Habitat Restoration for the Quino Checkerspot Butterfly

Scott McMillan, AECOM
Lindsey Cavallaro, AECOM

Southern California Grasslands Symposium
March 22, 2012

Presentation Overview

- Background on Quino checkerspot butterfly (*Euphydryas editha quino*)
- Quino habitat - costal mesa and foothill
- Overview of restoration and enhancement methods
- 3 project case studies and lessons learned
- Ongoing issues and challenges for the future
- Conclusions

- Species distribution (historical and current)
- Listed status
- Life cycle and Ecology

Historical: Los Angeles, San Bernardino, Orange, Riverside and San Diego Counties as well as Baja California.

Current: Possibly as few as a dozen occurrences in Riverside and San Diego Counties and Baja California

- Species distribution (historical and current)
- Listed status
- Life cycle and Ecology

Listed status: Listed as Federally Endangered on January 16, 1997 (62 Federal Register 2313)

- Species distribution (historical and current)
- Listed status
- Life cycle and Ecology

- **Adults normally fly in late February to April**
- **Females mate once then lay approximately 400-800 eggs**
- **Eggs hatch into pre-diapause larvae and molt 2-3 times**
- **Larvae enter diapause until early winter rains**
- **Post diapause larvae mature and then pupate (10 days)**

AECOM

- Species distribution (historical and current)
- Listed status
- Life cycle and Ecology

- **Hilltopping and Mating**
- **Metapopulation Theory**

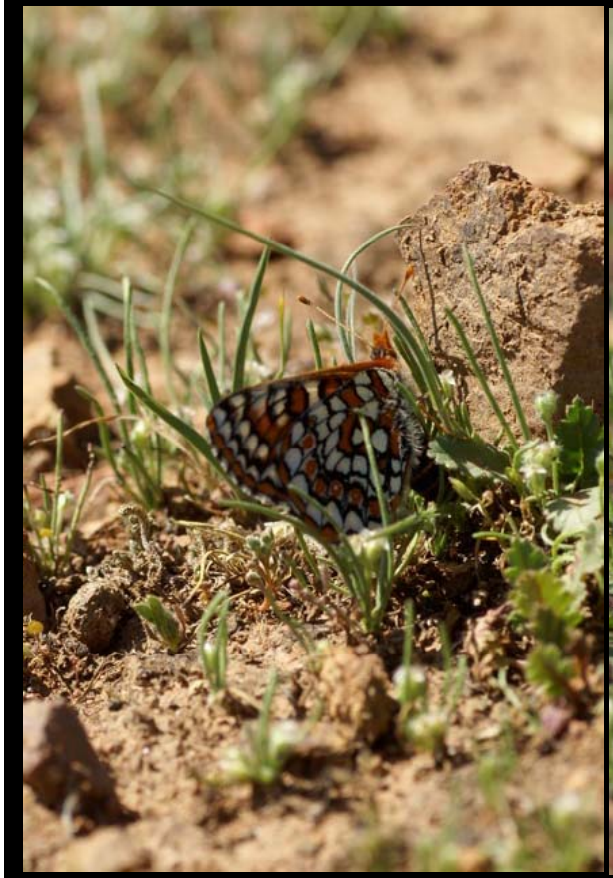
Quino Habitat – Coastal Mesas and Foothills

- Coastal sage scrub, chaparral, native grasslands, and open clay soils

Quino Habitat – Coastal Mesas and Foothills

- Open clay soils often associated with crytobiotic crusts (lichens, mosses, liverworts, blue-green algae, bacteria and fungi)

Quino Habitat – Coastal Mesas and Foothills



- Larval host plants

AECOM

Quino Habitat – Coastal Mesas and Foothills

- *Platago erecta* morphs – Environment or Genetics?

Quino Habitat – Coastal Mesas and Foothills

- Adult nectar sources

Types of Habitat Restoration and/or Enhancement

- Complete restoration and re-establishment
- Enhancement
- Management
- Different methods, results, and costs for each type

Habitat Restoration/Enhancement Methods Overview

- Weed Control
  - Dethatching
  - Herbicide
  - Hand weeding
  - Mowing
- Seeding
  - Collection
  - Preservation of *Plantago* genetics
  - Bulking
  - Seed bank reestablishment/improvement

Habitat Restoration/Enhancement Methods Overview

- Weed Control
  - Dethatching
  - Herbicide
  - Hand weeding
  - Mowing
- Seeding
  - Collection
  - Preservation of *Plantago* genetics
  - Bulking
  - Seed bank reestablishment/improvement

Habitat Restoration/Enhancement Methods Overview

- Weed Control
  - Dethatching
  - Herbicide
  - Hand weeding
  - Mowing
- Seeding
  - Collection
  - Preservation of *Plantago* genetics
  - Bulking
  - Seed bank reestablishment/improvement

Habitat Restoration/Enhancement Methods Overview

- Weed Control
  - Dethatching
  - Herbicide
  - Hand weeding
  - Mowing

- Seeding
  - Collection
  - Preservation of *Plantago* genetics
  - Bulking
  - Seed bank reestablishment/improvement

Project Case Studies

- State Route 125 South Vernal Pool and Quino Habitat Restoration
  - Clients: Caltrans and Southbay Expressway
- Dennery Canyon West Vernal Pool and Quino Habitat Restoration
  - Client: Caltrans
- *TransNet* Vernal Pool and Quino Habitat Restoration and Management Project
  - Client: City of San Diego, in cooperation with SANDAG, County of San Diego, USFWS, CDFG, and California Energy Commission

Project Case Studies

- Restoration and enhancement methods
- Monitoring techniques
- Results
- Lessons learned

SR 125 South Restoration Site
Restoration and Enhancement Methods

Year 1

Year 5

- Dethatching (multiple times)
- Numerous herbicide treatments
- Mowing/hand weeding
- Extensive seeding

SR 125 South Restoration Site
Monitoring Techniques

SR 125 South Restoration Site
Upland Vegetation Cover Results

Cover Type	Year 1 % Cover	Year 5 % Cover*	Year 5 Success Criteria	Criteria Achieved?
Non-Vegetative Cover	31	31	<30	Yes
Total Native Cover	29	64	>60	Yes
Native Shrub Cover	2	15	<30	Yes
Native Herb Cover	27	49	>40	Yes
Total Nonnative Cover	40	8	<5	No

* Average of qualitative and quantitative monitoring

SR 125 South Restoration Site
Lessons Learned

- Requires experienced and highly qualified crews
- Multiple seasons of seeding required for seed bank establishment
- Weed control in upland habitats vs. wetlands
- Conditions of the surrounding landscape

Dennery Canyon West
Restoration and Enhancement Methods

Year 1

Year 2

- Dethatching (1-time)
- Numerous herbicide treatments
- Mowing (very minor)/hand weeding
- Extensive seeding

Dennery Canyon West
Monitoring Techniques

Dennery Canyon West
Year 2 Upland Vegetation Cover Results

Cover Type	Year 2 Success Criteria (%)	Year 2 Results (%)	Criteria Achieved?
Salvage and Transplant Survival	≥70	90.4 [85, 99]	Yes
Container Plant Survival	≥70	90.4 [85, 99]	Yes
Native Cover	n/a	76.8 [61.1, 92.5]	Yes
Nonnative Cover	<15	10.0*	Yes
Perennial Invasive Exotic Species	<1	0	Yes

* Combination of transect and qualitative estimates

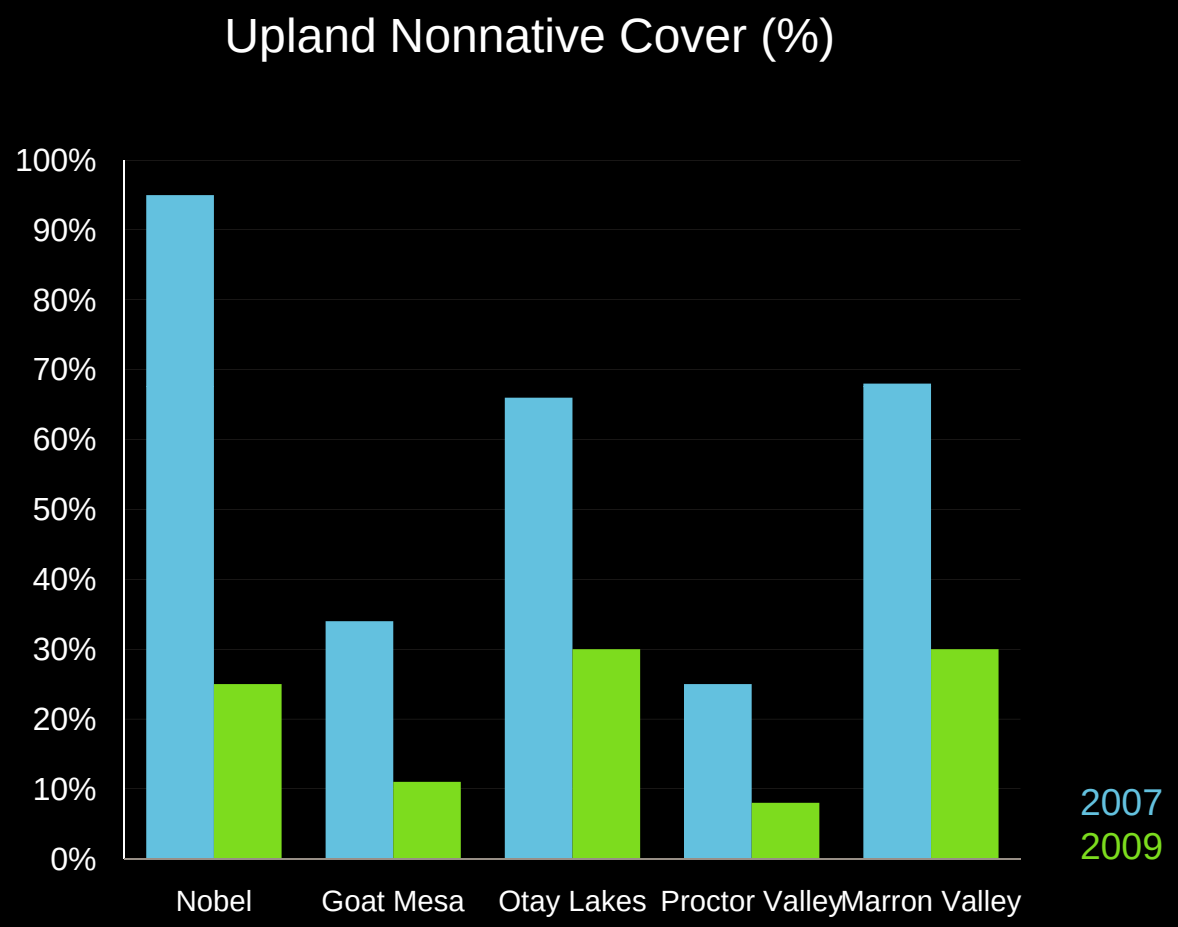
Dennery Canyon West
Lessons Learned

- Requires experienced and highly qualified crews
- Multiple seasons of seeding required for seed bank establishment
- Weed control in upland habitats vs. wetlands
- Conditions of the surrounding landscape
- Control of disturbance tolerant native species

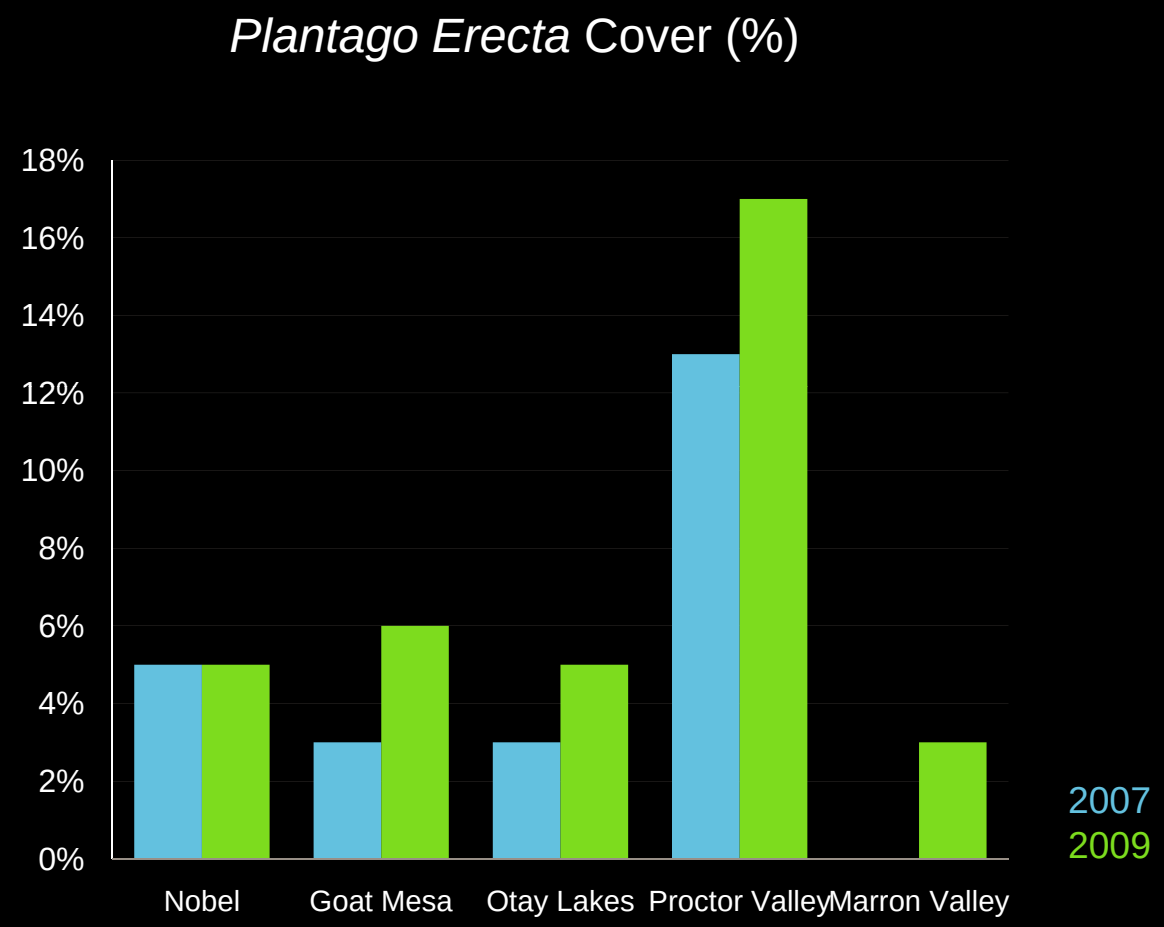
TransNet Vernal Pool and Quino Habitat Restoration
Restoration and Enhancement Methods

- Dethatch
- Low level of herbicide use
- One round of reseeding
- Fencing to prohibit cattle, off-road activity
- Sites adjacent to Quino populations
- Simple cover plots

TransNet Vernal Pool and Quino Habitat Restoration



TransNet Vernal Pool and Quino Habitat Restoration



TransNet Vernal Pool and Quino Habitat Restoration

Lessons Learned

- Dethatching alone is effective
- Low levels of herbicide use is effective
- Weed control of a subset of the weed species is not effective in many situations

General Costs by Category
Weed Control

- Restoration and re-establishment
  - $7,000 per acre per year
- Enhancement
  - $5,500 per acre per year
- Long-term management
  - $500 per acre per year

General Costs by Category
Seeding

- Restoration and re-establishment
  - $2,500 per acre per year
- Enhancement
  - $1,250 per acre per year
- Long-term management
  - Ideally, none
  - Remedial seeding only as needed

Ongoing Issues

- Other methods of management
- Measuring long-term success
- *Plantago erecta* morphology
  - Understanding population dynamics
  - USFWS study
- Reintroduction of Quino larvae to restored sites

Summary and Conclusions

- Restoration of Quino habitat is challenging
- Must have highly qualified crews
- Human goals can be met, but does that satisfy the needs of the butterfly?
- We may be wasting our time without a program for reintroduction of the butterfly
- Some management will always be necessary

Thank You

Scott.McMillan@AECOM.com
Lindsey.Cavallaro@AECOM.com