



CREEKSIDE SCIENCE

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Follow-up Memorandum on Bolinas Eucalyptus Project

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This memorandum is a follow-up to the March 2024 report on monarch butterflies and habitat in Bolinas, CA. The purpose is to examine some next steps so that the hazardous eucalyptus grove can be removed expeditiously while at the same time securing a future for monarchs in Bolinas.

Summary of March 2024 Report

Key points from the previous report include:

- 1) The grove in question is on Bolinas Public Utility District (BPUD) property along Mesa Rd. and Olema-Bolinas Rd. and is a demonstrated public hazard, with poor structure and accelerating tree failures in 2023 and 2024 that block the roads, take down powerlines, and pose a direct threat to people and property. The forestry reports call for complete removal of the grove, and the Bolinas Eucalyptus Project (BEP) proposes establishment of an oak woodland.
- 2) The BPUD site in its current condition is not sustainable as overwintering monarch habitat because of the accelerating tree failures. A progressive loss of wind shelter is inevitable.
- 3) Monarch butterflies seek and stay at groves that have wind-sheltered and sunny microsites. In 2023-24, a few thousand monarchs primarily used three sites on the Bolinas Peninsula, shifting their distribution and abundance from day to day and week to week. No one site provided suitable conditions over the entire season, as monarchs would scatter away from the aggregation sites, and regroup among them.
- 4) Other sites had small numbers of monarchs for short periods. And there are several historic sites that are defunct now. All alternative sites are explored by some part of the local monarch population – if one site is not available or is unsuitable, they will likely use other sites on the Peninsula until those sites do not provide suitable microclimates during extreme weather.
- 5) Preliminary hemiphoto analysis of wind and sun exposure patterns at five sites, including BPUD, identified site vulnerabilities, as well as outlining potential fixes. Some exploratory tree planting scenarios were sketched out as part of a first-cut feasibility study.

The main conclusion of the report is that there is ample opportunity for improvement of monarch habitat at several sites in Bolinas so that at least one monarch grove is well designed and managed for long-term habitat suitability. The exact site(s) and detailed plans are the next step.



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Moving forward

The goal is to have an expedited process that allow prompt relief from the urgent hazards posed by the BPUD eucalyptus grove, and initiation of short-, medium-, and long-term actions to secure and manage *some* high-quality overwintering monarch habitat on the Bolinas Peninsula. The current haphazard and *ad hoc* approach to overwintering monarch habitat in Bolinas (and elsewhere in California) is unlikely to succeed in the long-term.

The steps to that goal involve: 1) regulatory approval, 2) lining up funding, 3) deciding where efforts to secure, improve, and manage monarch habitat are feasible and appropriate, and 4) efficiently executing hazard reduction and monarch habitat improvement.

Regulatory approval

An expedited regulatory process is highly desirable. Overwintering monarch habitat is a sensitive coastal resource (even in the absence of ESHA designation) and the butterfly is a candidate for “Threatened” listing under the Federal Endangered Species Act. In California, monarchs are included on the California Department of Fish and Wildlife’s (CDFW) Terrestrial and Vernal Pool Invertebrates of Conservation Priority list and identified as a “Species of Greatest Conservation Need” in California’s State Wildlife Action Plan. Some combination of approvals and permits from local, state, and federal entities will be necessary. There will likely be conditions applied to the BEP project to address monarch habitat issues and to ensure long-term [protection and maintenance of habitat.

Some 40 trees in the grove are on Marin County property and are the responsibility of the county. Dealing with multiple jurisdictions often can be complicated, and consolidating the permitting for both BPUD and Marin County is highly desirable and one way to expedite the process.

Funding:

Removing the BPUD grove will be expensive. Informal estimates exceed \$1,000,000. BEP will likely have to obtain funding from multiple sources. Monarch habitat improvements offsite will be a very small fraction of any funding, as preliminary considerations suggest that a few dozen well-placed trees and some selected can address site vulnerabilities, so direct costs of implementation will be low. But planning and permitting, especially if there is a contentious process, can be a major cost and delay. The urgency of hazard reduction at BPUD emphasizes the need for starting work ASAP.

Choosing and designing improvement sites

A formal systematic assessment of improvement sites would include considerations of use patterns by monarchs, current canopy conditions and vulnerabilities, and property ownership. Once sites are chosen, a more fine-grained microclimate analysis (using existing hemiphotos and LiDAR) will be the basis of a detailed planting/tree management plan. Some long-term assurances will likely be required, in the form of conservation easements or rigorous management agreements – property ownership may be the largest barrier.



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The candidate sites were identified in the March report. Of the sites considered, the “Toyon Site” on the southern BPUD may have the most favorable property configuration – the northern part of this site is on BPUD property, and the private property (parcel 19303003) to the south is open space and under single ownership. Some monarchs were observed clustering there, and many were flying in the vicinity during site visits. The “Bowl” on the same property also had flying monarchs, but the potential cluster locations are inaccessible because of scrub.

An “environmental subdivision” could be the basis for a conservation easement, but other arrangements could meet the needs for assurances.

Key canopy tree species to be considered are Douglas-fir, Monterey cypress, and Torrey pine, which thrive in Bolinas and have high potential growth rates. Coast live oaks, toyon, and wax myrtle can be incorporated into site designs as middle and understory. Incorporating Douglas-fir into the oak woodland restoration proposed for the BPUD site could eventually create a substitute monarch habitat. *The key element in site improvements is **time** for new trees to grow to heights where they form effective shelterbelts.*

Assessment and Implementation Costs

These assessments and plans should be budgeted into any grant proposals as part of the environmental review and permitting. BEP has initiated the process by supporting the March 2024 report, after the forestry reports and other environmental documents. The actual detailed site assessments and planting plans will be well less than \$50,000; these assessments will leverage previous work on the LiDAR analysis and the arrays of hemiphotos taken in 2023-2024.

Based on the preliminary assessments in the March 2024 report, a few dozen well-placed trees (or even fewer) could ameliorate the site vulnerabilities at the Toyon and Bowl sites. Incorporating Douglas-fir (or other conifers) into native replanting plans for the BPUD grove will be a minor additional cost. Some monitoring of tree growth and monarch occupancy through time, and reporting on progress will be necessary as part of the assurances.

Summary

In summary, the deteriorating BPUD grove at Mesa Rd/Olema-Bolinas Rd. is an urgent hazard, and is unsustainable as monarch habitat, and should be removed as soon as possible. There are opportunities to improve local monarch habitat with strategic planting of new trees. Some assurances of long-term management of one or more monarch sites will likely be part of the permitting. Two nearby sites south of BPUD property have promise, if arrangements can be made. Other sites on the Bolinas Peninsula could be considered, but may be more complicated