



Ecological Risk Assessment in Florida

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What is Ecological Risk Assessment?

A process that evaluates the likelihood that adverse ecological effects may occur as a result of exposure to a stressor.

- **A well-executed
Ecological Risk Assessment is:**

Holistic

Planned

Focused

Flexible



Ecological Risk Assessment is NOT:

- ❖ Cost-benefit analysis
- ❖ Justification for already-planned activities
- ❖ Unfocused data collection.



Overview - ERA in Florida

- Primarily Follows Eight Step EPA Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments 1994.
- Supplementary Regional guidance provided in Region 4 ECO Update bulletins.
- Some screening guidelines developed specifically for Florida such as the sediment guidelines.

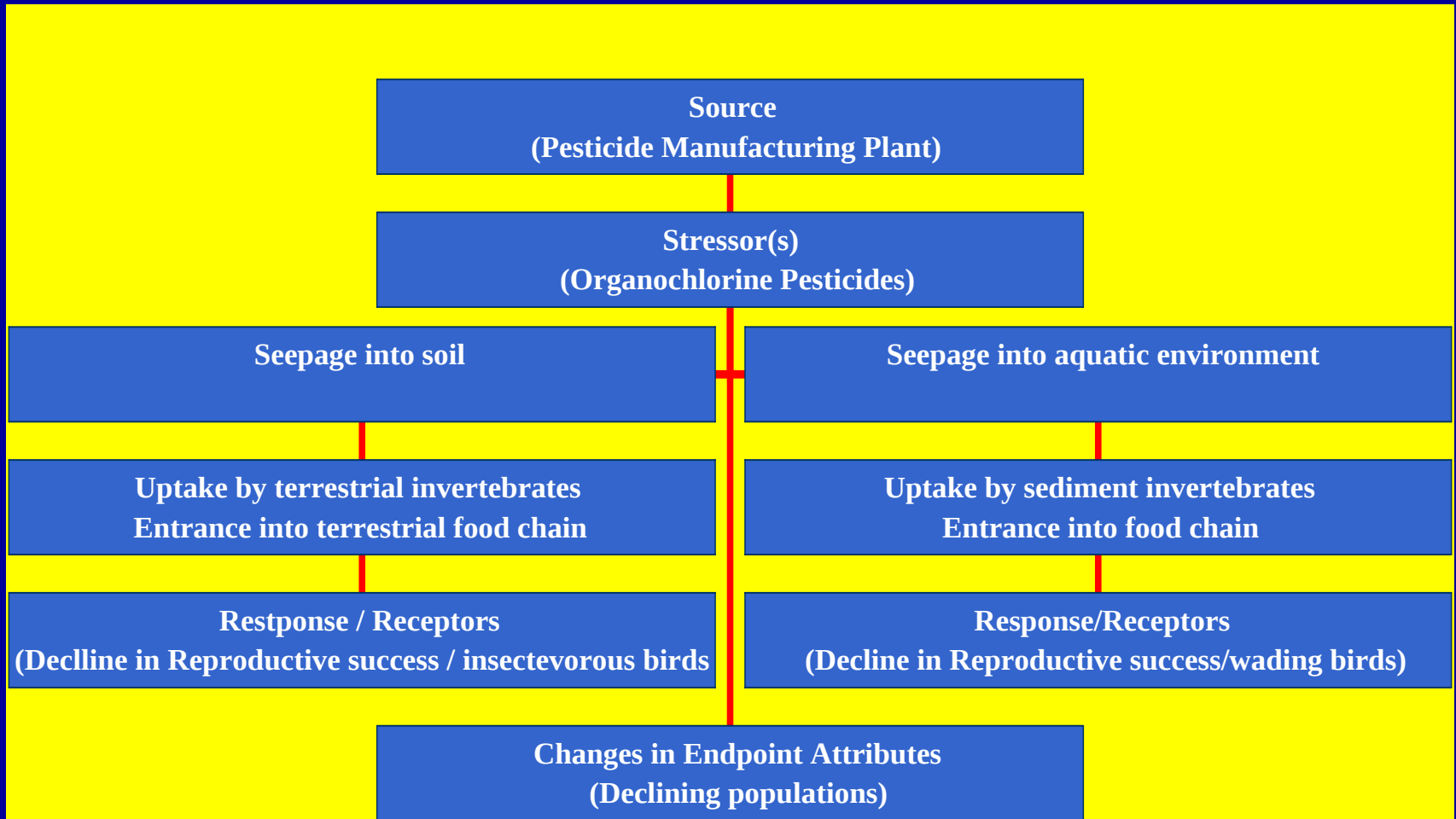
ERA: Steps One and Two

- **OBJECTIVE:** Assess potential impact to receptors through a screening-level conceptual model identifying exposure pathways & screening-level exposure estimates.
- **SMDP - Ecological Risk?**
 - Yes
 - No
 - Not enough information.

Conceptual Models

- To assess the status of the natural system, it is critical to understand the interactions among the physical, chemical and biological components of an ecosystem.
- A conceptual model is a diagram of a set of relationships among certain factors that are believed to impact or cause a certain result.

Simplified ERA Conceptual Model



ERA: Step Three – Problem Formulation

- **OBJECTIVE:** To identify the goals and focus of the baseline ERA and to identify the assessment endpoints or specific ecological values to be protected.
- **SMDP** - formalizes an agreement on the contaminants of concern, assessment endpoints and exposure pathways.





Assessment Endpoints:

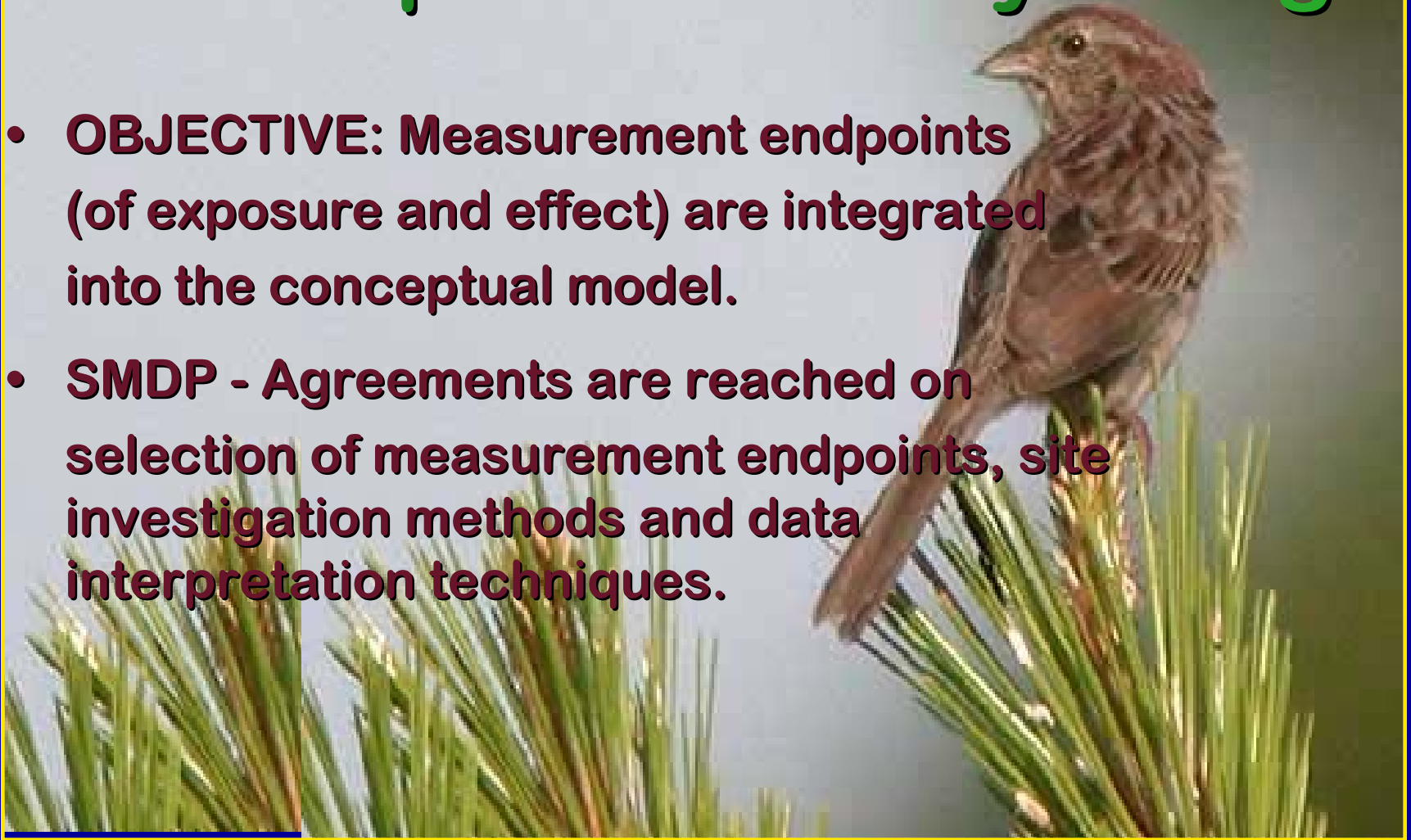
- Identify an ecological entity or attribute.
- Are an explicit expression of the environmental value to be protected.
- Are based on ecological relevance, susceptibility to the stressor and relevance to the management goal.

Assessment Endpoint Examples:

- Bird survival and reproduction.
- Eelgrass habitat and distribution.
- Forest community structure and habitat value.
- Fish survival, growth, and reproduction.

ERA: Step Four - Study Design

- **OBJECTIVE:** Measurement endpoints (of exposure and effect) are integrated into the conceptual model.
- **SMDP** - Agreements are reached on selection of measurement endpoints, site investigation methods and data interpretation techniques.



ERA: Step Five – Field Verification of Sampling Design

- **OBJECTIVE:** Verify that field study-targeted species are present in sufficient numbers to meet site-specific data quality objectives.
- **SMDP - The Work Plan and Sampling Analysis Plan are signed.**





ERA: Steps Six and Seven – Site Investigations, Analysis Phase and Risk Characterization

- **OBJECTIVE:** Implementation of the previously designed study.
- **SMDP** - only if alterations to the Work Plan or Sampling Analysis Plan are needed.



Ecological Media of Concern

- 1. Surface Soil**
- 2. Sediment**
- 3. Surface Water**
- 4. Groundwater**

Soil Screening Guidelines

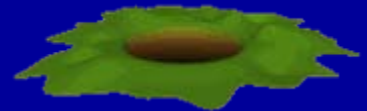
for use in Florida

1. Ecological Benchmark Screening Values for Soil, EPA Region 4, 2001.

www.epa.gov/region4/waste/ots/ecolbul.htm#tbl3

2. USEPA Ecological Soil Screening Levels (Eco-SSLs) OSWER Directive 9285.7-55

<http://mountain.epa.gov/ecotox/ecossl/SOPs.htm>



Sediment Screening Guidelines

for use in Florida

- | | | |
|--|---|--|
| 1. Sediment Quality
Assessment Guidelines for
Florida Inland Waters
(Mac Donald, 2003.) | → | Threshold Effects
Concentration (TEC) and
Probable Effects
Concentration (PEC). |
| 2. Sediment Quality
Assessment Guidelines for
Florida Coastal Waters | → | Threshold Effects Level
(TEL) and Probable
Effects Level (PEL) |
| 3. Region 4 Ecological
Benchmark Screening
Values for Sediment, USEPA
Region 4 Sediment
Screening Values for
Hazardous Waste Sites,
1999. | → | Single value. |

Surface Water Guidelines

for use in Florida

- FDEP Class III Surface Water Quality Criteria, freshwater and marine. Chapter 62-302.530.
- Ecological Benchmark Screening values for Surface Water, USEPA Region 4, 2001.



Groundwater Considerations

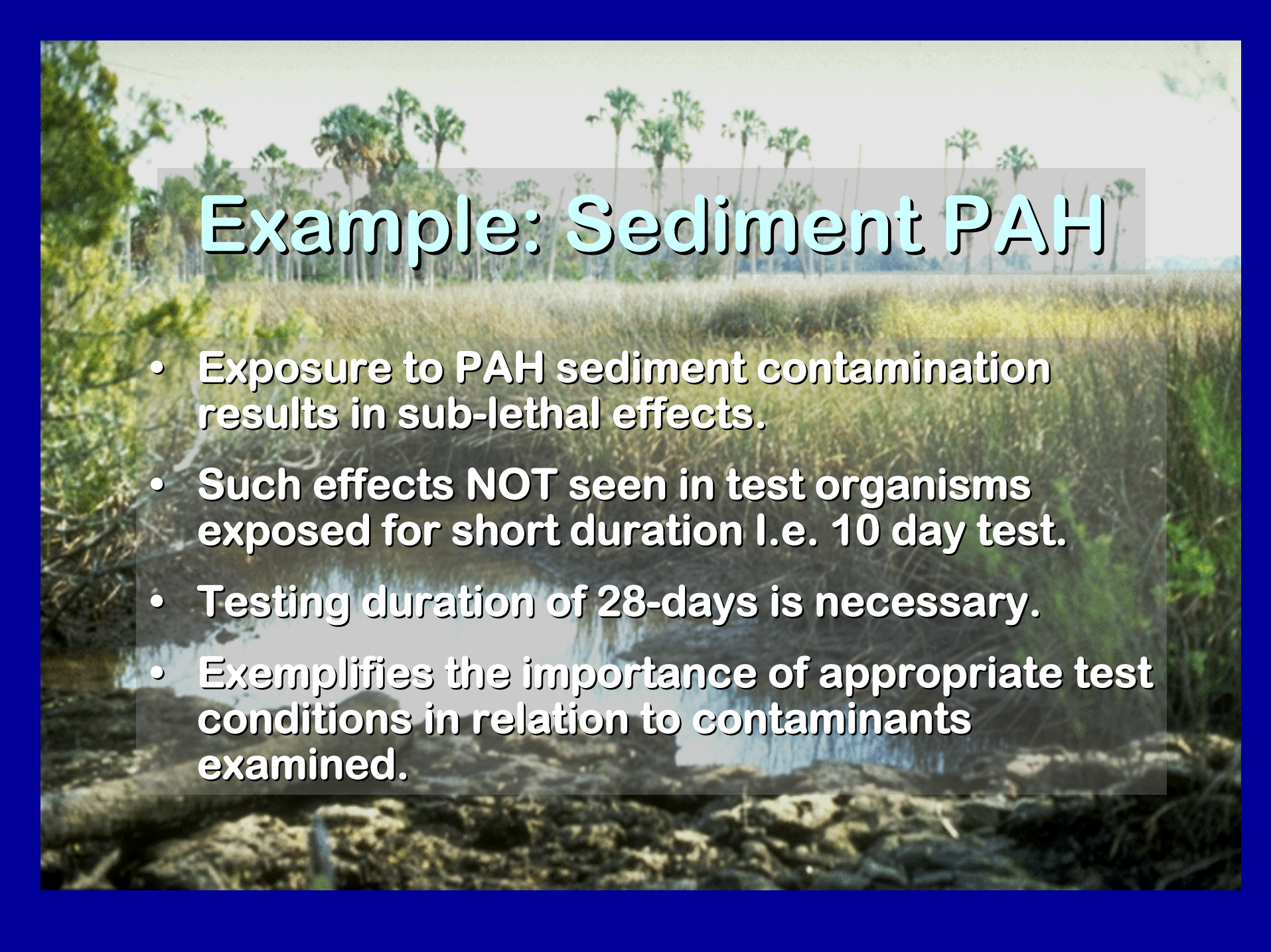
- “Where surface water is or may be exposed to contaminated groundwater (based on monitoring well data, groundwater flow rate and direction, or fate and transport modeling), the point of measuring compliance with the surface water standards shall be in the groundwater from the landward side immediately adjacent to the surface water body”. Chapter 62-780.690(3) F.A.C.



Additional Tools/Methods

- **Food Chain Modeling –**
 - Use of measured prey tissue burdens the best method. Assumed values introduce uncertainty.
- **Toxicity Testing -**
 - Appropriate Test Organism in relation to contaminant sensitivity
 - EXTREMELY Important
 - Appropriate Test Duration
 - EXTREMELY Important



A photograph of a natural landscape, likely a wetland or marsh. In the foreground, there is a body of water reflecting the sky. The middle ground is filled with tall, green grasses and reeds. In the background, a line of palm trees stands against a clear sky. The overall scene is bright and natural.

Example: Sediment PAH

- Exposure to PAH sediment contamination results in sub-lethal effects.
- Such effects NOT seen in test organisms exposed for short duration I.e. 10 day test.
- Testing duration of 28-days is necessary.
- Exemplifies the importance of appropriate test conditions in relation to contaminants examined.

Species of Concern

- Appropriate species chosen for modeling in relation to site.
- For example: food chain modeling using the sandpiper for a freshwater river bed makes no sense.
- Chose species relevant to site, with as much life history/biology information as possible.
- Official source of information: Wildlife Exposure Factors Handbook, EPA/600/R-93/187.

Ecological Remedial Goals

- How much residual material can be left and not be associated with risks or injury related to long-term exposures to chemicals that occur at low levels in the environment?
- Bioaccumulative chemicals are a primary concern.
 - Laboratory approach
 - Field approach
 - Modeling
- Don't rely on one tool, but use step-wise approach.
- When developed RGs are unattainable THEN bioavailability can be considered.

In Summary:

- Ecological Risk Assessment is a valuable tool.
- Planning, thoughtful data collection.
- Take the time to identify the appropriate species of concern.
- Use the appropriate screening values for Florida.
- **VALUE OUR NATURAL RESOURCES.**



Remember: ECO sites can be anywhere!