

MEMORANDUM

SUBJECT: Butterfly Monitoring Workshop
TRA FILE:
DATE: July 29, 2002
FROM: TRA
TO: San Bruno Mountain HCP Trustees

A public butterfly monitoring workshop was held on April 22, 2002.

Presenters and topics included:

Patrick Kobernus, TRA: Mission Blue, Callippe Silverspot, and San Bruno Elfin Butterflies on SBM

Stuart Weiss, butterfly biologist: Bay Checkerspot Butterfly at Kirby Canyon

Alan Launer, Stanford University Center for Conservation Biology: Bay Checkerspot Butterfly at Jasper Ridge Biological Preserve

Dawn Adams, Point Reyes Nat'l Seashore: Myrtle Silverspot Butterfly

Amy Lambert, GGNRA: Mission Blue Butterfly

Summary

The purpose of the workshop was to share and make publicly available information about butterfly monitoring at several locations in the Bay Area, with attention to any information which could improve or direct endangered butterfly monitoring at SBM.

Each panelist shared current methods used to monitor the respective species of concern, and addressed the unique characteristics of their program (purpose, directing agency, specific butterfly biology, financing and labor supply) which constituted either challenges or advantages in estimating butterfly abundance and distribution.

Ideally, butterfly monitoring at SBM would provide a good indicator of population size and distribution annually, would be powerful enough to correlate changes in populations with changes in habitat or abiotic factors, and would include sufficient good weather days. Realistically, however, the workshop highlighted several unique challenges to monitoring butterflies at San Bruno Mountain: the large size of the mountain, multiple species with overlapping flight seasons but different ecology, limited number of good weather days, limitations in both available person-hours, the limitation of monitoring to the adult life stage for MB and CS, and the need to avoid monitoring methods which impact any individuals of the species. The absolute size of these populations is not practicably knowable given these limitations, and the relative size of the populations from year to year may also not be detectable with current methods. These difficulties are compounded by a limited ability to analyze the existing data and to draw statistically significant conclusions.

Given budget constraints, the 2002-2007 Five Year Plan must propose monitoring methods that approximate the ideal butterfly monitoring situation at SBM as much as possible. Methods will focus on achieving meaningful answers to the distribution of the species, and when possible, the relative abundance.

Notes from Butterfly Monitoring Public Workshop

April 22, 2002

Patrick Kobernus, Thomas Reid Associates, re: Mission Blue, San Bruno Elfin, Bay Checkerspot, and Callippe Silverspot at San Bruno Mountain

- Objectives for monitoring: to assess abundance and distribution of butterfly populations on SBM annually; compare year to year variations; provide data to aid in management decisions; not possible to get precise abundance numbers, try to get index of relative abundance
- Monitoring based loosely on Pollard transect method
- Ideal method – simple, would provide good indicator of population annually; provide good flight season info; changes in butterfly populations correlate with changes in habitat; monitoring is done in good weather, butterflies are easily recognized, and accurately counted
- Reality – problems in identification of MB's, can be hard to tell if individuals are being counted twice (especially you are seeing lots of bugs at once), effects of weather are hard to factor out when assessing population info, terrain is steep, scheduling is difficult (compounded by weather factors)
- 2 types of monitoring – wandering surveys and fixed transects (points for Elfins)
 - Wandering
 - advantage – can check on remote areas
 - disadvantage – not repeatable
 - Fixed Transects
 - advantage – repeatable, time and distance for each transect is standardized
 - disadvantage - limited in area covered, some are too short and don't provide high enough numbers for analysis

Preliminary results

- Callippe silverspot – from wandering surveys, relative population size (sightings per hour) appears higher in drought years; from fixed transects, 2001 higher in sightings/hour than 2000
- Mission Blue – 1998 vs. 1999, population peaked later in 1999 due to cold spring; increase in wind correlated with a decrease in butterfly sightings; having 2 preferred host plants extends season, MBs use *L. albifrons* and *L. formosus* about equally, but *L. formosus* is less widespread; also, MBs use roadcuts and natural slopes about equally
- San Bruno Elfin – standardized larval surveys to include 25 m radius around a point to try to make data comparable year to year

Summary

- combination of methods: wandering, transects, points
- short transects – not enough butterflies to compare year to year with statistical analysis
- possibly considering lengthening transects or maybe switching systems for monitoring (but want to have method that allows for comparison to historical data)
- most important task = PROTECTING HABITAT (and improving it with restoration)

Stuart Weiss, Butterfly Biologist, re: Bay Checkerspot at Kirby Canyon

- Habitat for bay checkerspots = serpentine grassland
 - serpentine rock weathers to nutrient deprived soil
 - plants on serpentine soil include host and nectar plants for bay checkerspot
 - serpentine areas are decreasing with development, but there is still a large area in South San Jose
 - ungrazed serpentine habitat gets rapidly invaded by non-native grasses due to nitrogen deposition from smog

- Monitoring can show rapid, very significant changes in population
- Digital elevation model used to analyze landscape showed that slope and aspect have the greatest impact on butterfly population distribution
- Larvae are used for population index, since larvae bask in the sun and are easy to see
- System of stratified sample – terrain-based strata created according to amount of solar radiation an area could get; subsample within strata (# caterpillars seen in 10 person minutes converted to # caterpillars per square meter), then put info together to get relatively precise mean and standard deviation
- Can use data to consider how larvae are distributed over surface temperature gradient
 - in early years, mostly on cool slopes
 - as population increased, shift to warmer slopes
 - shifts back and forth every few years (fluctuations through time)
 - if enough time for butterflies to feed and go into diapause before plants dry out, then there was high survival
 - between years, there is variability in when butterflies fly and when plants dry out
 - when plants dry out quickly, populations decline
 - this explains why populations shift on slopes, because plants dry out later on north-facing slopes
 - population time series also correlates with weather – early and late season rain, late season temperature – these factors have strong effects on phenology of host plants

Alan Launer, Stanford University Center for Conservation Biology, re: Bay Checkerspot at Jasper Ridge Biological Preserve

Bay checkerspots have been studied at Jasper Ridge since the early 1960's – used as a model system, but problematic as a model because it is an anomaly – many things can be done on this system that can't be done elsewhere

- 1) Jasper Ridge serpentine grassland is a very small system (order of magnitude = tens of acres)
- 2) Close proximity to offices – researchers can be at their field site in 15 minutes, so the effects of weather on successful monitoring days is less of a practical issue; also, lots of cheap labor available from Stanford students
- 3) Much information known about this species from many dissertations, master's theses, and undergrad honors projects
- 4) Can use 2 life stages for monitoring – both adults and larvae are relatively easy to spot and catch; relatively robust, so can be marked and recaptured without significantly impacting population
- 5) Can monitor host plants (owl's clover) to monitor habitat quality in many areas
- 6) Research has been done in an academic context rather than a regulatory/ management context – did not have to be as precise for legal reasons
 - Monitoring can be a huge sink of time and resources
 - Expectations need to be realistic – need to consider whether questions being asked are answerable practically (i.e. without killing animals that are legally protected)
 - Expectations need to be in line with what you can do

Dawn Adams, Point Reyes National Seashore, re: Myrtle Silverspot

- Myrtle silverspot found at 2 locations at Pt. Reyes, one at Estero de San Antonio (private property)
- Historical range included coastal San Mateo County up through Sonoma County
- Stanford has been involved in setting up monitoring program – very little historical data available to use
- Cattle grazing in most of habitat in southern population, tule elk graze in habitat of northern population – will observe different kinds of impact on habitat
- Beginning studies of vegetation density of host plants
- Ice plant and Ammophila (European beach grass) are problem invasives in dune habitats
- Weather is major factor in butterfly monitoring (coastal winds and fog)
- Very early stages of study

Amy Lambert, GGNRA Site Stewardship Program, re: Mission Blue Butterfly Monitoring Program at lands of the Golden Gate National Recreation Area

- Study area for Mission Blues includes Milagra Ridge (at south) to Marin Headlands (at north)
- MB ecology – adults live 6 – 10 days, larvae have symbiotic relationship with native ants
- Monitoring – use Pollard-Yates transects – low impact survey, realistic level of effort involved for public organization – provides relative index, shows trends over time (long timescale)
- Limited by wind (they don't monitor if wind is greater than 10 mph), temperature – shown to correlate with population
- Restoration efforts undertaken at Milagra Ridge to remove pampas grass – soil was scraped and lupines planted, but not are left because outcompeted by coastal scrub - dieback of lupines seen in 1998, after El Niño even – due to rains and a pathogen
- Marin headlands site also has similar problems with invasives and lupine dieback
- Also do off-transect monitoring – important to notice MB use of areas that aren't included in transects

Question and Answer Period

Q: How do fires on SBM affect populations?

A:

- Positive results in test plots – lupines and viola returned after burn
- But fire can also promote certain weeds – Erodium and oxalis came in at burn area
- Early summer fire can drive out Callippes because of lack of nectar plants – timing of burns is crucial
- Vegetation communities change through time – need to find appropriate level of disturbance to maintain habitat
- Monitoring plant community can be more informative than monitoring butterflies

Q: What method will be used for monitoring plants at Pt. Reyes (some are annuals, some perennials)?

A: Probably long transects w/ quadrats for dune plants and point monitoring for Viola; may use certain methods for patchily distributed plants

Q: (From David Wright, USFWS) Has anyone considered methods such as “nearest neighbor”?

Standard methods are mostly developed for more abundant populations.

A: Other methods would be worth trying, but hard to integrate into monitoring program, because of resources (time and money). New data would not be comparable with methods that had been used historically

Q: Methods use by BLM for range management may be applicable – NRCS or BLM may have recommendations for methods that are less academic, more large-scale (i.e. using reference sites for comparison to plant communities)

A: This type of method is being used by Stu Weiss at Kirby – Need to use well stratified sample by soil, slope, aspect – gradients across large landscape – if sample sites are chose carefully, you can make your samples applicable broadly

Q/Comments: (Steve Courtney, Sustainable Ecosystems Institute, did peer review of SBM monitoring methods)

- At SBM, monitoring technique is being done well, but can't detect changes (short-term)
- Tradeoff in monitoring – applying money to monitoring vs. to restoration efforts
- Wandering surveys gives you feel for entire mountain, but short fixed transects don't have high enough numbers for analysis
- What is the point of monitoring if you can't evaluate population changes?

A: Monitoring tells you what is going on (though not statistically) – population crashes are detectable (i.e. bay checkerspot at Edgewood Park), allows you to evaluate quality of habitat, can give you an idea if you are succeeding at protecting the populations

Q: Have you considered doing surveys for MB eggs?

A: Very high impact survey technique – plants and survival of eggs may be affected; also only 1% survival of eggs into adulthood, high level of parasitism