



## ECOSYSTEM SERVICES RESEARCH PROGRAM

BUILDING A SCIENTIFIC FOUNDATION FOR SOUND ENVIRONMENTAL DECISIONS

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# The Ecosystem Services Research Program

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USEPA

Science Advisory Board Presentation  
Environmental Processes and Effects Committee

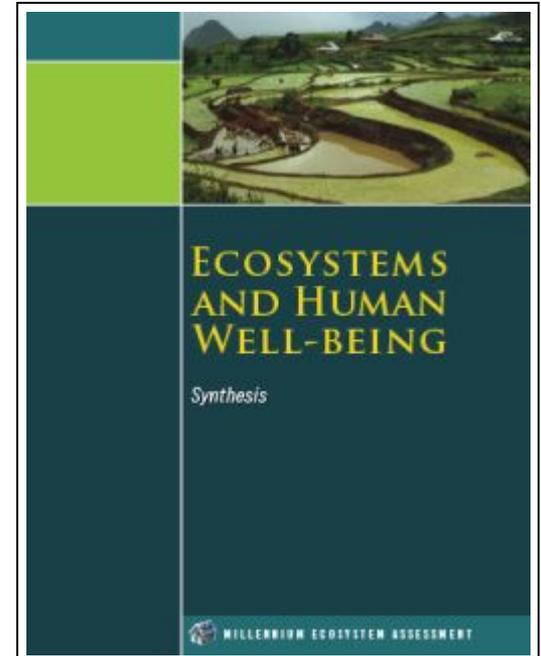
July 14, 2009

# Presentation

- How did get here?
- Where are we going?
- Evidence of acceptance
- Elements of the ESRP Strategy
- Nitrogen as an integrating theme
- Highlights of changes in response to EPEC.
- Other influential SAB reports
- Our Next Steps

## Millennium Ecosystem Assessment

- All aspects of human well-being are dependent upon nature and the world's ecosystems
- Unless we account for the full value of ecosystem services, humans will continue to degrade and deplete natural systems.



## ESRP's role is to provide the science to

- Clarify this dependence,
- Describe the full range of values, and
- Quantify what we know about different services – their status, trends, thresholds, trade-offs.

## Vision

A comprehensive theory and practice for quantifying ecosystem services so that their value and their relationship to human well-being, can be consistently incorporated into environmental decision making.

## Goal

Transform the way decision makers understand and respond to environmental issues by making clear the ways in which our management choices affect the type, quality and sustainability of the services we receive from ecosystems.

## Oregon State Senate Bill 513

Sponsored by Senator DEVLIN; Senator ATKINSON, Representatives GARRETT, GILLIAM

### SUMMARY

**Establishes policy regarding ecosystem services. Makes legislative findings regarding ecosystem services.**

**Encourages state agencies to take certain actions related to ecosystem services and ecosystem services markets.**

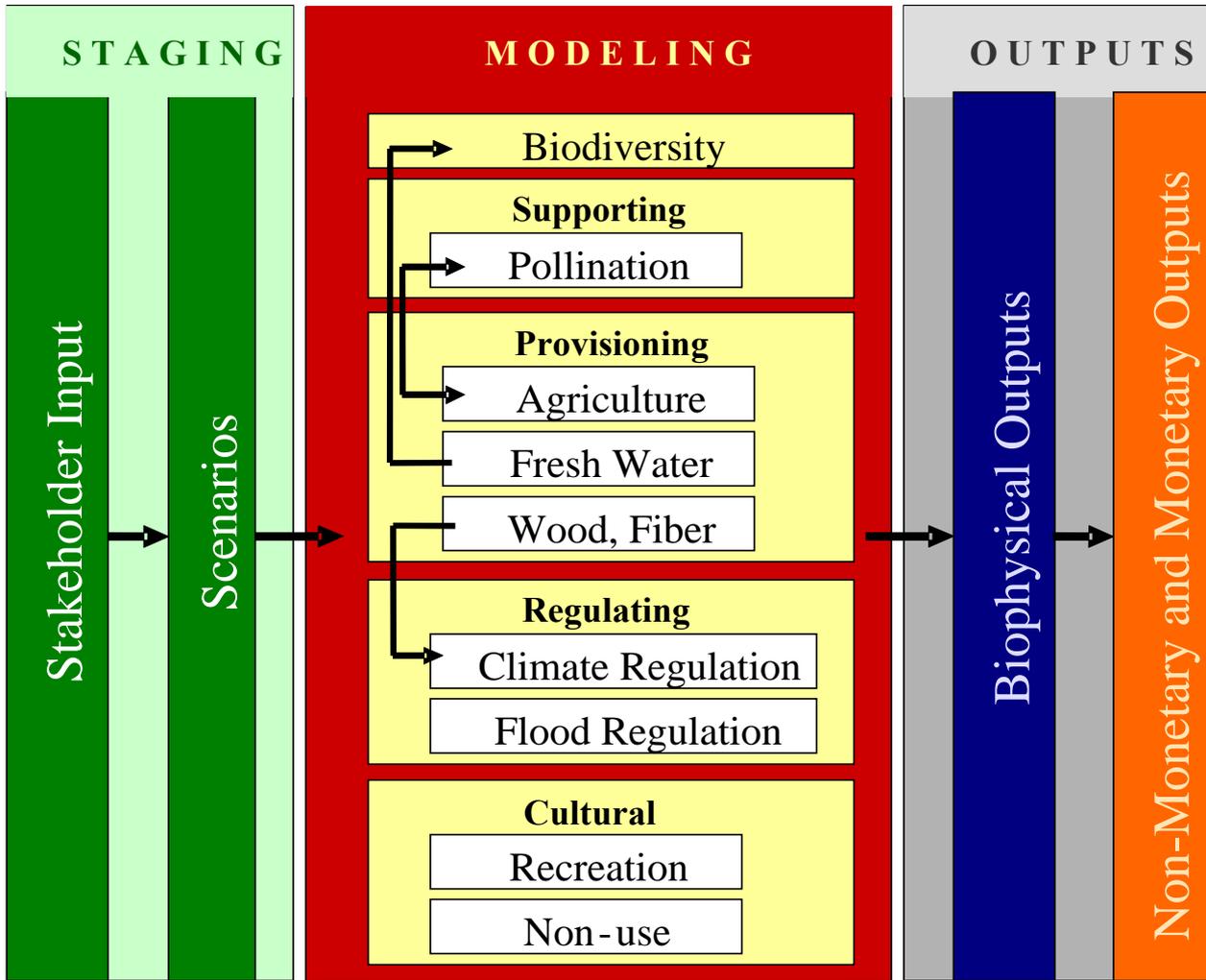
**Requires Sustainability Board to convene ecosystem services markets working group.**

*[Appropriates moneys from General Fund to Sustainability Board for purpose of ecosystem services markets working group.]*

## A BILL FOR AN ACT

- (1) “Adaptive management mechanisms” means the processes of implementing programs in a scientifically based, systematically structured approach that tests and monitors assumptions and predictions in management activities and then uses the resulting information to improve programs and management activities.**
  
- (2) “Ecological values” means clean air, clean and abundant water, fish and wildlife habitat and other values that are generally considered public goods.**
  
- (3) “Ecosystem services” means the benefits that human communities enjoy as a result of natural processes and biological diversity.**
  
- (4) “Ecosystem services market” means a system in which providers of ecosystem services can access financing to protect, restore and maintain ecological values, including the full spectrum of regulatory, quasi-regulatory and voluntary markets.**
  
- (5) “Payment for ecosystem services” means arrangements through which the beneficiaries of ecosystem services pay back the providers of ecosystem services.**

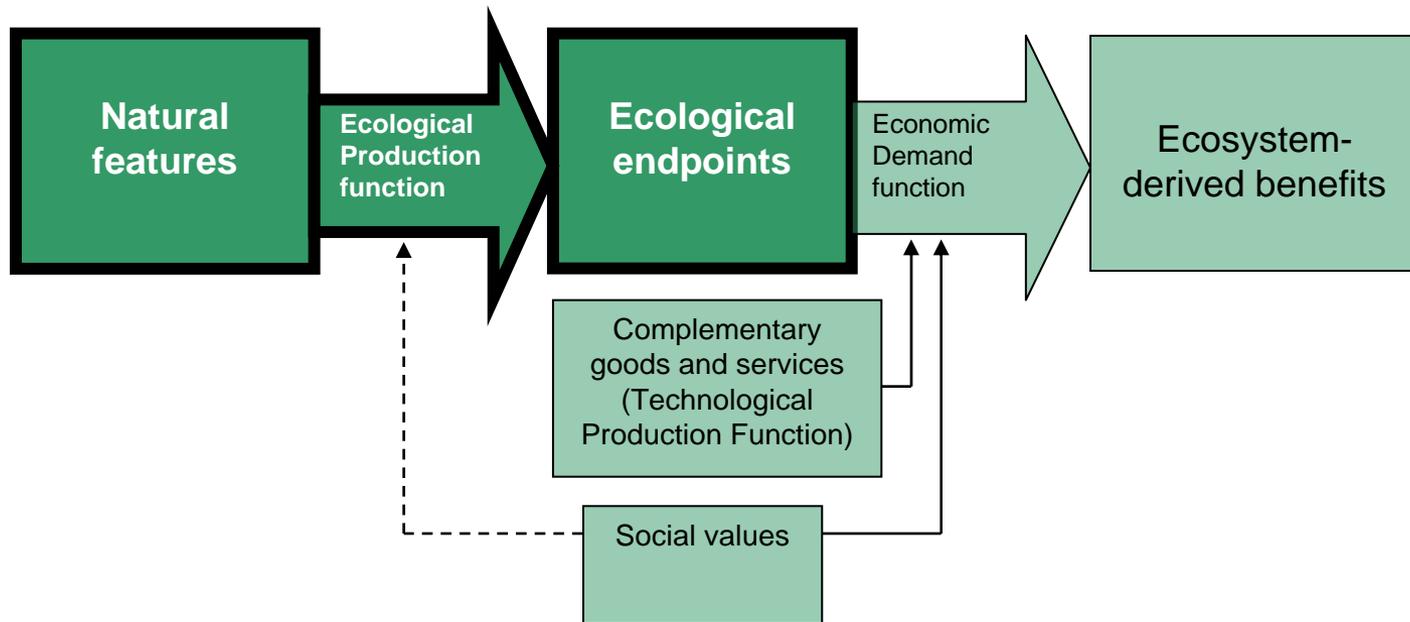
**SECTION 2. It is the policy of this state to support the maintenance, enhancement and restoration of ecosystem services throughout Oregon, focusing on the protection of land, water, air, soil and native flora and fauna.**



Modified from MEA by Taylor Ricketts, Natural Capital Project

# Ecosystem Services Framework

Lisa Wainger and Jim Boyd



# High Level Research Questions

## **Pollutant-Based Ecosystem Services Research**

How does a regulated pollutant—nitrogen—affect, positively and negatively, the bundle of ecosystem services at multiple scales?

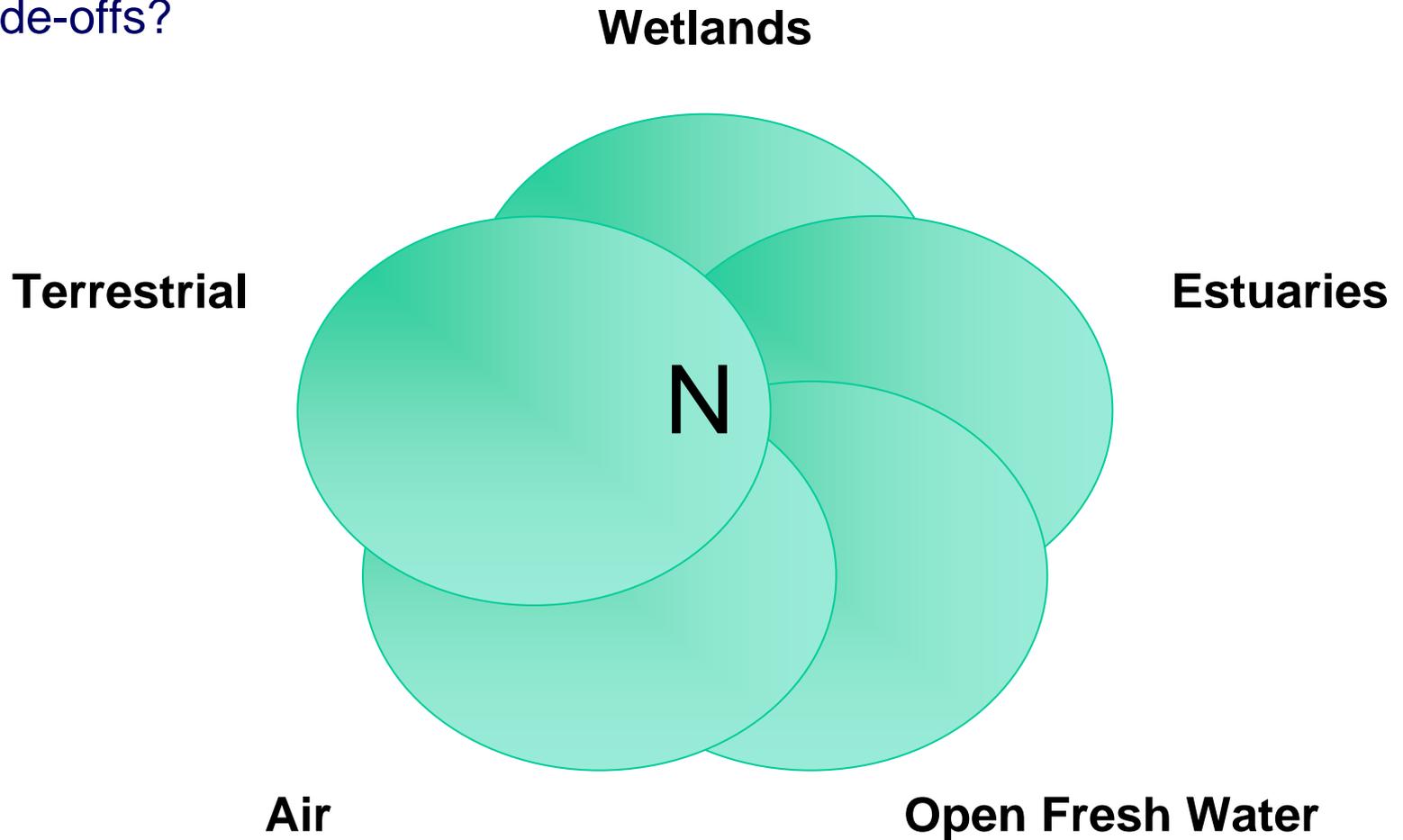
## **Ecosystem-Based Ecosystem Services Research**

How does the bundle of ecosystem services provided by selected ecosystem types—wetlands and coral reefs—change under alternative management options at multiple scales?

## **Place-Based Ecosystem Services Research**

How does the bundle of ecosystem services for all ecosystems within an ecosystem district change under alternative management options?

What are the levels of N, above or below which ecosystem services are enhanced, maintained, and/or degraded and how do we manage to balance these trade-offs?



# Stressors / Pressures on Wetlands

**Infrastructure Development**



**Hydrologic Modification**



**Invasive Species**



**Pollution**



**Land Use Change**



**Resource Exploitation**

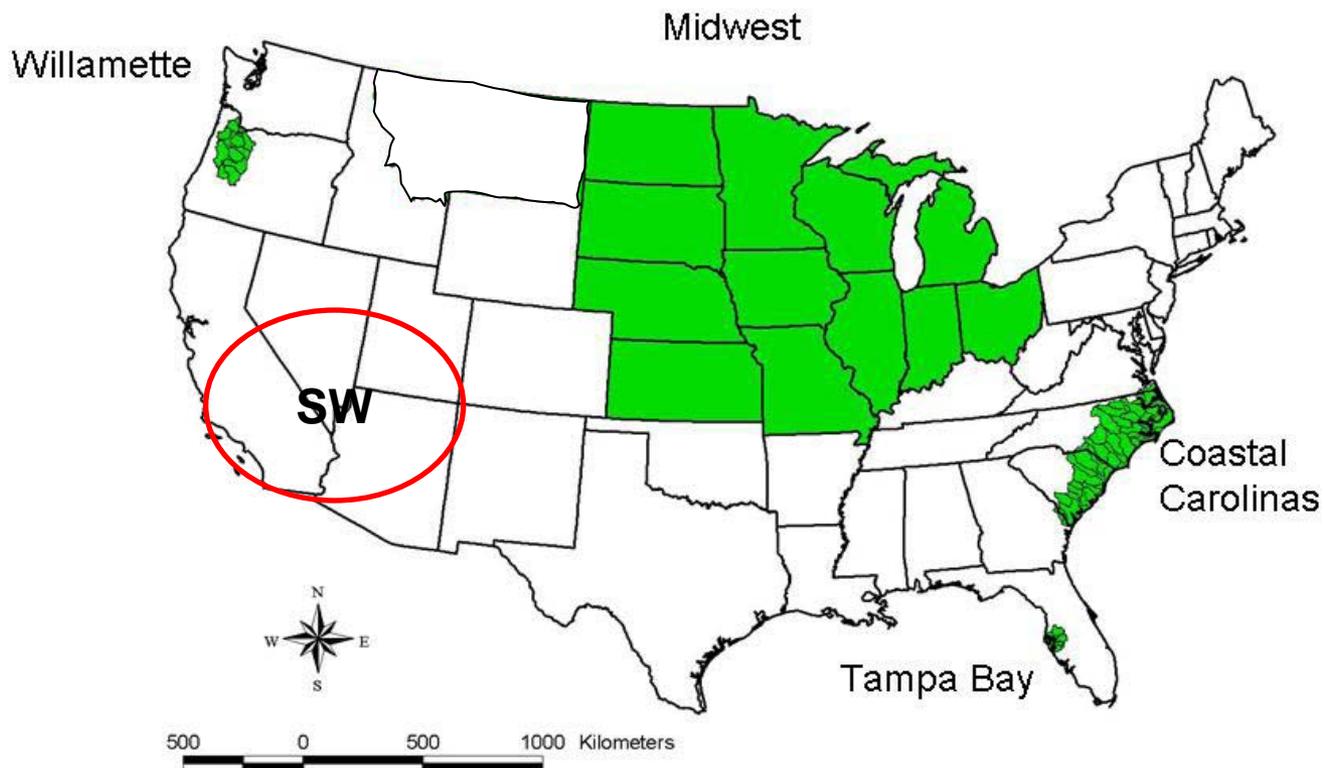


## Coral Reefs



- Under current policies and management, coral reef ecosystem services are perceived as free and limitless
- Despite high visibility, dedicated research, and focused management, coral reefs are declining
- Our goal is to provide the tools and information to ensure that the **full value** of coral reef services is incorporated **routinely** into all levels of management and decisions made in the reef watershed and coastal zone.

## Place Based Studies



**Opportunity for coordinated site work: Standardization, Scaling, Applicability Testing, Collective Strength,....**

## Cross-Cutting Themes

- Landscape characterization and mapping
- Modeling
- Inventory and Monitoring
- Wetlands and nitrogen

Across all elements and place-based projects

- Education and outreach
- Human health and well-being
- Valuation
- Decision Support

## ESRP Organizational Matrix

Projects and Long term Goals →		LTG 3 Pollutant-Specific Studies: 6%	LTG 4 Ecosystem Specific Studies: 23%			LTG 5: Community Based Demonstration Projects: For National, Regional, State and Local Decisions 28%					Theme Leads			
	Cross Program Themes and Research Objectives	Nitrogen (6%)	Wetlands (22%)	Coral Reefs (5%)	Willamette (11%)	Tampa Bay (4%)	Mid-West (4%)	Coastal Carolinas (8%)	Southwest (1%)					
Integration, Well-Being, Valuation, Decision Support, Outreach and Education  LTG 1 9%	Ecosystem Services and Human Well-Being (3%)									Laura Jackson				
	Valuation of Ecosystem Services									Wayne Munns-- Consultation Committee				
	Decision Support (6%)									Ann Vega				
	Outreach & Education to				<b>Budgetary Information</b>  ~\$71M  ~272 In-house scientists and support staff					Open				
Inventory, Map, and Forecast Ecosystem Services at multiple scales  LTG 2 31%	Landscape Characterization and Mapping (12%)													Anne Neale
	Inventory and Monitoring of Services (14%)													Mike McDonald
	Modeling (5%)									Tom Fontaine-- Consultation Committee				
Pollutant Specific Studies LTG 3	Nitrogen (6%)									Jana Compton				
Eco-system Specific Studies LTG 4	Wetlands (22%)									Janet Keough				
<b>Project Area Leads</b>	Rick Linthurst and Iris Goodman	Jana Compton	Janet Keough	Bill Fisher	David Hammer	Marc Russell	Randy Bruins/ Betsy Smith	Deborah Mangis	Nita Tallent-Halsell	Rick Linthurst and Iris Goodman				
Hal Walker: Place Based Coordinator														

## Overview of ESRP response to EPEC recommendations

Summarizing our responses using these categories:

1. Responses related to ESRP in-house research
2. Collaborations with clients for ESRP results
3. ESRP research as relates to other SAB Committees
4. Partnerships and proposals to build capacity for transdisciplinary research.

## 1. Responses related to ESRP in-house research

- Refined our unique systems approach to ecosystem service assessments
- Implemented and refined our cross-program organizational structure — thus, improving coordination and integration
- Increased in-house talent, learning, and capacity via seminars, developing implementation plans, and expert hires
- Created an economics committee
- In process to create a modeling committee
- Re-cast decision support
- Conducted promising exploratory work in human well-being; will expand as new opportunities arise
- Added U.S. Southwest to round out Place-based studies

## 2. Collaborations with EPA clients for ESRP results

- Increased recognition of ecosystem services within EPA Program Offices
- Developed closer ties to EPA Office of Water and Office of Air and Radiation
- Developed new collaboration with Office of Science Policy on reactive Nitrogen
- Created new opportunities for Regional participation: Regional Environmental Monitoring and Assessment Program redirection

### 3. ESRP research as it relates to other SAB Committees

- a. Committee on Valuing Ecological Systems and Services (CVPESS), 2009.
- b. SAB Report: *Advice to EPA on Advancing the Science and Application of Risk Assessment in Environmental Decision-making*, 2007.
- c. SAB Integrated Nitrogen Committee, ongoing.

. . . . Summary highlights follow for each of these.

# SAB

## Valuing the Protection of Ecological Systems and Services

A REPORT OF THE EPA SCIENCE ADVISORY BOARD



Technical briefing, June 10, 2009 from the SAB Committee  
Chair, Dr. Barton H. (Buzz) Thompson, Jr., and Vice Chair, Dr.  
Kathleen Segerson

## Longer-term research and data-sharing recommendations to improve ecological valuation

To determine, predict, and quantify ecological changes related to EPA actions or decisions

- Continue and strengthen EPA/ORD's research program focusing on ecosystem services

- Support development of quantitative ecosystem models and baseline data on ecosystem service flows

- Collect data to parameterize ecological models and valuations for site-specific analysis or transfer to other contexts

- Continue and accelerate research to develop key indicators for use in ecological valuation

## Valuations to support regional partnership activities

A major, untapped opportunity exists to use valuation at the regional level

Additional resources will be needed to take advantage of this opportunity

EPA should avoid “short cuts” in using “off the shelf” values or transferring value information from one site to another

EPA can use and evaluate methods not used traditionally, where formal benefit assessment is not required or appropriate

EPA should develop a system for regional offices to document valuation efforts and share them with other regions, NCEE and ORD

Many aspects of ESRP enable unique contributions to improved methods for ecological risk assessment. These include its:

### Transdisciplinary design

→ mitigates against “fragmentary risk analyses”

### Strength in quantitative landscape ecology

→ analyses that cross multiple space- and time-scales

### Systematic examination of effects of non-chemical stressors on ecosystem services

→ both chemical and non-chemical stressors can be better evaluated together.

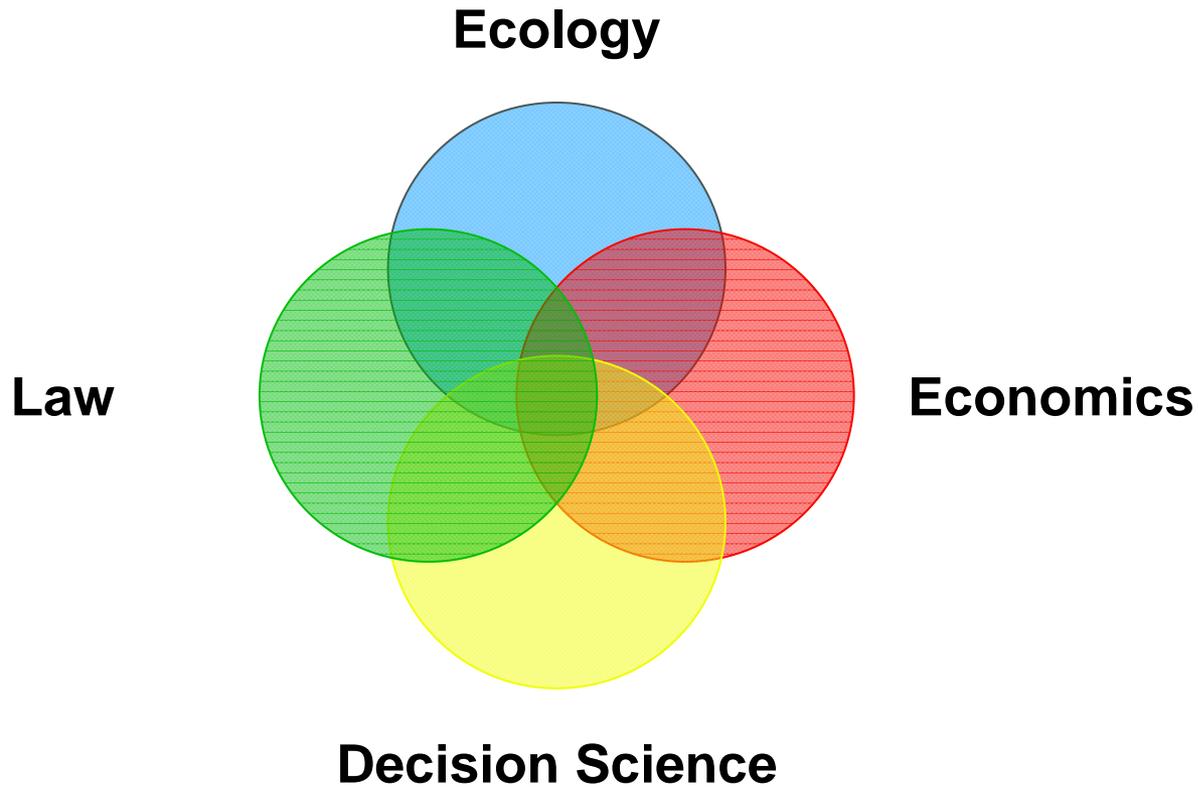
Many aspects of ESRP enable unique contributions to improved methods for ecological risk assessment (continued)

- Ecosystem service **assessments that lend themselves to meta-analyses**
  - ESRP's Place-Based studies and Wetlands studies.
- Studies that include **Bayesian analyses and "weight of evidence"**
  - preliminarily begun in Decision Support and in Modeling themes pioneering efforts to **identify how social attributes of ecosystem services translate to assessment endpoints that meet decision maker needs**
  - as being investigated in ESRP's Monitoring and in Place-Based studies.

### 3. C. SAB Integrated Nitrogen Committee (INC)

- This Committee is ongoing – no final recommendations yet available.
- Deliberations note that using ecosystem services to assess nitrogen effects provide a rich context for understanding complex interconnections, can contribute to setting priorities for action, and can be used to identify indicators / endpoints, costs, benefits, and risks.
- INC notes ESRP's research in reactive nitrogen and ecosystem services.

## Transdisciplinary Approach to Conserving Ecosystem Services



## 4. Partnerships and proposals to build capacity for transdisciplinary research.

- A. Announced establishment of public-private National Ecosystem Services Research Partnership.
- Received more than 160 expressions of interest from:
    - State resource agencies
    - Regional planning councils
    - Interdisciplinary research institutions
    - Professional ecological organizations
    - NGOs
    - Businesses
    - Federal agencies
    - Legal practitioners

## 4. A. Public-private National Ecosystem Services Research Partnership, cont.

- This partnership can help “scale-up” capacity needed to refine and test ecosystem service concepts at the requisite ecological, social, and institutional scales – which is beyond what any single organization or agency can accomplish.
- ESRP’s role is to facilitate establishment of partnership.
- Partnership efforts to begin Fall, 2009.

#### **4. B. Proposal: *Supplying ecosystem science in support of ecologic and economic sustainability***

- Goal is to expand the Agency's effective budget for environmental protection
- Methods include developing and testing new institutions, policies, and investment structures via:
  - Regional Centers of Excellence for Ecosystem Services
  - Expanding Community of Practice for Ecosystem Services
  - Providing incentives for collaborative partnerships
  - Applying ecosystem service concepts to inform investments in alternative energy and green infrastructure
  - Educating the next generation of transdisciplinary environmental professionals.

## With Your Input: Proposed Next Steps

- Maintain current components, approach and activities
- Increase publication presence in the literature
- Make National Ecosystem Services Partnership a reality
- Translate applicability to the Agency