

# Quantifying soil-stream nutrient linkages in coastal temperate rainforest watersheds

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Special thanks to: Jason Fellman, Erik Norberg, Jacob Berkowitz, Denise Elston, and Andy Bookter

Research funded by the USDA Forest Service PNW Research Station and  
USDA NRI CSREES Grant # 2005-35102-16289





IndexMap



NF

# Tongass National Forest

Annual precipitation 1.5-8 meters

Highly variable

Orography

Altitude

Glacial till

Wetlands ~ 30% of land surface



# Study Design

- **Local scale: detailed measurements highly replicated in space and time**
- **Regional scale: two temporal samples of 63 randomly chosen watersheds across Tongass NF**

**Three dominant soil types**  
**Three replicate watersheds**



**Forested wetland**



**Forested upland mineral**



**Sloping bog**



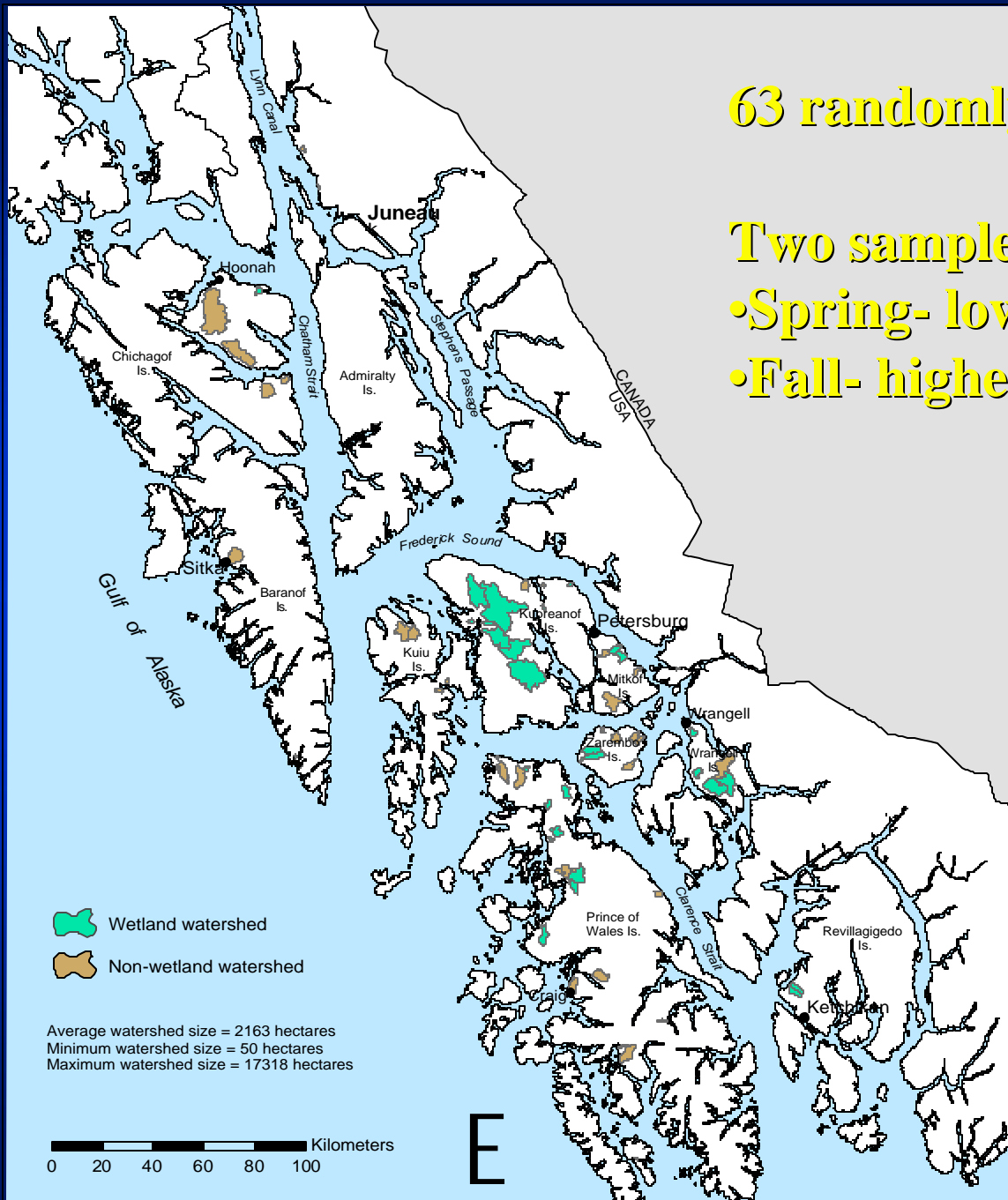
- Discharge measurements below mapped soil units
- Weekly to monthly water samples analyzed for C, N, P
- Carbon quality and quantity
- Calculate nutrient fluxes
- Upstream-downstream comparisons for salmon



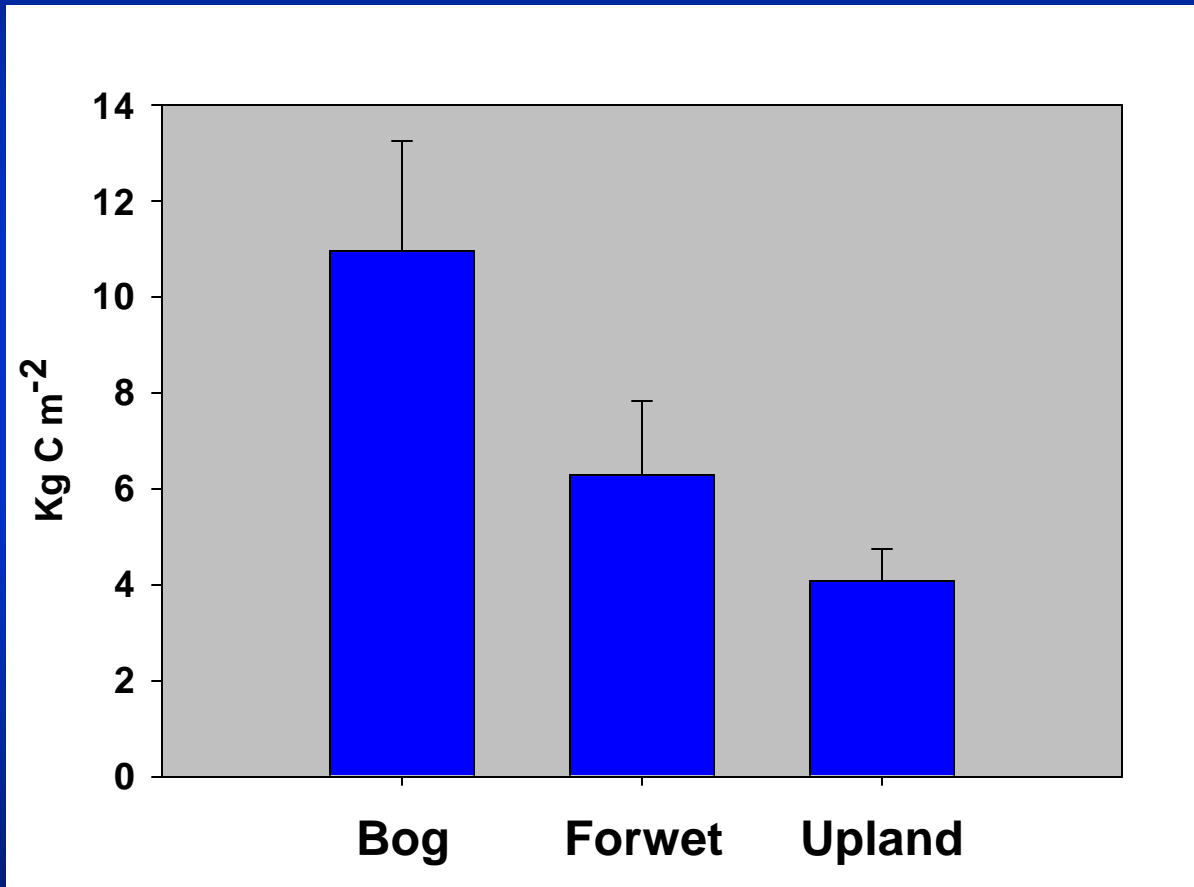
**63 randomly chosen watersheds**

**Two sample periods**

- **Spring- low baseflow, no fish**
- **Fall- higher flows, post spawning**

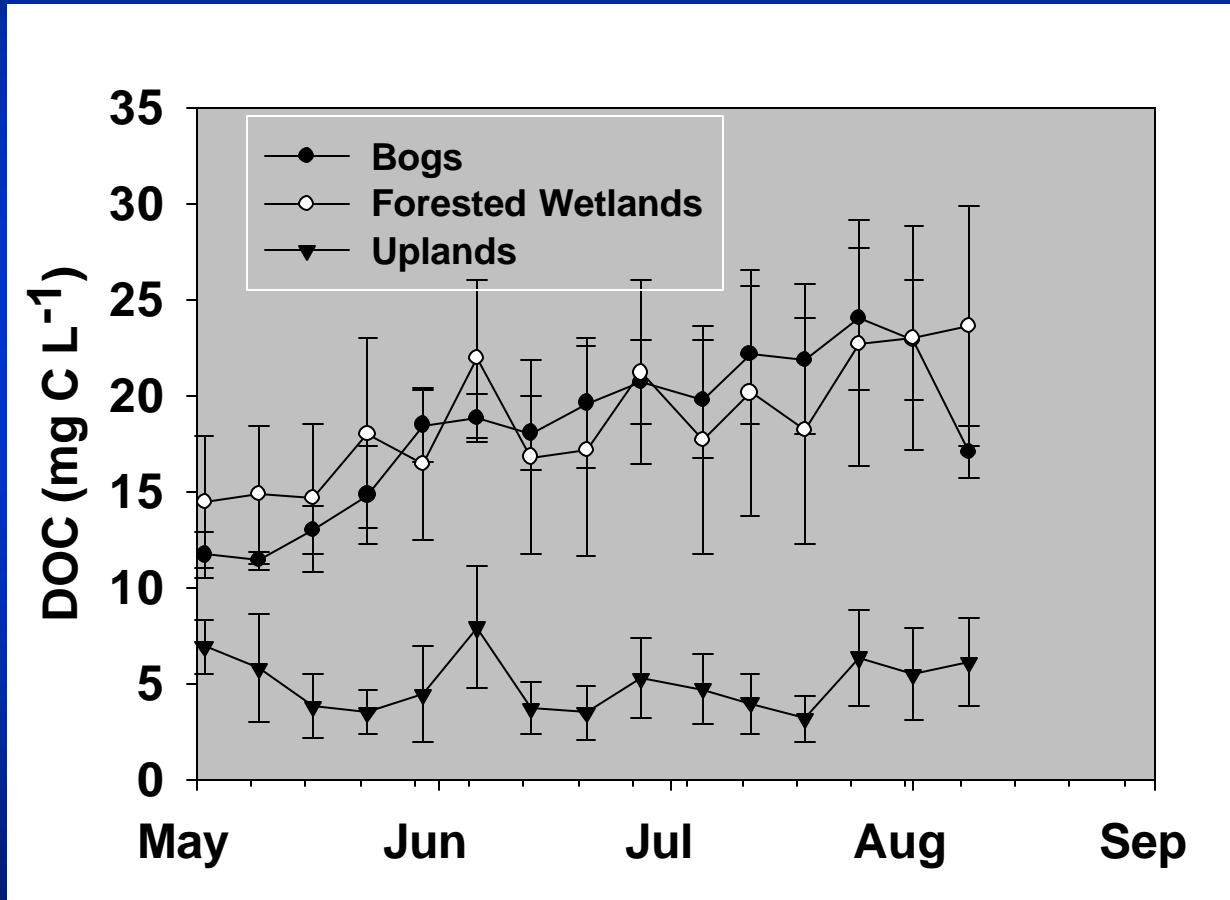


# Soil C storage by soil type

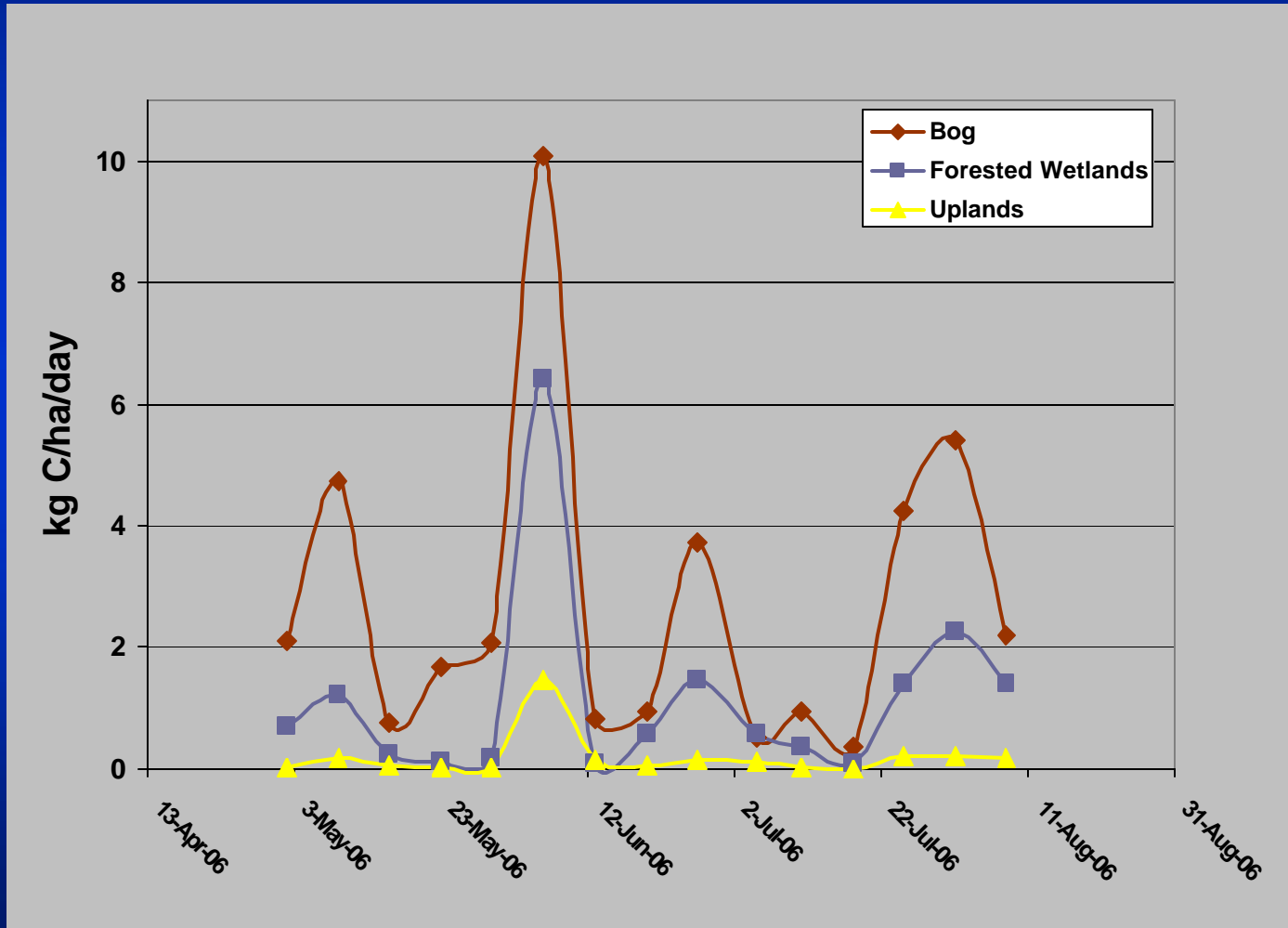




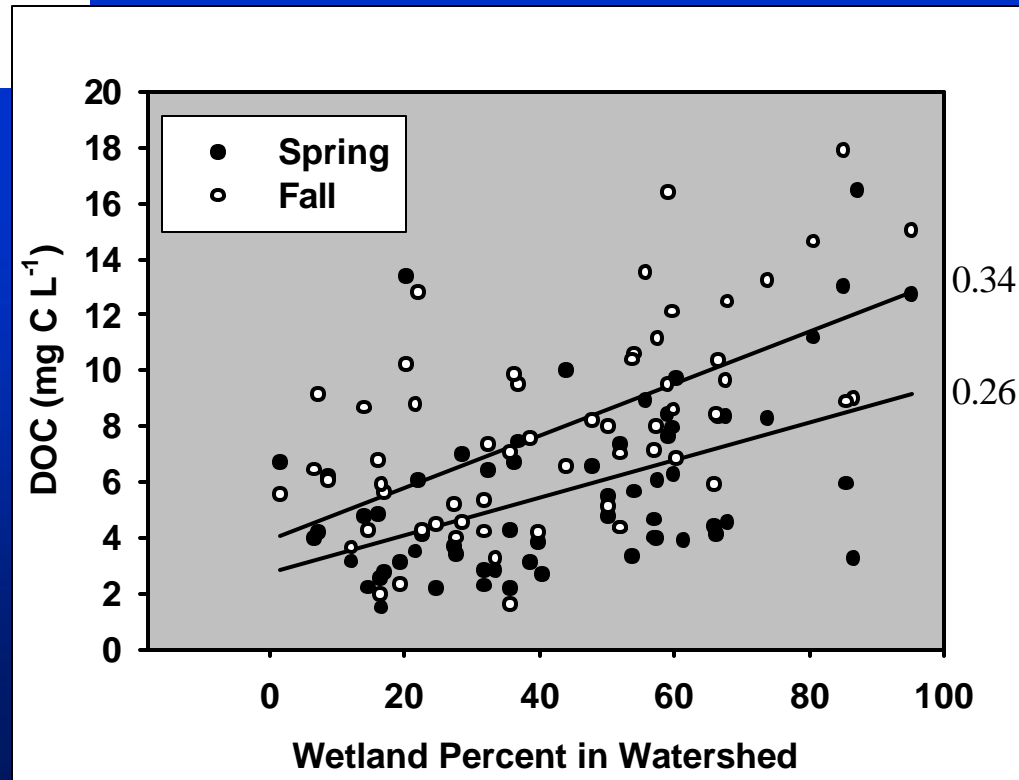
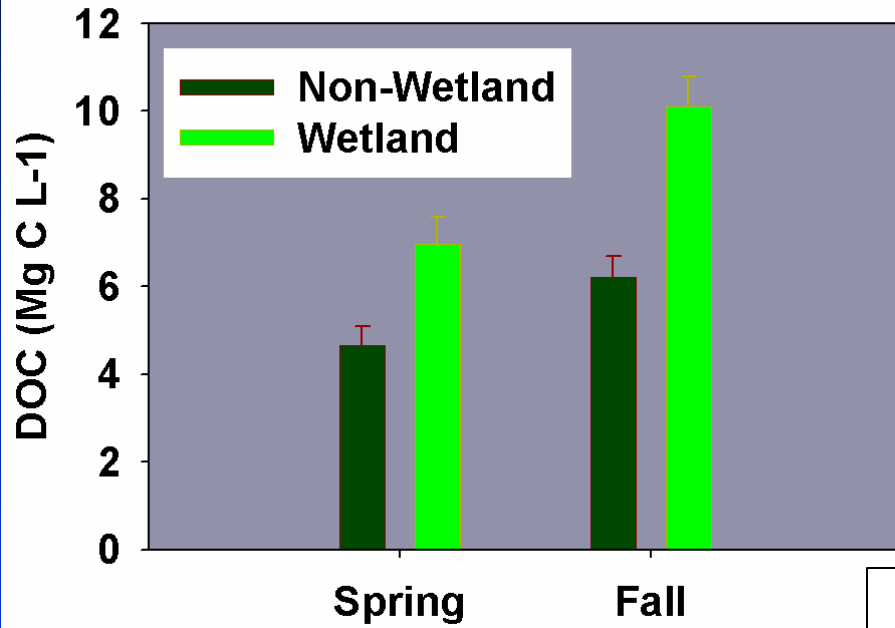
# Tributary DOC concentrations



# DOC flux per unit soil area

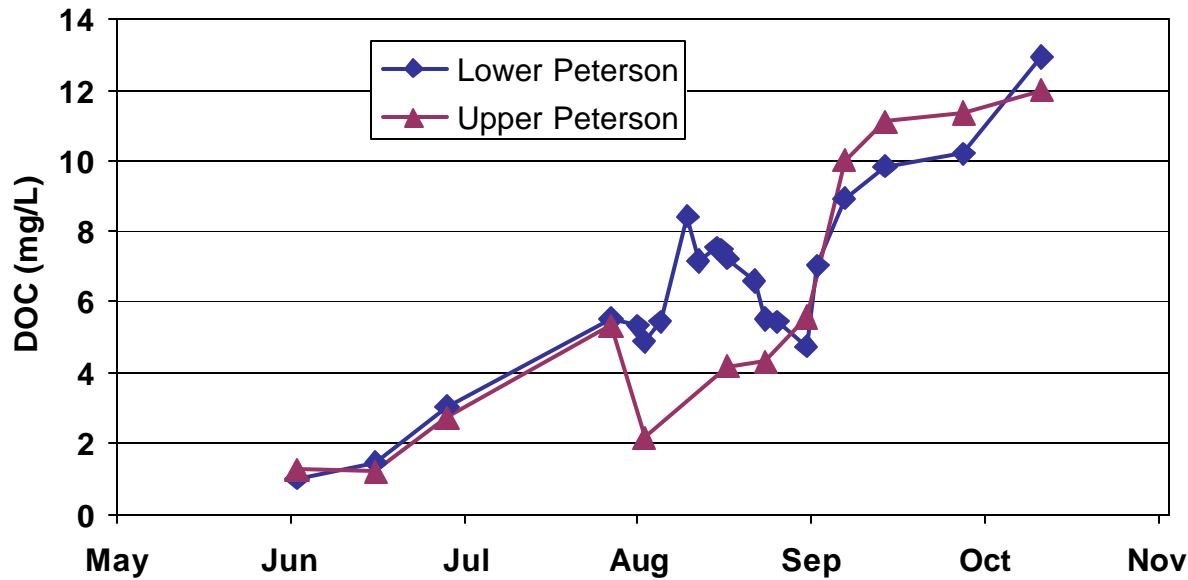


# Trends throughout Tongass



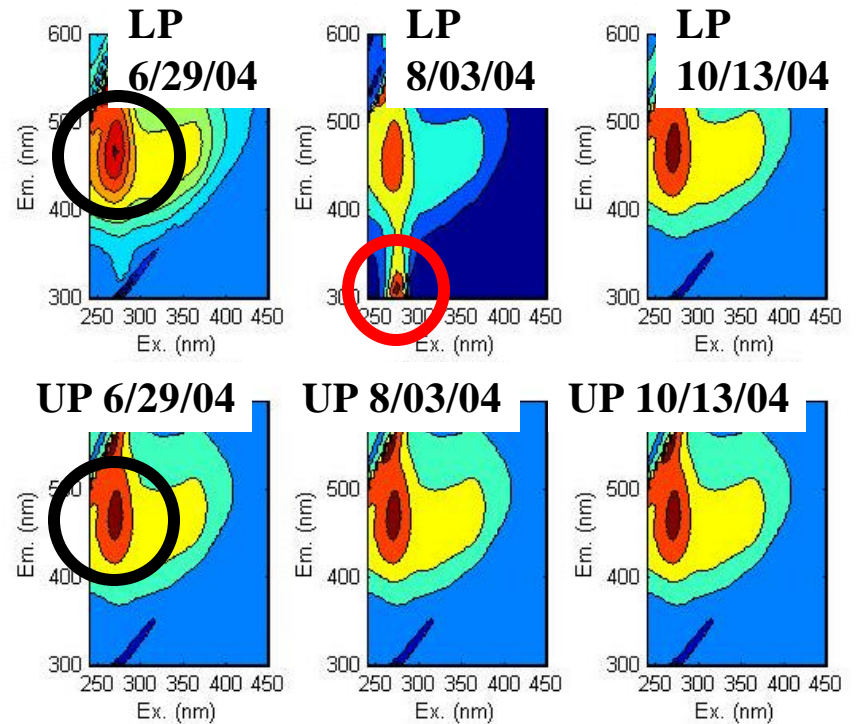


**Some streams receive runs of pink or chum salmon from August through early September**

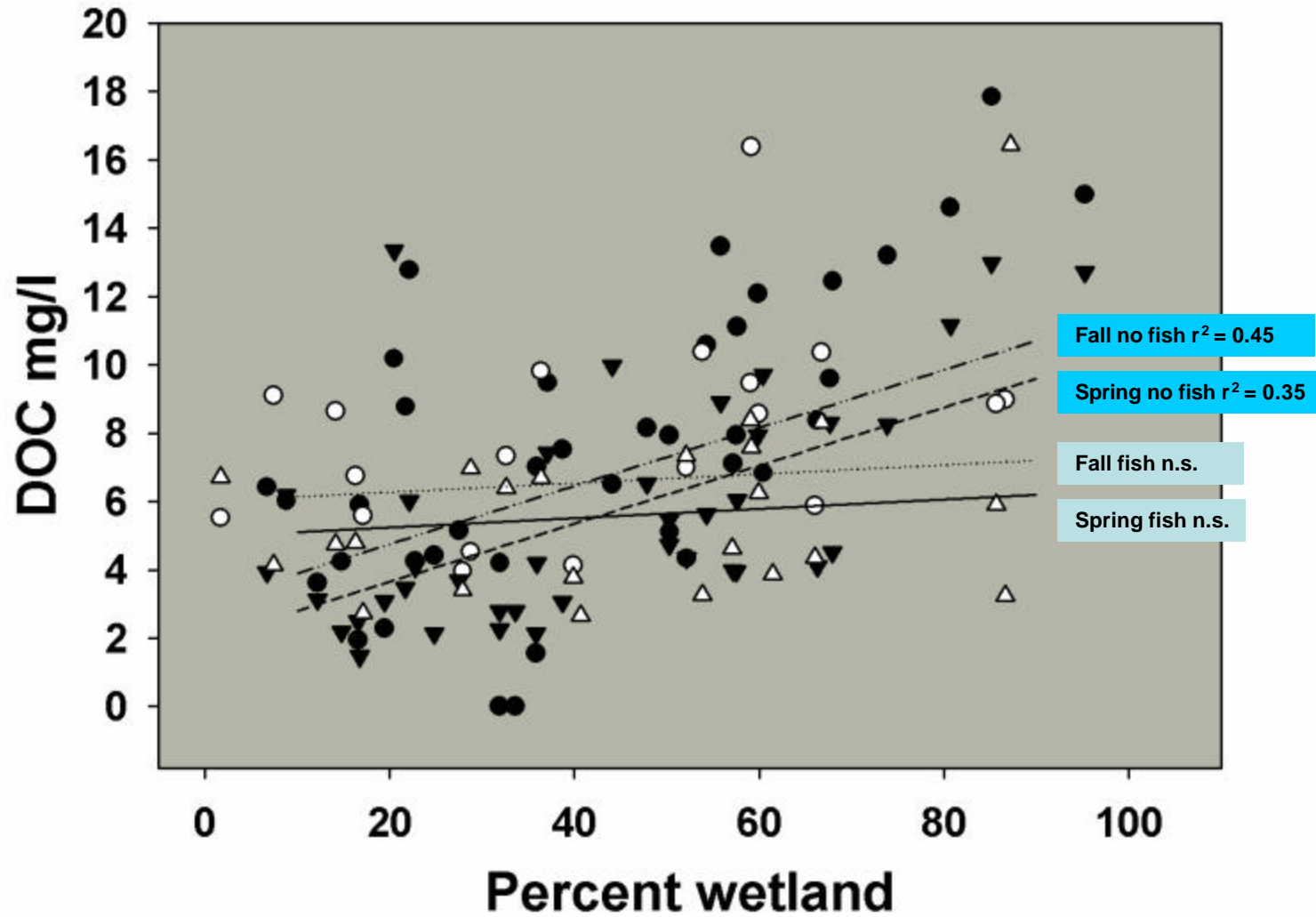


## DOC trends during salmon runs

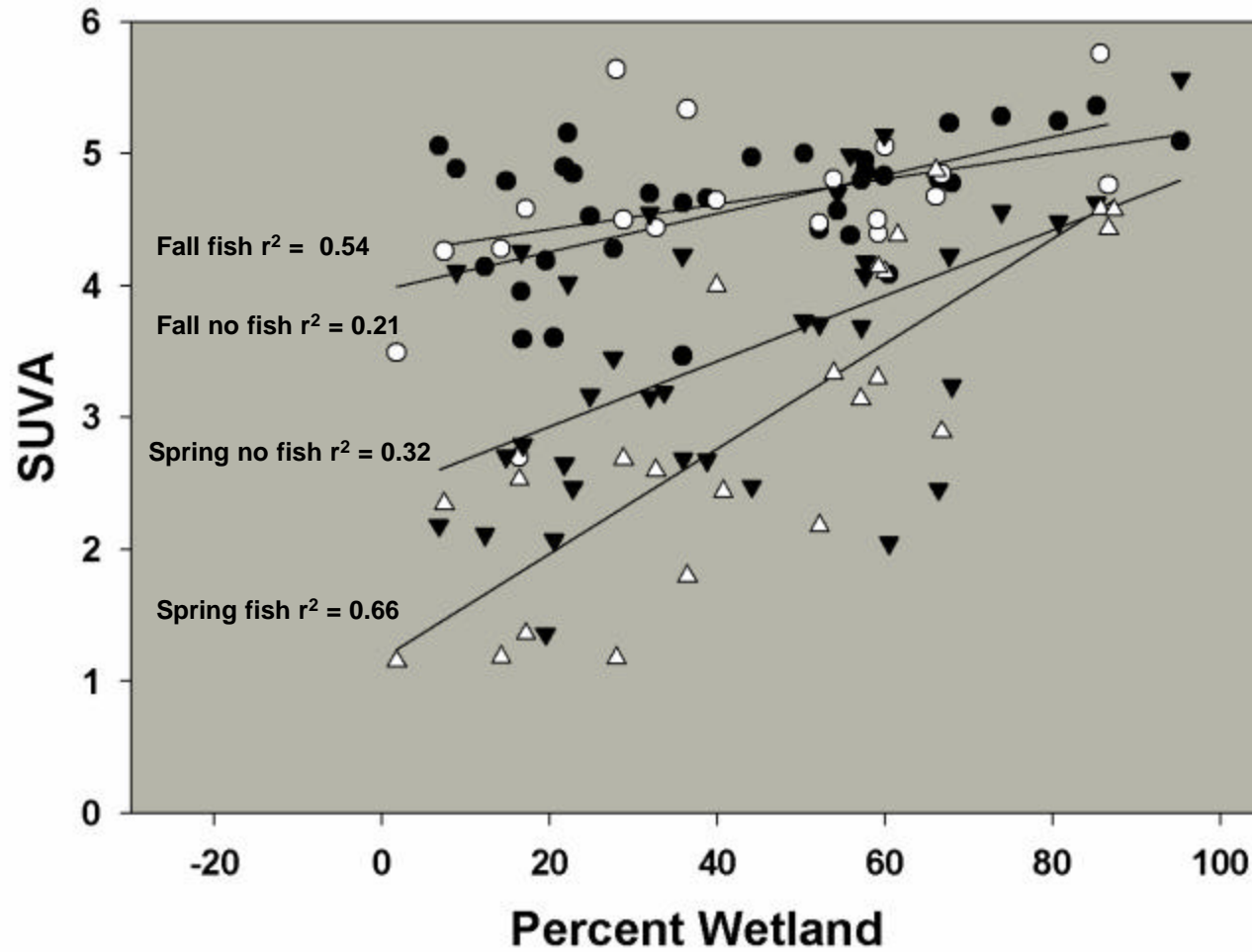
## Fluorescence excitation-emission matrices



DOC vs percent wetland by season and presence of fish



## SUVA vs percent wetland by season and presence of fish



# Climate Change

- Increase in soil temperature
- Increase in precipitation as rain
- Decrease in snow cover
- Change in annual hydrograph
  
- Increase in carbon mineralization?
- Increase in [DOM] and flux?
- Changes in aquatic habitat productivity/quality



# Climate change influences forest structure

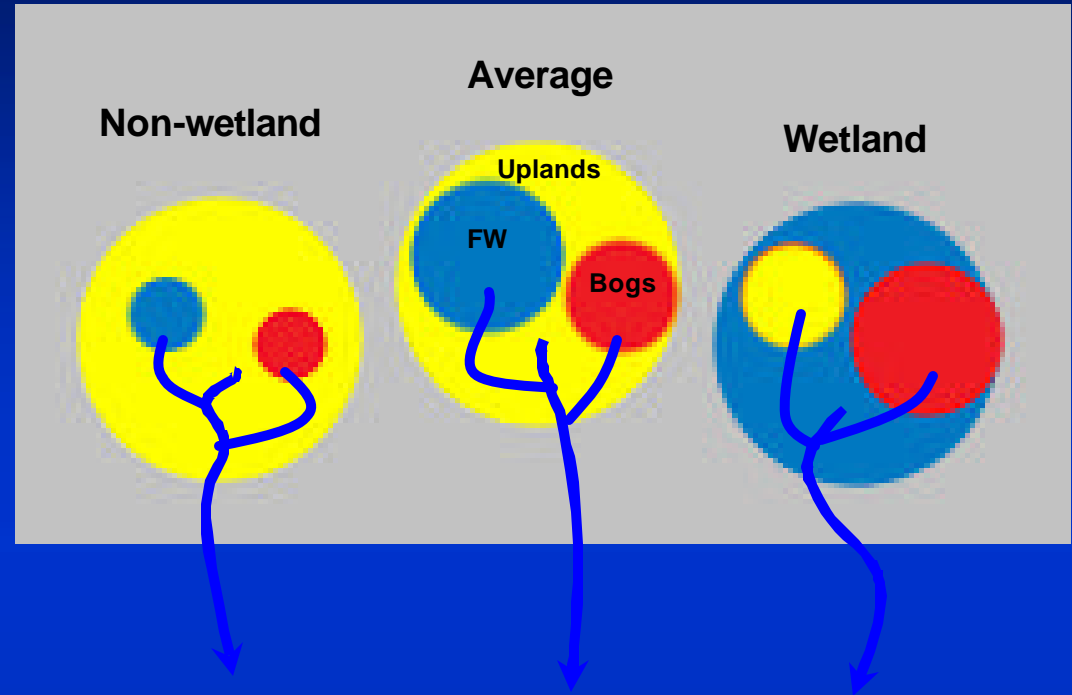
200,000 ha of yellow cedar declining



# Unit watersheds for Tongass NF

## Soil type distribution

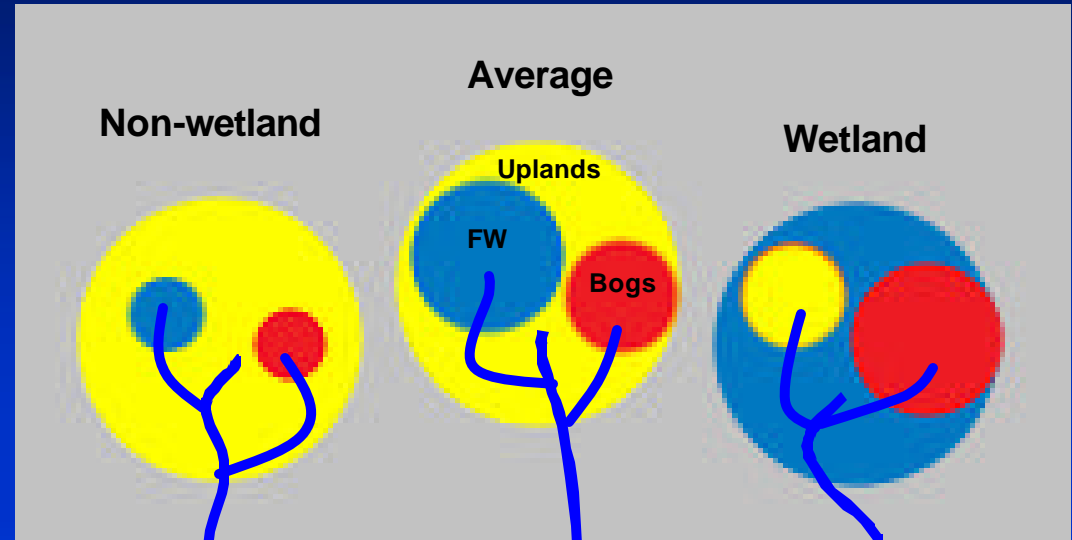
- **Non-wetland (<20%)**
- **Average (44%)**
- **Wetland (>80%)**



# Unit watersheds for Tongass NF

## Soil type distribution

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## Carbon flux by soil type

