# In-situ Multichannel Wireless Sensor Networks and iButton Temperature Logger Arrays for Characterizing Habitat Drivers in Tidal Wetland Reference Sites


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# Briefly…

New methods for measuring controlling factors in tidal wetlands

AND

Compilation and distribution of the resulting data from reference sites

# CICEET: The Cooperative Institute For Coastal & Estuarine Environmental Technology

- Partnership of the National Oceanic & Atmospheric Administration and the University of New Hampshire

- Develops and applies tools to detect, prevent, and reverse the impacts of coastal pollution and habitat degradation on coastal ecosystems and communities

- FY 2008 Funding Opportunity to be released 7/18

- Learn more: **http://ciceet.unh.edu**

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Tools for Clean Water
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# Problem statement

- High losses of tidal wetlands (70-90% on west coast)
- Urgent need for restoration and strong interest
- Lack of basic data for restoration design and evaluation, including reference conditions datasets
- Lack of inexpensive, user-friendly technologies to collect data and build those datasets

# 3 ecosystem "drivers" or "controlling factors" critical to restoration success

1. Tidal inundation regime
   - Seasonality, frequency, duration
2. Salinity regime
   - Seasonal/tidal fluctuation in surface & groundwater salinity
3. Groundwater regime
   - Seasonality, frequency, duration of high water table
   - Important in upper estuary (tidal flooding less frequent)

# Data needed to characterize these three drivers:

1. Water level
   - Surface waters
   - Groundwater
2. Salinity

# Characteristics of high quality data:

1. High temporal resolution
2. High spatial resolution

# Project goals

Goal 1: Determine information needs

Goal 2: Test new technologies for measuring habitat drivers

Goal 3: Compile pilot reference conditions database

Goal 4: Develop database portal

# Goal 1: Determine information needs

## PNW Estuarine Wetland Restoration Information Gaps Survey

# Goal 2: Test new technologies

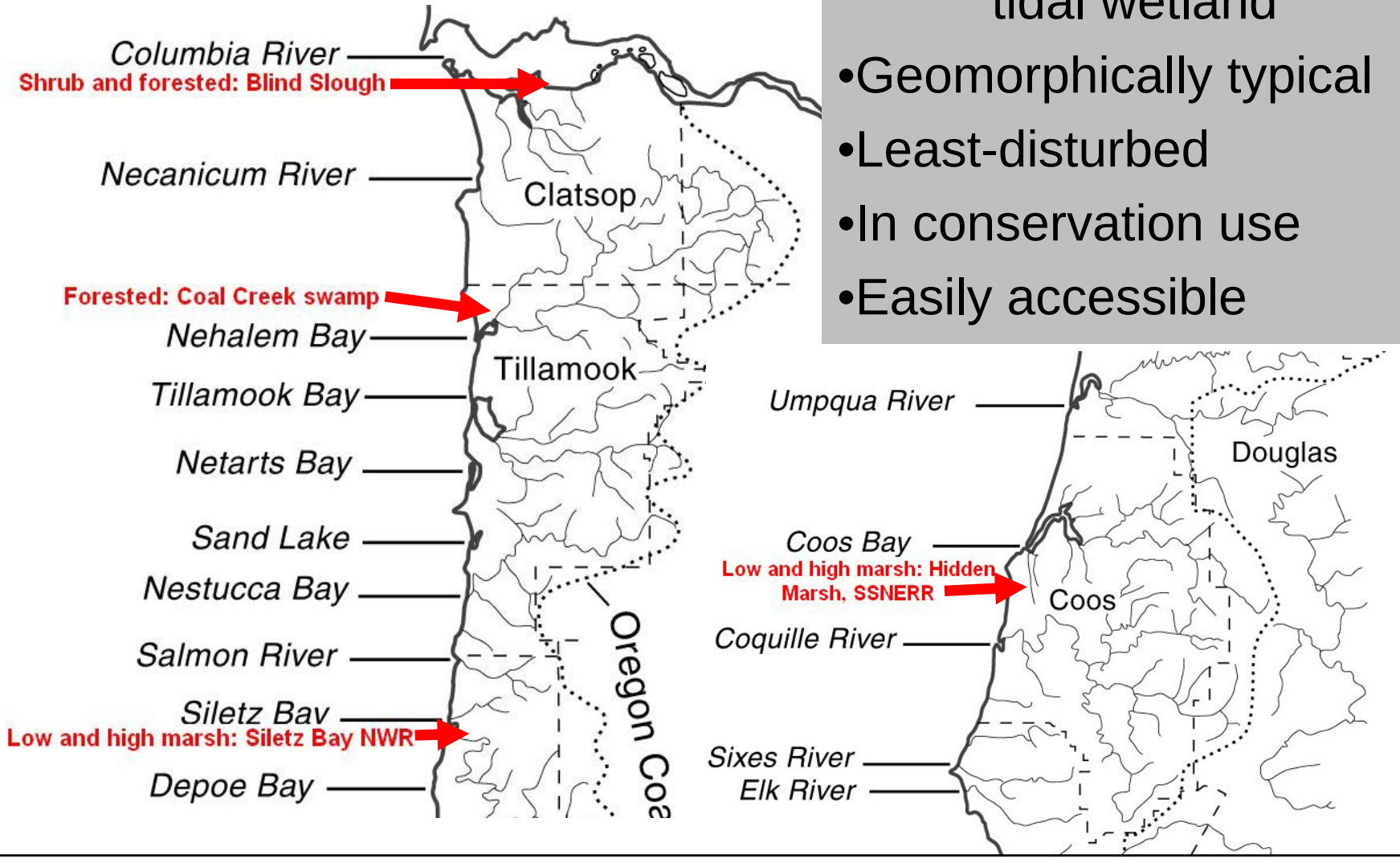
Current methods are expensive and/or lack adequate spatial or temporal resolution.

Examples:

- **Tide charts**: Based on models; do not incorporate river flows, lack spatial and temporal resolution (few gauging stations)
- **Level loggers:** Expensive (~$500-1000 for a single installation), lack spatial resolution (usually 1 gauge serves a large area)
- **Salinity grab samples:** Lack temporal resolution
- **Salinity loggers:** Expensive, hard to measure groundwater salinity

# Locate suitable reference sites

- Low marsh to forested tidal wetland
- Geomorphically typical
- Least-disturbed
- In conservation use
- Easily accessible



# New technologies we are testing:

1. Multichannel wireless sensor networks
2. Inexpensive temperature loggers ("i-Buttons")

# Multichannel wireless sensor networks

8 channels per logger:

Channel water

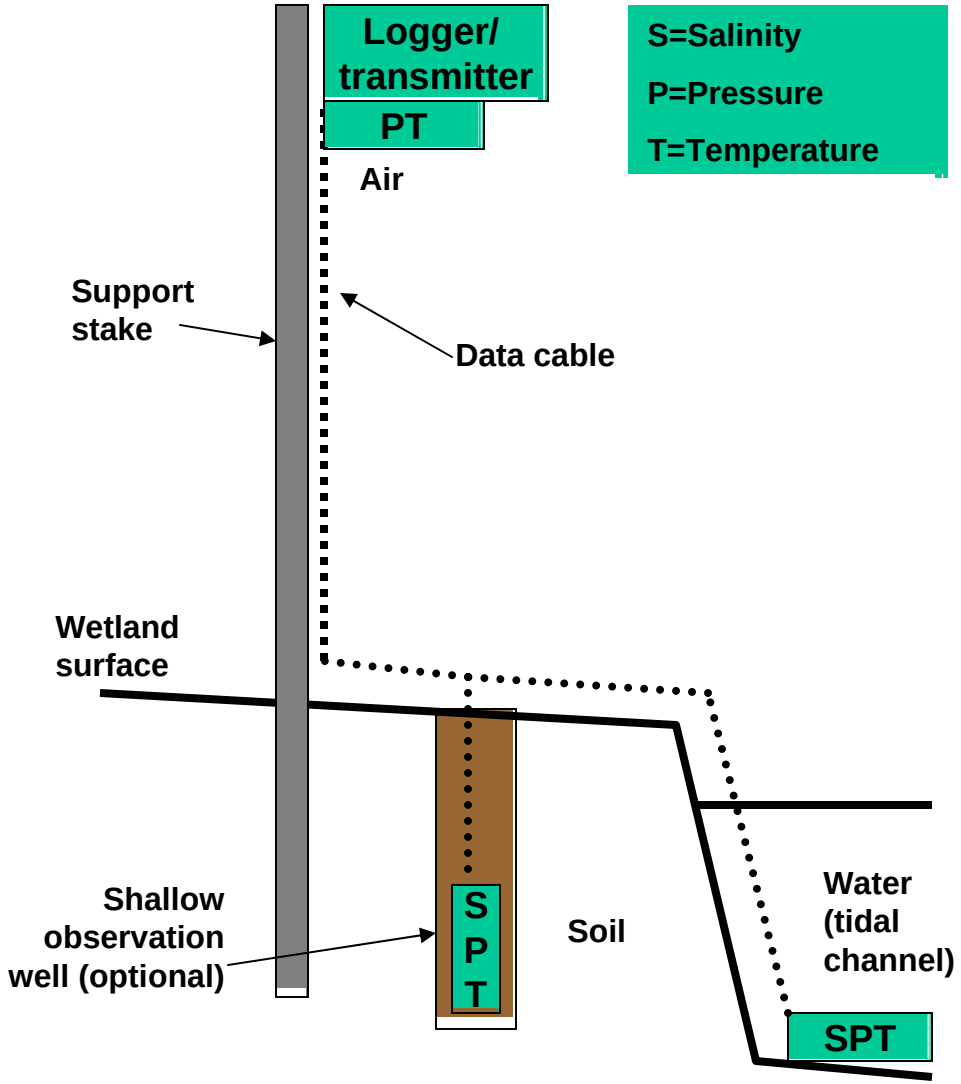
1. Depth (pressure sensor)
2. Temperature
3. Salinity

Groundwater

4. Depth (pressure sensor)
5. Temperature
6. Salinity

Air

7. Barometric pressure
8. Air temperature

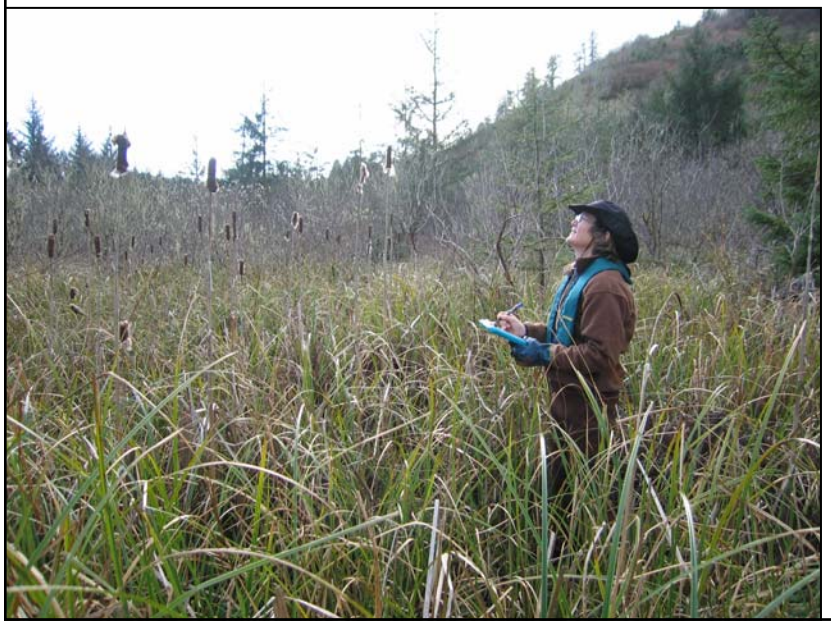


# i-Button temperature loggers

- Inexpensive ($10-15 each)
- Potential for high spatial accuracy
- Focus on specific parameter of interest (time of inundation)
- Testing different deployment methods involving air & water temperature reference buttons

# Goal 3: Compile reference conditions

- Design sampling to meet nationwide monitoring guidelines
- Link structural and controlling factors to biota (vegetation, invertebrates)
- Build pilot reference conditions database



# Pilot a reference conditions database

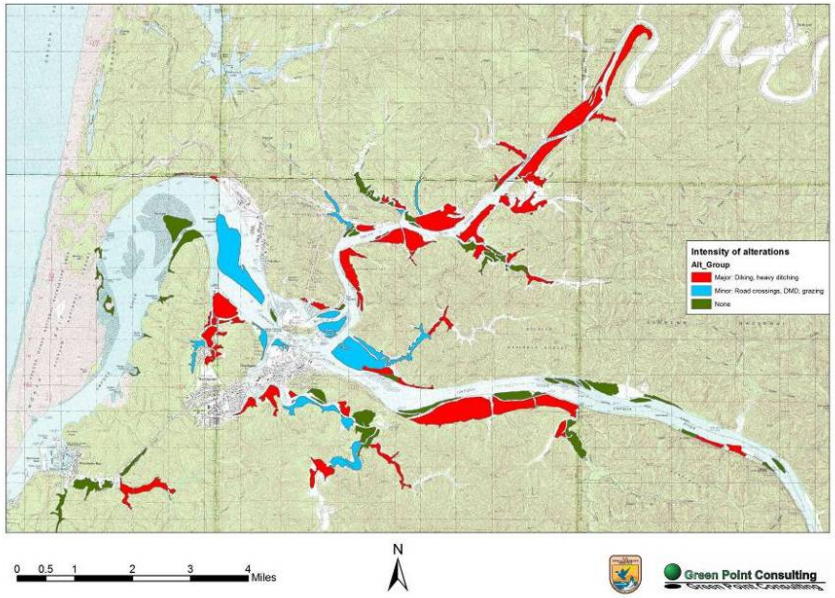
- Scarcity of adequate reference sites
- Better data from stratified, replicated sampling
- Opportunity to build regional knowledge base
- Framework for input from many projects
- Potential for geospatial correlation

# Immediate uses for a reference conditions database

- Restoration site selection
- Restoration design
- Evaluation of restoration success
- Adaptive management

# Goal 4: Distribute the reference conditions data

- Web portal
  - Easily accessible to all users
  - Georeferenced (Google Earth interface)
  - Two-way data flow
  - Data input from other projects





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