

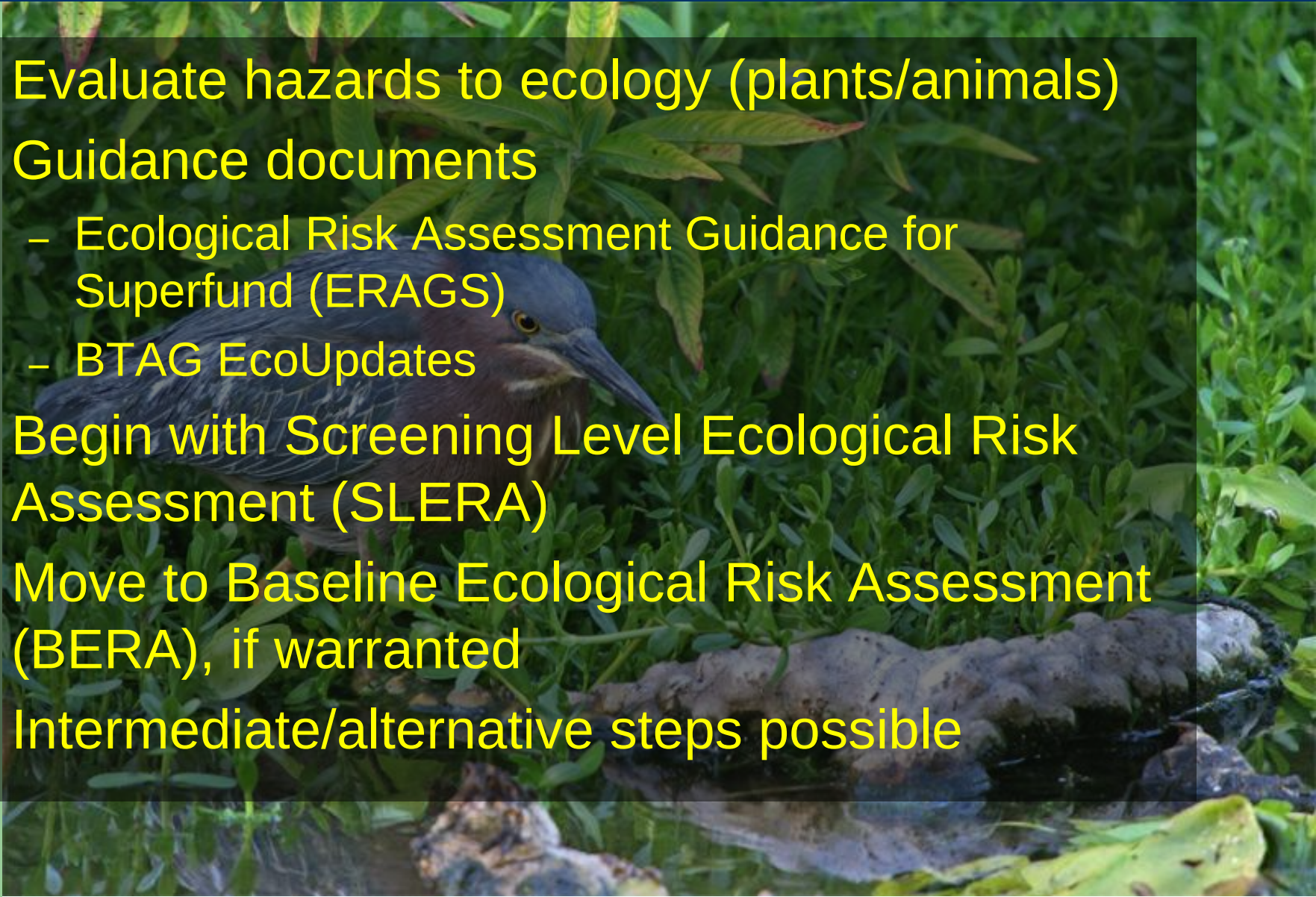
Ecological Risk Assessment For Superfund

Protection of the
Environment



Role of Ecological Risk Assessment (ERA)

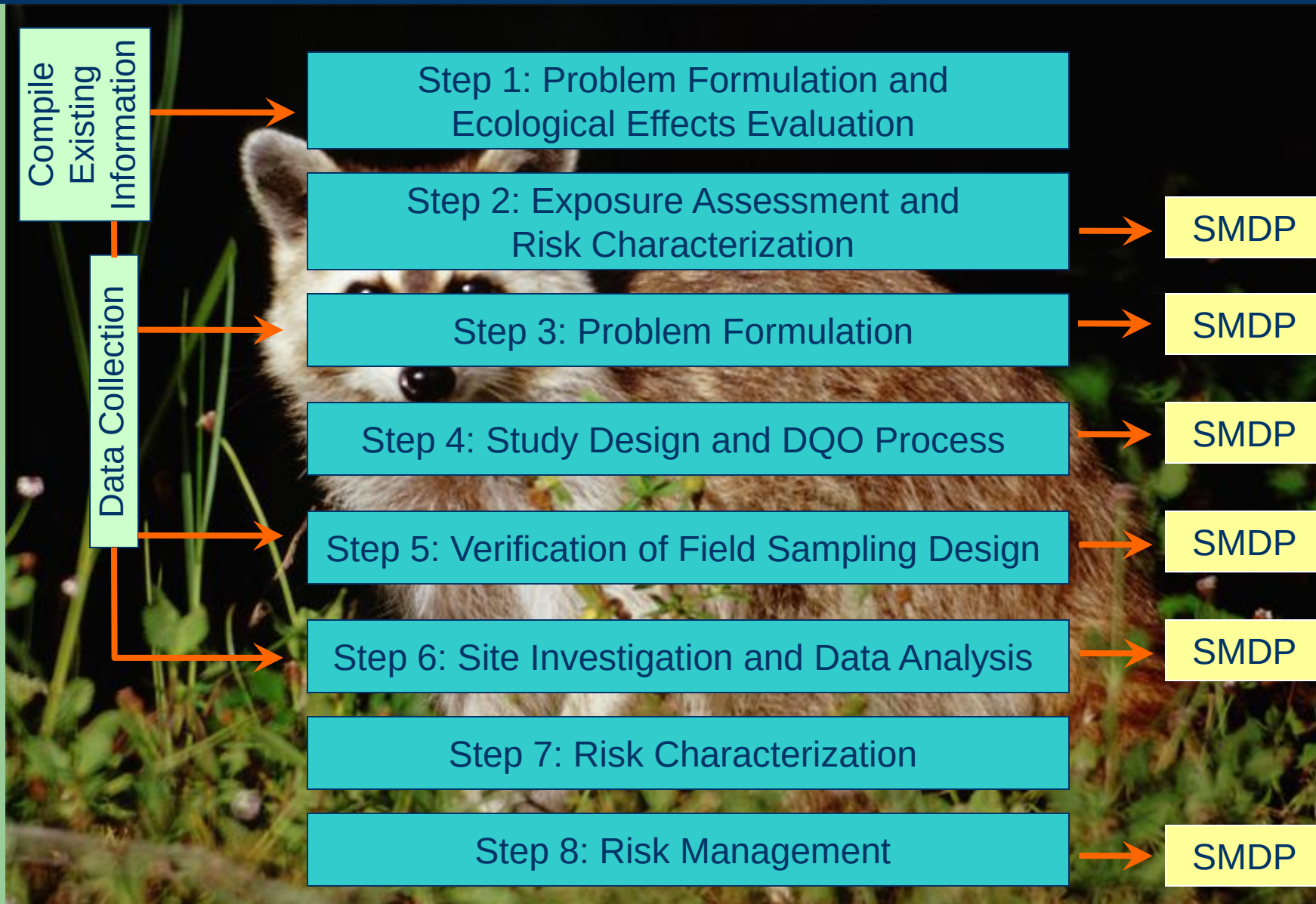
- Evaluate hazards to ecology (plants/animals)
- Guidance documents
 - Ecological Risk Assessment Guidance for Superfund (ERAGS)
 - BTAG EcoUpdates
- Begin with Screening Level Ecological Risk Assessment (SLERA)
- Move to Baseline Ecological Risk Assessment (BERA), if warranted
- Intermediate/alternative steps possible



ERA Participants

- Biological Technical Assistance Group (BTAG)
 - USEPA ecological risk assessors
 - USEPA wetland and cross-cutter staff (cultural resources, ARARs [Applicable or Relevant and Appropriate Requirements])
- Trustees
 - Federal – NOAA, USFWS, USGS, DOI, Bureau of Indian Affairs as applicable.
 - State – NYDEC
- Others as needed

ERAGS Process

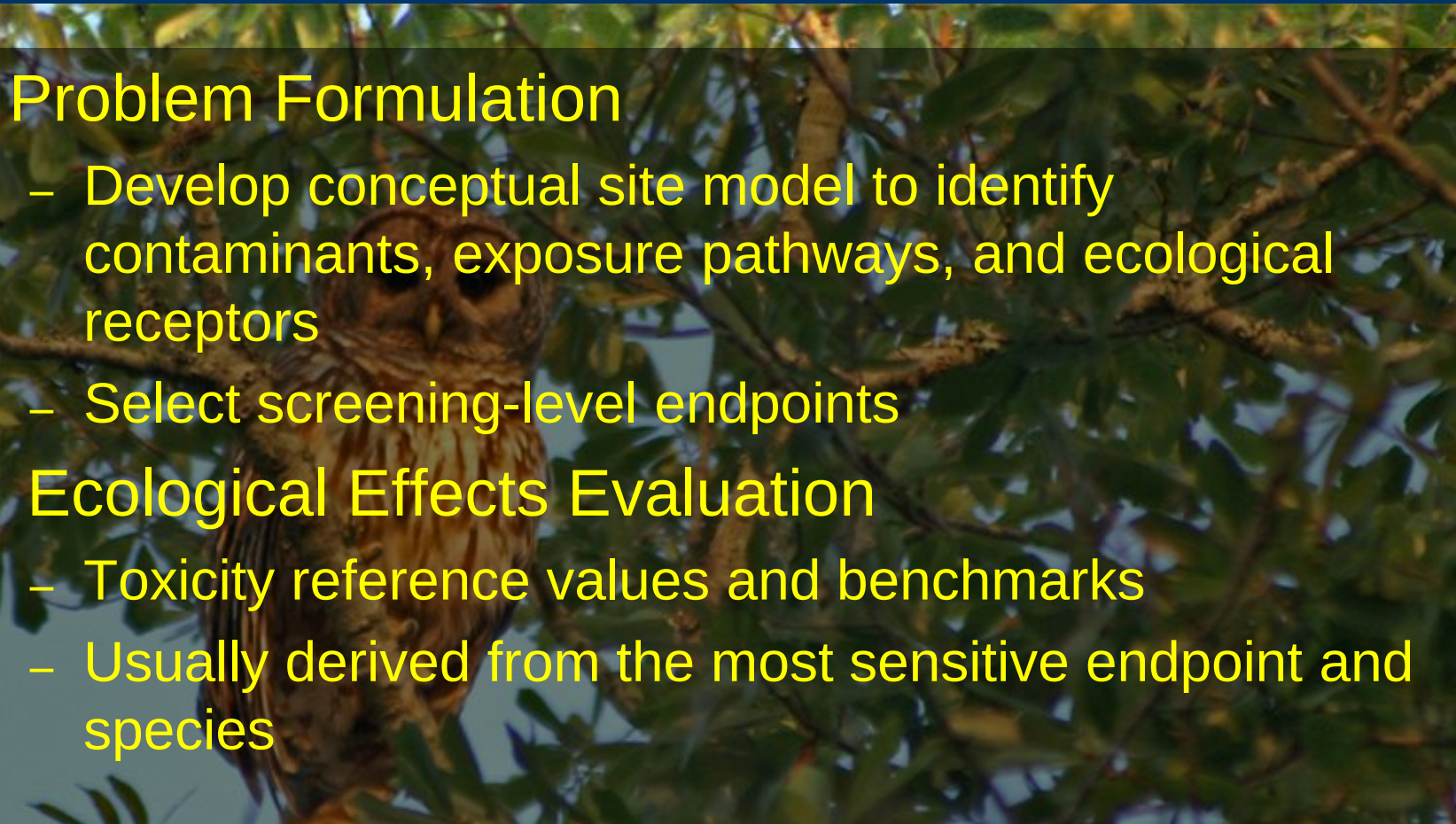


SLERA and BERA

- SLERA (Steps 1-2)
 - Provides an early exit mechanism for completing an ERA at sites where there are no or minimal ecological concerns
 - Identifies an initial set of Contaminants of Potential Ecological Concern (COPECs) to be evaluated in the Baseline Ecological Risk Assessment
- BERA (Steps 3-8)
 - Provides a framework for conducting ecological investigations at Superfund sites to characterize the potential hazards to ecological receptors



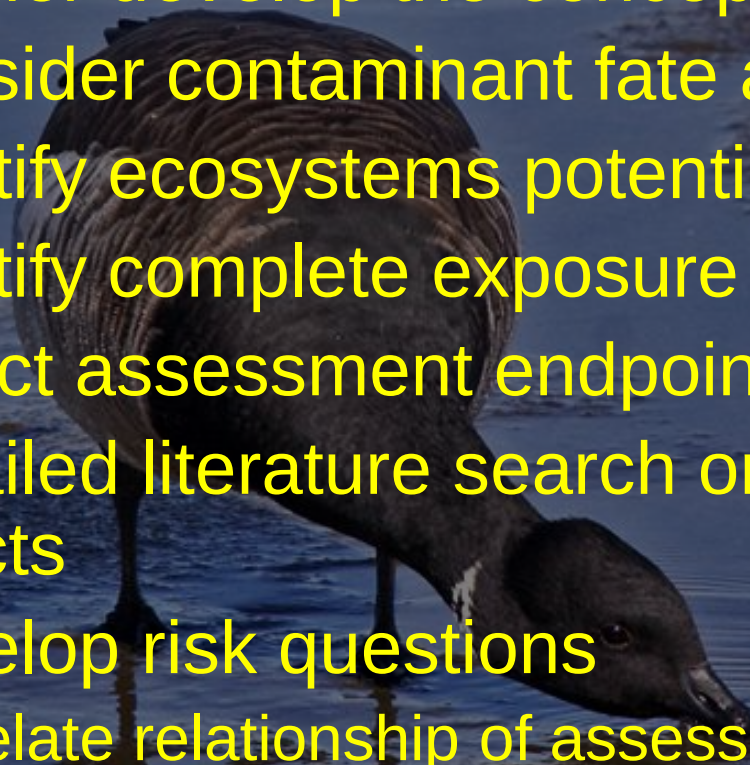
ERA – Step 1 (Beginning of SLERA)

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- Problem Formulation
 - Develop conceptual site model to identify contaminants, exposure pathways, and ecological receptors
 - Select screening-level endpoints
 - Ecological Effects Evaluation
 - Toxicity reference values and benchmarks
 - Usually derived from the most sensitive endpoint and species

ERA – Step 2 (End of SLERA)

- Screening-level exposure estimate and risk calculation
- Similar to Hazard Quotient for human health
- Maximum concentration detected divided by the toxicity reference value or benchmark
- If HQ is less than 1, ecological effects not likely, if HQ is greater than 1, ecological effects may be evident
- First Scientific Management Decision Point (SMDP) #1
 - There is adequate information to conclude that ecological risk is negligible (Stop)
 - The information is not adequate to make a decision at this point (Continue to Step 3)
 - The information indicates a potential for adverse ecological effects (Continue to Step 3)

ERA – Step 3 (Beginning of BERA)

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- Refine preliminary COPECs
 - Further develop the conceptual site model
 - Consider contaminant fate and transport
 - Identify ecosystems potentially at risk
 - Identify complete exposure pathways
 - Select assessment endpoints
 - Detailed literature search on known ecological effects
 - Develop risk questions
 - Relate relationship of assessment endpoints to measurement endpoints, develop study design, and testable hypotheses and null hypothesis

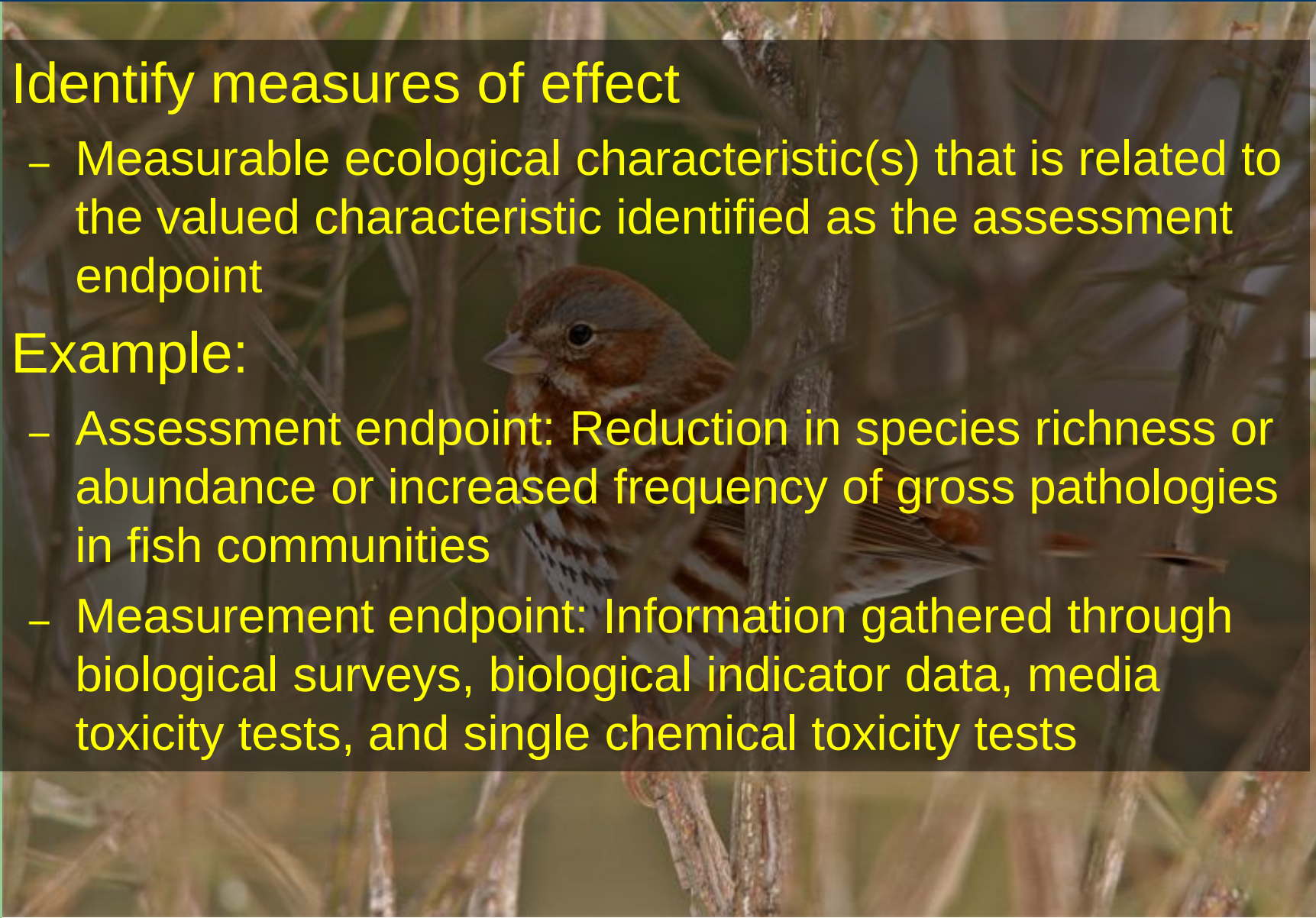
ERA Step 3: SMDP

- SMDP #2
 - Agreement on contaminants of concern
 - Assessment endpoints
 - Exposure pathways
 - Risk questions
- BERA workshop will provide forum to complete this step



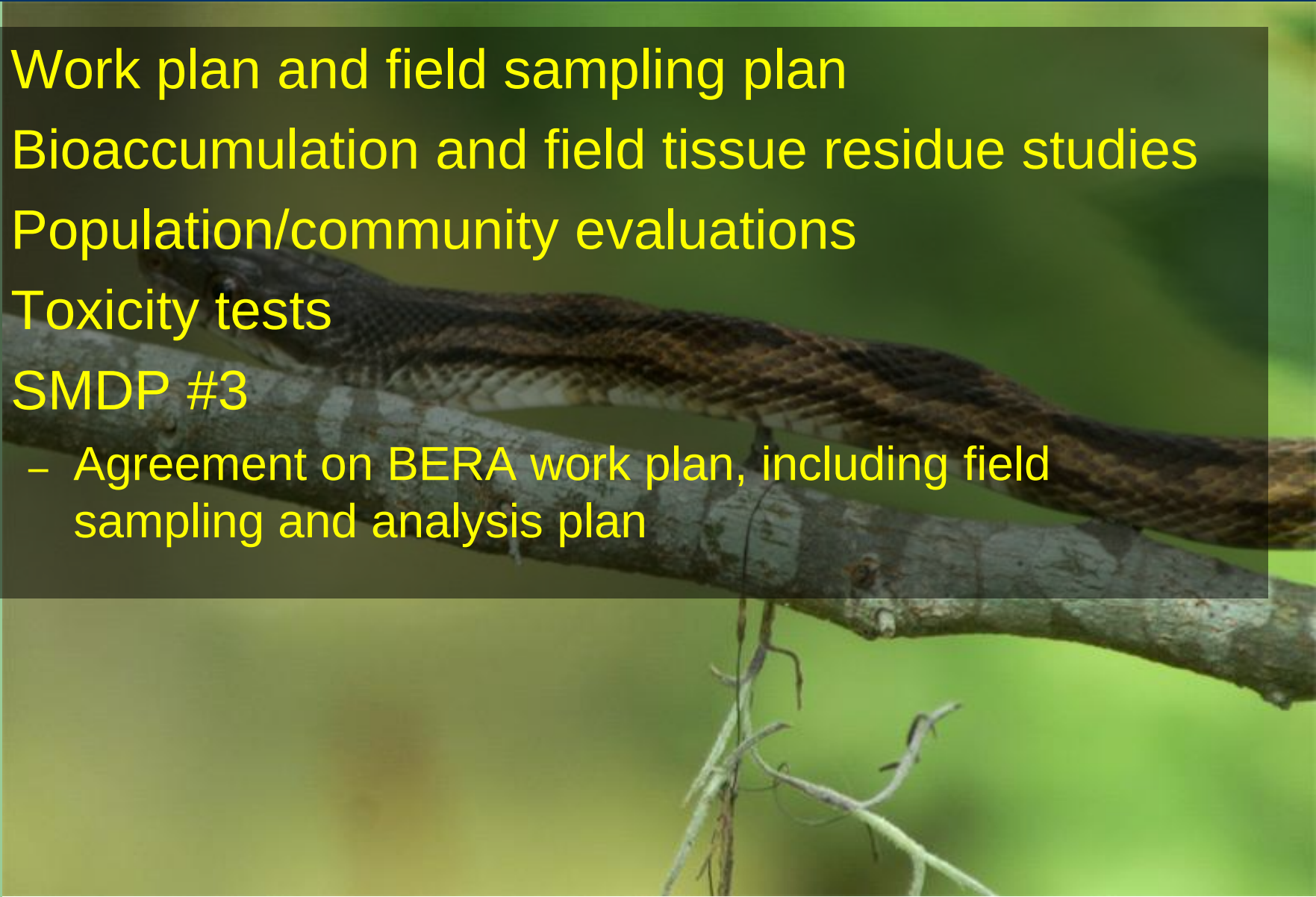
ERA Step 4

- Identify measures of effect
 - Measurable ecological characteristic(s) that is related to the valued characteristic identified as the assessment endpoint
- Example:
 - Assessment endpoint: Reduction in species richness or abundance or increased frequency of gross pathologies in fish communities
 - Measurement endpoint: Information gathered through biological surveys, biological indicator data, media toxicity tests, and single chemical toxicity tests



ERA Step 4

- Work plan and field sampling plan
- Bioaccumulation and field tissue residue studies
- Population/community evaluations
- Toxicity tests
- SMDP #3
 - Agreement on BERA work plan, including field sampling and analysis plan



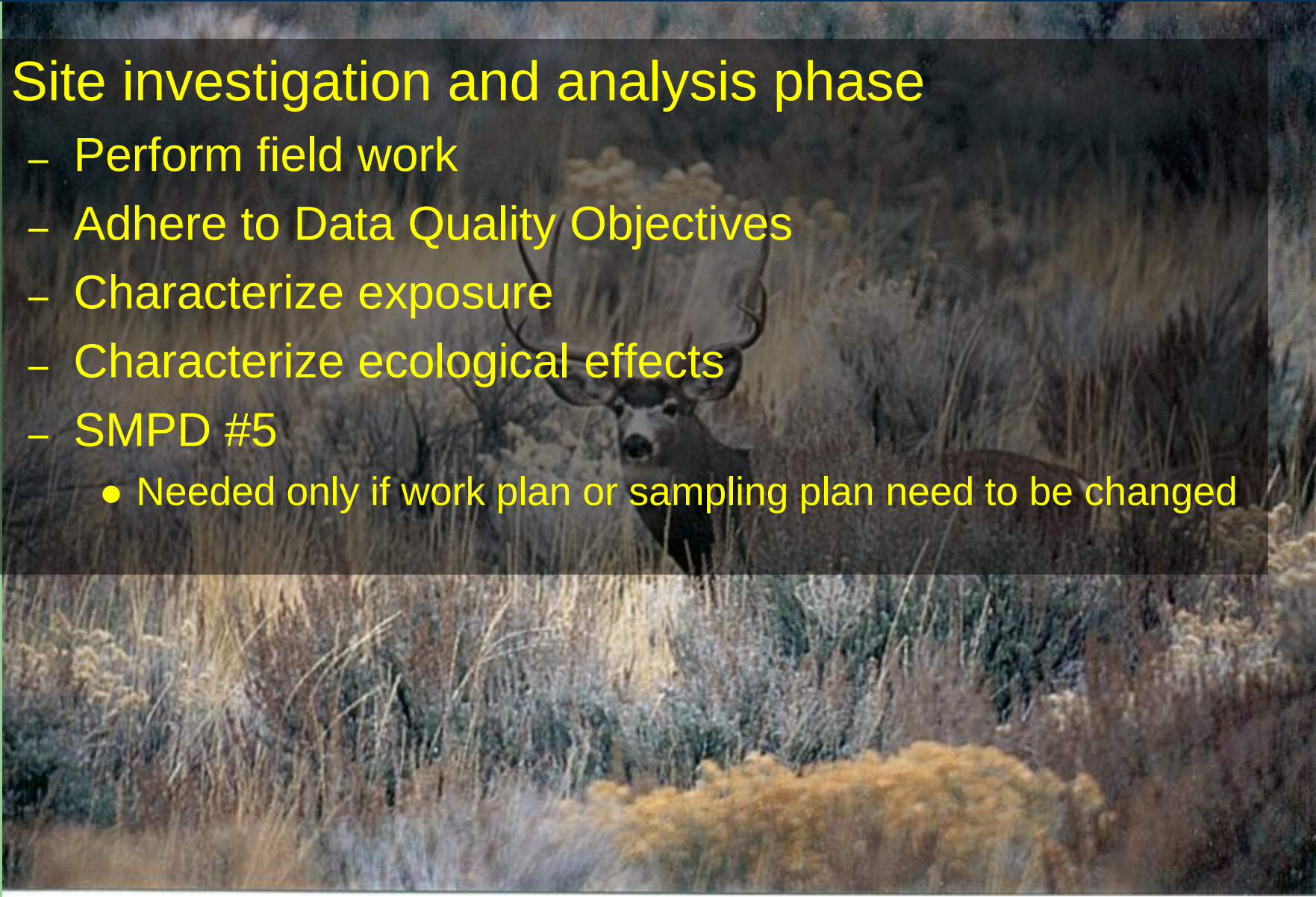
ERA Step 5

- Field verification of sampling design
 - Verify that field sampling plan is appropriate and implementable
 - Requires site visit
 - If appropriate, select reference sites
 - Field check proposed sampling locations
 - SMDP #4 – Any changes in hypothesis, work plan, or endpoints



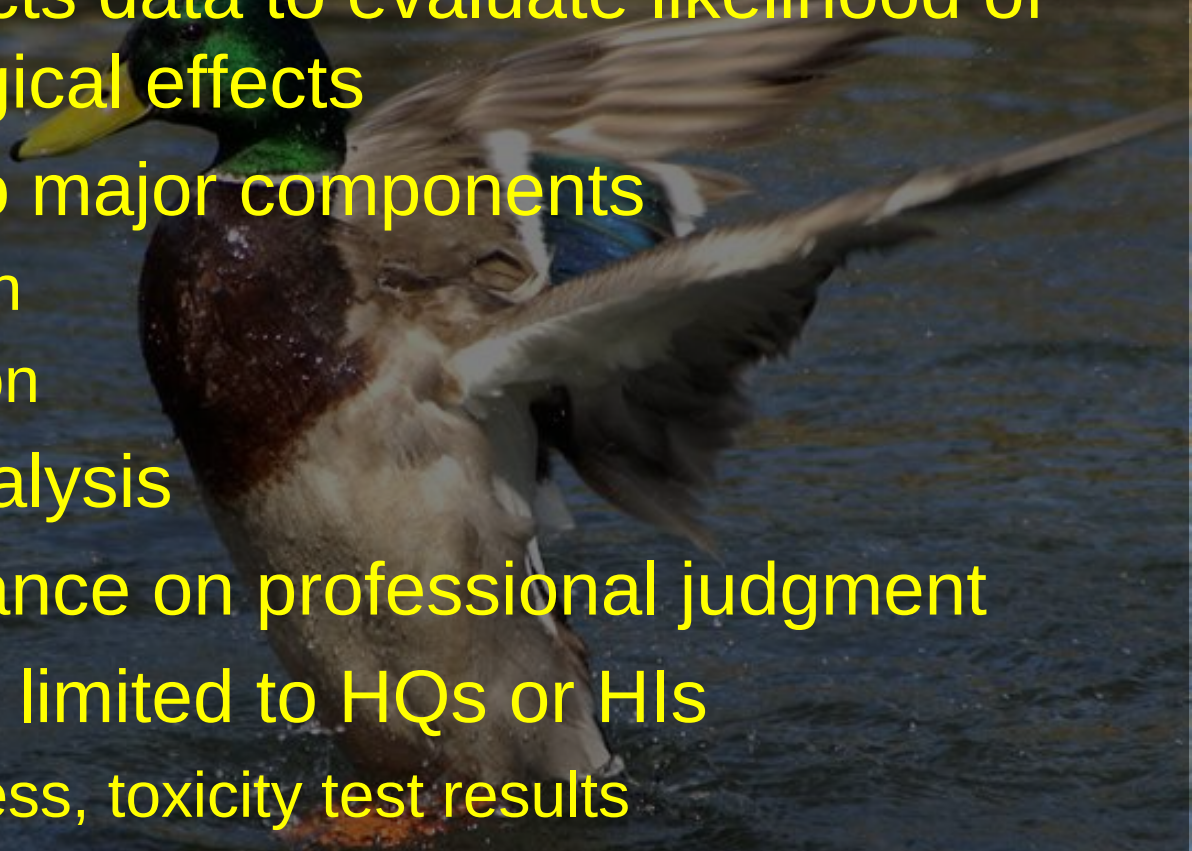
ERA Step 6

- Site investigation and analysis phase
 - Perform field work
 - Adhere to Data Quality Objectives
 - Characterize exposure
 - Characterize ecological effects
 - SMPD #5
 - Needed only if work plan or sampling plan need to be changed



ERA Step 7

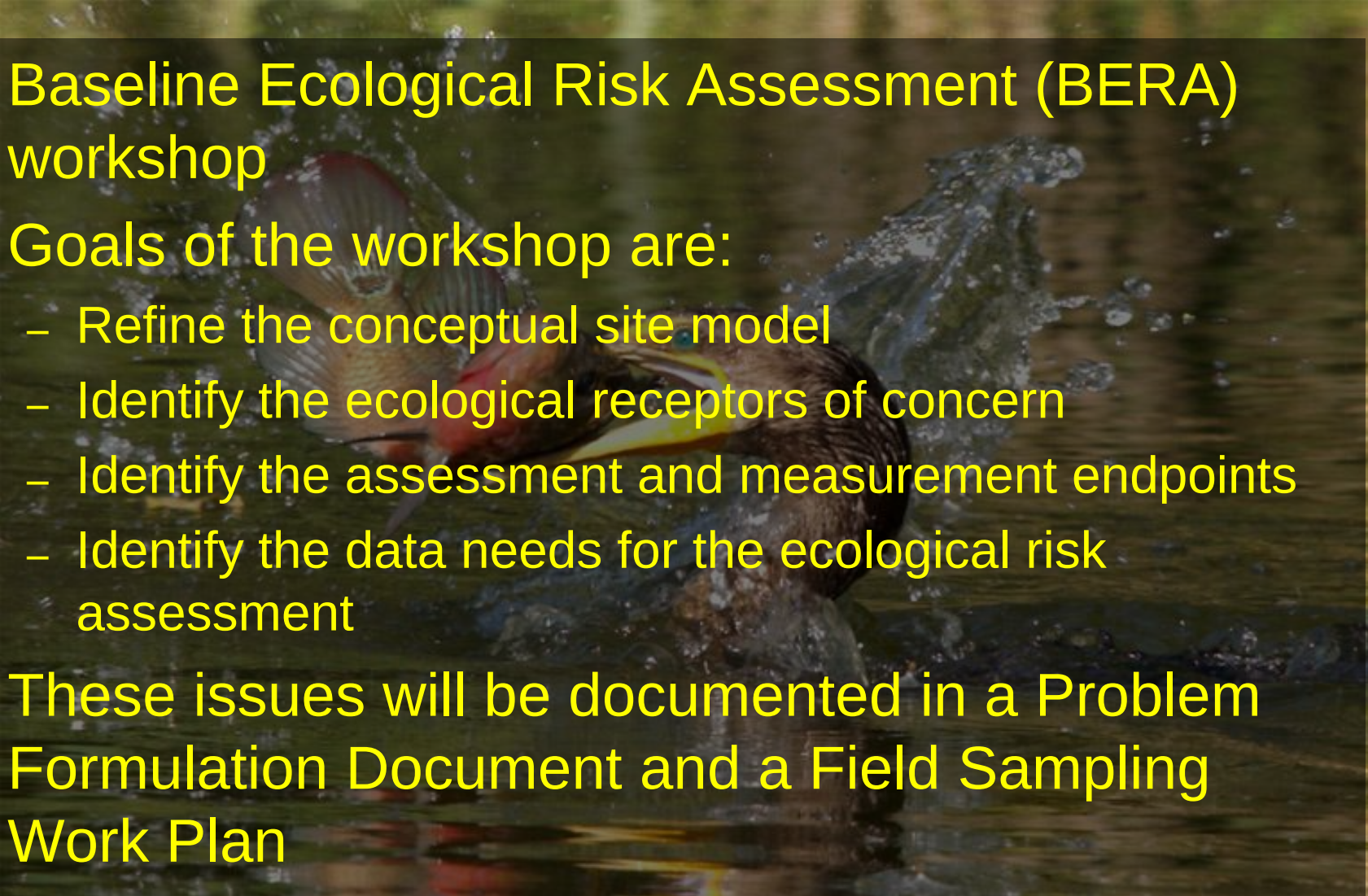
- Risk characterization integrates exposure and ecological effects data to evaluate likelihood of adverse ecological effects
- Consists of two major components
 - Risk estimation
 - Risk description
- Uncertainty analysis
- Significant reliance on professional judgment
- Metrics are not limited to HQs or HIs
 - Species richness, toxicity test results
- Build on lines of evidence



ERA Step 8

- Risk management integrates risk assessment results with other considerations to make and justify decisions
 - Responsibility of risk manager, not risk assessor
 - Risk manager should be involved throughout process
 - Primarily part of the Feasibility Study (FS)
 - Include risk assessment results, NCP criteria, available remedial technologies, ecological impacts of remedies, tradeoffs between human health and ecological impacts, and cost
- SMDP #6 is finalized in Record of Decision (ROD)
 - Must justify any residual contamination expected following selected remedy

Newtown Creek – Next Step

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- A photograph of a duck splashing in water, with water droplets visible around its head and neck. The duck has a brown body and a red head. The background is a blurred natural setting.
- Baseline Ecological Risk Assessment (BERA) workshop
 - Goals of the workshop are:
 - Refine the conceptual site model
 - Identify the ecological receptors of concern
 - Identify the assessment and measurement endpoints
 - Identify the data needs for the ecological risk assessment
 - These issues will be documented in a Problem Formulation Document and a Field Sampling Work Plan

The End

