NCER
3rd National Conference on Ecosystem Restoration
The Spirit of Cooperation

The Role of Ecosystem Services in Habitat Equivalency Analysis

Matt Wartian, April Smith & Kathleen Mittmann

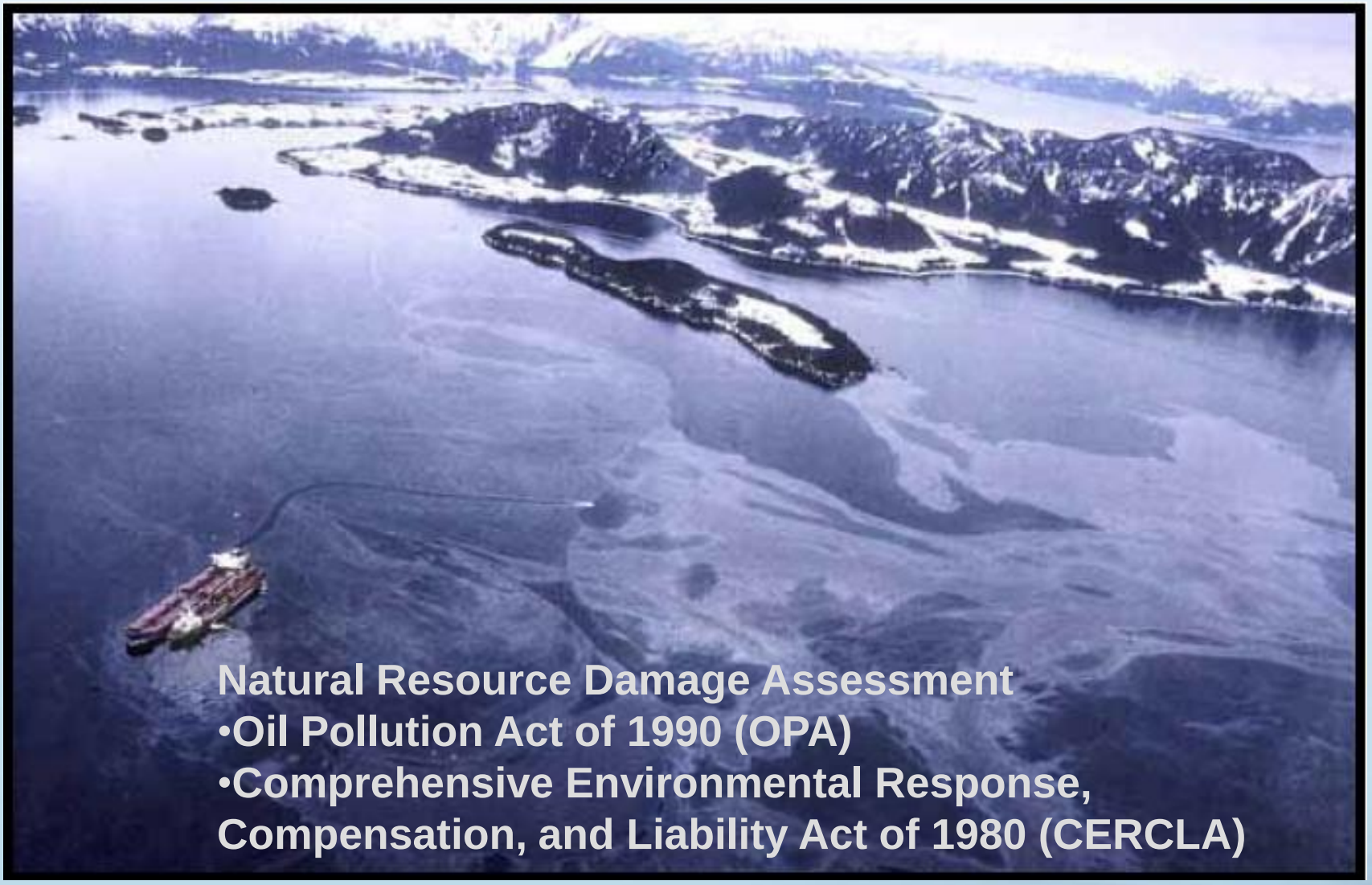
Environmental Solutions | Property Redevelopment | Design/Build Construction | Green Buildings | Clean Energy

August 3, 2011

WESTON SOLUTIONS
The Trusted Integrator for Sustainable Solutions

"…evidently we're leaking some oil & we're going to be here for a while."

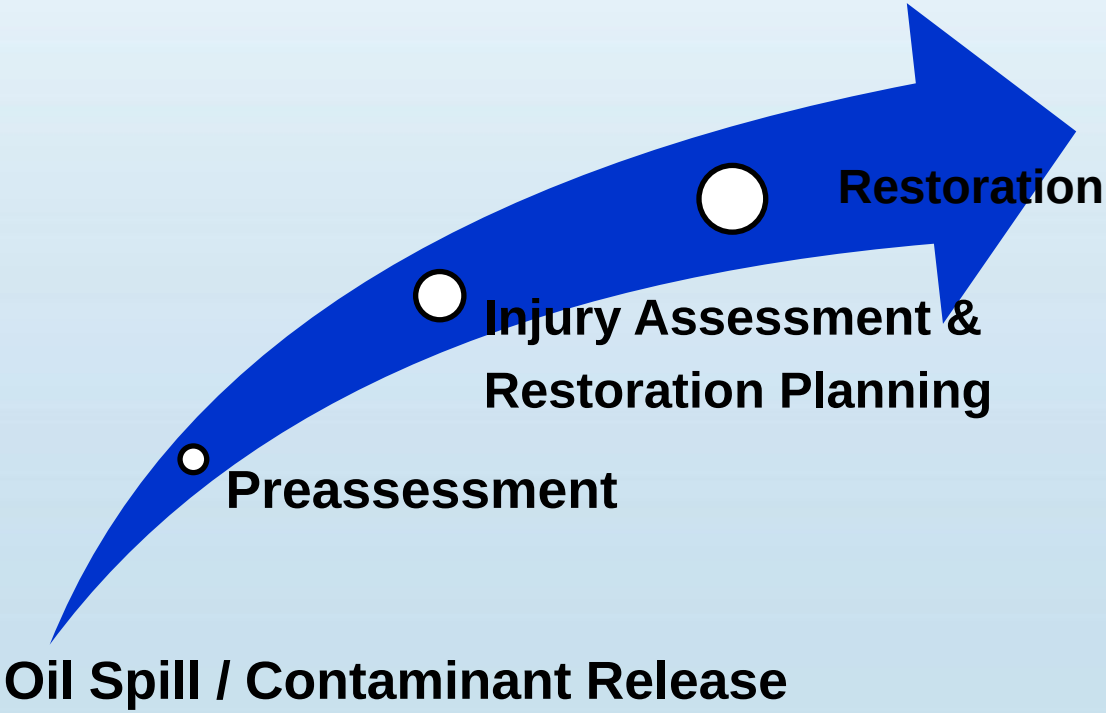
– Capt. Hazelwood Exxon Valdez



Natural Resource Damage Assessment

- **Oil Pollution Act of 1990 (OPA)**
- **Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)**

Natural Resource Damage Assessment



- OPA & CERCLA allow for the collection of damages
- Calculate the monetary cost of restoring injuries to natural resources

Deepwater Horizon Oil Spill

Deep Water Horizon Oil Spill

Injury Assessment & Restoration Planning

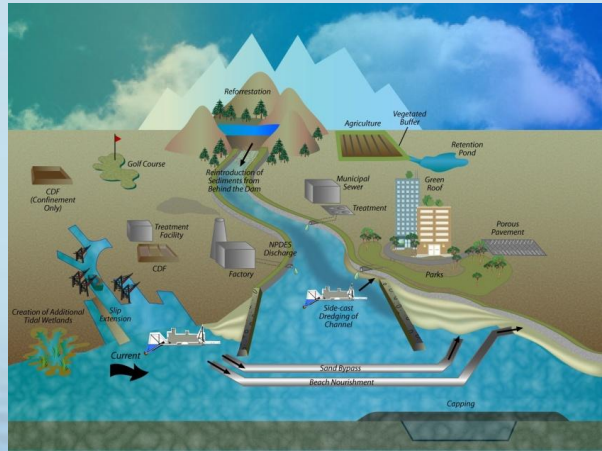
1. Quantify the Magnitude of the Injury
   - Changes in physical conditions
   - Community shifts
   - Loss of services relative to baseline
2. Develop Restoration Options
   - Compensate for the effects of the resource injury
3. Scale Preferred Restoration Options
   - Habitat Equivalency Analysis
   - Resource Equivalency Analysis
   - Monetization

Habitat Equivalency Assessment

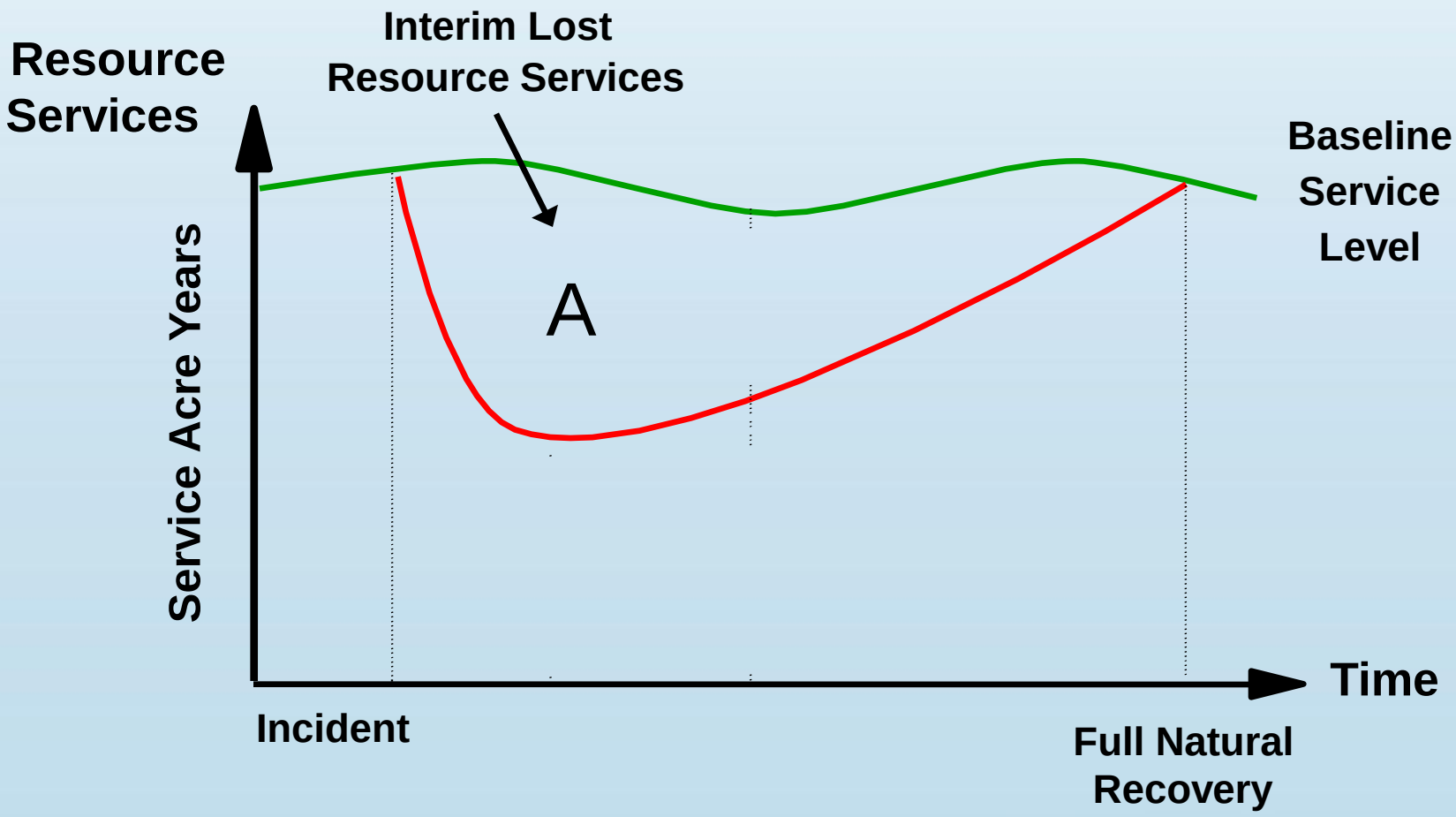
- Balance losses & gains of ecosystem services
- Service-to-service approach to restoration scaling
- Avoided controversy of monetary valuation and high cost of contingent valuation
- Can be used for interim and permanent losses
- Does not require the presence of the same habitat

Assessment of Ecosystem Services

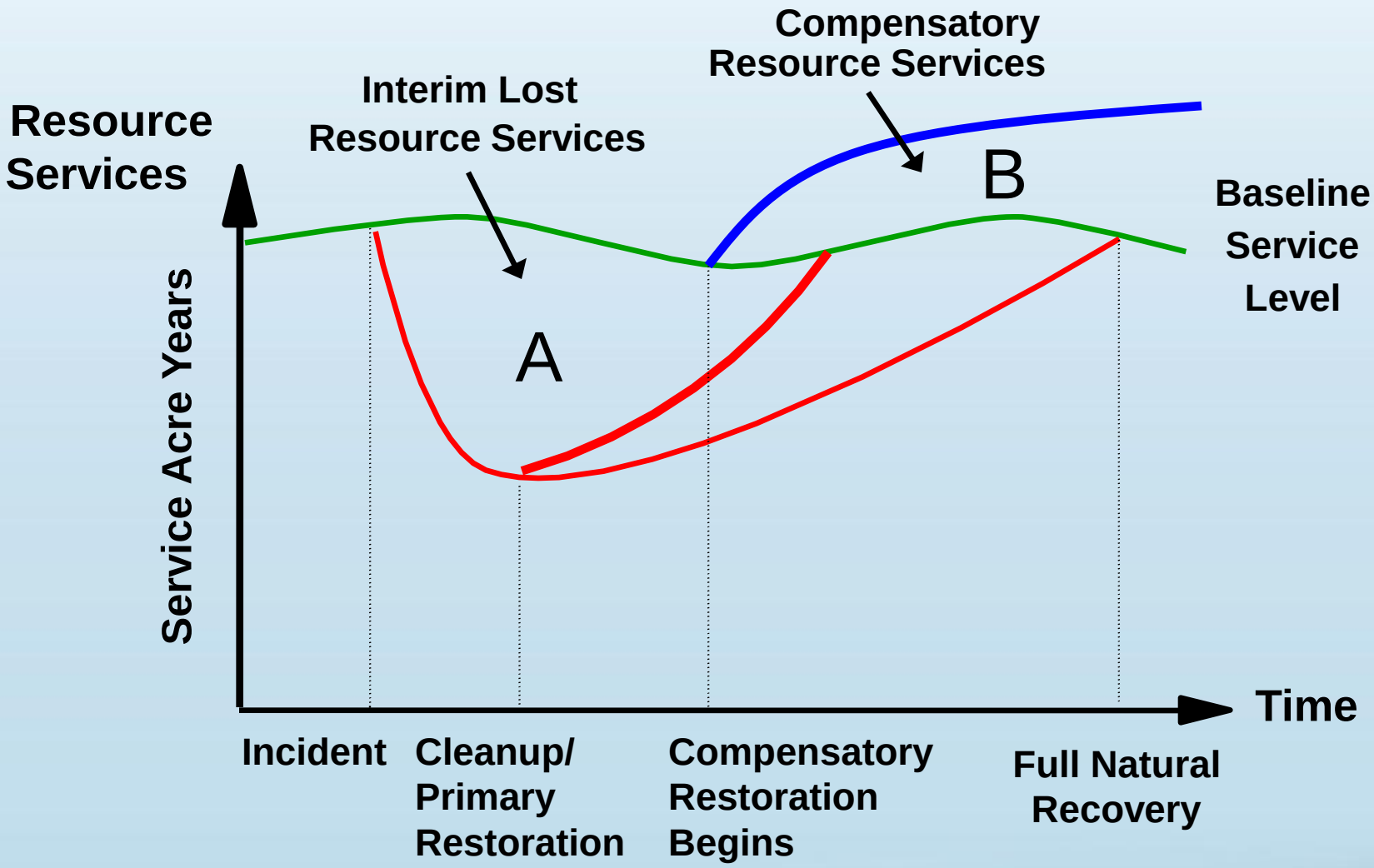
- Classification of Services
  - Supporting, provisioning, regulating, & cultural
  - Environmental & human services
- Valuation Approach for:
  - Addressing compensatory mitigation
  - Selecting remedial alternatives
  - Determining restoration success



Restoration Scaling



Restoration Scaling

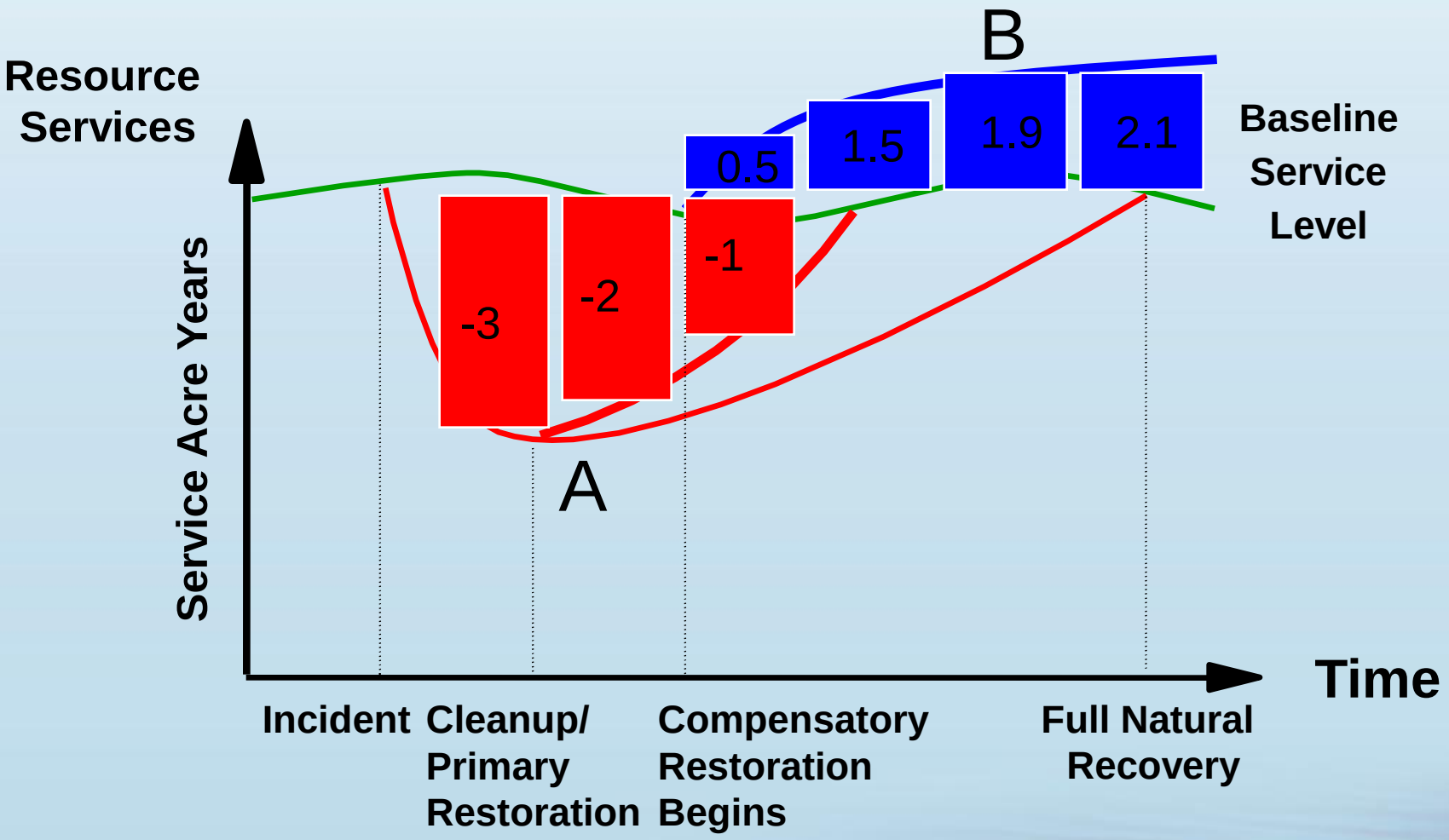


Calculation of Resource Services

- Unit of measure: service-acre-years (SAY) =
  - the benefits that one-acre of habitat provides per year
  - discount rate often applied → DSAYs

- Basic HEA formula for Compensatory Restoration
  - Calculated for each category of injury
  - Sum of Area x % Loss of Services across all Years

Restoration Scaling



HEA Case Study – Out of Kind Mitigation

- Craney Island 580 Acre Land Expansion
- Dredged Material Beneficial Use
- Loss of Soft Bottom & Water Column Habitat
- NRDA HEA Analysis by Charles Peterson (U. of North Carolina)

HEA Case Study - Out of Kind Mitigation

Determination of Lost Ecosystem Services:

- Based on measured densities and literature assessments of production
- Benthic Community Production Loss
  - Up to 34,000 kg/yr
- Zooplankton Production Loss
  - Up to 76,000 kg/yr

- Total Loss of Production
  - Up to 110,000 kg/yr

HEA Case Study - Out of Kind Mitigation

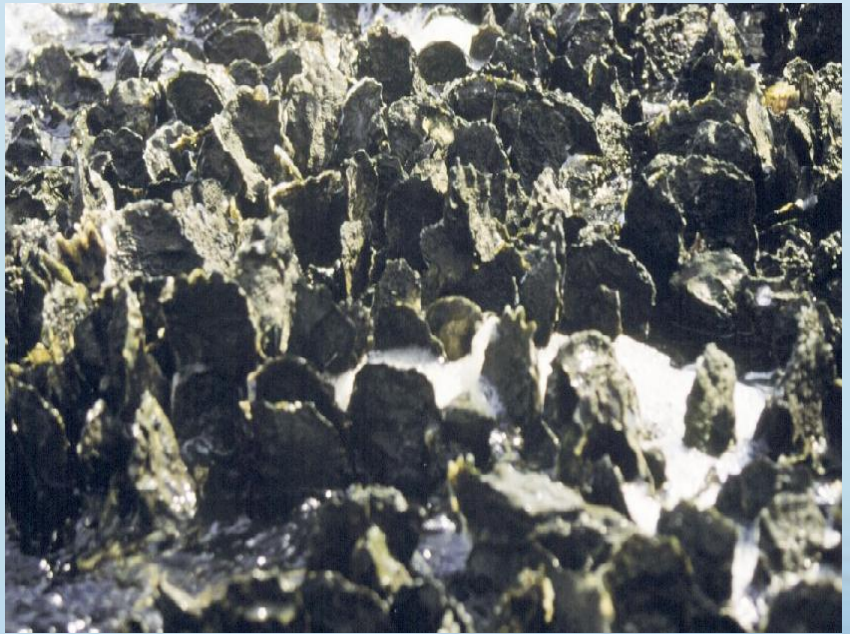
Restoration Options included:

Oyster Reef Creation

Salt Marsh Restoration

Oyster Reef Restoration Scaling

- Estimated Annual Production of 12,000 kg/yr/acre
  - Based on Production : Biomass
- Factored Success Rate of 50%
- Factored Annual Production = 6,000 kg/yr/acre



Salt Marsh Restoration Scaling

- Estimated Annual Primary Production
- Secondary Trophic Transfer to:
  - Insects – 98 kg/yr/acre
  - Detritivores – 130 kg/yr/acre
  - Herbivores – 9 kg/yr/acre
  - 5 % Margin of Safety
  - 100% increase for Habitat Structure Effects

- Total Annual Production = 450 kg/yr

Comparison of Restoration Alternatives

Habitat	Annual Production	Restoration Acres Needed	
Oyster Reef	6000 kg/yr/acre	110,000/6000	18 acres
Salt Marsh	450 kg/yr/acre	100,000/450	244 acres

Mitigation Includes:

- Wetland Restoration
  - Restoring Hydrology
  - Revegetation
- Oyster Reef Creation
- Sediment Remediation

Summary

- HEA provides a model for Ecosystem Services assessments
- Avoids the controversial monetization of services
- Provides a process for assessing potential for out-of-kind mitigation
- NRDA and HEA will continue to be major drivers of restoration

Questions?