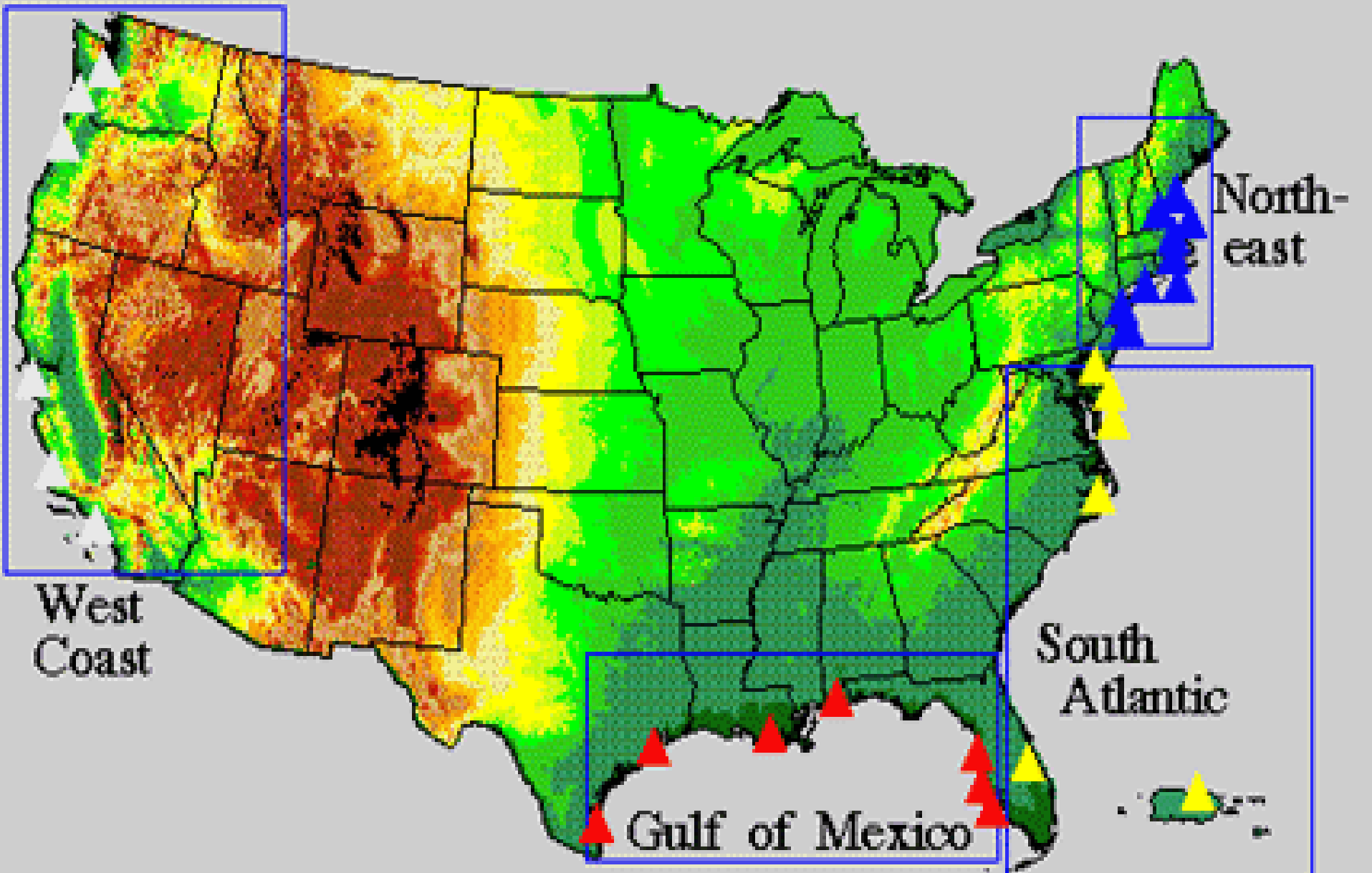
Science to Policy—The Lower Columbia River Estuary Partnership

Debrah Marriott & Catherine Corbett

Lower Columbia River Estuary Partnership

www.lcrep.org

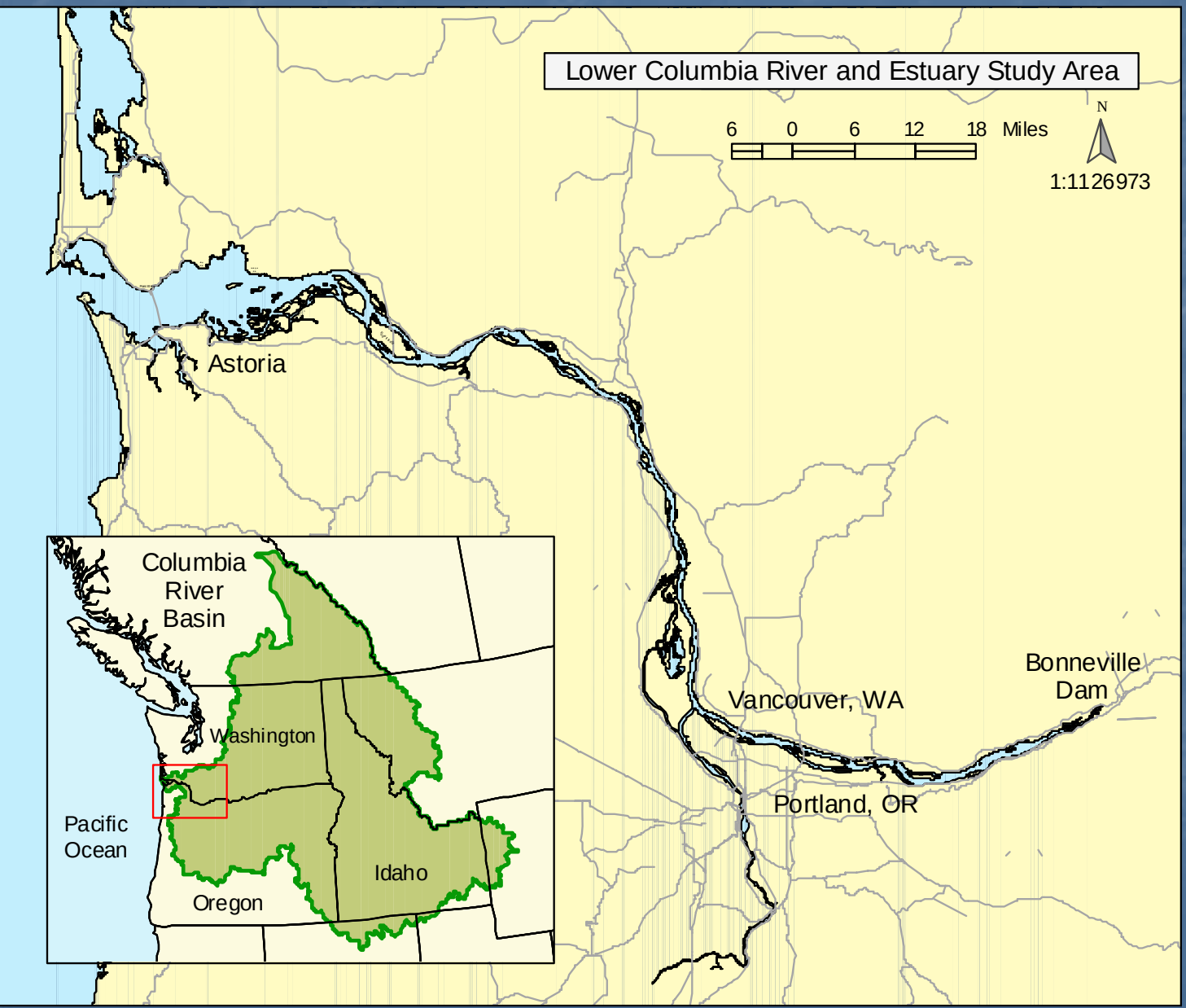
National Estuary Programs



National Estuary Program

- EPA program: Section 320 of Clean Water Act
- 28 in the United States
- A unique planning process based on collaborative decision-making and consensus
- A process that requires stakeholders participate in the development and implementation of a *Comprehensive Conservation and Management Plan (CCMP)*
- Science Based, On-the-ground focused

Columbia River Estuary



146 Mile Stretch – both sides of the river from Bonneville Dam to the Pacific Ocean

History of Estuary Partnership

- 1990: Oregon and Washington form the Bi-State Water quality committee to examine the health of the Lower Columbia River
  - Identify declining water quality, diminishing habitat, lack of focus on lower 146 miles, and institutional constraints as issues which became Estuary Partnership 7 priority issues
- 1995: the states of Oregon and Washington nominate the Lower Columbia River Estuary to the national estuary program
- 1996: Estuary accepted into Estuary Program and Management Committee Structure formed
  - stakeholders - fishing, ports, governments, agencies, environmental interests, recreationists

- 1996-1999: The Management Committee developed the Comprehensive Conservation and Management Plan (Management Plan)
  - **Volume 1:** 43 actions to address priority issues focused on what is best for river and species
    - Biological Integrity
    - Impacts of Human Activity and Growth
    - Habitat Loss and Modification
    - Conventional Pollutants
    - Toxic Contaminants in Sediments
    - Institutional Constraints
    - Public Awareness and Stewardship
  - Three categories: Habitat, Pollutant Reduction, Education and Information

Volume 2: Monitoring Strategy: Aquatic Ecosystem Monitoring Strategy for the lower Columbia River *(with USGS)*

- Long-Term Monitoring Strategy
- Ecosystem Condition Status and Trends
- Conventional Pollutants
  - Toxic Contaminants
  - Habitat Monitoring
  - Fish Sampling
  - Exotic Species
  - Nutrients, Primary Productivity, Food Web
- Data Management

Volume 3: Assessment of Management Responsibilities
over 150 agencies of government with responsibilities
Over 2000 non-profits of various sizes

- October 1999: Governors of Oregon and Washington and U.S. EPA sign the Implementation Agreement committing them to ensuring that actions in Management Plan are implemented. First two-state management plan for the Lower Columbia River, Management Plan is endorsed by the

Implementation 1999 to present

Goals

- **Protect the ecosystem and species-**restoring 16,000 acres of wetlands and habitat by 2010.
- **Reduce toxic and conventional pollution-** conducting long term monitoring and reducing contamination.
- **Provide information about the river to a range of audiences-** providing applied learning programs for children and enhancing coordination among public and private partners.

Estuary Partnership Niche

- **Big picture focus:** Complex ecosystem; multiple partners; diverse uses and issues
- **Builds capacity of partners and leverages resources:** Fill gaps and deliver tools, data, and information to the public
- **Removes barriers to better management:** Collaboration; convening; coordination

Aquatic Ecosystem Monitoring Strategy for the lower Columbia River, 1999

- Ecosystem Monitoring Project (EMP)
  - 2003 – present
  - Address habitat and toxic contaminant monitoring gaps and data management needs in lower Columbia River
  - On-going effort with UW, PNNL, USGS, & NOAA
- Supported by funding from BPA

EMP Phase 1: Contaminant Monitoring (USGS & NOAA)

Water

- Emerging contaminants (estrogenic compounds), copper, & pesticides

Suspended sediment and SPMDs

- PAHs, PCBs, DDTs, other pesticides, & PBDEs

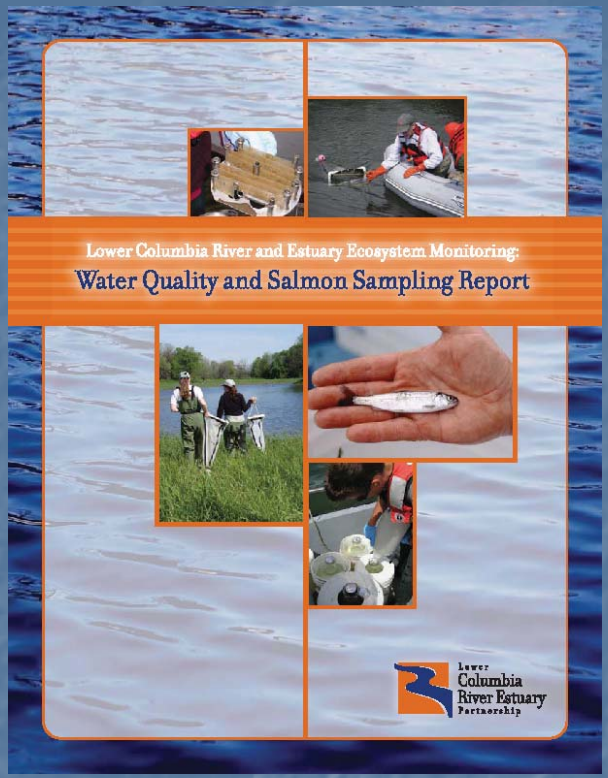
Juvenile Chinook salmon

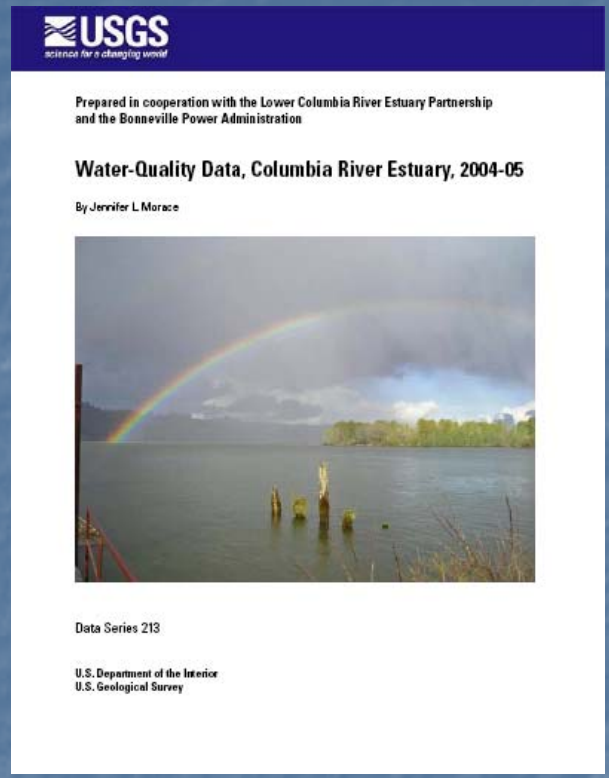
- Blood for vitellogenin exposure
- Stomach contents for contaminants in prey
- Bile for PAH metabolites
- Whole bodies for PCBs, DDT, & PBDEs
- Genetic stock samples

Results—take home points

- Chinook stocks from Columbia Basin are accumulating toxics in LCRE
- Contaminants of concern include traditional (DDT, PCBs) and emerging contaminants (estrogenic compounds, flame retardants)
- Urban, industrial areas contribute significantly to toxic contaminant loads in juvenile salmon
  - Highest PCBs, PAHs, and PBDEs in prey and fish from Portland to mouth
- Toxic reduction efforts are needed
  - Clean up, source control, precision agriculture, pesticide & drug take backs, and consumer education
- Contaminant monitoring is critical for assessing long-term trends, identifying emerging issues, and evaluating the success of toxic reduction efforts
- Contaminant monitoring and reductions will be important for effective habitat restoration

Resources





Report available at:

http://www.lcrep.org/pdfs/WaterSalmonReport.pdf

Water-quality data available at:

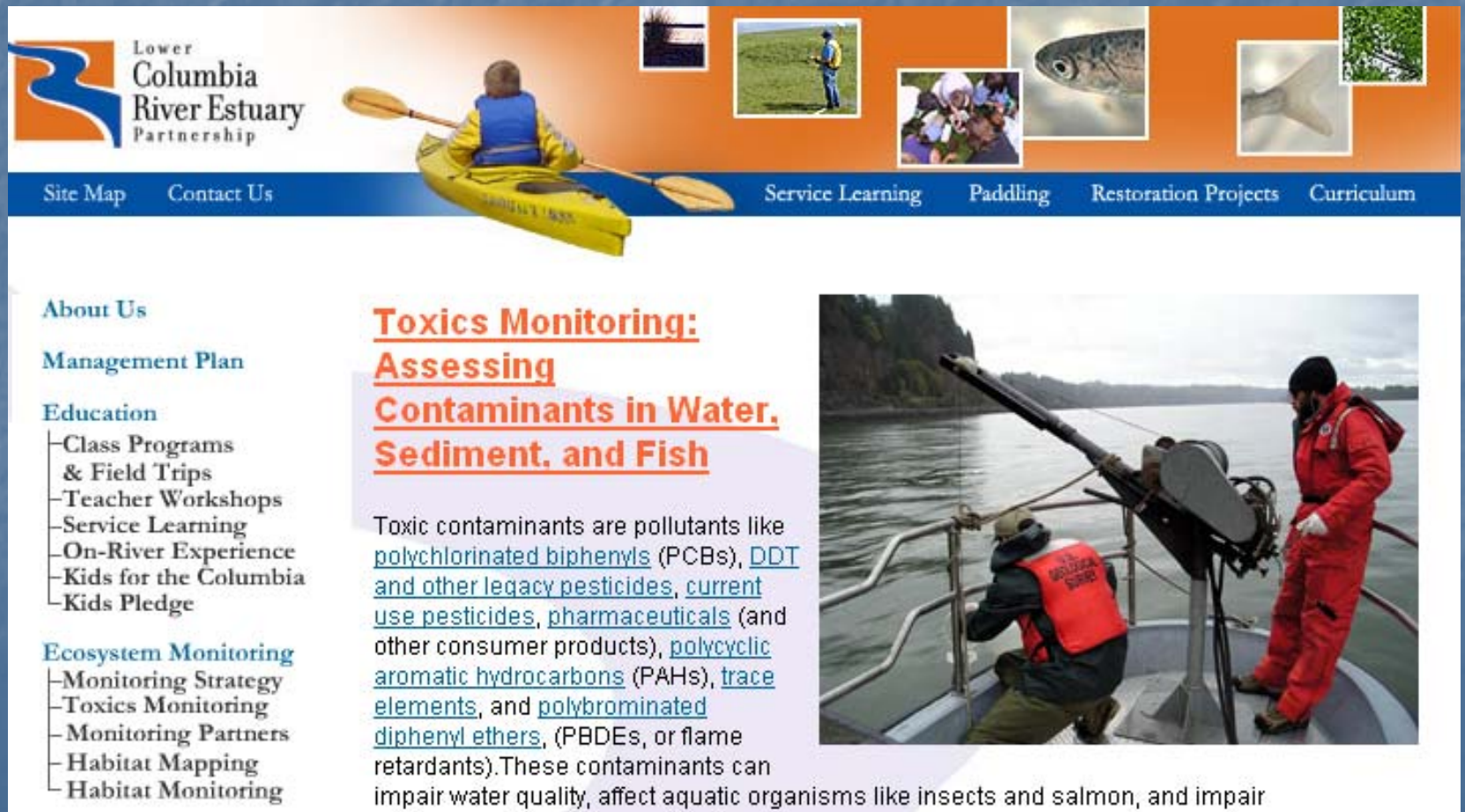
http://pubs.water.usgs.gov/ds213

Ecosystem Monitoring Project

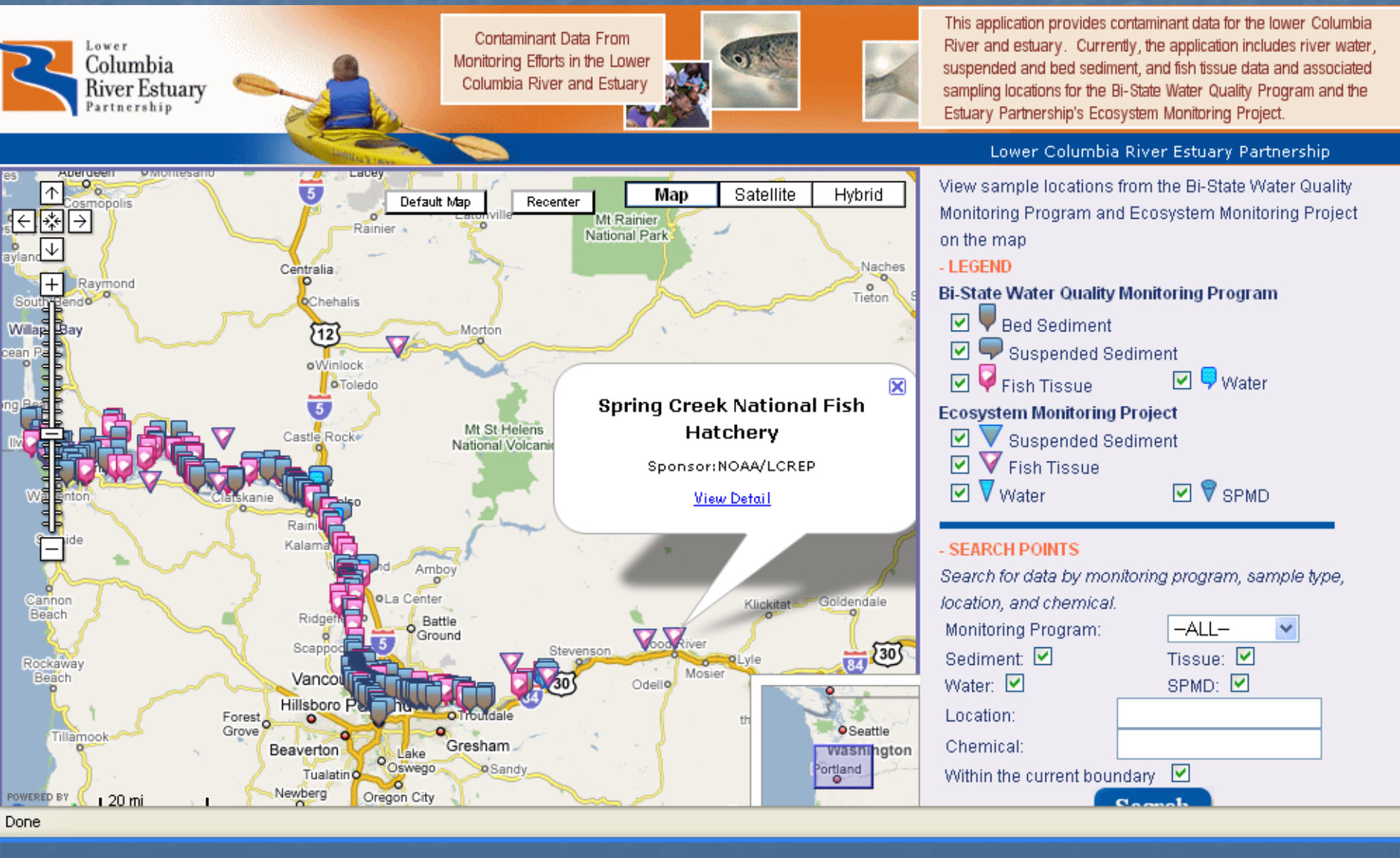
- Create CRE Ecosystem Classification to identify sampling locations
- Coordinated Habitat, Fish, and Prey Monitoring:
  - Vegetation monitoring (% cover along transects, species list, elevation)
  - Water quality (data loggers) and sediment (grain size along transects)
  - Fish sampling (species richness, abundance, CPUE, stock id, length, weight, stomach contents, otoliths for growth rates, marked/unmarked)
  - Fish prey (taxonomy, abundance, biomass, terrestrial versus aquatic origin)
- Provide Results Online on Estuary Partnership website: www.lcrep.org

Online Monitoring Information

- Supported by an EPA Regional Geographic Initiative Grant
- Developed fact sheets on contaminants of concern
- Incorporated information on Estuary Partnership's site



Interactive Maps

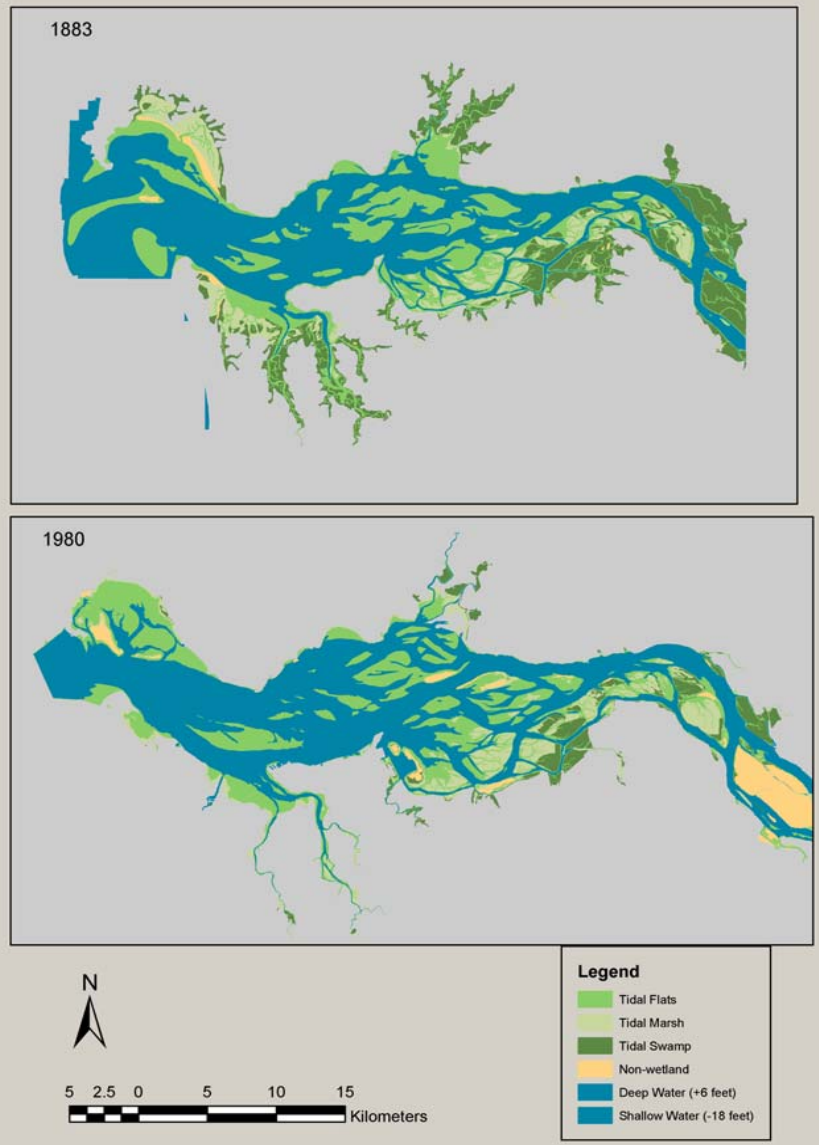


Habitat:

Historic Change in Columbia River Estuary, 1883-1980

Habitat changes:

- Diking for agriculture and shoreline development
- Loss of structural complexity via channelization and development
- Loss in productive capacity of ecosystem



Source: J. Burke, OSU modification of Thomas (1883)

Estuary Partnership's Role in Habitat Restoration

- **Restoration to date (by June 2008)**
  - > 4000 acres; >13,050 acres including partners
  - 30+ restoration sites with 85 partners

- **Techniques**
  - Dike removal or breaches
  - Removal or modification of tidegates and culverts
  - Removal/filling/plugging of drainage ditches
  - Placement of wood debris/structure for fish use

- **Increasing Strategic Selection of Restoration Sites using tools:**

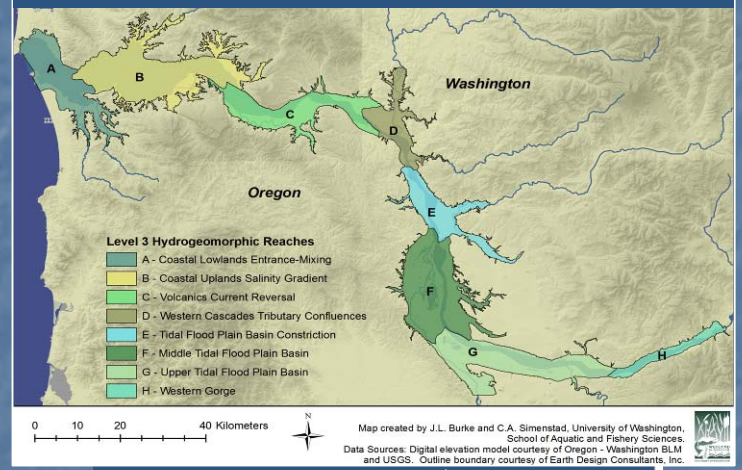
1. **Digital Shoreline Video and Inventory**
2. **Habitat Restoration Prioritization Framework**
3. **Estuarine Ecosystem Classification**
4. **Landowner and landuse considerations**
5. **Restoration Inventory**
6. **Partner's recovery plans (e.g., LCFRB, ODFW)**
7. **Results from ecosystem monitoring**

Lower Columbia River Estuary Partnership

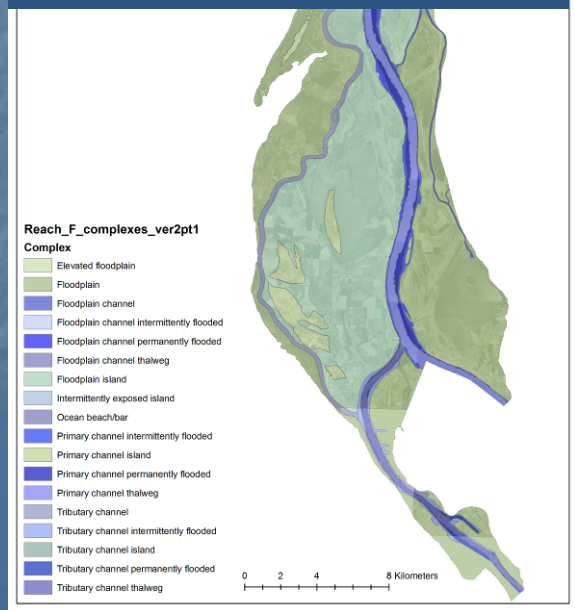
CRE Ecosystem Classification

- In estuaries, structures formed by hydrologic and geomorphic processes ("hydrogeomorphic structures") vary spatially and temporally and influence habitat conditions and biological communities.
- Research and monitoring programs develop "classifications" to categorize and stratify these structures and to provide a framework for structuring efforts.
- CRE Ecosystem Classification by UW, USGS, & EP

3-Hydrogeomorphic Reach

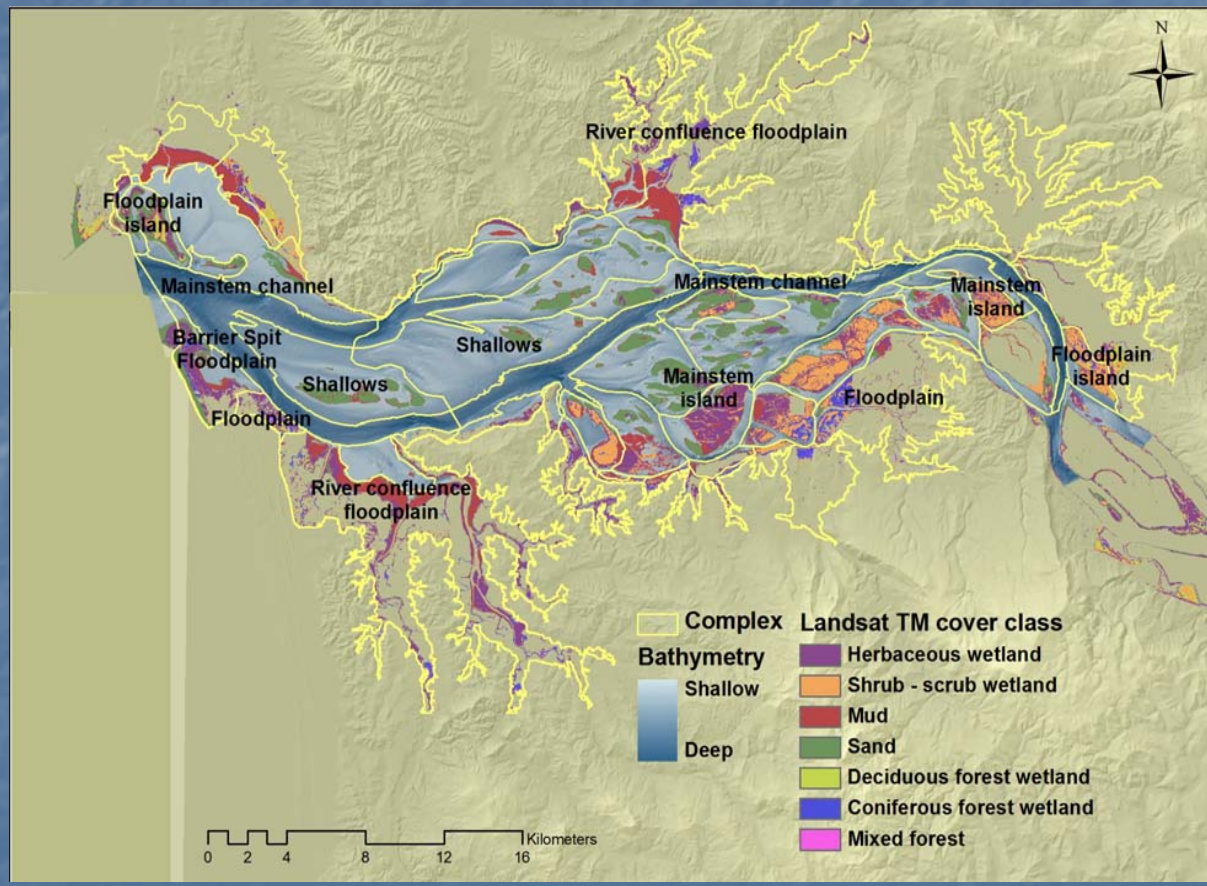


4-Complex



Applications:

- Ecosystem Monitoring Project
  - Identify sample locations
    - Stratify sampling by region
    - Further stratify by complex, catena and/or cover type
- Currently use wetland maps produced using our data and NWI maps
- Prioritizing locations for habitat restoration
  - Using landscape metrics
  - Number of patches
  - Types of patches
  - Edge density

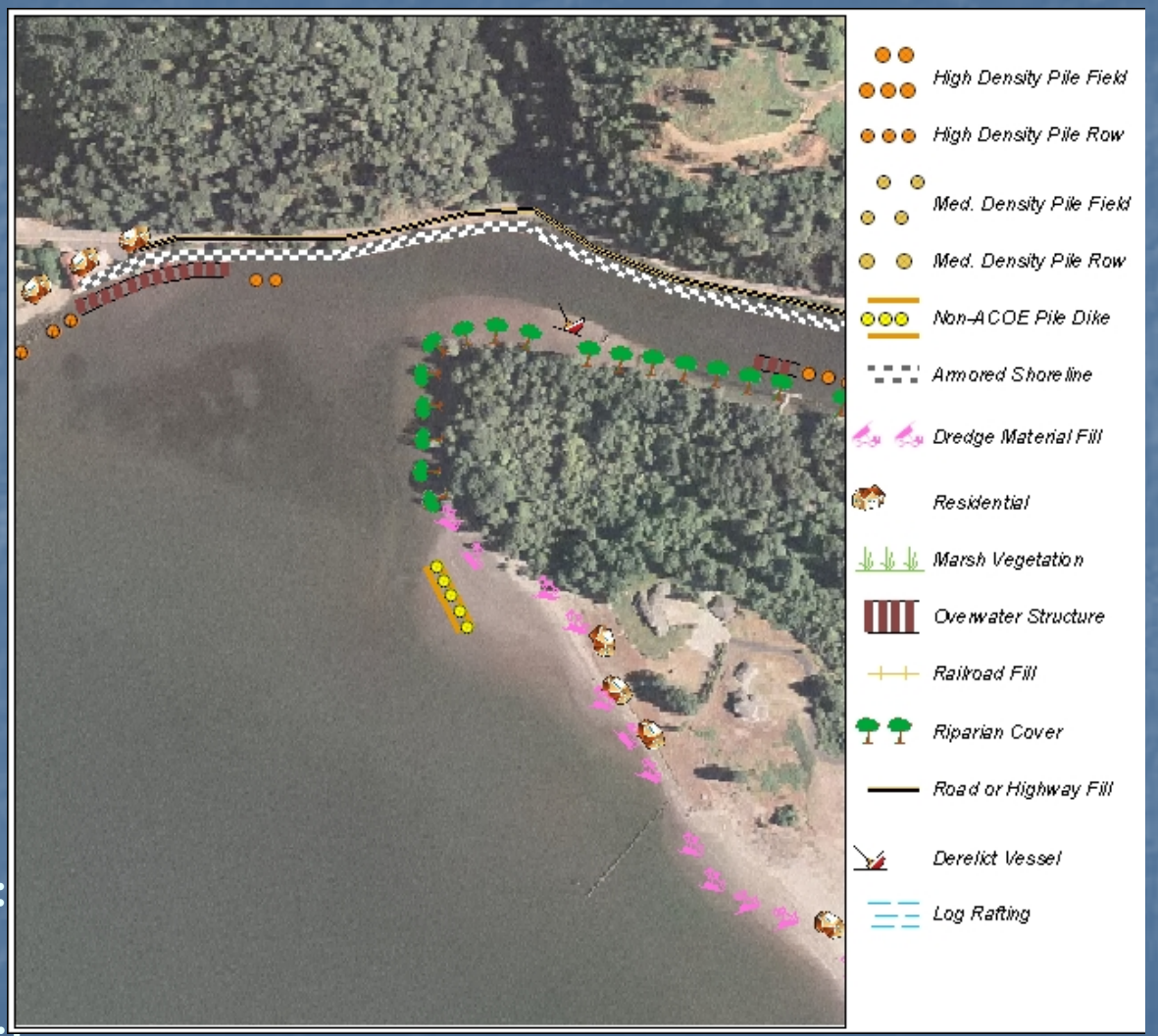


From Burke et al. 2005 presentation @ ERF

Digital Shoreline Mapping and Inventory

Location and categorization of the following shoreline features:

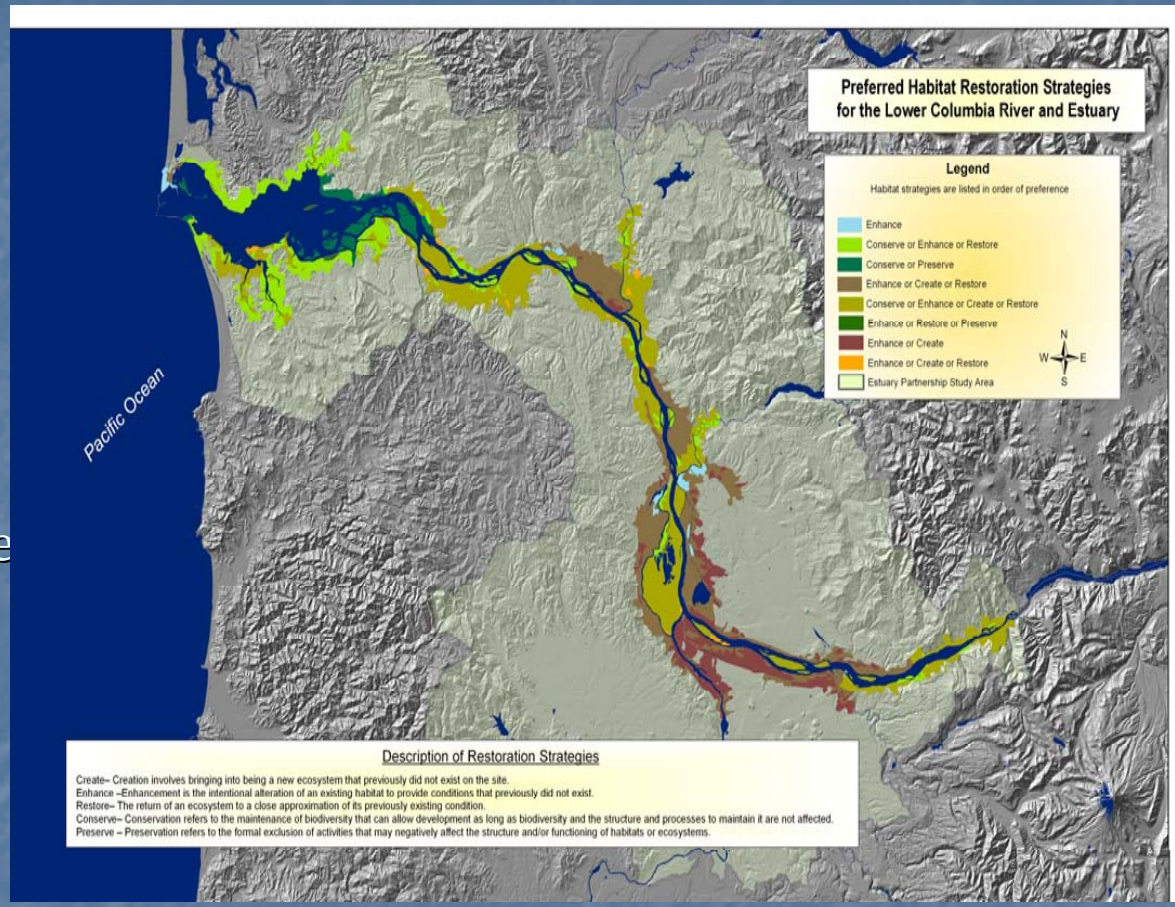
- General shoreline condition (modified vs. natural)
- Modified shoreline condition (armor, residential, commercial)
- Natural shoreline condition (riparian, tidal marsh, tidal swamp)
- In-Water structures (Pile dikes, jetties, boat ramps, debris)
- Over-Water structures (docks, log rafts/booms)
- Discharge locations (tidegates, point source outfalls)
- **605 miles shoreline surveyed:**
- **Jul 2005 – Oct 2006**
- **Modified Shoreline: 277 miles**
- **Natural Shoreline: 250 miles**



Lower Columbia River Estuary Partnership

Habitat Restoration Prioritization

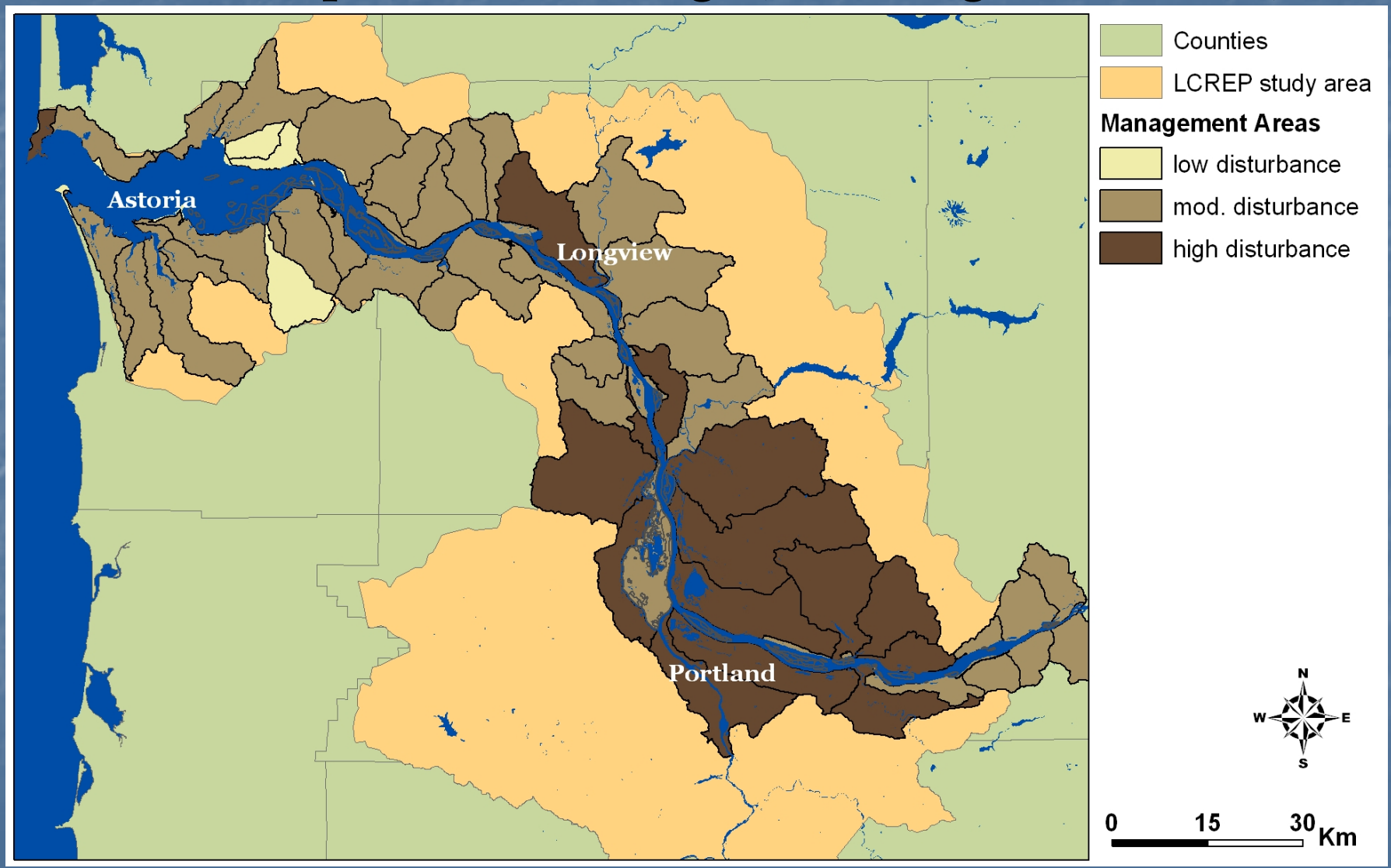
- Two-tiered approach - Scales from system-wide to project specific
- Tier 1 uses model
  - provides defensible method for comparing site function and structure at larger scale
  - Focuses on existing data
  - can refine by updating/adding new data



- Tier 2 provides scientific method of comparing specific projects using change in function and likelihood of success

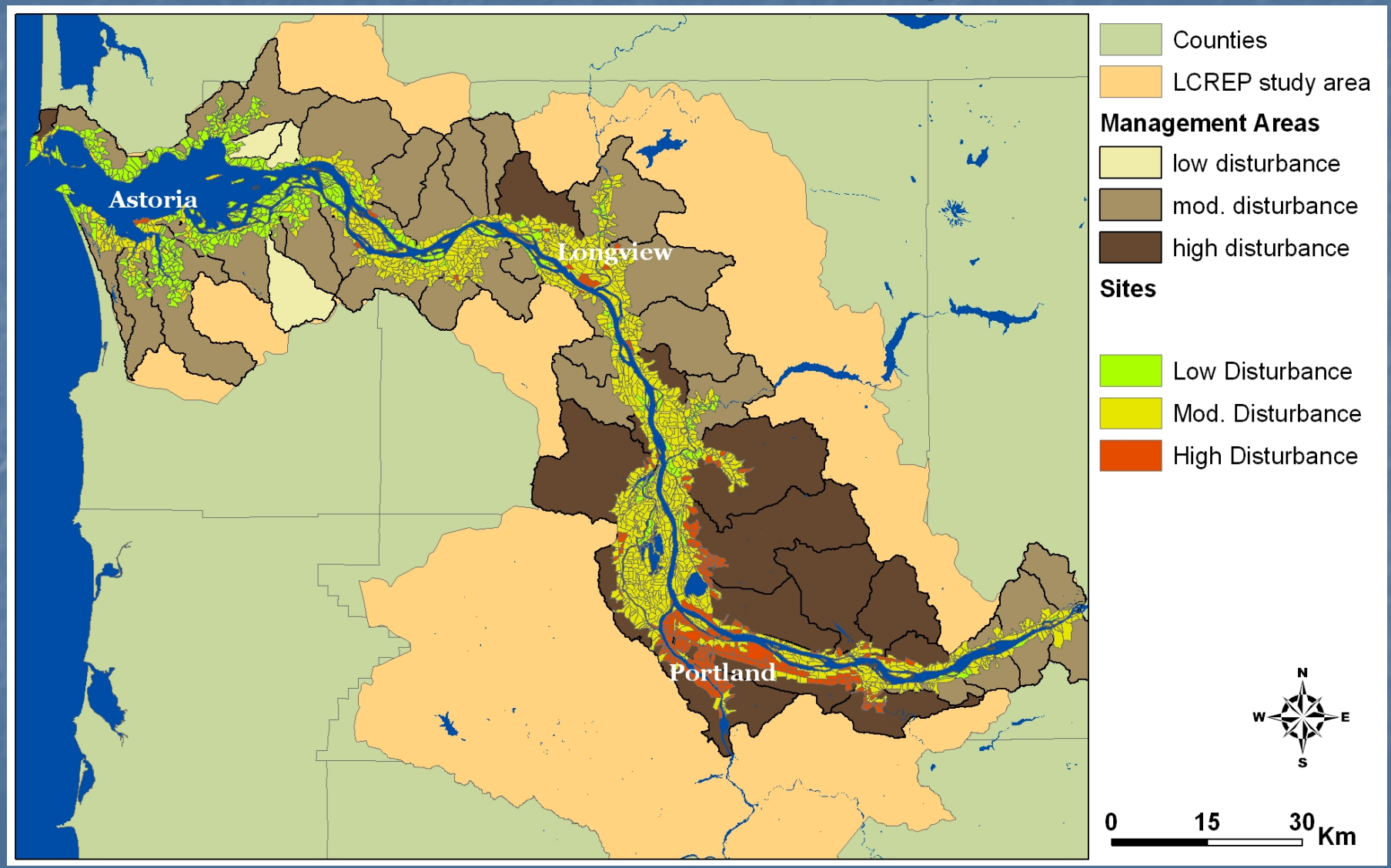
Restoration Prioritization – Tier 1

Landscape Scale Rankings (60 Management Areas)



Restoration Prioritization – Tier 1

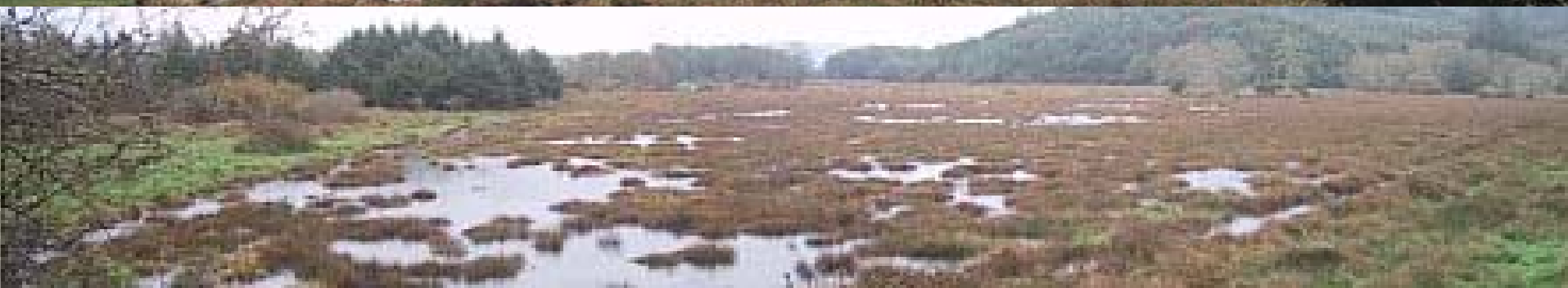
Site and Management Area Rankings (2072 Sites)



Action effectiveness monitoring-

- Assess ecosystem benefits and uncertainties affecting restoration success
- Support adaptive management of restoration techniques and projects by EP and regional partners
- Address RPA 60 in the 2008 Draft Biological Opinion

  "Evaluate the effects of selected individual habitat restoration actions at project sites relative to reference sites and evaluate post-restoration trajectories based on project-specific goals and objectives"



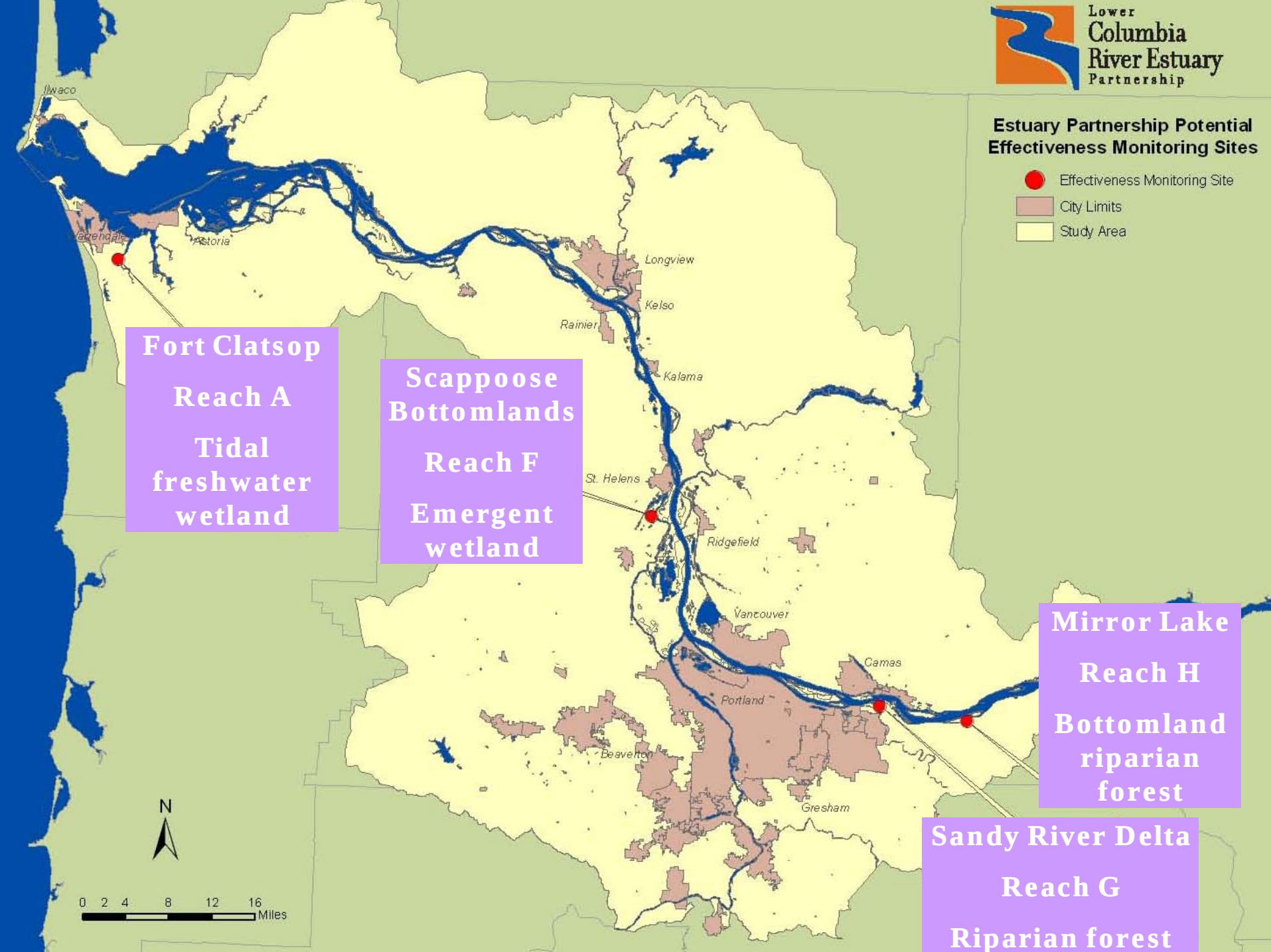
Reference Sites Study 2008

- Goal - use standard monitoring protocols to assess the structure of a suite of tidal freshwater wetland habitats; use these habitats as an indicator of function and condition

- 41 sites – at least 4 sites in each of the 8 hydrogeomorphic reaches of the lower Columbia River
  - Multi year restoration projects had occurred
  - BPA and partners (USACE) had funded restoration activities
  - Some baseline monitoring was conducted

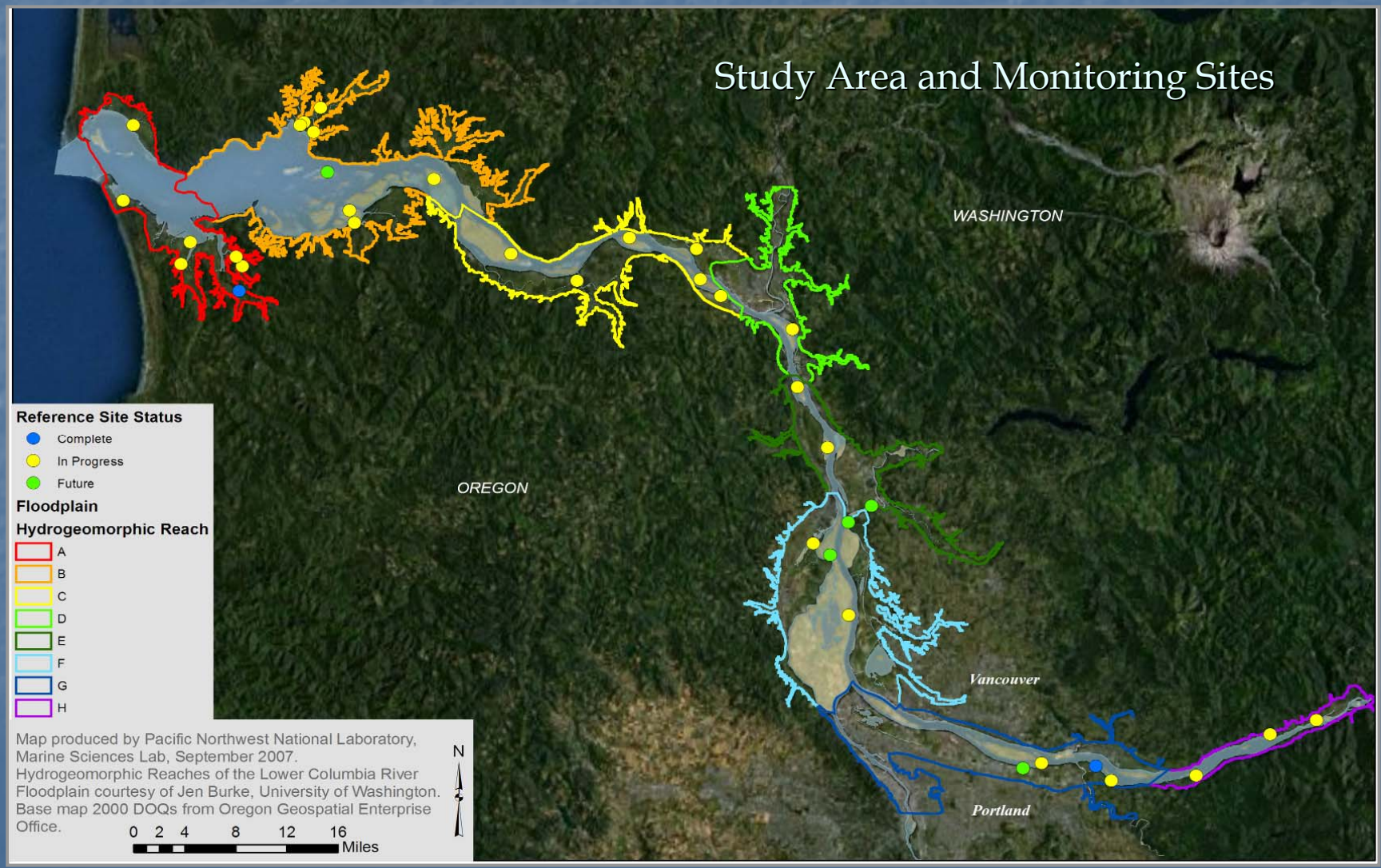
  → Number of potential sites = 12

  Selected 4 sites representing project diversity
  - Developed monitoring plans with the Estuary and Oceanic Subgroup (EOS) and BPA


Lower Columbia River Estuary Partnership
Estuary Partnership Potential Effectiveness Monitoring Sites
Effectiveness Monitoring Site
City Limits
Study Area
Fort Clatsop
Reach A
Tidal freshwater wetland
Scappoose Bottomlands
Reach F
Emergent wetland
Mirror Lake
Reach H
Bottomland riparian forest
Sandy River Delta
Reach G
Riparian forest
Ilwaco
Warrenton
Astoria
Longview
Kelso
Rainier
Kalama
St. Helens
Ridgefield
Vancouver
Camas
Portland
Beaverton
Gresham
N
0 2 4 8 12 16
Miles

Reference Sites Study

Lower Columbia River & Estuary



Institutional Constraints: Science to Policy

Heighten interaction among scientists, practitioners and policy makers.

- Board
- Science Work Group
- Forums
  - Initial Science to Policy May 2007
  - Toxics Summit January 2008
  - Habitat May 2009
- Conferences

Challenges

- Increase connection between habitat and water quality
- Diversify funding sources and expand funding
- Increase focus on lower Columbia River