Decision Making: Tools and Adaptive Management Framework

Ronald M. Thom[1] and Blaine D. Ebberts[2]

[1]Marine Sciences Laboratory, Pacific Northwest National Laboratory;

[2]Portland District, U.S. Army Corps of Engineers

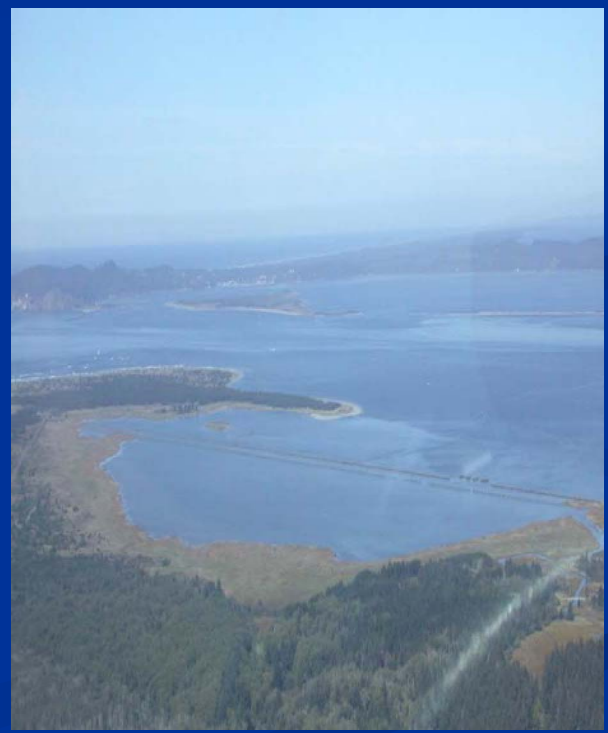
Presented at the Columbia River Estuary Conference,

29 April 2008, Astoria, Oregon

Purpose and Outline

Describe the tools and adaptive management framework developed for ecosystem restoration in the Columbia River estuary

- Restoration issues and uncertainties
- Tools, principles, and approach
- Integrated adaptive management
- Regional collaborations
- National context



Restoration Issues in the CRE

- General restoration goal is Net Ecosystem Improvement (NEI)
- Highest priority should be given to projects that maximize NEI with maximum probability and minimum cost
- There is uncertainty in predicting outcomes:
  - physical actions required
  - area that will actually recover
  - functional services that are realized
  - effect on the ecosystem from many projects
  - rates and patterns of habitat development
  - climate change effect on long term viability of the project

NEI = change in function X area X probability of success

Examples of Real Uncertainties Affecting Restoration Success in the CRE

- changes in hydrology and hydrodynamics from river regulation and climate change;
- potential flooding of adjacent properties;
- elevation distributions of major tidal wetland plant species;
- colonization of restored sites by an invasive species;
- changes in land use adjacent to restored sites
- juvenile salmon use of a restored wetland sites;
- salmon resilience.

Adaptive Management (AM)

- AM is a method to make decisions that demand action and where there are significant uncertainties
- AM elements: goal, conceptual model, evaluation framework
- AM feeds off other research that reduces uncertainties
- AM requires trust among participants

AM for the CRE was developed as part of the Cumulative Effects Study

Tools Available

Taken together, these tools represent essential building blocks of an effective, integrated ecosystem restoration AM program

- Ecosystem-based restoration framework (Johnson et al. 2003)
- Conceptual models (e.g., Thom et al. 2004)
- Monitoring protocols (Roegner et al. 2008)
- Estuary RME Program (Johnson et al. 2008)
- Habitat classification system (LCREP, UW, USGS)
- Reference site characterization Study (LCREP, PNNL)
- Habitat monitoring program (LCREP, PNNL, NOAA, USGS)
- Salmon at River's End (Bottom et al. 2005)
- Cumulative effects research program (Johnson et al. 2007)
- Other focused research (USGS, UW, NOAA, CREST, OGI, PNNL)
- An emerging commitment by the COE, LCREP, CLT, CREST, BPA and others to maximize the success of projects to make a difference in the ecosystem

Principles

- *Science Based* – Adheres to scientific principles of data acquisition, analysis and interpretation. Driven by questions and hypotheses such that the scientific knowledge base is consistently both utilized and improved.
- *Implementable* – Is cost-effective, feasible and reasonable. Utilizes existing organizational processes to avoid additional demands on staff or redundancy.
- *Mission Oriented* – Adheres to agency/entity planning process and procedures for restoration programs.
- *Regionally Collaborative* – Captures and complements learning from others' projects, and works collaboratively to raise the success of all restoration projects in the CRE, in cooperation with others funding projects in the CRE and other Pacific Northwest estuaries.

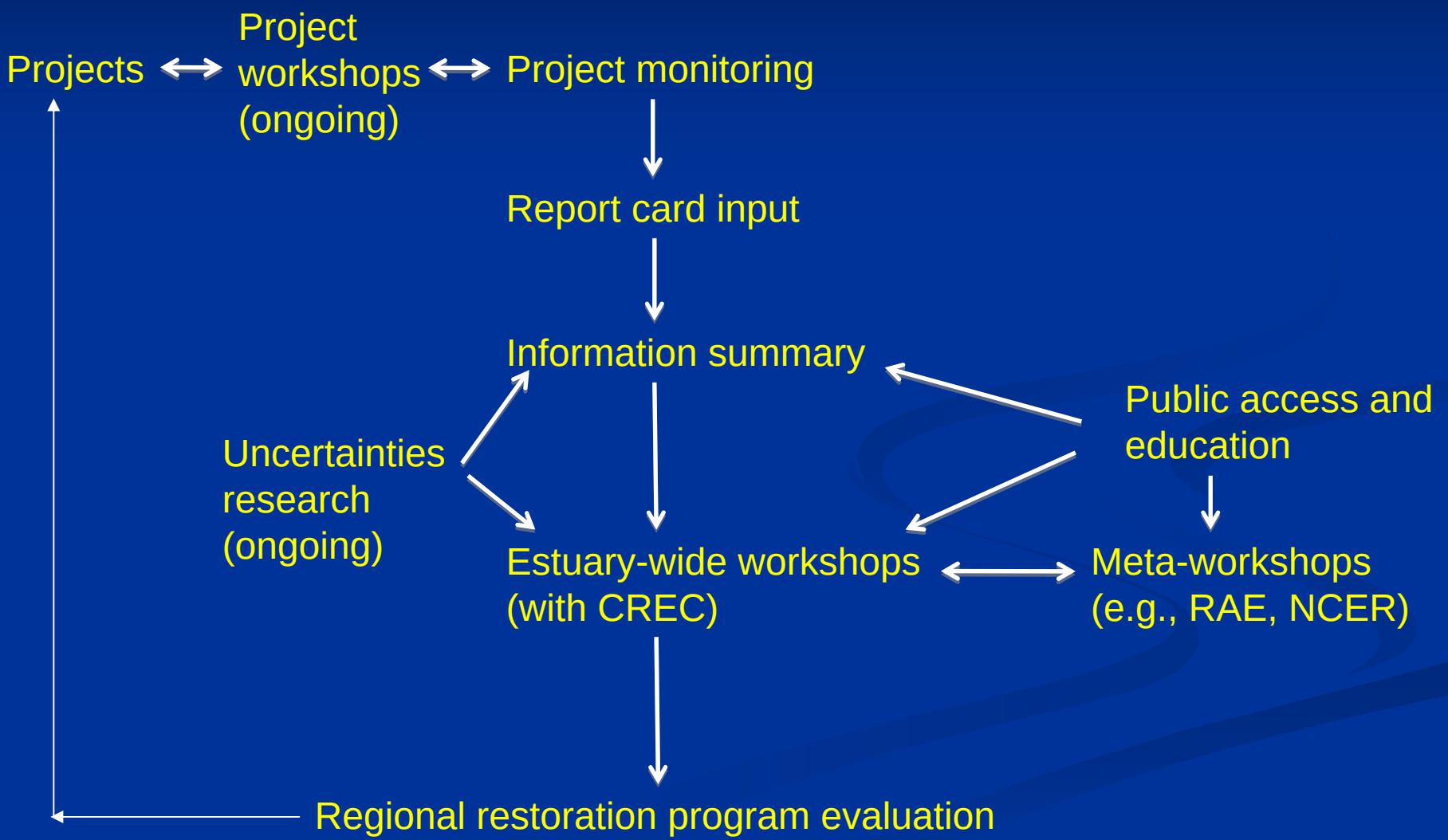
Approach

- Initiate AM workshops
- Focus on adaptive 'learning' for most projects
  - what can and have we learned?
  - how can we improve the success?
- Use a subset of projects where specific manipulations can be done to evaluate key uncertainties (e.g. JBH Refuge)
- Use a set of common protocols
- Use a combination of extensive and intensive monitoring
- Use a simple site evaluation 'report card' for all projects
- Submit report cards to central location
- Access research that addresses uncertainties

Integration

- AM Working Group
- Workshops
  - Project (program) level - to discuss progress, resolve issues, identify uncertainties, make decisions, implement next steps
  - Estuary-level – discuss projects and programs, present and discuss results, actions taken, lessons learned (e.g., held a day before CREC)
  - Meta-level – summary of basic CRE findings; examine and compare with information from other systems; participate in AM workshops in other regions…*enhance opportunities to learn*
- Dissemination of Information

How the Pieces Fit Together



Adaptive Management Decision-Making

- What is the goal for the project?
- What are the highest priority projects?
- What projects have the biggest impact on the broader ecosystem?
- What is the best approach to restore a site to meet its goal?
- What should be done if the project is not meeting its goal?
- When should the corrective action be implemented?
- What is the best way to assess and report effectiveness?

Regional Collaborations

- AM would not work without regional collaborations
- Ecosystem restoration partners, e.g., BPA, Estuary Partnership, have expressed interest in regional AM
- Our regional AM framework has national applications

National Context

- The need for AM in restoration is clearly being promoted nationally
  - National Research Council report (NAS 2004)
  - Corps of Engineers (Environmental Advisory Board)
  - Department of Interior Technical Guide (Weimer et al. 2007)
  - American Water Resources Association (2006)
- Huge ecosystem restoration projects are underway and in the works
- CRE AM is progressing and contributing to national needs

Closing

Really though, adaptive management is just……

Common Sense

Acknowledgements

- Co-authors: Dr. Heida Diefenderfer, Gary Johnson, Doug Putman, Dr. John Skalski
- Practitioners – CREST, CLT, & consultants
- Researchers – NOAA, UW, USGS, & PNNL
- State Agencies – Oregon and Washington
- Portland District COE
- Estuary Partnership

For more information, please contact
Blaine D. Ebberts @ (503) 808-4763