



**SAB EPEC Review of the  
Ecological Assessment Action Plan  
February 22, 2012**

***Ecosystem Services as  
Assessment Endpoints in ERA  
RAF Technical Panel***

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RAF Ecological Oversight Committee



# ***Ecosystem Services Endpoint Technical Panel***

## **Objective:**

- Develop general principles for incorporating ES into ERA

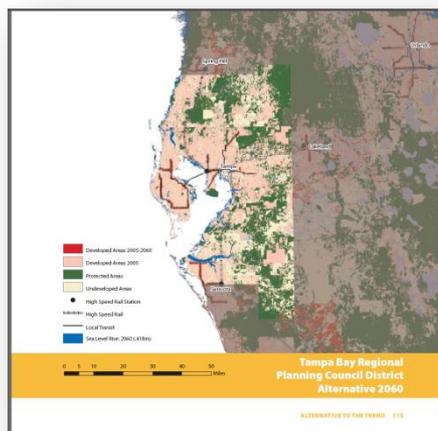
## **Value to EPA:**

- Improved means of communicating risk and informing risk management decisions
- Costs/benefits of protection and remediation cast in terms of contributions to human well being through identification and quantification of service losses/gains



# What are Ecosystem Services?

- Outputs of ecological functions or processes that contribute to human welfare or have the potential to do so in the future\*\*



Impact



Effect



Alternative  
Futures

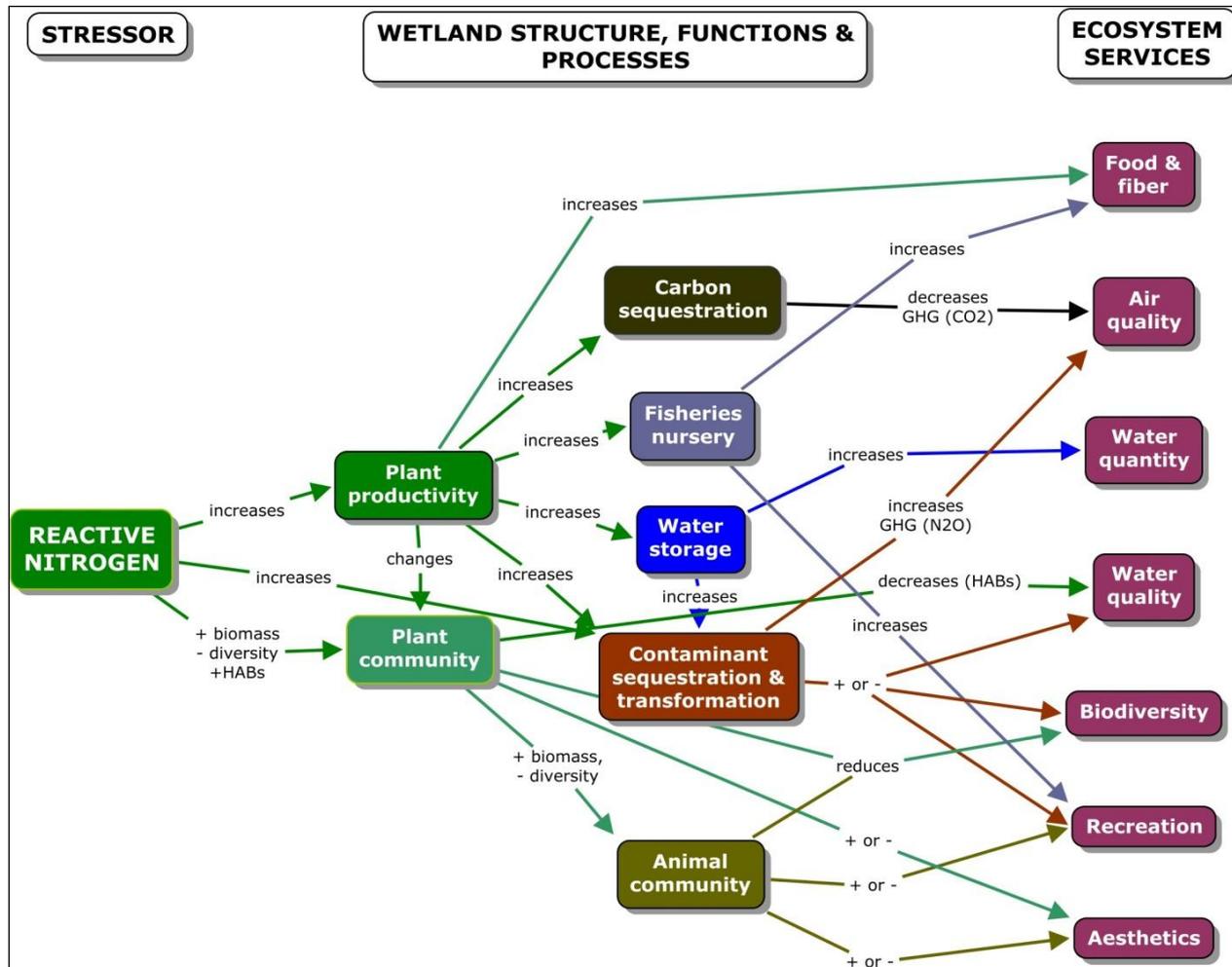
Ecosystem

Benefits

\*\*EPA (2005) Ecological Benefits Assessment Strategic Plan



# Nitrogen Deposition Example





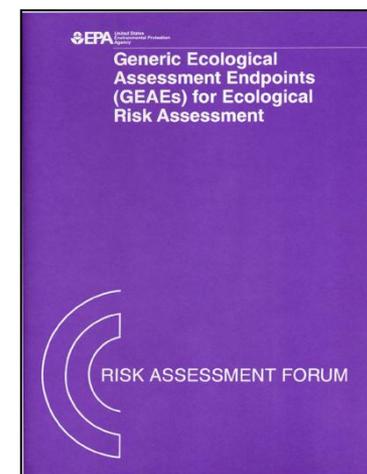
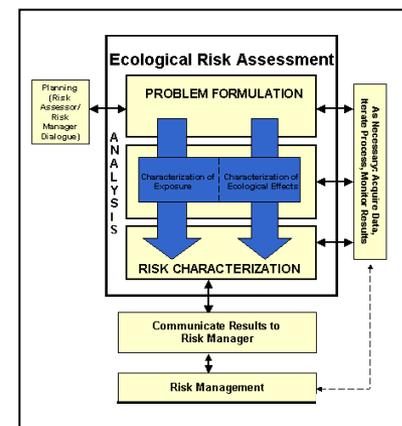
# Ecosystem Services Endpoints

## Project evolution:

- Identified need (2009 DC colloquium)
- Proposal developed and approved (2010)
- Conference calls and white paper drafts (2011+)
- Target for completion (2012)

## Proposed products:

- White Paper establishing the technical basis for complimenting traditional assessment endpoints with ES assessment endpoints
  - Case studies of applying the ES concept in ERA
- Guidance on using ES as ERA assessment endpoints
  - Addendum to the RAF GEAE report





## ***Panel Members***

- Mace Barron, Wayne Munns (co-chairs - ORD)
- Glenn Suter (chair EOC - ORD)
- Lawrence Martin (RAF staff)
- Michele Mahoney (OSWER)
- Tanja Crk (OPP)
- Gina Ferreira (Reg 2)
- Lynne Blake-Hedges (OPPT)
- Christine Davis (OAR)
- Bill Swietlik (OW)
- Steve Jordan, Anne Rea (ORD)

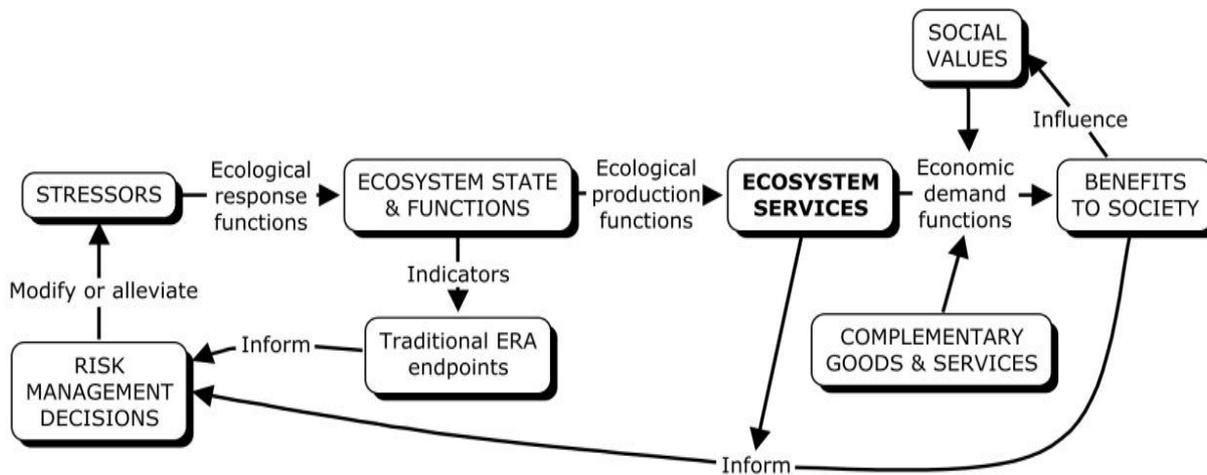




# Proposed Products

## Draft RAF White Paper

- ES as assessment endpoints
- Linking traditional measurement endpoints to ES assessment endpoints
- Linking GEAEs to ES assessment endpoints
- Lessons from case studies
  - NOxSOx standards, lampricide, stream invertebrates, T&E, CERCLA site
- Recommendations
- Appendices (valuation methods, case study descriptions)





# Proposed Products

EPA  
Generic Ecological  
Assessment Endpoints  
(GEAEs) for Ecological  
Risk Assessment



## Proposed GEAE addendum

- Based on White Paper
- Table translating traditional GEAEs to ES endpoints

Ecosystem Service	GEAE	Ecological Assessment Endpoint	Measurement Endpoint	Benefit to Humans	Potential Valuation Methods
Food production (e.g., catchable, edible fish for recreational, commercial, and subsistence uses) – a final ecosystem service	Population abundance and production	Population abundance, population size structure, recruitment index, presence/absence of game species, mortality, morbidity, survival, tissue contaminants, growth, production, extirpation, taxa richness, structure/function	Number of fish, number of species, number of lesions and tumors, size of individuals, feeding characteristics, numbers in age groups, LC50, LOEC, kills	Nutrition, recreation, income, enjoyment of catching/preparing food, survival	Market value and rents for commercial fisheries; travel cost, willingness to pay (choice modeling), actual expenditures for recreational fisheries; nutritional values
Clean water (i.e., for drinking, and for domestic, industrial, and agricultural uses) – a final ecosystem service	Ecosystem function	Ecosystem functions such as nutrient and flood water retention and organic matter degradation	Dissolved oxygen, fecal coliform, metals, TSS, pH, temperature, priority pollutants, flow, and storage volumes	Support for life, health, and commerce	Extraction and treatment costs; water rights trading values; contingent valuation; production values for industry and agriculture, benefits transfer
Clean air (for breathing and visibility) – a final ecosystem service	Ecosystem function	Plant community uptake and deposition of pollutants	Atmospheric concentrations of-- carbon monoxide, ozone, nitrogen oxides, particulates, HAPs, etc., visual distance	Support for life and health	Pollution control costs; contingent valuation, avoided health care costs
Stable climate – a final ecosystem service	Ecosystem function	Plant community production	CO <sub>2</sub> concentration trends, temperature trends, sea level	Support for life and health	Greenhouse gas control avoided costs; contingent valuation, benefits transfer,



# Charge Question

- Does the panel's approach and proposed products capture the most important opportunities to incorporate ES into EPA's ecological assessment methods?

