

Draft
Ellwood Mesa/Sperling Preserve Open Space
Monarch Butterfly Habitat Management Plan

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EXECUTIVE SUMMARY

This Ellwood Mesa/Sperling Preserve Open Space Monarch Butterfly Habitat Management Plan (MBHMP) outlines the programmatic approach and methods for the City of Goleta (City) to manage and improve the Ellwood Mesa eucalyptus forest for the benefit of the overwintering behavior of the monarch butterfly (*Danaus plexippus*), other wildlife, and the public's use and enjoyment.

Two key local policy documents drive the protection of the monarch butterfly: the Goleta General Plan/Coastal Land Use Plan (General Plan; City of Goleta 2006) and The Ellwood-Devereux Coast Open Space and Habitat Management Plan (Open Space Plan; City of Goleta et al. 2004). The Coastal Land Use Plan is not yet certified. These policy documents provide an important context for this MBHMP.

The 22 programs detailed in this MBHMP organize and integrate the many diverse aspects of habitat management into an overall plan that can be implemented in a clear and concise manner. Each specific program identifies individual goals, policies, and actions to establish a well-organized and efficient process leading to a management strategy for the sustainability of monarch habitat at Ellwood Mesa. The programs are followed by implementation priorities, schedules, needs, and contacts for those responsible for the implementation.

The 22 programs are organized into four categories: Administrative Programs; Natural Resources Management Programs; Outreach Programs; and Monitoring, Research, and Adaptive Management Programs.

- The nine Administrative Programs are designed to assist the City with and inform the many MBHMP stakeholders of the details regarding implementation of the MBHMP.
- The seven Natural Resources Management Programs articulate the goals, policies, and actions necessary to maintain and improve the many important natural resources, including biological diversity and ecosystem functions associated with the Ellwood Mesa eucalyptus groves and the monarch butterfly aggregation sites they support.
- The three Outreach Programs are designed to provide information for visitors, educators, and students to help develop a broad appreciation for natural resources and local natural heritage, with a focus on monarch butterflies.
- The three Monitoring, Research, and Adaptive Management Programs provide a mechanism for assessing environmental conditions and conducting original studies to help understand the ecology of monarch butterflies, particularly at Ellwood Mesa. Information obtained from these programs and other sources can be used to adapt the MBHMP in response to additional information or changing conditions.

With adoption and implementation of this MBHMP, the City will fulfill a major commitment to the natural resources of Ellwood Mesa and its residents, and to all those committed to the conservation of monarch butterflies.

Funding for implementation of the MBHMP will be drawn from a variety of sources, which may include grants, donations, mitigation fees, and City funds. An implementation budget estimate is included in Appendix 1. On June 29, 2018, the California state budget for the 2018–2019 fiscal year was approved and included a provision allocating 3.9 million dollars to the City for management and restoration of the monarch butterfly habitats on Ellwood Mesa. The state funds will be maintained in an account separate from other City funds and will be used only for actions to restore, enhance, manage, and monitor butterfly habitats on Ellwood Mesa. In the near-term, this funding will be instrumental in getting the MBHMP’s programs operational and in addressing some of the imminent habitat issues that presently face the grove.

INTRODUCTION

BACKGROUND

Monarch butterfly (*Danaus plexippus*) use of the eucalyptus groves on Ellwood Mesa in the City of Goleta (City), California has inspired many residents and visitors over the years to help in the preservation and conservation of this important natural phenomenon. These eucalyptus groves occur in the City-owned Ellwood Mesa/Sperling Preserve Open Space (Ellwood Mesa Open Space or Ellwood Mesa) (Figure 1).

Over-wintering monarch butterfly aggregations in Ellwood Mesa groves have numbered in the tens of thousands during some years, making Ellwood Mesa one of the most important sites for monarch butterflies in California (Pelton et al. 2016). Each fall, monarch butterflies in the western United States migrate to the coast of California from various locations throughout western North America. The butterflies arrive at Ellwood Mesa in mid-September and, as winter approaches, cluster into aggregation roosts, often called overwintering or wintering colonies. The butterflies remain until about mid-February, when they generally disperse inland.

The eucalyptus groves at Ellwood Mesa are called the Ellwood Complex. As shown on Figure 2, six monarch butterfly over-wintering sites occur in the complex: Sandpiper, Ellwood North, Ellwood West, Ellwood Main, Ellwood East, and Ocean Meadows. The Ellwood East site is on private property and not within the Ellwood Mesa Open Space and is therefore outside the scope of this Monarch Butterfly Habitat Management Plan (MBHMP); however, it is included for context. The Ellwood Main site is located along Devereux Creek and is the primary aggregation site for over-wintering butterflies in Ellwood Mesa.

Information and data regarding the condition of the butterfly population and groves—as well as trends in butterfly health, number, and behavior—were compiled over the last several years through a collaborative effort between City staff and the City’s consultants—Althouse and Meade, Rincon Consultants, and Agri-Turf Supplies. Tracking butterfly numbers at Ellwood aggregation sites has been an ongoing effort that began in 1989 and has been maintained by the City since the City’s incorporation in 2002. A Habitat Assessment was completed for Ellwood Mesa in 2013 to document the habitat conditions and health of the eucalyptus groves on the mesa (Althouse and Meade, Inc. 2013). In 2017, during the 5-year drought, the condition of the eucalyptus trees was assessed at the aggregation sites, and tree mortality was determined throughout Ellwood Mesa. The development of management priorities was an expanded effort between City staff, the consultant team, the City’s monarch butterfly docents, and members of the public.

The monarch butterfly populations at Ellwood Mesa and in California statewide have declined at least 74% since the 1990’s (Pelton et al. 2016). The monarch butterfly is listed on the California Department of Fish and Wildlife’s (CDFW) Special Animals List with overwintering roosts designated as imperiled to vulnerable in the state (CDFW 2017). Currently, the species is under federal review for potential listing under the Endangered Species Act (ESA), and the U.S. Fish and Wildlife Service (USFWS) plans to make its determination of whether this species warrants ESA listing by June 30, 2019.



Figure I. Vicinity Map



Figure 2. Monarch Butterfly Aggregation Sites



Photo 1. Monarch Butterfly (*Danaus plexippus*) Aggregation on Blue Gum (*Eucalyptus globulus*)

POLICY

Two key local policy documents drive the protection of the monarch butterfly: the Goleta General Plan/Coastal Land Use Plan (General Plan; City of Goleta 2006) and The Ellwood-Devereux Coast Open Space and Habitat Management Plan (Open Space Plan; City of Goleta et al. 2004). These policy documents provide an important context for this MBHMP. Additionally, the City's Community Wildfire Protection Plan (CWPP) was used as a key reference. The Goleta Urban Forest Management Plan (as amended and approved February 21, 2017) was also used to guide management recommendations. A summary of related policies and/or actions is provided below.

Goleta General Plan/Coastal Land Use Plan – Conservation Element

Monarch butterfly overwintering sites are considered Environmentally Sensitive Habitat Areas (ESHAs) under the Coastal Act because the occupied groves meet the definition of an ESHA in Section 30107.5 of the California Coastal Act. An ESHA is defined as follows:

Any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.

As such, autumnal and overwintering sites are protected by the Coastal Act and the General Plan. Specifically, the General Plan protects monarch butterflies and associated habitat via General Plan Conservation Element Policy 4, Protection of Monarch Butterfly Habitat Areas. The objective of the policy is as follows:

To preserve, protect, and enhance habitats for monarch butterflies in Goleta, including existing and historical autumnal and winter roost or aggregation sites, and promote the long-term stability of overwintering butterfly populations.

The definition of butterfly habitat is stated in subpolicy CE 4.1, Definition of Habitat Area, as follows:

Sites that provide the key elements essential for successful monarch butterfly aggregation areas and are locations where monarchs have been historically present shall be considered ESHAs. These elements include stands of eucalyptus or other suitable trees that offer shelter from strong winds and storms, provide a microclimate with adequate sunlight, are situated near a source of water or moisture, and that provide a source of nectar to nourish the butterflies.

Additional subpolicies pertaining to the protection of this important local resource are provided in Policy CE 4 of the General Plan Conservation Element and were used to guide the preparation of this MBHMP.

Ellwood Mesa Open Space Plan

The 230-acre Ellwood Mesa is part of a 652-acre contiguous open space along the Ellwood-Devereux Coast that is managed by the City, the County of Santa Barbara, and the University of California, Santa Barbara (UCSB). In March 2004, these three agencies released The Ellwood-Devereux Coast Open Space and Habitat Management Plan (City of Goleta et al. 2004). The sections of the plan applying to the Goleta properties (referred to as the Ellwood Mesa Open Space Plan) were adopted by the Goleta City Council on June 24, 2004.

The Ellwood Mesa Open Space Plan establishes the following goal and policies that guide the management actions related to the monarch butterfly and supporting habitat:

Monarch Goal 1. Protect and maintain existing monarch butterfly populations in the Open Space Plan Area, and manage the habitats to be self-sustaining.

Monarch Policy 1. Manage public access to protect butterflies and their habitat, while promoting public enjoyment, education, and scientific research.

Monarch Policy 2. Conduct scientifically sound studies using appropriate and cautious methods to maintain and improve habitat conditions to ensure long-term viability of the population.

Monarch Policy 3. Implement phased habitat improvements using pilot programs, small-scale projects, and adaptive management.

Additional overarching management goals and policies are provided in the Ellwood Mesa Open Space Plan and were used to guide the preparation of this MBHMP.

Community Wildfire Protection Plan

The City's CWPP was adopted by the City Council on March 20, 2012. The purpose of the CWPP is to enhance community wildfire protection by identifying fire hazard treatments that are in balance with sustainable ecological management and fiscal resources. The CWPP presents design standard recommendations for fuel treatments specific to areas near butterfly aggregation sites that are intended to minimize adverse effects on adjacent habitat while reducing hazardous fuels. Key recommendations focus on the coordination between butterfly and wildland fire experts during planning and implementation of fuel treatment strategy prescriptions. The CWPP was used during the preparation of this MBHMP, and this MBHMP is intended to support implementation of the CWPP, which is further discussed in detail in Program 4 (City of Goleta 2012).

Goleta Urban Forest Management Plan

The Goleta Urban Forest Management Plan (GUFMP) (as amended and approved February 21, 2017) was also used to guide management recommendations. The GUFMP provides a guide for the long-term preservation and enhancement of the urban forest within the City's jurisdiction. The urban forest is defined as all public and private trees including the street tree system, trees in parks and other public lands, and trees on private properties throughout the City. The vision statement of the GUFMP is:

Goleta's urban forest is a thriving and sustainable mix of tree species and ages that creates a contiguous and healthy ecosystem that is valued and cared for by the City and all of its citizens as an essential environmental, economic and community benefit.

The GUFMP Section 4.7 Very Mature Tree Care calls to establish a regular maintenance program for trees located in parks, open spaces, and median islands to ensure very mature tree health. Mulching, fertilization, and pruning are three major practices used to tend to mature trees. The MBHMP fulfills this section for a tree maintenance program for Ellwood Mesa eucalyptus groves.

PURPOSE

The purpose of the MBHMP is to provide a programmatic approach to management of the habitats that support the monarch butterfly seasonal aggregation areas at the Ellwood Mesa Open Space, as well as a variety of other plant and animal species and coastal access and recreation. The intent of the management approach is to maintain and improve habitat conditions to ensure long-term viability of the monarch butterfly population, while allowing for coastal access, education and compatible recreational opportunities. The 22 programs detailed in this MBHMP organize and integrate the many diverse aspects of habitat management into an overall plan that can be implemented in a clear and concise manner.

METHODS

This MBHMP is the result of careful consideration of existing information, site surveys, inventory, and assessment of tree health within the groves, consultation with a broad array of professionals and interested public, and discussions with City staff. The City collaborated with Althouse and Meade, Inc. and Rincon Consultants, Inc. in the preparation of this MBHMP. This MBHMP is composed of 22 programs, each of which contains a goal, one or more policies, and one or more actions associated with each policy. Information on program status, needs, and contacts are also included, as well as general priority and schedule information and an annual cost estimate (Appendix 1). A main focus of each program is to establish an implementation structure with targets and actions to achieve present and future goals. . The scope of this MBHMP includes monarch butterfly habitat in the City's Ellwood Mesa Open Space, including aggregation sites, forest areas, and nectaring locations (refer to Figure 1 for a vicinity map and Figure 2 for a map of the butterfly aggregation sites and Habitat Management Area).

For the purposes of this MBHMP, the following definitions apply:

Program: a planned series of activities.

Goal: a broad statement of program intentions.

Policy: a set of plans or actions agreed upon by the interested parties.

Action: the process of doing something to achieve a goal.

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THE HABITAT MANAGEMENT PLAN

This MBHMP for the Ellwood Mesa Open Space is organized into four categories: Administrative Programs; Natural Resource Management Programs; Outreach Programs; and Monitoring, Research, and Adaptive Management Programs. These programs—including their goals, policies, actions, implementation priorities, and schedules—are described in the sections that follow.

A. ADMINISTRATIVE PROGRAMS

Administrative programs are designed to assist the City and inform the many MBHMP stakeholders of the details regarding implementation of the MBHMP. Identifying specific programs and their goals, policies, and actions enables a well-organized and efficient process to be established that leads to a management strategy for the sustainability of monarch habitat at Ellwood Mesa.

It is the City's intent that the goals and policies of this MBHMP should be considered and incorporated into future land use planning and policy documents, such as General Plan amendments and a Local Coastal Program, as appropriate, as these documents are developed.

I. Municipal Management Program

Overview: This program focuses on the role of the City as manager of the Ellwood Mesa Open Space and, in particular, the role of the City in the implementation of this MBHMP. Habitats included in this MBHMP include primarily the eucalyptus groves and windrows used by monarch butterflies for winter aggregations at Ellwood Mesa, covering approximately 230 acres from Hollister Avenue south to the ocean bluffs and from UCSB west to the Sandpiper Golf Course. The eucalyptus groves and windrows occur in the context of coastal mesa grasslands, coastal scrub, riparian habitats, and residential development. Therefore, they are part of a larger coastal ecosystem and neighborhood, with management priorities for which the MBHMP is designed to be compatible.

Goal I. To implement the MBHMP, with the City providing the administrative structure to oversee the programs and scheduling, and to interface with the community at large.

Policy I-1. The City shall review, and revise as necessary, the MBHMP to reflect current data, butterfly conservation science, and management techniques that apply to the local monarch population.

Action I-1.1. Conduct a public workshop to inform the community regarding the content and implementation of this MBHMP.

Action I-1.2. Conduct environmental review of this MBHMP, including a public hearing.

Action I-1.3. Prepare any necessary revisions to this MBHMP to resolve any issues identified during public review.

Action I-1.4. Submit this MBHMP to the Goleta City Council for review and discussion, followed by adoption and implementation.

Policy I-2. During implementation of the programs, goals, policies, and actions described in this MBHMP, and during the planning and implementation of other projects that may affect monarch butterfly habitat within the Ellwood Mesa Open Space, protection of the environment and specifically of monarch butterfly habitat shall be given the utmost consideration.

Action I-2.1. Whenever vegetation removal, ground disturbance, construction, or other activities with the potential to significantly disrupt habitat values are proposed within the MBHMP coverage area by the City or any other agency or utility, environmental protection measures shall be implemented. These measures shall be determined in coordination with a qualified biologist, and should normally include pre-activity surveys for nesting birds or other wildlife, pre-activity surveys for monarch butterfly aggregations, presence of an environmental monitor during construction, and other protections, as deemed appropriate.

Policy I-3. Because many of the MBHMP actions are related to trail improvements, tree work, and related project implementation monitoring and reporting, the City's Public Works Department shall oversee the implementation of this MBHMP. Public Works personnel overseeing implementation will have specific knowledge and experience to properly follow directives of this MBHMP.

Action I-3.1. The City's Public Works Department, Neighborhood Services Department, and Planning and Environmental Review Department will coordinate regularly regarding MBHMP implementation.

Policy I-4. The MBHMP is an overarching, long-term conservation strategy, setting forth the broad objectives, desired outcomes, and management policies for the Ellwood Mesa monarch butterfly habitat. Periodic Implementation Plans shall identify and describe short-term actions needed to further the goals and objectives of the MBHMP, taking into consideration current conditions and funding levels at the time each Implementation Plan is prepared.

Action I-4.1. On an annual basis, or as warranted based on habitat conditions, prepare an Implementation Plan identifying the actions planned to implement the MBHMP's programs, goals, policies, and actions during the coming year.

Action I-4.2. City staff shall present each annual Implementation Plan at a public hearing for stakeholder input and City Council approval.

Program Status: This MBHMP has been completed and is in the process of undergoing environmental review.

Program Needs: A public workshop, MBHMP review and revision as needed, and a public hearing—followed by adoption by City Council—are to be achieved.

Program Contact: Public Works Department

2. Fiscal Program

Overview: Successful implementation of this MBHMP and related conservation of the Ellwood Mesa Open Space depend in part on the ability to provide funding for the various programs contained in this MBHMP. Funding will come from a variety of sources as identified herein.

Goal 2. To provide short-term (annual), long-term (endowment), and special project (grant) funding for the implementation of this MBHMP.

Policy 2-1. The City shall consider providing annual funding to support MBHMP implementation.

Action 2-1.1. Consider appropriating General Fund, Special Revenue Fund, or Grant Fund monies, as available, during the bi-annual and mid-cycle budget processes.

Action 2-1.2. Consider including the MBHMP as a project sheet in the Capital Improvement Program annual budget.

Action 2-1.3. Develop an annual needs list from which the annual operating budget can be determined. This list should be included in the annual Implementation Plan (see Policy 1-3).

Policy 2-2. The City shall manage and use the City's Ellwood Mesa Butterfly Fund (Butterfly Fund) (226-5-9800-706) to pay for the implementation of the MBHMP and special projects consistent with the requirements of the fund. The Butterfly Fund shall be supplemented by grant funds and compensatory mitigation fees, as available.

Action 2-2.1. Manage the Butterfly Fund such that the fund may serve as an implementation funding source. Continue to identify grant funds to supplement the Butterfly Fund. Accept donations specific to the Butterfly Fund.

Action 2-2.2. Allow payments of compensatory mitigation fees into the Butterfly Fund, as deemed appropriate during CEQA analysis for projects with limited impacts on monarch butterfly habitat.

Program Status: The City provides annual funds in support of planning initiatives and general management needs at the Ellwood Mesa Open Space. With adoption of this MBHMP, funds can be earmarked annually for implementation of programs and specific actions within this MBHMP. Furthermore, grants and other fundraising opportunities will exist for which City funds can be used

as a local match to new funds raised from external sources. In the near term, the \$3.9 million allocated in the State Budget will provide a vital funding source.

Program Needs: Adoption of this MBHMP so the Fiscal Program can be implemented.

Program Contact: Public Works Department

3. Interagency Cooperative Program

Overview: In today's complex regulatory environment, important sites for natural resource conservation can be subject to conflicting regulatory goals at the federal, state, county, and municipal levels. Management of threatened or endangered species that may occur in the future—and rare species and sensitive habitats at Ellwood Mesa—require careful coordination among regulatory partners so that conflicts are minimized.

Goal 3. To develop cooperative relationships with federal, state, county, and municipal agencies toward the implementation of integrated management practices favorable to the conservation of the monarch butterfly habitats at Ellwood Mesa Open Space.

Policy 3-1. The City shall pursue cooperative relationships with other agencies regarding regulatory goals and policies that the partners have in common concerning the Ellwood Mesa Open Space, in particular, goals and policies that have an impact on the management of the monarch butterfly aggregation sites.

Action 3-1.1. As appropriate and productive, pursue cooperative relationships with federal agencies such as the USFWS and the U.S. Army Corps of Engineers to obtain potential permits, identify funding opportunities, and identify/pursue other potentially shared interests regarding the natural resources at Ellwood Mesa, with a focus on sustaining monarch butterfly aggregation sites.

Action 3-1.2. As appropriate and productive, pursue cooperative relationships with state entities such as the CDFW, Regional Water Quality Control Board (RWQCB), UCSB, and California Coastal Commission (CCC) to obtain potential permits, identify funding opportunities, and identify/pursue other potentially shared interests regarding the natural resources at Ellwood Mesa, with a focus on sustaining monarch butterfly aggregation sites.

Action 3-1.3. As appropriate and productive, pursue cooperative relationships with Santa Barbara County departments (such as Agricultural Commissioner, Fire, Parks, Planning and Development, Flood Control, and Public Works) to obtain potential permits, identify funding opportunities, solve problems, and identify/pursue other potentially shared interests regarding the natural resources at Ellwood Mesa and adjacent properties, with a focus on sustaining monarch butterfly aggregation sites.

Program Status: City staff regularly coordinates with the County of Santa Barbara and UCSB. Additionally, City staff has formed a functioning interdepartmental working relationship among the

Public Works Department, Neighborhood Services Department, and Planning and Environmental Review Department regarding the management of Ellwood Mesa. Many additional productive relationships can be pursued related to the conservation of monarch and other butterflies.

Program Needs: Adoption of this MBHMP and implementation of its programs.

Program Contacts: Public Works Department, Neighborhood Services Department, and Planning and Environmental Review Department

4. Community Wildfire Protection Program

Overview: One of the most important efforts regarding coordination of potentially competing management goals is the identification and resolution of conflicts between the actions to protect the adjacent communities from the threat of wildfires while also providing protection of the habitats for seasonal aggregation of monarch butterflies at the Ellwood Mesa Open Space. The groves and windrows, composed primarily of blue gum eucalyptus (*Eucalyptus globulus*), are fire-prone and can present a threat to residential communities adjacent to the butterfly habitats. The CWPP was produced in coordination with this MBHMP to provide management practices compatible with monarch butterfly aggregation site protection. The City's adopted CWPP provides important context for the management of these resources.

Ellwood North, Main, and West sites are the aggregation locations within the groves on Ellwood Mesa that are directly adjacent to residences along eucalyptus grove boundaries (Figure 2). The Sandpiper site is not directly adjacent to structures, but it is adjacent to the Sandpiper Golf Course (Figure 2). In habitat areas that are not adjacent to structures, fuel treatments consist of mowing along the outside edge of the grove.

The Monarch Butterfly Aggregation Area Treatment Strategy section of the CWPP states that fuel treatments in areas near human developments are critical measures in the wildfire protection strategy for both residences and butterfly aggregations and habitat. Trees along grove edges provide wind and weather protection for aggregation sites. Therefore, it is important to maintain adequate tree density inside these edges (The Xerces Society 2017). Larger trees are not the primary fuel of concern in the spread of wildfire; rather, the greater hazard and threat are understory vegetation, dead/downed trees, and fuels that could create fire ladders. The CWPP describes the prescription guidance for butterfly aggregation areas adjacent to structures and outlines approved actions to be taken within 100 ft. of structures to reduce the ignitability of those structures. Figure 3 shows the CWPP fuel reduction zones within the MBHMP area.

In butterfly aggregation areas within 100 ft. of homes, the fuel treatment strategy prescribed by the CWPP includes removal of understory, ladder fuel, and dead/downed fuel. Careful thinning of smaller or unhealthy trees within 30 feet of the grove edge is recommended while considering the wind buffering needs of the aggregation site. Fuel reduction implementation and subsequent monitoring should involve input by City-approved monarch butterfly and wildfire professionals.

Goal 4. To provide management practices within the eucalyptus groves and windrows that support healthy monarch butterfly habitat and are compatible with the City's CWPP.

Policy 4-1. The goals, policies, and actions of this MBHMP shall be consistent with the intent of the CWPP to reduce the ignitability of homes and structures.



Figure 3. CWPP-related fuel reduction zones within the MBHMP area

Action 4-I.I. Support implementation of Goleta’s CWPP in the 100-ft. buffer from homes and structures as the 100 ft. extends into the Ellwood Mesa eucalyptus groves with actions outlined in below in Table 1 (as seen in Table 14 of the CWPP).

Table I. CWPP Prescription Guidance for Butterfly Aggregation Areas Adjacent to Structures

Location	Primary Defense Zone (A)*** (0 – 30')	Fuel Reduction Zone (B)*** (30' – 100')
Fuel Type Based on Defensible Space PRC – 429I and Firefighter Safety		
Grass/ Forbs	Reduce fuel depth to 4 inches; methods include mowing, masticating, weed-whacking, biological browsing	Same treatment as (A); longer grass in isolated open areas is acceptable.
Surface dead/ down material	Clear dead/down flammable materials; methods include raking, hand-piling/ removal, masticating chipping/ dispersal on site	Reduce dead/down flammable material to < 3” depth; methods same as (A).
Brush/ Shrub fuel	Remove to a spacing (between edges of brush) generally 2x brush height on <20% slopes; methods include masticating or hand-cutting, biological browsing	Same Treatment as (A); a pocket or clump of brush can be treated as one large shrub in more open site conditions.
Trees Overstory without brush understory	Trim or thin only trees that do not provide protection to monarch butterfly aggregation sites* Thin smaller or unhealthy trees at 10 – 20 ft crown spacing (as determined by slope, tree size and type);Leave larger trees unless toppling hazard.** Reduce ladder fuels by pruning lower branches 6-15 ft up, or lower 1/3 of tree height on trees smaller than 18 ft..	Trim or thin only trees that do not provide protection to monarch butterfly aggregation sites* Thin smaller or unhealthy trees at approximately 10 ft crown spacing (as determined by slope, tree size and type);. Leave larger trees unless toppling hazard.** Reduce ladder fuels by pruning lower branches approximately 6 ft up, or lower 1/3 of tree height on trees smaller than 18 ft..

Location	Primary Defense Zone (A)*** (0 – 30')	Fuel Reduction Zone (B)*** (30' – 100')
Fuel Type	Based on Defensible Space PRC – 429I and Firefighter Safety	
Trees Overstory with brush understory	Trim or thin only vegetation that does not provide protection to monarch butterfly aggregation sites* Thin small or unhealthy trees at 10-20 ft crown spacing (based on slope, tree size and type). Leave larger trees at 10 ft. crown spacing unless toppling hazard.** (Reduce ladder fuels by pruning lower branches 6-15 ft up, or lower 1/3 of tree height on smaller trees In understory: remove brush ladder fuel. Methods include masticating or hand-cutting.	Trim or thin only vegetation that does not provide protection to monarch butterfly aggregation sites* Thin small or unhealthy trees to approximately 10 ft. crown spacing. Leave larger trees unless toppling hazard.** Reduce ladder fuels by pruning lower branches approximately 6 ft up, or lower 1/3 of tree height on smaller trees. In understory remove brush ladder fuel. In non-canopied areas, non-continuous patches of shrubs or small trees in openings is acceptable.. Methods include masticating or hand-cutting.
<p>*As determined by the Goleta City Project Manager overseeing mitigation work in consultation with a City-approved monarch butterfly specialist and a City-approved wildland fire specialist.</p> <p>**As determined by the Goleta City Project Manager and Goleta City arborist.</p> <p>***For further information specific to homeowner/structure mitigation measures see CWPP Section 6.2.1.</p>		

Action 4-1.2. Support implementation of Goleta’s CWPP, specifically in regard to guidelines that are not in potential conflict with the management of the groves that support monarch butterfly aggregation sites, as noted below.

Action 4-1.3. Maintain and revegetate moderate cover of understory in and around aggregation sites with fire-resistant, native plant species (The Xerces Society 2017) (Appendix 3).

Action 4-1.4. Conduct all wildfire protection work within 300 feet of butterfly aggregations areas between April 1 and September 15, outside of monarch butterfly overwintering season.

Action 4-1.5. Coordinate with City-approved butterfly and wildland fire experts during planning and implementation of any fuel treatments since conditions within groves can change and aggregation locations may shift.

Action 4-1.6. Install a large, bilingual “NO PARKING-FIRE LANE” sign at Santa Barbara Shores access gate.

Policy 4-2. Trees in the groves containing monarch butterfly aggregation sites shall be managed, as feasible, to ensure their health and longevity in the context of a high fire hazard environment.

Action 4-2.1. Implement Program 12, Tree Management Program, to reduce fire hazard, improve public safety, and eliminate trees that are threatening the sustainability of the aggregation sites, including dead, diseased, and dying trees.



Photo 2. Evidence of Wildfire (Charred Trunks) at Main Grove – East, Ellwood Mesa Open Space

Program Status: The CWPP was adopted with the passage of Resolution No. 12-21 by the Goleta City Council on March 20, 2012. The Ellwood Mesa Implementation Plan is in environmental review.

Program Needs: Adoption and implementation of CWPP and the MBHMP will result in a reduction of wildfire hazards associated with eucalyptus groves.

Program Contact: Public Works Department

5. Trail Management Program

Overview: Public access trails are located through or adjacent to most of the monarch butterfly aggregation sites on Ellwood Mesa. These localized trails link together a series of regional trails, adjacent residential neighborhoods, and other preserves, such as the Coronado Butterfly Preserve managed by the Santa Barbara Land Trust and open space lands managed by the University of California system. Public access, including organized field trips to see the seasonal aggregations of monarch butterflies, is an important part of the Ellwood Mesa experience. However, repeated and increasing access along the semi-formal trails can result in negative impacts on the habitats and overall site aesthetics. Additionally, the trees constituting the butterfly habitat do occasionally die, fall, and shed limbs, creating hazardous conditions for recreationalists at certain locations.

Goal 5. To develop and maintain public access trails that provide a safe and meaningful experience for visitors while also limiting impacts on habitats and wildlife, in particular, monarch butterflies and their seasonal aggregation sites.

Policy 5-1. The City shall maintain existing public access trails that provide a safe experience for visitors to the eucalyptus groves supporting seasonal monarch butterfly aggregation sites.

Action 5-1.1. Maintain existing public access trails through the eucalyptus groves supporting monarch butterfly aggregation sites by reducing threats of trips, slips, and falls. May use Trails Council and CCC to help with maintenance.

Action 5-1.2. Implement Program 12, Tree Management Program, to reduce the threats from falling tree limbs and trunks.

Action 5-1.3. Repair damage to trail boundary ropes and posts, as needed.

Action 5-1.4. Prevent damage to seasonal monarch habitat by installing additional trail boundary posts, ropes, and signs, as necessary, consistent with those at the Ellwood Main monarch aggregation area.

Action 5-1.5. Use wood chips on trails to reduce soil compaction and decrease erosion during wet months.

Action 5-1.6. Retain and maintain Ellwood Main visitor viewing area boundary signs and rails.

Action 5-1.7. Review locations of trail and viewing area delineations and adjust if needed to protect trees or butterflies, annually.

Action 5-1.8. Review trail conditions on an annual basis and provide recommendations on improvements and modifications regarding human safety, trail maintenance, and ecosystem health, including conservation of monarch butterfly habitat in relationship to location,

condition, use of trails, and number of visitors. Include recommendations for any tree trimming, removal recommendations, or other tree safety issues in the annual Implementation Plan.

Action 5-1.9. Long-term closure of official trails is undesirable and should not be used as a management approach. It is preferable to remedy trail hazards promptly, or to allow trails to remain open with appropriate signage alerting users to the risks present.

Policy 5-2. Maintain and improve existing links between trails associated with eucalyptus groves that support monarch butterfly aggregation sites at Ellwood Mesa with the adjacent Coronado Butterfly Preserve.

Action 5-2.1. Coordinate trail improvement activities with the Santa Barbara Land Trust and UCSB staff to ensure that improvements are compatible.

Action 5-2.2. Coordinate trail improvements with proposals for the Coastal and Juan Bautista De Anza trails that traverse Ellwood Mesa, which also link to trails within the eucalyptus groves that support monarch butterfly aggregation sites, to ensure protection measures are addressed for the aggregation sites.

Program Status: Public access trails already exist within the majority of the aggregation sites, but human safety issues exist because of the poor condition of many eucalyptus trees along the trails and eroded trail conditions. Impacts on eucalyptus groves supporting monarch butterfly aggregation sites also exist as a result of public access.

Program Needs: Dead and dying trees along trails and viewing areas present a public safety risk and risk to habitat stability. The Implementation Plan should detail work to be accomplished on an annual basis to maintain access and protect the public and sensitive habitat. Eroded trail conditions and overhanging trees can be public safety issues as well as tree health issues, necessitating trail improvements.

Program Contact: Public Works Department

6. Waste Management Program

Overview: Although the City's Public Works Department staff conducts inspections and removes easily visible waste and trash, unauthorized off-trail use, homeless encampments, and related trash dumping periodically occur in the Ellwood Mesa's eucalyptus groves. The City's butterfly docents also remove trash and alert the Public Works Department staff when there are new accumulations of trash and/or other debris that are too large or abundant for hand removal.

Goal 6. To maintain a waste-, trash-, and debris-free butterfly habitat management area.

Policy 6-1. The City shall collect, remove, and appropriately dispose of all waste, trash, and debris that accumulate in habitat on Ellwood Mesa.

Action 6-1.1. Continue to remove existing accumulations of waste, trash, and debris from monarch butterfly habitat and dispose of them in an appropriate manner. Coordinate with Sheriff's Office for removal of homeless encampments, if necessary.

Policy 6-2. The City shall inform visitors of the monarch butterfly habitat of rules relating to trash and debris policies associated with monarch butterfly habitat.

Action 6-2.1. Post signs at appropriate locations stating open space user rules; for example, "Please take out your trash" and, "Day Use Only – Camping Prohibited."

Action 6-2.2. Educate the public through seasonal, on-site presence by the City's butterfly docents about the importance of maintaining the groves free of trash.

Action 6-2.3. Place trash cans in the parking lot. Inspect annually and replace as needed.

Program Status: Despite trash removal attempts by Public Works Department staff and the City's butterfly docents, various sites throughout the monarch butterfly habitat at Ellwood Mesa accumulate trash and other debris from human activity.

Program Needs: Trash and debris should be removed, where feasible, from the Ellwood Mesa habitat that support monarch butterfly aggregation sites.

Program Contact: Public Works Department, Neighborhood Services Department

7. Aesthetic Resources Management Program

Overview: Portions of Ellwood Mesa eucalyptus groves suffer from grove senescence, drought, pests, disease, or lack of formal management efforts that maintain consistent aesthetic values. Fencing and signs are irregularly installed and inconsistently maintained. They also lack a consistent theme. This MBHMP would provide a consistent management structure.

Goal 7. To integrate this MBHMP's programs into an effort to improve the quality of aesthetic resources of the Ellwood Mesa, in particular, the eucalyptus groves and windrows supporting monarch butterfly aggregation sites.

Policy 7.1. The City shall provide stewardship and management oversight of the eucalyptus groves, in particular, those areas supporting monarch butterfly aggregation sites.

Action 7-1.1. Adopt and implement this MBHMP, including its 22 management programs.

Action 7-1.2. Provide integration of program goals, policies, and actions to improve the overall aesthetics of the various groves, including installation of a consistently designed

interpretive program and strategically placed fencing, as more specifically outlined in Program 18, Interpretive Program.

Policy 7.2. Signs, fencing, and restoration efforts associated with monarch butterfly habitat on Ellwood Mesa shall be aesthetically compatible with natural conditions.

Action 7-2.1. Review signage and fencing design for compatibility with the Ellwood Mesa natural areas.

Action 7-2.2. Review restoration plantings and activities for appropriate aesthetic compatibility.

Program Status: Adoption and implementation of this MBHMP will result in a more sustainable and visually pleasant user experience because of the improved aesthetic value of the Ellwood Mesa eucalyptus groves and monarch butterfly aggregation sites.

Program Needs: Adopt and implement this MBHMP.

Program Contact: Public Works Department

8. MBHMP Review, Update, and Amendment Program

Overview: Reviewing and updating key planning documents would ensure that the management goals and actions are working as intended. Updating and amending programs, when needed, would ensure that the planning document is responsive to the changing needs of the community and the resource.

Goal 8. To maintain the relevance of this MBHMP with periodic reviews, updates, and amendments.

Policy 8-1. The City shall review this MBHMP as the need for updates and amendments arises (e.g., changes in physical conditions, regulations, or expansion of habitat management knowledge or strategies) or at least every 5 years.

Action 8-1.1. Conduct internal and public review of this MBHMP, as conditions warrant.

Action 8-1.2. Update information in this MBHMP, as conditions warrant.

Action 8-1.3. Amend programs, goals, polices, and actions in this MBHMP to reflect the results of the review and update process.

Action 8-1.4. Seek public input on amendments to programs, goals, polices, and actions in this MBHMP.

Action 8-1.5. Conduct environmental review, if necessary (new or modified policies and actions pose new impacts).

Action 8-1.6. Obtain approval by the Goleta City Council and adopt amended MBHMP.

Program Status: Adoption of this MBHMP by the City will provide the mechanism for review, update, and amendment.

Program Needs: Commitment to update this MBHMP to ensure that it is meeting the demands of the existing conditions.

Program Contacts: Planning and Environmental Review Department and Public Works Department

9. Catastrophic Event Response Program

Overview: The eucalyptus groves at Ellwood Mesa are at risk of catastrophic environmental events. For example, trees falling during powerful storms could cause collapse of additional trees, excessive fuel loads can spread wildfires, and infestations of insect pests can weaken or kill trees. Because such potential catastrophic events are likely to occur within the monarch butterfly aggregation sites, Program 9, Catastrophic Event Response Program, would put in place a preliminary plan of action to address the consequences of loss of trees or entire groves containing monarch butterfly aggregation sites.

For the purpose of this MBHMP, a catastrophic environmental event is defined as an event causing great ecological distress and damage, either sudden or gradual, across a significant portion of the monarch butterfly habitat within the Ellwood Mesa plan area. This is distinct from an emergency, which may involve emergency responders such as the fire department and would involve immediate actions under their direction to protect life and property. A qualifying catastrophic event could negatively affect a large portion of the eucalyptus groves within the Ellwood Mesa, or could cause substantial damage to single monarch butterfly overwintering site.

The response actions for catastrophic events would primarily involve restoration activities, would not necessarily be funded in the annual budget for this MBHMP and would likely require supplemental funding with approval from the City Council. Funding approved by the City Council should include a finding that the condition is a qualifying catastrophic event. If such a finding is made, funding received through the State Budget or other sources may be also used to address catastrophic events.

As of this writing, the 5-year drought in Goleta from 2012 to 2016 has created dire conditions for the eucalyptus trees at Ellwood Mesa (County of Santa Barbara 2018). Arborists estimate that over 1,200 trees are dead or dying due to drought, drought stress, and infestation by pests across the Ellwood Mesa. The monarch overwintering sites are suffering from the die-back of trees with the loss of canopy and wind protection and loss of roosting branches. The last similar 5-year drought on record for the Goleta area was in 1947–1951 and was not as severe, with 58.05 consecutive rainfall inches, compared with 50.83 inches during the 2012–2016 drought years (County of Santa Barbara

2018). Timing of rainfall since 2012 has also been more concentrated than in prior years, with the annual rainfall occurring in a small number of intense storm events rather than a larger number of small or gentle events. This concentration has come with an increased rainfall intensity, which leads to increased runoff, excess erosion and sediment transport, and decreased groundwater recharge. The ultimate result has been less available water for uptake by trees.

The 5-year drought and the death of over 1,200 trees may qualify as a catastrophic event, if so determined by the City Council.

Goal 9. To prepare for possible catastrophic environmental events within the monarch butterfly aggregation sites by adopting a set of actions that potentially minimize the impacts and plan for a response should such events affect the groves in which aggregation sites are located.

Policy 9-1. The City shall adopt a set of protocols that could minimize the impacts from potential catastrophic environmental events.

Action 9-1.1. Implement Program 12, Tree Management Program, to reduce potential impacts on eucalyptus groves that support monarch butterfly aggregation sites.

Action 9-1.2. Implement Program 4, Community Wildfire Protection Program, to reduce potential impacts on monarch butterfly aggregation sites from wildfire.

Action 9-1.3. Implement Program 13, Integrated Pest Management Program, to reduce the potential impacts from pest infestations.

Policy 9-2. The City shall assess the damage of catastrophic events as they occur and respond with corrective action to restore damaged monarch butterfly habitat.

Action 9-2.1. Measure the extent and assess the magnitude of the damage to the monarch butterfly overwintering habitat.

Action 9-2.2. Design and implement a response strategy with actions to correct and restore the habitat after the catastrophic event and include them in the annual Implementation Plan (Policy 1-3), if practical. When feasible, employ phased approaches with consistent monitoring to evaluate success or need for changes in strategy or actions. Assign priorities, including sources of materials, constraints, and methods for debris management.

Steps for Response Strategy:

1. Define the extent of the damage to the monarch butterfly habitat within the plan area.
2. Divide affected area into sections for a phased approach, based on level of damage and importance of overwintering site compared to other areas.
3. Assign priorities to the divided sections of the damaged area.

4. Implement guidance from Programs 4, 12, and 13 for specifics in those areas.

Example Response Strategy for a catastrophic event that causes the die-back of 25% of the trees in the MBHMP area. The catastrophic event for this example could be fire, drought, pest, disease, wind storm, etc.

1. Consider whether the catastrophic event presents an imminent danger to the public, and install warning signage and/or closures as appropriate.
2. Assess and analyze the extent of the dead/dying trees in the forest at Ellwood Mesa in relation to the monarch butterfly aggregation areas.
3. Establish a phased approach for restoration activities, starting with the most affected areas. Tag and map the trees that are dead, dying, diseased, burnt, hazardous, or otherwise affected by the catastrophic event. Confer with arborists, biologists, and/or other relevant specialist to select trees for removal to benefit the forest on a whole and facilitate restoration. Remove selected trees in the first phase area. The removed trees may be disposed of off-site or chipped for use on site as ground cover. Install new trees and native understory species with irrigation.
4. Monitor the success of the plantings and irrigation over a set time (e.g., 1–2 years). Replace plantings, as needed.
5. Adjust restoration methods if necessary and implement phased approach at the next priority phase area for restoration.
6. Repeat steps 2 through 5 until every area has been attended to and restored.
7. Continue to monitor for the presence of monarch butterflies during the aggregation season and other wildlife.

Action 9-2.3. Request City Council approval for supplemental funding, with a finding that the condition is a catastrophic event. Use funding received from the State Budget, apply for grants, and/or accept private donations for the dedicated mission of monarch butterfly overwintering habitat restoration.

Program Status: Tree condition surveys that have been completed for Ellwood Mesa eucalyptus trees have identified the number of dead trees. Cause of tree mortality has been identified as drought and pest infestations. Ellwood Main and Ellwood North monarch butterfly aggregation sites contain many dead trees. In-depth planning for management and recovery of a living eucalyptus forest will be detailed in an annual Implementation Plan. Similar events have occurred in the past and are likely to be part of the future.

Program Needs: Development of an Implementation Plan addressing the significant die-off of eucalyptus trees on Ellwood Mesa is underway. The City should have an ongoing response program in place so that careful and measured decisions following a catastrophic event can be implemented.

Program Contact: Public Works Department

B. NATURAL RESOURCES MANAGEMENT PROGRAMS

Seven natural resources management programs are provided that articulate the goals, policies, and actions necessary to maintain and improve the many important natural resources, including biological diversity and ecosystem functions, associated with the Ellwood Mesa eucalyptus groves and the monarch butterfly aggregation sites they support.

10. Monarch Butterfly Management Program

Overview: The City's General Plan includes a policy specific to the protection of monarch butterfly habitat areas, including the habitat on Ellwood Mesa. The City's Ellwood Mesa Open Space Plan further specifies the need to protect and maintain the eucalyptus habitat to be self-sustaining and identifies the need for managed public access, scientifically sound existing conditions studies, phased habitat improvements, and adaptive management. The primary focus of the Habitat Management Plan described below is to implement the directives of the General Plan and Ellwood Mesa Open Space Plan.

Goal 10. To ensure the ongoing use of Ellwood Mesa by the monarch butterfly.

Policy 10-1. The City shall implement management strategies that facilitate the use of Ellwood Mesa by monarch butterflies.

Action 10-1.1. Implement Program 12, Tree Management Program, to help facilitate the conservation of the monarch butterfly aggregation sites.

Action 10-1.2. Implement Program 20, Biological Monitoring Program, and Program 21, Monarch Research Program, to expand the body of knowledge and further the understanding of the monarch butterflies' use of the resources at Ellwood Mesa.

Policy 10-2. Preservation of aggregation sites on Ellwood Mesa shall be the focus of management activities, as feasible, and in coordination with Program 9, Catastrophic Event Response Program.

Action 10-2.1. Should one or more catastrophic events result in impacts on the sustainability of monarch butterfly aggregation sites, consider alternative management and recovery strategies that incorporate goals for sustaining aggregation sites at Ellwood Mesa.

Policy 10-3. Ecosystem functions proposed for habitat restoration projects at Ellwood Mesa shall consider inclusion of native plant species.

Action 10-3.1. Implement Program 14, Habitat Enhancement and Restoration Program, as feasible, to improve conditions for native plants and animals and the ecosystem functions

they provide in and adjacent to the eucalyptus groves containing monarch butterfly aggregation sites.

Policy 10-4. To avoid impacts on monarch butterflies while they are present at the Ellwood aggregation sites, no maintenance or restoration work shall be conducted in the aggregation sites from October 1 through March 31 of each year, unless authorized by a qualified biologist.

Action 10-4.1. Unless authorized by a qualified biologist, conduct all site maintenance, tree trimming and removal, habitat restoration, exotic plant removal, and other potentially invasive activities between April 1 and September 30 of each year, when there would not likely be direct impacts on monarch butterflies.

Program Status: Monarch butterflies are important to the ecosystem of Ellwood Mesa and to the City's sense of community. Development and implementation of this MBHMP is an important step in the active conservation of the monarch butterflies and their habitat at Ellwood Mesa.

Program Needs: New information about monarch butterflies regularly emerges from the scientific community, and the Ellwood Main site is an important site for the sustainability of monarchs. The more monarch butterfly biology is understood, the better Ellwood Mesa can be managed.

Program Contact: Public Works Department

11. Wildlife Habitat Management Program

Overview: Eucalyptus groves supporting seasonal aggregation sites for monarch butterflies also provide habitat for other wildlife species. Examples include or have included perches for red-shouldered hawks, roosting sites for turkey vultures, and nesting sites for white-tailed kites, Cooper's hawks, great horned owls, and acorn woodpeckers. This MBHMP identifies management strategies for conserving habitat for monarch butterflies that are intended to be consistent, where feasible, with management of habitat for other wildlife species.

Goal 11. Manage eucalyptus groves at Ellwood Mesa for monarch butterflies in a manner consistent with ecosystem functions for other wildlife species that use the groves as habitat.

Policy 11-1. The eucalyptus groves at Ellwood Mesa that support monarch butterfly aggregation sites shall be managed in a manner consistent with ecosystem functions supporting other wildlife species, where feasible.

Action 11-1.1. All personnel associated with the implementation of this MBHMP will receive educational information regarding the presence of monarch butterfly and other native wildlife species and the need to protect all native wildlife species.

Action 11-1.2. Preserve some trees with cavities to provide opportunities for cavity-nesting birds, such as acorn woodpeckers.

Action 11-1.3. Avoid removal of or disturbance to trees or other woody vegetation during nesting bird season (March 15 to August 15), when feasible. If not feasible, a biological monitor will survey for nesting birds in the area of proposed vegetation removal and ensure no active nests are present prior to removal or disturbance.

Action 11-1.4. Limit vegetation removal and ground disturbance activities to the dry season. Avoid areas with open water in Devereux Creek and tributaries.

Policy 11-2. Program 14, Habitat Enhancement and Restoration Program, shall complement the Wildlife Habitat Management Program.

Action 11-2.1. Include native plant species that are important for wildlife habitat and food in enhancement and restoration projects (Appendix 3).

Action 11-2.2. Require a Planting Plan for any proposed enhancement plantings near the groves containing aggregation sites.

Action 11-2.3. Consider increasing mid-canopy and low-stature or groundcover native plant species to enhance wildlife habitat complexity and increase potential use of eucalyptus groves by a variety of wildlife species.

Action 11-2.4. Implement restoration for the Devereux Creek riparian corridor to improve functions for wildlife, consistent with the goals of this MBHMP for monarch butterflies.

Program Status: A variety of management actions have occurred in the Ellwood Mesa eucalyptus groves, including monitoring the butterfly populations, evaluating the health of the eucalyptus grove and individual trees, and educating the public regarding the sensitivity of the aggregation sites. However, a comprehensive approach to managing and educating the public as to the importance of all native wildlife species that inhabit the Ellwood Mesa eucalyptus groves will benefit both the visitors and the natural resources of the open space area.

Program Needs: Adoption and implementation of this MBHMP will include programs to improve the health of the habitats and their ecosystem functions for wildlife species in general, and monarch butterflies in particular.

Program Contact: Public Works Department

12. Tree Management Program

Overview: One of the most important aspects of this MBHMP is the set of management practices that would result in a sustainable eucalyptus forest that supports aggregation sites for monarch butterflies. Health of the individual eucalyptus trees, structure of the aggregation sites, and long-term sustainability of the groves supporting the sites are of primary importance. In response to these management needs, as well as concern for public safety within the groves and concern for wildfire

hazards, City staff continues to work with professional biologists and arborists to develop protocols for managing the eucalyptus groves supporting monarch butterfly aggregation sites. The information obtained during inventories and assessments, and coordination with the development of the CWPP, resulted in the management recommendations as presented in this MBHMP.

Goal 12. To manage the eucalyptus groves within monarch butterfly aggregation sites at Ellwood Mesa in a manner that provides for (1) healthy trees, (2) suitable aggregation site structure, (3) sustainable butterfly aggregation sites, (4) public safety while visitors are on trails within the groves, and (5) sensitivity to wildfire hazards.

Policy 12-1. Eucalyptus trees in the groves containing monarch butterfly aggregation sites shall be managed, as feasible, to ensure tree health and longevity.

Action 12-1.1. Include guidance for necessary tree work in the annual Implementation Plan (Action 1-4.1). Tree work will take place in the month of September each year. The Implementation Plan should specify responsible parties, work locations, individual trees addressed, work to be accomplished, restoration measures, and methods and procedures for managing tree health. An annual plan is recommended but may be prepared on an as-needed basis based on conditions and progress of the previous Implementation Plan.

Action 12-1.2. Preliminarily identify potential threats to aggregation sites that may occur over time and develop a framework for mitigating the threats and maintaining/recovering suitable overwintering habitat. Threats may include, but are not limited to, the following:

- Drought
- Pests
- Disease
- Fire
- Flood/erosion
- Vandalism
- Invasion by non-native plants (not including eucalyptus)

These threats, as well as others, may arise and impair the function of Ellwood Mesa as habitat for overwintering monarch butterflies. When threats are encountered, a specific plan of action should be undertaken to address the needs of the situation. However, for planning purposes, the City should be prepared to undertake the response measures outlined in Table 2 below. Although not exhaustive, these measures represent a prudent suite of response tools to address future conditions. Measures listed below may prevent or rectify impacts from multiple types of threats, as the intent of the measures is to restore and encourage healthy habitat.

Table 2. Identified Threats and Potential Response Actions

Potential Actions/Tools for Management	Purpose/Goal/Target	Threat/Cause
Selective removal of standing dead trees	To protect the living trees from being taken out if a dead tree falls, and to provide space for growth of young trees.	Drought, disease, pests, fire
Selective removal of downed trees/debris	To open up space in the grove for younger trees to grow and replace dead trees. To reduce fuel load.	Drought, disease, pests, fire
Watering/irrigation	To prevent trees (established and newly planted) from declining in health because of insufficient water, or attempt to recover drought-stressed trees. Provide water to establish replacement trees. Use of reclaimed water should be explored.	Drought
Planting trees	To correct habitat deficiencies such as: <ul style="list-style-type: none"> ▪ The overstory has become too sparse. ▪ Wind speeds in the grove are too strong. ▪ A tree died, fell over, or was removed. 	Death of one or more trees, insufficient canopy, or aggregation site protection.
Planting understory species	To add or create a diverse understory. To add nectar sources. To create variable edge barrier.	Non-native plants, poor/homogeneous understory
Planting nectar sources within and near groves	To make nectar sources for adult monarchs available near the overwintering sites.	Non-native plants, understory lacking nectar species
Selective pruning	To prune or remove understory plants when they reduce monarch butterfly flight space or aggregation areas. To protect/maintain the open interior of the grove.	Understory becomes too dense
Re-contouring/grading	In the case of a flood, to correct erosion and reshape the drainage channel to protect trees.	Flood/erosion
Installation of erosion control best management practices (BMPs)	To prevent future erosion and direct flows away from erosion-sensitive areas (exposed roots, etc.).	Flood/erosion

Action 12-1.3. Thresholds should be established to direct professional review and potential action to address conditions in the groves. Ultimately, it is envisioned that quantitative thresholds will be established based on the results of monitoring and scientific study within the groves (Programs 20, 21, and 22). However, until adequate reference data are available, action thresholds will be determined qualitatively by the City in consultation with a qualified monarch butterfly biologist.

Factors for Consideration:

- Did a major tree fall down in or adjacent to a known overwintering site?
- Is a butterfly expert recommending that action be taken?
- Has the butterfly overwintering population at a specific site decreased dramatically in a way that does not follow the populations at other sites in the vicinity?
- Is there erosion or threat of exposed roots of trees in or adjacent to a known overwintering site?
- Has the tree canopy decreased noticeably and dramatically?
- Has a certified arborist identified a high-risk tree that could degrade the aggregation site?

Steps for Taking Action:

1. Identify the threat (persistent or temporary, site-specific or large-scale).
2. Consult with a qualified monarch butterfly biologist, guided by the goals for a sustainable overwintering habitat.
3. Develop a plan of action.
 - If the problem is large-scale, a prescribed action may be taken in phases and the effect will be evaluated to assess success before any large-scale implementation of the action.
 - Manipulative experiments may occur in coordination with adaptive management, such as pilot studies, to inform decisions.
4. Obtain approvals. Depending on the plan of action, authorization from the City Council, CCC, and/or resource agencies may be needed. Environmental review may also be required, depending on the scope.
5. Implement the plan of action.
6. Monitor and document results.
 - Areas affected by response actions, especially major ones, should be included in the monitoring program conducted under Program 20, Biological Monitoring Program.

Action 12-1.4. Implement Program 13, Integrated Pest Management Program, to help maintain tree health and control infestation in the eucalyptus groves supporting monarch butterfly aggregation sites.

Action 12-1.5. Cut down or prune trees identified as a threat to butterfly aggregation sites because they may fall and cause injury or collapse on other trees important to sustaining aggregation sites.

Action 12-1.6. Maintain a living forest within the outline of pre-drought forest extent as determined with historic aerial photographs. Restore sections of the forest where dead zones occur due to multiple tree die-offs.

Action 12-1.7. Implement Program 14, Invasive Plant Management Program, particularly regarding non-native vines that could affect the quality of monarch butterfly habitat, following recommendations for eradication consistent with the California Invasive Plant Council (Cal-IPC) and conservation priorities of monarch butterflies and their habitat.

Action 12-1.8. Implement Program 20, Biological Monitoring Program, to provide information regarding management of eucalyptus groves to ensure their health and longevity.

Action 12-1.9. Annually, identify conditions that threaten trees at aggregation sites and include recommended actions in the Implementation Plan to reduce perceived threats.

Action 12-1.10. Plant trees as needed to maintain grove density and improve monarch butterfly habitat. Plant in locations that improve aggregation site conditions as per the best available scientific analysis, and replant areas within historic eucalyptus grove extent where gaps have occurred from drought die-back.

Action 12-1.11 Following evaluation of compatibility with existing habitat and functionality with respect to butterfly habitat, conduct a pilot planting for any eucalyptus species considered for tree restoration that is not present in the MBHMP area as of 2018.

Policy 12-2. Eucalyptus trees in the groves containing monarch butterfly aggregation sites shall be managed, as feasible, to provide sustainable habitat for butterfly aggregation sites.

Action 12-2.1. When considering eucalyptus or other tree replacement actions, consider tree configurations that retain open areas for monarch butterfly patrolling and monarch overwintering preferences.

Action 12-2.2. Investigate potential enhancement to monarch butterfly patrolling habitat by reducing tree tangles and fallen debris.

Action 12-2.3. Remove hazard trees as necessary to protect monarch butterfly cluster locations, as consistent with goals for public safety.

Action 12-2.4. Implement, as feasible, Program 10, Monarch Butterfly Management Program, to facilitate improvements in eucalyptus groves that help sustain aggregation sites.

Action 12-2.5. Protect blue gum saplings as necessary to encourage natural recruitment of trees in the eucalyptus forest.

Policy 12-3. Eucalyptus trees within the groves containing monarch butterfly aggregation sites shall be managed, as feasible and consistent with conservation of monarch habitat, to provide safe conditions for the visiting public.

Action 12-3.1. Prune and remove dead, dying, or particularly vulnerable tree trunks and branches that overhang trails and seating areas, or lay across trails, inside and near monarch butterfly aggregation sites to reduce the threat of injury from falling trunks and branches, debris on trails (trip hazards), or low-hanging material across trails that visitors could bump heads on.

Action 12-3.2. As recommended by the City arborist and detailed in the annual Implementation Plan, conduct work designed to protect and improve the structure of aggregation sites.

Action 12-3.3. As recommended by the City arborist and detailed in the annual Implementation Plan, remove or prune dead standing, dead suspended, dead on the ground, or thick understory trees both to improve grove tree health and monarch butterfly habitat and to correct hazard conditions for human safety along trails and at observation sites.

Action 12-3.4. Consider using downed, dead trees for seating along trails, or to add to slope stability or help control erosion, for preservation rather than removal, as feasible, considering human safety or wildfire threat.

Action 12-3.5. Remove ground debris, such as accumulations of branches and leaves, at trailheads in particular to reduce threat from wildfires, to reduce threat to human safety from obscured views, and to increase aesthetic appeal.

Action 12-3.6. In consultation with the City arborist, conduct an annual review of tree health in April and May at aggregation sites. Develop and implement an annual Implementation Plan to address issues identified during the review, including potential need for tree removal or pruning, treatment of diseases or pests, and other potential recommendations.

Policy 12-4. Eucalyptus trees within the groves containing monarch butterfly aggregation sites shall be managed, as feasible, to provide for low wildfire hazards.

Action 12-4.1. Implement Program 4, Community Wildfire Protection Plan, to provide wildfire protection consistent with the City's adopted CWPP.

Action 12-4.2. Reduce accumulations of dead, dry, and loose organic and other flammable material within eucalyptus groves to decrease potential for ground-level fires becoming canopy fires as a result of ladder effect of fire hazard materials. Sufficient downed wood, debris, and ground cover will be left in place to provide substrate and shelter for monarchs dislodged from clusters.

Action 12-4.3. Remove accumulations of dead plant material along southern grassland margins of eucalyptus groves and at southern trailheads to reduce threat of grassland fires becoming eucalyptus grove fires as a result of fire hazards at the boundary between grasslands and groves via mowing or selective weed-whacking. Herbicides shall not be used.

Action 12-4.4. Replace removed understory plants as recommended by the City monarch butterfly biologist with fire-resistant native shrubs to restore and improve habitat structure for monarch butterflies (Appendix 3).

Action 12-4.5. Coordinate (1) butterfly habitat management, (2) public access and safety needs, (3) fire management requirements, and (4) wildlife habitat restoration proposals to ensure management priorities and implementation of procedures that provide the most compatible result for the conservation of monarch butterflies, while also respecting the goals of the other MBHMP programs, as feasible.

Program Status: Although eucalyptus trees in some groves with monarch butterfly aggregation sites are in good health (e.g., Sandpiper and Ocean Meadows, both of which are more windrow-like than grove-like), others are of average health (Ellwood West), and some are rated poor (Ellwood East, Ellwood North, and the important Ellwood Main). As of July 2017, a significant die-off of trees occurred from drought and pest infestation, resulting in over 1,200 dead trees on Ellwood Mesa.

Program Needs: Quantitative habitat condition standards based on best available science that establishes thresholds for action. With adoption of this MBHMP and implementation of the 22 programs—in particular, Program 12, Tree Management Program—the health of the eucalyptus groves supporting monarch butterfly aggregation sites is anticipated to improve and become a more sustainable resource.

Program Contact: Public Works Department

13. Integrated Pest Management Program

Overview: Eucalyptus trees are subject to a variety of pests and diseases that can injure or kill trees. When trees occur in groves, the spread of pests and disease is facilitated by proximity to infected trees, resulting in the potential of widespread losses. Current and past infestations at Ellwood Mesa of blue gum and river red gum (*Eucalyptus camaldulensis*) include lerp psyllids on leaves, tortoise beetles, longhorned borer beetles, and orange sulfur fungus. Insect pests are often present in equilibrium with their predators and do not need further control. However, new threats to trees on Ellwood Mesa may occur that require pest control measures. Invasive non-native species such as English ivy and cape ivy also can be problematic, smothering entire trees and changing or destroying wildlife habitat (Refer to Program 15, Invasive Plant Management Program). Various approaches to pest management will be necessary to try experimentally to determine which approach works best for each pest without affecting native plant and animal species, including birds, and monarch butterflies and their seasonal aggregation sites.

Goal 13. Control or eradicate, as feasible, plant, animal, fungal, and other pests that would result in detectable impacts on monarch butterflies or degrade monarch butterfly habitat.

Policy 13-1. To maintain current knowledge of pests and diseases, the City shall conduct an annual inventory of organisms negatively affecting trees in the groves at Ellwood Mesa.

Action 13-1.1. Conduct an inventory of pests and diseases throughout the groves and windrows at Ellwood Mesa.

Action 13-1.2. Conduct an inventory of pests and diseases within the monarch butterfly aggregation sites in the Ellwood North, Ellwood West, Ellwood Main, Ellwood East, Sandpiper, and Ocean Meadows groves.

Policy 13-2. The City shall consider using a variety of approaches to pest management to prevent pests and diseases from affecting eucalyptus groves, particularly those supporting seasonal aggregation sites for monarch butterflies.

Action 13-2.1. As feasible, experiment with different integrated pest management (IPM) approaches for different pests and diseases to determine which approach best suits the conditions in eucalyptus groves at Ellwood Mesa.

Action 13-2.2. Implement wise management practices in the eucalyptus groves at Ellwood Mesa that do not facilitate the spread of pests and diseases in groves.

Action 13-2.3. Identify current problems that require immediate treatment and implement appropriate treatment protocols.

Action 13-2.4. Implement a pest and disease monitoring program, as feasible, to determine success of treatments and any new infestations requiring treatment.

Program Status: Currently, no IPM approaches are implemented for eucalyptus trees at Ellwood Mesa. A tree inventory was conducted in 2017 that found over 1,200 dead eucalyptus trees on Ellwood Mesa City property. An Implementation Plan is in preparation to address tree health issues.

Program Needs: Adopt the MBHMP and implement the 22 MBHMP programs—including Program 13, Integrated Pest Management Program—to reduce the threat of impacts on tree health and sustainability and the potential for degradation of habitat supporting monarch butterfly aggregation sites.

Program Contact: Public Works Department

14. Habitat Enhancement and Restoration Program

Overview: This program focuses on the enhancement of the eucalyptus groves from a native plant and wildlife habitat perspective and on the restoration of the Devereux Creek corridor along the

northern margin of Ellwood West, Ellwood Main, and Ellwood East groves. The mid-canopy vegetation and understory of the eucalyptus groves is generally lacking or in some situations is composed of non-native invasive plant species. Enhancement of groves with native plant species would benefit native wildlife. Various native plants are present but scattered within the groves. Most of these plant species have fleshy fruits and are bird-dispersed. Restoration of portions of Devereux Creek associated with eucalyptus groves, as feasible, is consistent with the goal to restore Devereux Creek. This restoration would provide important habitat for native plant and animal species and would potentially improve water quality flowing downstream to Devereux Slough and the Pacific Ocean.

Goal 14. To provide for the enhancement of native plant and animal habitats in the context of preserving the monarch butterfly habitat associated with established eucalyptus groves.

Policy 14-1. Establishment of appropriate native plants—in particular, ground cover, shrub, and mid-canopy species—shall be encouraged in the eucalyptus groves and along the Devereux Creek corridor outside of the eucalyptus groves.

Action 14-1.1. Plant experimental plots of native ground cover species to determine which species may result in sustainable populations.

Action 14-1.2. Focus enhancement efforts on native plants existing in the eucalyptus groves, such as toyon (*Heteromeles arbutifolia*), and native plants with nectar sources for monarchs (Appendix 3).

Action 14-1.3. Coordinate with Program 13, Integrated Pest Management Program, and Program 15, Invasive Exotic Plant Management Program.

Policy 14-2. Areas between eucalyptus groves shall be considered for habitat enhancement and restoration alternatives.

Action 14.2.1. Implement priority native plant restoration activities along Devereux Creek in areas outside of eucalyptus groves.

Action 14-2.2. Eradicate non-native herbaceous cover, seedlings, and saplings (not including eucalyptus saplings) in areas between eucalyptus groves to encourage or actively plant local natives.

Policy 14.3. Restoration of Devereux Creek shall include appropriate actions to improve the habitat structure, ecological functions and processes, and native biodiversity of the existing native riparian areas.

Action 14-3.1. Restoration activities include establishment of a riparian area along the banks of Devereux Creek composed of native riparian tree species.

Action 14-3.2. Ensure that no restoration activities along Devereux Creek shall result in increased flooding.

Action 14-3.3. Coordinate to align efforts with other restoration projects under separate permits or mitigation plans for Devereux Creek.

Policy 14-4. Native plant species are considered to be local genotypes of plants occurring naturally within the Ellwood Mesa/Devereux Creek Ecosystem.

Action 14-4.1. Collect all plant materials for use in restoration projects from existing native plant populations in the Ellwood Mesa/Devereux Creek Ecosystem, where feasible.

Action 14-4.2. Collect plant material from the nearest existing populations for re-introduction of extirpated species.

Action 14-4.3. Obtain native plants for use in restoration from local nurseries or growers within the Santa Barbara area, emphasizing contract-grown material of local genotypes.

Policy 14-5. No enhancement or restoration actions shall result in negative impacts on the quality of the eucalyptus groves that provide monarch butterfly habitat.

Action 14-5.1. Coordinate with Program 10, Monarch Butterfly Management Program; Program 11, Wildlife Habitat Management Program; and Program 12, Tree Management Program.

Policy 14-6. No enhancement or restoration actions shall conflict with the goals and policies of the CWPP.

Action 14-6.1. Coordinate all enhancement and restoration activities with the guidelines and recommendations of the CWPP.

Program Status: An Implementation Plan that describes work activities to occur each year will accompany this MBHMP.

Program Needs: Adoption of this MBHMP and implementation of Program 14, Habitat Enhancement and Restoration Program, and fund-raising necessary to design, permit, implement, and maintain the projects.

Program Contacts: Public Works Department and Planning and Environmental Review Department



Photo 3. Toyon (*Heteromeles arbutifolia*), a Native Shrub or Small Tree in the Ellwood Main Grove

15. Invasive Plant Management Program

Overview: Cal-IPC has established a list of invasive, non-native plant species of concern regarding conservation of California natural heritage (www.cal-ipc.org/ip/inventory/index.php). Invasive non-native plants are defined by Cal-IPC (2006) as “plants that 1) are not native to, yet can spread into, wildland ecosystems, and that also 2) displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes.” Non-native invasive plants have been given High, Moderate, or Limited ratings by Cal-IPC, depending on the severity of their potential for resulting in impacts on wildland ecosystems.

The monarch butterfly aggregation sites at Ellwood Mesa are themselves characterized and dominated by non-native and potentially invasive plants species—most importantly blue gum, given a “Moderate” rating, and to a lesser degree river red gum, given a “Limited” rating. However, these stands of introduced trees are designated as an ESHA in the General Plan because of their importance to monarch butterflies as fall and winter aggregation sites. Several other aggressively invasive non-native plant species have prominent visual and habitat impacts within the monarch aggregation sites at Ellwood Mesa. These are mostly vines that climb butterfly habitat trees, and herbaceous ground cover, which potentially endanger the character and sustainability of the

aggregation sites. Examples of these deleterious invasive species at Ellwood Mesa and their ratings are listed below:

- “High” rating:
 - Canary Islands ivy (*Hedera canariensis*)
 - English ivy (*Hedera helix*)
 - Cape ivy (*Delairea odorata*)
 - Victorian box or mock orange (*Pittosporum undulatum*)
- “Moderate” rating:
 - Panic veltgrass (*Ebrharta erecta*)
 - Myoporum (*Myoporum laetum*)
- “Limited” rating:
 - Kikuyu grass (*Pennisetum clandestinum*)
 - New Zealand spinach (*Tetragonia tetragonioides*)

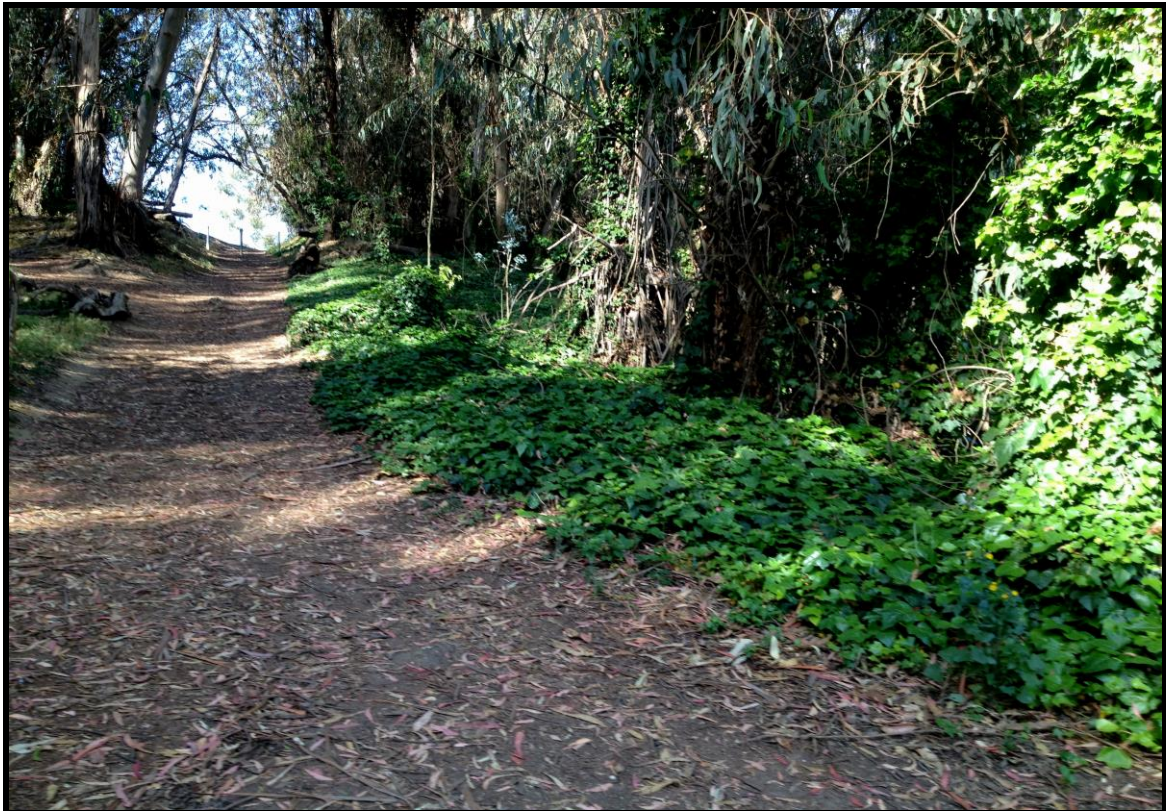


Photo 4. Canary Islands Ivy (*Hedera canariensis*) along Trail and Growing up Trees at Ellwood Main

Goal 15. To eradicate existing stands of invasive non-native species and prevent or control new occurrences of invasive non-native plant species within the monarch butterfly habitat at Ellwood Mesa.

Policy 15-1. The City shall undertake an inventory and generalized mapping program to identify, locate, and prioritize for eradication or control all invasive non-native plant species within the butterfly habitat at Ellwood Mesa.

Action 15-1.1. Identify and map all invasive non-native species identified by Cal-IPC as “High” priority species.

Action 15-1.2. Identify and map all invasive non-native species identified by Cal-IPC as “Moderate” priority species.

Action 15-1.3. Identify all invasive non-native species identified by Cal-IPC as “Limited” or unrated priority species and map any medium to large populations.

Policy 15-2. The City shall control all “High,” “Moderate,” and “Limited” priority invasive plant species within the monarch butterfly habitat, except those species for which monarch butterflies are dependent, as feasible.

Action 15-2.1. Control all “High” priority invasive non-native invasive plant species.

Action 15-2.2. Control all “Moderate” priority, non-native invasive plant species.

Action 15-2.3. Eradicate or control all medium or large stands of “Limited” or unrated priority non-native invasive plant species.

Policy 15-3. The City shall undertake annual monitoring as feasible to identify and eradicate or control new occurrences of “High” or “Moderate” priority invasive non-native plant species.

Action 15-3.1. Implement monitoring of eradication efforts and potential new occurrences as part of Program 20, Biological Monitoring Program.

Action 15-3.2. Coordinate with other programs in this MBHMP, including Program 14, Habitat Enhancement and Restoration Program.

Program Status: Currently, no non-native invasive plants species control or detection program is in place for the eucalyptus groves at Ellwood Mesa.

Program Needs: Adoption of this MBHMP and implementation of the MBHMP programs, including Program 15, Invasive Plant Management Program.

Program Contacts: Public Works Department and Planning and Environmental Review Department

16. Ecosystem-wide Management Coordination Program

Overview: The eucalyptus groves, including those areas where seasonal monarch butterfly aggregation sites occur, do not exist as island ecosystems but in fact are part of a broader ecosystem of the Ellwood Mesa and Devereux Creek Watershed, including UCSB's North Campus Open Space (Upper Devereux Slough) and Coal Oil Point Reserve. This MBHMP primarily addresses monarch butterfly eucalyptus tree habitat in the Ellwood Mesa Open Space.

Goal 16. To manage the eucalyptus trees supporting seasonal monarch butterfly aggregation sites by coordinating among the 22 programs directed toward the management of monarch butterfly habitat and to consider management of eucalyptus groves in the context of managing the entire Ellwood Mesa Open Space.

Policy 16-1. The City shall manage eucalyptus trees in the context of all eucalyptus habitat supporting monarch butterfly aggregation sites at Ellwood Mesa.

Action 16-1.1. When considering implementation of actions for each program, consider their relationships to other actions in the same program.

Action 16-1.2. When considering implementation of actions for each program, consider their relationships to actions in related programs.

Policy 16-2. The City shall manage eucalyptus trees supporting monarch butterfly aggregation sites in the context of all eucalyptus habitat at Ellwood Mesa.

Action 16-2.1. Through results of Program 20, Biological Monitoring Program, consider potential changes in monarch butterfly use of other aggregation locations at Ellwood Mesa, impacts of pests and diseases throughout the eucalyptus groves, or other relevant factors that can potentially affect monarch butterflies and their habitats at Ellwood Mesa.

Policy 16-3. The City shall manage eucalyptus trees supporting monarch butterfly aggregation sites in the context of all habitats at Ellwood Mesa.

Action 16-3.1. When considering implementation of management actions for eucalyptus trees, consider their relationships to management actions for other habitats and programs for all of Ellwood Mesa.

Program Status: The City regularly coordinates the management of Ellwood Mesa with adjoining public agency land managers, including UCSB and Santa Barbara County. The focus of these management meetings is to ensure that trails are connected, grant applications are coordinated, and general issues such as illegal encampments and police enforcement are discussed and collectively addressed.

Program Needs: Adopt this MBHMP and implement its 22 programs considering the potential interaction of the program actions and results. Examples include eradication of exotic plant species

(Program 15, Invasive Plant Management Program) and removal of trash and debris (Program 6, Waste Management Program), followed by habitat enhancement efforts (Program 14, Habitat Enhancement and Restoration Program) within the affected sites in eucalyptus groves, in particular along affected trails (Program 5, Trail Management Program) with potential for additional erosion.

Program Contacts: Public Works Department and Planning and Environmental Review Department

C. OUTREACH PROGRAMS

Outreach programs are designed to provide information to visitors, educators, and students to help develop a broad appreciation for natural resources and local natural heritage, with a focus on monarch butterflies.

17. Community Advisory and Docent Program

Overview: The residents of Goleta have been actively involved in the protection and acquisition of Ellwood Mesa over many decades, with a focus on the conservation of the monarch butterfly aggregation sites. The long-term sustainability of the eucalyptus groves and the aggregation sites they support will depend in part on the continuing public involvement in the process.

Goal 17. To provide a formal vehicle to involve public participation, the City shall engage with the City's butterfly docents to provide recommendations to the Public Works Department.

Policy 17-1. The City shall engage with the City's butterfly docents to review MBHMP implementation work plans and make recommendations to the Public Works Department.

Action 17-1.1. Identify a point of contact with the City's butterfly docents, referred to as the Butterfly Docent Coordinator, who will coordinate with and speak on behalf of the docents with the Public Works Department, Planning and Environmental Review Department, and Neighborhood Services Department.

Action 17-1.2. Set up regular meetings between the Butterfly Docent Coordinator and City staff.

Policy 17-2. As needed, the City shall continue to support the City's Butterfly Docent Program, the Butterfly Docent Coordinator, and ongoing training for the docents to ensure that educational opportunities for the public are maintained and to demonstrate the City's stewardship of the eucalyptus groves.

Action 17-2.1. Continue to support the Butterfly Docent Program and the Butterfly Docent Coordinator.

Action 17-2.2. Continue to support and update the City of Goleta's monarch butterfly website at www.goletabutterflygrove.com.

Action 17-2.3. Continue to support development of educational materials to be used by docents during scheduled public tours of the monarch butterfly aggregation sites.

Action 17-2.4. Train docents in the details of this MBHMP.

Action 17-2.5. Expand the pool of trained docents and encourage docent assistance with the implementation of this MBHMP.

Program Status: An active Butterfly Docent Program, including a Butterfly Docent Coordinator, has been in operation since 2007.

Program Needs: With adoption and implementation of this MBHMP, the existing docent program becomes part of the structure of this MBHMP. No formal volunteer program exists to assist in the implementation of this MBHMP.

Program Contacts: Neighborhood Services Department, Public Works Department, and Planning and Environmental Review Department.

18. Interpretive Program

Overview: Although there are a few signs identifying the Ellwood Main grove and several behavioral signs regarding trails, there are no interpretive signs that provide information regarding the biology of monarch butterflies, general aspects of Ellwood Mesa, and the importance of the aggregation sites. There is an interpretive sign program at the nearby Coronado Butterfly Preserve. City butterfly docents at Ellwood Mesa provide an important role, and the City's monarch website has important information and links to the National Geographic monarch web information. However, for the casual visitor without web access and without the presence of a docent, there is no interpretive information to assist in understanding this significant biological phenomenon.

Goal 18. To establish a useful and informative interpretive signage program at Ellwood Mesa monarch butterfly aggregation sites that is environmentally sensitive and creates a minimum of intrusion into the habitats.

Policy 18-1. The City shall design and install an interpretive signage program that provides important information on the biology of monarch butterflies, the significance of the aggregation sites, and general information on Ellwood Mesa and the eucalyptus groves, when feasible.

Action 18-1.1. Apply for grant funding to design, construct, and install the interpretive signage program.

Action 18-1.2. Design, construct, and install an interpretive signage program that is sensitive to the environment.

Action 18-1.3. Locate the interpretive signage program in key locations minimally intrusive to the sensitive habitats of Ellwood Mesa.

Policy 18-2. The Butterfly Docent Coordinator shall provide input during design, review the draft interpretive program, and make recommendations to the City.

Action 18-2.1. Involve the butterfly docents in all phases of the interpretive signage program.



Photo 5. Ellwood Main Grove Entrance Sign at Trailhead along Devereux Creek

Program Status: No on-site interpretive program currently exists for the eucalyptus groves supporting monarch butterfly aggregation sites.

Program Needs: Adopt this MBHMP—including Program 18, Interpretive Program—and include links to the city’s existing website and docent program.

Program Contact: Neighborhood Services Department and the Public Works Department.

19. Education Program

Overview: Education has always been an important part of the Ellwood Mesa monarch butterfly enthusiasm expressed by the residents of the area. Local and regional schools participate on a regular basis, especially when monarch butterflies are using the seasonal aggregation sites. Also, the

National Geographic educational information is available through the City’s website: www.goletabutterflygrove.com. Therefore, it is important that education is a part of this MBHMP.

Goal 19. To provide educational experiences and information for K–12 students.

Policy 19-1. The City shall continue to work with K–12 students and their schools to explore educational experiences regarding Ellwood Mesa and the eucalyptus groves supporting monarch butterfly aggregation sites.

Action 19-1.1. Continue to support the educational opportunities provided by the Ellwood Mesa eucalyptus groves and their monarch butterfly aggregation sites.

Action 19-1.2. Create educational materials regarding biology of monarch butterflies and their habitats.

Action 19-1.3. Continue to support the position of Butterfly Docent Coordinator.

Policy 19-2. The City shall continue to support its website containing educational materials regarding monarch butterflies.

Action 19-2.1. Support, expand, and revise as necessary the City’s website www.goletabutterflygrove.com.

Program Status: The City has active participation in K–12 education programs, including scheduled docent-led tours of the aggregation sites when monarchs are present and presentations at local area schools during science fairs. The City’s website also includes a link to the Monarch Teachers’ Network.

Program Needs: Adoption of this MBHMP—including Program 19, Education Program—will formalize the city’s contributions to K–12 students as part of this MBHMP for Ellwood Mesa.

Program Contact: Neighborhood Services Department

D. MONITORING, RESEARCH, AND ADAPTIVE MANAGEMENT PROGRAMS

Monitoring and research programs provide the mechanism for assessing environmental conditions and conducting original studies to help understand the ecology of monarch butterflies, particularly at Ellwood Mesa. Information obtained from these programs and other sources can be used to adapt the MBHMP to improved or additional information or changing conditions.

20. Biological Monitoring Program

Overview: Background studies of monarch butterfly number, aggregation locations, environmental conditions, tree health, wildlife, botanical resources, and climate have been conducted at Ellwood Mesa over many years. However, more detailed studies are warranted regarding tree health and failure risk, aggregation site canopy cover and light intensity, wind patterns, microclimate, soil moisture and water demand, viable forest density, pest control, wildlife species, invasive non-native plants, eucalyptus tree health (including pest and diseases), enhancement and restoration projects within the groves, impacts from access trails, and other important aspects of the biological and physical resources related to monarch butterfly aggregation sites.

Goal 20: To develop and implement a monitoring program integrating various components of the biological resources and impacts related to the eucalyptus groves that support seasonal monarch butterfly aggregation sites.

Policy 20-1. The City shall maintain annual counts of the butterfly population at the various aggregation sites on Ellwood Mesa.

Action 20-1.1. Count and document monarch butterfly population number and cluster locations within the six Ellwood Mesa aggregation sites every year. The counts shall be conducted every 2 weeks through the overwintering season (October 1 through March 15) using the counting protocol established by Xerces Society, as funding allows. Where possible, record the tree tag numbers of trees with clustering monarchs to establish habitat use patterns (Althouse and Meade 2018).

Policy 20-2. The City shall conduct an annual assessment of ecosystem-wide tree and vegetation health on Ellwood Mesa, as funding allows.

Action 20-2.1. Track ecosystem-wide tree and vegetation health on Ellwood Mesa using high resolution multispectral and hyperspectral imaging and analysis, or similar appropriate means (Appendix 2).

Action 20-2.2. Coordinate results of the ecosystem-wide tree health assessment with Program 12, Tree Management Program, as feasible, to determine necessary and applicable management actions.

Policy 20-3. Create a Monitoring Report, updated annually, resulting from the information obtained during the implementation of the various policies and actions called for in this MBHMP.

Action 20-3.1. Track the implementation of this MBHMP in the form of a Monitoring Report.

Action 20-3.2. Conduct a Visitor Impact Assessment as part of the monitoring program to determine use patterns and potential impacts on trails, changes in erosion of trails, and potential impacts on aggregation sites through which trails are located.

Action 20-3.3. Coordinate results of the monitoring reports with Program 22, Adaptive Management Program, as feasible, to determine if changes in management actions are necessary.

Program Status: Various studies and butterfly counts have been gathered on a somewhat irregular basis. The City recently conducted a Tree Inventory and Health Analysis. However, no formal regular monitoring program has been developed or implemented at eucalyptus groves, in particular those areas that support monarch butterfly aggregation sites.

Program Needs: Adopt and implement this MBHMP, including Program 20, Biological Monitoring Program.

Program Contact: Public Works Department

21. Monarch Research Program

Overview: Although the City has conducted field studies as part of the preparation of this MBHMP, the City has not actively encouraged scientific studies using appropriate and cautious methods to maintain and improve habitat of the Ellwood Mesa habitats.

Goal 21. Encourage research projects and identify funding for research associated with monarch butterflies and their habitats at Ellwood Mesa.

Policy 21-1. The City shall allow for certain research projects that investigate the biology of monarch butterflies and their habitats at Ellwood Mesa and that provide information helpful to this MBHMP management programs.

Action 21-1.1. Evaluate requests for research and, where approved, issue Scientific Research Permits to regulate the research efforts.

Action 21-1.2. Ensure that scientists use non-invasive research projects at Ellwood Mesa, in particular those that focus on monarch butterflies and their habitats, and require that the

results of the research are provided to the City and posted on the City's website at www.goletabutterflygrove.com.

Action 21-I.3. Encourage research of the plants native to Santa Barbara County with regard to their ability to provide suitable monarch butterfly overwintering habitat and their applications for the restoration of the Ellwood Mesa.

Program Status: No formal, ongoing research projects are conducted at the Ellwood Mesa eucalyptus groves that support monarch butterfly aggregation sites.

Program Needs: Adopt and implement this MBHMP, including Program 21, Monarch Research Program.

Program Contact: Public Works Department

22. Adaptive Management Program

Overview: Management plans with ongoing maintenance, restoration, monitoring, and research programs generally develop an information base that helps provide insight into those portions of the implemented management plan that are performing well and those that could be performing better or differently with changing situations. In addition to the update and amendment process provided in Program 8, MBHMP Review, Update, and Amendment Program, the Adaptive Management Program provides a vehicle for the management authority to make adjustments in management approaches on an as-needed basis, especially as new information provides new opportunities for improved management practices and resource stewardship.

Goal 22. To establish an adaptive management approach to resource management at the eucalyptus groves that supports monarch butterfly aggregation sites and their surrounding environment at Ellwood Mesa.

Policy 22-I. The City shall use an adaptive management approach to resource management at the eucalyptus groves that supports monarch butterfly aggregation sites and their surrounding environment at Ellwood Mesa.

Action 22-I.1. Implement adaptive management procedures associated with all relevant programs of this MBHMP for Ellwood Mesa.

Action 22-I.2. Include a description of adaptive management actions in the Monitoring Report (Action 20.3-1).

Action 22-I.3. Conduct a review of management policies and actions every fifth year, as feasible, to determine possible patterns in change regarding monarch butterfly use of the aggregation sites and overall ecosystem health of the monarch butterfly habitat at Ellwood Mesa.

Program Status: Currently, there are no adaptive management procedures associated with the management of the eucalyptus groves at Ellwood Mesa.

Program Needs: Adopt and implement this MBHMP, including Program 22, Adaptive Management Program.

Program Contact: Public Works Department

E. CONCLUSION

This MBHMP for the Ellwood Mesa/Sperling Preserve Open Space provides a fully functional programmatic plan for the management of natural resources, focusing on habitat that supports the phenomenal occurrence of seasonal aggregations of thousands of monarch butterflies at six aggregation sites at Ellwood Mesa. With adoption and implementation of this MBHMP, the City of Goleta will fulfill a major commitment to the natural resources of Ellwood Mesa and its residents, and all those committed to the conservation of monarch butterflies.

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G. LIST OF PREPARERS

This MBHMP was collaborative effort. Consultants and City staff involved in the preparation of this plan are listed below.

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APPENDIX A. IMPLEMENTATION PRIORITIES, SCHEDULE, AND ESTIMATED COSTS

For the purposes of this MBHMP, implementation priorities, scheduling, and cost estimates are provided on a general programmatic basis. Programs are ranked as **Urgent**, **High**, and **Moderate** priority. They also are given an **Ongoing** and **Long-term** (+/- 5-year) scheduling estimate. Cost estimates are on an annual basis, with staff time listed as such and some first-year estimates in brackets.

Table A1. Implementation Priorities and Cost Estimates

Program	Cost (\$)		City Labor Cost (hours)		Priority	Schedule	Department Responsible
	Annual	One-Time	Annual	One-Time			
A. Administrative Programs							
1. Municipal Management Program	\$16,000	\$13,000	\$26,000 (260)	\$9,600 (96)	High	ASAP	PW
2. Fiscal Program	\$1,000	—	\$19,600 (196)	—	High	ASAP	PW
3. Interagency Cooperative Program	\$3,000	—	\$9,600 (96)	—	High	ASAP	PW, NS, PER
4. Community Wildfire Protection Program	\$8,000	—	\$7,800 (78)	—	Moderate	Annually	PW
5. Trail Management Program	\$10,000	\$10,000	\$45,600 (456)	\$24,000 (240)	Moderate	Annually	PW
6. Waste Management Program	\$1,500	—	\$10,400 (104)	\$1,600 (16)	Moderate	Annually	PW/NS
7. Aesthetic Resources Management Program	—	—	\$7,000 (70)	—	Low	Annually	PW
8. MBHMP Review, Update, and Amendment Program	\$10,000	—	\$12,400 (124)	—	Moderate	Annually	PW, PER
9. Catastrophic Event Response Program	\$75,000	—	\$20,400 (204)	—	Moderate	Annually	PW
B Natural Resources Management Programs							
10. Monarch Butterfly Management Program	\$2,000	—	\$6,000 (60)	—	High	Annually	PW
11. Wildlife Habitat Management Program	\$2,750	—	\$5,600 (56)	—	Moderate	Annually	PW

Program	Cost (\$)		City Labor Cost (hours)		Priority	Schedule	Department Responsible
	Annual	One-Time	Annual	One-Time			
12. Tree Management Program	\$49,600	—	\$99,200 (992)	—	High	ASAP	PW
13. Integrated Pest Management Program	\$11,500	\$5,000	\$11,600 (116)	—	Moderate	As funding is available	PW
14. Habitat Enhancement and Restoration Program	\$30,000	\$40,000	\$29,600 (296)	\$16,000 (160)	High	ASAP	PW, PER
15. Invasive Plant Management Program	\$5,500	\$27,500	\$14,800 (148)	—	Moderate	As funding is available	PW, PER
16. Ecosystem-wide Management Coordination Program	—	—	\$5,000 (50)	—	Low	Annually	PW, PER
C. Outreach Programs							
17. Community Advisory and Docent Program	\$5,000	—	\$77,200 (772)	—	High	Annually	PW, NS, PER
18. Interpretive Program	\$500	\$3,000	\$8,800 (88)	\$6,000 (60)	Moderate	As needed	PW, NS
19. Education Program	—	—	\$12,400 (124)	\$2,000 (20)	Moderate	Annually	NS
D. Monitoring, Research, and Adaptive Management Programs							
20. Biological Monitoring Program	\$20,000	—	\$8,000 (80)	—	High	Annually	PW
21. Monarch Research Program	\$34,000	\$40,000	\$4,000 (40)	\$4,000 (40)	Low	As needed	PW
22. Adaptive Management Program	\$5,000	—	\$8,000 (80)	—	Low	Every 5 years	PW
<i>Totals</i>	\$290,350	\$138,500	\$449,000 (4,490)	\$63,200 (632)			
Grand Total Over 5 Years	\$1,590,250		\$2,308,200 (23,082)			TOTAL: \$3,898,450	

PW = Public Works Department

NS = Neighborhood Services Department

PER = Planning and Environmental Review Department

Table A2. Cost Estimates by Action

	Materials and Contractors Cost (\$)		City of Goleta Staff Time (hours)		Notes/Assumptions
	Annual	One-Time	Annual	One-Time	
A. ADMINISTRATIVE PROGRAMS					
1. Municipal Management Program					
Action 1-1.1	\$4,000	—	—	24	Prepare and conduct public workshop, 40 consultant hours
Action 1-1.2	—	\$8,000	—	—	IS/MND
Action 1-1.3	—	\$5,000	—	40	Depends on quantity and scope of revisions
Action 1-1.4	—	—	—	32	4 hours for the review by 8 people
Action 1-2.1	—	—	200	—	City coordination
Action 1-3.1	\$10,000	—	40	—	Prepare annual Implementation Plan
Action 1-3.2	\$2,000	—	20	—	Prepare and conduct City Council presentation, 20 consultant hours
2. Fiscal Program					
Action 2-1.1	—	—	24	—	Accounting staff, 12 hours bi-annually
Action 2-1.2	—	—	8	—	Accounting staff
Action 2-1.3	\$1,000	—	8	—	Annual needs list to be included into Implementation Plan, accounting staff to determine operating budget
Action 2-2.1	—	—	136	—	8 hrs/month + 40 hours grant application coordinating
Action 2-2.2	—	—	20	—	As compensatory mitigation fees are paid
3. Interagency Cooperative Program					
Action 3-1.1	\$1,000	—	24	—	2 hr/month for coordination meetings/calls with City staff and consultants
Action 3-1.2	\$1,000	—	48	—	2 hr/month for coordination meetings/calls with City staff and consultants
Action 3-1.3	\$1,000	—	24	—	2 hr/month for coordination meetings/calls with City staff and consultants

	Materials and Contractors Cost (\$)		City of Goleta Staff Time (hours)		Notes/Assumptions
	Annual	One-Time	Annual	One-Time	
4. Community Wildfire Protection Program (CWPP)					
Action 4-1.1	—	—	12	—	CWPP
Action 4-1.2	\$2,000	—	40	—	PW's site maintenance. the majority of this cost is included in Program 14
Action 4-1.3	—	—	—	—	Restrictions on timing of work
Action 4-1.4	\$6,000	—	24	—	Coordination with butterfly and fire experts 2hr/mo prior to work activates. Expert time for consultation/surveys/inspections monthly as necessary
Action 4-2.1	—	—	2	—	Cost incorporated into Program 12
5. Trail Management Program					
Action 5-1.1	—	—	192	—	2 days/month for trail maintenance
Action 5-1.2	—	—	—	—	Cost incorporated into Program 12
Action 5-1.3	\$1,000	—	—	—	Staff time in Action 5-1.1
Action 5-1.4	\$5,000	\$10,000	96	240	Installation cost & 2 wks x 3 staff; maintenance 1 day/mo
Action 5-1.5	—	—	64	—	2 day effort x 2 staff x twice during wet season
Action 5-1.6	—	—	16	—	2 day effort once annually
Action 5-1.7	—	—	8	—	Annual review of trails boundaries
Action 5-1.8	\$4,000	—	40	—	5 days x 1 staff and risk assessor, trails, arborist, butterfly biologist
Action 5-2.1	—	—	20	—	Staff coordination time and meetings
Action 5-2.2	—	—	20	—	Staff coordination time and meetings
6. Waste Management Program					
Action 6-1.1	—	—	96	—	1 day/mo
Action 6-2.1	\$1,500	—	—	16	2 days staff time and signs
Action 6-2.2	—	—	4	—	Cost incorporated into Program 17

	Materials and Contractors Cost (\$)		City of Goleta Staff Time (hours)		Notes/Assumptions
	Annual	One-Time	Annual	One-Time	
Action 6-2.3	—	—	4	—	Inspection of trash cans annually
7. Aesthetic Resources Management Program					
Action 7-1.1	—	—	10	—	Read and adopt all programs
Action 7-1.2	—	—	20	—	Program 18
Action 7-2.1	—	—	20	—	Review signage and fencing. Cost included in Program 5
Action 7-2.2	—	—	20	—	Staff time to review restoration plans
8. MBHMP Review, Update and Amendment Program					
Action 8-1.1	\$1,000	—	32	—	Staff and consultant time for review
Action 8-1.2	\$2,000	—	24	—	City staff and consultant's' time for updates
Action 8-1.3	\$2,000	—	24	—	City staff and consultants' time for updates
Action 8-1.4	\$2,000	—	24	—	City staff and consultants' time for response to public comments
Action 8-1.5	\$3,000	—	12	—	Update IS/MND, if necessary. Consultant time
Action 8-1.6	—	—	8	—	City Council approval/meeting
9. Catastrophic Event Response Program					
Action 9-1.1	—	—	4	—	Cost included in Program 12
Action 9-1.2	—	—	4	—	Cost included in Program 4
Action 9-1.3	—	—	4	—	Cost included in Program 13
Action 9-2.1	\$25,000	—	80	—	Expert/arborist/risk/biologist consultant time, plus materials to assess
Action 9-2.2	\$50,000	—	80	—	Expert/arborist/risk/biologist consultant time, plus materials to design and implement strategy
Action 9-2.3	—	—	32	—	City staff time
B. NATURAL RESOURCES MANAGEMENT PROGRAMS					
10. Monarch Butterfly Management Program					
Action 10-1.1	—	—	8	—	Program 12
Action 10-1.2	—	—	8	—	Program 20 and 21
Action 10-2.1	—	—	8	—	Program 9
Action 10-2.2	\$1,000	—	20	—	Staying current with research, staff time, and consultant time to inform staff.

	Materials and Contractors Cost (\$)		City of Goleta Staff Time (hours)		Notes/Assumptions
	Annual	One-Time	Annual	One-Time	
Action 10-3.1	—	—	8	—	Program 14
Action 10-4.1	\$1,000	—	8	—	Guidance to staff and education
11. Wildlife Habitat Management Program					
Action 11-1.1	\$1,000	—	40	—	0.5-hr training per employee
Action 11-1.2	\$750	—	8	—	Arborist/biologist as needed
Action 11-1.3	\$800	—	—	—	Cost of nesting bird survey if needed, NBS biologist 1 day to confirm nests \$800
Action 11-1.4	\$200	—	8	—	Educate City/crew to avoid water
Action 11-2.1	—	—	—	—	Program 14
Action 11-2.2	—	—	—	—	Program 14
Action 11-2.3	—	—	—	—	Program 14
Action 11-2.4	—	—	—	—	Program 14
12. Tree Management Program					
Action 12-1.1	\$4,800	—	40	—	Monarch biologist (8 hrs) and arborist (16 hrs) site visits. \$2400. Implementation Plan preparation 16 hrs. \$2400. = \$4800. Quarterly site visits 32 hrs, IP 8 hrs
Action 12-1.2	—	—	—	—	Guidance for identifying threats
Action 12-1.3	—	—	—	—	Guidance for establishing thresholds
Action 12-1.4	—	—	—	—	Program 13
Action 12-1.5	\$23,800	—	20	—	Arborist for 5 days: \$4000, Butterfly biologist for 1 day to confirm tree work: \$800, Wildlife biologist to monitor work for 5 days: \$4000, Tree crew for 5 days: 15,000. (Total = \$23,800.) City staff to check work for 5 days @4 hrs. (Total = 20 hours.)
Action 12-1.6	—	—	—	—	Would be accomplished with replanting restoration.
Action 12-1.7	—	—	—	—	Program 14
Action 12-1.8	—	—	—	—	Program 20
Action 12-1.9	\$1,600	—	—	—	Biologist/arborist field visit 2 days

	Materials and Contractors Cost (\$)		City of Goleta Staff Time (hours)		Notes/Assumptions
	Annual	One-Time	Annual	One-Time	
Action 12-1.10	\$5,000	—	60	—	Container trees and labor estimate, depends on # of trees planted.
Action 12-2.1	—	—	—	—	Direction for restoration design
Action 12-2.2	\$800	—	32	—	Biologist 1 field day, City staff labor for 4 x 4 days
Action 12-2.3	—	—	—	—	Included in 12-1.5
Action 12-2.4	—	—	—	—	Program 10
Action 12-3.1	\$8,800	—	768	—	Inspection of trails one per month (16 hr/mo=192hr/yr), maintenance crew to prune/remove hazard limbs and trucks every month for 2 days (3 crew, 2 d/mo = 576hr/yr). Est. 768 total staff time plus equipment. Arborist 5 days \$4000, butterfly biologist 1 day to confirm tree work \$800, wildlife biologist to monitor work 5 days \$4000.
Action 12-3.2	—	—	—	—	Included in 12-1.5
Action 12-3.3	—	—	—	—	Included in 12-1.5
Action 12-3.4	—	—	—	—	Included in 12-1.5
Action 12-3.5	—	—	48	—	3 days x 2 staff
Action 12-3.6	\$4,800	—	8	—	Implementation Plan. Arborist: 20 hours. Monarch biologist: 20 hours. Report prep: 8 hours. @ 100/hr. City staff to review Implementation Plan
Action 12-4.1	—	—	0	—	Program 4
Action 12-4.2	—	—	—	—	Program 4
Action 12-4.3	—	—	—	—	Program 4
Action 12-4.4	—	—	8	—	To review programs annually
Action 12-4.5	—	—	8	—	Staff time to coordinate
13. Integrated Pest Management Program					
Action 13-1.1	—	—	—	—	Arborist pest assessment can be done during annual plan site visits, 12-3.6

	Materials and Contractors Cost (\$)		City of Goleta Staff Time (hours)		Notes/Assumptions
	Annual	One-Time	Annual	One-Time	
Action 13-1.2	—	—	—	—	Arborist pest assessment can be done during annual plan site visits, 12-3.6
Action 13-2.1	\$5,000	—	40	—	Estimate for experimental techniques
Action 13-2.2	\$2,000	—	20	—	Guidance
Action 13-2.3	\$3,000	—	24	—	Pest inspection by specialist with recommendations; staff time to review
Action 13-2.4	\$1,500	\$5,000	32	—	Pest specialist to develop and maintain pest monitoring program and materials, and staff time to implement.
14. Habitat Enhancement and Restoration Program					
Action 14-1.1	\$20,000	\$25,000	120	80	Container plants, planting, irrigation system, water, maintenance, and monitoring; Initial experimental plots allowance. City staff maintenance: 10 hr/month.
Action 14-1.2	—	—	—	—	Guidance
Action 14-1.3	—	—	—	—	Programs 13 and 15
Action 14-2.1	\$10,000	\$15,000	120	80	Container plants, planting, irrigation system, water, maintenance, and monitoring; Initial experimental plots allowance. City staff maintenance: 10 hr/month.
Action 14-2.2	—	—	—	—	Program 15
Action 14-2.3	—	—	20	—	Guidance
Action 14-3.1	—	—	12	—	Coordination activities
Action 14-3.2	—	—	12	—	Coordination activities
Action 14-3.3	—	—	12	—	Coordination activities
Action 14-4.1	—	—	—	—	Direction for collection locations
Action 14-4.2	—	—	—	—	Direction for collection locations
Action 14-4.3	—	—	—	—	Direction for collection locations
Action 14-5.1	—	—	—	—	Coordinate with Program 10, 11, 12

	Materials and Contractors Cost (\$)		City of Goleta Staff Time (hours)		Notes/Assumptions
	Annual	One-Time	Annual	One-Time	
Action 14-6.1	—	—	—	—	Coordinate with Wildfire Protection Plan
15. Invasive Plant Management Program					
Action 15-1.1	\$2,500	\$5,000			Renew map every two years. Initial mapping for 1511.1, 1.2, and 1.3 = 40 hrs. Botanist: 10 hrs. GIS @ \$100 = \$5000
Action 15-1.2	—	—	—	—	Cost in 15-1.1
Action 15-1.3	—	—	—	—	Cost in 15-1.1
Action 15-2.1	\$1,000	\$7,500	36		Control invasive plants allowance. Hand removal, herbicide. Hand crews CCC for 5 days per year.
Action 15-2.2	\$1,000	\$7,500	36		Control invasive plants allowance. Hand removal, herbicide
Action 15-2.3	\$1,000	\$7,500	36		Control invasive plants allowance. Hand removal, herbicide
Action 15-3.1	—	—	20	—	Program 20
Action 15-3.2	—	—	20	—	Program 14
16. Ecosystem-wide Management Coordination Program					
Action 16-1.1	—	—	20	—	Guidance for staff
Action 16-1.2	—	—	10	—	Guidance for staff
Action 16-2.1	—	—	10	—	Guidance for staff
Action 16-3.1	—	—	10	—	Guidance for staff
C. OUTREACH PROGRAMS					
17. Community Advisory and Docent Program					
Action 17-1.1	—	—	4	—	Hire docent coordinator
Action 17-1.2	—	—	64	—	2 hrs/wk for 8 month (Aug–Mar)
Action 17-2.1	\$5,000	—	640	—	20 hrs/wk for 8 month (Aug–mar), supplies for the program
Action 17-2.2	—	—	64	—	2 hrs/wk for 8 month (Aug–Mar)
Action 17-2.3	—	—	—	—	Incorporated in Action 17-2.1
Action 17-2.4	—	—	—	—	Incorporated in Action 17-2.1
Action 17-2.5	—	—	—	—	Incorporated in Action 17-2.1
18. Interpretive Program					
Action 18-1.1	—	—	40	40	Staff prepare grant applications
Action 18-1.2	\$500	\$3,000	20	20	Design and install signage

	Materials and Contractors Cost (\$)		City of Goleta Staff Time (hours)		Notes/Assumptions
	Annual	One-Time	Annual	One-Time	
Action 18-1.3	—	—	20	—	Guidance for signs
Action 18-2.1	—	—	8	—	Guidance for signs
19. Education Program					
Action 19-1.1	—	—	80	—	1 hr/tour x 80 tours average, by docents
Action 19-1.2	—	—	20	20	Create education materials and keep them updated
Action 19-1.3	—	—	—	—	Incorporated in Action 17-2.1
Action 19-2.1	—	—	24	—	Monthly updates. 12 x 2 hrs. = 24 hrs
D. MONITORING, RESEARCH, AND ADAPTIVE MANAGEMENT PROGRAMS					
20. Monitoring Program					
Action 20-1.1	\$4,800	—	20	—	This could be docents for 48 hours: 4 hours per survey for 12 surveys
Action 20-2.1	\$4,800	—	—	—	Per year estimate. One field day with drone to cover 4 sites; camera use, analysis, and brief report
Action 20-2.2	—	—	20	—	Staff coordination
Action 20-3.1	\$3,000	—	4	—	30 hrs for biologist for monitoring report, staff review
Action 20-3.2	\$3,000	—	4	—	30 hrs for biologist for visitor impact assessment, staff review.
Action 20-3.3	\$500	—	8	—	Coordination of programs for biologists and staff
21. Monarch Research Program					
Action 21-1.1	—	\$15,000	16	40	Evaluate requests for research and issue permits as needed.
Action 21-1.2	—	—	8	—	Guidance for research permits
22. Adaptive Management Program					
Action 22-1.1	—	—	16	—	16 hours per year staff time
Action 22-1.2	—	—	8	—	8 hours per year staff time
Action 22-1.3	—	—	8	—	8 hours per year staff time
TOTALS	\$203,650	\$63,500	3226	472	

APPENDIX B. SPECTRAL IMAGING AND ANALYSIS FOR ASSESSING TREE HEALTH

To monitor and determine vegetation health within the aggregate sites, spectral imaging and analysis will be used. In the last few decades, high resolution multispectral and hyperspectral imaging have become more commonly used by agricultural and horticultural industries to manage soil, fertilizing, and irrigation, and to monitor the health of crops. Spectral imaging is similar to digital photography except that instead of just collecting an image of three primary colors or bands (red, green, and blue; RGB) the multispectral camera sensor (spectrometer) divides the color range into multiple discrete bands of colors (typically 5 to 15 bands for multispectral to greater than 100 for hyperspectral) across the visible and near-infrared spectrums. In addition, the image captures data about the amount of light for each band that reaches the sensor. Since most plants with chlorophyll absorb light in the red (650 to 700 nm) and blue spectrum (425 to 475 nm) and reflect green and yellow light (500 to 600 nm), changes in the ratio of light within these regions can be used to determine vegetation health over time or in comparison to known healthy vegetation. By using spectral imaging over traditional arborist techniques, small changes in vegetation health can be assessed rapidly, the data can be quantified, and management decisions can be monitored for effectiveness. In addition, very little quantifiable information about the health of vegetation and butterfly use of aggregation sites has been studied.

To monitor the health of vegetation in aggregate sites, a ground-based imaging spectrometer will be used at set locations within the study area and within known aggregates sites. The spectrometer will be placed on a tripod at a known elevation and location within a study site. A series of images (both spectral and RGB) will be taken at a predefined aspect and slope of the tree canopy and surrounding vegetation. All perennial vegetation (trees and shrubs) within each image will be identified, and a visual assessment of vegetation health will be recorded and catalogued in order to track changes over time. For at least the first 2 or 3 years of the study, images should be taken three times during the year to help determine phenotypical color differences (variation in color due to genetics) between members of the same species and to calibrate seasonal changes. Afterwards, image frequency can be reduced to twice a year (at the beginning and middle of the growing season). For each spectral image, key individuals will be identified, and multiple pixel groups will be sampled across the foliage using multispectral imaging software and statistically analyzed to determine relative chlorophyll absorbance and reflectance, to indicate vegetation health.

By comparing changes in spectral signatures of like species and individuals, and by looking for abnormal changes for all species over time, the health of vegetation can be assessed. Individual, chronic changes to perennial vegetation can help determine which individuals are stressed and have a higher potential for mortality, while overall changes to the ecosystem can indicate climate stressors (e.g., drought) or toxic conditions (e.g., pollution). Since modern cameras are small and light enough to be mounted to unmanned aerial vehicles (UAVs), this technique can be used to determine whole forest health by sampling upper canopy foliage (once yearly) along with below canopy aggregation sites. This would allow for a whole ecosystem assessment and would help determine stressed locations or individual species across the whole study area.

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APPENDIX C. NATIVE PLANTS TO BE INCLUDED IN HABITAT RESTORATION EFFORTS

The following plants are native to the Central Coast of California and are known to offer several valuable elements to enhance the quality and longevity of native coastal habitats, including: fall and winter nectar source for monarch butterflies, canopy for wind protection, food source for wildlife, drought resistance, and fire resistance. California native plants are plants that were present in California prior to the arrival of European explorers and colonists in the late 18th century. Native plant stock should be sourced from local populations.

Restoration Native Plant List	Location					Purpose			
	Over-wintering Site	Open Area Adjacent to Overwintering Site	Devereux Creek	Understory Windbreak	Nectar Source	Wildlife Habitat and Forage	Fire Resistant	Drought Tolerant	Erosion Control
Common Name (Scientific Name)									
Trees									
coast live oak (<i>Quercus agrifolia</i>)	X	X		X		X	X	X	
western sycamore (<i>Platanus racemosa</i>)			X			X			
toyon (<i>Heteromeles arbutifolia</i>)	X			X	X	X	X	X	X
arroyo willow (<i>Salix lasiolepis</i>)			X		X*	X			X
hollyleaf cherry (<i>Prunus ilicifolia</i>)		X			X*	X	X	X	
Shrubs									
seacliff buckwheat (<i>Eriogonum parvifolium</i> var. <i>parvifolium</i>)		X			X*	X			
California bay laurel (<i>Umbellularia californica</i>)	X			X	X*			X	
California wax myrtle (<i>Myrica californica</i>)	X			X				X	
lemonade berry (<i>Rhus integrifolia</i>)		X		X	X*	X	X	X	X
golden currant (<i>Ribes aureum</i>)		X		X	X	X	X	X	
mulefat (<i>Baccharis salicifolia</i>)			X		X*	X			
California brittlebush (<i>Encelia californica</i>)		X			X*	X		X	X
California goldenrod (<i>Solidago velutina</i> ssp. <i>Californica</i>)		X			X*	X		X	
California goldenbush (<i>Ericameria ericoides</i>)		X			X*	X		X	
saltmarsh baccharis (<i>Baccharis glutinosa</i> [douglassii])			X		X	X			X
coyote bush (<i>Baccharis pilularis</i>)		X			X*	X		X	
black sage (<i>Salvia mellifera</i>)		X			X*	X		X	

Restoration Native Plant List	Location					Purpose			
	Over-wintering Site	Open Area Adjacent to Overwintering Site	Devereux Creek	Understory Windbreak	Nectar Source	Wildlife Habitat and Forage	Fire Resistant	Drought Tolerant	Erosion Control
seaside fleabane (<i>Erigeron glaucus</i>)		X			X*	X		X	
purple sage (<i>Salvia leucophylla</i>)		X			X	X		X	
blueblossom (<i>Ceanothus thyrsiflorus</i>)		X			X*	X		X	
heart-leaved Keckiella (<i>Keckiella cordifolia</i>)	X	X	X		X*	X		X	
Groundcovers									
black figwort (<i>Scrophularia atrata</i>)	X	X	X	X	X*	X		X	
purple needlegrass (<i>Nassella pulchra</i>)		X				X		X	X
blue-eyed grass (<i>Sisyrinchium bellum</i>)		X			X*	X	X	X	
bluedicks (<i>Dichelostemma capitatum</i>)		X			X*	X		X	
Santa Barbara honeysuckle (<i>Lonicera subspicata</i> var. <i>subspicata</i>)	X	X	X	X	X	X			
Sticky monkeyflower (<i>Diplacus aurantiacus</i>)		X	X	X	X*	X		X	

X* indicates species that bloom during the overwintering period (October – March)

Plant List References

The Theodore Payne Foundation for Wildflowers and Native Plants, Inc. Fire Resistant Native Plants with High Wildlife Value. Sun Valley, CA. Available; http://www.theodorepayne.org/plants/fire_resistant.htm.

The Xerces Society. 2017. Protecting California's Butterfly Grove: Management Guidelines for Monarch Butterfly Overwintering Habitat. 32+vi pp. Portland, OR: The Xerces Society for Invertebrate Conservation.