How do we effectively restore tidal freshwater swamps?

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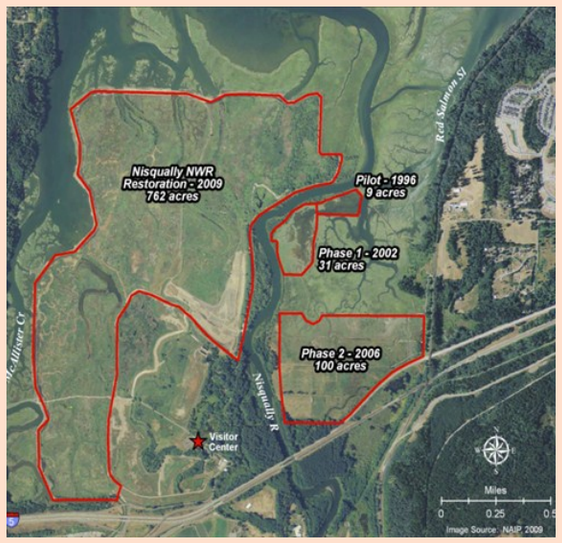
Question: Are there measureable environmental conditions under which woody species do not establish?

Restoration Stages

1. Restore natural hydrology

2. Identify environmental conditions supporting woody plant growth: elevation, salinity, hydrology

3. Install restoration plants



Nisqually Estuary. Red lines show removed tidal dikes. Source: NNWR

Puget Sound Tidal Swamps

Forested wetlands in upper estuaries. Historic ditching, diking & filling → 60% - 83% loss of tidal wetlands.

- Deep tidal channels
- Large woody debris creates variation in micro-topography
- Quality foraging habitat for juvenile salmon

Intact Sikta spruce tidal swamp centered between Deer & Cranberry Creeks, at Oakland Bay, Puget Sound. Source: WA DOE.

Methods

Restoration plantings measured over one summer:

Response variables = plant mortality & growth rates

Explanatory variables = elevation, soil properties, salinity, location, water table & herbaceous cover

Michael Moy collecting soil bulk density data.

Complex interactions between marine, river & ground waters → difficult-to-predict biogeochemistry.

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Results

Installed woody plantings failed at elevations < 1/2 meter above mean higher high water & at soil salinities > 2 ppt.

Photo on left shows successful tidal freshwater swamp plantings, installed at elevations > 1/2 m above MHHW & at salinities < 2 ppt. Photo on right shows failed plantings; live-staked trees installed below MHHW & at salinities > 2 ppt.