Background:

Monarch butterflies have declined dramatically across North America and are under review for Endangered Species Act protection. Monarchs West of the Rockies occur broadly and are distinct from the larger eastern population. Monarchs in the West have declined 99 percent since the 1980s. They overwinter in California and Mexico, and breed and migrate across the west, including a considerable portion of Department of Defense (DoD) land. Breeding phenology differs between eastern and western populations. Eastern monarchs breed in successively northbound generations. Western monarchs do not follow this pattern, and basic information is lacking to construct management strategies that reduce conflict with active military training.

Monarch nectaring on mulefat in Southern California near Vandenberg Air Force Base. Photo by Stephanie McKnight/Xerces Society

Objective:

The primary purpose is to determine seasonal timing of 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. This will help DoD land managers maximize the use of these lands for training while considering the needs of a widespread at-risk species.

Summary of Approach:

The project involves systematic surveys to understand seasonal timing of monarch breeding, a key building block in constructing demographic models for monarchs in the West. Monthly surveys were conducted throughout the expected breeding season at six installations in the West. Surveys documented abundance of monarch life stages (eggs, larvae, pupae and newly emerged adults) as evidence of site-based breeding phenology. The six installations were Vandenberg Air Force Base (AFB) and Beale AFB in California, Naval Weapons Systems Training Facility

in Boardman, Oregon, Joint Base Lewis McChord/Yakima Training Center in Washington, Naval Air Station Fallon in Nevada, Mountain Home Air Force Base in Idaho. Generalized Additive Models are being used to understand monarch breeding phenology. The broad geographic area surveyed in this project provides data to better understand the phenology of the western monarch population from relatively sparse data. These data are a building block for constructing a full demographic model of western monarchs.

Benefit:

By increasing knowledge of the timing, location, and habitat associations of monarch breeding in the West, data from this project 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 plans, such as Integrated Natural Resources Management Plans at each installation, by focusing efforts on the temporal windows with greatest importance to breeding monarchs throughout their range.

Accomplishments:

Three years of surveys (2017-19) at DoD installations were completed successfully within each of the target regions. Preliminary data analyses suggest breeding is mostly continuous from early May to late October in California and Nevada. And monarchs are most abundant in July and August in Idaho, Oregon, and Washington. In 2018 and 2019 surveys documented a decline in the range and density of monarch adults and immature stages at many study sites in the West, with very few monarchs reaching the northern breeding grounds in Oregon and Washington. Preliminary data analyses also suggest that shade may provide seasonal temperature refugia for monarch eggs and larvae during the hottest summer periods. Shade may be an important habitat feature to consider in monarch conservation efforts.

Contact Information:

Dr. Cheryl B. Schultz
Associate Professor
School of Biological Sciences
Washington State University
14204 NE Salmon Creek Ave.
Vancouver, WA 98686
Phone: (360) 546-9525
Email:schultzc@wsu.edu