Department of Toxic Substances Control

Ecological Risk Assessment Scoping Assessment

J. Michael Eichelberger

J. Michael Eichelberger Ph.D.
Staff Toxicologist
DTSC/HERD
8800 Cal Center Drive
Sacramento, CA 95826
(916) 255-6688
JEichelb @ dtsc.ca.gov

Scoping Ecological Assessment

- When is it required?
  - DTSC-specific examples
    - Hazardous waste site or permitting assessment before, during, and/or after removal action, remedy selection, remedial action, or corrective action
    - Support of declarations of imminent and substantial endangerment
    - Use as evidence in enforcement actions
    - Assess risk to biota whenever the Department

      Requires corrective action pursuant Health and Safety Code 25187 or 25200.10

Scoping Ecological Assessment

- Level of Effort?
  - Depending on the site and its habitat value:
    - One paragraph
    - Detailed site investigation and report

Risk is Possible When:

1. Chemicals of Potential Ecological Concern (COPECs) are present
2. Receptors are present; and
3. They Come in Contact

A Scoping Assessment Makes this Determination

Components of Scoping Assessment

1. Site Physical and Chemical Characterization
2. Biological Characterization
3. Pathway Assessment
4. Scoping Results and Decision Criteria

1. Site Physical and Chemical Characterization

- Location and property lines
- Land use, current and past
- Topography including drainages
- Surrounding land use
- Adjacent areas of significant environmental value
- Identify COPECs

Site Physical Characterization

Site Chemical Characterization

- Site History
  - What was the site used for?
  - What chemicals were used?
  - What were the waste products?
- Organic COPECs
- Inorganic Background
  - Selection of Inorganic COPECs (DTSC 1997)

Site Chemical Characterization

Potential Media for Chemical Analysis

- Surface Soils
- Surface Water
- Sediment
- Groundwater

Summarize Data, COPECs

- Chemical name
- Media
- Site Records
- Number of detects
- Reporting limits
- Minimum
- Maximum
- Mean
- Standard Deviation
- 95^{th} UCL
- Extent

2. Biological Characterization

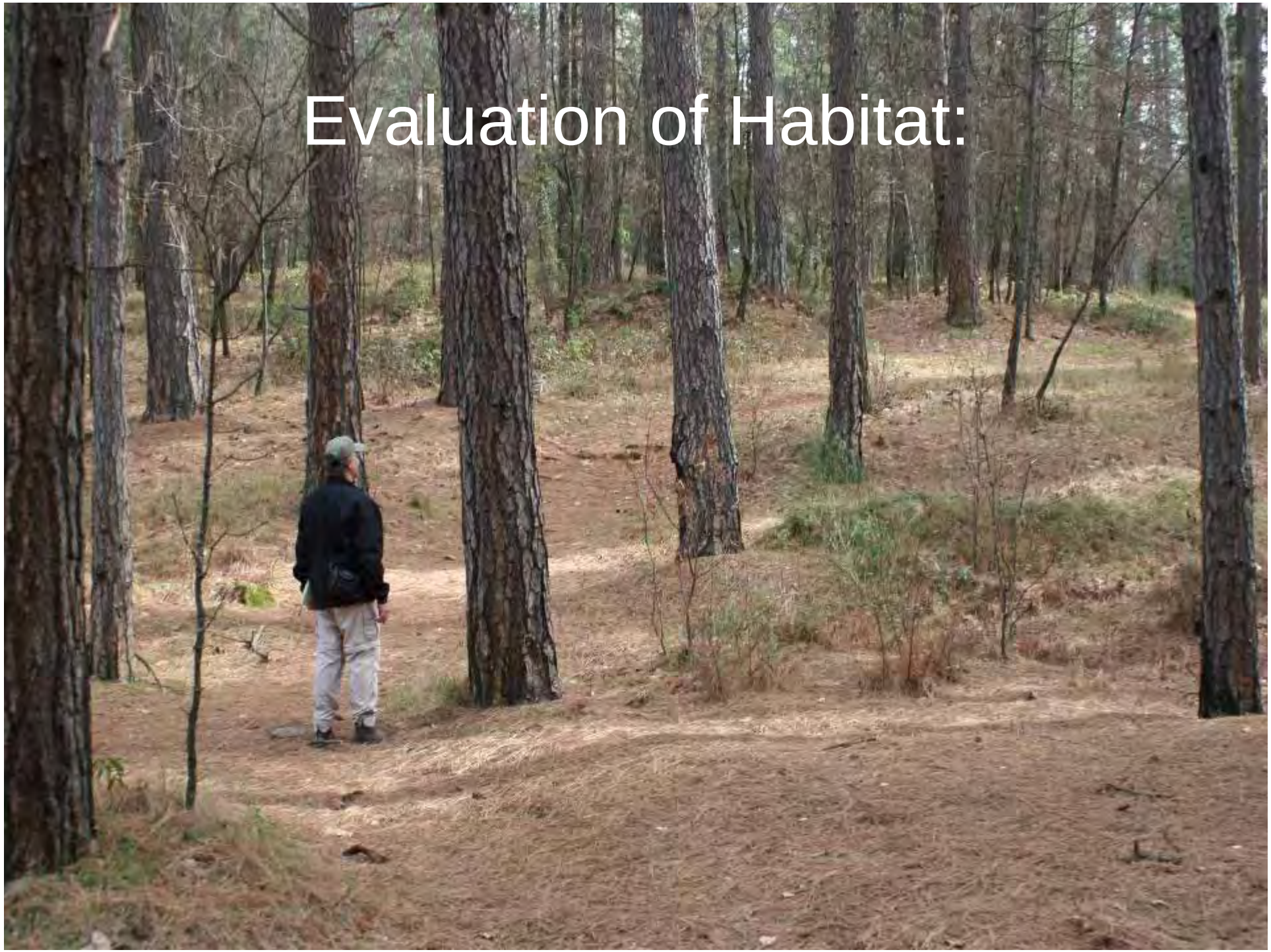
- Identification of each distinct habitat
  - Habitat types
    - Terrestrial versus wetland
    - Special status species
- Species identification
    - Potential receptors in various habitats

Biological Characterization (Cont.)

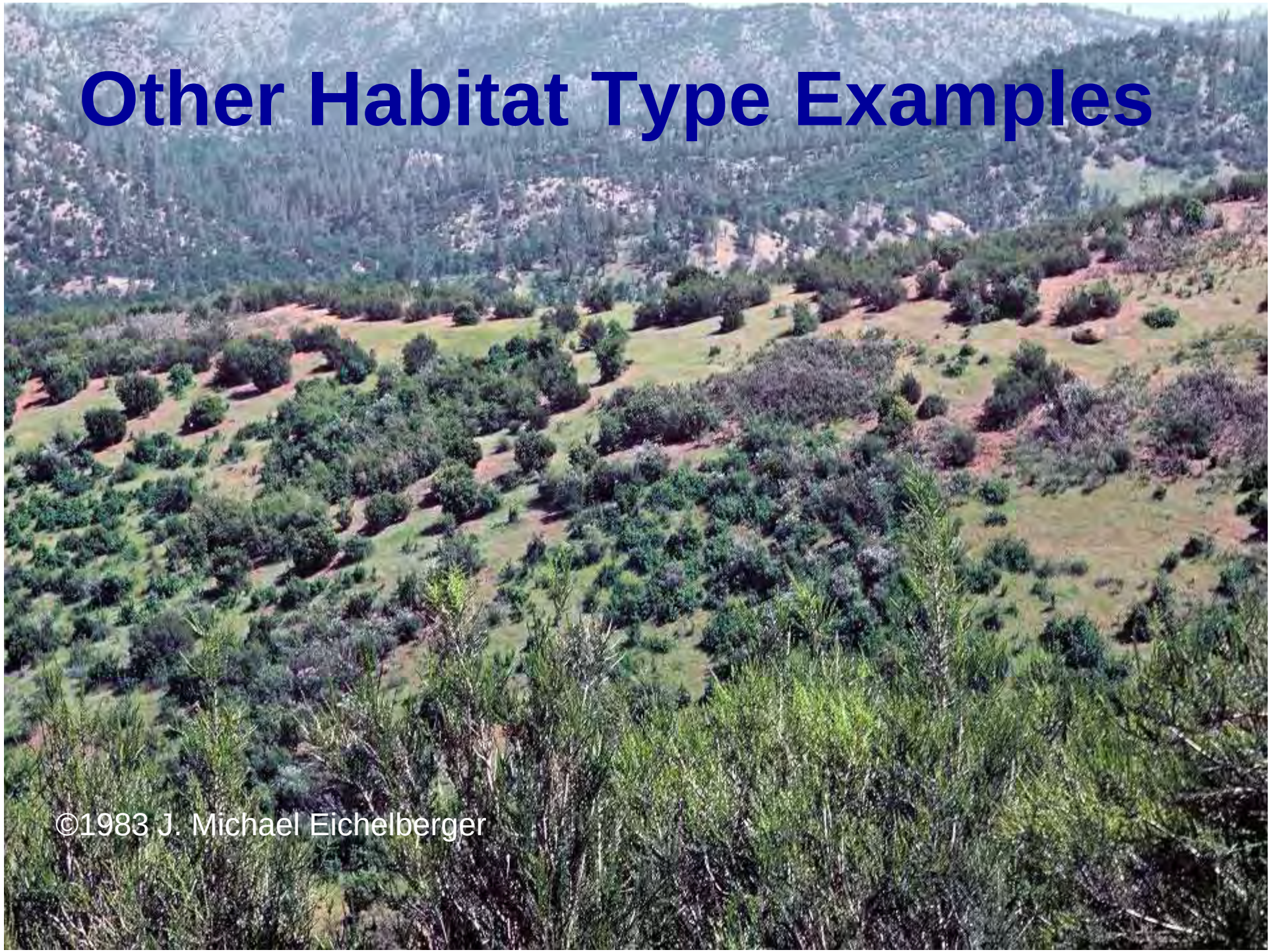
- Perform Site Habitat Surveys
  - Based on the physical characterization results, surveys should be conducted during the optimum time to observe and identify species
- Identification of special status species and their habitats
  - CDFG Database Review versus Protocol Survey

May require surveys during multiple seasons
During the appropriate time of the year to identify presence or absence.

Evaluation of Habitat:



Other Habitat Type Examples



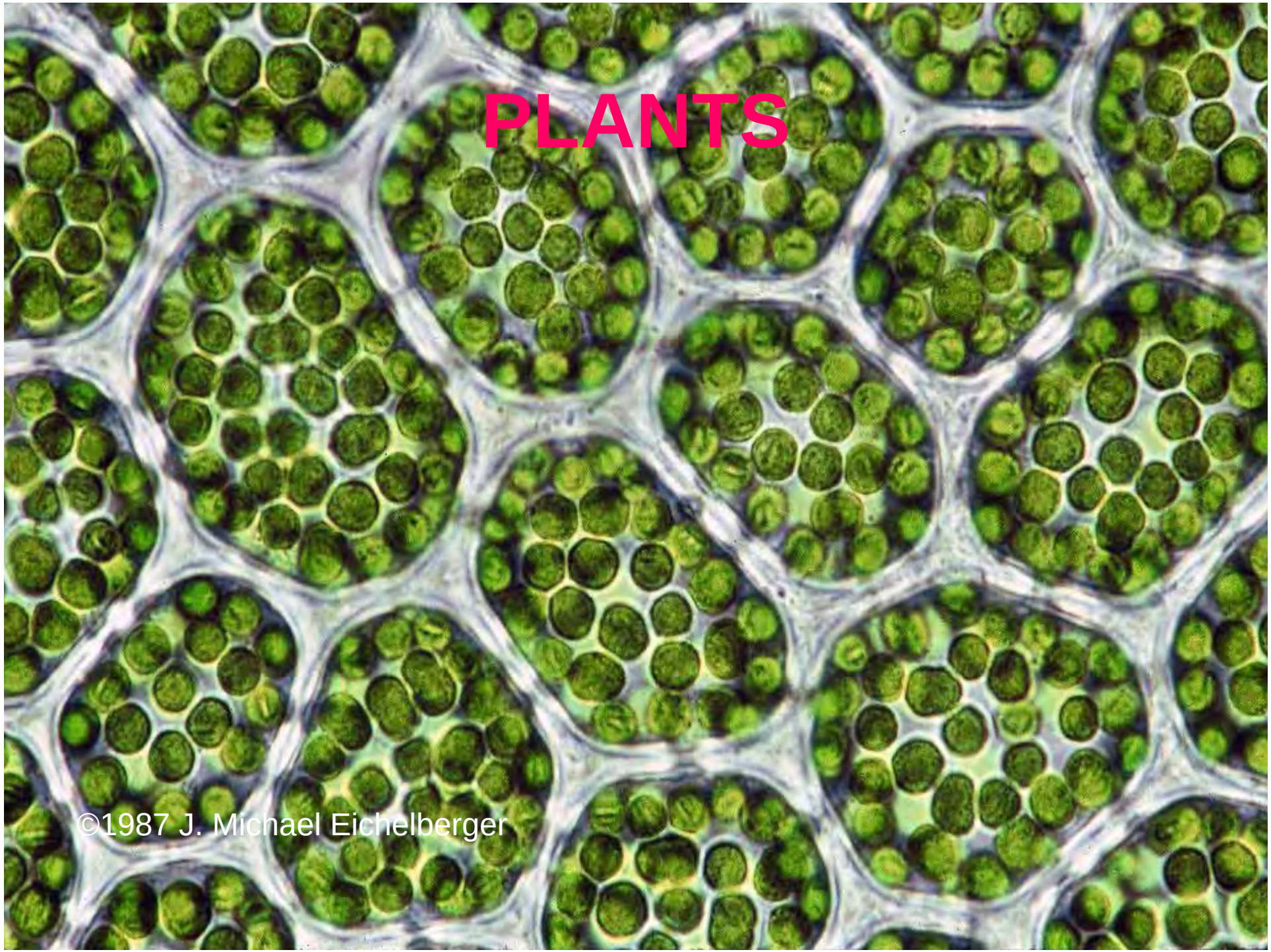
Wetlands and Streams

Sensitive Habitat

Special Status Species

Potential Receptors

- Terrestrial Plants
- Aquatic Plants
- Terrestrial Invertebrates
- Freshwater Invertebrates
- Fish
- Amphibians
- Reptiles
- Birds
- Mammals


PLANTS
©1987 J. Michael Eichelberger

Terrestrial Plants

Primary producers

Aquatic Plants & Invertebrates

Terrestrial Invertebrates

Detritivores, Primary and Secondary Consumers


©2007 Michael Martin

Amphibians

Secondary Consumer

Salamanders and Frogs


Snakes, Lizards and Turtles
Reptiles
Primary, Secondary
& Tertiary Consumers
»Evaluate Qualitatively
© J. Michael Eichelberger 1999


Primary Consumer
Herbivorous Birds
© Joyce Gross

Invertivorous Birds

Secondary Consumer

Select those species that preferentially forage
On the ground

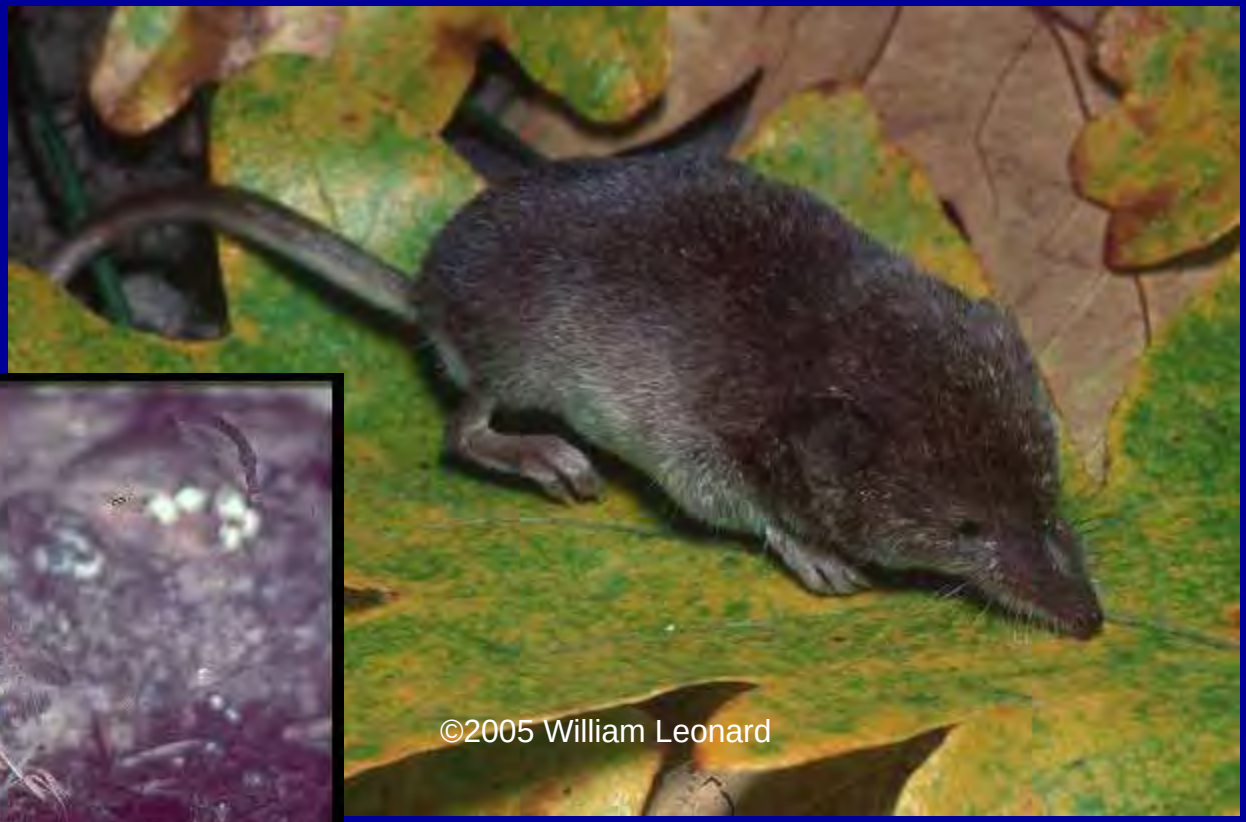

Carnivorous Birds
Tertiary Consumer
©2004 George W. Hartwell

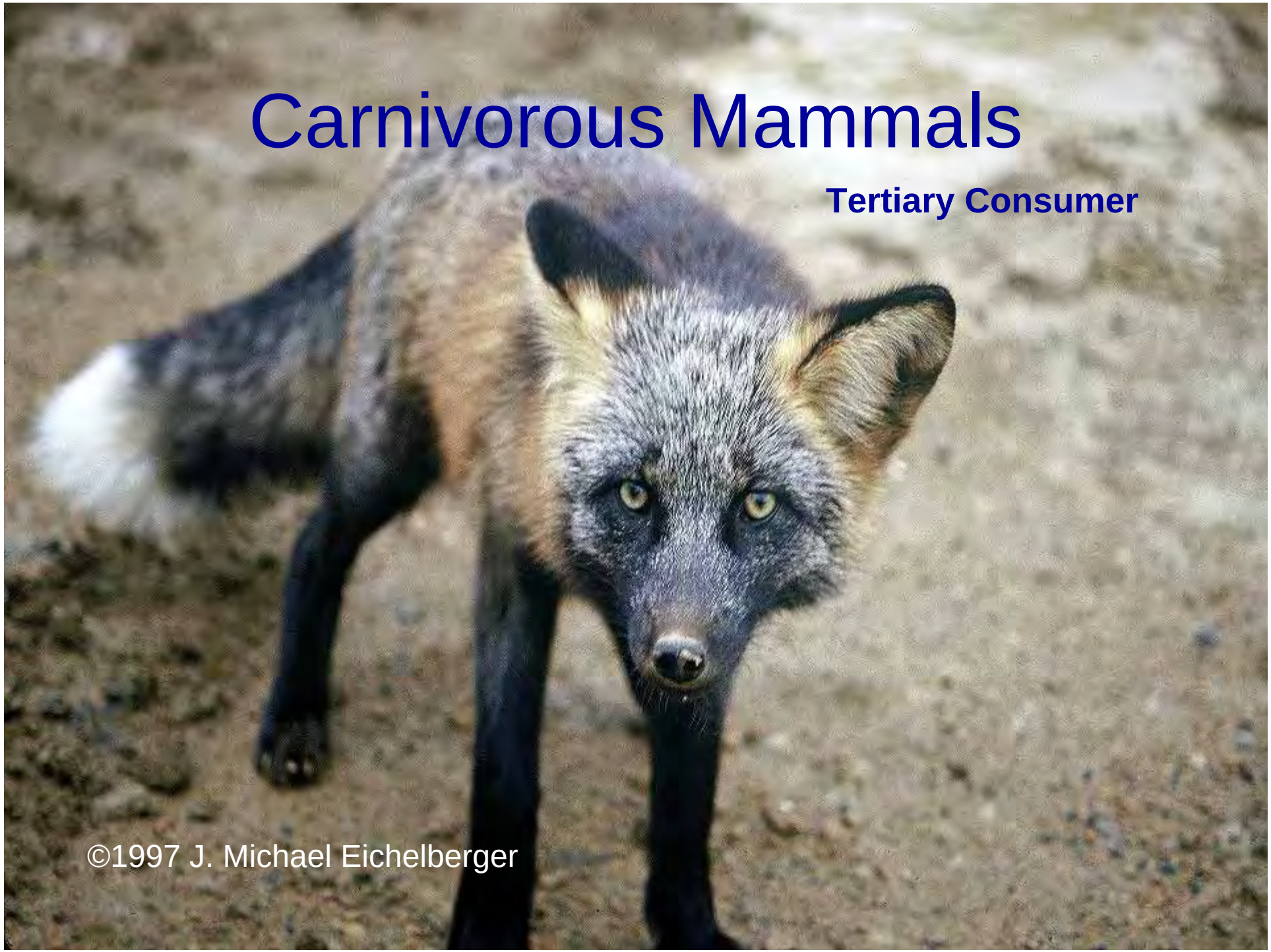
Herbivorous Mammals

Primary Consumer

Invertivorous Mammals

Secondary Consumer




Carnivorous Mammals
Tertiary Consumer
©1997 J. Michael Eichelberger

3. Pathway Assessment

A complete ecological exposure pathway includes:

- A potential release to the environment
- A transport mechanism to the receptors of concern
- A point of contact exists for the contaminant and potential receptors
- An exposure route (e.g., ingestion, inhalation) at the point of contact

Potential Exposure Pathways

1) Direct Contact
    a) Soil/Sediment
    b) Surface Water
    c) Air
2) Indirect Contact
    a) Food

Soil

DTSC Guidance:

Evaluate to at least 6 ft. below ground surface (see HERD Note 1).

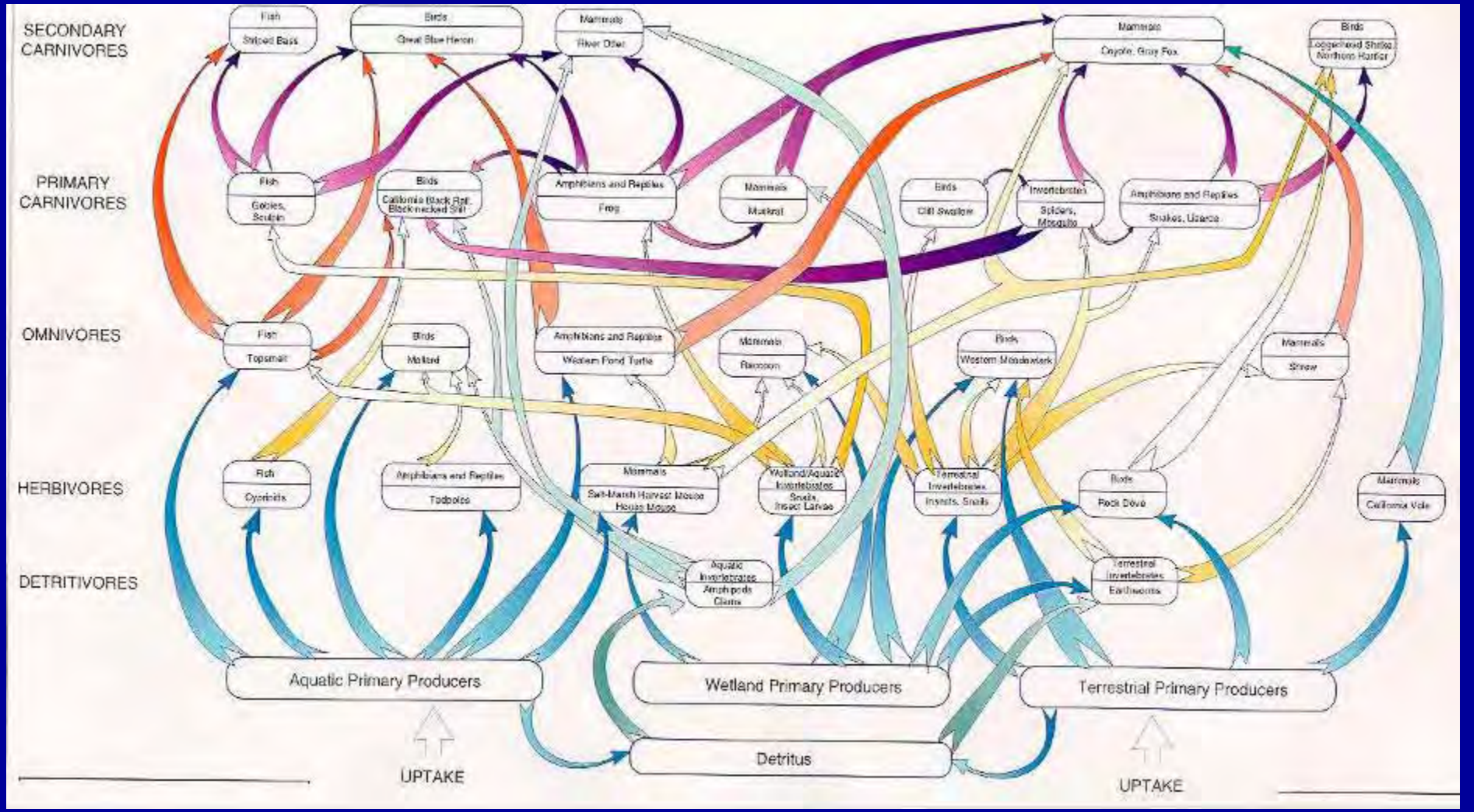

©2005 Gloria Marie


©2000 J. Michael Eichelberger


©1998 J. Michael Eichelberger


©1987 J. Michael Eichelberger

FOOD WEB PATHWAYS



Barn Owl: Feeding on rodents

Ringneck snake:
Feeding on prey associated with the scat
From the nest.


©2006 Gloria.Marie

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL
July 4, 1996

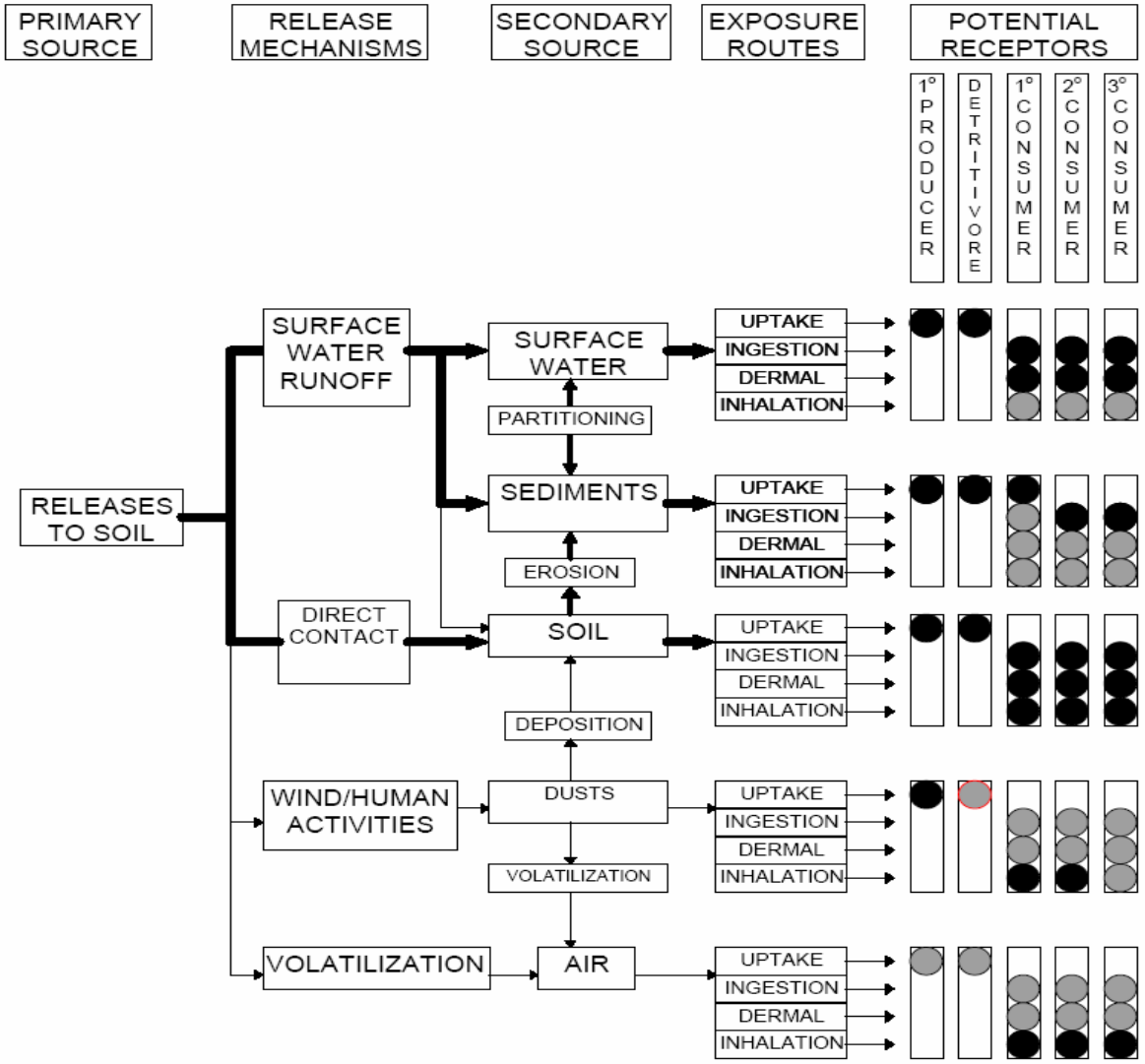


FIGURE 1. EXPOSURE PATHWAY ANALYSIS
● = POTENTIALLY COMPLETE EXPOSURE PATHWAY
● = POSSIBLY COMPLETE EXPOSURE PATHWAYS (INSUFFICIENT DATA)
CLEAR = INCOMPLETE EXPOSURE PATHWAY

4. Scoping Results and Decision Criteria

Two Possible Outcomes of Scoping Assessment

- **Chemicals and Receptors Do not Come in Contact;**
  - **If this is the conclusion of the Scoping Assessment, there is no further investigation**

- **Chemicals and Receptors Do Come in Contact;**
  - **Prepare a Phase I Work Plan and proceed to a Predictive Ecological Risk Assessment**

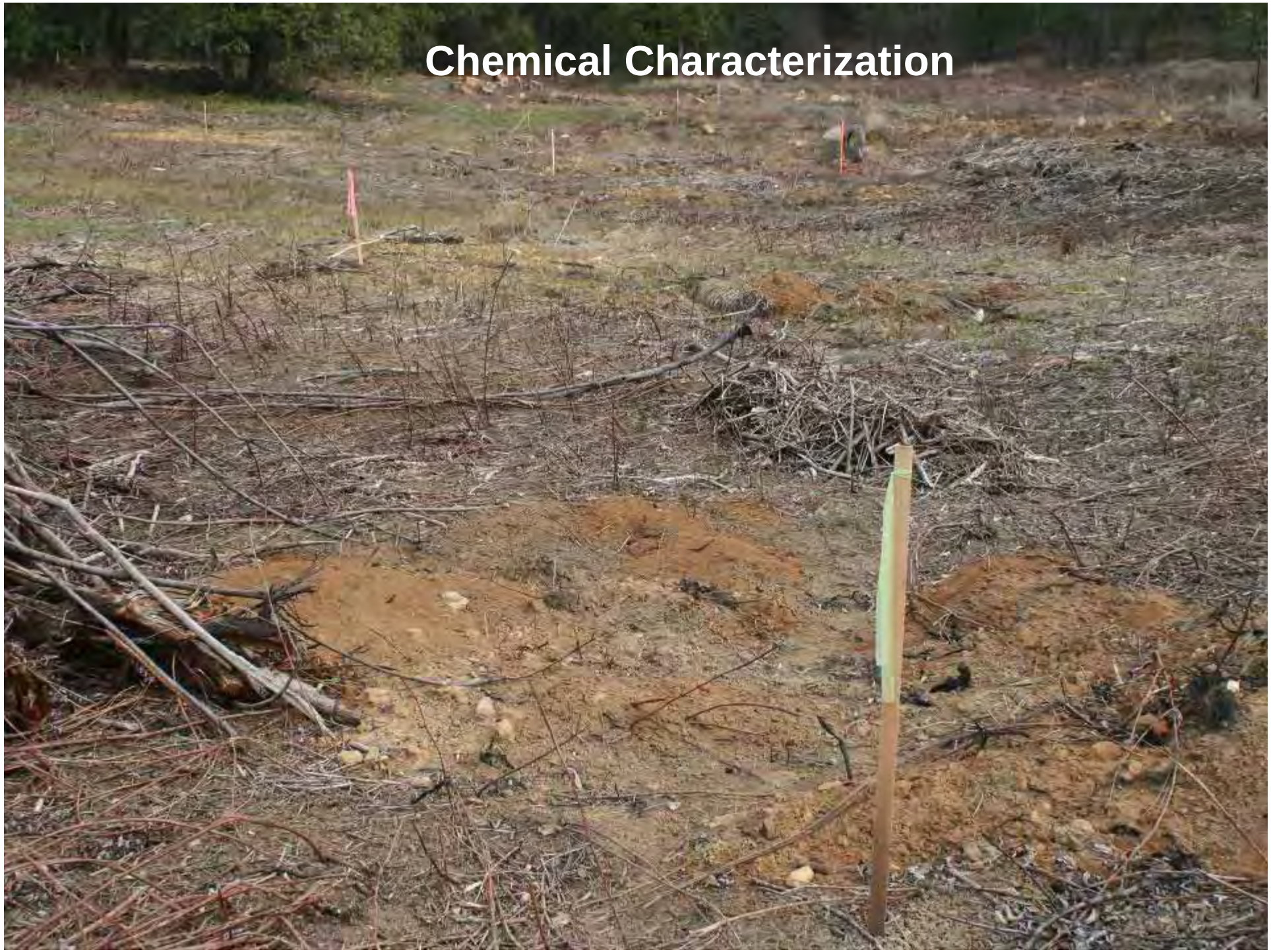
Report

- Condense the results of the investigation.
- Present the report in sections according to the steps outlined in the Scoping Assessment Guidance.
- Include maps, figures and tables.
- Summarize the findings of the scoping assessment.


MINE SITE EXAMPLE
Statewide
165,000 Mine Features
47,000 abandoned Mines

Physical Characterization

Chemical Characterization



Biological Characterization

Pathway Assessment

Future Land Use Considerations

- If future land is not going to include habitat, and special status species are not present, the project need not proceed to a PERA and the project can exit the risk assessment process.
- However, if the project will not proceed directly to development and the project will provide habitat in the interim, then at a minimum, risk to birds and mammals should be evaluated (i.e., attractive nuisance assessment).

DTSC Guidance for Scoping Assessments

- Guidance for Ecological Risk Assessment at Hazardous Waste Sites and permitted Facilities (1996)
  - Part A: Overview
  - Part B: Scoping
- Selecting Inorganic Constituents as Chemicals of Potential Concern at Risk Assessments at Hazardous Waste Sites and Permitted Facilities (1997)