Estuarine Restoration Priorities: A Landscape Approach

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Photo by David Pitkin
Estuary Module of the Oregon Watershed Assessment Manual

- Characterizes current and former tidal wetlands from ocean to head of tide
- Prioritizes tidal wetlands for restoration and conservation actions
- Based on field work, literature review
- Peer-reviewed
- Developed/tested in 6 estuaries
Tidal wetland assessments & prioritizations completed by GPC & co-authors

Estuary Module of Oregon Watershed Assessment Manual

*Necanicum assessment in progress by FWS/GPC in 2006
What is assessed and prioritized?

- All tidal wetlands from ocean to head of tide
- Excludes mudflats, eelgrass beds, open water
- Excludes filled lands
- Method applies to estuaries S of the Columbia
Why assess tidal wetlands?

• Valuable ecological functions
  – Habitat
  – Food web
  – Water quality protection
  – Flood/storm protection
• Highly altered landscape
• Development pressure
• Inadequate existing data
Why prioritize the resources?

- Extensive losses (~70%)
- Urgent need for action
- Limited funding
- Grant requirements
What is a tidal wetland?

- Hydrology
- Soils
- Vegetation
Hydrology

- Water level is affected by tides
- Water may be salt, brackish or fresh
- May have freshwater input

Illustration courtesy of Dr. James Good, Oregon State Univ.
Soils

- Saturation
- Salinity
- Organic matter
- Texture
Tidal wetland vegetation:

I. Tidal marsh

Low marsh

High marsh
Tidal wetland vegetation:

II. Tidal swamp
Tidal swamp
Landscape array of tidal wetland classes

Illustration courtesy of Dr. James Good, Oregon State Univ.
Physical features

• Deep, steep-sided channels
• High sinuosity
• Natural levees
• Internal salinity gradients
Why prioritize tidal wetlands for conservation and restoration?

- Extensive losses (~70%)
- Urgent need for action
- Limited funding
- Grant requirements
Tidal wetland loss/conversion estimates

- Oregon:
  - 70-80% of tidal marshes
  - >> 90% of tidal swamps

- Washington
  - 70% of tidal wetlands in Puget Sound area

- California:
  - 90% of tidal wetlands statewide
Alterations to tidal wetlands

- Diking
- Ditching
- Tide gates / restrictive culverts
- Excavation / fill
Historic vegetation type, Umpqua River estuary
Remaining tidal marsh, Umpqua River estuary
Remaining tidal swamp, Umpqua River estuary
Key elements of the method

1. Focus on ecological functions
2. Community-based
3. Intended for active use
4. Non-regulatory
1. Focus on ecological functions

- Landscape ecology approach
- Indicators of multiple wetland functions
- Focus on controlling factors ("drivers")
- Existing data → "first cut"
- New data → refined map & wetland characterization
2. Community-based and user-friendly

- Local watershed group involvement
- GIS or paper maps
- Straightforward method
- Clear linkages between inputs and results
3. Intended for active use

- Dynamic estuary database
- Provides a basis for immediate action
- Improves chances of funding projects
4. Non-regulatory

- Results provide strategic direction
- Willing landowners
- No wetland is excluded
- Uses existing wetland mapping
- Does not delineate wetlands
Steps in the method

1. Assessment
   • Historic extent
   • Alterations
   • Current conditions

2. Prioritization
   • Ecological factors

3. Supplementary analyses
   • Land ownership
   • Land use zoning
Prioritization protocol: Requirements for criteria

• Should indicate level/quantity of multiple wetland functions
• Should effectively discriminate among sites
• Interpretation of levels should be clear
• Data should be quantitative and accurate
• Coverage throughout study area should be complete and consistent
Existing data sources

- LiDAR
- Map of existing and “potential” tidal wetlands (Scranton 2004)
- Estuary Plan Book
- National Wetland Inventory
- Local Wetland Inventories
- Head of tide data
- Historic vegetation maps
- NRCS Soil Survey maps
LiDAR for assessment of historic extent
New data development

- Aerial photograph interpretation
  - Geomorphology
  - Alterations
  - Vegetation type
New data development

• Field reconnaissance and local input
  – Ground-truthing
  – Site details
  – Local involvement vital
Supplementary analyses

• Land ownership
• Land use zoning/planning
• Potential further analyses
  – Economics
  – Community perceptions
  – Salmon habitat
  – Historic vegetation
Prioritization criteria

1. Site size
2. Tidal channel condition
3. Wetland connectivity
4. Historic wetland type
5. Diversity of vegetation classes
6. Number of salmon stocks
Umpqua Estuary: Sites (NOAA salinity zones in gray)

144 sites
Size + Hydrologic condition + Wetland connectivity

# of salmon stocks + # Cowardin classes

% historic tidal swamp = Final score
Adjunct data on opportunity

Umpqua Estuary: Number of landowners

Umpqua Estuary: Landowner type

# of landowners

Landowner type
Public participation

Watershed Council Technical Teams contributed to protocol development and site characterization.

At public meetings, Council and community members ranked sites for acceptability of restoration/conservation.
Umpqua & Nehalem: Major results I

- Criteria chosen successfully discriminated among sites
  - Total score range 9 – 24 out of a possible 6 – 30
  - Studies provide guidance for future action planning

- Level of public interest is high
  - Good turnout at public meetings
  - Results already being used for action planning
Area of historic tidal wetlands is much greater than previously estimated.

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<th>Estuary</th>
<th>Past study</th>
<th>Current study</th>
<th>% increase</th>
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<tr>
<td>Umpqua</td>
<td>979 ha</td>
<td>1537 ha</td>
<td>57%</td>
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<tr>
<td>Nehalem</td>
<td>848 ha</td>
<td>1350 ha</td>
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Proportion of historic tidal wetlands that have been altered is greater than previously estimated, in some areas.

<table>
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<th>Estuary</th>
<th>Historic total</th>
<th>Relatively unaltered</th>
<th>Altered</th>
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<tr>
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<td>343 ha  25%</td>
<td>1008 ha</td>
<td>75% lost</td>
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*Good 2000
OREGON: 1999 vs. 2005 estimated losses

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<th>1850's marsh + swamp (ha)</th>
<th>1850's marsh (ha)</th>
<th>2005 estimated marsh loss (%)</th>
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Summary

• Straightforward, user-friendly approach
• Extensively reviewed and tested
• Detailed yet comprehensive
• Landscape-scale analysis
• Community-based
• Facilitates rapid action
Questions?

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