Department of Defense

Legacy Resource Management Program

USFS Monarch-23

US Forest Service and Department of Defense Cooperation on Monarch Butterfly Conservation (Interagency Agreement)

USDA Forest Service Office of International Programs

May 29, 2024

USDA Forest Service
U.S. DEPARTMENT OF AGRICULTURE

INTERNATIONAL PROGRAMS | OFFICE OF THE CHIEF

FY2024 1st Biannual Activity Report (October 2023-March 2024)

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USDA Forest Service | International Programs May 2024

This project is supported by the Department of Defense Legacy Resource Management Program.

ACRONYMS AND ABBREVIATIONS

BMPs	Best Management Practices
CARCD	California Association of Resource Conservation Districts
CCAA	Candidate Conservation Agreement with Assurances
CDFW	California Department of Fish and Wildlife
DLT	Deschutes Land Trust
DOI	Department of Interior
DoD	Department of Defense
ECEC	Elkton Community Education Center
ESA	Endangered Species Act
EFTA	Environment for the Americas
HOH	Hiring Our Heroes
IMMP	Integrated Monarch Monitoring Program
JMU	James Madison University
MJV	Monarch Joint Venture
NAVAIR	Naval Air Systems Command
NMFWA	National Military Fish and Wildlife Association
PWG	Pollinator Working Group
RCD	Resource Conservation District
ROWHWG	Rights of Way as Habitat Working Group
UC-Davis	University of California - Davis
UIC	University of Illinois-Chicago
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFS IP	United States Forest Service International Programs
WMA	Western Monarch Advocates
WSU	Washington State University

INTRODUCTION

The Department of Defense, Legacy Resource Management Program (DoD Legacy Program) and the United States Forest Service, International Programs (USFS IP) are supporting eight focal monarch butterfly conservation projects, six of which were initiated in an FY2022 interagency agreement and continued through additional support during FY2023. The on-going work highlighted in this report will increase the efficiency and effectiveness of managing habitat for monarchs on DoD and other tribal, federal, state and private lands. Increasing knowledge and data from these projects will enhance military readiness by enabling DoD managers to balance habitat protection with training activities and other land uses. This work will contribute to key aspects of DoD land management by identifying priority areas for monarch conservation, providing on-the-ground support in baseline and ongoing data collection, developing best management practices for overwintering and breeding populations, and providing resources and virtual support on all aspects of monarch conservation. Ultimately the outputs of these projects will help DoD land managers maximize the use of their lands for training while considering the needs of a widespread at-risk species.

DoD Legacy Program and USFS IP staff are working collaboratively to ensure that all projects benefit both the monarch butterfly and military readiness. Partner activities supporting this objective include trainings, data collection, technical exchanges, consultations, planning support and developing best management practices (BMPs) for monarch butterfly management on DoD lands. A key aspect of this work is the exceptional degree of collaboration among the partners. For example, Environment for the Americas (EFTA), Monarch Joint Venture (MJV) and Xerces Society are closely coordinating work with EFTA interns at numerous military installations. This close coordination of activities is generating operational efficiencies allowing for an even greater level of direct support for installations.

This FY2024 biannual activity report (October 2023 – March 2024) serves as a compiled activity report for the USFS IP and DoD funded partners working on monarch butterfly conservation and management. Each partner submitted comprehensive reports encompassing this time period. These individual reports are shared separately. The intent with this report is to provide a one-file summary of highlighted partner activities. A table summarizing partner and installation interactions and support is also shared separately.

PROJECT COORDINATION

USFS IP has provided overall project coordination, including maintaining communications with partners and DoD, strategizing with partners and DoD to plan work that meets desired program outcomes, managing grants and contracts, overseeing project implementation, facilitating communication and linkages among partners and projects, and planning meetings.

Partner Stewardship and Project Coordination:

- Ensuring collaboration through frequent communications with partners about project level questions and concerns
- Reviewed and modified SOWs with partners
- Managed shared Google Calendar to enhance cooperation with site visits to installations

USFS IP organized or participated in the following coordination meetings in FY24 (Oct 23 – Mar 24):

- February 6, 2024: Trinational Monarch Science Meeting
    - USFS IP participated in this meeting along with DoD partners from Washington State University (WSU), James Madison University (JMU), University of California - Davis (UC-Davis), and Xerces Society.
- March 6, 2024: Monarchs and More Network Meeting, co-hosted by MJV and University of Illinois Chicago (UIC) Rights-of-Way as Habitat Working Group (ROWHWG)
    - USFS IP presented on the larger monarch conservation program and included highlights of the USFS DoD partnership.
    - The DoD Legacy Program presented on its work, including the goals of the partnership with USFS IP.
- March 28, 2024: National Military Fish & Wildlife Association (NMFWA) DoD Monarch Conservation Special Meeting
    - USFS IP worked with DoD to organize a half-day in-person meeting with DoD natural resource managers attending the annual NMFWA meeting in Grand Rapids, MI. USFS IP, WSU, UC-Davis, JMU, Xerces Society, MJV, EFTA, and California Association of Resource Conservation Districts (CARCD) were all present and presented.
    - The goals, objectives, and priorities of the DoD – USFS IP partnership were presented to DoD land management specialists, and feedback was solicited to allow the Forest Service and its partners to meet the specific priorities of the DoD.
    - DoD natural resource managers were encouraged to provide contact information and request a monarch/pollinator questionnaire by scanning a QR code generated by the MJV to help identifying how the monarch partners can best support natural resource managers with their monarch and other pollinator needs.
- April 18, 2024: Collaborative Wildlife Protection and Recovery Initiative (CWPRI) Meeting
    - USFS IP presented on the monarch program and cooperation with DoD at this in-person meeting in Arlington, VA.
    - USFS IP also discussed potential connections to other program areas such as habitat for other migratory species, including birds and bats, and invasives species.
    - USFS IP joined CWPRI's new monarch working group.

PROJECT 1

Washington State University and University of California-Davis

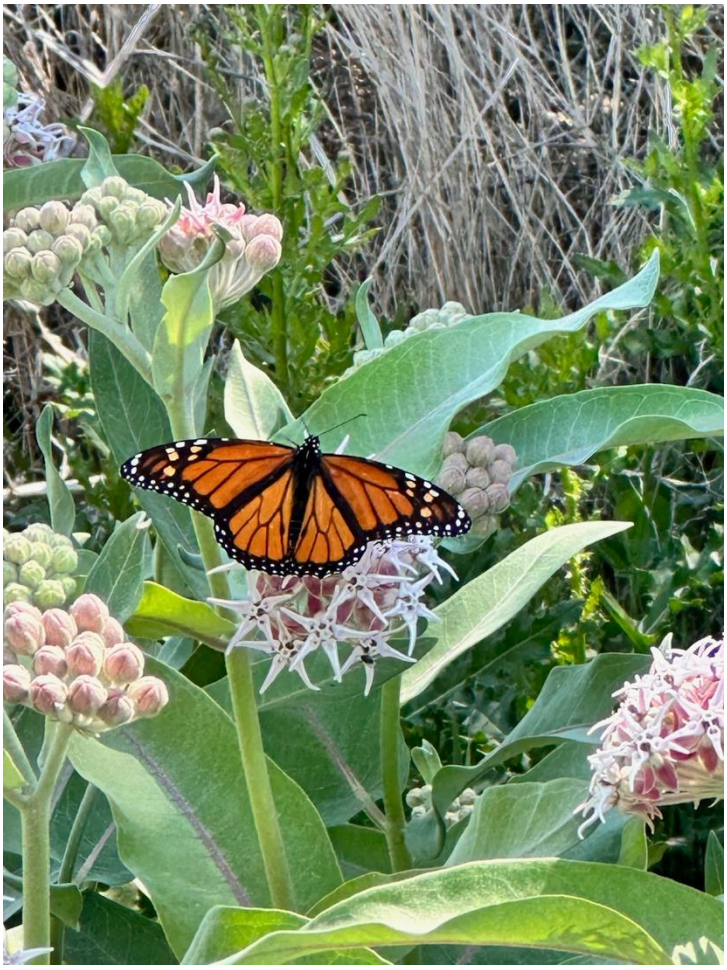
Ecological Studies to Advance Conservation and Management of Monarch Butterfly on Public Lands Across the West

WSU, UC – Davis and JMU have built upon work initiated with the DoD Legacy Program in 2017 to determine seasonal timing of western monarch butterflies in locations across the West, and to use this information to increase the efficiency and effectiveness of managing habitat for monarchs on DoD lands in the West. In FY2023 this project supported field research across five western states (CA, ID, NV, OR and WA), working with installation staff in each state and many public agencies on multiple research projects. The primary objectives of this work are to monitor breeding phenology across the west, study larval performance in sunny vs shady habitats in the arid west, evaluate the potential use of Motus technology for tracking monarch movement, and understand the potential of monarch habitat to serve as an umbrella for native pollinator communities.

FY 2024 Highlighted Accomplishments

Breeding Phenology

Through a targeted study focusing on specific monitoring sites selected based on habitat features, WSU\UC - Davis continued work to investigate the timing of breeding activities for western monarch butterflies. Previous research presented varying perspectives on the migratory behaviors of monarch butterflies, including the suggestion of a mid-summer lull in monarch presence in California. However, based on four years of monitoring data (2017, 2018, 2019 and 2023), WSU\UC - Davis found no evidence supporting a mid-summer gap. Instead, they documented consistent use of certain areas for breeding throughout the summer in Northern California. Similarly, breeding occurred consistently in Southern California once juveniles were sighted, but showed more variability from year to year in terms of when breeding occurred. Monarch butterflies in Nevada, Oregon, Idaho, and Washington arrived later in the year compared to California. However, once they arrived, breeding activity remained consistent until fall. Based on work-to-date, this study underscores the importance of adapting habitat management strategies to accommodate the shifting population dynamics of western monarch butterflies. Understanding the consistent breeding activity in Northern California and the variable trends elsewhere highlights the need for targeted and flexible approaches to manage and restore suitable habitats throughout the breeding season. Additionally, it is important to note that during these surveys WSU\UC - Davis documented juvenile monarchs at all monitored installations, suggesting these installations all contribute to breeding activity with interannual variation of the magnitude and timing of those contributions.



Monarch butterfly at NWSTF Boardman. Photo by VR Seagal, June 12, 2023

Larval Performance in Sunny vs Shady Habitats in the Arid West

Rising summer temperatures and changes in seasonal weather patterns due to human-induced climate change may have widespread impacts on western monarchs breeding in arid parts of the range. Historically more than a third of the migratory population of western monarchs migrated from breeding grounds in Oregon, Washington and Idaho – regions which can potentially make important contributions to the overwintering population if habitat conditions are suitable. Preliminary data from the DoD Legacy-funded project in 2017-2019 indicated that larvae are more abundant in habitat under/near trees. This suggested that shady habitats might provide "cool-air refugia" in the middle of periods of extreme heat and that the effectiveness of monarch habitat restoration may depend on the overall habitat context. In this work, WSU\UC - Davis explores the potential role of shade structure in influencing monarch larval survival. They varied both microclimate and host plant milkweed in the late season (August) in monarch habitat near NWSTF Boardman in summer 2023. In enclosures with showy milkweed, the most abundant milkweed in the Pacific Northwest, larval survival was three times higher in the shade relative to sun-exposed plots. In contrast, there was no effect of microclimate on larvae foraging on narrow-leaved milkweed. Overall, larval survival was higher on narrow-leaved milkweed than showy milkweed. This suggests that organizations like USFS, DOD or other organizations have some flexibility in restoration options: to enhance narrow-leaved milkweed which is native but uncommon in these regions, or to increase access to shade structure when establishment of trees or shrubs is a feasible option.

Potential Use of Motus Technology to Understand Monarch Movement

JMU led this portion of the collaborative studies in partnership with WSU, UC – Davis, and Xerces Society. A complete summary is given under Project 2 below.

PROJECT 2

James Madison University

Do Featherweight Telemetry Tags Affect Monarch Butterfly Movement?

The goal of this project is to assess the utility of the Motus telemetry tower network for monarch conservation via tracking studies, and to evaluate the impact of Motus-compatible tags on monarch movement and behavior. This progress report provides updates on primary objectives of this work including (1) assessing the impact of the two smallest currently available Motus-compatible telemetry tags on monarch butterfly movement, and (2) communication of findings and collaboration with monarch butterfly partners, particularly in the western US, for whom movement studies may be instrumental for monarch conservation.

Motus is an international system of telemetry towers aimed at connecting researchers and providing valuable movement data on organisms outfitted with Motus-compatible tags. Since the release of the new lightweight, solar-powered CTT BluMorpho tags in September 2023, combined with their preliminary findings and anecdotal reports that the previously used Lotek Nanopin tags may limit flight capacity, there has been increased interest in using the Motus tower system and specifically CTT tags to track monarch butterflies. During October 2023-March 2024, JMU continued analysis of 2023 pilot field data comparing movement in breeding populations of monarchs with and without CTT and Lotek telemetry tags. Preliminary results from the 2023 pilot study suggest that movement is likely hindered in larger monarchs carrying the larger Lotek tags, but not those carrying CTT tags. They are preparing for the summer 2024 field season to update our preliminary findings and expand this project to include migratory monarchs. JMU reported research findings at formal and informal meetings to other researchers, government officials and nonprofit organizations interested in using Motus-compatible tags to track monarchs. Given increased interest in using the very new, lighter-weight CTT tags, JMU visited Vandenburg Space Force Base in January 2024 to test the detection range and signaling of CTT tags under different light conditions, across different landscape structures, and on live monarchs in an overwintering monarch grove. Tags were detected from ~900 km in open land cover and from ~100 meters in forest. The CTT tags were detected from even farther distances on live monarchs in the understory of the overwintering grove, suggesting that monarch movement facilitates tag detection. CTT tags were also detected from up to ~100 meters on a monarch with closed wings. These results provide insight into the distances within and outside of overwintering groves that newly installed Motus towers would need to be placed to enhance successful detection of overwintering monarchs. Results were presented to representatives from the Xerces Society, California Fish and Wildlife, Vandenberg Space Force Base, Point Blue Bird Observatory, and Althouse and Meade at a Western Monarch Movement Ecology meeting, organized by Xerces Society.

FY 2024 Highlighted Accomplishments

- October 2023-March 2024: Ongoing work with JMU undergraduate Emilie Huebner to analyze summer 2023 pilot data, as well as to compare movement from untagged monarchs from the 2023 study with untagged monarchs from a 2016 study following the same protocol; Regular meetings with lab assistant and incoming JMU Master's student Helen St. John in preparation for 2024 field season
- January 12, 2024: Informal presentation of preliminary results from summer 2023 pilot study during virtual planning meeting for field visit to Vandenburg SFB (organized by Xerces)

- January 17-19, 2024: Helen St. John visits Vandenburg SFB to conduct tag range testing with Ashley Fisher (Xerces), demos CTT tag attachment during January 18th field visit, and tests detection on live monarchs in overwintering grove
- February 6-8, 2024: Participation in Trilateral Meeting for Monarch Conservation in Mexico City, Mexico, and formal presentation of preliminary results from summer 2023 pilot study
- February 23, 2024: Helen St. John presents results from Vandenburg CTT tag study at virtual meeting with Western Monarch Movement Ecology group (organized by Xerces)
- March 11, 2023: Participation in Western Monarch Movement Ecology monthly meeting (organized by Xerces)
- March 28, 2024: Formal presentation of 2023 preliminary results at 41st Annual National Military Fish & Wildlife Association meeting in Grand Rapids, Michigan, USA; One-on-one meetings with installation officials in attendance at 'office hours' session organized by Monarch Joint Venture

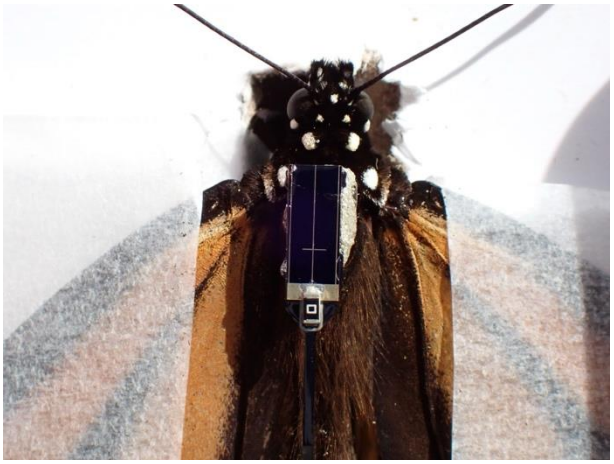


Image of CTT BluMorpho tag attached to the dorsal thorax of a monarch butterfly. Glassine envelopes cover the wings to minimize scale loss during handling. Photo courtesy of Kyle Nessen, Cal Poly/Althouse & Meade.

PROJECT 3

Xerces Society for Invertebrate Conservation

Recovering Monarch Butterflies in California and the West: Habitat Restoration at Overwintering Sites and within the Breeding Zone

The Xerces Society is working with the DoD natural resource managers, USFS IP, community scientists, and other conservation partners to protect and restore overwintering sites and restore habitat where monarchs breed, especially in the early spring and on/near DoD lands in the West. They are also partnering with researchers, DoD natural resource managers, and local stakeholders to advance monarch overwintering conservation science. The main aim of this project is to address the lack of focused conservation work within the monarch's overwintering sites, early-breeding zone, as well as on or near DoD installations that occur in other key breeding areas in the West. The strategies they employ—protecting and restoring overwintering and breeding habitat—are likely to be the most effective short-term strategies to prevent further decline and ultimately allow the western monarch population to rebound.

Their work from October 2023 through March 2024 aligns with each of the following major focal areas in their multi-year grant: 1) Develop management guidance for monarch overwintering habitat on DoD installations in California; 2) Develop site-specific management guidance for monarch breeding habitat on DoD installations in western states; 3) Identify and fund priority research, monitoring, and habitat enhancement projects to advance western monarch conservation; and 4) Expand western monarch community science programs, with a focus on improving the end user experience and on engaging more diverse and underserved communities.

FY 2024 Highlighted Accomplishments

Focal Area 1: Develop management guidance for monarch overwintering habitat on DoD installations in coastal California

Xerces reached out to two key DoD installations in California that contain significant monarch overwintering habitat: Marine Corps Base Camp Pendleton in San Diego County (five overwintering sites) and Vandenberg Space Force Base (SFB) in Santa Barbara County (~34 overwintering sites). They also engaged with Camp San Luis Obispo, which has potential monarch overwintering habitat. They held virtual meetings between Xerces and DoD staff to launch the project. They then followed up with emails and meetings and conducted planning and site visits. Xerces also facilitated DoD natural resources staff's inclusion into the Western Monarch Count: www.westernmonarchcount.org and brought a new installation (Camp San Luis Obispo) into monitoring monarchs through the Western Monarch Count. We also solicited DoD staff's input on overwintering site boundaries on their installations as part of a larger project to map overwintering sites according to standardized criteria. Xerces continues to co-lead an overwintering site manager working group with the US Fish and Wildlife Service, a group with over 80 participants, including Vandenberg SFB representation.

Focusing the majority of our installation-specific efforts on a few installations with monarch overwintering habitat will have the largest conservation impact on the western monarch population, given our current understanding of when and where monarchs are most vulnerable in their migratory cycle. Vandenberg SFB alone hosts a significant portion of the entire monarch overwintering population most years and MCB Camp Pendleton has hosted relatively large numbers for southern California.

Specifically, Xerces engaged in the following manner to support DoD installations:

- Visited Vandenberg SFB on multiple occasions to conduct applied science work (see Focal Area 3) and began drafting site-specific overwintering habitat management plans for four monarch overwintering sites identified as priorities by Vandenberg SFB.
- Visited MCB Camp Pendleton in October 2023 to assess their five overwintering sites and coordinated with Vandenberg SFB's Center for Environmental Management of Military Lands (CEMML) biologist Jessica Griffiths to join the trip to improve cross-installation knowledge sharing of overwintering habitat management.
- Visited Camp San Luis Obispo twice in October and November 2023 to complete habitat assessments and monarch monitoring their four potential overwintering sites.
- Mapped two new overwintering sites discovered on DoD properties during the 2023-2024 overwintering season: one at MCB Camp Pendleton and one at Vandenberg SFB.

Photos: Left: Potential overwintering habitat at Camp San Luis Obispo in fall 2023. Photo by Ashley Fisher/Xerces. Right: Discussing overwintering habitat quality at MCB Camp Pendleton in fall 2023 with Bill Raitter, Jessica Griffiths, Jim Asmus (all DoD) and Sara Cuadra (Xerces Society). Photo by Emma Pelton/Xerces Society.

Focal Area 2: Develop site-specific management guidance for monarch breeding habitat on DoD installations in western states

Between October 2023 and March 2024, Xerces staff provided individual installations in California with technical assistance on monarch breeding habitat. Xerces is also continuing to have broader conversations with fellow USFS IP monarch grant recipients, DoD natural resource managers, Texas A&M, USFWS, and US Forest Service International Programs about how Xerces can best help DoD installation natural resource managers conserve monarchs. Xerces staff also presented and participated in the March 2024 National Military Fish & Wildlife Association (NMFWA) Annual Meeting & Training Workshop, monarch special session, and office hours.

Specific activities that Xerces conducted to support DoD installations include:

- Helped California installations understand where and when they have monarchs and monarch habitat. This involved providing monarch and milkweed records for MCB Camp Pendleton, Camp Parks, and Def Fallbrook through custom data pulls from multiple sources based on each installation's geographic areas of interest. Xerces staff also answered questions about the timing of monarch presence and monitoring protocols.
- Connected Camp Parks with outreach materials and connected them to their local RCD for monarch habitat restoration support.
- Participated in an initial conversation with Camp Roberts and provided technical follow-up about low irrigation techniques for a possible landfill monarch habitat restoration project, organized by Monarch Joint Venture. They are still looking for funding sources as of March 2024.

Xerces' California Monarch and Pollinator Habitat Kit Program: The program provides climate-smart native plants to people creating pollinator habitat in California. In October 2024, US Army Camp Parks and Beale AFB received kits to support the pollinator conservation work they are doing on base. In spring 2024, Xerces sent application information to all DoD installations engaged with to date in order to make them aware of the program for fall 2024. Beale AFB submitted a project proposal in March 2024 for Xerces' 2024 habitat kits and applications are currently being reviewed.

Focal Area 3: Identify and fund priority research, monitoring, and habitat enhancement projects to advance western monarch conservation

Building off the Xerces' Western Monarch Overwintering Science Meeting held in May 2023 in San Luis Obispo, CA, Xerces is now funding multiple efforts stemming from the meeting (details below). Storytelling about this initiative has been developed through the launch of a StoryMap and associated QR codes which link to the StoryMap applied to signage at Vandenberg SFB and Pismo State Beach which has tens of thousands of annual visitors. In addition, Xerces staff and graduate student Kyle Nessen who is financially supported by this agreement were featured on the February 2024 installation of the Insectarium series by PBS, hosted by the American Museum of Natural History. The video is called "Butterfly Effect: Can Monarchs Avoid Extinction?" and available on YouTube here.

Motus/Radio Telemetry Study on Vandenberg SFB

Xerces and Point Blue Conservation Science convened a "Western Monarch Movement Ecology" working group to evaluate the feasibility of utilizing radio telemetry tagging and Motus towers to better understand monarch movement. This technology is of great interest to many

including agency partners, researchers, and DoD partners who are interested in using it to more efficiently track animal movement, especially as the Motus network expands into new areas.

Point Blue led a series of meetings in 2023, then in January 2024, Xerces began leading meetings to coordinate with researchers, agency staff, and other stakeholders on the development of a radio telemetry / Motus monarch study. Xerces plans to continue leading monthly meetings, opened up to a wider range of those interested in exploring Motus for monarchs including USGS, Southwest Monarch Study, Althouse and Meade, and others.

Forest Structure "Super Study" at Vandenberg SFB and Pismo State Beach

Xerces launched a novel research study with CalPoly, Vandenberg SFB, USGS, California State Parks, and other partners as part of a pilot "super study." The goal of the study is to examine and link monarch overwintering presence and abundance with environmental variables by integrating tools like Lidar, infrared cameras, cluster mapping, and weather meters. Understanding grove structure requirements can directly inform management decisions, including at Vandenberg SFB and MCB Camp Pendleton. For example, the study will address questions like "How do monarchs respond to disturbances like strong wind events due to storms?" and "Do monarchs respond to vibration events due to military operations?" The second question is of particular importance to Vandenberg SFB as one of their largest overwintering sites is directly adjacent to the Space Launch Complex.

Overwintering Habitat Mapping

Xerces continues to work with USFWS and other partners in a working group (including a representative from Vandenberg SFB) to refine overwintering site boundaries and improve overwintering habitat management. They held exploratory meetings with partners who are also interested in this topic from USGS, US Fish and Wildlife Service, and CalPoly to develop the methodology. During this project period, Xerces worked to update boundaries on dozens of sites, including nine overwintering sites on DoD land to better describe the extent of sensitive habitat on coastal bases.

Focal Area 4: Expand western monarch community science programs, with a focus on improving the end user experience and on engaging more diverse and underserved communities.

The Xerces Society harnesses the power of volunteer community scientists and partners (including staff of at least three DoD installations) to collect robust data for monarchs across the West. They have two major efforts focused on engaging volunteers and partners to help us gather monarch and monarch habitat data.

Western Monarch Count

The Western Monarch Count includes multiple survey periods, namely the mid-season count (formerly referred to as the "Thanksgiving count") and the late-season count (formerly referred to as the "New Year's count"). In the overwintering season of 2023-2024, Xerces coordinated over 400 volunteers and partners who participated in the 27th annual mid-season count and late-

season count. This is a significant project which serves as the basis of understanding the size of the overwintering population, western monarch population trends over time, and the conditions of hundreds of overwintering sites stretching from Mendocino County, California south to northern Baja California, Mexico.

Western Monarch Milkweed Mapper

The Western Monarch Milkweed Mapper collects observations of milkweeds and monarchs anywhere in the West and has an associated iNaturalist project. Over 100 community scientists were engaged between October 2023-March 2024, during a time when monarchs are primarily in their overwintering habitat, and leaving overwintering sites during this time period. Focus on improving this project's platforms will take place later in 2024 including developing a short video to explain how to report observations to iNaturalist and the website as well as participation in the summer 2024 International Monarch Monitoring Blitz.

Western Monarch Trail

The Xerces Society has just taken a new initiative under our wing, the Western Monarch Trail. The trail consists of a series of locations along the California coast where monarchs can be seen and enjoyed, from State Parks that host overwintering monarchs to downtown parks that feature nectar plant gardens along the migration path. The sites provide information, education, and inspiration on how Californians can work together to restore populations of healthy migrating western monarch butterflies. QR codes link to a website with additional resources. ADA compliant signage is available in both English and Spanish–the first non-English signs at any overwintering sites. In addition to the traditional sign format, a four-panel family-friendly storywalk format is also available.

PROJECT 4

Monarch Joint Venture

Partnerships in Habitat Conservation, Science, and Education On and Near DoD Installations

The Monarch Joint Venture (MJV), a partnership of federal and state agencies, non-governmental organizations, businesses and academic programs that work together to protect the monarch migration across the United States, entered into a partnership with USFS IP and the DoD Legacy Program to focus on monitoring, conservation, and connectivity of DoD lands with other public and private lands. Through this partnership, the MJV is working closely with the DoD, USFS IP, and other partners to ensure coordination and impact along flyways, with emphasis on the Eastern monarch flyway. Both the DoD and USFS IP benefit from access to an incredible network of partners with experience and expertise that can assist government agencies navigate science-based approaches to monarch conservation. Support includes providing recommendations and information to national-level coordinators of the DoD Legacy Programs as well as on-the-ground and virtual guidance to natural resource managers at the installation-level.

FY 2024 Highlighted Accomplishments

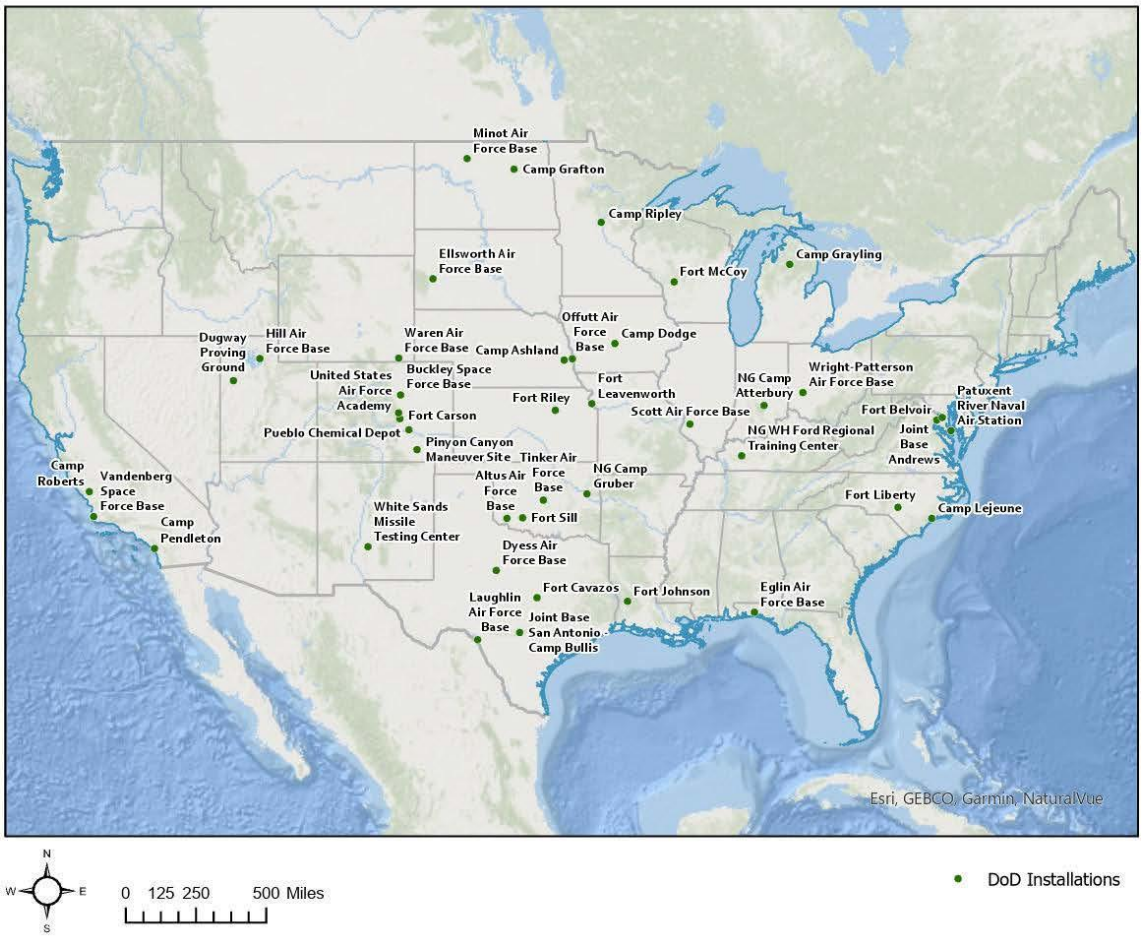
Resource Development and MJV Data and Science support

Robust data collection and habitat evaluation using the Integrated Monarch Monitoring Program will begin in earnest in March of 2024. Preparations to support this work included recruiting and hiring a new DoD Science and Monitoring Associate focused on onsite surveys, technical support, and educational materials.

Coordinating with Monarch Partners to Aid Installations

MJV has been working very closely with EFTA staff member Dejeanne May throughout the intern hiring process (see Project 5 below). MJV participated in hiring one of the primary monarch interns who will be working on over 11 installations this season. Initial installations were selected based on location within the flyway as well as installation interest in the monarch program.

Department of Defense Installations to be Visited by Monarch Joint Venture & Environment for the Americas in 2024



Map by MJV.

Virtual Training

MJV staff provided 12 hours of virtual training to EFTA staff and interns. Topics covered were monarch biology, generational timing, milkweed and plant identification, IMMP survey protocols, as well as strategies and insights for coordinating with installation natural resource managers.

MJV Partner Meeting in Austin Texas

EFTA staff were invited to participate in the MJV's annual partner meeting. This was an excellent opportunity for them to meet others in the monarch and pollinator field as well as DoD and USFS staff. Additionally, EFTA staff participated in the regional breakout groups as well as research and plenary sessions offered at the meeting.

In-person training at Bamberger Ranch

MJV staff coordinated logistics for the in-person training at the unique Bamberger Ranch in the hill country of Texas. Three interns and three MJV staff in addition to the Bamberger Ranch land

manager participated in the training. Topics covered were IMMP protocols, nectar and milkweed identification of the region, and site selection and sample plot layout. Additionally, butterfly handling and capturing were reviewed as OE parasite testing and tagging will be part of the surveys conducted during the migratory season.

Fort Cavazos Military Installation Site Visit and Training

In an effort to provide a suite of necessary experiences to the EFTA interns and MJV staff, a site visit to a military installation was conducted. Participants also included staff from the University of Chicago Illinois Energy Resource Center (UIC). The site visit to the military installation, guided by Chelsea Plimpton, provided invaluable hands-on training in various aspects of conservation and safety, and hands on practice with the IMMP protocol.

National Military Fish and Wildlife Association 2024 Annual Meeting and Training Workshop

Special Session – Monarch Butterfly Conservation on DoD Lands

The Monarch Special Meeting served to facilitate information exchange among USFS-IP, its partners, and DoD natural resource managers, aimed at steering current and future conservation efforts. Due to experience at NMFWA 2023, MJV staff took an organizational role in helping to plan and implement the session. Mercy Manzanares (MJV Program Coordinator) worked with all partners to draft an agenda, discussion questions, and format for the session as well as assisted in logistical details for the participants. During the session, Manzanares presented on Monarch Conservation East of the Rocky Mountains, highlighting accomplishments during the past year of the project. She also worked closely with Russel Martin, Fort Sill Natural Resource Manager, on his presentation about working with MJV on his installation.

DoD Monarch Partner Open House

The MJV Program Coordinator led and worked with all partners to craft a format and organize the open house. The event went very well with robust participation from USFS-IP partners and natural resource managers. The open house provided a space for managers to learn about monarch biology as well as directly address questions pertaining to their installation needs. Please see the folder for the open house guide.

Pollinator Working Group (PWG) Technical Session

Due to her role as the 2023 Pollinator Working Group Information Chair, Mercy Manzanares also organized and participated in the PWG technical session. She presented updates about the QR code survey results as well as MJV DoD project progress.

Show and Tell Monarch Resource Table

In an effort to reach as many DoD managers as possible, MJV hosted a resource table with hand outs and information from the USFS-IP team at the Show and Tell Reception on March

28th. The resource table was attended by local MJV staff Jen Thieme as well as Mercy Manzanares.

The Northwest Florida Sentinel Landscape Workshop, Habitat Surveys, and Technical Assistance

The collaboration between Eglin Air Force Base and MJV staff marks a significant step in understanding and conserving monarch butterfly habitats in Florida. Despite not being within the typical migratory path, Eglin's potential year-round nonmigratory monarch population presents unique considerations for habitat management. This section details the fruitful exchange between Eglin managers, USFWS staff, and MJV coordinators, encompassing site visits, workshops, and ongoing restoration efforts. Through these endeavors, a comprehensive understanding of habitat overlap, management practices, and potential impacts on timing emerges, shedding light on crucial conservation strategies for monarchs and other pollinators in the region. Eglin Air Force Base has expressed interest in MJV staff conducting a workshop and assisting with monarch habitat determinations. Although Eglin Air Force Base is not situated within the I-35 flyway, the area is noteworthy due to the potential presence of year-round monarchs, which could influence the timing of management activities. Furthermore, monarch populations in Florida are susceptible to high rates of the debilitating monarch parasite, OE (*Ophryocystis elektroscirrha*), with some experts characterizing Florida monarchs as a "sink population."

- Site visits were conducted with Eglin Air Force Base managers and USFWS staff in February 2023 during which the MJV program coordinator toured areas managed for species such as the Red Cockaded Woodpecker, Southeastern beach mouse, and Gopher Tortoise. This allowed for an assessment of habitat overlap for monarchs and an evaluation of the impact of management activities on timing.
- In coordination with the site visits, a monarch and pollinator workshop was taught by MJV program coordinator, Mercy Manzanares. A total of 23 people participated in the event.
- Eglin Air Force Base was a recipient of the National Public Lands Day funding. MJV staff helped coordinate seed resources in November of 2023.

National Military Fish and Wildlife Association Pollinator Working Group Webinar: Monarchs and the Military: Monarch Joint Venture Collaboration on Public Lands East of the Rocky Mountains

A one-hour webinar was presented by MJV staff on January 10th. Attendees were notified of the opportunity through the NMFWA pollinator working group listserv and through the OSD Legacy listserv. A total of 162 people registered for the webinar and 83 people attended the webinar session. After the webinar a link to the recording as well as the PowerPoint presentation and information about the USFS-DoD Monarch Agreement was provided to the 378 people that are on the PWG listserv.

Support for Installations

The DoD Program Coordinator conducted the following interactions and support activities for installations, including:

- Initiated discussions with Camp Roberts regarding habitat establishment on closed landfills in the fall of 2023. In November, a meeting was coordinated between the MJV, Xerces Society, and DoD staff to plan next steps, including possible funding and research opportunities. The MJV is exploring how our staff team in California could support efforts at Camp Roberts in the future.

- Met with Resource Managers at Fort Belvoir in November to discuss increased involvement in monarch and pollinator conservation and to explore opportunities for Blue Star family participation in outreach events. IMMP surveys are planned at the installation for September 2024.
- Multiple virtual meetings and email correspondence have been conducted with resource managers at various installations to assess the needs of installations for the upcoming 2024 field season.

Resource development for installations

The DoD Program Coordinator is working on multiple resources that will support installations in the future, including:

- Collaborating with Dr. Karen Oberhauser and the Rights-of-way as Habitat Working Group to refine timing management windows based on extensive monitoring data.
- Gathering information to create DoD-specific content for installations, focusing on native pollinator habitat.
- Developing a comprehensive needs assessment for installations across the monarch flyway and USFWS core states. This assessment will focus on addressing gaps within the monarch range in eastern states.
- Actively participated in virtual training sessions by the USFWS Pollinator Center.

UIC ROWHWG Activities

UIC has established partnerships with biologists and natural resource managers at three DoD installations: Fort McCoy, Fort Riley, and Fort Cavasos. Through this correspondence, UIC has been given an overview of each installation's strategies for pollinator conservation and habitat restoration as outlined within their respective Integrated Natural Resource Management Plans (INRMPs). Installation representatives also identified intersecting energy and transportation organizations and provided insight into current vegetation management on overlapping landscapes. Several of these energy and transportation organizations are currently enrolled in the Monarch CCAA, including Texas Department of Transportation (DOT) at Fort Cavasos; Evergy at Fort Riley; and Northern Natural Gas, Wisconsin DOT, and American Transmission Company at Fort McCoy. Installation partners have given UIC contact information for intersecting ROW organizations not currently enrolled in the Monarch CCAA.

PROJECT 5

Environment for the Americas (EFTA)

Internships for Monarchs and Pollinators

Environment for the Americas (EFTA) is a non-profit organization that provides information and materials about birds, bird conservation, and bird education throughout the Western Hemisphere, from Canada to South America and the Caribbean. In addition to its bird conservation work, EFTA also offers unique internship experiences to early career professionals.

EFTA brings this history and experience to the USFS-DoD Monarch Partnership and is closely working with the partners to achieve the goals of the broader partnership but also to provide professional development opportunities to members of diverse communities, veterans, and family members of active military. This program empowers field technicians and interns to take action and contribute to broader monarch conservation goals, while exploring career opportunities in natural resources, stewardship, and conservation.

During the Second Year of this project, EFTA has expanded its efforts to the Eastern Flyway, with monitoring efforts focused on the Interstate 35 (I-35) corridor that extends from Texas to Minnesota and is a priority area for monarch conservation. Plans are underway to continue monitoring in California, and other areas on the Eastern and Western flyways of the monarch will be considered throughout the course of this project based on DoD and USFS priorities.

EFTA continues with the goal of collecting monitoring data to inform the DoD about how and where monarchs use habitat on their lands and the extent of habitat present for monarchs. Additionally, EFTA will provide information, guidance, and recommendations for connections with other key species such as migratory birds and pollinators along with groups such as the Western Hummingbird Partnership and Partners in Flight.

FY 2024 Highlighted Accomplishments

EFTA launched the second year of its Monarch Conservation partnership with the DoD in 2024. They began almost immediately with intern recruitment and training. EFTA partnered with many organizations to recruit military affiliated interns. EFTA worked closely with military organizations including Hire Heroes USA, Blue Star Families, Hiring Our Heroes (HOH) including HOH Military Spouse Professional Networks at: Dyess AFB, Fort Cavazos, and Fort Sill, as well as local on-base employment and family readiness offices to recruit veterans, military spouses, and dependents. By March EFTA successfully recruited and hired a U.S. Army veteran, a U.S. Marine Corps veteran, a U.S. Air Force military spouse, and three dependents of veterans. In total there are seven interns supporting five installations during this period.

From October 2023 to March 2024, EFTA prioritized establishing connections to DoD Natural Resource Managers to prepare for spring monitoring activities. Program Manager Dejeanne May initiated and formed relationships with Natural Resource managers from the installations.

Before stepping into the field, EFTA interns attended the *Monarchs and More* Networking Meeting in Austin, TX convened by MJV. There, they connected with monarch experts and conservationists from around the country. This meeting provided them the opportunity to build their network and hone their networking skills.

During this period EFTA also began prepping survey sites at Fort Sill in central Oklahoma, home of the US Army's Fires Center of Excellence and the military's premier field artillery training ranges. Under the direction and support of Natural Resource managers Russell Martin, Vici White, and branch chief Jeremiah Zurenda, the EFTA team traveled hundreds of cumulative miles over Fort Sill's rangelands during the week, covering each of the base's main three range areas to identify 30 plot sites that the Natural Resource managers identified as being representative of monarch habitats across the installation's nearly 94,000 acres.

EFTA field techs will conduct Integrated Monarch Monitoring Program (IMMP) surveys at each of these hectare-sized plot sites to gather data on monarch butterflies, larvae, eggs, and the flowering plant resources that monarchs and other pollinators require—especially the vital species of milkweed plants that monarchs require exclusively in their early life stages.

EFTA Interns Jansy Alvarado and Brittany Hutchinson conduct monarch butterfly habitat surveys following the Integrated Monarch Monitoring Program protocol designed by the Monarch Joint Venture. Photo by EFTA.

PROJECT 6

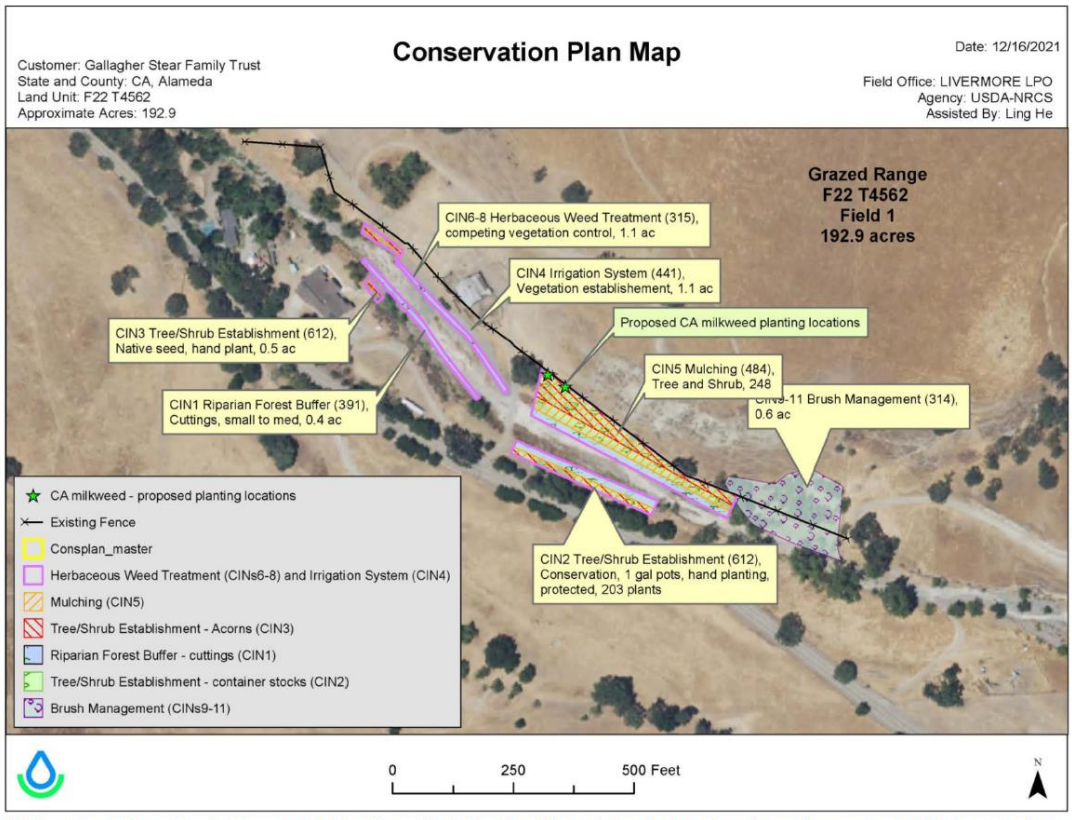
California Association of Resource Conservation Districts (CARCD)

Implementing Western Monarch Habitat Projects in Priority Action Zones

CARCD is an organization that provides technical support, funding, and coordination for conservation work implemented by the 95 RCDs in California. In this partnership CARCD is providing support to RCDs for planning and implementation of monarch and pollinator habitat restoration projects on or near DoD lands in Early Breeding Priority Action Zone 1. CARCD is working closely with five miliary installations focusing on various aspects of monarch conservation and management including habitat restoration and pollinator-friendly resource management.

FY 2024 Highlighted Accomplishments

- Providing support to five RCDs: Monterey County RCD, Coastal San Luis RCD, Solano RCD, Mission RCD, and Cachuma RCD. RCD accomplishments are summarized in the "RCD Direct Engagement with Installations" below.
- Presented at 2024 NMFWA Conference and met with installation staff during "office hours" at conference.



TA Site: Copper Moon Ranch Conservation Plan Map with California milkweed planting locations shown by green stars (15 plants total, actual locations).

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Example of RCD technical assistance and planning support. Map by CARCD.

RCD Direct Engagement with Installations – Update for Oct 2023 - 2024

			10-22-2022 to 9/30/2023	10/1/2023 - 3/31/2024
RCD	**Installation**	**Location**	**Brief Description of Support Installations are seeking and receiving**	**Brief Description of Support Installations are seeking and receiving**
Cachuma	Vandenberg SFB	Santa Barbara County	CRCD will assist VSFB with a project that will improve habitat for pollinators such as monarch butterflies, bumblebees, and other butterfly species on VSFB via habitat restoration, enhancement, and management. Project activities will be focused on three areas: 1) monarch butterfly overwintering habitat; 2) monarch butterfly breeding habitat; and 3) habitat for other pollinators.	No improvements have yet been implemented. Plans should be completed by fall and then implementation would begin.
Coastal San Luis	Camp San Luis Obispo (Camp SLO)	San Luis Obispo County	CSLRCD will assist Camp SLO in reducing erosion and establishing monarch nectar sources for overwintering and early breeding Monarchs. The RCD will facilitate identification of implementation sites, coordinate California Conservation Corps (CCC) plant propagation and installation, and monitor implementation sites. During this reporting period, the RCD coordinated closely with Camp SLO environmental staff, CCC and other watershed partners to begin planting and seeding efforts along constructed bioswales. Staff also developed an identification presentation for the Grizzly Youth Academy that will assist in maintaining some of the established plantings.	During this reporting period, seeding and planting efforts at Camp SLO continued. Seeds and transplants were mostly nectar plants and combination of perennials and annuals. Seeds were sourced from S&S seeds and plants were propagated by CCC nursery. Seeds were installed with a hydro mulch on steeper slopes and hand spread in bioswales. In next reporting period, CCC will continue to propagate nectar plants and milkweed to increase the diversity at current planting sights for fall planting. The RCD will continue to work with Camp SLO to identify future priority areas, however implementation has been challenging at Camp SLO after several Commanders since the start of the project. Staff at Camp SLO remain supportive of the work and will continue to focus efforts on current planting areas.

Mission	Camp Pendleton MCB	North San Diego County	MRCD staff has been communicating with the Environmental Security Team on CPEN and met with their staff and toured the base's pollinator habitat sites in August, 2023. MRCD staff learned that CPEN has suspended planting new milkweed, so they are planning more broad pollinator support and to identify other pollinator species of concern that would find these early annuals useful, including native bees. Both bees and Monarchs will use native annual clover species for nectar. MRCD staff plan to collect pollinator data for this land management practice and this data might influence how CPEN manages discing these firebreaks and the times in the future. MRCD staff are looking at S&S Seeds for materials, Gulf South Research Corp to assist with site prep and planting, and entomologist Eva Lowell at the San Diego Natural History Museum for monitoring assistance. To keep costs down MRCD will handle researching/purchasing seeds in addition to managing/planning the project and use the Nat's lower rates for monitoring.	On February 8, 2024, MRCD staff checked in with Ecologist William Raitter and Ecologist Abigail Hanlen. In addition to seeding the firebreaks with annuals this year, there is a 7-acre restoration site in need of a seed budget. This restoration site transitions from uplands to riparian habitat. Species to be seeded on this site will include perennials, increasing the longevity and impact of the work funded by this grant. Native plants that are also preferred monarch nectar plants, hosts for other invertebrates, and known to provide essential forage for native bees will be prioritized. Mission RCD is working with Raitter and Hanlen to develop a species list of annuals and perennials for the 7-acre site to seed this Oct-Nov 2024. Monitoring of successful plant species may be completed as part of Hanlen's ongoing work on the 7-acre site. In addition to restoring monarch and other invertebrate habitat, this project should yield useful data on seed selection and custom mixes for the region.
Monterey	Fort Hunter-Liggett	south Monterey County	RCDMC will grow *Asclepias fascicularis* and *A. eriocarpa* from seed collected at FHL and plant in new areas on the installation. RCDMC will conduct invasive plant control in existing milkweed areas.	Habitat Stewardship Project (RCDMC's contractor based at California State University Monterey Bay) grew *Asclepias fascicularis* and *A. eriocarpa* from seed provided by Fort Hunter-Liggett staff. RCDMC, FHL, and HSP staff coordinated and completed the first milkweed installation for this project in late March. One RCDMC biologist, one HSP student leader, and 8 students worked with FHL biologists to plant 250 *A. fascicularis* and 60 *A. eriocarpa* on FHL property. The immediate areas around the plants were cleared of surface vegetation and will be mulched

Solano	Travis AFB	Solano County	SRCD plans to assist Travis AFB in habitat restoration focused on improving pollinator habitat. This project will occur at the Cypress Lakes Golf Course which is a DoD owned, Geographically Separated Unit managed by Travis AFB. Work on a preliminary restoration plan was also started for the project.	Potential planting sites within the GSU at Travis have been identified. Working on the restoration plan and coordinating the necessary permits for implementation. Planning for fall 2024 implementation.

PROJECT 7

Deschutes Land Trust

Western Monarch Conservation in Oregon

Deschutes Land Trust (DLT) is working in South, Central, and North Oregon focusing on community engagement/education and habitat restoration. In Central Oregon, DLT is expanding the distribution of free native milkweed and other native pollinator-friendly plants to build western monarch migration corridor connectivity, increase monarch conservation awareness, and inspire community engagement. DLT is also expanding the native plant palette of large-scale floodplain restoration projects to include more native milkweed and other native pollinator-friendly plants to better support western monarchs, hummingbirds, bats, and bees.

DLT is contributing much needed support during the continued restoration of a fire-ravaged riparian corridor in Southern Oregon (Bear Creek) that provides critical resting and fueling resources to second generation and super generation monarchs. Funding is used to purchase plants, develop interpretive signage to help educate the public, and conduct maintenance work (weeding, mulching, infilling) at numerous pollinator waystations within the 20-mile fly-way corridor. Learn more about the Bear Creek Restoration Initiative (BCRI) here: https://bearcreekrestoration.org/. Additionally in Southern Oregon, DLT is working with the Elkton Community Education Center (ECEC) that has been cultivating native plants and mentoring young people as an independent nonprofit for over 20 years. With native nursery, greenhouses, pollinator gardens, and classrooms, it has evolved into a full-service community center and a popular summer tourist destination along the Umpqua River. More than 100 volunteers work with part time staff to keep ECEC beautiful and open to the public. Grant funding will strengthen an emerging network of pollinator advocates in Umpqua River Valley by providing the resources necessary to grow and give away thousands of native milkweed plants and seeds for free distribution. https://elktonbutterflies.com/

In North Oregon, DLT has been working with The Pittock Mansion, one of the most visited outdoor garden areas in Portland, Oregon including national and international tourists. Half of the 46 acres are left wild and connect to an additional 80 miles of trails. Prior to this grant, there was no pollinator garden on the grounds. Now that DLT has been able to establish a waystation, they are working to increase habitat connectivity and heighten awareness – as well as expand this work into other areas around Portland. Work is being completed in collaboration with Parks and Recreation, Master Gardeners, Portland Monarchs and the Museum Society.

FY 2024 Highlighted Accomplishments

Central Oregon

- Community Education & Engagement
    - Donated thousands of native milkweed and other pollinator-friendly plants to local community gardens and events, backyards, schools, public libraries and other locations and individuals throughout our region, including Prineville, Madras, La

Pine, Chemult and Bend - with a focus on underserved and underrepresented populations, as well as local Tribes.
    - Special highlight: DLT delivered over 200 native milkweed and pollinator plants to Chiloquin Elementary School in Klamath County and the students, many from Klamath Tribes families, planted them in their school garden.
    - Developed a new bilingual form to track the survivorship of the plants and remain engaged with the recipients. DLT is looking forward to checking back with everyone this summer to see how their monarch waystations and pollinator gardens are faring!

- Floodplain Restoration
    - Completed the final phase of floodplain restoration in Sisters, OR at Rimrock Ranch, a 1123-acre property owned and managed by the Deschutes Land Trust. https://www.deschuteslandtrust.org/news/blog/2020-blog-posts/rimrock-ranch-virtual-tour
    - For more information about the restoration and a video of the work: https://www.deschuteslandtrust.org/visit/rimrock-ranch-restoration
    - Planted additional monarch and pollinator-friendly plants at our Ochoco Preserve in Prineville, OR, as part of Phase 1 of the three-phase floodplain restoration project. https://www.deschuteslandtrust.org/visit/ochoco-preserve
    - To learn more about the scope and scale of this work: https://www.deschuteslandtrust.org/visit/ochoco-preserve/op-vision-future
    - Native plant species selected to provide monarch host plants and spring through fall blooms: showy and narrowleaf milkweed, hoary aster, globemallows and checkermallows, Jacob's ladder, various species of penstemons, lupines and buckwheats, Oregon sunshine, arrowleaf balsamroot, blue mountain prairieclover, blue flax, threadleaf fleabane, wax currant, golden currant, rabbitbrush, and more.

Southern Oregon – Bear Creek Initiative

- Worked with members, volunteers, and partners to maintain (weeding, mulching, in-filling) the monarch waystations previously planted.
- Collaborated with Lomakatsi Restoration Project to establish new monarch waystation. The Lomakatsi Project works to advance social equity by layering in education, tribal partnerships, and workforce training while helping to create more resilient ecosystems and communities. https://lomakatsi.org/

Bear Creek Restoration Initiative: Rebuilding monarch migration corridor habitat in Southern Oregon. Photo by DLT.

Umpqua River Valley – Elkton Community Education Center

- Deepened partnership with the Cow Creek Band of Umpqua Tribe of Indians to finalize the creation of a 14-acre site for tribal education and inter-tribal gatherings. The project includes re-introducing native plant species to land on the Umpqua River. Some of those plants are also pollinator habitat and DLT will use grant funds for those varietals. Other plantings include oak savannah, camas, etc and will be sourced with other funds.
- Provided 45 flowering native shrubs to the Kommema Cultural Protection Association (Kalapuya) for a restoration project they are completing on property that was recently donated to the group. The property is located on their traditional homelands and they have added many other culturally-important plants from other sources, including camas bulbs.
- Initiated planning for a new butterfly habitat garden on the ECEC grounds. Funding from this grant will be used to cover the cost of the milkweed and native pollinator plants, which will be supplemented by other flowering perennial plants as a public demonstration of what a backyard habitat garden could look like.

North Oregon – Portland

- Worked with local nurseries to grow native milkweed and other pollinator-friendly plants to distribute as “habitat kits” to underserved local communities to help educate the public and expand habitat availability.
- Planted over 900 pollinator-friendly plants at natural area in SE Portland.

PROJECT 8

Karen Oberhauser

Eastern Monarch Research Review

Dr. Karen Oberhauser is developing a document that summarizes land management-relevant research and resources on the Eastern monarch butterfly population to support DoD natural resource managers in habitat management and decision-making. Dr. Oberhauser is conducting a thorough research review as well as site visits to DoD installations to better understand natural resource management issues and needs on the ground. In addition to analyzing and summarizing existing knowledge and resources, her report will also identify information gaps where more research is needed to inform land management decision-making for monarch conservation.

FY 2024 Highlighted Accomplishments

Eastern Monarch Research Review

Dr. Oberhauser is reviewing literature on key drivers for the Eastern Migratory Monarch Population, including newly-published models and recent trends throughout the annual cycle. She has reviewed documents produced by and had conversations with monarch conservation experts focused on the Western Migratory Population and will ensure that her products are complementary.

To ensure that the final report addresses DoD needs, Dr. Oberhauser has spoken to DoD installation land managers, including several conversations at the National Military Fish and Wildlife Conservation meeting and formal participation in a session focused on monarchs and potential implications of federal listing.

Support for other DoD projects

Dr. Oberhauser gave a presentation to the MJV interns monitoring DoD installations and will continue to communicate with this team during the summer. She has also worked with the MJV team, with input from Xerces personnel, to create a more unified, accurate and useful management training document.

Data production

While not part of the official DoD-funded work, Dr. Oberhauser is continuing to oversee the Monarch Larva Monitoring Project. Given the ongoing volatility in and current declining trends of the Eastern Migratory Monarch population, it is key to continue to monitor monarch responses to weather conditions, and changes in the quality and quantity of monarch breeding habitat.