



Lower Columbia
Estuary
Partnership

Ecosystem Monitoring Program: Estuarine Indicators

Restoring Natural Habitat Diversity and the Historic Habitat
Mosaic

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Indicator System for the lower Columbia River Estuary

Regional Scientific Community identified Key Ecosystem Attributes (April 2012 workshop)

- a. **Natural Habitat Diversity**, Historical Habitat Mosaic
- b. **Focal Species:** e.g., Pacific salmonids, Columbia White-tailed deer, Pacific Flyway species (NPCC 2004)
- c. **Water Quality**
- d. **Ecosystem Processes**

Next Steps—develop quantifiable targets for each attribute along with development of indicators

This Presentation:

- Method of identifying habitat targets of the Tampa Bay Estuary Program (TBEP) to restore the historic habitat mosaic
- Modified application of these methods to the lower Columbia River Estuary

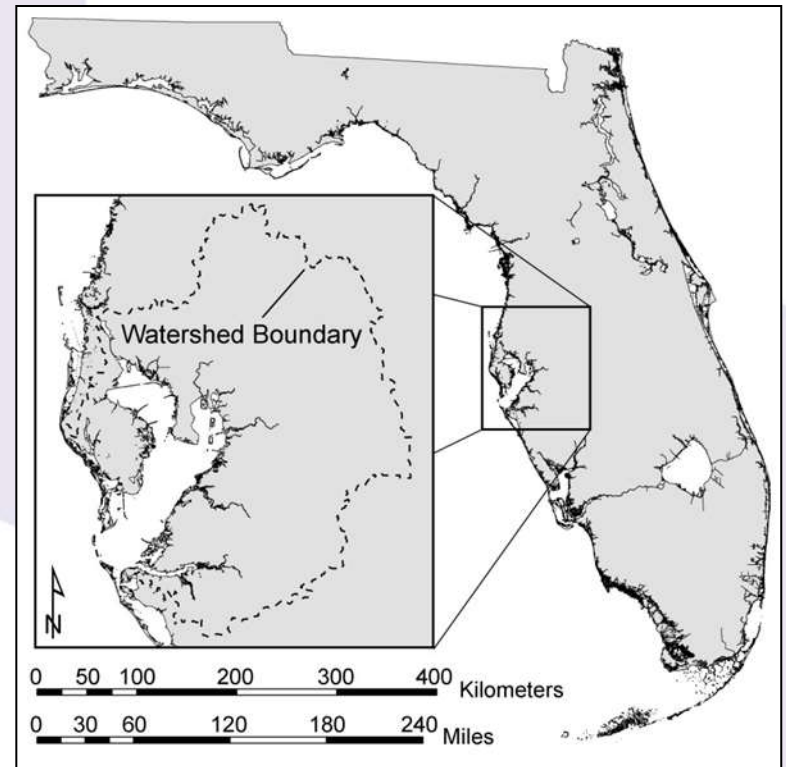


TBEP

A Case Study for biological goal-setting using the BCG

The Tampa Bay environment was showing signs of rapid degradation in the 1970s: macroalgal blooms, poor water quality, and decreasing populations of valued species.

TBEP took on a role as convener of scientists and stakeholders to develop goals and a plan for the future of Tampa Bay.



Tampa Bay Example

1. Using the Biological Condition Gradient (BCG), identified faunal guilds of importance (estuary-dependent species); identified ecological needs (i.e., key habitats)
2. Identified datasets that could be used for creating targets
 - Used historic habitat maps, compared to current habitat coverage for floodplain and aquatic habitats
3. Developed numeric targets for habitats important to faunal guilds
 - Targeted subset of historic floodplain habitat mosaic
 - protect the remaining stands of intact habitats through conservation lands
 - Targeted 1950s coverage of habitats
4. Determined resource needs of seagrass:
 - Improve water clarity (by reducing phytoplankton levels)
 - Reduce nutrient loads, specifically nitrogen, to reduce phytoplankton concentrations

Tampa Bay Example

- Created numeric management targets:
 - Numeric habitat coverage goals by bay segment
 - Numeric nitrogen load reduction goals by year
- Created decision support framework and tools for implementation (collaboration, monitoring, reporting, diagnostic studies)

Results - region has met nitrogen load reduction goals, shown significant increases in habitat coverage and is on recovery trajectory to meet seagrass coverage goals

Historic habitat mosaic targets

Habitat	Type	1900	1950	1950 % comp	2007-2008 hectares	2007-2008 % comp	TBEP target hectares	TBEP Hectare deficit
<i>Acrostichum/Juncus</i>	High marsh	6,965	2,679	10.3	1,779	8.9	2,555	776
<i>Salicornia</i>	Salt barren	ND	555	2.1	181	0.9	521	340
<i>Mangrove/Spartina</i>	Emergents	6,694	6,432	24.7	6,127	30.5	6,127	Hold the line
Seagrass	Subtital	~30,500	16,357	62.9	11,998	59.7	15,601	3,604
Total		~44,000	26,024	100	20,084	100	24,804	4,720

Considerations for application in lower Columbia River

- Large tidal freshwater section
- Little seagrass, oyster bars or other “typical” estuary habitats
- Significant temporal and spatial differences in forcings and conditions such as water elevation, water quality, and biologic communities
- The lower Columbia River might **not** have a key, instream aquatic habitat that functions as essential fish habitat, which allows managers to use the “build it and they will come” paradigm, as in Tampa Bay and lagoonal type estuaries

Criteria for Priority Habitats

- **Habitat Change Analysis using t-sheets/GLO maps (late 1800s) and High Resolution Land Cover Data (2010)**
- **Priority Habitats By Hydrogeomorphic Reach (as identified by LCEP Science Work Group)**

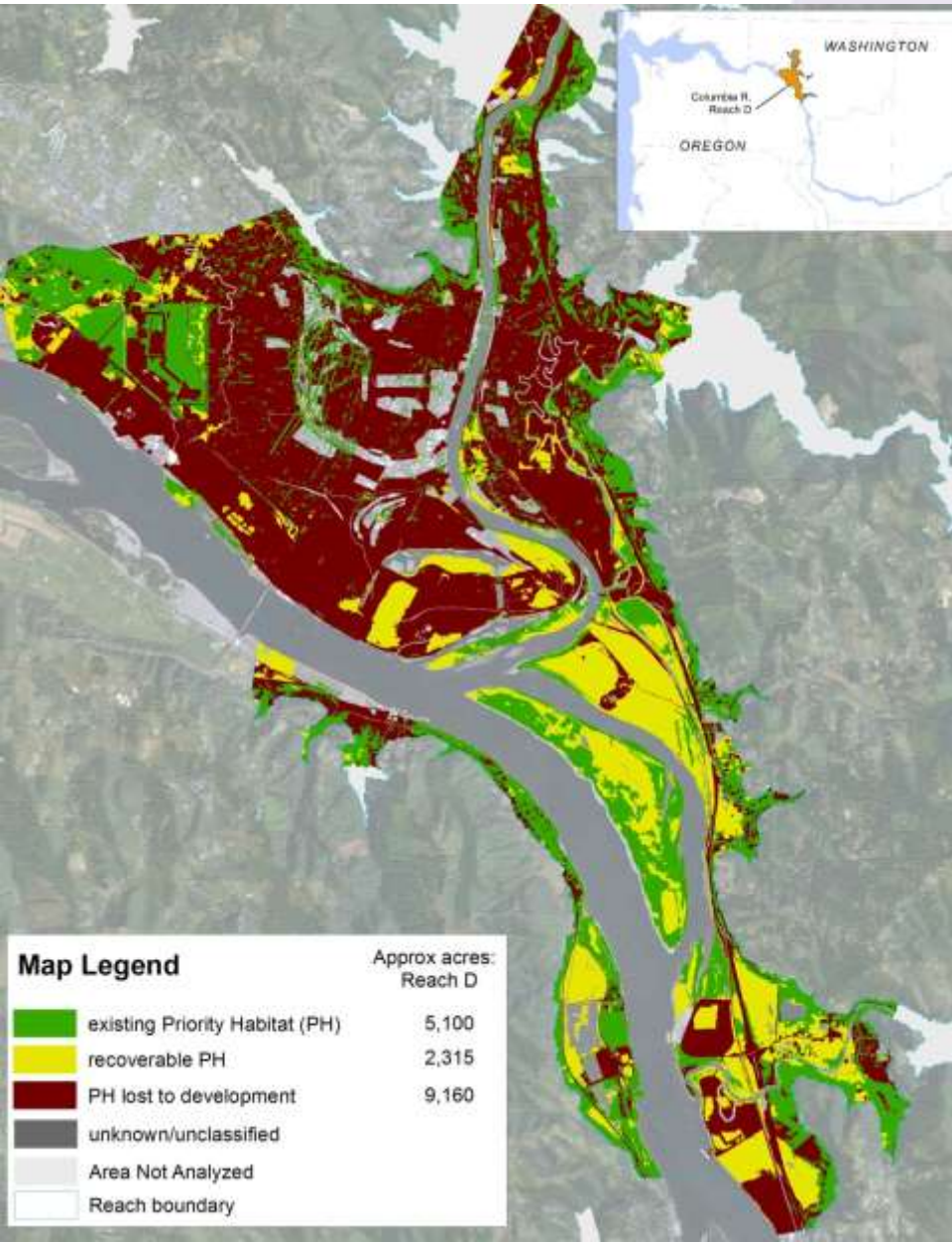
Rules:

- habitats which historically comprised >10% of total cover for the Reach
 - Include habitats which suffered >25% loss
 - Prioritize by severity of loss
 - Include 'rare' habitats (those which historically comprised <10% cover within the Reach)
- **Establish habitat acreage and % composition targets using first priority habitats for each reach**

Priority Habitats from Habitat Change Analysis

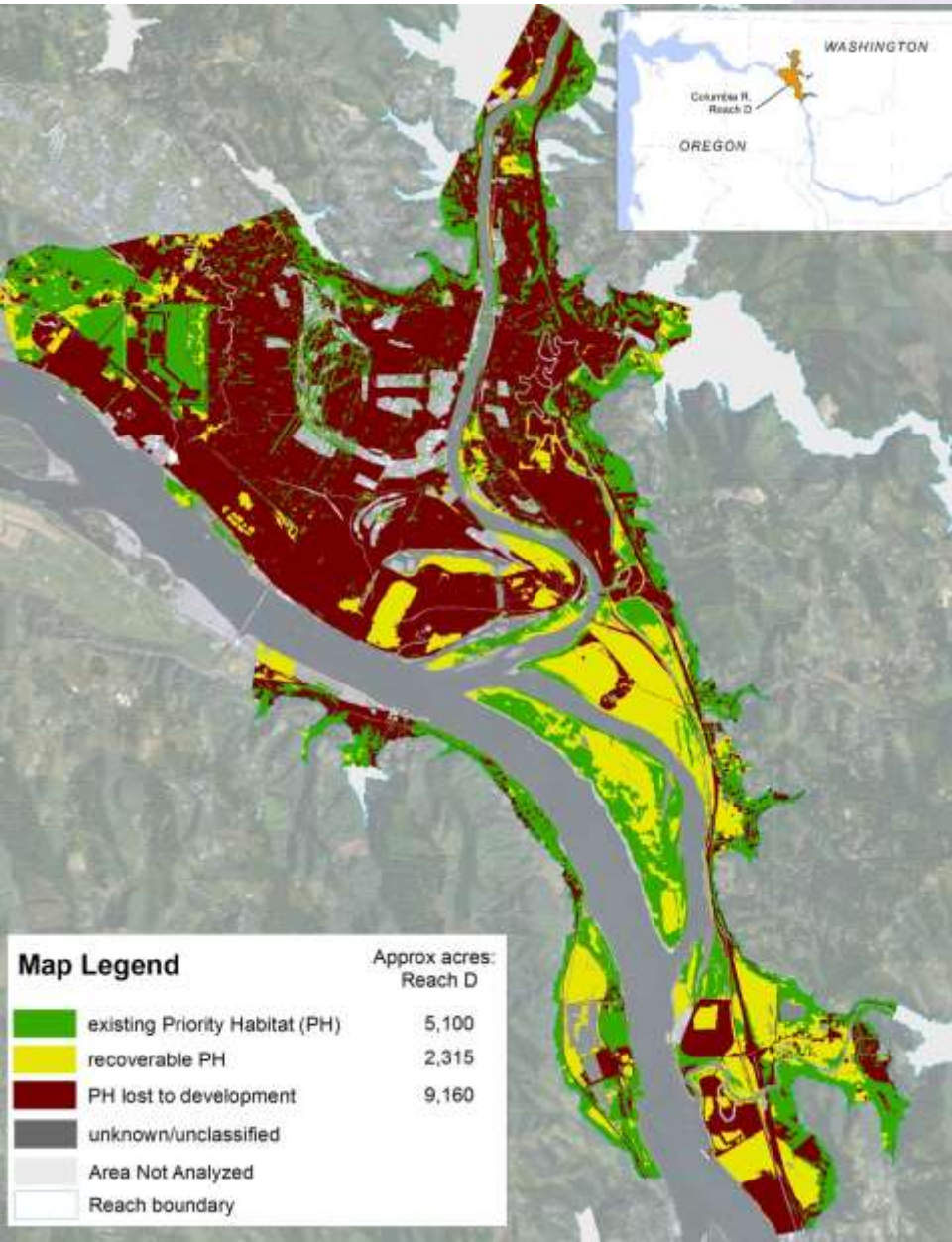
Reach	Priority Habitats			
	1	2	3	4
A	herbaceous tidal WL	wooded tidal WL		
B	wooded tidal WL	herbaceous tidal WL		
C	wooded tidal WL	herbaceous tidal WL		
D	herbaceous tidal WL	wooded tidal WL	forested	herbaceous
E	herbaceous	forested	shrub-scrub	herbaceous tidal WL
F	forested	herbaceous	herbaceous WL	shrub-scrub
G	forested	herbaceous	herbaceous WL	
H	wooded WL			

Reach D Example



Habitat Type From Historic Change Analysis	Role in Targeted Recovery Analysis
Herbaceous Tidal WL	Priority Habitat 1
Wooded Tidal WL	Priority Habitat 2
Forested	Priority Habitat 3
Herbaceous	Priority Habitat 4
Shrub-Scrub	Existing Upland Habitat
Agriculture Herbaceous Non-Tidal Wetland Wooded Non-Tidal Wetland	Recoverable Habitats
Developed Other	Non-Recoverable Habitats
Water Tidal Flat	Not Analyzed

Reach D Example



Habitat	Historic Area (acres)	Current Area (acres)
Herb. Tidal WL	2,570	133
Wooded Tidal WL	2,740	283
Forested	8,164	3,399
Herbaceous	3,135	1,293
Upland, Non Priority (Shrub-Scrub)	276	238
Recoverable (Ag + WWNT + HWNT)	733	2,310
Non-Recoverable (Dev + Other)	270	11,347
Water/Tidal Flat	6,331	5,216
Sums:		
Total Reach	24,219	24,219
Floodplain (Total – Water/Tidal Flat)	17,888	19,003
Floodplain Habitat (Floodplain – non recoverable)	17,618	6,541

Reach D Example

Targeted recovery of Priority Habitat 1 based on restoring its historical % composition relative to total Floodplain Habitat area:

Extent of Priority Habitat	Historic, % composition	Current, % composition
Herbaceous Tidal WL relative to Floodplain Habitat	14.6	2
Wooded Tidal WL relative to Floodplain Habitat	15.6	4.3
Forested relative to Floodplain Habitat	46.3	52
Herbaceous relative to Floodplain Habitat	17.8	19.8

Targeted Priority Habitat 1 (Herbaceous Tidal WL)		Targeted acres for recovery
Necessary recovery to regain Historic % relative to Floodplain Habitat (14.6%)		821

Total Acres Herbaceous Tidal WL after recovery: $133 + 821 = 954$
(compare to historical total of 2,570 acres)

Reach D Example

Targeted recovery of remaining Priority Habitats based on restoring their historical % composition relative to each other (based on Tampa Bay example):

Priority Habitat	Historical acres	Historical % comp	Current Acres	Current % comp		Target Acres	Target % comp	Acre Deficit	Revised Target Acres	Revised % comp
Herbaceous Tidal WL relative to Floodplain Habitat	2570	15.5	133	2.6		954 (133 + 821)	15.5	821	954	14.3
Wooded Tidal WL relative to Floodplain Habitat	2,740	16.5	283	5.5		1,017	16.5	734	1,017	15.2
Forested relative to Floodplain Habitat	8,164	49.2	3,399	66.5		3,031	49.2	-368	3,399	51.1
Herbaceous relative to Floodplain Habitat	3,135	18.9	1,293	25.3		1,164	18.9	-129	1,293	19.4
Totals	16,609	100.0	5,108	100		6,165			6,663	100.0

Check targeted recovery relative to available Recoverable Habitat:

Total recovery goals for Reach: $821 + 734 = 1,555$ acres

Total Recoverable Habitat available in Reach = $2,310 - 733 = 1,577$ acres

Next Steps and Discussion

- How to monitor progress towards target
 - Reporting of habitat acreage in restoration is difficult to track
 - Landcover data every 5 years (keep methods the same to reduce variability)

