers to make informed decisions about actions that should be taken to address issues relating to overuse of the reserve and associated impacts to the resource. Individual photo-points are identified using a system of coordinates, bearings, and the date to identify the location, direction and time of each photograph. It is recommended that annual photographs are taken on approximately the same date to give an accurate record of the status of the resource during comparable times of the year.

Photo-point 1: An area of high traffic in the region of the stock pond where the trails from the Patricia Drive and Highland Drive access points meet. The concentration of foot traffic in this area has resulted in trail braiding, erosion problems, and has prevented the establishment of native shrubs and trees. Recent restoration efforts

have fenced large portions of the open grassland areas adjacent to the stock pond, and planted native vegetation. The success of these efforts will be monitored from this photo point.

Photo-point 2: The main access trail for both the Felsman loop trail and the Peak trail, and it experiences very heavy traffic. This photo point will monitor the status of this heavily used portion of the trail system and increases in trail width and/or braiding of the trail in this area will be evident.

Photo-point 3: An area of the Felsman loop trail that is currently experiencing a small degree of gully formation and width expansion on the main trail. This photo point will monitor any deterioration in this portion of the trail system over time.

Photo-point 4: A Series of switchbacks ascending towards the peak, this area of the trail system is particularly susceptible to erosion due to the high levels of use it experiences from users who summit the mountain, and also because of the steep terrain in this area.

Photo-point 5: A shortcut trail which has developed close to the pond area in the foot hills of the peak. This area should be monitored carefully and restorative activities implemented to either make the shortcut the official trail or concentrate use on to the existing official trail.

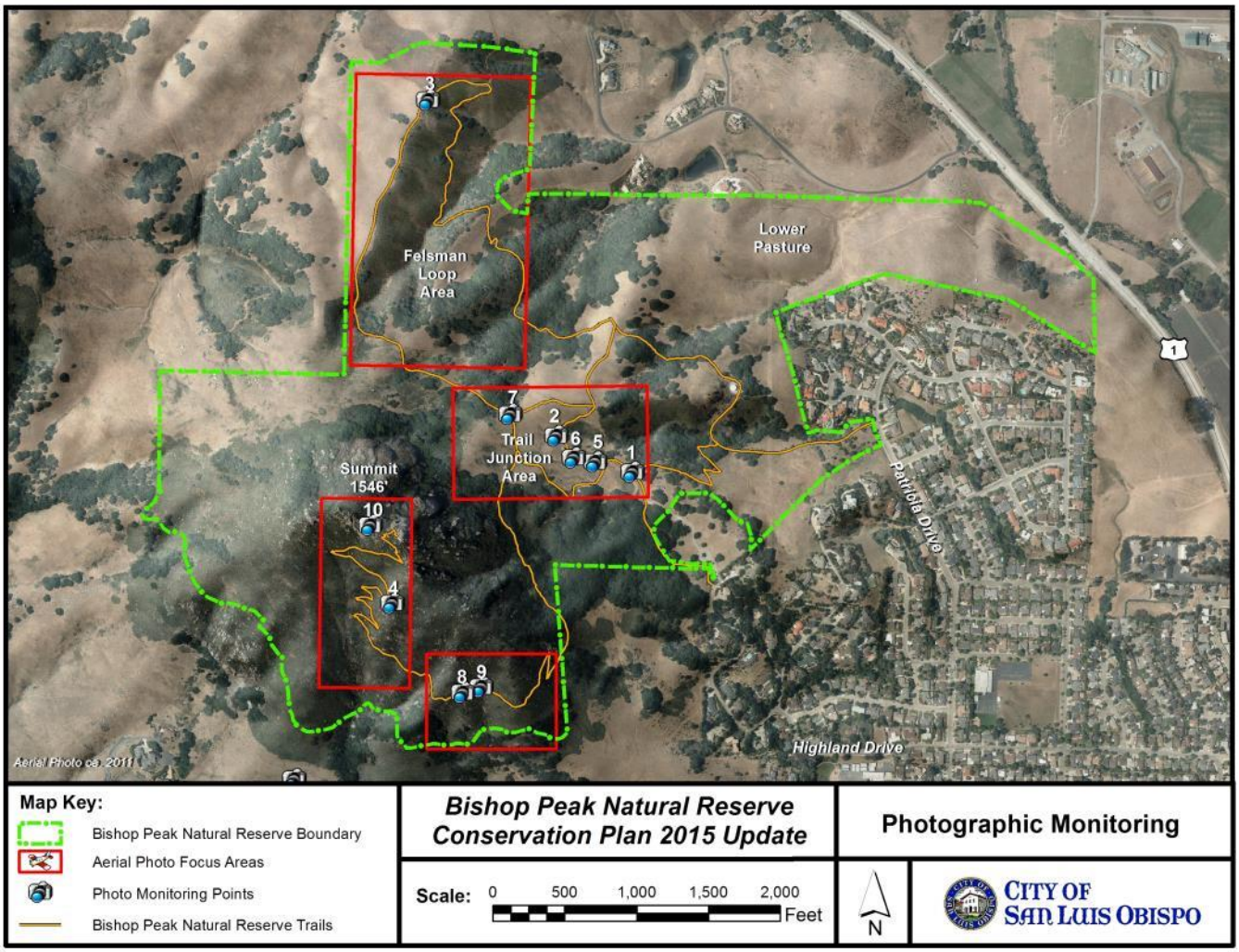
Photo-point 6: A poplar bouldering rock in the BPNR foothills. Heavy use of this area has resulted in the elimination of all native vegetation around the rock and erosion of top soil has resulted.

Photo-point 7: Trailhead for the Bishop Peak trail, this is a very heavily used section of the Bishop Peak trail, and should be monitored for increases in trail width and braiding of the trail.

Photo-point 8: Junction of the bootleg trail originating from the unofficial access point on Foothill Drive, and the official Bishop Peak trail. This junction of two heavily used trails is an area of heavy foot traffic and should be monitored for increases in trail width, braiding and erosion problems.

Photo-point 9: The bootleg trail originating from the unofficial access point on Foothill Drive, this trail is very steep and has no switchbacks. This trail is very prone to erosion problems and should be closely monitored for signs of gully formation and expansion in width.

Photo-point 10: The ridge trail is very heavily used by hikers who summit the peak. As of 2003, the trail was in good repair, having narrow width and good growth of trailside vegetation. Due to the heavy use in this area, the ridge trail should be closely monitored for signs of deterioration. As of 2015, this will remain as a photo-point; however the photo itself will be replaced with one that is a view depicting a broader scene that will be much more useful over time.



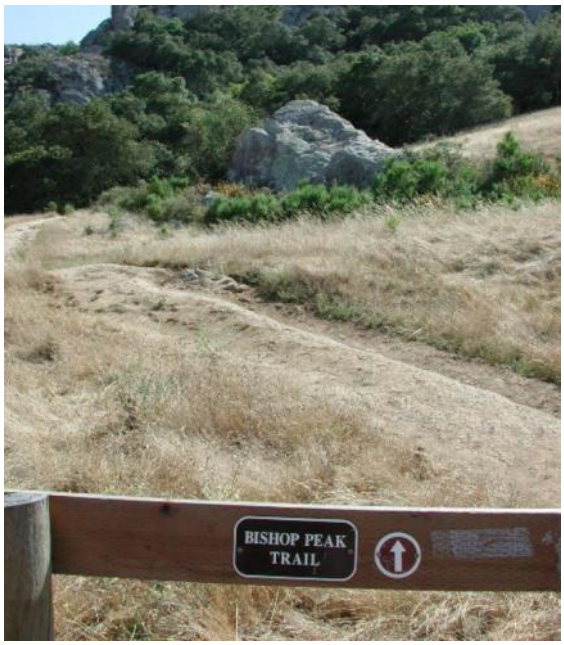
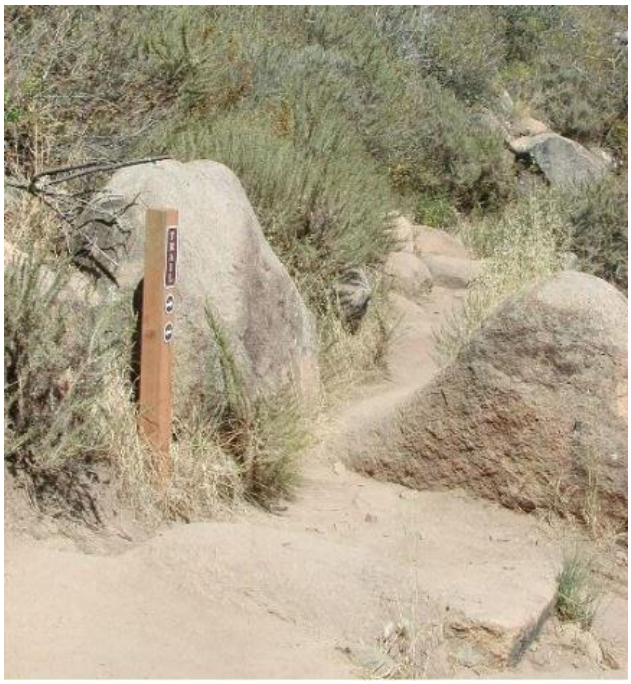
In addition to ground-level photo-points, comparative aerial photography has also been established with the 2015 Update. These photo-points and aerial photo focus areas follow on the ensuing pages.

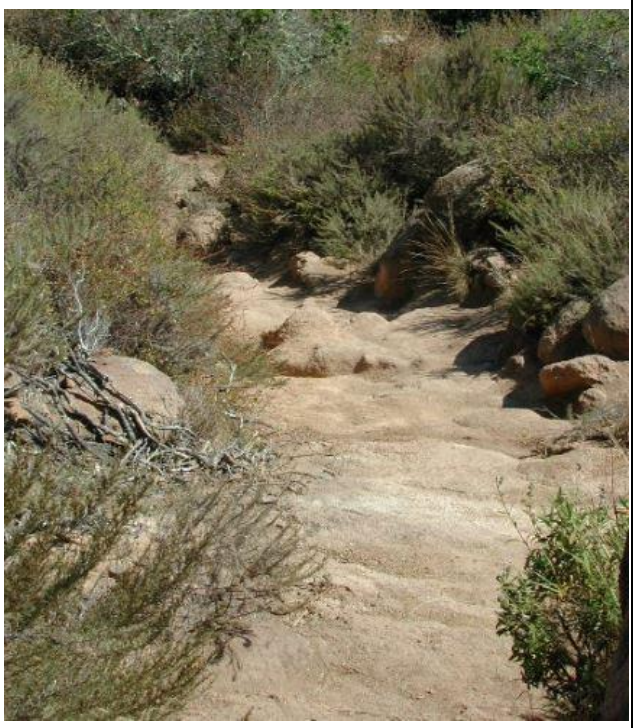
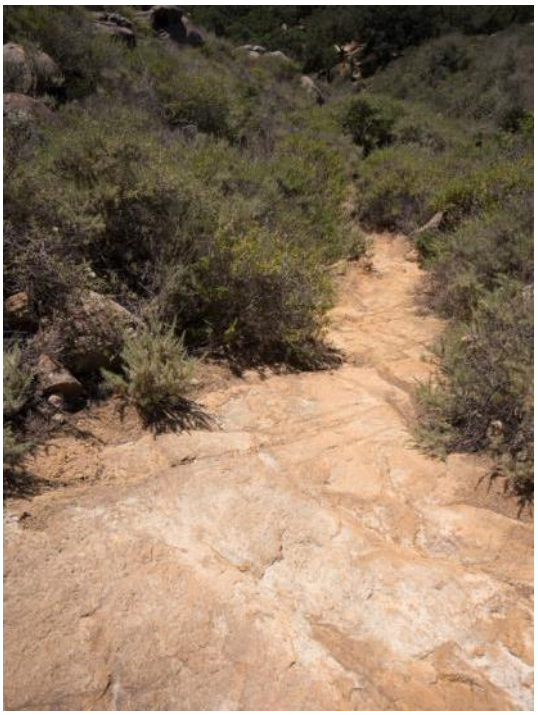
Table 5: 2004-2015 Photo Monitoring Points:

(All photos established Spring, 2015 by Douglas Bush, using images from a Sony A7r)

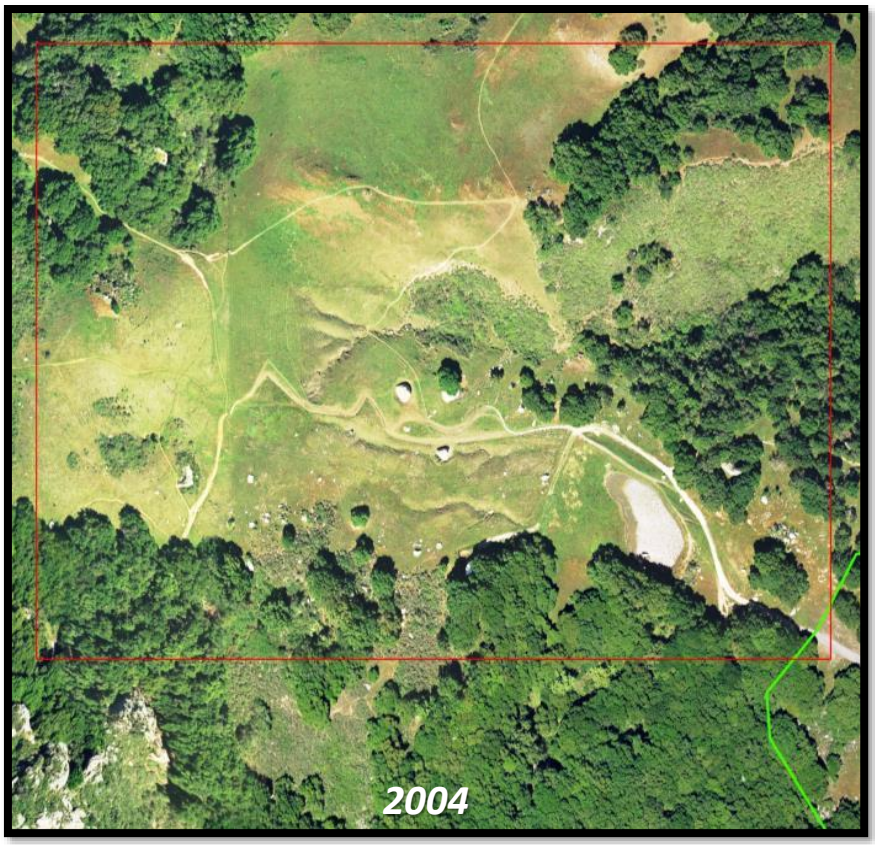
	2004	2015
1		

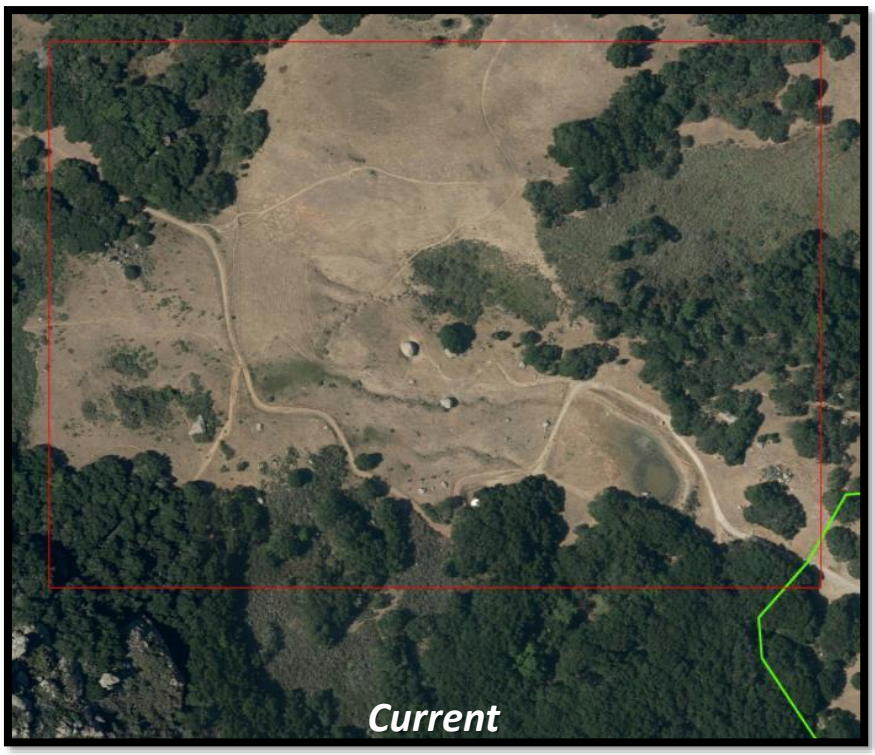
2		
3.		
4		
7		
8		

9		
5		

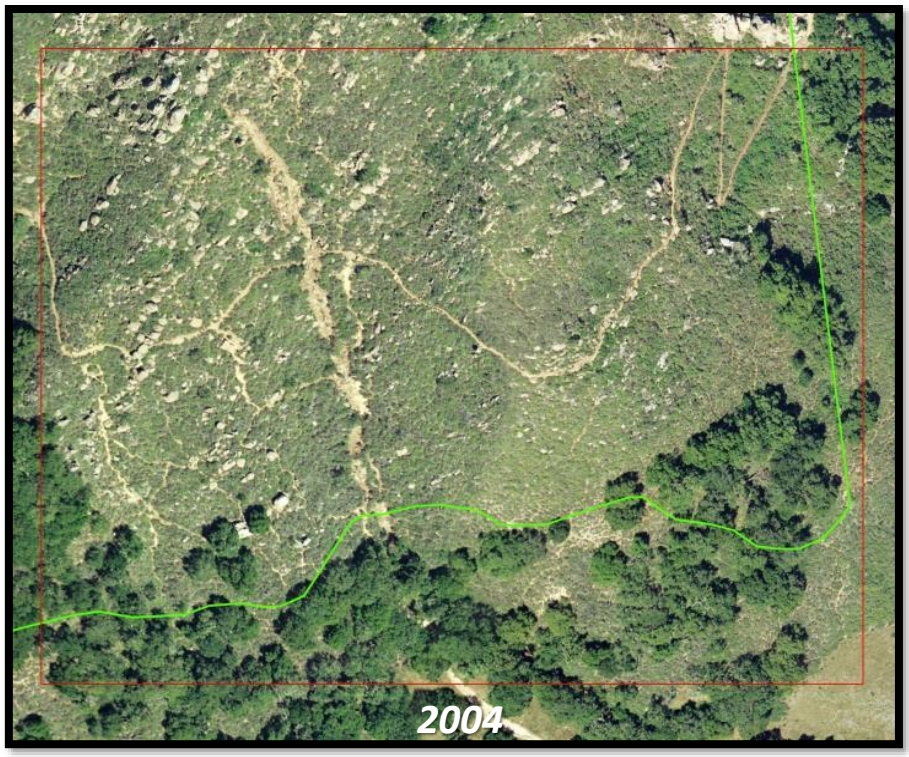
6		
10		To be replaced

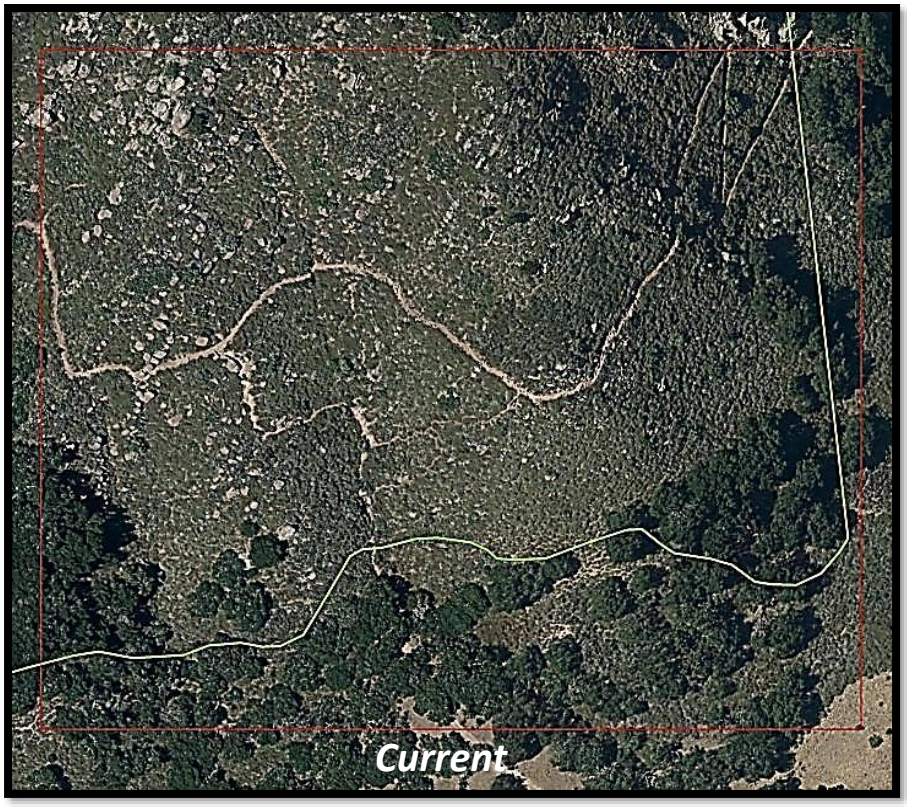
Aerial Photo Comparison - Felsman Loop Area



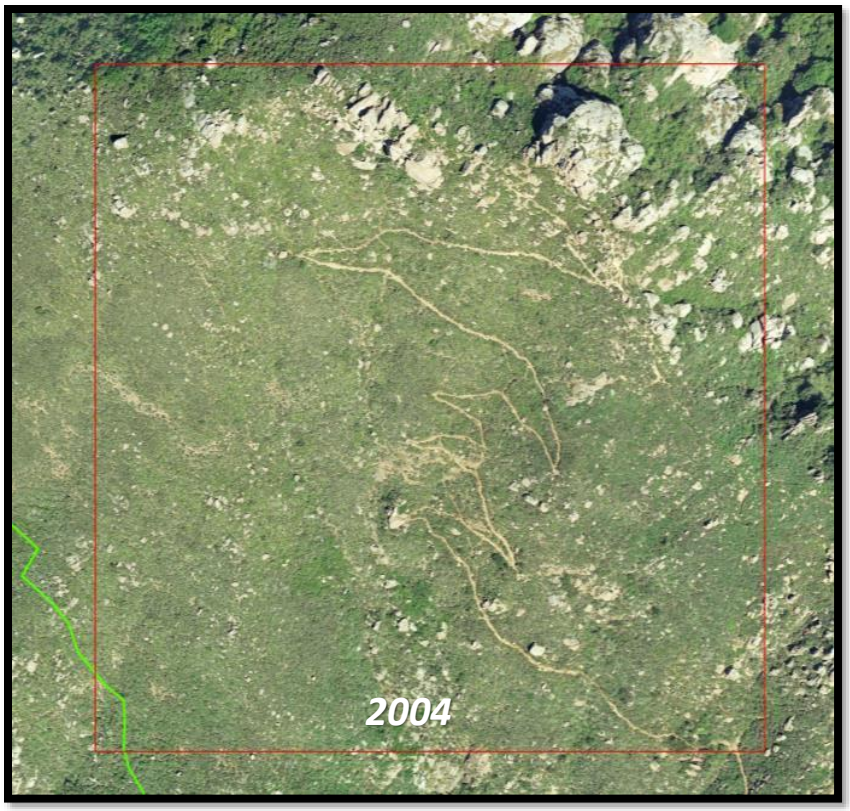


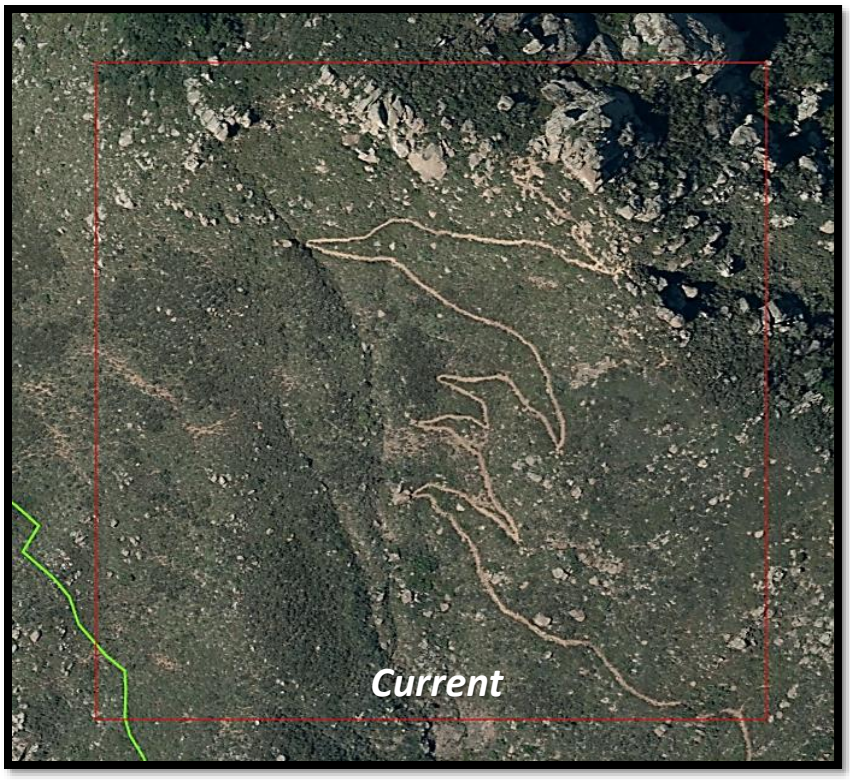
Aerial Photo Comparison – Trail Junction Area





Aerial Photo Comparison - Summit Trail / Foothill Access Area





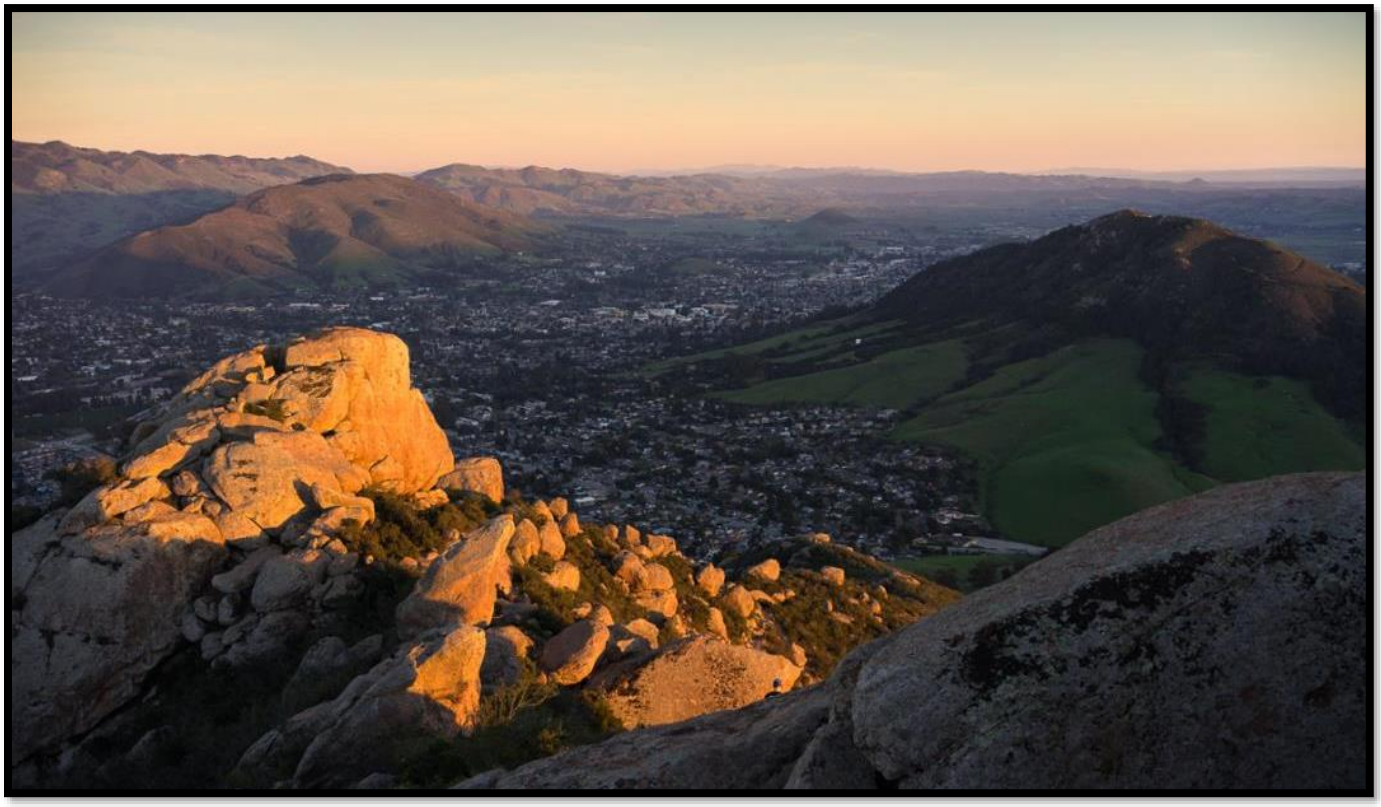
Aerial Photo Comparison - Upper Summit Trail Area

5. Updates and Amendment

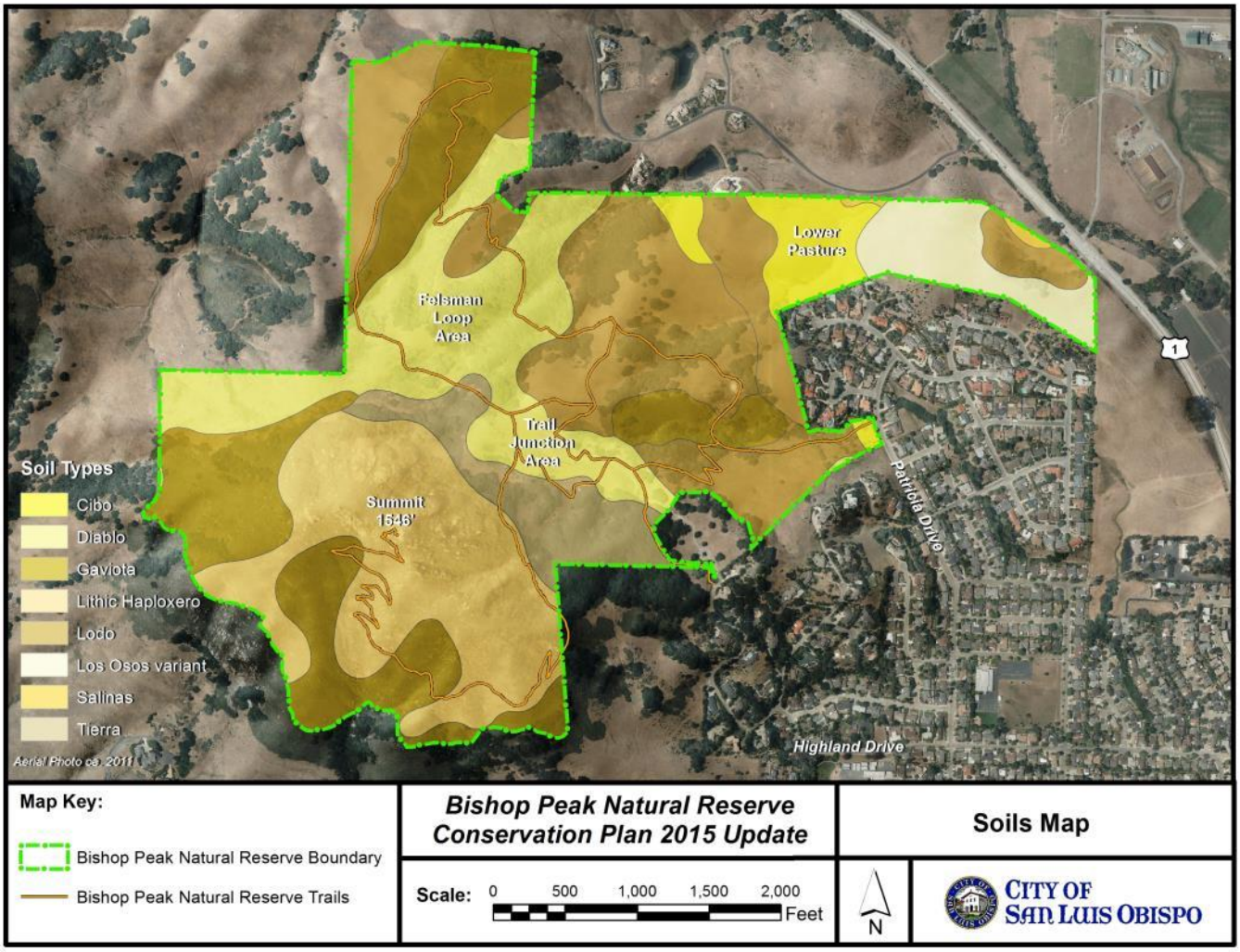
This Conservation Plan Update is intended to guide management actions over the course of the next ten years, after which time staff should consider the need for a second update. Any portion of the plan may be considered for amendment upon request. Any citizen or other interested party may initiate such a request, and shall be directed to the City Manager or designee. Such a request will include the nature of the requested amendment and rationale for the request. If appropriate, the amendment will be processed in the same manner as the original Conservation Plan.

6. References

The following sources are available by request:	
1.	City of San Luis Obispo Municipal Code, Open Space Regulations, Chapter 12.22. Ordinance 1332 § 1 (part), 1998.
2.	*Conservation and Open Space Element, General Plan*. City of San Luis Obispo, 2006.
3.	*Conservation Guidelines for Open Space Lands of the City of San Luis Obispo*. City of San Luis Obispo, 2002.
4.	*Mountains of Fire: San Luis Obispo's Famous Nine Sisters – A Chain of Ancient Volcanic Peaks.* Dickerson, S., 1990.
5.	*Summary and Results of a Plant Inventory and Wildlife Survey at Bishop Peak Natural Reserve, City of San Luis Obispo, California.* Terra Verde Environmental Consulting, 2015.
6.	*Wildlife Survey and Identification of Game Trails, Bishop Peak Natural Reserve, Fall 2013.* Engdahl, J., 2014. Biological Sciences Department, California Polytechnic State University, San Luis Obispo.
7.	*City of San Luis Obispo Open Space Survey.* Riggs, Rugh, Jackson, Steffan, Knox, 2015. City and Regional Planning Department, California Polytechnic State University, San Luis Obispo.



Appendix A
Soils Map and Description



Los Osos loams have developed on 13.5 acres of the IHNR in the eastern corner of the property. They occur above the sandstone and shale in the mélange (Franciscan Formation). Los Osos clay loams appear dark grayish brown and fine textured at the surface. Underneath they are primarily brown to yellowish brown heavy clay loam. They have relatively slow permeability, are well drained, and have medium runoff. The effective rooting depth is 20 to 40 inches. The pH is slightly to medium acid to neutral. Vegetation is mostly annual grasses and forbs with some perennial grasses, coastal sagebrush (*Artemisia californica*), and coast live oak (*Quercus agrifolia*).

Diablo complex soils are found in association with Los Osos soils on 32 acres on sloping land to the east of the IHNR. They are formed from weathered sandstone, shale, and conglomerate. The surface layers include brown gravelly loam underneath un-decomposed leaves. Beneath is a light yellowish brown gravelly loam over bedrock. Maymen sandy loams have relatively slow permeability, are well drained, and have medium runoff. The effective rooting depth is approximately 15 inches, with a few large woody roots that grow through the rocky substrate to 60 inches in depth. Maymen soils are medium to strongly acidic. Vegetation is usually open stands of chaparral

consisting of chamise (*Adenostoma fasciculatum*), scrub oak (*Quercus berberidifolia*), and, in protected sites, scattered coast live oak (*Quercus agrifolia*).

Gaviota soils are found on 20.5 acres in the northern/central region of the IHNR. They are a brown to dark grayish brown fine sandy loam, developed from light yellowish brown sandstone. They have moderately rapid permeability, are well drained, and have medium to rapid runoff. Their effective rooting depth is from six to 20 inches. They are medium acid to neutral. Uncultivated areas have a cover of annual grasses and forbs. Steeper areas usually have a cover of brush.

Obispo-rock outcrop is the most common substrate type within the IHNR, and is found on 600.5 acres. These often support soils which are very dark gray at the surface. Beneath the top layer is black, yellowish brown, or olive colored serpentinite. This soil type has very slow permeability. Obispo rock-outcrops are very well drained and have rapid to very rapid runoff. Their effective rooting depth is between eight and 20 inches. Their pH ranges from moderately alkaline to neutral. The sparse vegetative cover on Obispo-rock outcrops and associated soils consists of scattered shrubs such as leather oak (*Quercus durata*), toyon (*Heteromeles arbutifolia*), and sagebrush (*Artemisia fasciculatum*), as well as grasses and forbs.

Lodo is a grayish brown to very dark grayish brown shaly clay loam over dark grayish brown hard shale. It has moderate permeability, is somewhat excessively drained, and has medium to rapid runoff. Lodo soils are found on 28.5 acres within the IHNR. The effective rooting depth is from four to 20 inches. It is slightly acid. Native vegetation is primarily chaparral, with some buckwheat (*Eriogonum fasciculatum*) and scattered oaks (*Quercus spp*.). Naturalized cover includes annual grasses and forbs.

Salinas soils are typically deep and well drained, formed in alluvium or weathered from sandstone and shale. Salinas soils are found on alluvial plains, fans, and terraces and have slopes of 0 to 9 percent. Within the IHNR Salinas soils are found on 7.3 acres adjacent to Prefumo Creek to the north of the property. They are found at elevations of 50 to 2,000 feet. The climate is dry subhumidmesothermal with cool to warm rainless summers with some fog and cool moist winters. Mean annual precipitation is 12 to 20 inches. They are well drained soils, with slow to medium runoff and moderately slow permeability.

Briones formation typically consists of distinctly bedded, gray to white, fine-grained sandstone and siltstone. Sandstone beds are as thin as 5 to 10 cm, with 2 to 10 cm thick shale interbeds. These are interbedded with massive fine-grained sandstone beds as much as five meters thick. The middle part of the Formation consists of indistinctly bedded, white, fine- to coarse-grained sandstone, conglomeratic sandstone, and massive shell-hash conglomerate (shell beds). Shell-hash conglomerate is made up of interlocking mollusk and barnacle shells and shell fragments in a white calcareous sandstone matrix.

Appendix B
Biological Inventory

TERRA • VERDE
Environmental Consulting

May 13, 2015

Mr. Bob Hill
Natural Resources Manager
City of San Luis Obispo
990 Palm Street
San Luis Obispo, CA 93401

RE: Summary and Results of a Plant Inventory and Wildlife Survey at Bishop Peak Natural Reserve, City of San Luis Obispo, California

In support of the proposed City of San Luis Obispo (City) Bishop Peak Natural Reserve Conservation Plan 2015 Update, Terra Verde Environmental Consulting, LLC (Terra Verde) was retained to conduct a focused plant and wildlife survey of the Bishop Peak Natural Reserve (Reserve). Prior to conducting the survey, results of a California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) query were evaluated (see Attachment A - Figure 1: 1.5-mile Botanical CNDDB Map; Figure 2: 1.5-mile Wildlife CNDDB Map) as well as a review of available aerial site imagery, the Bishop Peak Natural Reserve Conservation Plan (Natural Resources Protection Program 2004), and the Wildlife Resources of the Bishop Peak Natural Reserve (Tenera Environmental 2003).

General Survey Methodology

Terra Verde botanist Sean Ryan and subconsultant Jessica Peak of Storrer Environmental Services conducted reconnaissance level botanical surveys of the entire 352-acre Reserve between March 25 and 27, 2015. Environmental conditions consisted of clear skies, 5-10 mile per hour winds, and temperatures ranging between 61 and 82° F. Seasonal timing and weather conditions were suitable for detection of botanical and wildlife resources occurring in the Reserve area. A follow-up site visit was performed by Terra Verde botanist Kristen Nelson and biologist Rhett Blanton on April 22, 2015. The botanical and wildlife inventories focused on documenting all detectable plant and wildlife to species level. Lastly, Terra Verde biologist Halden Petersen conducted acoustic bat monitoring and focused wildlife surveys of the Reserve on April 17 and 27, 2015. Methods for the bat monitoring are discussed below in further detail.

During the wildlife portion of the surveys, all species observed directly and/or indirectly (e.g., tracks, scat, remains, and acoustic observation) were documented. Special-status plant and/or wildlife species were also mapped using a hand-held Trimble Global Positioning System (GPS) and plotted on a vicinity map. Special-status plant populations

less than 400 square feet (sf) in area were mapped as points and populations greater than 400 sf were mapped as polygons (see Attachment A - Figure 3: Biological Survey Results).

Acoustic Bat Monitoring Methodology

A Pettersson D500x bat detector was employed for two nights near the base of the Reserve's northeast rock face to acoustically monitor bat activity in the Reserve. The initial monitoring effort was conducted on April 17, 2015 above the dry stock pond within the proximity of Highland Drive and the second monitoring period on April 27, 2015 at a higher elevation directly abutting the rock outcroppings of the peak. During each monitoring period, full spectrum acoustical data was collected from one half hour prior to sunset lasting until one half hour following sunrise, coinciding with peak bat activity. Following field acoustic monitoring, recorded full spectrum data was analyzed using SonoBat US West (Szewczak). Each bat recording was identified to species level when possible.

Botanical Results

During the botanical component of the survey efforts, a comprehensive floristic survey was conducted. The timing of the survey coincided with the blooming period of several special-status species known to occur within a 1.5-mile radius of the Reserve; however, it may have been early for the detection of San Luis mariposa Lily (*Calochortus obispoensis*, CNPS Rare Plant Rank 1B.2). San Luis mariposa lily typically blooms from May to June and may have been missed due to the timing of the surveys. See Attachment B for a full list of botanical species observed.

The Reserve consists of a mosaic of nine distinct vegetation communities as defined by A Manual of California Vegetation, 2nd Edition (Sawyer et al. 2008) which includes one sensitive plant community. Annual grassland communities were combined into a single classification as defined by A Preliminary Description of the Terrestrial Communities of California (Holland 1986) (see Attachment A - Figure 4: Plant Community Map). Each of these communities is described below in further detail:

- **Mountain Mahogany Chaparral**. This community occurs along the high elevation north and east facing slopes of Bishop Peak and is dominated by mountain mahogany (*Cercocarpus betuloides*) with chamise (*Adenostoma fasciculatum*) and California sagebrush (*Artemisia californica*) as common associates.

- **Coast Live Oak Woodland**. This community occurs at lower elevations on the north-facing slopes of the Bishop Peak and areas surrounding several intermittent drainage features which occur within the Reserve. Coast live oak

(*Quercus agrifolia*) is the dominant species with scattered California bay in the canopy layer, and poison-oak (*Toxicodendron diversilobum*) in the understory layer.

- **Chamise Chaparral**. Chamise chaparral covers the southwestern slope of Bishop Peak. This community is dominated by chamise, with California sagebrush and black sage (*Salvia mellifera*) as common associates.

- **Black Sage Scrub.** Black sage scrub covers the west and south-facing slopes of Bishop Peak, the east-facing slopes in the northern part of the Reserve, and several small areas just north of the existing stock pond. This community is dominated by black sage with California sagebrush as a common associate.

- **Annual Grassland.** Non-native, annual grassland habitat covers a majority of the north facing slopes and northeastern portion of the Reserve and the west-facing slopes in the vicinity of the Felsman Loop Trail. This community is co-dominated by various non-native, annual grass species including two wild oat species (*Avena barbata* and *A. fatua*) and various bromes (*Bromus* spp.) with rye grass (*Festuca perennis*), foxtail barley (*Hordeum murinum*), false brome (*Brachypodium distachyon*) and two filaree species (*Erodium botrys* and *E. cicutarium*) as common associates.

- **Coyote Brush Scrub**. Coyote brush scrub is scattered between the oak woodland and grassland communities on the lower elevation, north-facing slopes of Bishop Peak. This community is dominated by coyote brush (*Baccharis pilularis*) with California sagebrush and sticky monkeyflower (*Mimulus aurantiacus*) as common associates.

- **California Sagebrush Scrub.** California sagebrush scrub occupies a small area in the eastern portion of the Reserve near California Highway 1. This community is dominated by California sagebrush with poison-oak, false brome, and saw-toothed goldenbush (*Hazardia squarrosa*) as common associates.

- **Emergent Wetland.** An emergent wetland feature occurs in the area immediately surrounding the stock pond northwest of the Highland Drive trailhead. This community is co-dominated by common spikerush (*Eleocharis macrostachya*), mayweed (*Anthemis cotula*), and Bermuda grass (*Cynodon dactylon*).

Two special-status plant species and one special-status plant community were observed within the Reserve (refer to Attachment A - Figure 3). Cambria morning-glory (*Calystegia subacaulis* spp. *episcopalis*, CNPS Rare Plant Rank 4.2) was observed in abundance in the annual grassland communities throughout the Reserve. Additionally, San Luis Obispo owl's-clover (*Castilleja densiflora* var. *obispoensis*, CNPS Rare Plant Rank 1B.2) was mapped in a localized area within the annual grassland community in the northeastern portion of the Reserve. Several small but distinct areas of purple needle grass grassland were mapped on the lower elevation north and northeast facing slopes of Bishop Peak. These areas meet the membership rules outlined in A Manual of California Vegetation, 2nd Edition (e.g., purple needle grass [*Stipa pulchra*] constitutes greater than 10% of the relative cover of the herbaceous layer).

Wildlife Results

The majority of wildlife species observed within the Reserve were limited to avifauna although several mammals, reptiles, and insects were noted. Plant communities in the Reserve provide a wide variety of suitable nesting and foraging habitat for passerine and raptor species. Raptor species such as red-tailed hawk (*Buteo jamaicensis*) and American kestrel (*Falco sparverius*) were observed foraging over the open areas within the annual grasslands. Although no nest sites from these raptors were identified, mature trees within the coast live oak woodlands provide suitable nesting opportunities for these as well as various other raptor species. Mesic plant communities such as chamise chaparral, black sage scrub and coyote brush scrub also provide excellent forage and nesting opportunity for smaller, migratory songbirds such rufous-crowned sparrow (*Aimophila ruficeps*) and wrentit (*Chamaea fasciata*). Additionally, grasslands throughout the Reserve provide suitable habitat for ground nesting avian species such as lark sparrow (*Chondestes grammacus*) and Western meadowlark (*Sternella neglecta*).

In addition to the Reserve providing highly suitable avifauna forage and nest habitat, rock outcrops, and dense woodlands provide day and night roost opportunity for several bat species. Suitable roosting habitat combined with prevalent insect activity in foraging areas such as the stock pond and associated emergent wetlands, and drainages throughout the Reserve provide high quality habitat for a variety of bat species. A total of seven individual bat species were positively identified during acoustic monitoring efforts. Although the data recorded does not give an accurate representation of population size, it can be reasonably assumed based on the number of calls that Mexican free-tailed bat (*Tadarida brasiliensis*) was the most frequently detected bat species during the study period. Of the seven bat species identified, three are considered special-status species. Townsend's big-eared bat (*Corynorhinus townsendii*) and pallid bat (*Antrozous pallidus*) are listed by CDFW as Species of Special Concern (SSC) (see Figure 3) while hoary bat (*Lasiurus cinereus*) is listed as High Priority by the

Western Bat Working Group. As noted in the wildlife CNNDB Map, Townsend's big-eared bat was previously documented approximately one mile north of the Reserve; however, pallid bat or hoary bat have not been previously documented within a 1.5-mile radius according to the CNDDB. For a complete list of wildlife observed refer to Appendix B.

In summary, Terra Verde's survey effort resulted in a total of 201 plant species, nine plant communities, and 54 wildlife species. Of those, two plant species, one plant community, and seven wildlife species are considered special-status. Please refer to Appendix B for specific listing status of each special-status plant and animal detected. Lastly, please refer to Appendix C for a series of representative site photographs taken during the combined survey efforts.

If you should have any questions or require further information, please contact Brian Dugas at bdugas@terraverdeweb.com or at (805) 701-4648.

Sincerely,

Sean Ryan
Botanist

Attachments

A – Maps
- Figure 1: 1.5-mile Botanical CNDDB Map
- Figure 2: 1.5-mile Wildlife CNDDB Map
- Figure 3: Biological Survey Results Map
- Figure 4: Plant Community Map

B – Lists of Species Observed in the Bishop Peak Natural Reserve

C – Representative Site Photographs

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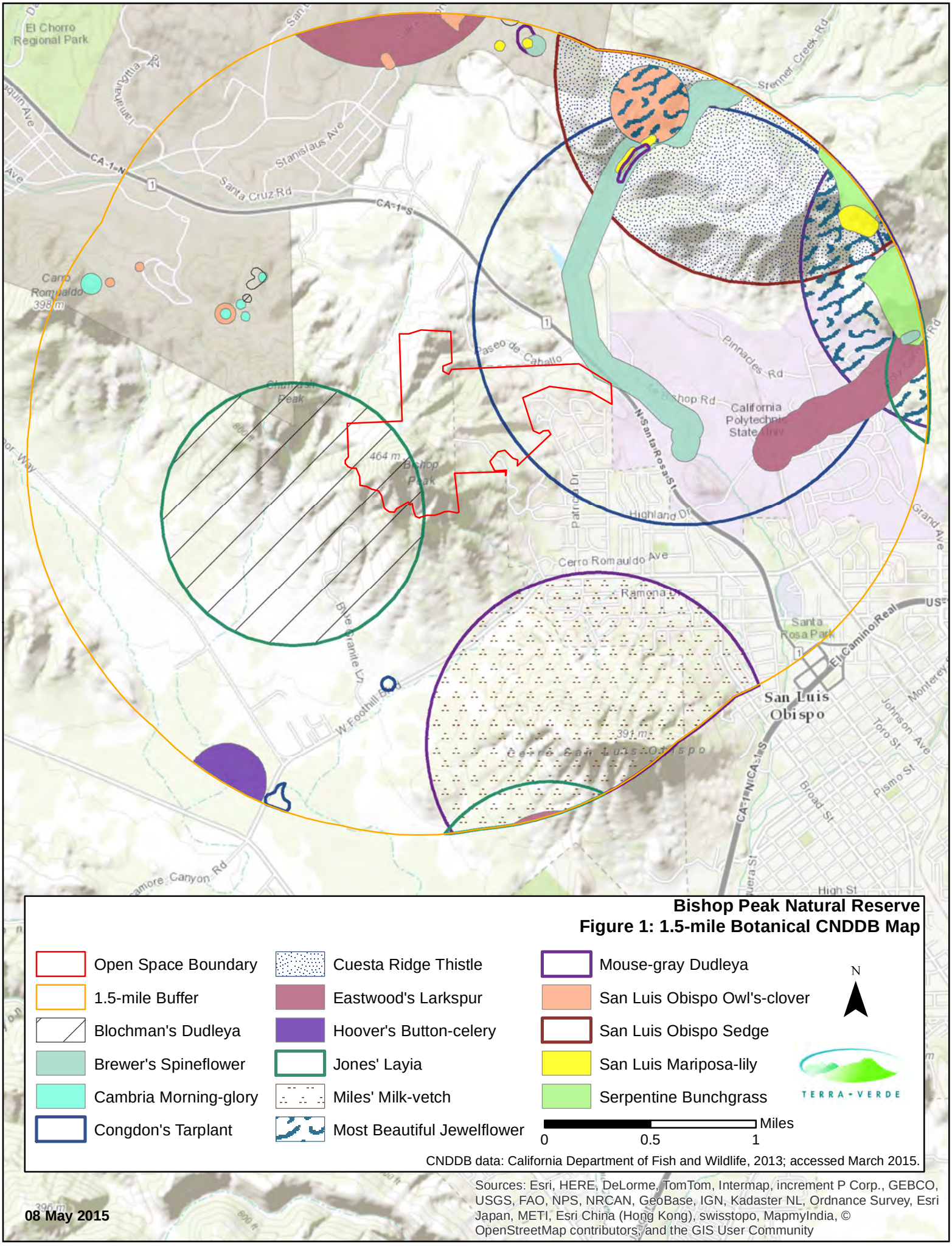
ATTACHMENT A – Maps
Figure 1: 1.5-mile Botanical CNDDB Map
Figure 2: 1.5-mile Wildlife CNDDB Map
Figure 3: Biological Survey Results Map
Figure 4: Plant Community Map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Stanislaus Ave
Santa Cruz Rd
CA-1-N
CA-1-S
Cerro Romualdo 398 m
Paseo de Caballo
Pinnacles Rd
Bishop Rd
California Polytechnic State Univ
N Santa Rosa St
Patricia Dr
Highland Dr
464 m
Bishop Peak
Blue Granite Ln
W Foothill Blvd
Cerro Romauldo Ave
Ramona Dr
Santa Rosa Park
El Camino Real
US-1
San Luis Obispo
391 m
Cerro San Luis Obispo
Monterey St
Johnson Ave
Toro St
Pismo St
Broad St
CA-1-N
CA-1-S
Grand Ave
High St
Stenner Creek Rd
Sycamore Canyon Rd
Bishop Peak Natural Reserve
Figure 1: 1.5-mile Botanical CNDDB Map
Open Space Boundary
1.5-mile Buffer
Blochman's Dudleya
Brewer's Spineflower
Cambria Morning-glory
Congdon's Tarplant
Cuesta Ridge Thistle
Eastwood's Larkspur
Hoover's Button-celery
Jones' Layia
Miles' Milk-vetch
Most Beautiful Jewelflower
Mouse-gray Dudleya
San Luis Obispo Owl's-clover
San Luis Obispo Sedge
San Luis Mariposa-lily
Serpentine Bunchgrass
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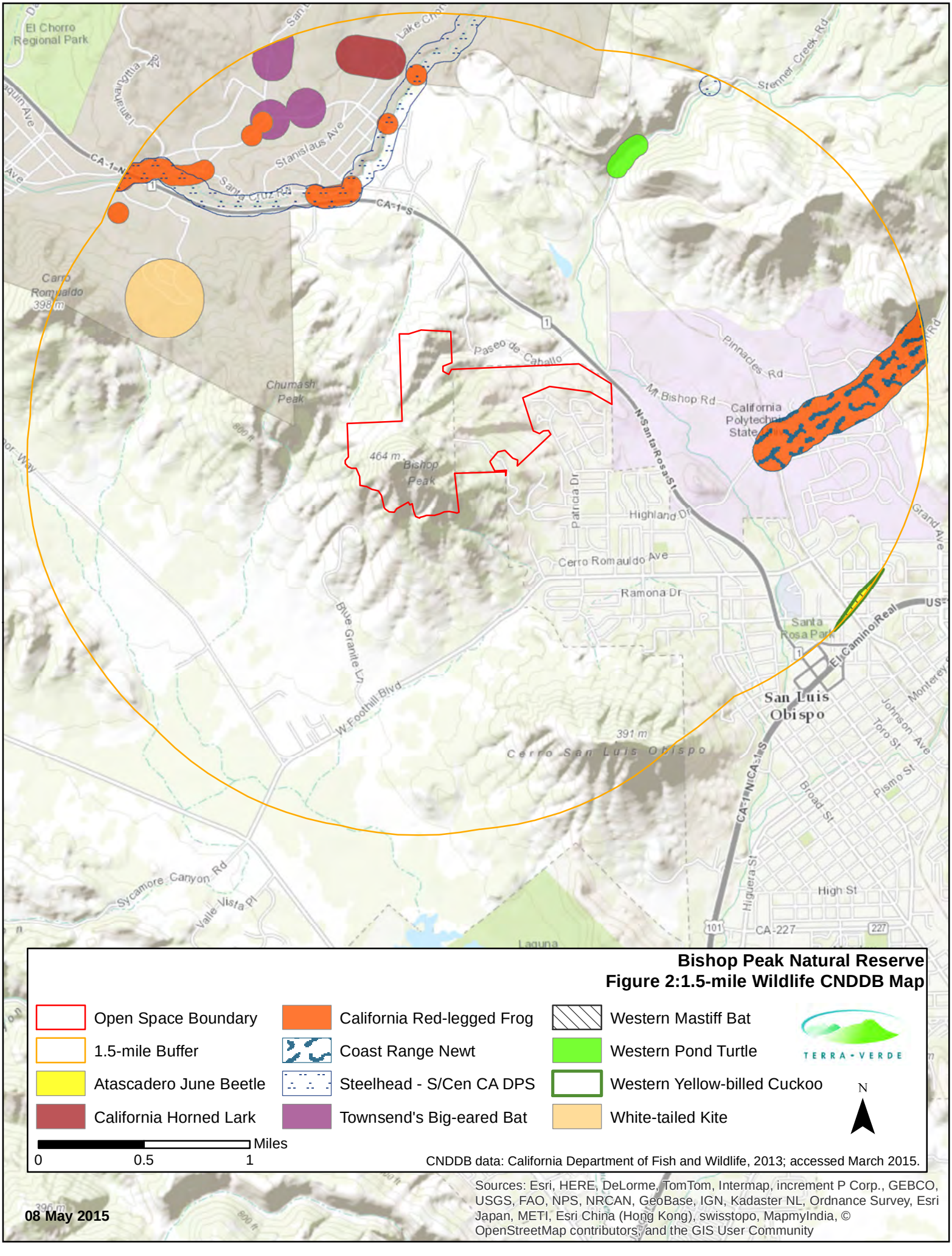
CNDDB data: California Department of Fish and Wildlife, 2013; accessed March 2015.
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
08 May 2015


El Chorro Regional Park
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Lake Chorro
Stanislaus Ave
Santa Cruz Rd
CA-1-N
CA-1-S
Cerro Romualdo
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Chumash Peak
Paseo de Caballo
Pinnacles Rd
N Bishop Rd
California Polytechnic State
N Santa Rosa St
464 m
Bishop Peak
Patricia Dr
Highland Dr
Cerro Romauldo Ave
Ramona Dr
Grand Ave
El Camino Real
Santa Rosa Park
San Luis Obispo
Monterey St
Johnson Ave
Toro St
Pismo St
Broad St
Blue Granite Ln
W Foothill Blvd
391 m
Cerro San Luis Obispo
Sycamore Canyon Rd
Valle Vista Pl
Higuera St
High St
CA-227
101
Laguna
Bishop Peak Natural Reserve
Figure 2:1.5-mile Wildlife CNDDB Map
Open Space Boundary
1.5-mile Buffer
Atascadero June Beetle
California Horned Lark
California Red-legged Frog
Coast Range Newt
Steelhead - S/Cen CA DPS
Townsend's Big-eared Bat
Western Mastiff Bat
Western Pond Turtle
Western Yellow-billed Cuckoo
White-tailed Kite
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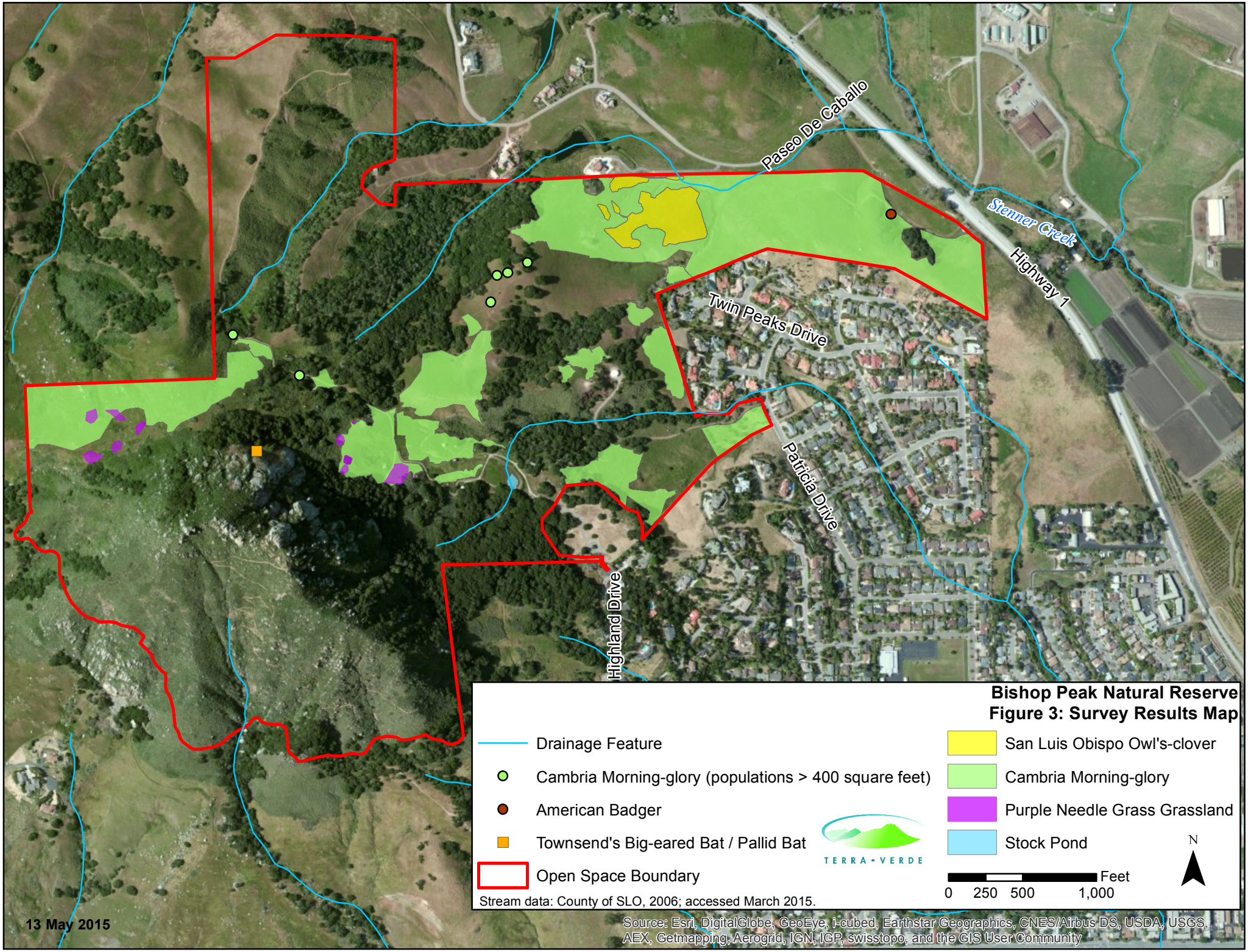
CNDDB data: California Department of Fish and Wildlife, 2013; accessed March 2015.
08 May 2015
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community


Paseo De Caballo
Stenner Creek
Highway 1
Twin Peaks Drive
Patricia Drive
Highland Drive
Bishop Peak Natural Reserve
Figure 3: Survey Results Map
Drainage Feature
Cambria Morning-glory (populations > 400 square feet)
American Badger
Townsend's Big-eared Bat / Pallid Bat
Open Space Boundary
San Luis Obispo Owl's-clover
Cambria Morning-glory
Purple Needle Grass Grassland
Stock Pond
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Feet
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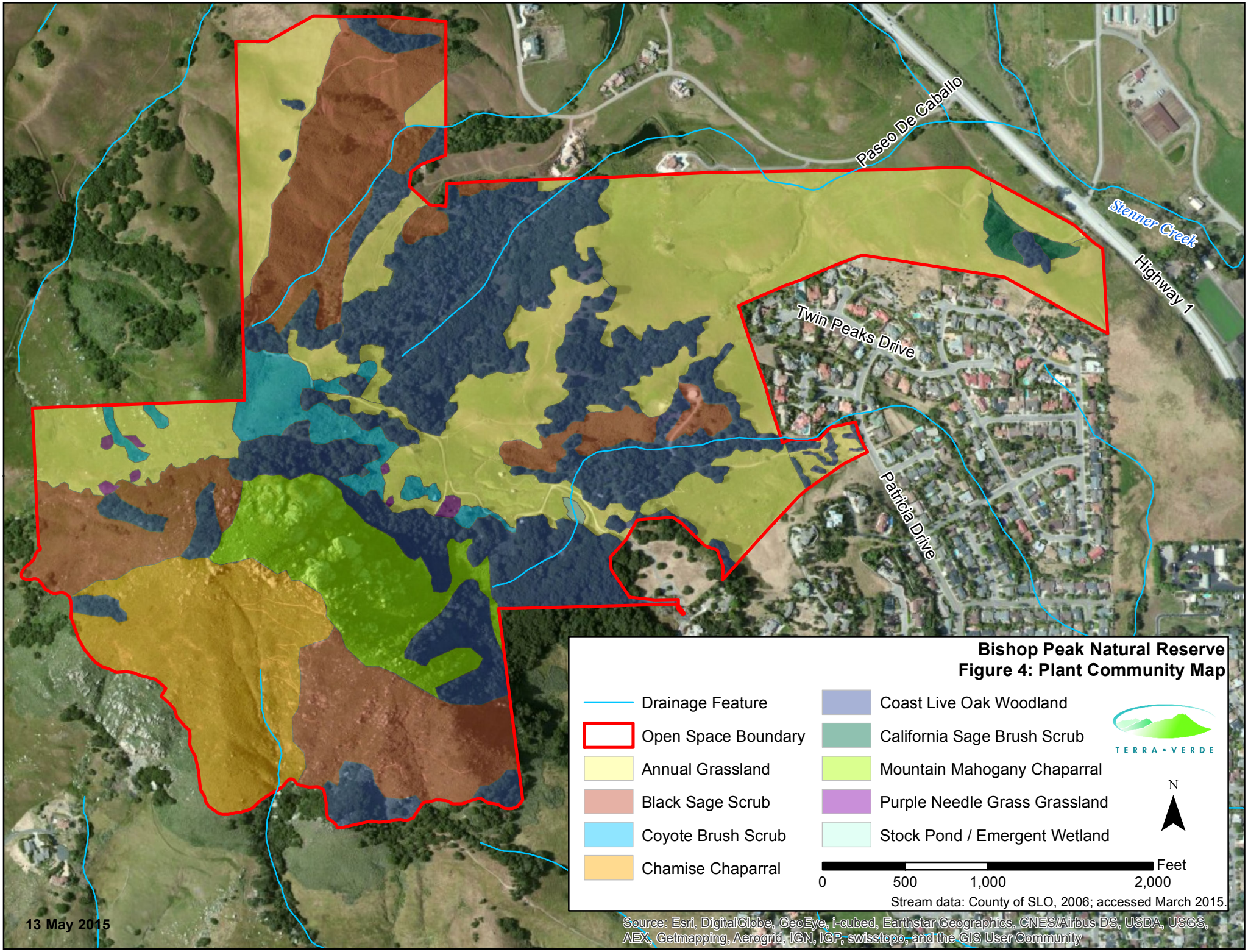
Stream data: County of SLO, 2006; accessed March 2015.
13 May 2015
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


Paseo De Caballo
Stenner Creek
Highway 1
Twin Peaks Drive
Patricia Drive
Bishop Peak Natural Reserve
Figure 4: Plant Community Map
Drainage Feature
Open Space Boundary
Annual Grassland
Black Sage Scrub
Coyote Brush Scrub
Chamise Chaparral
Coast Live Oak Woodland
California Sage Brush Scrub
Mountain Mahogany Chaparral
Purple Needle Grass Grassland
Stock Pond / Emergent Wetland
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Stream data: County of SLO, 2006; accessed March 2015.
13 May 2015
Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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ATTACHMENT B -
Lists of Species Observed in the Bishop Peak Natural Reserve

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Bishop Peak Natural Reserve Plant List
Species Observed by Terra Verde on March 25-27 and April 22, 2015

Scientific Name	Common Name
Adoxaceae	**Muskroot Family**
Sambucus nigra ssp. *caerulea*	Blue elderberry
Agavaceae	**Century Plant Family**
Chlorogalum pomeridianum	Soap plant
Anacardiaceae	**Sumac Family**
Rhus integrifolia	Lemonade berry
Toxicodendron diversilobum	Poison-oak
Apiaceae	**Carrot Family**
Daucus pusillus	American wild carrot
*Foeniculum vulgare**	Fennel
Sanicula arguta	Sharp-tooth sanicle
Sanicula crassicaulis	Pacific sanicle
*Scandix pecten-veneris**	Venus' needle
*Torilis nodosa**	Short sock-destroyer
Apocynaceae	**Dogbane Family**
Asclepias eriocarpa	Kotolo
Asteraceae	**Composite Family**
Achillea millefolium	Yarrow
Achyrachaena mollis	Blow-wives
Acourtia microcephala	Sacapellote
Agoseris heterophylla	Mountain dandelion
*Anthemis cotula**	Mayweed
Artemisia californica	California sagebrush
Artemisia douglasiana	Mugwort
Baccharis pilularis	Coyote brush
Brickellia californica	California Brickellbush
*Carduus pycnocephalus**	Italian thistle
*Carthamus lanatus**	Woolly distaff thistle
*Centaurea calcitrapa**	Purple star-thistle
*Centaurea solstitialis**	Yellow star-thistle
*Cirsium vulgare**	Bull thistle
Corethrogyne filaginifolia	California-aster
*Cynara cardunculus**	Artichoke
Deinandra fasciculata	Clustered tarweed
Erigeron foliosus	Leafy fleabane
Eriophyllum confertiflorum var. *confertiflorum*	Golden-yarrow
Eurybia radulina	Roughleaf aster
*Gazania linearis**	Treasure flower

Grindelia hirsutula	Gumplant
Hazardia squarrosa	Saw-toothed goldenbush
*Helminthotheca echioides**	Bristly ox-tongue
Hemizonia congesta	Hayfield tarweed
Hypochaeris glabra	Smooth cat's-ear
Hypochaeris radicata	Rough cat's-ear
Isocoma menziesii	Coastal goldenbush
*Lactuca serriola**	Prickly lettuce
Lagophylla ramosissima	Common hareleaf
Logfia depressa	Hierba limpia
Logfia filaginoides	California cottonrose
*Logfia gallica**	Daggerleaf cottonrose
Madia gracilis	Gumweed
Matricaria discoidea	Pineapple weed
Micropus californicus var. *californicus*	Cottontop
Microseris douglasii	Douglas' silverpuffs
Pseudognaphalium californicum	California everlasting
*Pseudognaphalium luteoalbum**	Jersey cudweed
Psilocarphus brevissimus var. *brevissimus*	Dwarf woollyheads
*Senecio vulgaris**	Common groundsel
*Silybum marianum**	Milk thistle
Solidago confinis	Southern goldenrod
*Sonchus asper**	Prickly sow thistle
*Sonchus oleraceus**	Common sow thistle
Stephanomeria sp.	Wirelettuce
Betulaceae	**Birch Family**
Alnus rhombifolia	White alder
Boraginaceae	**Borage Family**
Amsinckia menziesii	Common fiddleneck
Eucrypta chrysanthemifolia	Spotted eucrypta
Phacelia distans	Common phacelia
Phacelia imbricata ssp. *imbricata*	Imbricate phacelia
Plagiobothrys canescens var. *canescens*	Valley popcornflower
Plagiobothrys fulvus var. *campestris*	Field popcornflower
Plagiobothrys nothofulvus	Rusty popcornflower
Brassicaceae	**Mustard Family**
*Brassica nigra**	Black mustard
Cardamine californica	Milk maids
*Hirschfeldia incana**	Perennial mustard
Lepidium nitidum	Peppergrass
*Sisymbrium orientale**	Oriental hedge mustard
Thysanocarpus curvipes	Fringepod

Turritis glabra	Tower mustard
Caprifoliaceae	**Honeysuckle Family**
Symphoricarpos mollis	Creeping snowberry
Caryophyllaceae	**Pink Family**
*Silene gallica**	Windmill pink
*Stellaria media**	Common chickweed
Chenopodiaceae	**Goosefoot Family**
Chenopodium californicum	California goosefoot
Convolvulaceae	**Morning-glory Family**
Calystegia macrostegia	Coast morning-glory
Convolvulus arvensis*	Bindweed
Crassulaceae	**Stonecrop Family**
Dudleya lanceolata	Lance-leaved dudleya
Cucurbitaceae	**Gourd Family**
Marah fabacea	California man-root
Cupressaceae	**Cypress Family**
Sequoiadendron giganteum	Giant sequoia
Cyperaceae	**Sedge Family**
Cyperus eragrostis	Tall flatsedge
Eleocharis macrostachya	Common spikerush
Dennstaedtiaceae	**Bracken Family**
Pteridium aquilinum	Bracken fern
Dryopteridaceae	**Wood fern Family**
Dryopteris arguta	California wood fern
Euphorbiaceae	**Spurge Family**
Croton setiger	Turkey-mullein
Fabaceae	**Legume Family**
Acmispon americanus	Deervetch
Acmispon brachycarpus	Deervetch
Acmispon glaber	Deerweed
Acmispon strigosus	Strigose lotus
Astragalus curtipes	Morro milkvetch
Lupinus albifrons	Silver bush lupine
Lupinus bicolor	Miniature lupine
Lupinus hirsutissimus	Stinging lupine
Lupinus nanus	Sky lupine
Lupinus succulentus	Arroyo lupine
*Medicago polymorpha**	California burclover
*Trifolium hirtum**	Rose clover
Trifolium willdenovii	Tomcat clover
*Vicia benghalensis**	Purple vetch
*Vicia sativa**	Spring vetch

*Vicia villosa**	Hairy vetch
Fagaceae	**Oak Family**
Quercus agrifolia	Coast live oak
*Quercus suber**	Cork oak
Geraniaceae	**Geranium Family**
*Erodium botrys**	Storksbill filaree
Erodium cicutarium	Redstem filaree
*Erodium moschatum**	Greenstem filaree
*Geranium dissectum**	Cutleaf geranium
*Geranium molle**	Crane's bill geranium
Grossulariaceae	**Gooseberry Family**
Ribes malvaceum	Chaparral currant
Ribes speciosum	Fuchsia-flowered gooseberry
Iridaceae	**Iris Family**
Sisyrinchium bellum	Western blue-eyed grass
Juncaceae	**Rush Family**
Juncus patens	Spreading rush
Lamiaceae	**Mint Family**
Lepechinia calycina	Pitcher sage
*Marrubium vulgare**	Horehound
Monardella villosa ssp. *obispoensis*	San Luis Obispo coyote mint
Salvia mellifera	Black sage
Salvia spathacea	California hummingbird sage
Stachys bullata	California hedge-nettle
Lauraceae	**Laurel Family**
Umbellularia californica	California bay
Liliaceae	**Lily Family**
Fritillaria biflora var. *biflora*	Chocolate lily
Calochortus albus	Fairy-lantern
Malvaceae	**Mallow Family**
*Malva parviflora**	Cheeseweed
Sidalcea malviflora	Checkerbloom
Montiaceae	**Miner's Lettuce Family**
Claytonia perfoliata	Miner's lettuce
Myrsinaceae	**Myrsine Family**
*Lysimachia arvensis**	Scarlet pimpernel
Onagraceae	**Evening-primrose Family**
Clarkia epilobioides	Canyon clarkia
Clarkia purpurea ssp. *quadrivulnera*	Four-spot
Clarkia unguiculata	Elegant clarkia
Epilobium canum	California fuchsia

Orobanchaceae	**Broomrape Family**
Castilleja affinis var. *affinis*	Coast Indian paintbrush
Castilleja densiflora ssp. *obispoensis*	San Luis Obispo owl's-clover
*Bellardia trixago**	Mediterranean linseed
Oxalidaceae	**Oxalis Family**
*Oxalis pes-caprae**	Bermuda buttercup
Paeoniaceae	**Peony Family**
Paeonia californica	California peony
Phrymaceae	**Lopseed Family**
Mimulus aurantiacus	Sticky monkeyflower
Pinaceae	**Pine Family**
*Pinus halepensis**	Aleppo pine
Pittosporaceae	**Pittosporum Family**
*Pittosporum undulatum**	Mock orange
Plantaginaceae	**Plantain Family**
Antirrhinum kelloggii	Climbing snapdragon
Plantago erecta	California plantain
*Plantago lanceolata**	English plantain
Plantago ovata	Desert plantain
Platanaceae	**Sycamore Family**
Platanus racemosa	Western sycamore
Poaceae	**Grass Family**
*Avena barbata**	Slender wild oat
*Avena fatua**	Wild oat
*Brachypodium distachyon**	False brome
Bromus carinatus var. *carinatus*	California brome
*Bromus diandrus**	Ripgut grass
*Bromus hordeaceus**	Soft chess
Bromus madritensis ssp. *rubens**	Red brome
*Cynodon dactylon**	Bermuda grass
Elymus condensatus	Giant wild-rye
*Festuca bromoides**	Brome fescue
*Festuca myuros**	Rattail sixweeks grass
*Festuca perennis**	Rye grass
*Hordeum murinum**	Foxtail barley
*Lamarckia aurea**	Goldentop grass
Melica californica	California melic
Melica imperfecta	Little California melica
Phalaris lemmonii	Lemmon's canary grass
*Polypogon monspeliensis**	Rabbitfoot grass
Stipa lepida	Foothill needle grass
Stipa pulchra	Purple needle grass

*Triticum aestivum**	Wheat
Polygonaceae	**Buckwheat Family**
Eriogonum elongatum var. *elongatum*	Long-stem wild buckwheat
Eriogonum fasciculatum var. foliolosum	California buckwheat
Eriogonum parvifolium	Seacliff wild buckwheat
*Polygonum aviculare**	Knotweed
*Rumex crispus**	Curly dock
*Rumex pulcher**	Fiddle dock
Polypodiaceae	**Polypody Family**
Polypodium californicum	California polypody
Primulaceae	**Primrose Family**
Primula clevelandii	Shooting star
Pteridaceae	**Brake Family**
Aspidotis californica	California lace fern
Myriopteris covillei	Coville's lip fern
Pellaea andromedifolia	Coffee fern
Pellaea mucronata	Birds-foot fern
Pentagramma triangularis ssp. *triangularis*	Goldback fern
Ranunculaceae	**Buttercup Family**
Clematis ligusticifolia	Western virgin's bower
Delphinium parryi ssp. *parryi*	Parry's larkspur
Ranunculus californicus	California buttercup
Rhamnaceae	**Buckthorn Family**
Ceanothus cuneatus var. *cuneatus*	Buckbrush
Frangula californica	California coffee berry
Rhamnus crocea	Spiny redberry
Rosaceae	**Rose Family**
Adenostoma fasciculatum	Chamise
Cercocarpus betuloides	Mountain mahogany
Heteromeles arbutifolia	Toyon
Holodiscus discolor	Oceanspray
Prunus ilicifolia	Hollyleaf cherry
Rosa californica	California rose
Rubus ursinus	California blackberry
Rubiaceae	**Madder Family**
Galium andrewsii	Phlox-leaved bedstraw
Galium californicum	California bedstraw
Galium porrigens	Climbing bedstraw
Scrophulariaceae	**Figwort Family**
Scrophularia californica	California figwort
Selaginellaceae	**Spike-moss Family**
Selaginella bigelovii	Spike-moss

Solanaceae	**Nightshade Family**
Solanum xanti	Purple nightshade
Themidaceae	**Brodiaea Family**
Bloomeria crocea	Common goldenstar
Dichelostemma capitatum	Blue dicks
Violaceae	**Violet Family**
Viola pedunculata	Johnny-jump-up

*indicates non-native species

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Bishop Peak Natural Reserve Wildlife List
Species Observed by Terra Verde on April 17, 22, and 27, 2015

Scientific Name	Common Name	Listing Status*
Avifauna		
Aeronautes saxatalis	White-throated swift	
Aimophila ruficeps	Rufous-crowned sparrow	
Aphelocoma californica	Western scrub-jay	
Archilochus alexandri	Black-chinned hummingbird	
Baeolophus inornatus	Oak titmouse	NABCI – Yellow Watch List
Buteo jamaicensis	Red-tailed hawk	
Buteo lineatus	Red-shouldered hawk	
Callipepla californica	California quail	
Calypte anna	Anna's hummingbird	
Cathartes aura	Turkey vulture	
Chamaea fasciata	Wrentit	
Chondestes grammacus	Lark sparrow	
Corvus brachyrhynchos	American crow	
Falco sparverius	American kestrel	
Haemorhous mexicanus	House finch	
Junco hyemalis	Dark-eyed junco	
Larus occidentalis	Western gull	
Meleagris gallopavo	Wild turkey	
Melozone crissalis	California towhee	
Mimus polyglottos	Northern mockingbird	
Myiarchus cinerascens	Ash-throated flycatcher	
Vermivora celata	Orange-crowned warbler	
Patagioenas fasciata	Band-tailed pigeon	
Pheucticus melanocephalus	Black-headed grosbeak	
Pipilo maculatus	Spotted towhee	
Polioptila caerulea	Blue-gray gnatcatcher	
Psaltriparus minimus	Bushtit	
Sayornis nigricans	Black phoebe	
Sialia mexicana	Western bluebird	
Spinus psaltria	Lesser goldfinch	
Sternella neglecta	Western meadowlark	
Thryomanes bewickii	Bewick’s wren	
Troglodytes aedon	House wren	

Scientific Name	Common Name	Listing Status*
Tyrannus verticalis	Western kingbird	
Vireo gilvus	Warbling vireo	
Zenaida macroura	Mourning dove	
Zonotrichia leucophrys	White-crowned sparrow	
Mammals		
Antrozous pallidus	Pallid bat	SSC
Corynorhinus townsendii	Townsend's big-eared bat	SSC
Eptesicus fuscus	Big brown bat	
Lasiurus cinereus	Hoary bat	WBWG – High Priority
Mephitis mephitis	Striped skunk	
Myotis californicus	California myotis	
Myotis thysanodes	Fringed myotis	
Odocoileus hemionus columbianus	Columbian black-tailed deer	
Otospermophilus beecheyi	California ground squirrel	
Tadarida brasiliensis	Mexican free-tailed bat	
Taxidea taxus	American badger	SSC
Thomomys bottae	Botta's pocket gopher	
Reptiles		
Elgaria multicarinata	Southern alligator lizard	
Pituophis catenifer catinifer	Gopher snake	
Sceloporus occidentalis	Fence lizard	
Invertebrates		
Bombus chinensis	Bumblebee	
Danaus plexippus	Monarch butterfly	CDFW – Special Animal
Fish		
Gambusia affinis	Mosquito fish	

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ATTACHMENT C -
Representative Site Photographs

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Photo 1. Ecotone between chamise chaparral (left and downslope) and mountain mahogany chaparral (right), view west (March 25, 2015).

Photo 2. Ecotone between black sage scrub (left) and annual grassland (right) with Chumash Peak in the background, view west (March 25, 2015).

Photo 3. View from peak toward Morro Bay, view northwest (March 25, 2015)

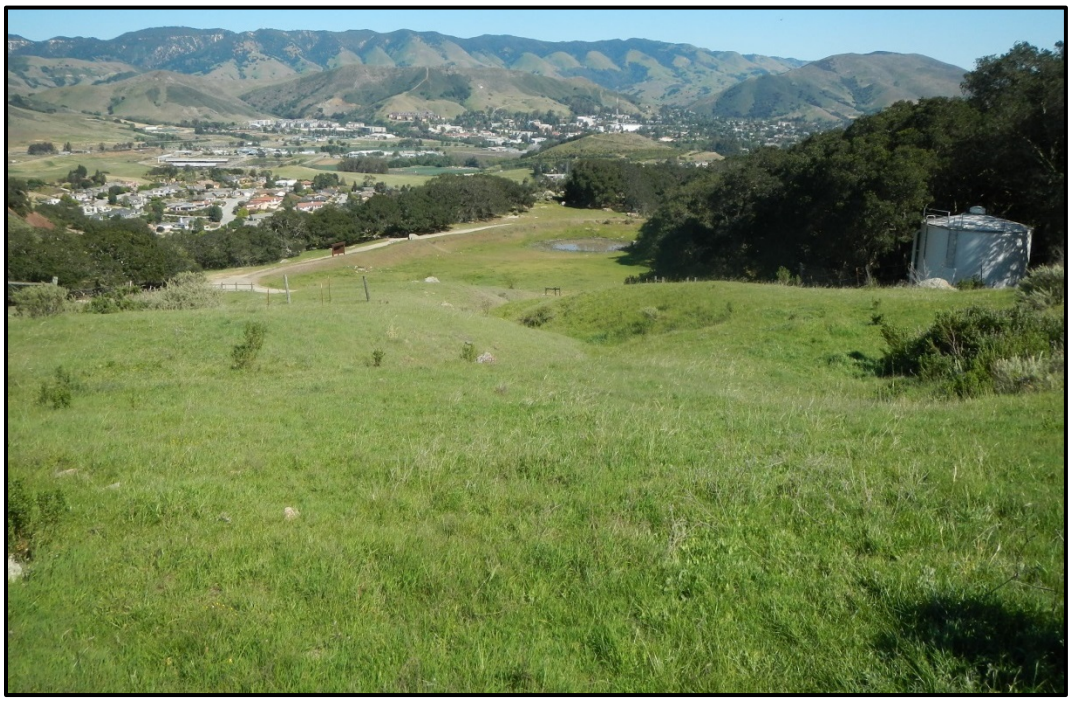

Photo 4. Annual grassland (foreground) and stock pond surrounded by coast live oak woodland (March 25, 2015)

Photo 5. Purple needle grass grassland northwest of the peak, view southeast (March 26, 2015).

Photo 6. San Luis Obispo owl's-clover in northwest of the Reserve (March 27, 2015).

Photo 7. Cambria morning-glory in northeast of the Reserve (April 22, 2015).

Photo 8. House wren cavity nesting in a western sycamore (April 27, 2015).

Photo 9. Ash-throated flycatcher perched in a coast live oak (April 27, 2015).

Photo 10. Western fence lizard basking on a crustose lichen-covered rock (April 27, 2015).

Photo 11. Location of the bat detector on the northeast-facing rock outcropping of Bishop Peak, view southwest (April 27, 2015).

Photo 12. Bishop Peak showing oak woodlands and grasslands, view southwest (April 27, 2015).

Wildlife Survey and Identification of Game Trails

Bishop Peak Natural Reserve

Fall 2013

Jessica Engdahl
B.S. in Biological Sciences
Concentration in Field and Wildlife, Emphasis in Field

Senior Project

Dr. John Perrine, Associate Professor of Biological Sciences and Project Advisor
Freddy Otte, San Luis Obispo City Biologist

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Abstract

This project was designed to be a pilot project for future wildlife camera deployment operations in the many Natural Reserves of San Luis Obispo City. The goal of the project was to identify wildlife passage corridors and monitor wildlife activity levels, with the intent to provide conservation plan recommendations to the City of San Luis Obispo. The project was conducted in Bishop Peak Natural Reserve near the Felsman Loop trail and the north side of Bishop Peak mountain. Six Bushnell Trophy Cam HD game cameras were obtained and installed at seven different locations in the open space. The cameras were deployed for an average of five weeks in October and November of 2013. Species of interest were mountain lion, *Puma concolor*, black bear, *Ursus americanus*, and feral pig, *Sus scrofa*. Unfortunately, these species were not detected on the game cameras. Eleven species of mammals and several unidentified bird species were detected in the entire study. Species detected included mule deer, *Odocoileus hemionus*; coyote, *Canis latrans*; striped skunk, *Mephitis mephitis*; bobcat, *Lynx rufus*; red fox, *Vulpes vulpes*; and others. High species diversity occurred at camera sites 2 and 3, with nine and six different species being detected at the sites, respectively. Humans had the highest utilization intensity, or frequency of visits, of all species with a value of 3.216 visits per day at Camera 1, and cattle had the second highest utilization intensity at Camera 4a with a value of 1.143. Deer were detected at every location and tended to have higher intensities than the other species. Turkeys had the lowest utilization intensity with a value of 0.027 at Camera 6. Latency period values, or days to first detection, ranged from zero days to thirty-four days and varied widely between species. The lowest median latency periods were miscellaneous birds (0 days), humans (2 days), skunk (4.66 days), and deer (5.14 days). The greatest

median latency periods were rabbit (25.5), raccoon (21), and squirrel (19.33). A longer study period may result in greater knowledge of species diversity in the Natural Reserve. Overall, the study provided beneficial information to San Luis Obispo City about the wildlife abundance and diversity present in Bishop Peak Natural Reserve.

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Introduction

Natural Reserves and Open Spaces in the City of San Luis Obispo are intended to reestablish and protect the native flora and fauna of San Luis Obispo, as well as for the use and enjoyment of the public. Natural reserves are the combination of two or more properties for which the City of San Luis Obispo owns or has easements covering, and Open Spaces are individual properties owned outright by the City of San Luis Obispo. Wildlife is a natural component of the many Natural Reserves maintained by the City of San Luis Obispo. This project was developed by collaboration with myself, Jessica Engdahl; Freddy Otte, San Luis Obispo City Biologist; and Dr. John Perrine, Associate Professor of Biological Sciences at California Polytechnic State University and project advisor. The goal of the project was to identify wildlife passages and monitor wildlife activity levels with the intent to support future conservation efforts for Bishop Peak Natural Reserve, (BPNR).

Wildlife corridors are of immense importance because they provide continuous passage for wildlife to migrate or roam for foraging, mating, or other purposes. Increased connectivity between habitats and territories increases species diversity and encourages healthy gene pools, as opposed to small, isolated populations with inhibited mating and migration opportunities. The natural reserves in San Luis Obispo are unique in that the majority of the lands are managed with little direct human interference besides trail building. BPNR, as well as the other natural reserves in San Luis Obispo, has been modified very little from its original state to accommodate public activity, effectively striking "an acceptable balance between protecting the existing resources on BPNR while providing for recreational use and public safety" (Havlik, 2004). This is beneficial to wildlife because the open space is near the natural state of the land, thus remaining useful to the habitat.

Human-altered habitats tend to have less success maintaining natural ecological functions and high habitat connectivity because of changes to vegetative cover or loss of appropriate habitat for prey items (Evans, 2007).

In general, human recreation has had minimal impact on large wildlife species distribution, such as deer (Marzano, 2007). The intensity of impact varies with the kind of activity exerted on the location. BPNR experiences hiking, biking, and occasional horseback riding. Thus, the disturbance of wildlife in Bishop Peak Natural Reserve would be less than if larger recreational vehicles were used on the open space or if camping was permitted (Marzano, 2007). Human activity nearly always occurs during the daytime in Bishop Peak Natural Reserve, allowing the wildlife to utilize the open space at night essentially undisturbed. Undisturbed wildlife populations add to the health of the ecosystem and thus reduce the conservation efforts necessary on the open space.

Methods

1. Project Location

The project site was Bishop Peak Natural Reserve in San Luis Obispo, California. The natural reserve is approximately 352 acres located in the northwest portion of the City of San Luis Obispo, accessible from Highland Drive and Patricia Avenue (Fig. 1). The natural reserve includes Bishop Peak and is part of a string of volcanic rock formations called the Morros (Havlik, 2004). The Morros form a chain of hills and mountains beginning in San Luis Obispo and continuing northwest until the chain ends with Morro Rock, in Morro Bay. Several botanical communities are found in BPNR including oak woodland, grassland, rocky serpentine outcrop, chaparral, as well as ecotones of each community (Fig. 2).

Ecotones refer to the blending of two or more plant communities. Dominant plant species include coast live oak, *Quercus agrifolia;* black sage, *Salvia mellifera;* bay laurel tree, *Umbellularia californica;* coyote bush, *Baccharis pilularis;* and poison oak, *Toxicodendron diversilobum.* The general topography of the area is very sloping, with maximum elevation the summit of Bishop Peak at 1,546 feet (Havlik, 2004) (Fig. 3). Rolling hills are characteristic of the land to the northwest of the peak (Fig. two). The natural reserve is bordered by private lands and a small portion on the east side is bordered by Highway 1 (Fig. 3).

2. Site Selection and Camera Placement

A total of six game cameras were deployed in the Bishop Peak Natural Reserve for a span of five and a half weeks. The cameras were 2012 Bushnell Trophy Cam HD series with a 0.6 second trigger speed, day-night auto sensor, and 80 foot infrared flash (Bushnell). Each camera was installed in a metal Trophy Cam Security Case and padlocked with the provided Bushnell lock or Masterlock lock. The security cases were attached to a rock or tree with heavy wire rope and Masterlocks. The security cases and wire rope were to prevent theft or vandalism of the cameras.

Site locations were initially determined in collaboration with Freddy Otte, the City Biologist, and Robert Hill, the Natural Resources Manager. An aerial map of BPNR was printed and site possibilities were drawn on the map. Freddy Otte and I determined the exact camera locations once in the field and recorded GPS locations of each camera (Table 1), as well as taking a photo of each camera once it was secured to its respective tree or rock. Each site was labeled with a number on the map (Fig. 1). Five of the cameras were

installed relatively near the Felsman Loop trail and one camera was installed on a rocky outcrop on the north side of Bishop Peak approximately 0.5 miles off the Felsman Loop trail toward Morro Bay (Fig. 1).

Camera location 1 was approximately 0.10 miles southwest of the large water tank near the Highland trailhead (Fig. 1). The vegetative community was an ecotone of foothill and oak woodland communities. The camera was mounted on a coast live oak tree facing north.

Camera location 2 was approximately 0.6 miles along the Bishop Peak and Felsmen Loop trails from Highland Drive (Fig. 1). The camera was approximately 50 feet southwest off trail and was attached to a coast live oak tree (Fig. 6). The camera was positioned to face west. The camera was placed in this location because of the tree cover behind and peripheral to it and scrub bushes in front of it. The blend of these two vegetative covers would possibly support a wide range of wildlife. Notably, a game trail was sighted directly in front of the Felsmen Loop trail.

Camera location 3 was approximately 0.65 miles along the Bishop Peak and Felsmen Loop trails from Highland Drive, and approximately 0.10 miles off trail to the west (Fig. 1). The camera was fixed to a small boulder beneath a solitary coast live oak tree on the west side of Bishop Peak (Fig. 7). The camera faced east and slightly upward toward the peak to monitor a notable game trail. The vegetative community was an ecotone of grassland and chaparral scrub of about a meter stature.

Camera 4 had two locations. Location “a” was approximately 1.8 miles along the Felsmen Loop trail and 200 feet north off trail (Fig. 1). The camera was placed on a coast live oak tree facing west over a grassland heavily impacted by cattle grazing, as made

apparent by an abundance of cattle hoof marks and stool (Fig. 8). The camera was moved to location “b” ten days after initial placement to better collect data pertaining to wildlife passages instead of cattle grazing. Location “b” was approximately twenty feet east of location “a,” facing a series of possible game trails along a drainage area (Fig. 1). The vegetation immediately surrounding location “b” was lightly wooded with coast live oak and bay laurel trees with sparse shrubby understory. The camera was fastened to a coast live oak tree (Fig. 9).

Camera location 5 was approximately 0.65 miles along the Bishop Peak and Felsmen Loop trail and 160 feet northeast off trail (Fig. 1). The camera was fastened to a bay laurel tree facing north towards a presumed game trail (Fig. 10). The area was wooded with coast live oak trees and was heavily littered by leaves. Few shrubs were present.

Camera location 6 was approximately 1800 feet along the Felsmen Loop Trail from Patricia Avenue and about 175 feet northeast off trail in the midst of a coast live oak woodland (Fig. 1). There were few bushes or shrubs in the understory but the area was heavily littered with oak leaves. The woodland was likely supported by a drainage nearby. The camera was fastened to a coast live oak tree facing west towards the drainage and possible game trails (Fig. 11).

3. Data Collection

Each camera was set to the same settings: flash was set to on, photos taken per trigger was set to two, photo delay was set to ten seconds, and video settings were turned off. The cameras were filled with four AA batteries and four more backup batteries to ensure the camera would not die or lose data. The batteries were taped down with

electrical tape to guarantee they would stay in place and maintain connection through much jostling from wind and possible animal contact, as learned through initial testing.

Cameras 1, 2, 3, 4 location "a", and 6 were deployed on October 16, 2013. Camera 5 was deployed and Camera 4 was moved to location "b" on October 23, 2013. The first data collection day was October 25, 2013, the second was November 8, 2013, and the final collection day was November 22, 2013. Ted Engdahl and I hiked to each camera location with a MacBook to collect the photos. Each camera was unfastened from its respective tree or rock, turned off, set to 'Standby mode,' and connected to the MacBook by USB. The photos were then transferred and saved to the computer and deleted from the camera. The camera was disconnected from the computer, set to 'On' mode, and refastened to its respective tree or boulder. The data collectors' arrival was marked by photos taken once they were in camera range, and their departure was marked by photos taken as they walked back through the camera range.

When the study period ended, the cameras and all connected equipment were unfastened from their respective trees and boulders and removed entirely from the area with minimal to no impact to the area. No equipment was left in the Bishop Peak Natural Reserve, and no camera location was permanently marked or detrimentally altered by the project's activities.

4. Data Analysis

The photos were sorted by camera location. Visits of each species were defined as any number of individuals present at the time the photo was taken. Visits could be counted as multiple visits if there was a time span of ten minutes between photos; photos of the

same species within a ten minute time span at the same camera location were considered duplicates and were not counted as separate visits. For example, a series of photos within a ten minute time span containing multiple deer would be counted as a single deer visit. Human visits were determined by identifying separate groups based on clothing and physical appearance. If the same human groups had multiple photos taken, they were counted as multiple visits if there was a ten minute gap between photos. The field team was not counted in the Human category.

The data was consolidated to reflect visit frequencies by species and camera location. Not all cameras were deployed for the same number of days (Table 2). To account for the differences in deployment days, the number of visits of each species was divided by the total number of deployment dates for its respective camera location. This resulted in utilization intensity values for each species for each camera site (Table 5).

Efficiencies for each camera were calculated to represent the proportion of blank photos taken for each camera (Table 3). Blank photos lacked any identifiable organisms. Photos in which an organism was definitely present but its identity could not be determined were left out of the calculations. Photos of field personnel collecting the data were also excluded from these calculations. The proportion of blank photos was represented by a value determined by dividing the total blank photos by total photos taken for each camera. The percent efficiency was determined by subtracting the proportion value from 1.0 and multiplying the resulting value by 100.

Latency periods were calculated for each species and camera location. Latency is the number of days of data recording required until a specific species was detected. The values reflect the number of days until a visit was achieved by the specific organism. Days were

defined by twenty-four hour periods, beginning October 16, 2013 for Cameras 1, 2, 3, 4a, and 6 at 8:00am and October 23, 2013 at 8:00am for Cameras 4b and 5. Latency values of 0 reflect a visit recorded in less than twenty-four hours.

Results

Six cameras at seven locations were deployed in the Bishop Peak Natural Reserve for 7-37 days (Table 2). A total of 3,054 photos were taken (Table 3). The most visits recorded were of humans, 126 visits, and the next most common species sighted were deer, 46 visits, and skunk, 21 visits (Table 4).

1. Camera Efficiency

Camera efficiency varied between locations. All cameras were of the same brand and model, so efficiency is likely a reflection of placement and habitat characteristics. The lowest efficiencies were from Cameras 2 and 3. Camera 3 had an overall efficiency of 9.6%; likely because of placement. The camera was placed on a granite boulder overlooking the north side of Bishop Peak, but unfortunately its initial placement allowed a swaying bundle of *Avena sp.* to be in direct camera view. The swaying *Avena sp*. triggered the camera and resulted in several hundred blank photos. Once the error was realized, the camera's position was slightly adjusted so that the bundle of grass was removed from view.

Camera 2 had an overall efficiency of 26.3%. This was due to a small twig that constantly triggered the camera and resulted in hundreds of blank photos. Once the initial photos from Camera 2 were viewed and the error noticed, this small twig was removed.

Cameras 1, 4a, 4b, 5, and 6 had fairly high efficiencies of 89.9%, 73.6%, 100%, 91.7%, and 86.4%, respectively.

On October 22, 2013, a steer rubbed against Camera 4a and changed the frame of view. The camera angle shifted slightly down and to the right. This change does not appear to have affected the availability or quality of data.

2. Species Richness

Considering data from all cameras, a total of eleven species was recorded, plus several unidentified species of small birds. Humans accounted for the vast majority of visits recorded, even though they were only recorded from Cameras 1 and 2. Five species were carnivores: bobcat, coyote, red fox, raccoon, and skunk. The remaining species were herbivores: mule deer, rabbit, squirrel, turkey, and cattle.

Camera 2 had the highest species diversity with nine different species recorded: bobcat, coyote, red fox, mule deer, rabbit, raccoon, skunk, squirrel, and human (Table 4). Camera 4b had the lowest species diversity with only one species, mule deer (Table 4). Besides humans, the most commonly recorded animal was mule deer with twenty-six visits, and visits at every camera location (Table 4). The least commonly recorded animal was turkey with one visit at one camera location (Table 4).

3. Utilization Intensity

Utilization intensity was calculated to generate a standard value for visits that accounted for the differences in deployment days among sites. This is so the data from each camera can be directly compared to the data from other cameras. Humans at Camera 1 had the highest utilization intensity of all species at all camera locations, with a value of 3.216 visits per day (Table 5). Cattle at Camera 4a had the second highest utilization intensity with a value of 1.143 (Table 5). Mule deer were detected at every location and tended to have higher intensities than the other wildlife species. Turkeys at Camera 6 had the lowest utilization intensity with a value of 0.027 (Table 5).

4. Latency Period

Latency period values ranged from 0 days to 34 days and varied widely between species. The lowest median latency periods were Miscellaneous Birds (0 days), Humans (2 days), Skunk (4.66 days), and Mule deer (5.14 days) (Table 6). The highest median latency periods were Rabbit (25.5), Raccoon (21), and Squirrel (19.33) (Table 6). Raccoon, Red Fox, and Squirrel had the greatest ranges in days to detection, and Cattle, Rabbit, and Human had the smallest ranges (Table 6). Coyote and Miscellaneous Birds had no range in days to detection because they were only recorded visiting one camera location (Table 6).

Discussion

1. Camera Performance

There were large differences in efficiency between cameras. Efficiency ranged from 100% to less than ten percent (Table 3). All cameras were of the same make and model, which likely minimized differences in efficiency due to technology. The differences in efficiency were likely due to camera positioning and site characteristics. In cameras with especially low efficiency, there were periods of data collection saturated with blank photos because there was an object at the site that continually triggered the camera. At Camera 3, a twig a few feet in front of the camera triggered the camera when it swayed every few minutes; at Camera 2, a small branch from the coastal live oak tree the camera was attached to triggered the photo response continually. In both cases, the cameras were slightly repositioned and the triggering object was removed, to no degradation of the natural environment.

There were less blank photos for cameras that had fewer total photos. This could be due to fewer stimuli in the surrounding area or slight variations in the trigger sensitivity of each camera. Camera efficiencies did not have any relationship to utilization intensity (Table 3, Table 5).

2. Species Richness and Utilization Intensity

Mule deer, *Odocoileus hemionus*, were detected at every camera location and generally had higher utilization values than the other species. This may be due to the topography of the land surrounding BPNR. Deer tend to travel much less in forested and covered areas than in urban or agricultural land (Mankin and Nixon, 2011). The natural

reserve has urban land to the east and agricultural or unused land on all other sides (Fig. 3). BPNR and its surrounding features may encourage deer to travel through the agricultural land seeking the more covered natural reserve, and result in a high concentration of deer in the natural reserve because the deer are less inclined to travel in a more wooded area. The natural reserve is a blend of vegetative communities, but there are several oak woodland ecotones that would encourage and facilitate mule deer inhabitation. There is a possibility that there are one or a few small herds of deer that travel extensively over the natural reserve and they were well-documented in this study because the cameras were placed in or near wooded areas, except for Camera 3 which was placed facing a scrubland.

Humans had the highest utilization intensity across all camera sites, but they were only detected at two camera locations (Table 5). Both those locations were in areas with severe unauthorized trail activity. This is likely because BPNR is one of the most frequently used of all the San Luis Obispo Natural Reserves and has the highest density of hikers. A high density of hikers is likely to result in a high number of unauthorized trail-making and use, likely because hikers are looking to explore other areas of the natural reserve or find shortcuts to the peak. The other camera locations did not experience human activity, likely because the cameras were located farther off trail or on hillsides undesirable for citizens to scale. The high human activity levels in the open space are not necessarily negative, as they suggest the natural reserve is well used by the public and a valued asset of the San Luis Obispo Community. Activity at only two camera sites also suggests that the unmarked trails are a small area of the natural reserve, and that the majority of the land is largely untouched by off-trail hikers and thus may be rehabilitating as planned in the conservation

reports by the Natural Resources Protection Program of the City of San Luis Obispo. Unmarked trails created spontaneously by humans can disrupt wildlife activity, but established trails tend not to show wildlife disruption because the wildlife adjusts to the presence of humans (Coppes and Braunisch, 2013). The high levels of diversity and utilization of camera sites 1 and 2 suggest that those areas, although filled with unmarked trails, might have been heavily impacted by human traffic for some time and the wildlife in those areas are already adjusted to the high human activity.

Camera 2 had the greatest species diversity of all the camera locations (Table 4). This could be because the camera location was at an ecotone of two vegetative communities, an oak woodland and a scrubland. When communities meet, there is increased species diversity because there are increased number of niches and habitats available which can support more species. Increased number of smaller species, typically supported by the scrubland and lower vegetation, can attract larger species that prefer taller vegetation for camouflage and may prey on the smaller species. Humans were detected in this location, but at utilization intensities similar to that of the wildlife seen in that location as well (Table 5). This suggests that humans likely did not disrupt the routine activities of the wildlife, probably because the trail (although not city-authorized) had been well established and the wildlife had adjusted to high human activity (Coppes and Braunisch, 2013).

Feral pigs, *Sus scrofa*, were not recorded at any site, which suggests either that there are no feral pigs in the BPNR or there may be a small population whose range does not extend into the camera site areas. In the case of a small, unrecorded population, it is likely that they would not have been recorded by the game cameras because of relatively small

home-range size (Massei et. al., 1997). Feral pigs occupying coastal Mediterranean areas, similar to the California Central Coast, have been shown to occupy small home ranges in the event of food shortages, possibly similar to the drought status of San Luis Obispo and most areas in California in 2013 and previous years (Massei et. al., 1997). Feral pigs are of management interest because they can cause significant damage to native habitats. They are a nonnative species that fiercely compete for resources with the native species, can introduce diseases, and can cause significant damage to habitat (Otte, personal communication).

Other species of interest, specifically mountain lion, black bear, and gray fox, were not detected by the game cameras. This could be circumstantial, if the game cameras were not in locations that those animals utilize often or at all, or it could indicate that these species are not found in BPNR. Black bears have been known to occur in San Luis Obispo. They are detected regularly on Highway 101 near Los Padres National Forest and on the Cuesta Grade, one was sighted in 2013 near the San Luis Obispo airport, and in 2011 roaming near Patricia Drive trailhead for BPNR (Staff, Tribune; Staff, Mustang). Mountain lions have been reported roaming in Poly Canyon on Cal Poly's property, and are known to be in the San Luis Obispo area. Gray fox may not have been captured on the game cameras due circumstance as well, or due to competition with red fox. Red fox is a non-native invasive species that has often outcompeted the native gray fox for habitat and food resources (Freddy Otte, personal communication). Red fox were captured on the game cameras more than once, which confirms their presence in BPNR. It is possible that these red fox may have already outcompeted the native gray fox in BPNR.

3. Latency Period

Wide ranges of latency periods suggest that species detection is widely variable. Latency periods ranged from 0-34 days, with some species having similar latency values for multiple camera sites and others having very different latency periods for different camera sites (Table 6). The variations could suggest higher activity levels of species in certain vegetative communities over others. A low latency value does not necessarily indicate high utilization intensity at that site. Latency periods are generally utilized to determine how long game cameras should be deployed for, so if a specific species is being targeted, it can be recorded by the cameras (McAdams, 2012). This data can assist researchers in accurate surveys of species richness and diversity.

Conclusions and Recommendations

The project and game camera deployment were successful. The Bishop Peak Natural Reserve proved to be an ideal location for the first camera deployment operation. The data collected from the cameras indicates a high diversity and abundance of wildlife utilizing the natural reserve, undoubtedly adding to the overall health of the ecosystem. While large mammals such as mountain lion, *Puma concolor*, and bear, *Ursus americanus*, were not recorded by the cameras, they have been known to the San Luis Obispo area and may likely be present in the Natural Reserve at other times.

Camera efficiencies varied by camera and location likely due to repositioning interference during data collection periods. In future studies, efficiencies can be kept high by locating and removing non-animal stimuli, such as branches or brush. The low camera

efficiencies were due to similar non-animal triggers, and cameras were repositioned to retain high efficiency rates once such triggers were identified and removed.

There was relatively high success in drainage zones off trail, but there appears to be higher success in capturing species diversity from cameras nearer trails higher on the mountain than cameras farther from trails lower on the mountain. In future camera deployments, it may be beneficial for data collection to place more cameras near trails as well as far from trails because several species seem to make use of human-made trails at night, although this could increase the risk of camera theft. An additional strategy to encourage wildlife activity near the game cameras is to bait the camera locations. Bait may increase the number of species captured on camera as well as the utilization intensity of each camera location.

In regards to the several unofficial, unmarked trails, the well-established trails may not have a strong effect on wildlife activity in the Bishop Peak Natural Reserve. Previous studies have shown that well established trails, authorized or not, tend not to have much effect on wildlife activity because the wildlife have been able to navigate around them or in coordination with human usage (Coppes and Branisch, 2013). The creation of new trails, as like with the public seeking trail "shortcuts," can have a disruptive effect on wildlife activity because new or unexpected human activity can startle or scare off existing wildlife (Coppes and Braunisch, 2013). Utilizing wildlife-friendly fencing, as the City of San Luis Obispo is already doing, is the most effective way to prevent and discourage creation of these unofficial trails rather than signage. This is possibly due to the heightened level of physical exertion required to bypass the fencing and hike off trail (Coppes and Braunisch, 2013).

The project ultimately provided the City of San Luis Obispo's Natural Resources Program with data to describe the diversity and activity of wildlife in BPNR in their upcoming revision of the Bishop Peak Natural Reserve Conservation Plan. The wildlife found there is consistent with the native wildlife species known in the San Luis Obispo area, such as mountain lion, bobcat, mule deer, and raccoon. The absence or presence of each focal species was informative as well. The data confirming that red fox, a non-native species, is present in BPNR and that feral pig, another non-native and invasive species, was absent can help shape the focus of future conservation and management efforts. Other focal species such as mountain lion, grey fox, and black bear were not confirmed to be present in BPNR, but this data provides valuable information to the City of San Luis Obispo's Natural Resources Program about the quality and availability of habitat present at BPNR. For future studies, cameras might be placed in different locations, or the survey done during a different season than fall. This survey method proved useful and feasible, and could provide helpful information at other Open Spaces and Natural Reserves in the future.

Acknowledgements

Special gratitude is extended to the City of San Luis Obispo, especially Freddy Otte, City Biologist, and Bob Hill, Natural Resources Manager. These individuals allowed for equipment purchase and special access to off-trial sites of Bishop Peak Natural Reserve. Without their leadership, this project would not have been possible.

Special gratitude is extended to Dr. John Perrine, Associate Professor of Biological Sciences at California Polytechnic State University, for providing insight into the survey method, valuable editing counsel, and general advisory.

Special gratitude is also extended to Ted Engdahl, who was an invaluable field teammate and data collector.

Tables and Figures

Camera ID	Latitude	Longitude	Elevation (ft)
Camera 1	35°18’7” N	-120°-41’-33” W	748
Camera 2	35°18’17” N	-120°-41’-44” W	867
Camera 3	35°18’14” N	-120°-41’-59” W	1052
Camera 4a	35°18’24” N	-120°-41’-33” W	567
Camera 4b	35°18’25” N	-120°-41’-33” W	551
Camera 5	35°18’23” N	-120°-41’-48” W	860
Camera 6	35°18’21” N	-120°-41’-22” W	523

Table 1. The GPS coordinates of each deployed game camera.

Camera ID	Day Deployed	Day Recovered	Total Days Utilized
1	October 16, 2013	November 22, 2013	37
2	October 16, 2013	November 22, 2013	37
3	October 16, 2013	November 22, 2013	37
4a	October 16, 2013	October 23, 2013	7
4b	October 23, 2013	November 22, 2013	30
5	October 23, 2013	November 22, 2013	37
6	October 16, 2013	November 22, 2013	37

Table 2. Days each camera was deployed in the field.

Camera ID	Blank Photos	Total Photos	Proportion of Blank Photos	Percent Efficient (%)
1	46	455	0.101	89.90
2	948	1287	0.737	26.3
3	962	1064	0.904	9.6
4a	28	106	0.264	73.6
4b	0	6	0.000	100.0
5	4	48	0.083	91.7
6	12	88	0.136	86.4

Table 3. The efficiencies of each deployed game camera.

Species	Camera Sites							Total
	1	2	3	4a	4b	5	6	
Bobcat	-	7	4	-	-	-	-	11
Coyote	1	5	-	-	-	-	-	6
Fox, Red	2	3	-	-	-	-	-	5
Mule Deer	9	4	3	1	1	12	16	46
Misc. Birds	-	-	10	-	-	-	-	10
Rabbit	-	7	5	-	-	-	-	12
Raccoon	-	3	1	-	-	-	-	4
Skunk	-	7	13	1	-	-	-	21
Squirrel	-	3	-	1	-	1	-	5
Turkey	-	-	-	-	-	-	1	1
Cattle	-	-	-	8	-	-	2	10
Human	119	7	-	-	-	-	-	126
Total	132	46	36	11	1	13	19	

Table 4. Species richness and abundance at each camera location. Values indicate the number of visits of each species at each location. A visit is defined as any number of individuals present, with at least ten minutes between pictures to distinguish different visits.

Species	Camera Sites						
	1	2	3	4a	4b	5	6
Bobcat	-	0.054	0.108	-	-	-	-
Coyote	0.054	0.135	-	-	-	-	-
Fox, Red	0.054	0.081	-	-	-	-	-
Mule Deer	0.243	0.108	0.081	0.143	0.033	0.324	0.432
Misc. Birds	-	-	0.270	-	-	-	-
Rabbit	-	0.189	0.135	-	-	-	-
Raccoon	-	0.081	0.027	-	-	-	-
Skunk	-	0.189	0.351	0.143	-	-	-
Squirrel	-	0.081	-	0.143	-	0.027	-
Turkey	-	-	-	-	-	-	0.027
Cattle	-	-	-	1.143	-	-	0.054
Human	3.216	0.189	-	-	-	-	-

Table 5. Utilization intensity of each species at each site. Number of visits (Table 3) were divided by total days utilized (Table 2) to achieve standardized visit values.

Species	Camera Sites							Median	Range
	1	2	3	4a	4b	5	6		
Bobcat	-	5	12	-	-	-	-	8.5	(5, 12)
Coyote	9	6	-	-	-	-	-	7.5	(6, 9)
Fox, Red	2	25	-	-	-	-	-	13.5	(2, 25)
Misc. Birds	-	-	0	-	-	-	-	0	(0)
Mule Deer	4	2	2	0	13	10	5	5.14	(0, 13)
Rabbit	-	26	25	-	-	-	-	25.5	(25, 26)
Raccoon	-	8	34	-	-	-	-	21	(8, 34)
Skunk	-	9	5	0	-	-	-	4.66	(0, 9)
Squirrel	-	29	-	6	-	23	-	19.33	(6, 29)
Turkey	-	-	-	-	-	-	14	14	(14)
Cattle	-	-	-	6	-	-	7	6.5	(6, 7)
Human	0	4	-	-	-	-	-	2	(0, 4)

Table 6. Latency periods for each species. Values represent number of days of camera deployment until species were sighted.

Figure 1. Aerial map of Bishop Peak Natural Reserve. Numbers indicate locations of each game camera. Yellow lines indicate trails, and green lines indicate property boundaries.

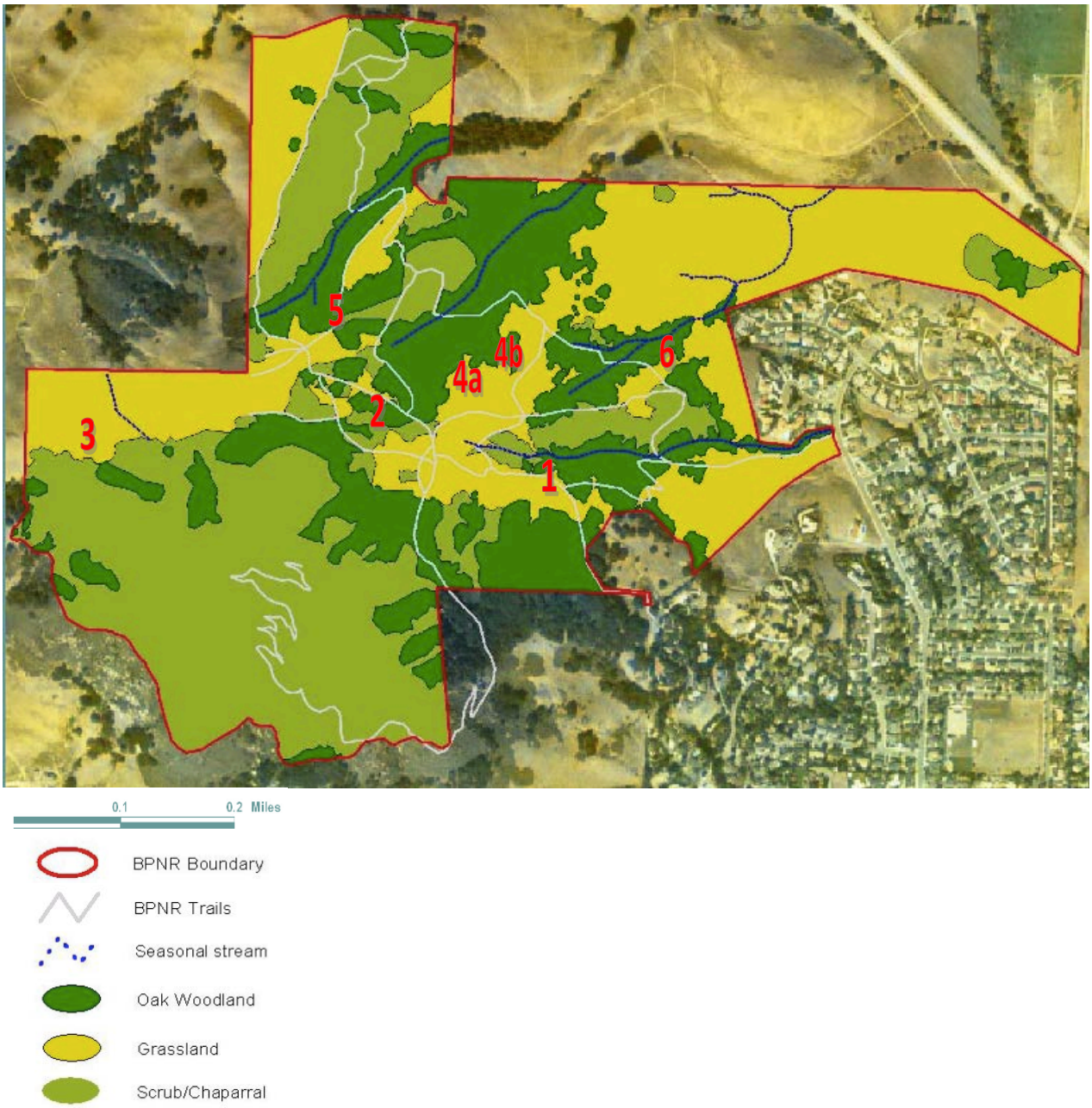

Figure 2. Aerial map of BPNR. Map displays the different vegetative habitats of the open space, trails, and open space boundaries (Havlik, 2004). The colored numbers indicate the approximate locations of cameras used in this study.

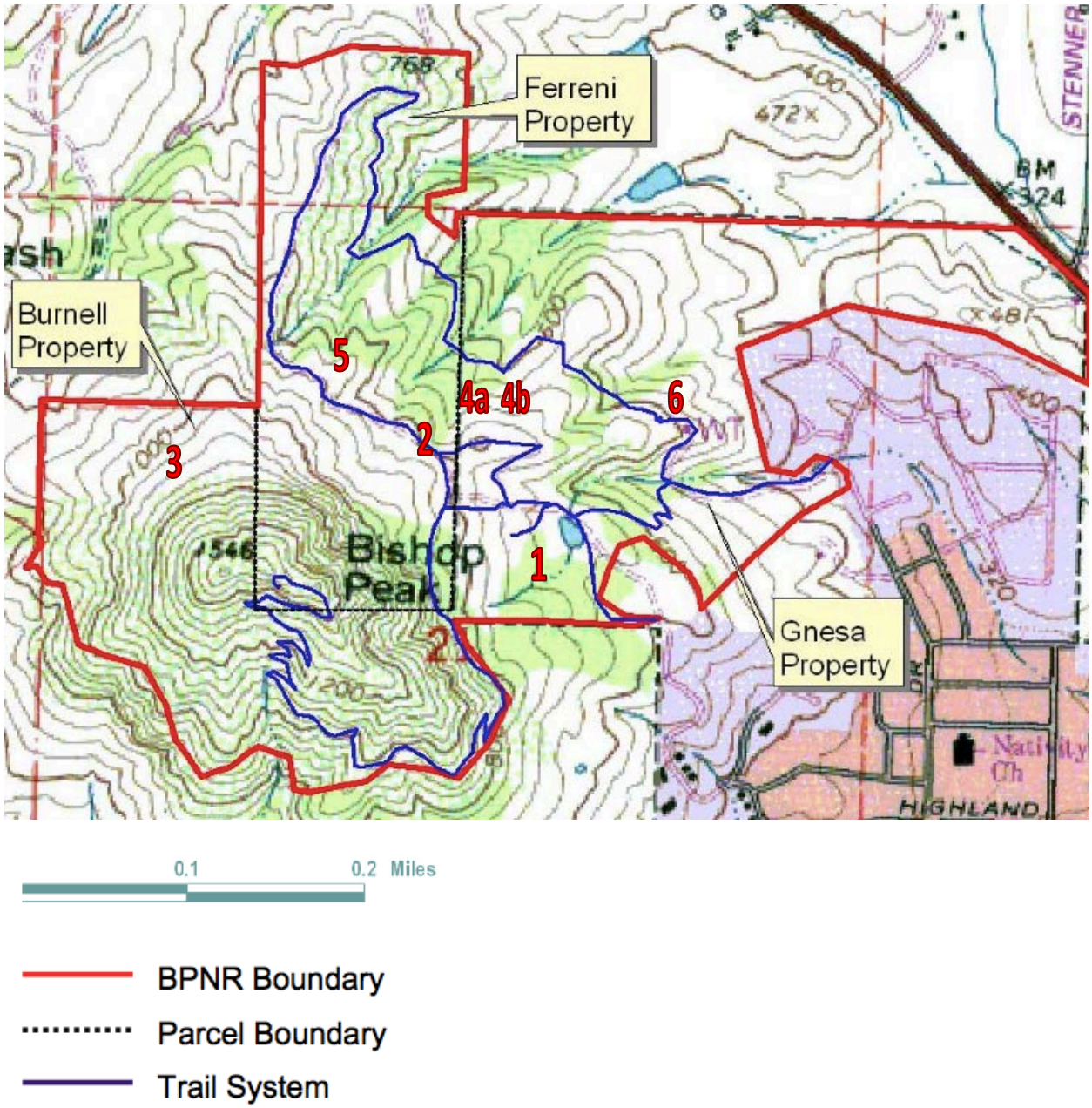

Figure 3. Topographical map of Bishop Peak Natural Reserve along with surrounding property parcels (Havlik, 2004). Red numbers on map indicate the approximate locations of cameras used in this study.

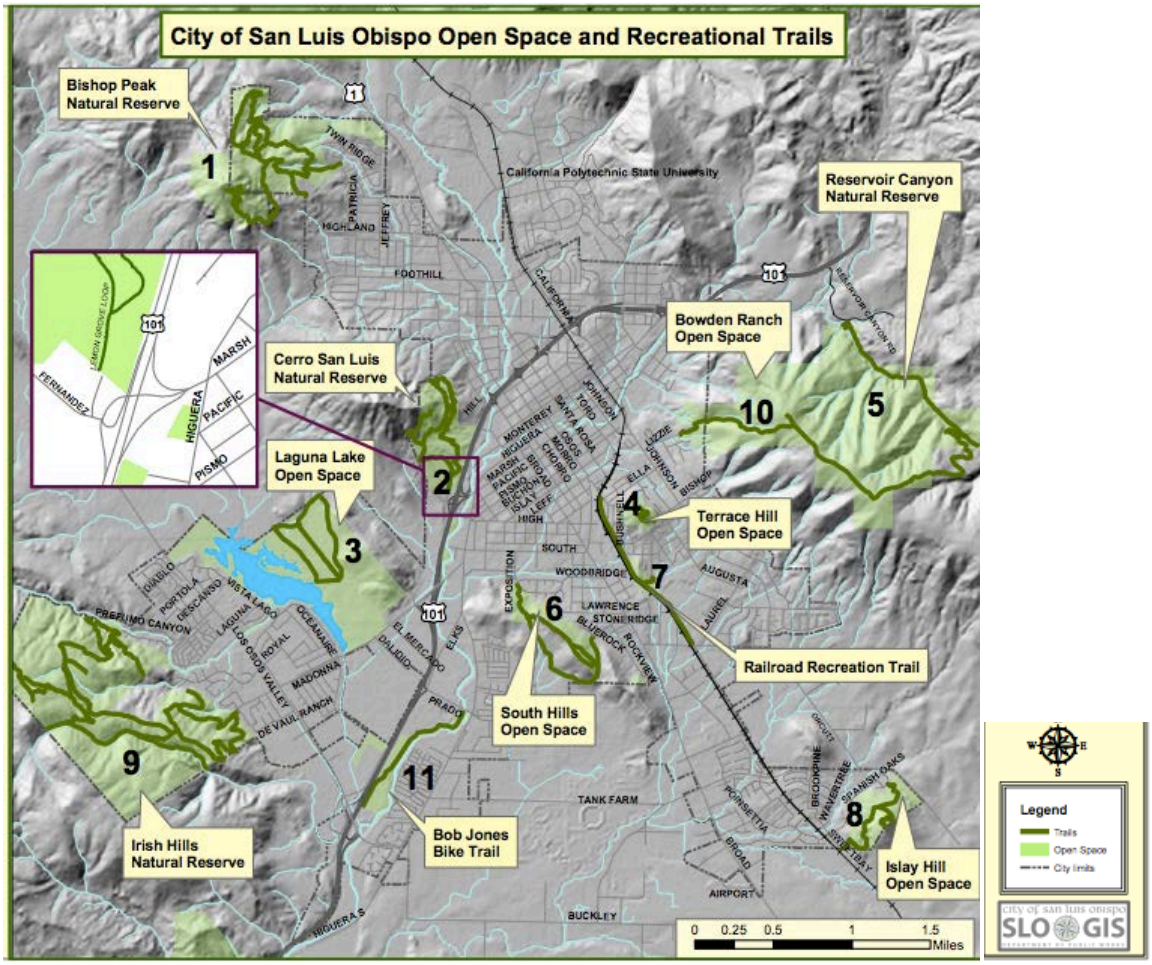

Figure 4. An aerial map of San Luis Obispo City highlighting the Open Spaces, Natural Reserves, and popular trails within the city. Open Space rules and regulations are listed, as well as access points to each recreational area. Bishop Peak Natural Reserve is numbered 1 on the above map (GIS).

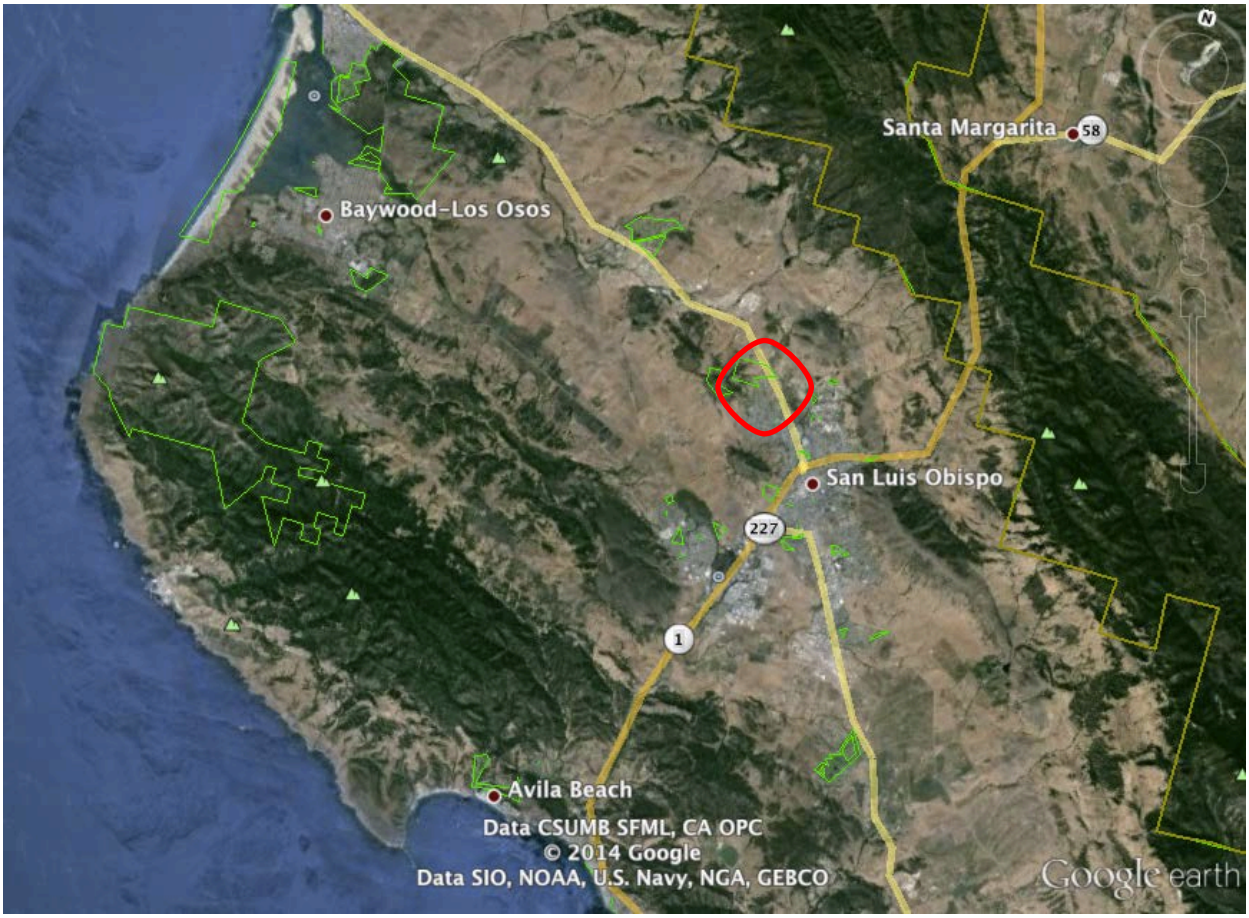

Figure 5. Map indicates BPNR's location in relation to the Central Coast (Google Earth). BPNR is circled in red. Green lines indicate recreational area boundaries.

Figure 6. Location of Camera 2. Camera is fastened to a coast live oak tree. A game trail lies directly in front of the camera, in the bottom right of the photo.

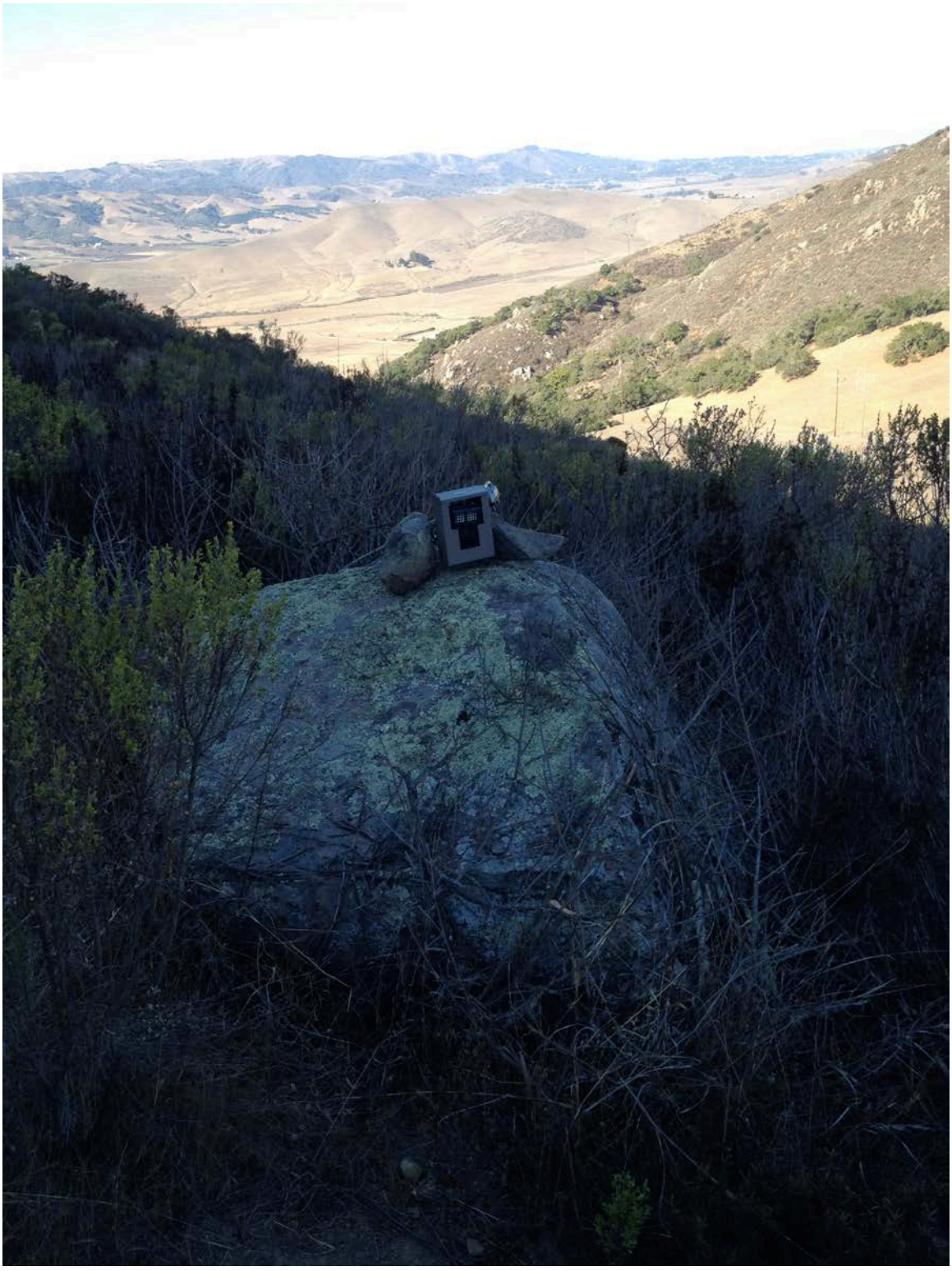

Figure 7. Location of Camera 3. Camera is secured on a boulder.

Figure 8. Location “a” of Camera 4. Camera is fastened to a coast live oak tree.

Figure 9. Location “b” of Camera 4. Camera is fastened to a coast live oak tree.

Figure 10. Location of Camera 5. Camera is fastened to a bay laurel tree.

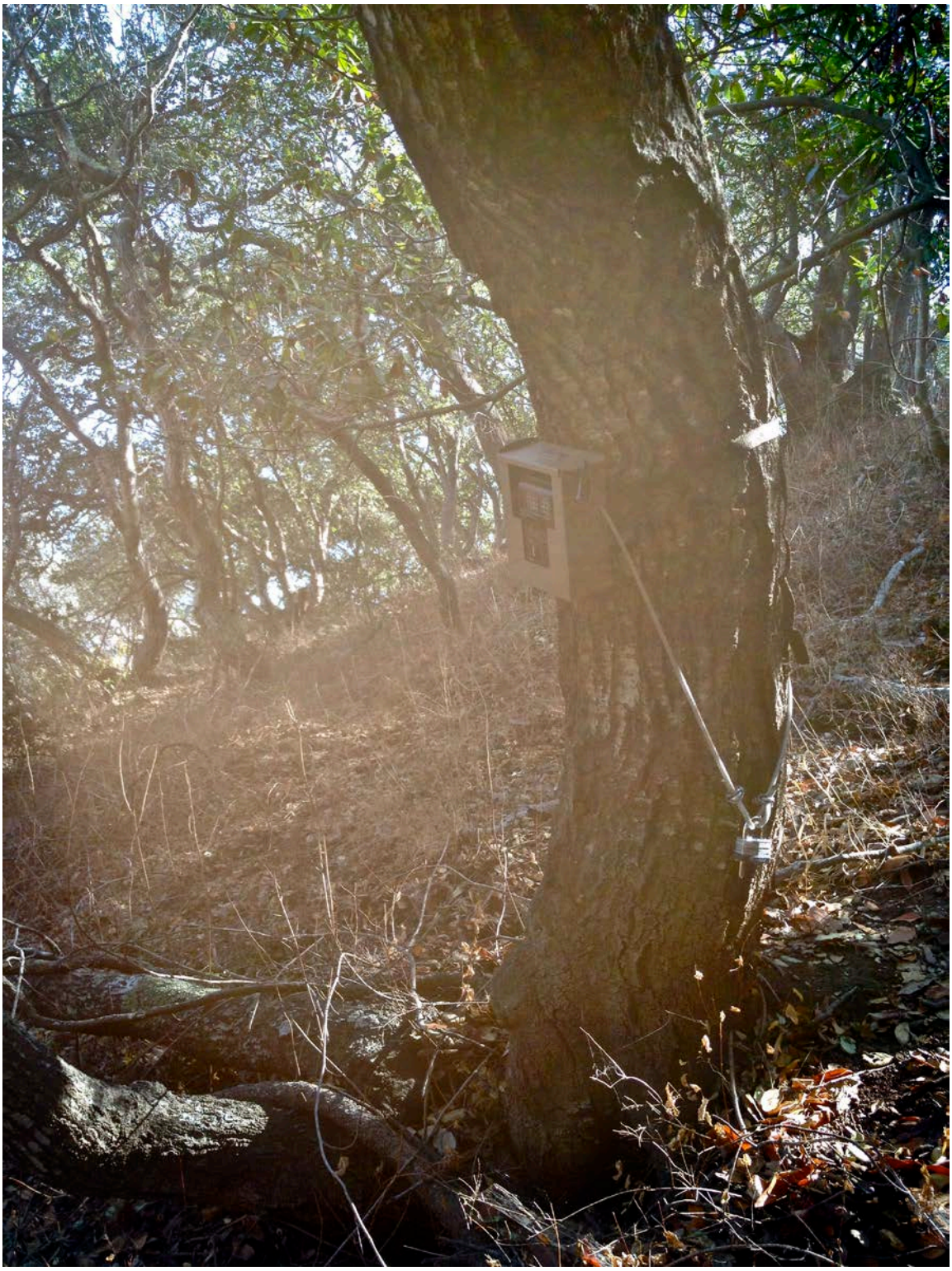

Figure 11. Location of Camera 6. Camera is fastened to a coast live oak tree.

Figure 12. A raccoon, *Procyon lotor*, at Camera 2.

Figure 13. A coyote, *Canis latrans*, at Camera 2.

Figure 14. A red fox, *Vulpes vulpes*, at Camera 1.

Figure 15. Mule deer, *Odocoileus hemionus*, at Camera 2.

Figure 16. A striped skunk, *Mephitis mephitis*, at Camera 3.

Figure 17. Cattle, *Bos taurus*, at Camera 4a.

Figure 18. Bobcat, *Lynx rufus*, at Camera 2.

Figure 19. Bobcat, *Lynx rufus*, at Camera 3.

Figure 20. Turkeys, *Meleagris gallopavo*, at Camera 6.

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Appendix C
Trail Map

Bishop Peak Trails

0 0.05 0.1 0.2 0.3 Miles

Felsman Loop

Bishop Peak Trail

Trailhead

1546 ft

600 700 800 900 1000 1100 1200 1300 1400 500 400

1.3 0.1 0.3 0.1 0.2 0.2 0.2 0.2 0.2 1.2

SANTA ROSA N

STENNER CREEK

MONTROSE

TWIN RIDGE

MIRA SOL

PATRICIA

PASATIEMPO

SKY LINE

CLOVER

RANCHO

BRITTANY

HIGHLAND

OAKRIDGE

MARLENE

DALY

AL HIL

FEL MAR

JEFFREY

PRINCETON

city of san luis obispo SLO GIS GEOGRAPHIC INFORMATION SERVICES

RESOLUTION NO. 10646 (2015 Series)

A RESOLUTION OF THE CITY COUNCIL OF SAN LUIS OBISPO, CALIFORNIA, APPROVING THE BISHOP PEAK NATURAL RESERVE CONSERVATION PLAN 2015 UPDATE AND ADOPTION OF A NEGATIVE DECLARATION

WHEREAS, the City of San Luis Obispo has adopted policies for protection, management, and public use of open space lands and cultural resources acquired by the City; and

WHEREAS, the City of San Luis Obispo manages twelve open space areas totaling approximately 3,500 acres, including the approximately 352-acre Bishop Peak Natural Reserve; and

WHEREAS, the Planning Commission, Parks and Recreation Commission, and the general public have commented upon the *Bishop Peak Natural Reserve Conservation Plan 2015 Update* as it has moved through a Council-directed approval process, and staff has considered and incorporated those comments where appropriate; and

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of San Luis Obispo that:

SECTION 1. Bishop Peak Natural Reserve Conservation Plan 2015 Update. The City Council hereby adopts the *Bishop Peak Natural Reserve Conservation Plan 2015 Update*, an official copy of which shall be kept on record with the City Clerk, based on the following findings:

a) The *Bishop Peak Natural Reserve Conservation Plan 2015 Update* is consistent with General Plan goals and policies relating to the oversight and management of City open space areas, specifically Conservation and Open Space Element Policy 8.5.6 that calls for the development of conservation or master plans for open space properties to protect and enhance them in a way that best benefits the community as a whole;

b) Implementation of the *Bishop Peak Natural Reserve Conservation Plan 2015 Update* will provide protection of identified natural resources and appropriate public access to the site while maintaining a majority of the site for habitat protection and enhancement; and

SECTION 2. Environmental Review. The City Council hereby adopts the Negative Declaration for the project, an official copy of which shall be kept on record with the City Clerk, finding that it adequately identifies all of the potential impacts of the project and that those potential impacts identified in the areas of Aesthetics; Geology and Soils; Hazards and Hazarous Materials; and, Hydrology and Water Quality are *de minimis* and less than significant.

Upon motion of Council Member Rivoire, seconded by Council Member Christianson, and on the following roll call vote:

AYES:	Council Members Carpenter, Christianson, and Rivoire, and Mayor Marx
NOES:	None
ABSENT:	None
RECUSED	Vice Mayor Ashbaugh

The foregoing resolution was adopted this 7th day of July 2015.

Mayor Jan Marx

ATTEST:

Anthony Mejia
City Clerk

APPROVED AS TO FORM:

J. Christine Dietrick
City Attorney

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the City of San Luis Obispo, California, this 27th day of July, 2015.

Anthony J. Mejia, MMC
City Clerk