


# Habitat Quality, Toxics, and Salmon in the Lower Columbia Estuary: Updated Results from the Ecosystem Monitoring Project

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Columbia River Estuary Workshop  
Astoria, OR  
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# Ecosystem Monitoring Program

## Coordinated Habitat, Fish, and Prey Monitoring at ~6 sites annually:

Vegetation monitoring (% cover along transects, species list, elevation)

Sediment grain size along transects

Water quality (data loggers)

Fish sampling (species richness, abundance, CPUE, stock id, length, weight, stomach contents, otoliths for growth rates, marked/unmarked, condition, contaminants)

Fish prey (taxonomy, abundance, biomass, terrestrial vs. aquatic origin)

Primary production/food web

**Both fixed and rotating sites for spatial and temporal trends**

**Results Online on at Estuary Partnership website: [www.lcrep.org](http://www.lcrep.org)**



# EMP Focus—Undisturbed emergent wetlands

- Undisturbed Emergent Wetlands
  - Dominated by erect, rooted, herbaceous “water loving” plants for most of the growing season
- Productive habitats that support fish and wildlife and are likely important rearing and nursery habitats for salmon



# **Estuary Partnership's Ecosystem Monitoring Program**

## **Major Program components:**

Water Quality (USGS)

Vegetation Monitoring (PNNL)

Food web (USGS and OHSU)

**Invertebrate prey (NOAA Fisheries)**

**Fish (NOAA Fisheries)**

# Summary of Findings from 2012

- Distinctive fish communities by reach
- Multiple salmon species and stocks with distinctive patterns of occurrence by reach
- Variety of prey but consistent preference by Chinook for Dipteran prey; found at highest densities in nearshore emergent vegetation
- Evidence of human activity even at relatively undisturbed sites
  - Non-native species, especially in Reaches F-H
  - Dominance of hatchery fish, especially in Reaches F-H
  - High summer water temperatures at most sites
  - Chemical contaminants, especially below Portland/Vancouver



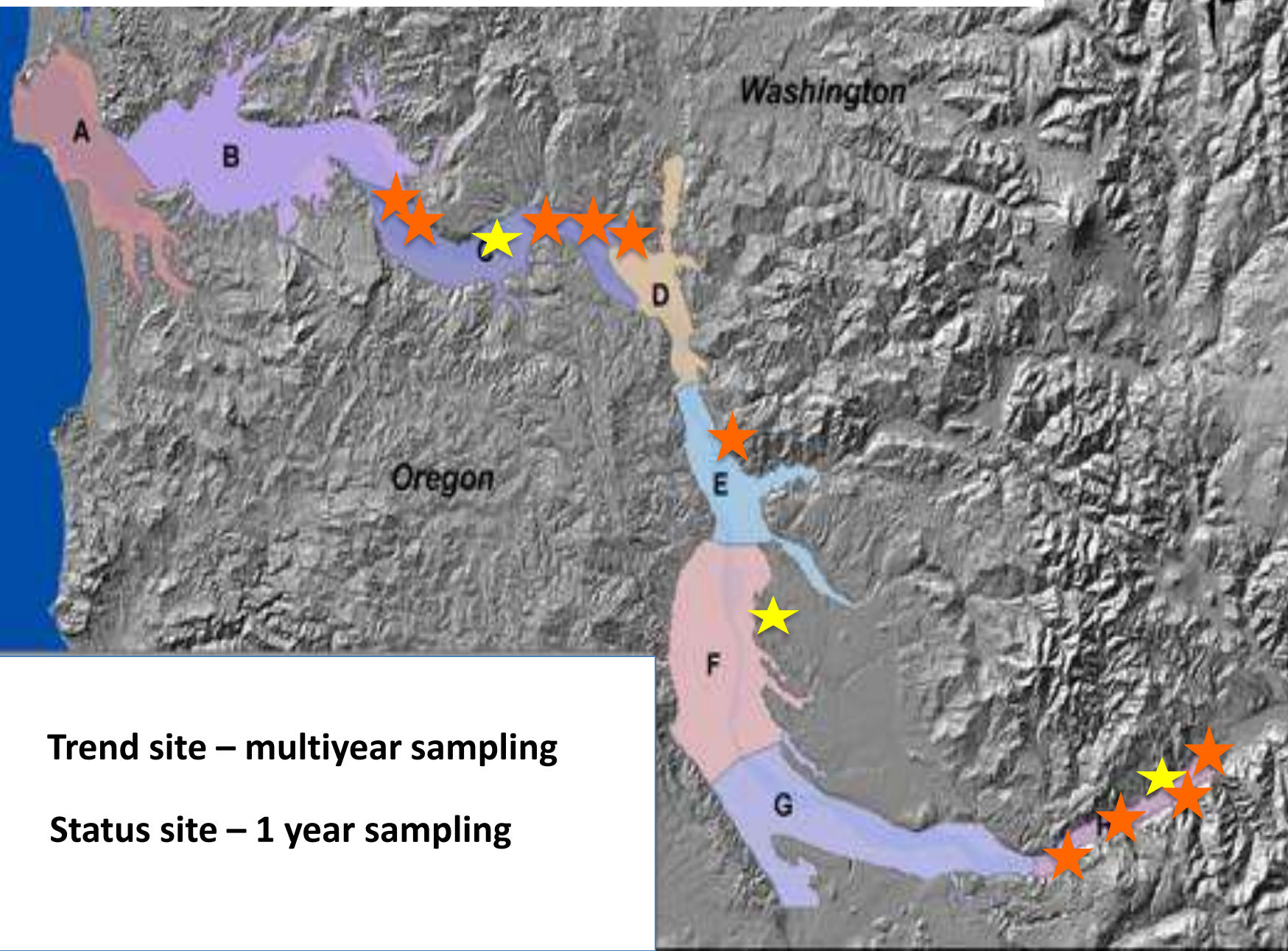
# What's New Since CREC 2012?

- New data from Reaches A, B, E, and G
- Additional years of data from trend sites
- More extended sampling in fall and winter



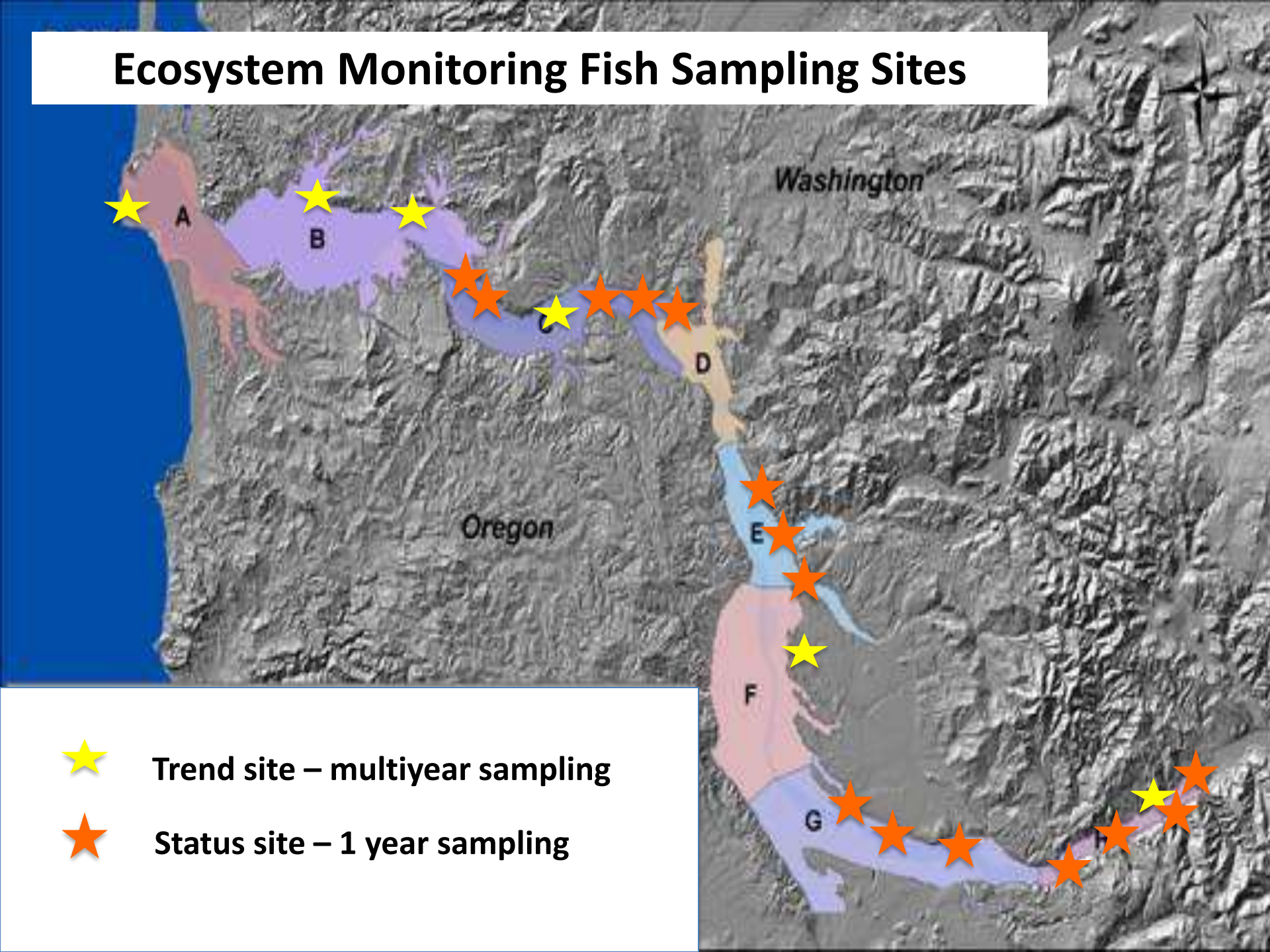
# Ecosystem Monitoring Fish Sampling Sites

- ★ Trend site – multiyear sampling
- ★ Status site – 1 year sampling





# Ecosystem Monitoring Fish Sampling Sites





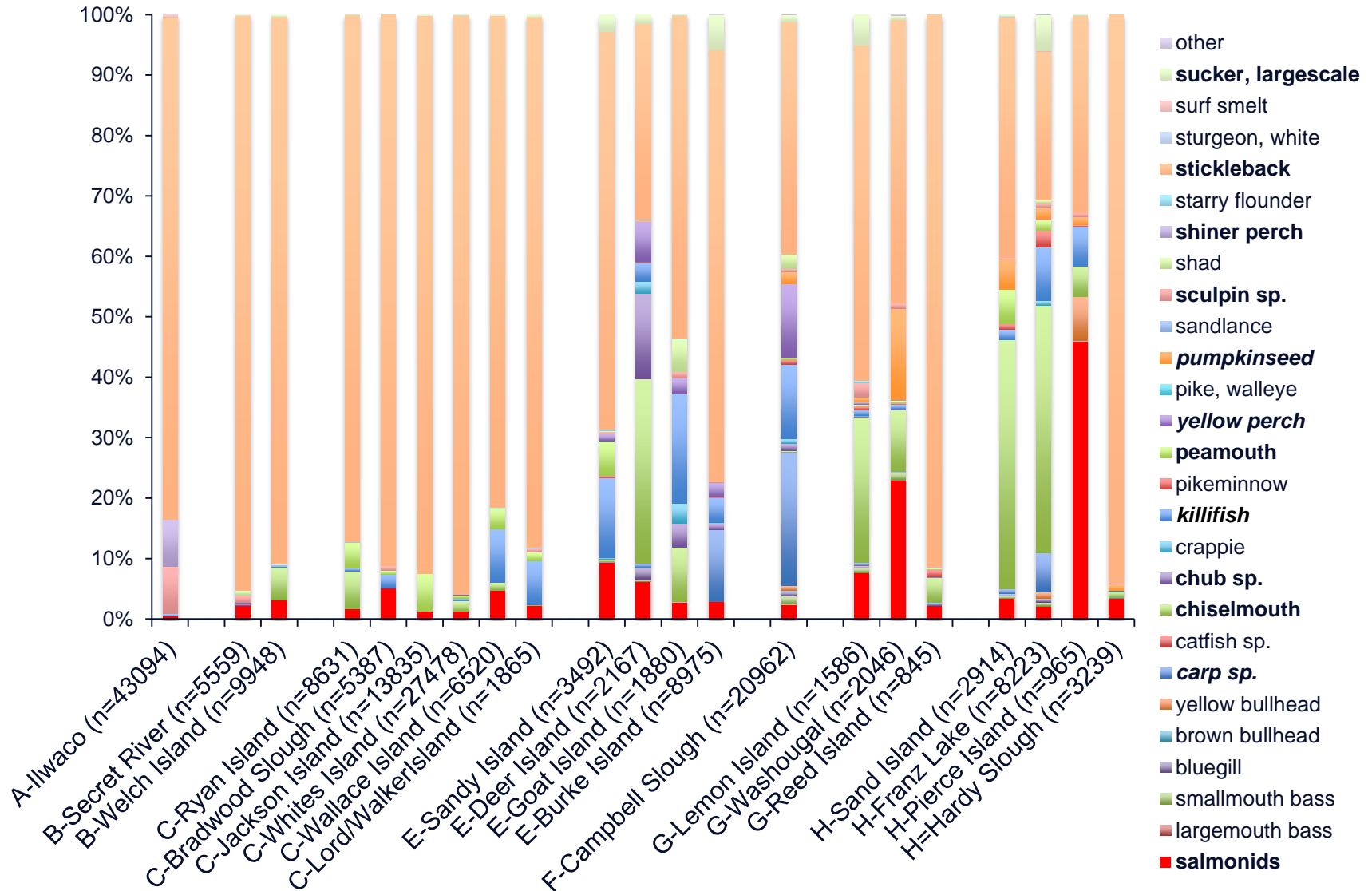
# Ecosystem Monitoring Results

- Fish communities
- Salmon occurrence
- Salmon condition
- Salmon prey and diets
- Contaminants in salmon
- Trends at fixed sites
  - Campbell Slough and Whites Island

# Ecosystem Monitoring Results

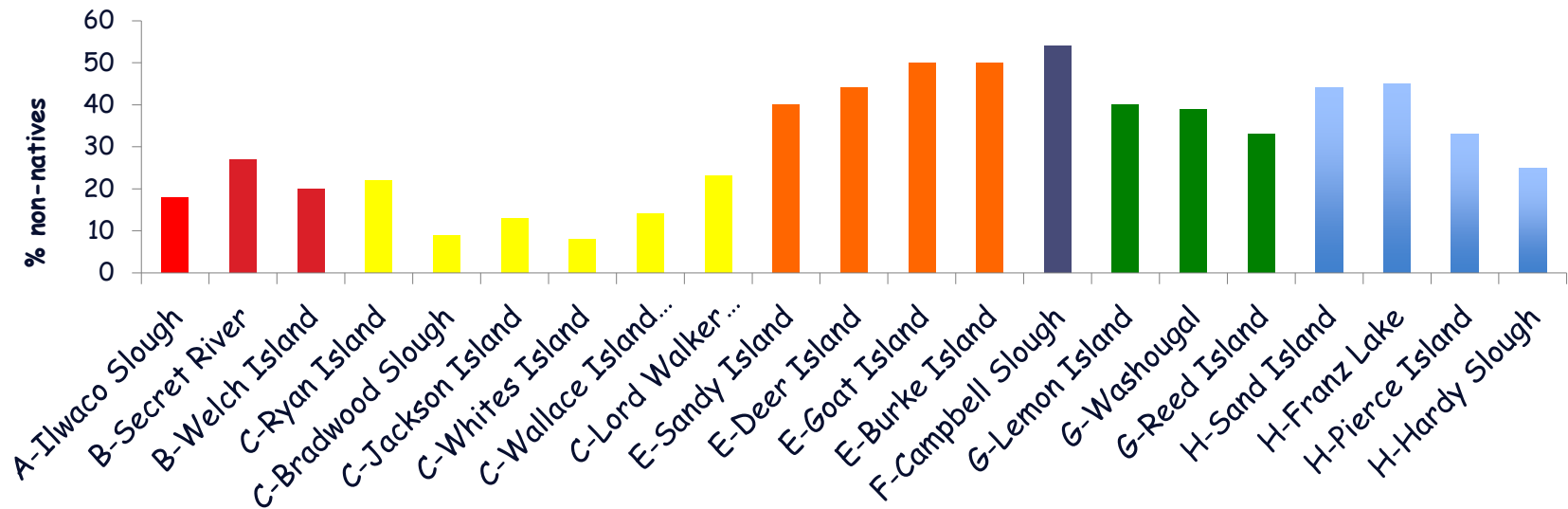
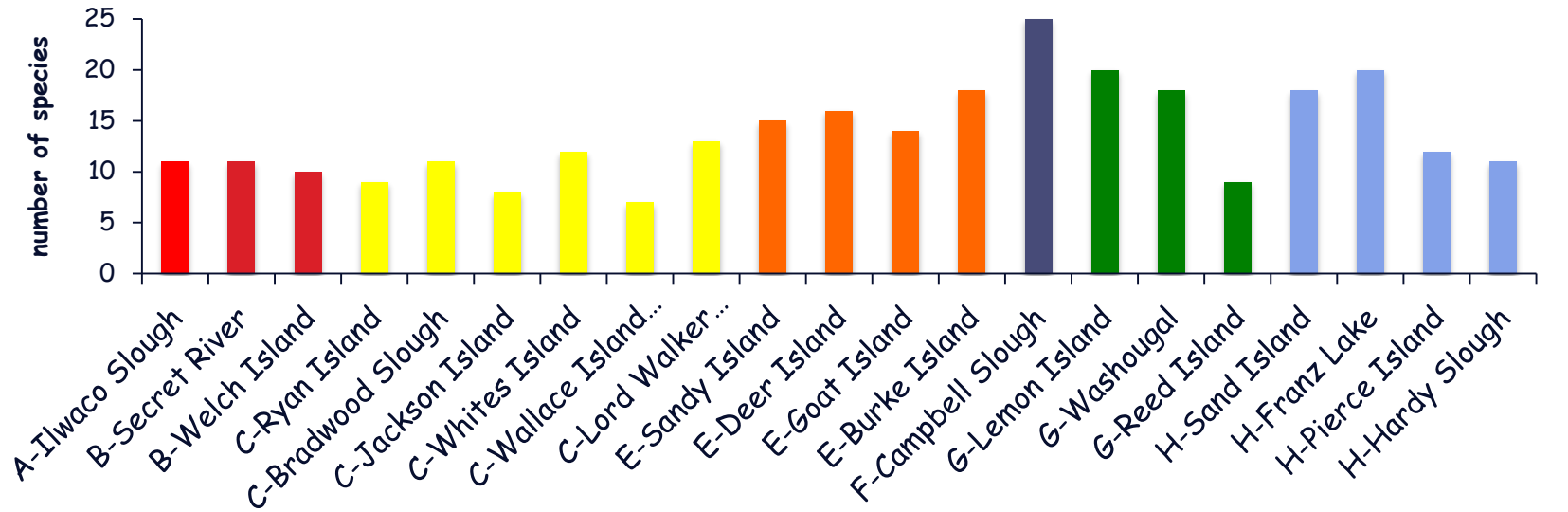
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# Fish Community Composition by Site

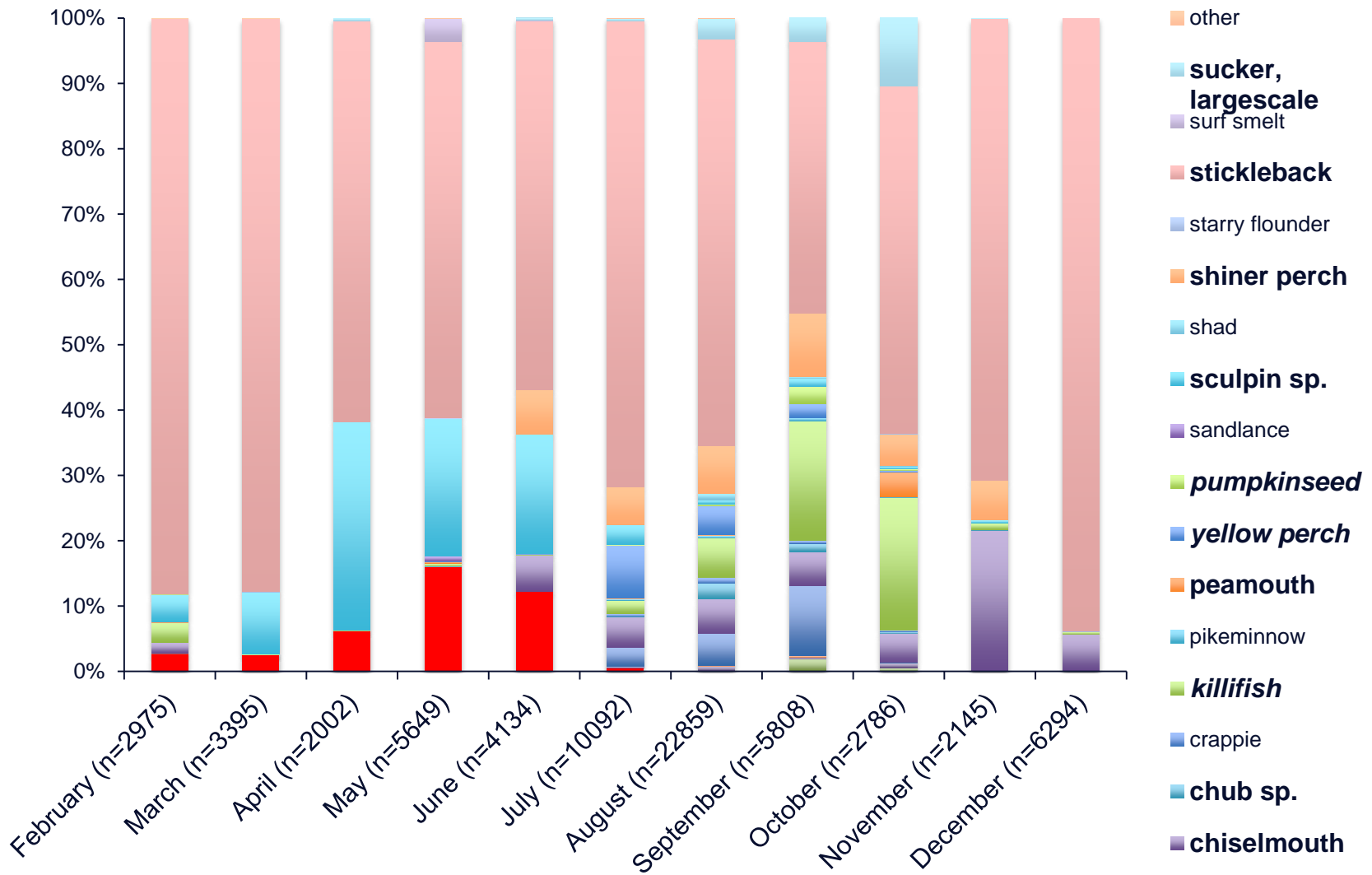




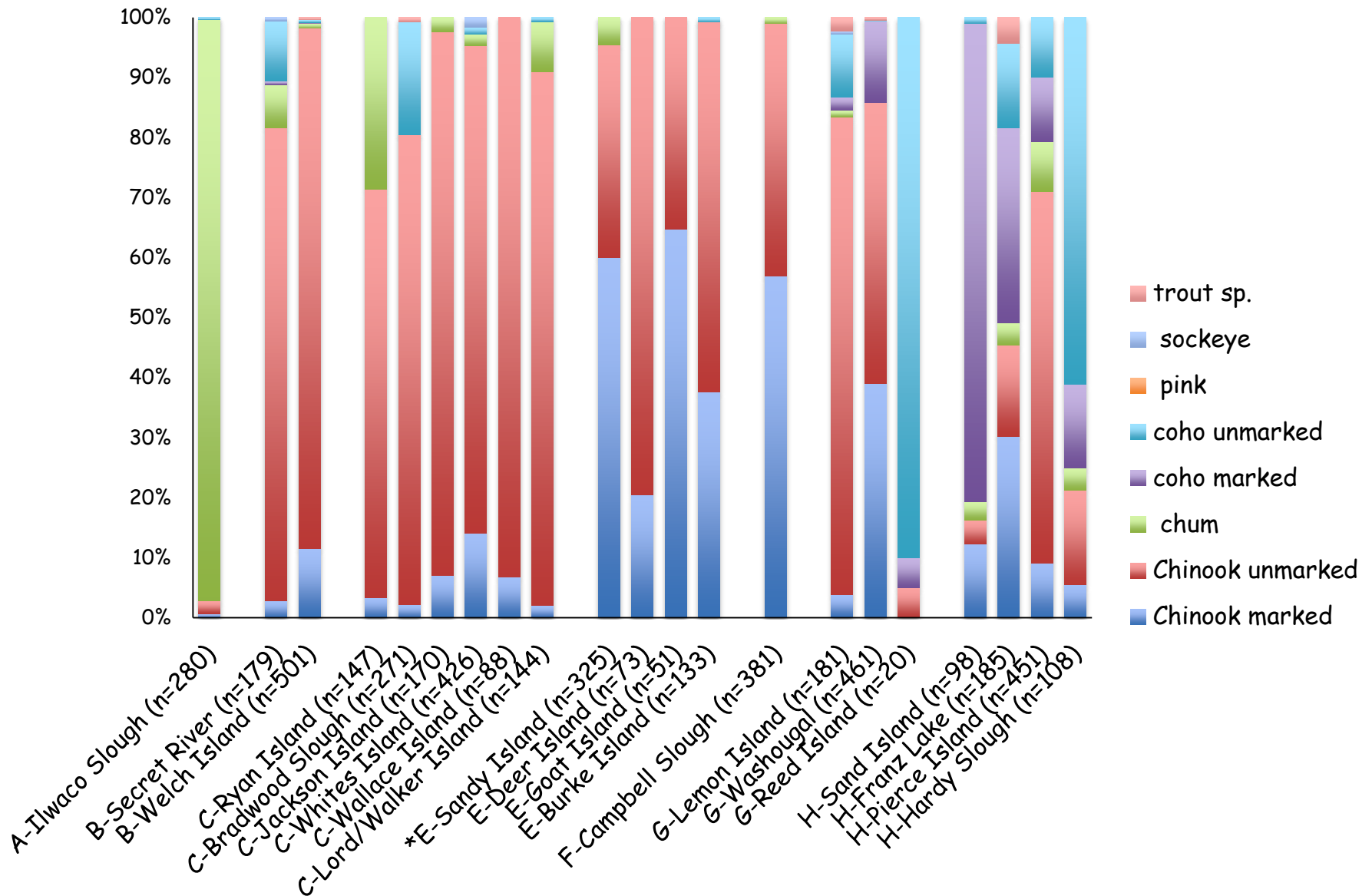
# Number of species and % non-natives



# Fish Community Composition by Month



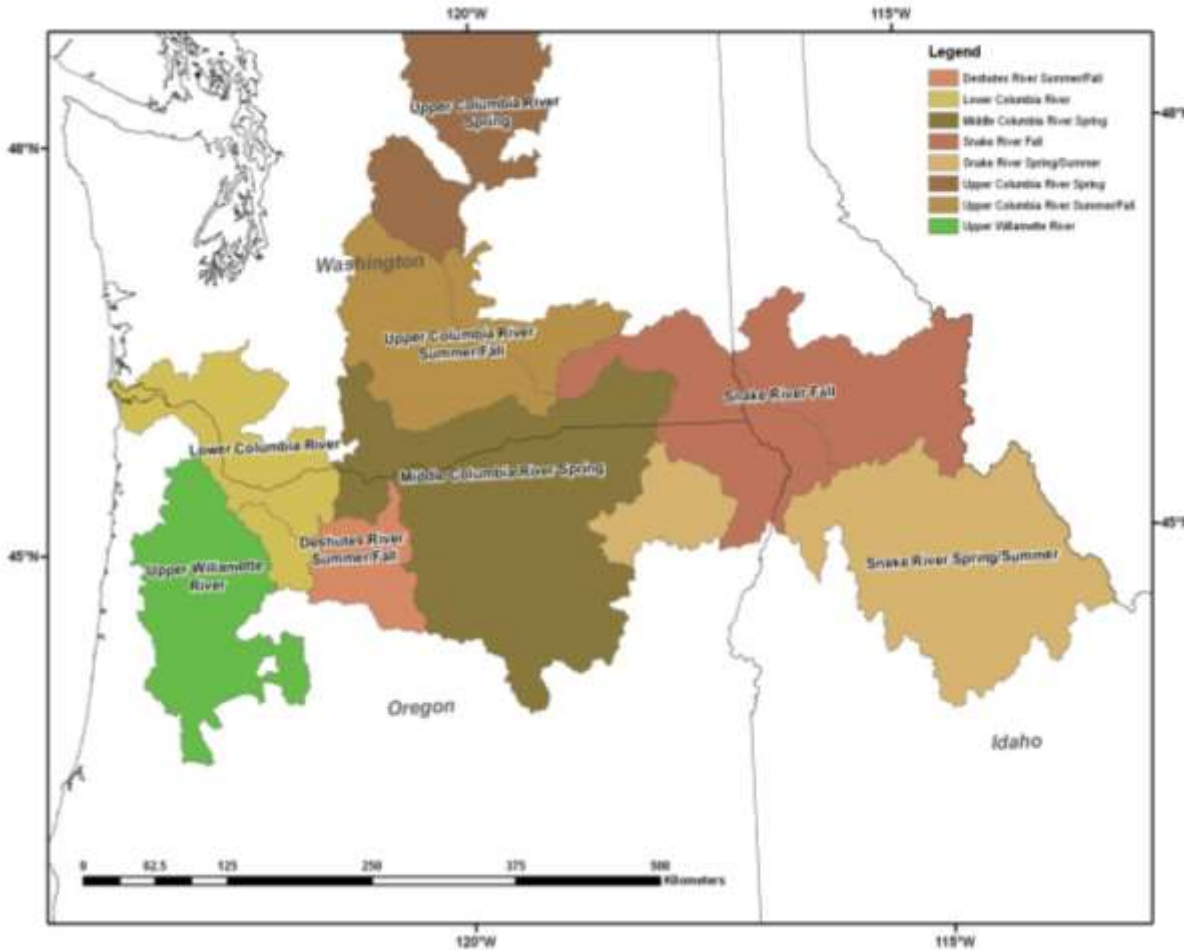
# Salmonid Catch Composition



\*percentage of marked and unmarked chinook salmon estimated from subsample



# Chinook Salmon Genetic Groups



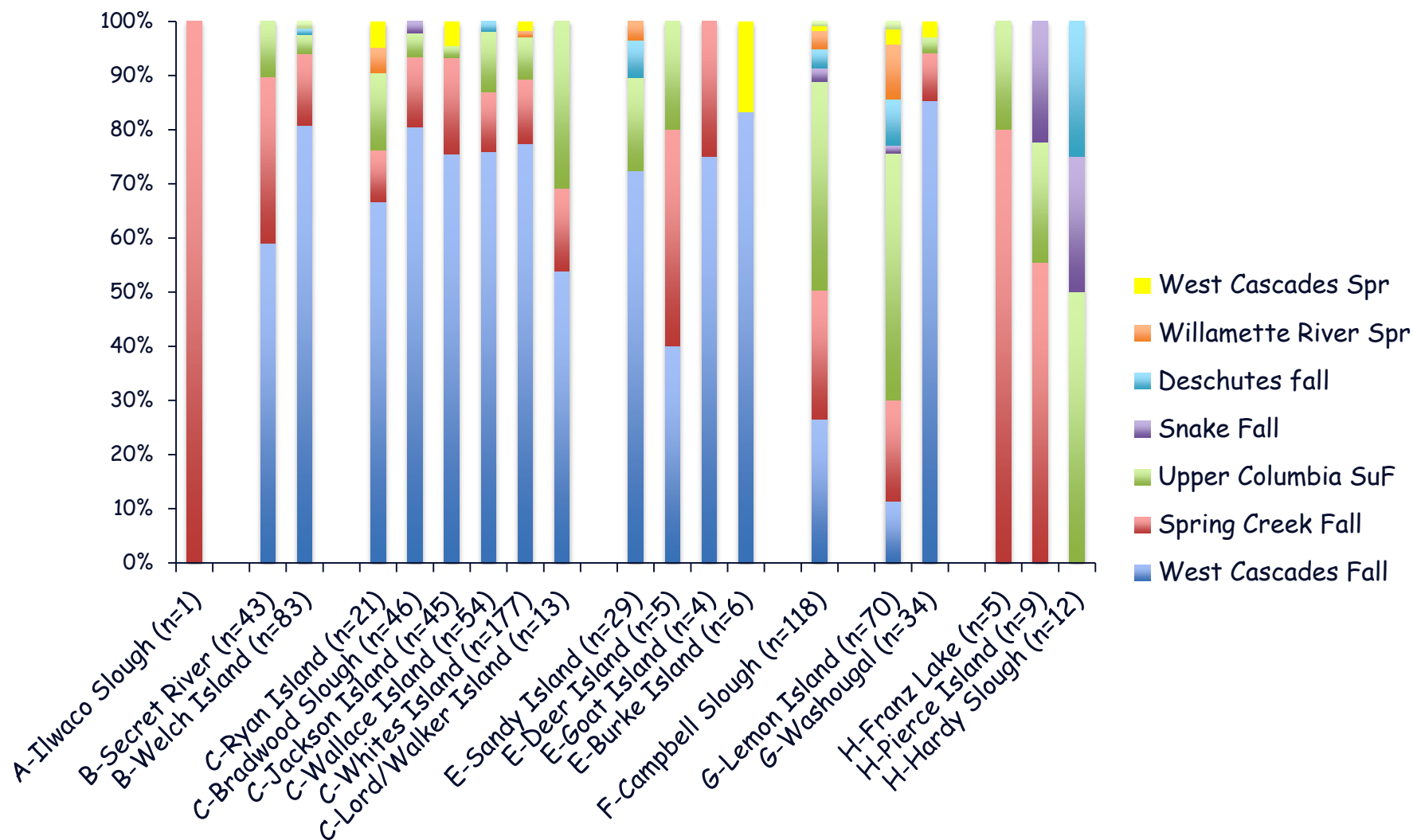
## Lower Columbia/Willamette Stocks:

- West Cascade Fall
- West Cascade Spring
- Spring Creek Group Fall
- Upper Willamette Spring

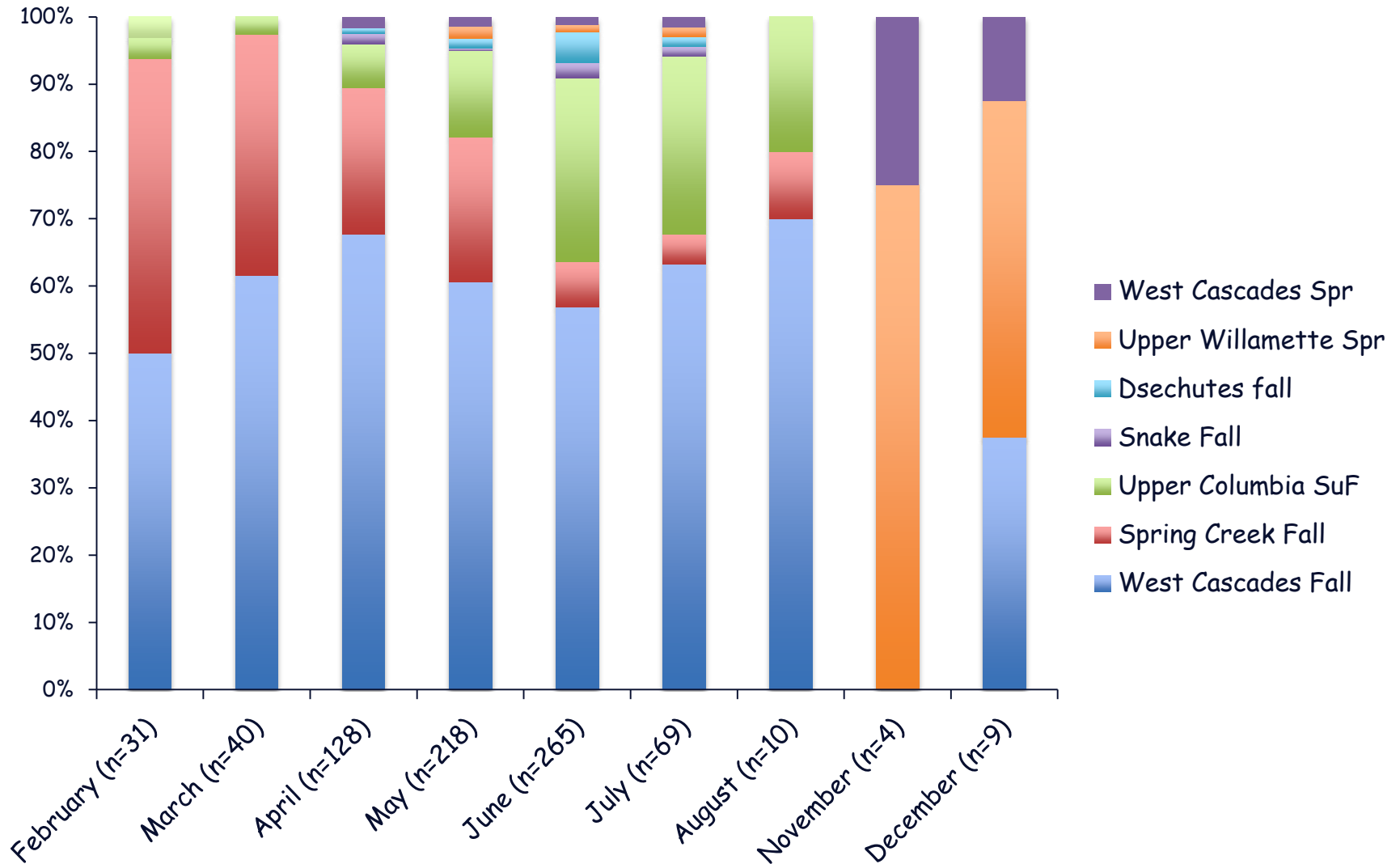
## Interior Columbia Stocks:

- Upper and Middle Columbia Spring
- Snake River Spring/Summer
- Snake River Falls
- Deschutes River Summer/Fall

# Genetic Stocks by Reach - Unmarked Chinook

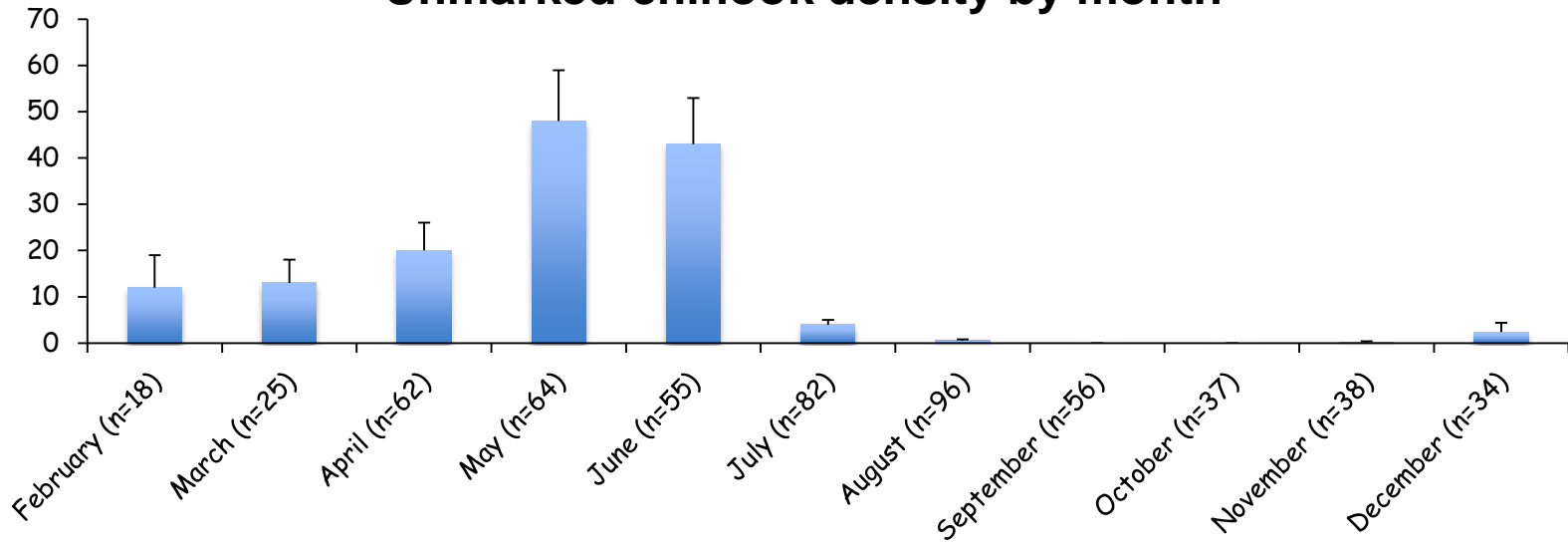


# Genetic Stocks by Month - Unmarked Chinook

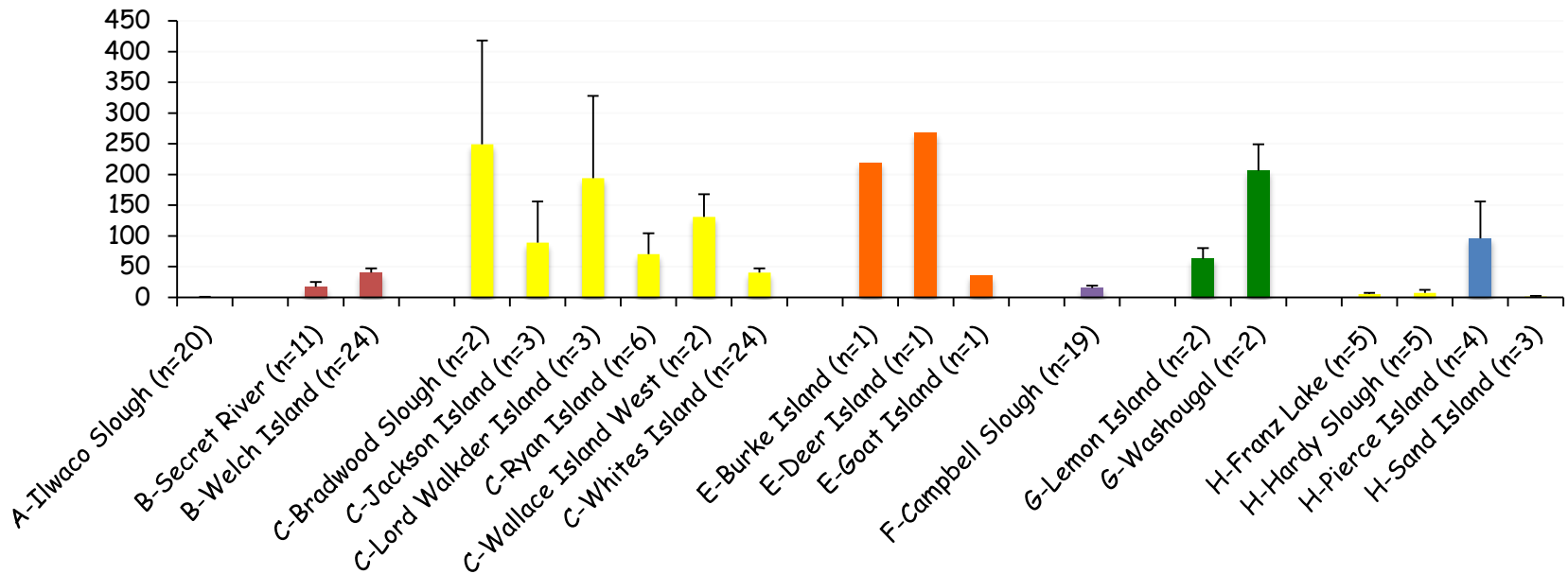




## Unmarked chinook density by month



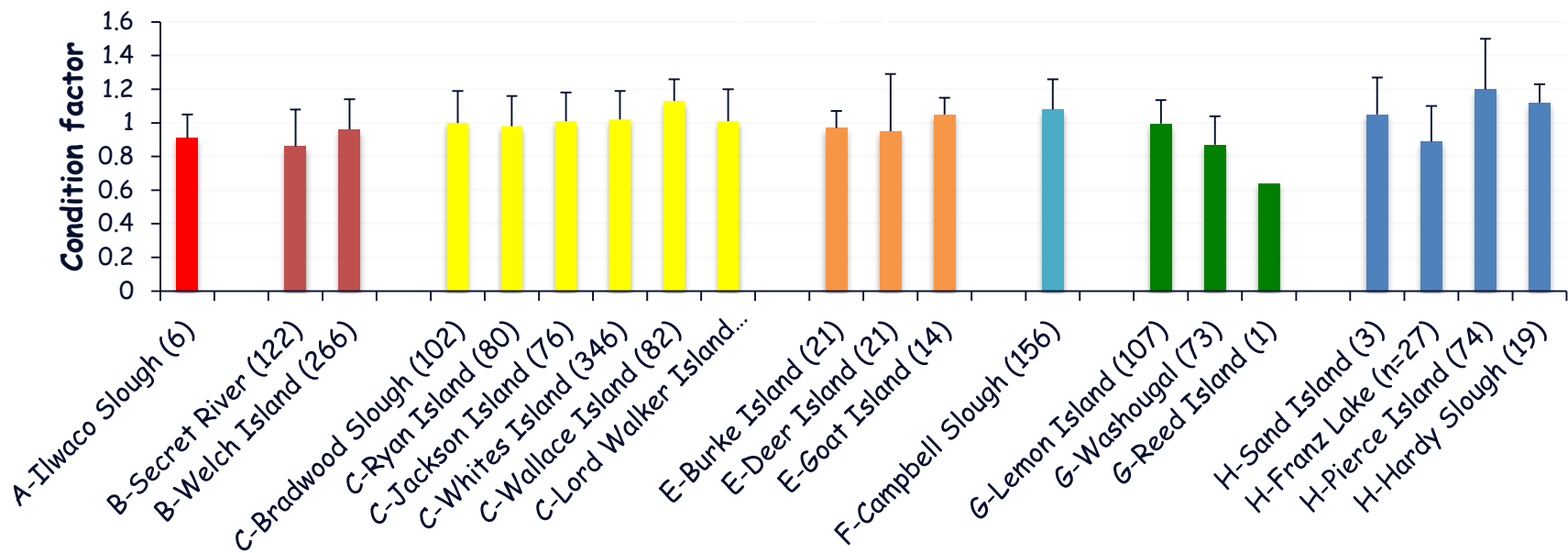
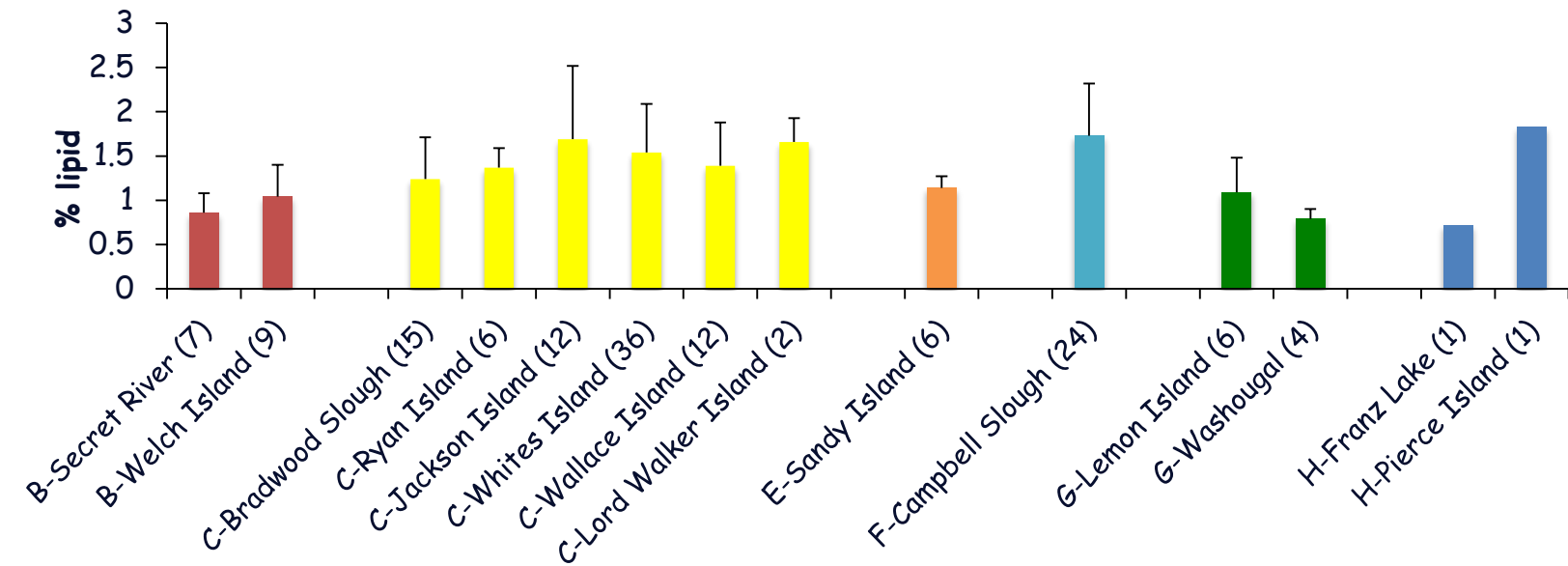
## Unmarked Chinook density (May and June) by site



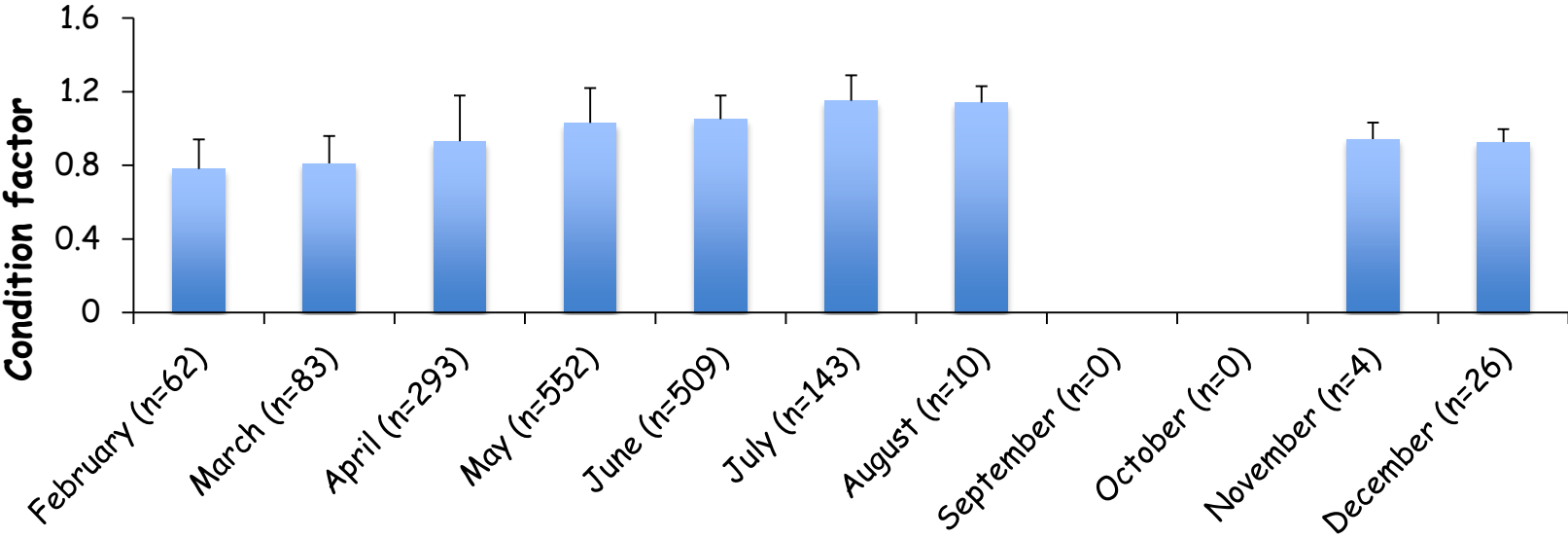
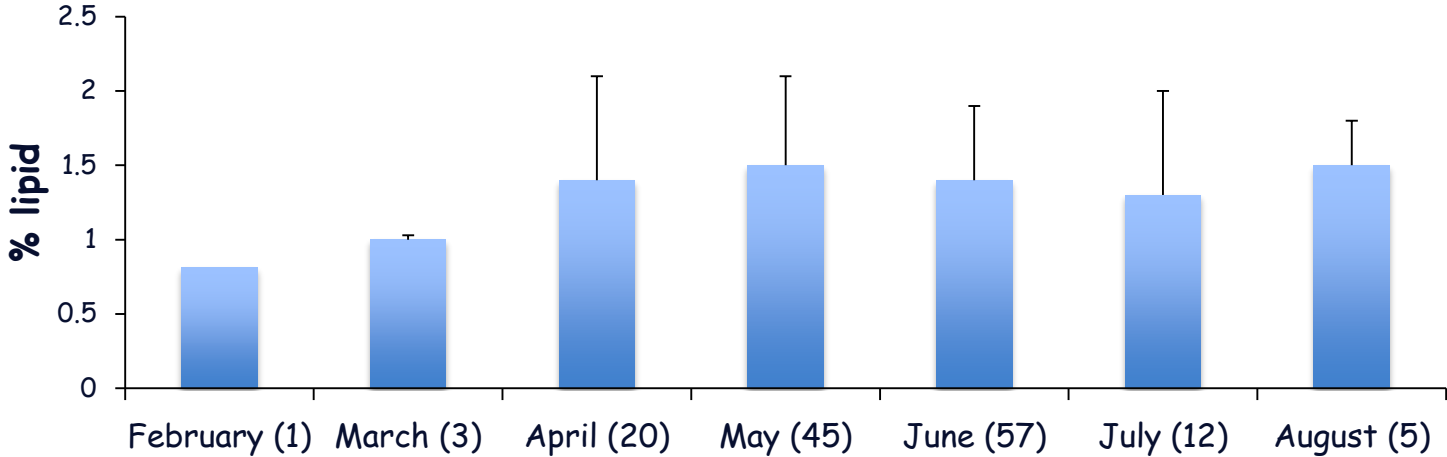
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# Condition factor and lipid content of unmarked Chinook salmon by site



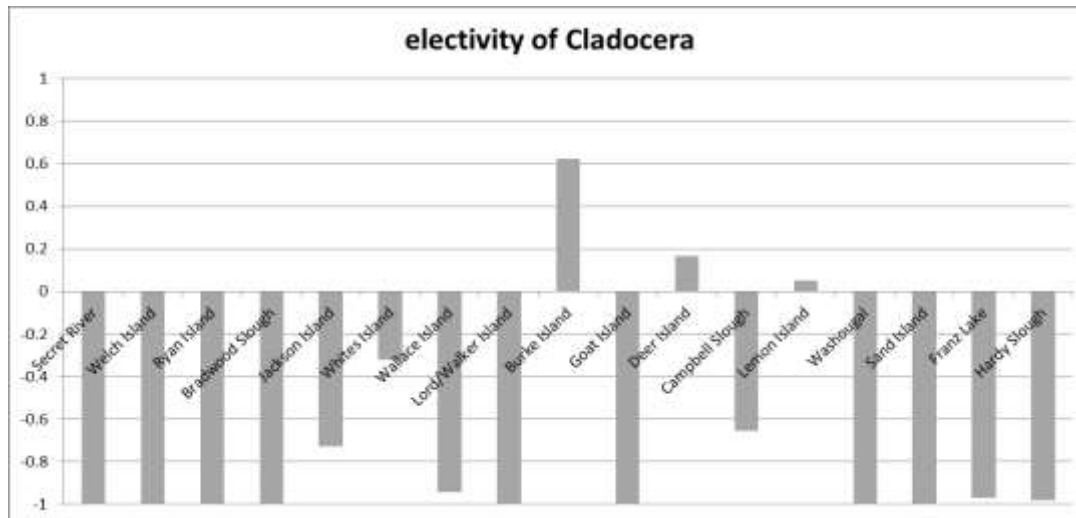
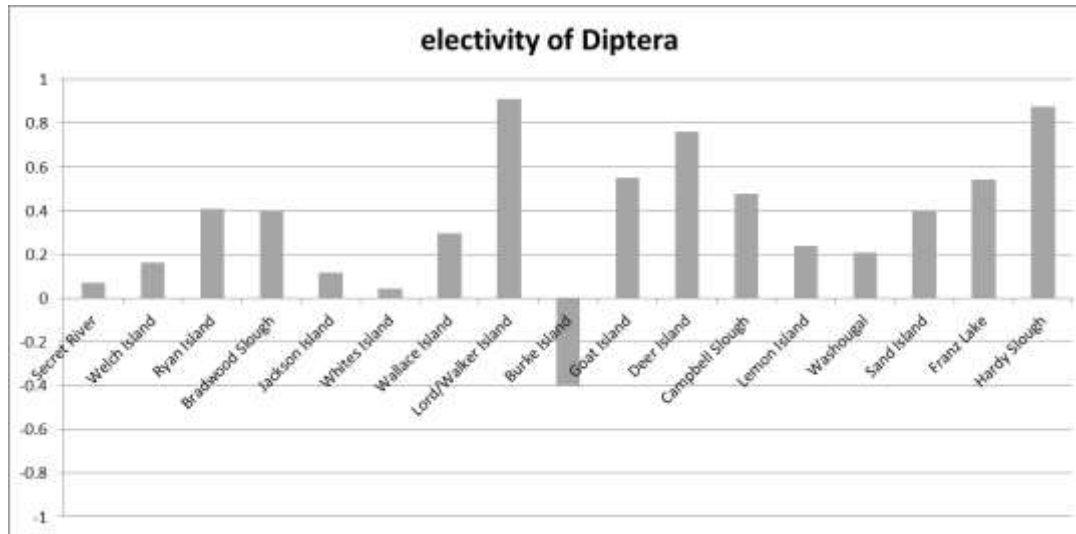
# Condition factor and lipid content of unmarked Chinook salmon by month



# Ecosystem Monitoring Results

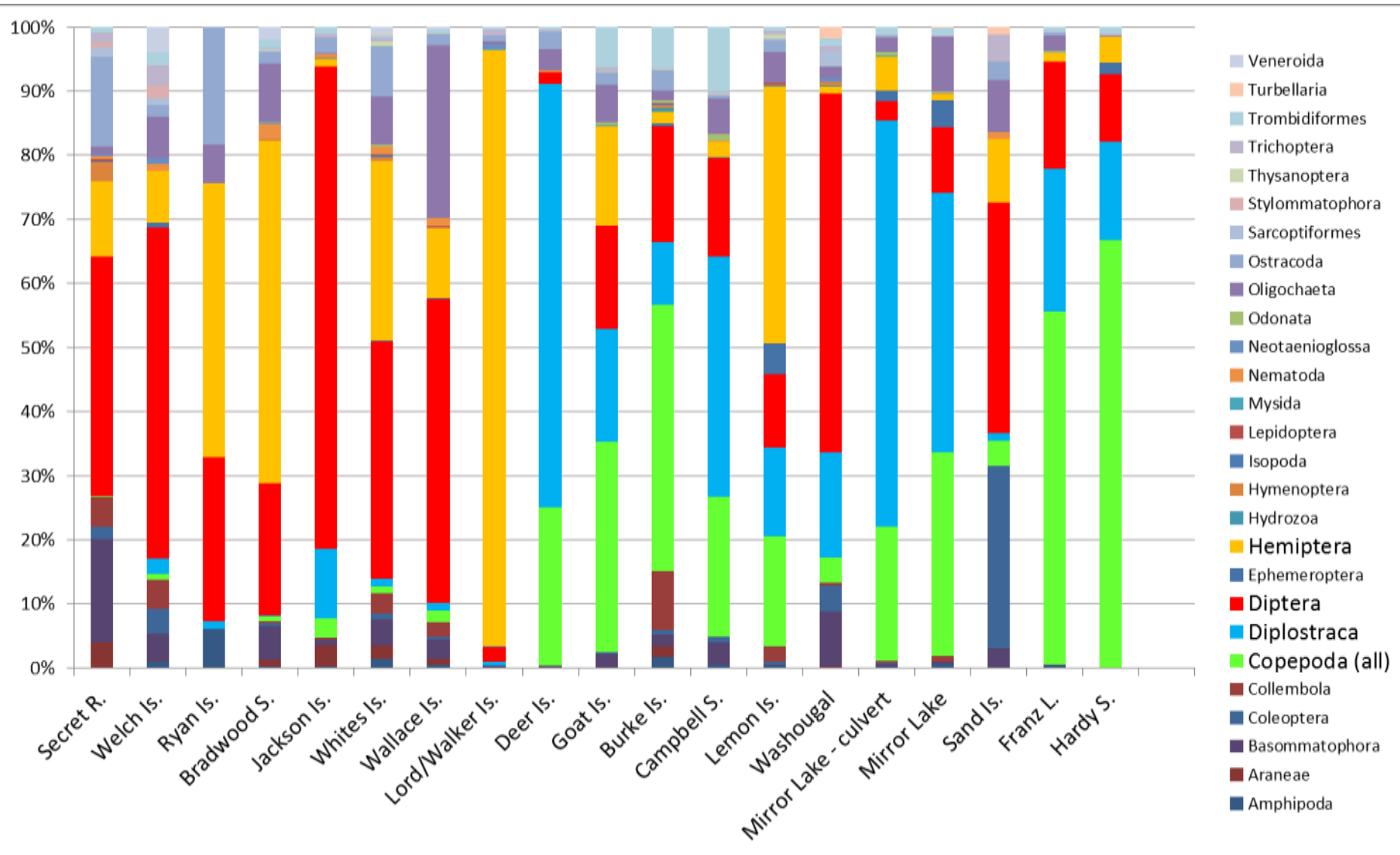
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# What they like . . . and what they don't





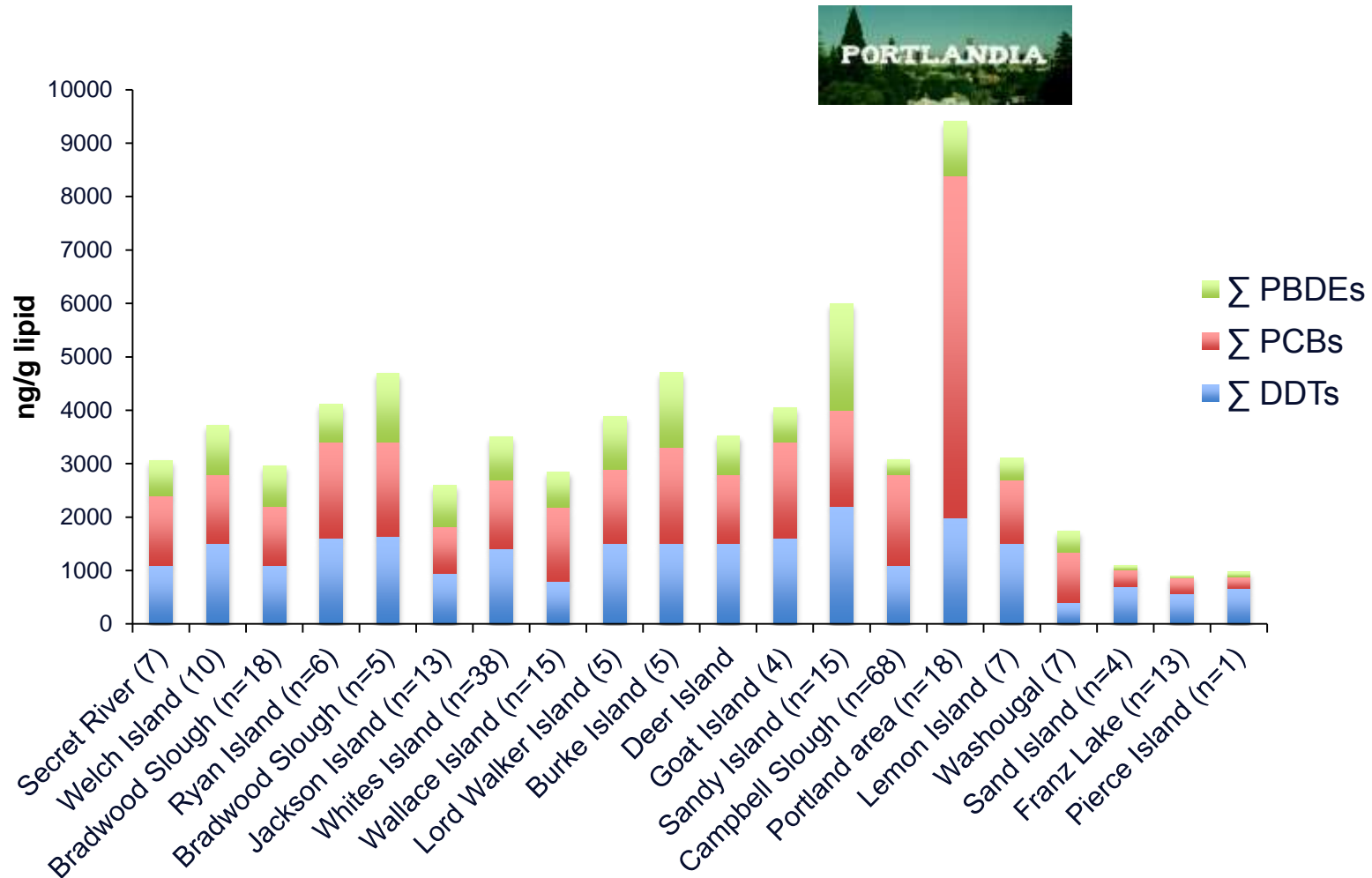
# Composition of available prey



# Ecosystem Monitoring Results

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# Persistent organic pollutants in Chinook salmon

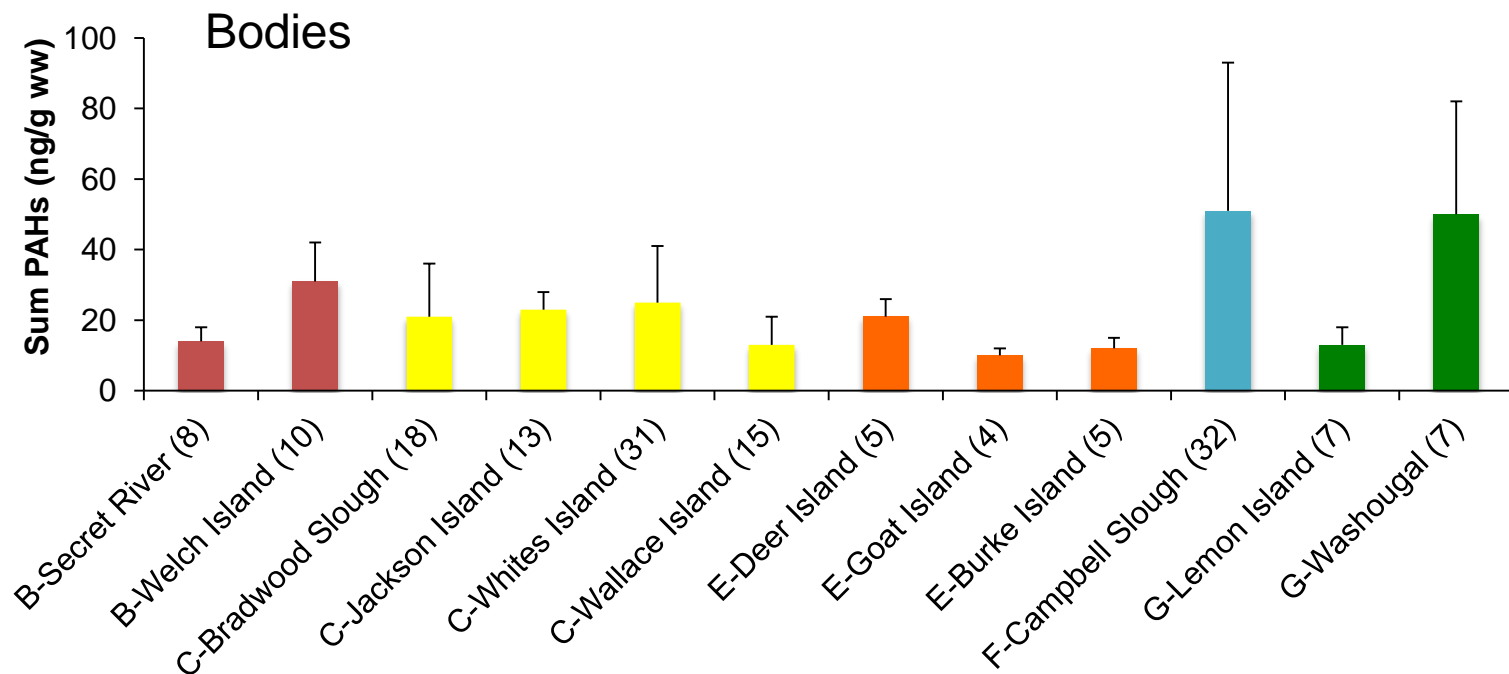
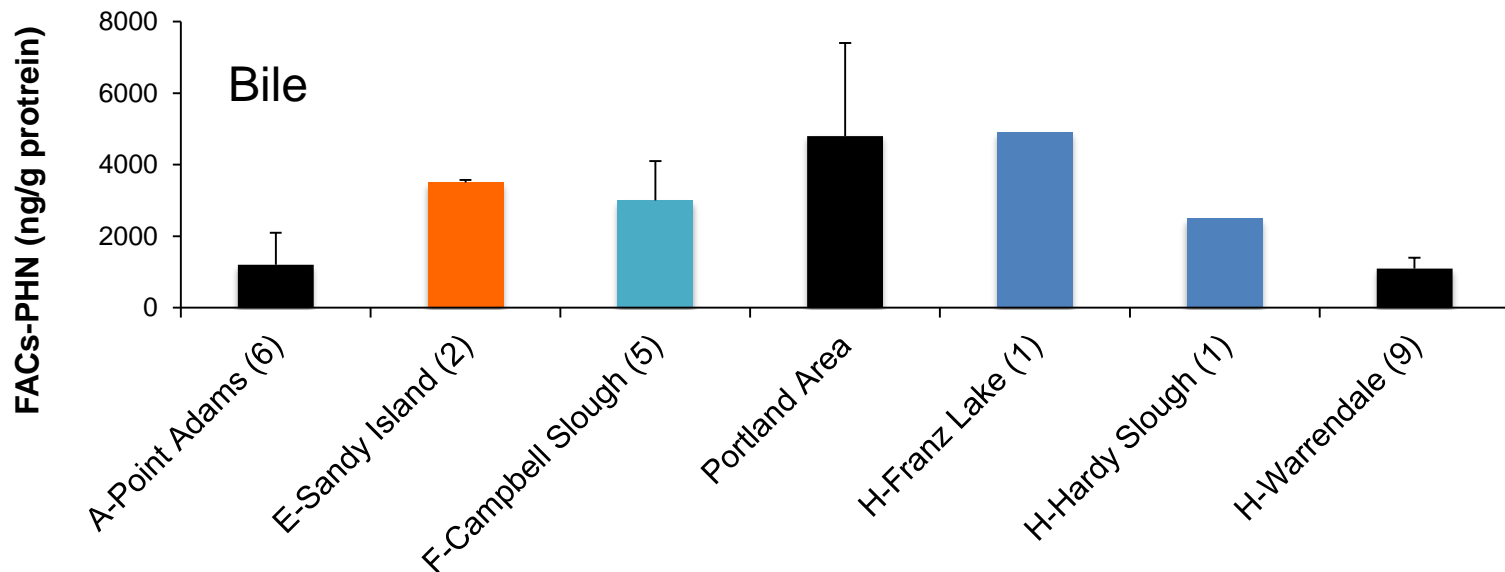


DDTs: <1% of samples EMP samples at or above estimated toxic effects thresholds

PCBs: 8% of EMP samples at or above estimated toxic effects threshold

PBDEs: 20% of EMP samples at or above estimated toxic effects threshold

# PAHs in Chinook salmon

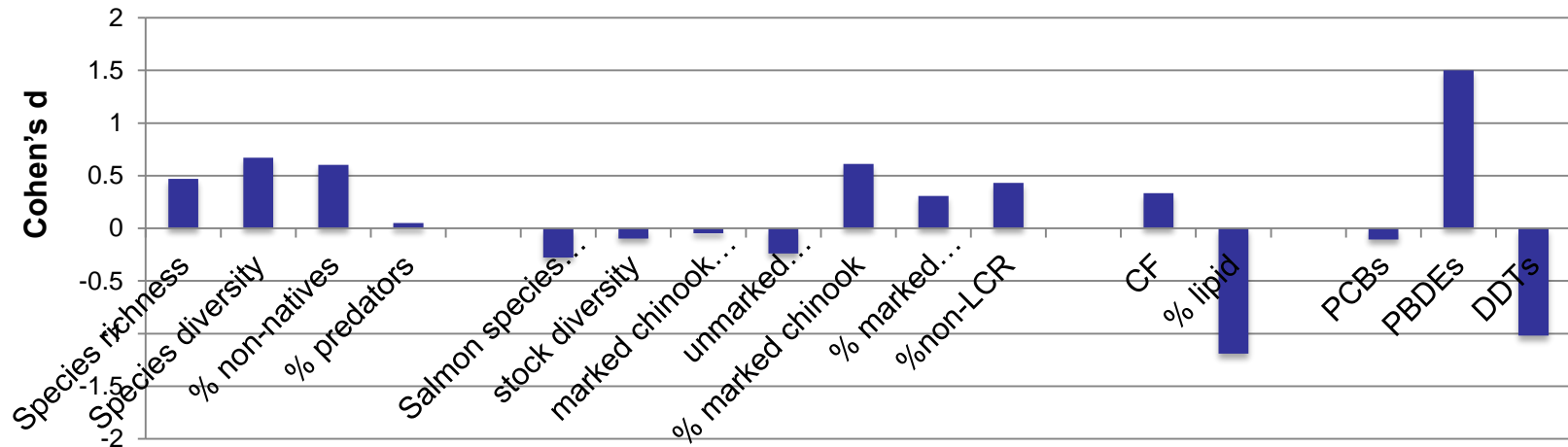


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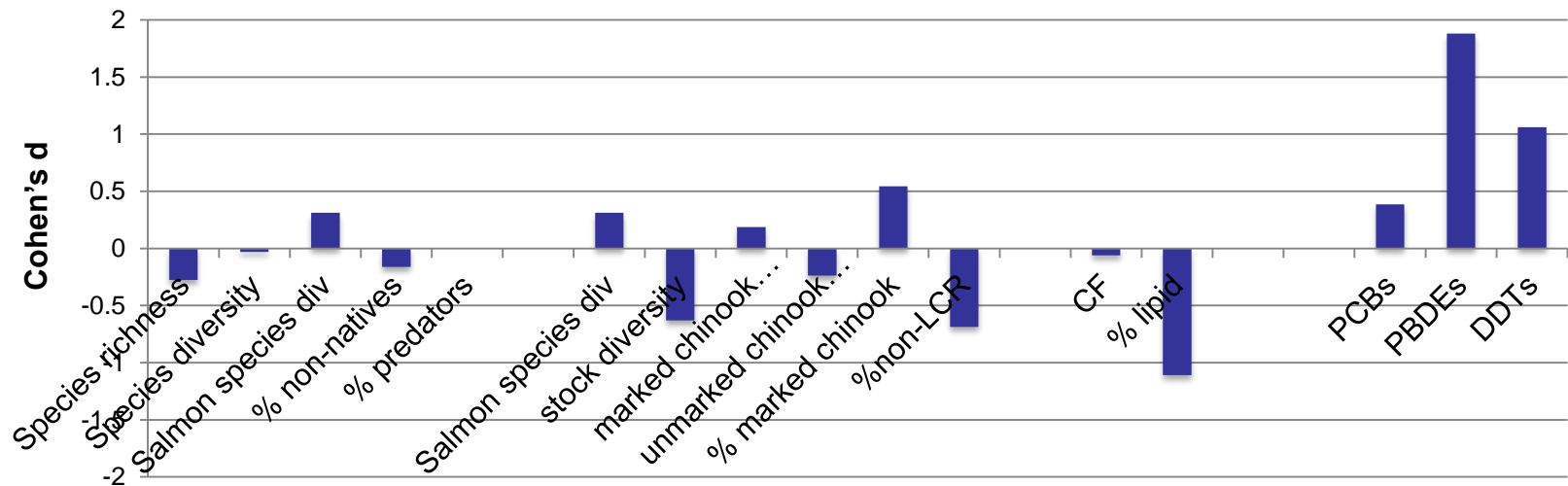
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# Trends at Campbell Slough and Whites Island

## Campbell Slough 2007-2013



## Whites Island 2009-2013





# Summary of Findings

- Distinctive fish communities by reach and season
- Multiple salmon species and stocks with distinctive patterns of occurrence by reach and season
- Highest lipid content and condition factor in summer; patterns by reach less clear
- Chinook salmon from all reaches like Dipterans and amphipods better than Cladocerans and copepods, and these are most abundant in Reach C and below (and in emergent vegetation).
- Evidence of human activity even at relatively undisturbed sites (e.g., non-native species, chemical contaminants)
- Little evidence of trends in most measures at fixed sites – but there are a few exceptions!

# Questions?

