

Environmental Assessment and Management Programs for the TVA Kingston Ash Recovery Project

Daniel Jones[†]

David Ludwig[†]

Neil Carriker[‡]

Dennis Yankee[‡]

[†]ARCADIS U.S., Inc.; [‡]Tennessee Valley Authority

Overview

- **Platform & Poster Sessions:**
 - Regulatory Framework
 - Assessment Efforts
- **Why?**
 - Environmental Management
- **This Presentation:**
 - Risk Assessment
 - Restoration
 - Stewardship
 - Decision-Making



Site Characterization
Fate & Transport
Geochemistry
Ecotoxicology
Ecological Studies
Risk Assessments

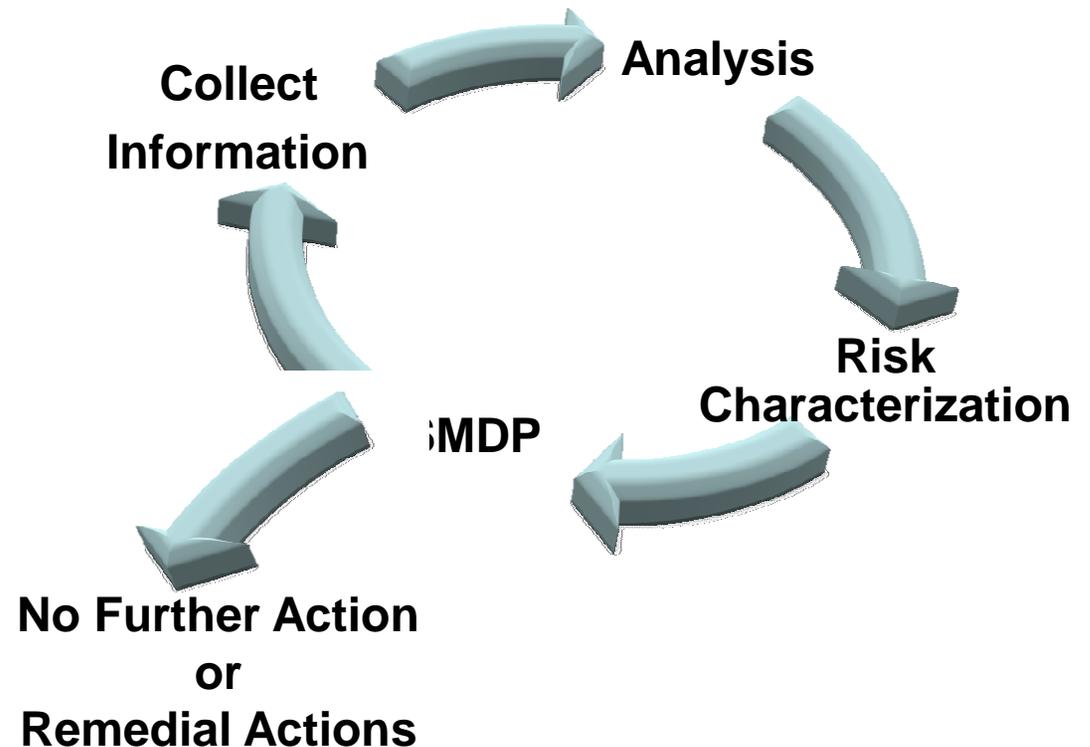
Environmental Management

Comprised of three major processes

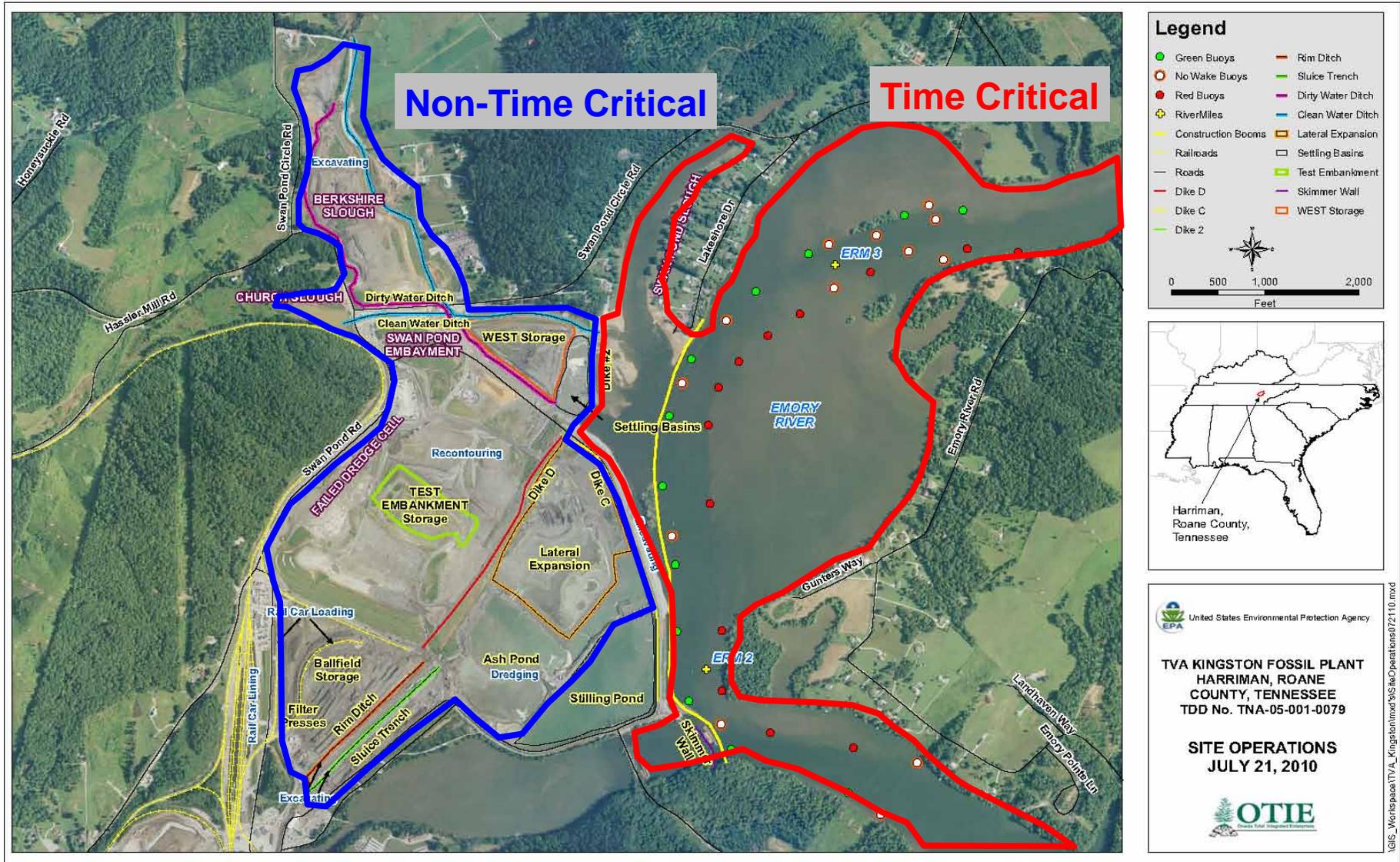
	Remediation	Restoration	Stewardship
Goals	Protection of <ul style="list-style-type: none"> • Human Health • Environment 	Replacement of Environmental Services Lost	Services Maintenance <ul style="list-style-type: none"> • Human Use • Ecological
Assessments	<ul style="list-style-type: none"> • HHRA • ERA 	NRDA <ul style="list-style-type: none"> • Human Use • Ecological 	Monitoring
Guidance & Guidelines	<ul style="list-style-type: none"> • RAGS • ERA 8-Step 	Federal Guidance <ul style="list-style-type: none"> • 43 CFR 11 	TVA Stewardship Programs and Standard Operating Procedures
Decisions	Risk Management	Services Compensation	Resource Management

Risk Assessment

- **Iterative Process**
- **Historic Releases**
 - “Stable” conditions
 - Start simple
 - Identify uncertainties
 - Add lines of evidence
- **Current Releases**
 - Dynamic conditions
 - Start comprehensive
 - Document trends
 - Focus efforts



Phased Removal Strategy

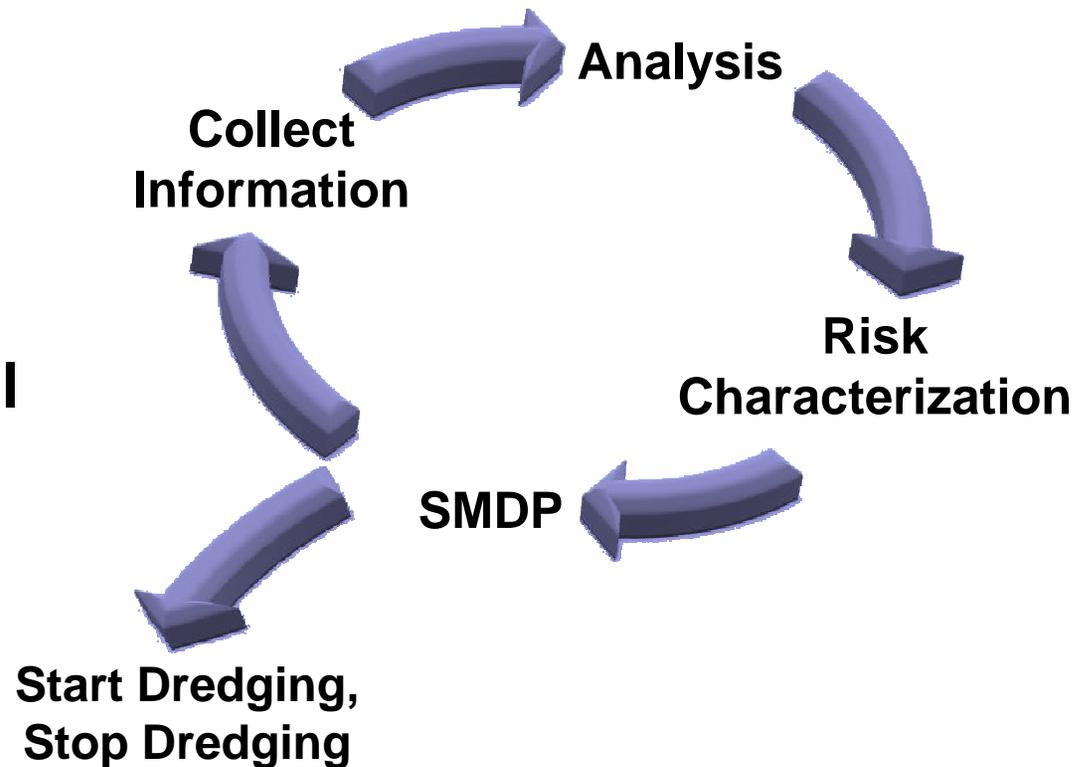


Cleanup: Phase 1

- **Emory River Channel**

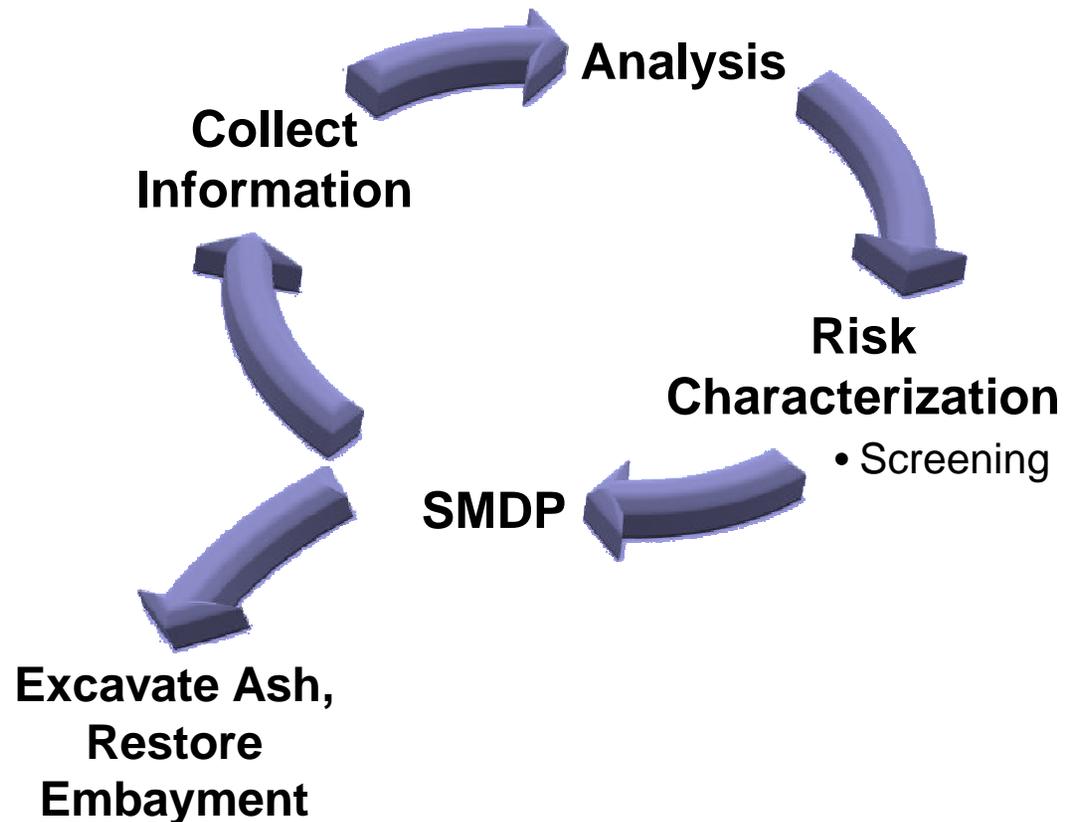
- Blocked by ash
- Risks evident and immediate
 - Flooding
 - Migration

- **Time Critical Removal Action**



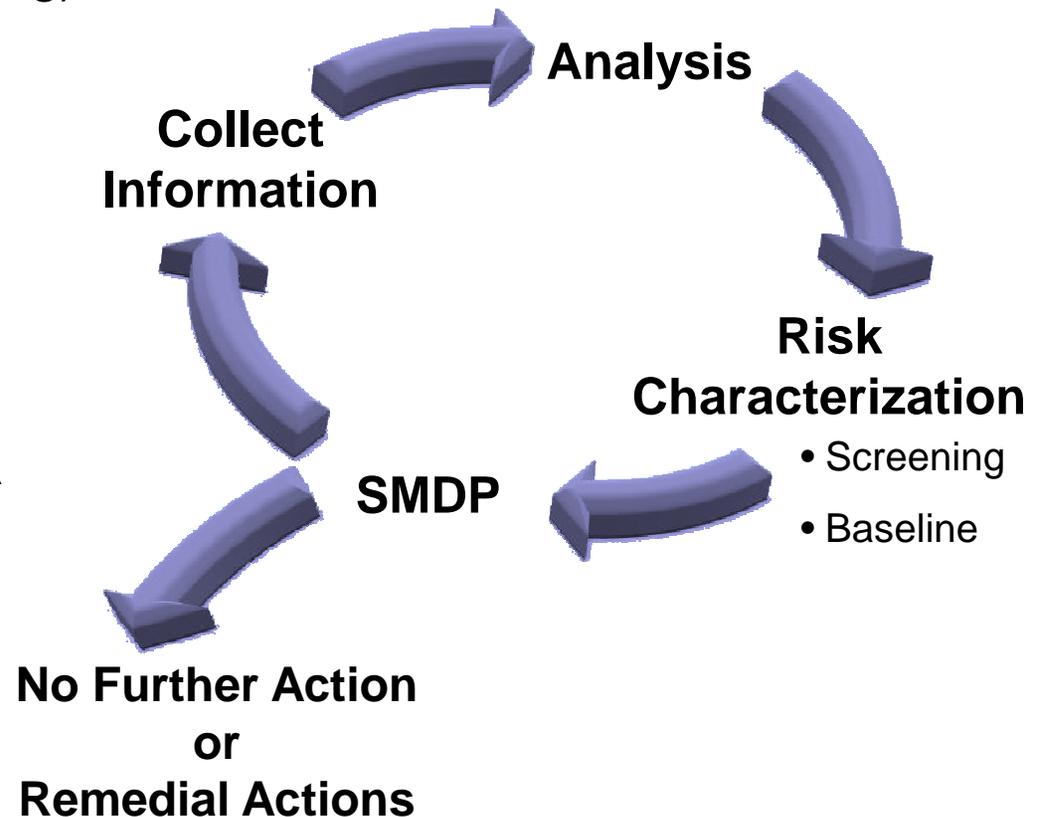
Cleanup: Phase 2

- **Dredge Cell, Embayment**
 - Stabilized by Dike #2
- **Non-Time Critical Removal Action**
- **EE/CA Done**
 - Viable alternatives:
 - All ash removed from embayment
 - Waters restored
 - Wetlands restored
 - Screening RAs done
 - Baseline RAs unnecessary

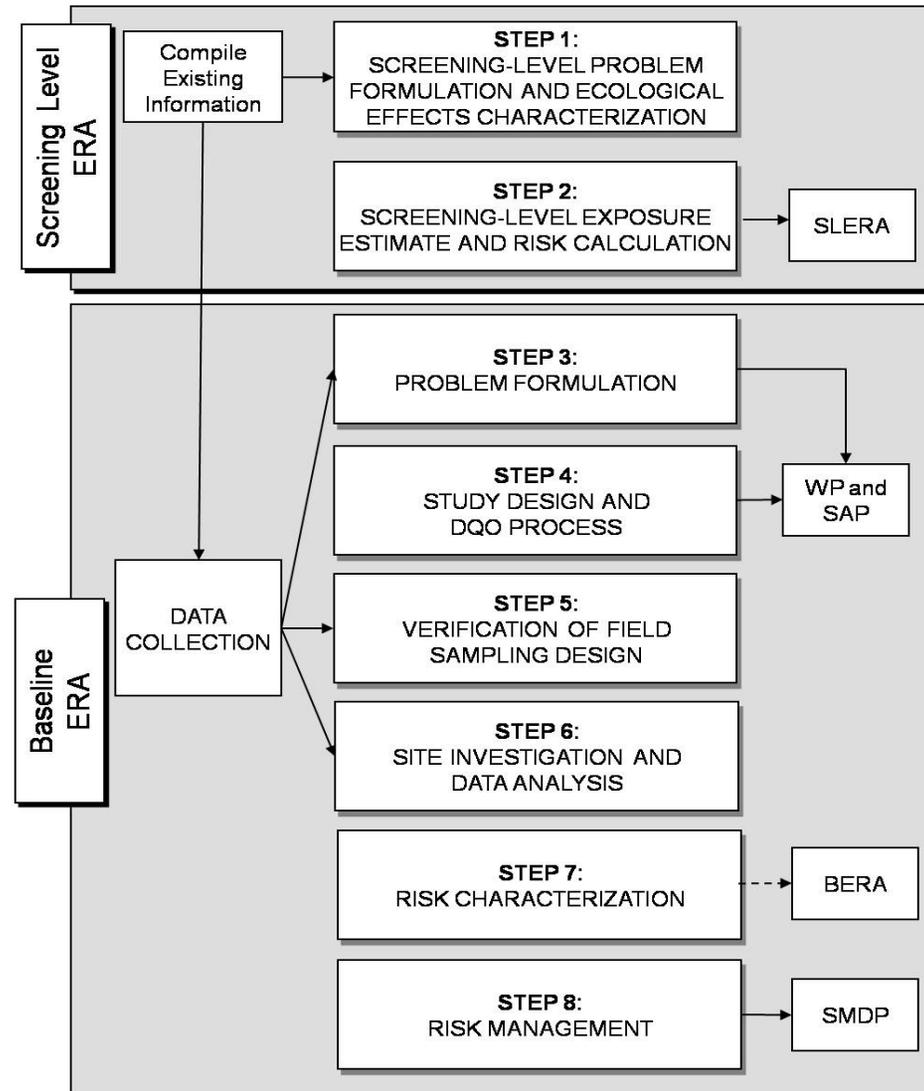


Cleanup: Phase 3

- **River System**
 - Emory River (post-dredging)
 - Clinch River
 - Tennessee River
- **Non-Time Critical Removal Action**
- **EE/CA planning**
 - Residual ash, larger area
 - Risks are uncertain
 - Cleanup is challenging
 - Screening RAs done
 - Baseline RAs underway

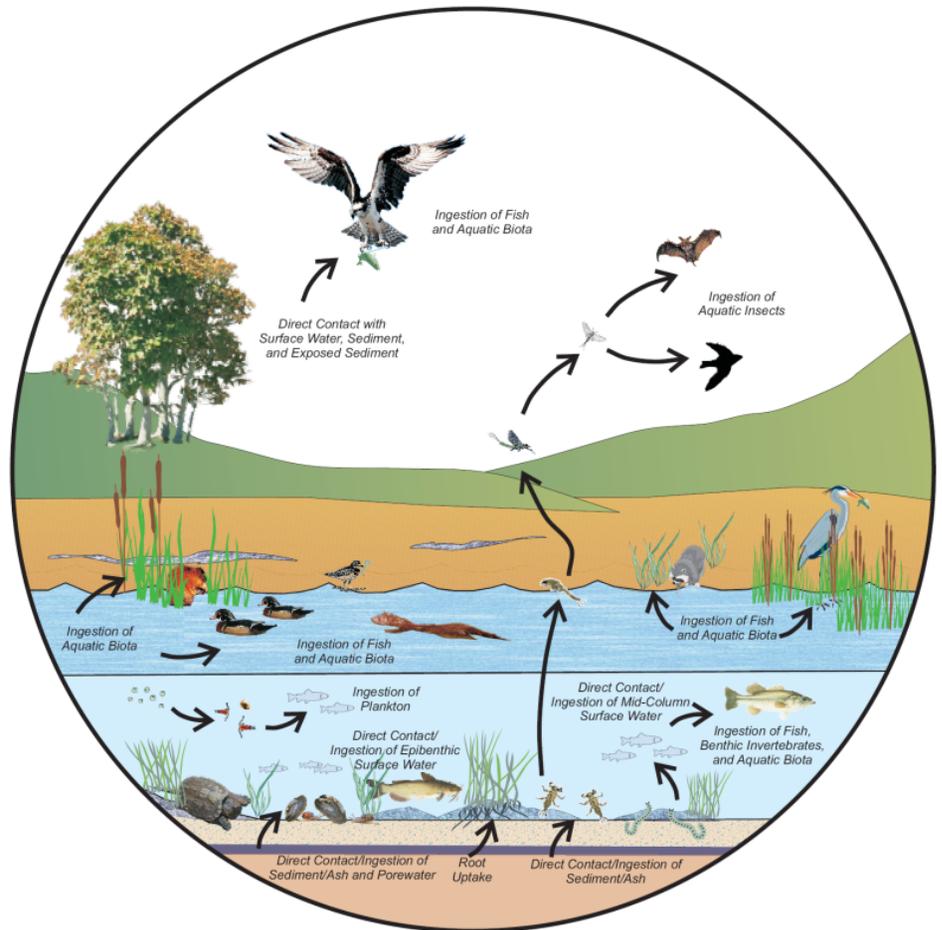


River System ERA



River System: Ecological Receptors

- Aquatic plants
- Pelagic fish
- Benthic fish
- Benthic invertebrates
- Aquatic- or riparian-feeding birds
 - Herbivores (wood duck)
 - Omnivores (mallard; killdeer)
 - Piscivores (osprey; great blue heron)
- Aquatic- or riparian-feeding mammals
 - Herbivores (muskrat)
 - Omnivores (raccoon)
 - Piscivores (mink)
- Aerial-feeding insectivores
 - Birds (tree swallow)
 - Mammals (gray bat)
- Aquatic- or riparian-feeding reptiles
- Aquatic- or riparian-feeding amphibians



Lines-of-Evidence

- **Exposure Concentrations vs. Literature-Derived Effects Values**
 - Abiotic media
 - Biota
 - Diet
- **Bioassays**
 - Sediment/Ash
 - Surface water
- **Biosurveys**
 - Fish, Benthics
 - Birds, Mammals
 - Herps, Plants

Weight-of-Evidence



Restoration Status

- **West Embayment**
 - Completed
- **Swan Pond Embayment**
 - Ecological Restoration Design
 - Conceptual, in Phase 2 EE/CA
- **East Embayment**
 - Ash Removal Completed 2010
 - Restoration Design 2011
 - Consistent with Swan Pond
- **River System**
 - To Be Determined



Environmental Management: Restoration

Natural Resource Damages Assessment

1. **Injuries** are “measurable adverse changes” in natural resources or resource services.

[15 CFR 990 Subpart E.II.B.1; 43 CFR 11.14(w)]

2. **Baseline** is “...the condition of natural resources and services that would have existed had the incident not occurred.”

(15 CFR 990.30)

3. **Damages** are injuries quantified as lost natural resource services flows.

[15 CFR 990 Subpart E.II.B.1; 43 CFR 11.14(w)]

Environmental Management: Stewardship

- **Fly ash release was huge - however:**
 - Not all resources were damaged
 - Not all services were impaired
- **TVA continues to:**
 - Monitor resources
 - Manage services
 - Human use
 - Ecological

Environmental Management

- **Ultimately about making decisions**
 - Assessments must support the decision-making process
- **Zero-Sum Enterprise**
 - Resources are finite
 - Time, money, effort and expertise spent on one question or action are not available for other environmental activities
 - Investments must be made wisely!

Concurrent Poster Session

Monday November 8, 2010 (TODAY!)

- Integrated Ecotoxicological Research Programs
- Ash Characterization and Migration
- Surface Water Quality Monitoring
- Survival/Growth of *Hyalella azteca*
- Bioaccumulation of Selenium and Trace Elements
- Fish and Benthic Invertebrate Studies
- Insectivorous Birds and Other Wildlife
- Risk Assessment Strategies
-and more!

SECTION BREAK