

Ecological Research of Rare Butterflies Using GIS and GPS



Daniel A. Marschalek
Postdoctoral Researcher
San Diego State University

Ken DeVore
GIS Specialist
California Dept. of Fish & Wildlife

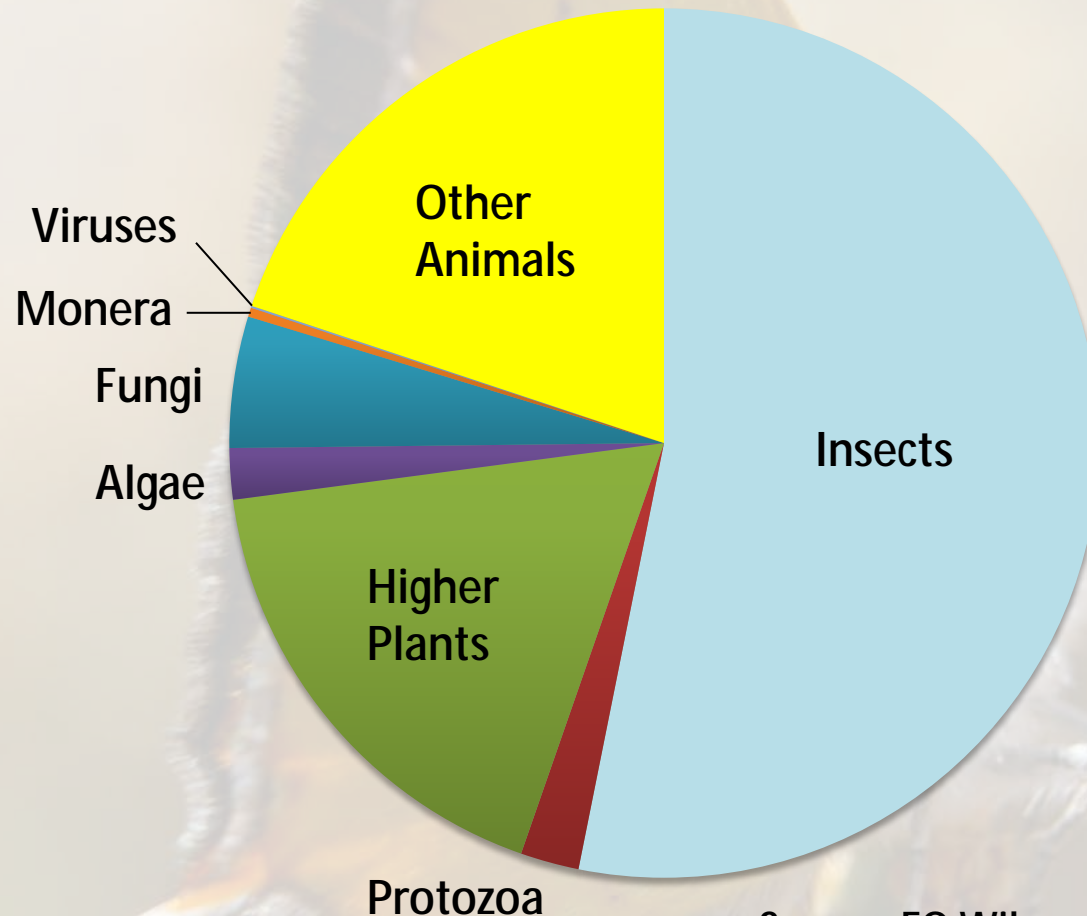
Outline



- **Introduction** Dan
 - Butterfly Conservation
 - Assessing Status of Species
- **Methods** Ken
 - Field Surveys (GPS)
 - GIS
- **Example** Dan
 - Hermes Copper
 - Distribution, Population Size, Behavior

Butterfly Conservation

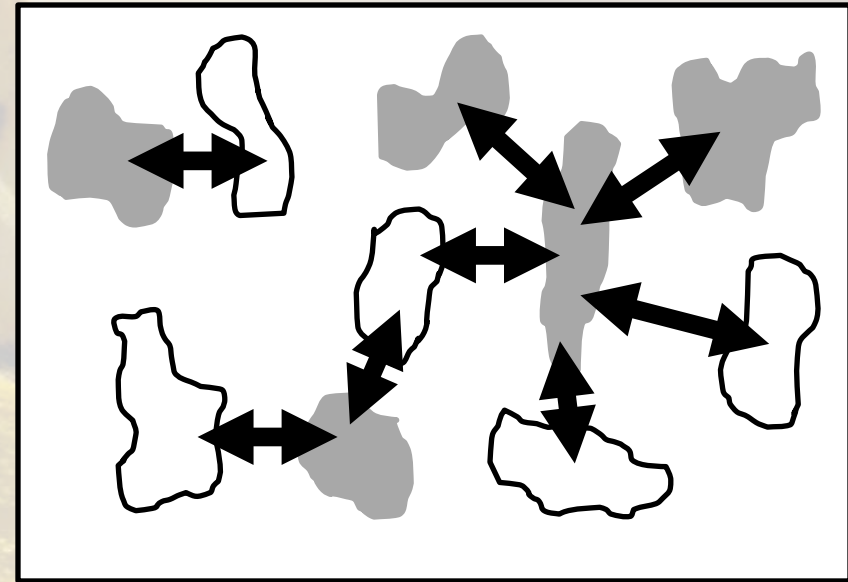
- Insect/Butterfly Diversity



Source: EO Wilson (1992) "The Diversity of Life"

Butterfly Conservation

- Importance of Butterfly Research
 - Population Dynamics
 - Genetics/Evolution
 - Biodiversity Conservation
 - Flagship Species
 - Indicator Species
 - Umbrella Species



Source: UC-Santa Barbara

Southern California Butterflies

- Biodiversity Hotspot
- Endangered Species Act
 - Laguna Mountains Skipper
 - Quino Checkerspot
- Rare Species
 - Thorne's Hairstreak
 - Hermes Copper
 - Harbison's Dun Skipper



Status Assessment

- Distribution
- Population Size
- Behavior (Dispersal)
- Identifying Threats

- Tools: GPS and GIS



Hermes Copper Butterfly



Harbison's Dun Skipper

Hermes Copper

(*Lycaena hermes*)

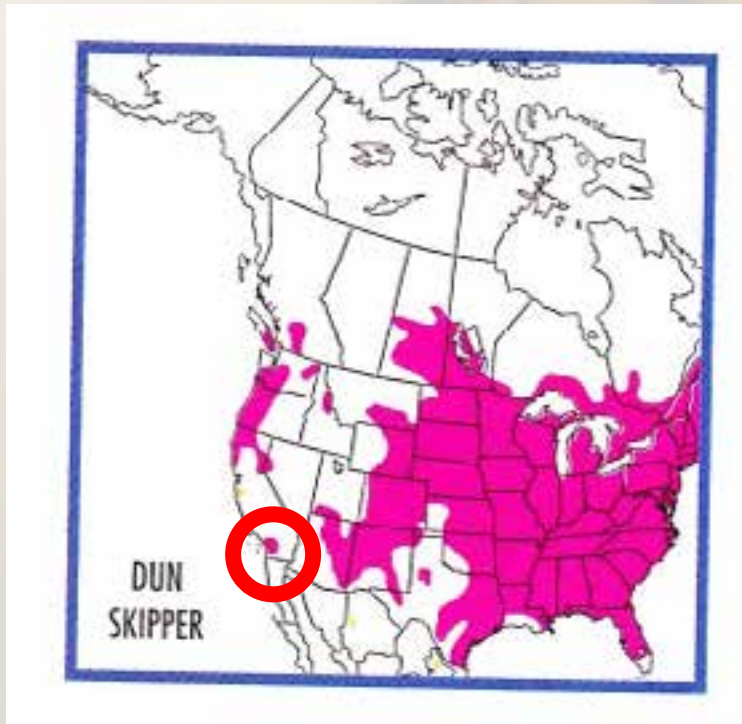
- Specialist Larval Feeder
- Restricted Distribution
- Candidate Species (ESA)



Harbison's Dun Skipper

(*Euphyes vestris harbisoni*)

- Specialist Larval Feeder
- Restricted Distribution



Peterson Field Guides: Western Butterflies

Methods



Data Conversion:

- Hardcopy Paper/GPS
- ArcPad Data Manager (Check in/Check out)

Data Analysis:

- Habitat Identification/Prioritization
- GIS Data/Databases
- National Agriculture Imagery Program (NAIP)/Bing Maps

Data Storage:

- Geodatabase
- Field MapBook with Grid System

Fieldwork Methods and Tools

Positives and Negatives

- Garmin 76 / Hardcopy Data Sheet / Camera
(marking waypoints – field notes w/attributes)
- Trimble Juno 5B /ArcPad 10.1
(collecting points and photo points)

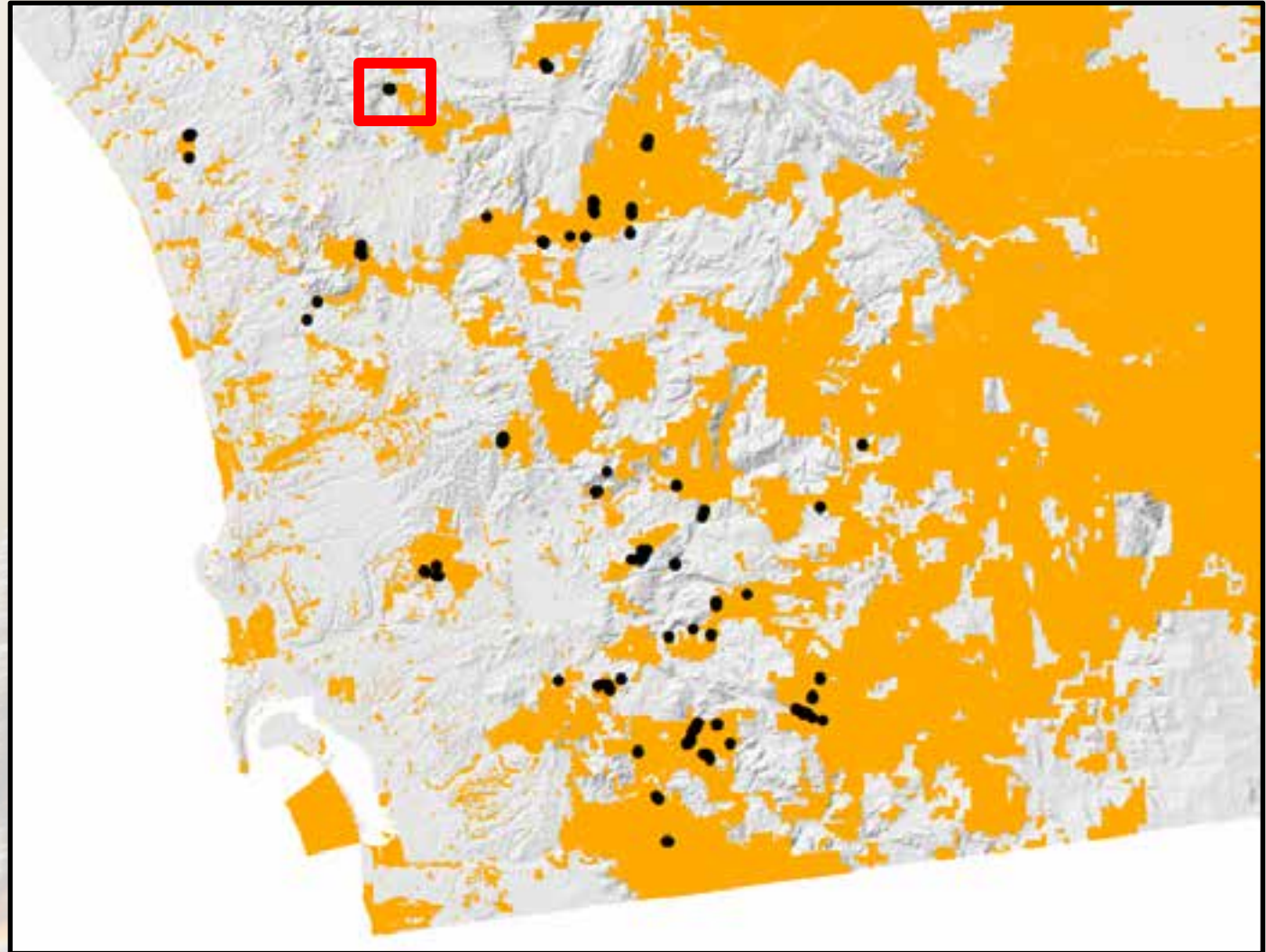


Prioritizing Survey Sites

(e.g. Harbison's Dun Skipper)

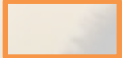


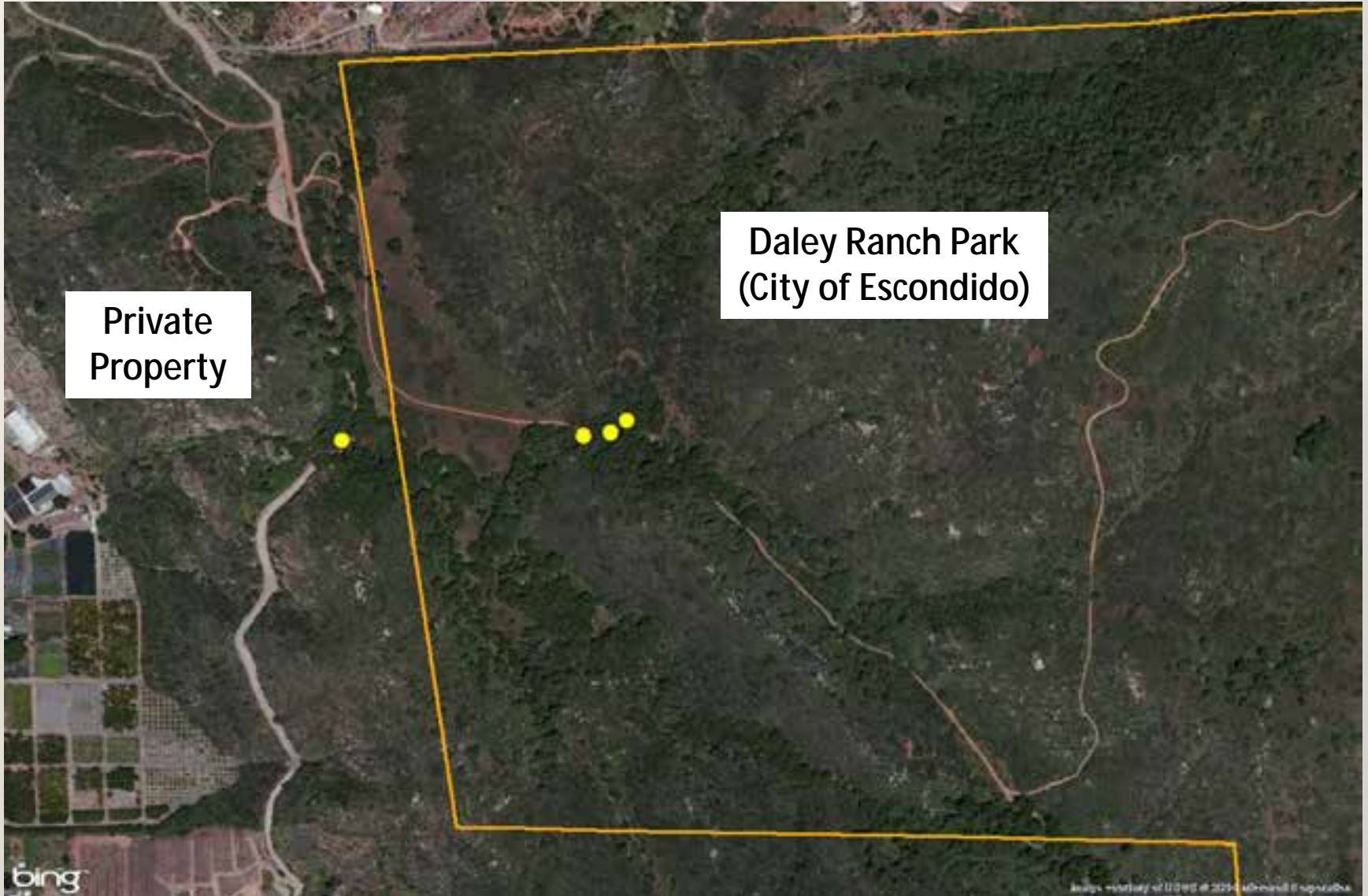
San Diego Sedge
(*Carex spissa*)



Plant location data: San Diego Plant Atlas (SDNHM),
Consortium of California Herbaria

Priority Survey Areas

 Conserved Lands

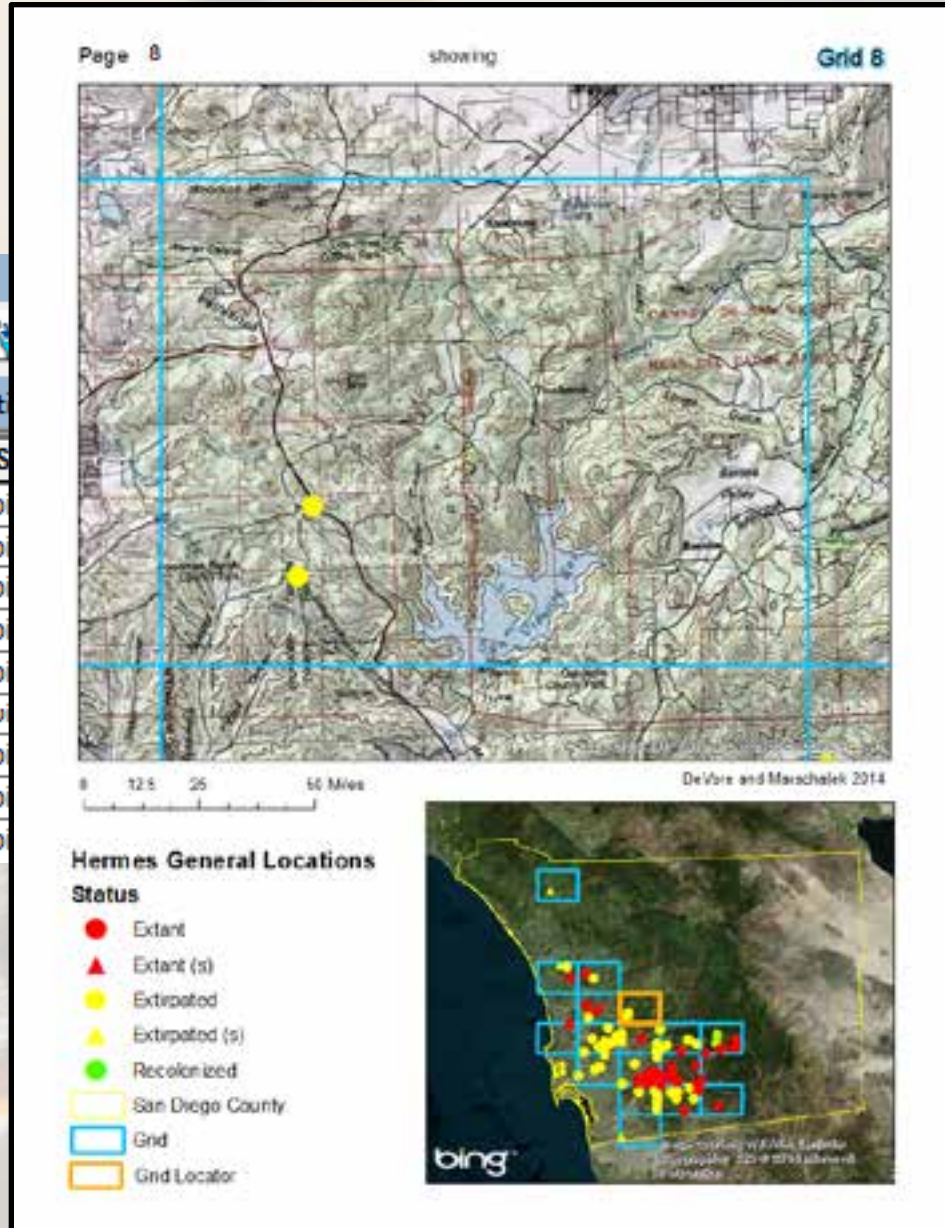


Storage – Geodatabase/Mapbooks

Table

1 Hermes_GeneralLocat

OBJECTID *	S
13	Po
23	Po
66	Po
67	Po
3	Po
77	Pu
76	Po
39	Po
40	Po



Status
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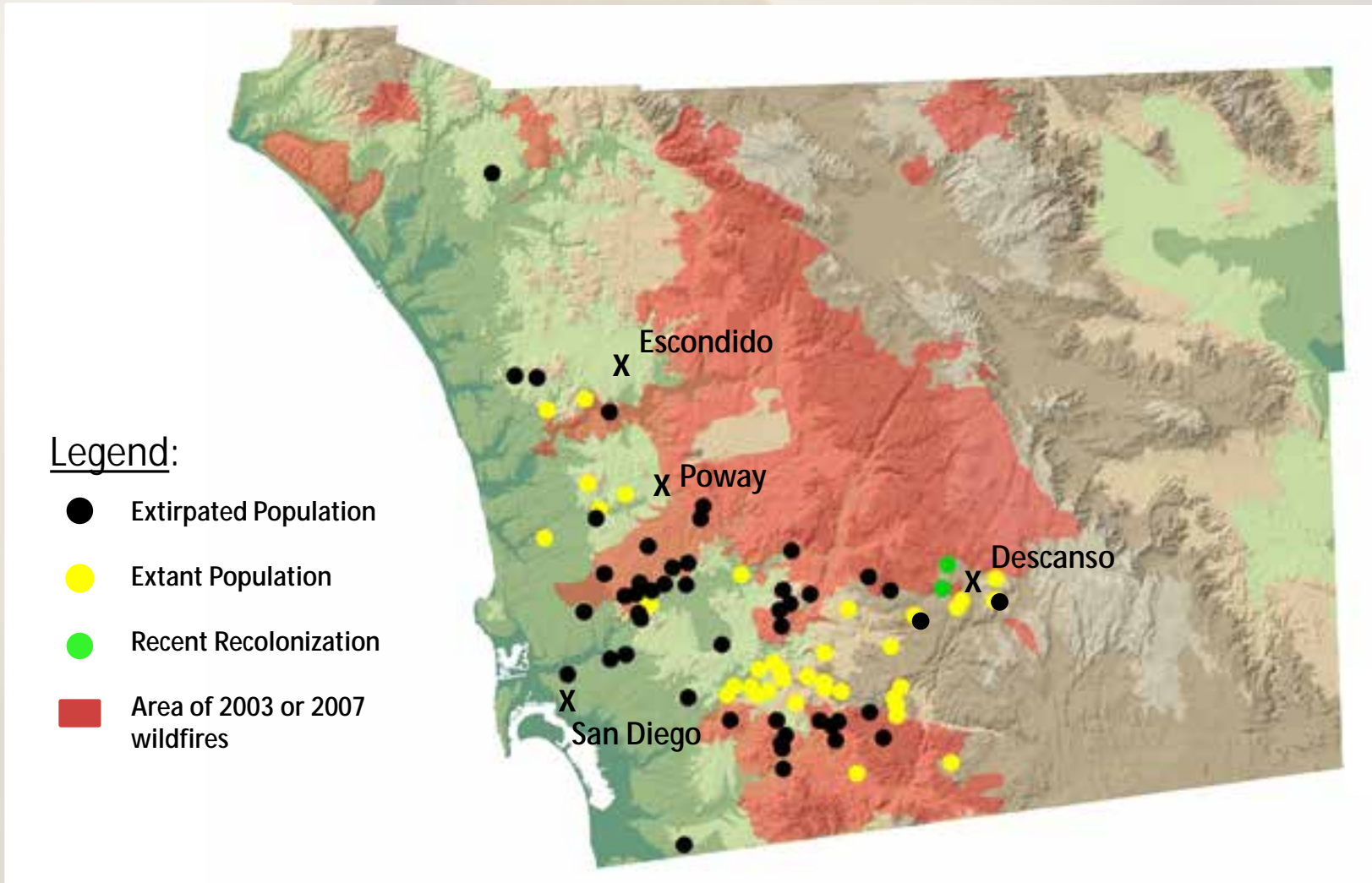
Results/Examples

- Status Assessment
 - Distribution
 - Population Size
 - Behavior (Dispersal)
 - Identifying Threats
- Tools: GPS and GIS
- Example: Hermes Copper



Distribution

- Historic vs. Contemporary



Threats: Habitat Destruction



(Imagery: Google Earth)

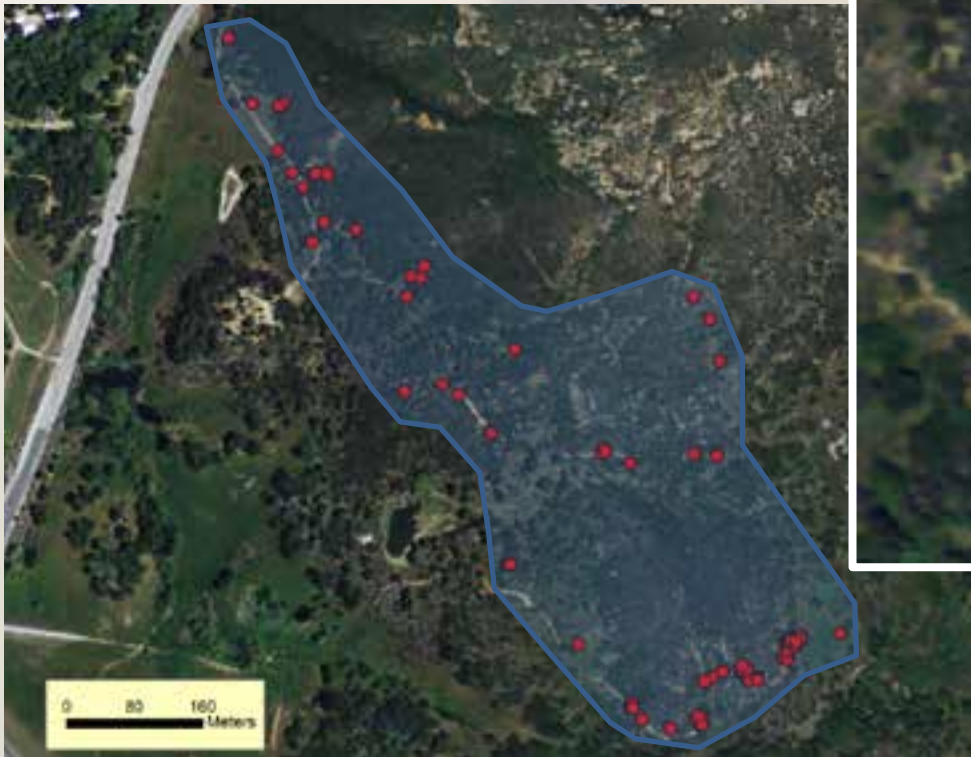
Threats: Wildfire



(Photos: SD Wildfires Education Project)

Population Size

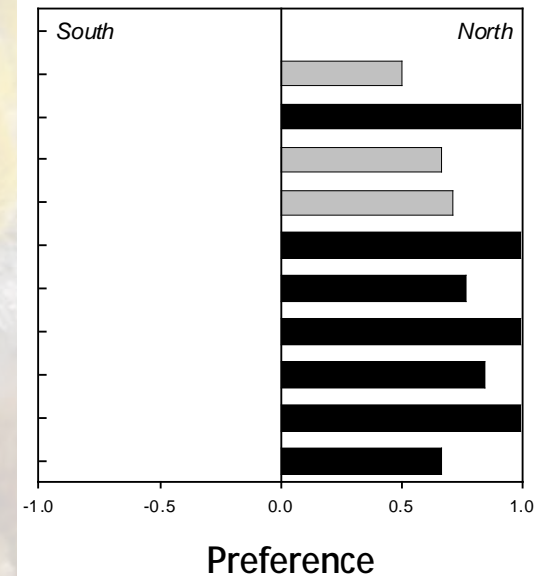
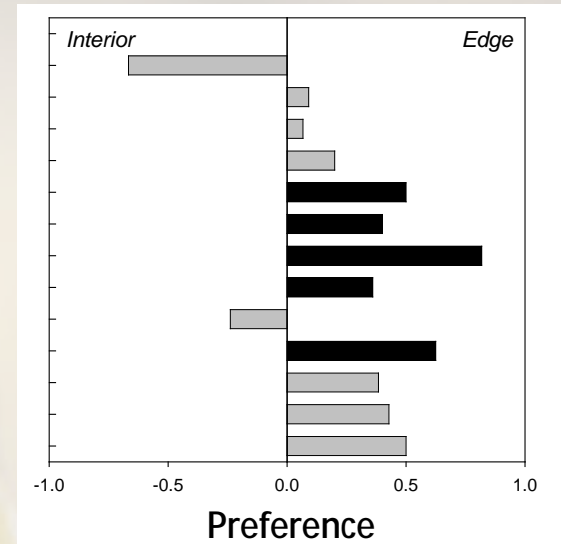
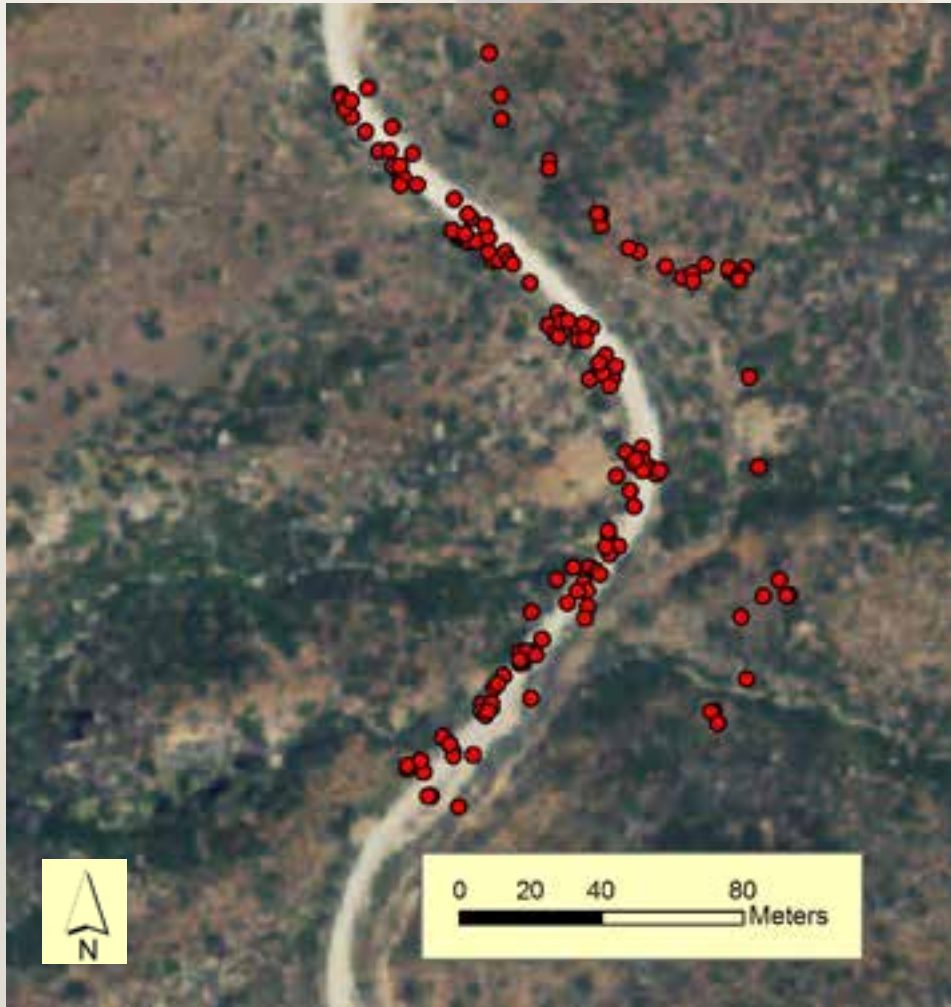
- Area of Occupancy
- Repeatable Transects (Pollard Walks)



	Year 1	Year 2	Year 3
Count	4	9	6

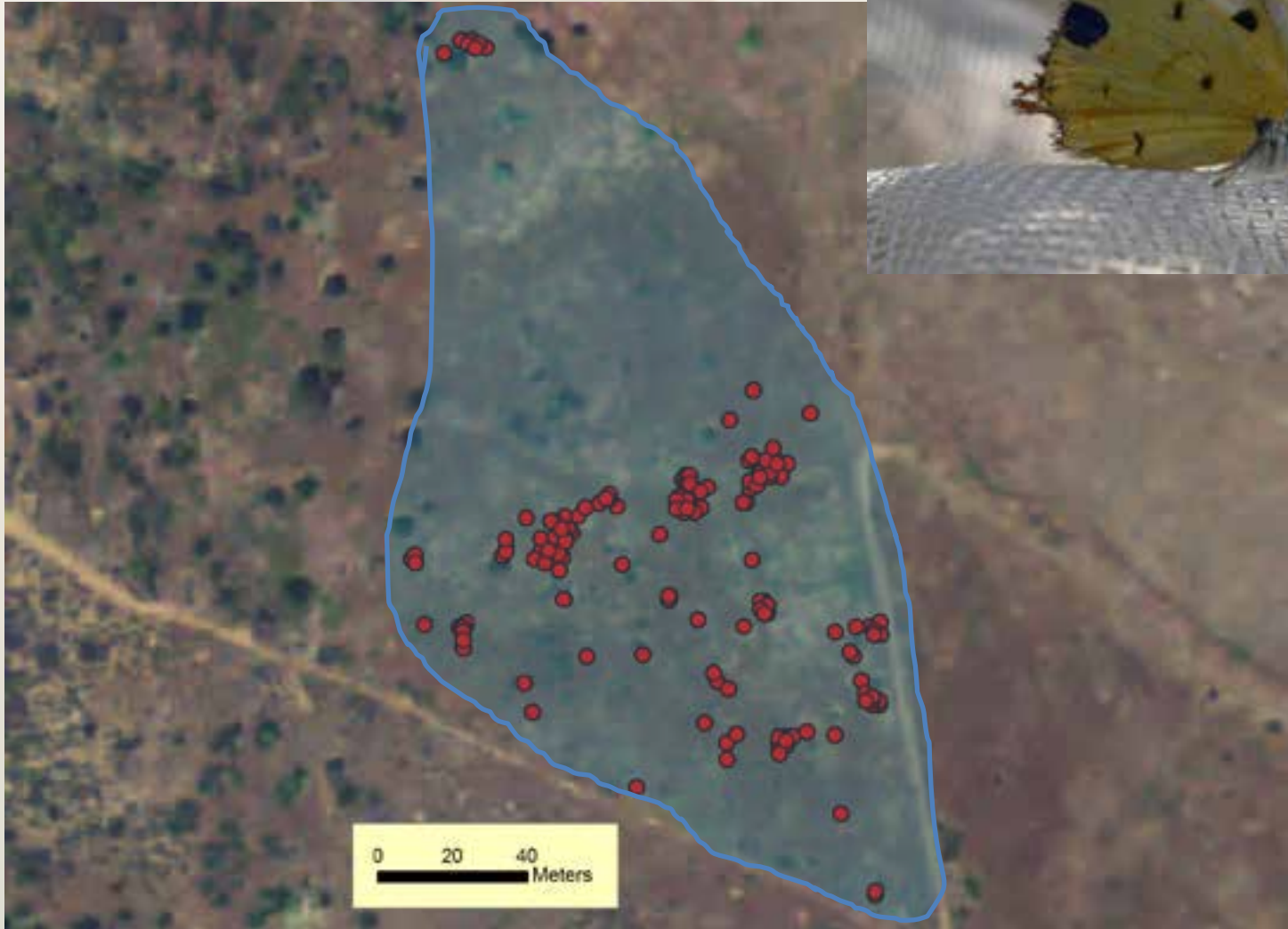
Behavior

- Microhabitat Preferences



Behavior

- Movement/Dispersal



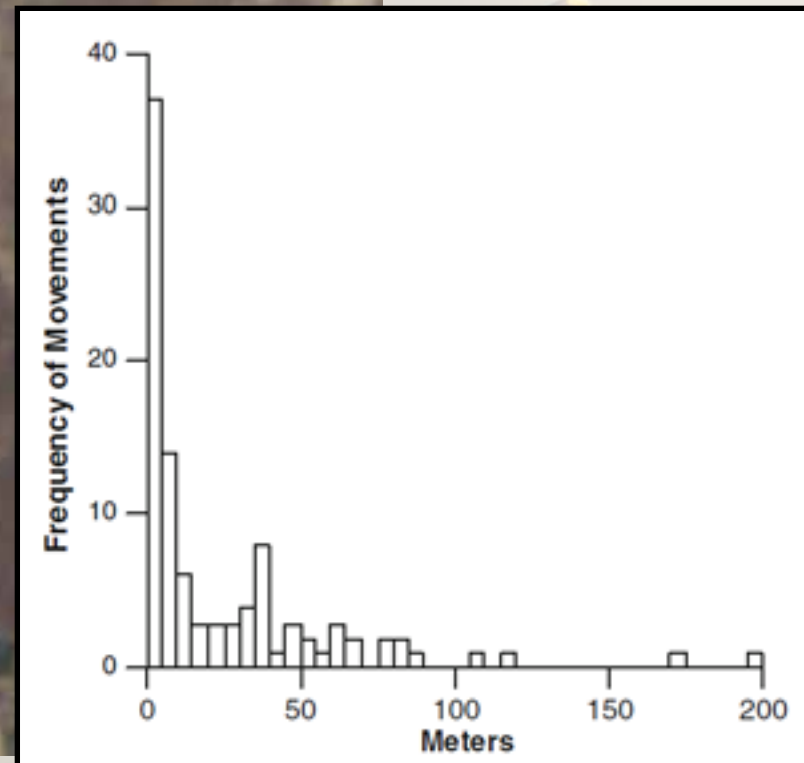
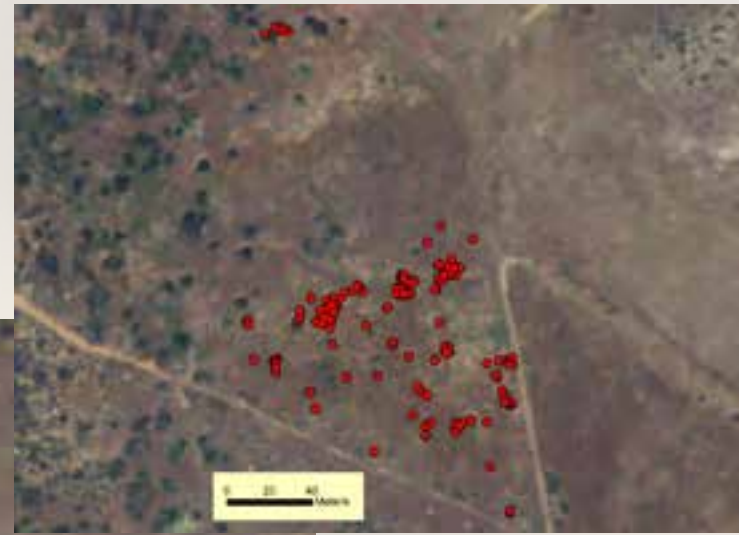
Movement

- Individual #39



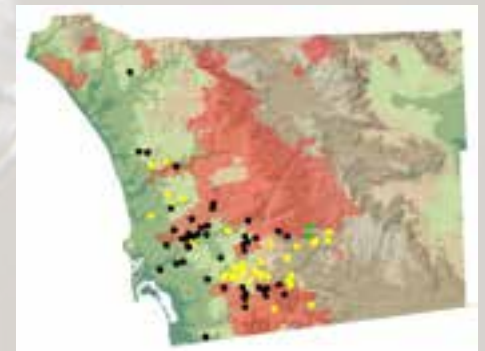
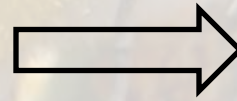
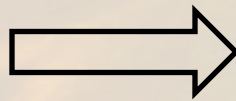
Movement

- Individual #5



GPS and GIS for Butterfly Research

- Simple applications of GPS and GIS very valuable
- Applicable to different species/habitats
- Usefulness not restricted to butterflies



Questions?



- Dan Marschalek
San Diego State University
dmarschalek@mail.sdsu.edu
- Ken DeVore
California Department of Fish and Wildlife
ken.devore@wildlife.ca.gov