Ecological Research of Rare Butterflies Using GIS and GPS

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Outline

• Introduction
  – Butterfly Conservation
  – Assessing Status of Species

• Methods
  – Field Surveys (GPS)
  – GIS

• Example
  – Hermes Copper
  – Distribution, Population Size, Behavior
Butterfly Conservation

• Insect/Butterfly Diversity

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
(Lycaena hermes)

• Specialist Larval Feeder
• Restricted Distribution
• Candidate Species (ESA)
Harbison’s Dun Skipper
(Euphyes vestris harbisoni)

• Specialist Larval Feeder
• Restricted Distribution
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

Private Property

Daley Ranch Park (City of Escondido)
Storage – Geodatabase/Mapbooks

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Hermes General Locations Status

- Extant
- Extant (s)
- Extirpated
- Extirpated (s)
- Recolonized

San Diego County

Grid

Grid Locator

DeVore and Marachek 2014

DeVore and Marachek 2014

San Diego County

Grid

Grid Locator
Results/Examples

• Status Assessment
  – Distribution
  – Population Size
  – Behavior (Dispersal)
  – Identifying Threats

• Tools: GPS and GIS

• Example: Hermes Copper
Distribution

- Historic vs. Contemporary

Legend:
- • Extirpated Population
- Yellow Extant Population
- Green Recent Recolonization
- Red Area of 2003 or 2007 wildfires

Locations:
- San Diego
- Poway
- Escondido
- Descanso
- San Diego
Threats: Habitat Destruction

(Imagery: Google Earth)
Threats: Wildfire

(Photos: SD Wildfires Education Project)
Population Size

- Area of Occupancy
- Repeatable Transects (Pollard Walks)

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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?

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