

Results of Multi-Year Coordinated Fish, Fish Prey, Habitat and Water Quality Data Collection under the Ecosystem Monitoring Project

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Columbia River Estuary Conference

Astoria, OR

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Ecosystem Monitoring Project

Objectives:

- Characterize tidal freshwater salmon habitats in the Lower Columbia River and Estuary, and salmon and salmon prey occurrence in those habitats
- Provide long term data to assess the status and trends of aquatic habitats, including those used by endangered salmon populations
- Apply these data, as appropriate, for estuary habitat restoration.



Ecosystem Monitoring Project

Coordinated Habitat, Fish, and Prey Monitoring at ~4-6 sites annually:

Vegetation monitoring (% cover along transects, species list, elevation) - 4-6 sites

Sediment grain size along transects - 4-6 sites

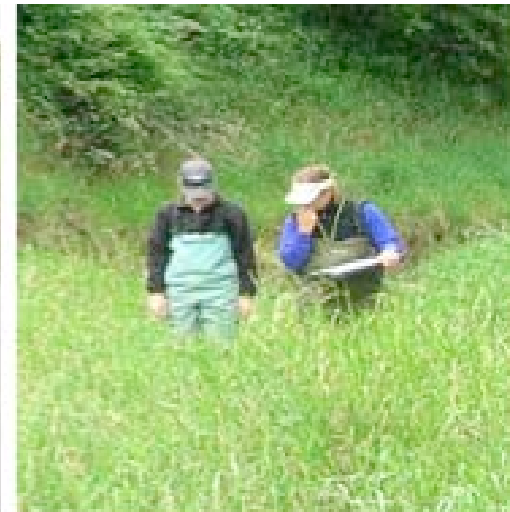
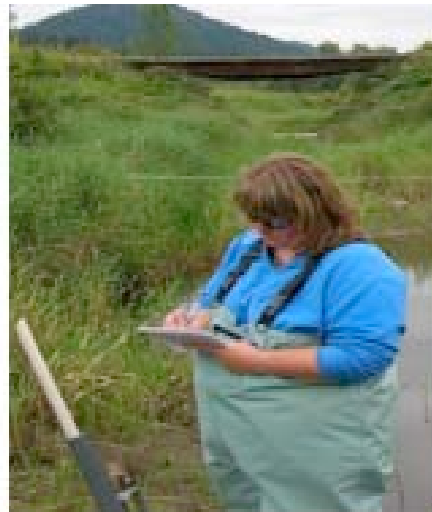
Water quality (data loggers) - 2 sites

Fish sampling (species richness, abundance, CPUE, stock id, length, weight, stomach contents, otoliths for growth rates, marked/unmarked, condition, contaminants) - 5 sites

Fish prey (taxonomy, abundance, biomass, terrestrial vs aquatic origin) - 5 sites

Primary production/food web – 1 site

Results Online on at Estuary Partnership website: www.lcrep.org



EMP Focus—Undisturbed emergent and forested wetlands

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



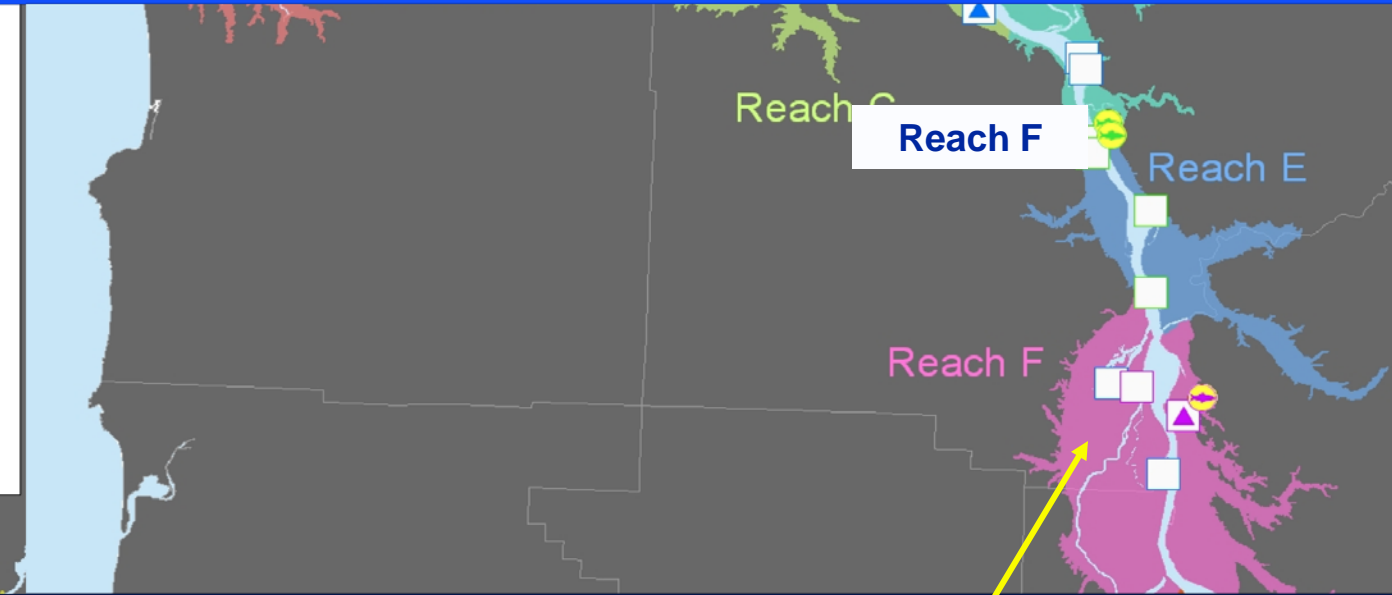
**Ecosystem Monitoring Project.
Habitat, Water Qual, Fish Monitoring:
All phases**

- ▲ Multi-Year Water Quality Monitoring
- ▲ 2009 Water Quality
- ▲ 2008 Water Quality Monitoring
- ▲ Phase 1 Water Quality Monitoring
- 🐟 Multi-Year Fish Monitoring
- 🐟 2008, 2009 Fish Monitoring
- 🐟 2009 Fish Monitoring



Reach C

Reach E



- 🐟 2008 Fish Monitoring
- 🐟 2007 Fish Monitoring
- Multi-Year Habitat Monitoring
- 2008, 2009 Habitat Monitoring
- 2009 Habitat Monitoring
- 2008 Habitat Monitoring
- 2007 Habitat Monitoring
- Phase 1 Habitat Monitoring

Reach H

Portland

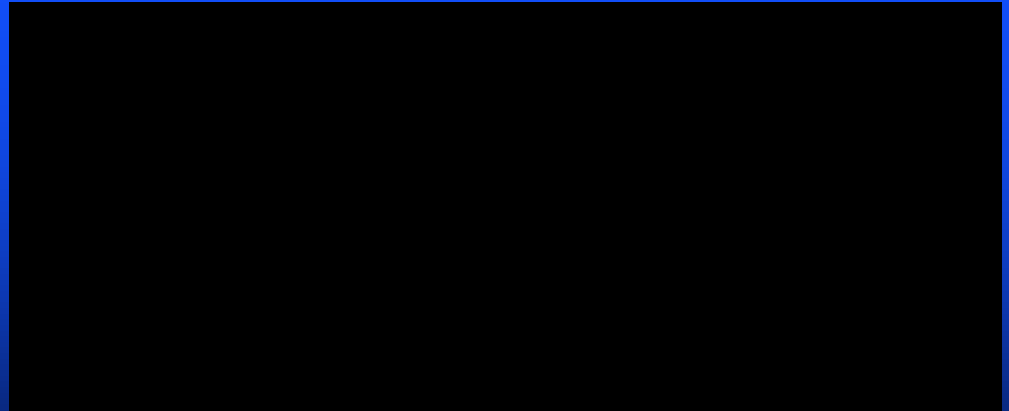
Ecosystem Monitoring Multi-year Sampling Sites



Multiyear Sampling Sites



Campbell Slough (Reach F) – Ridgefield Wildlife Refuge, WA



Franz Lake (Reach H) –near Beacon Rock State Park, WA

Ecosystem Monitoring Program Results Multi-year Sites

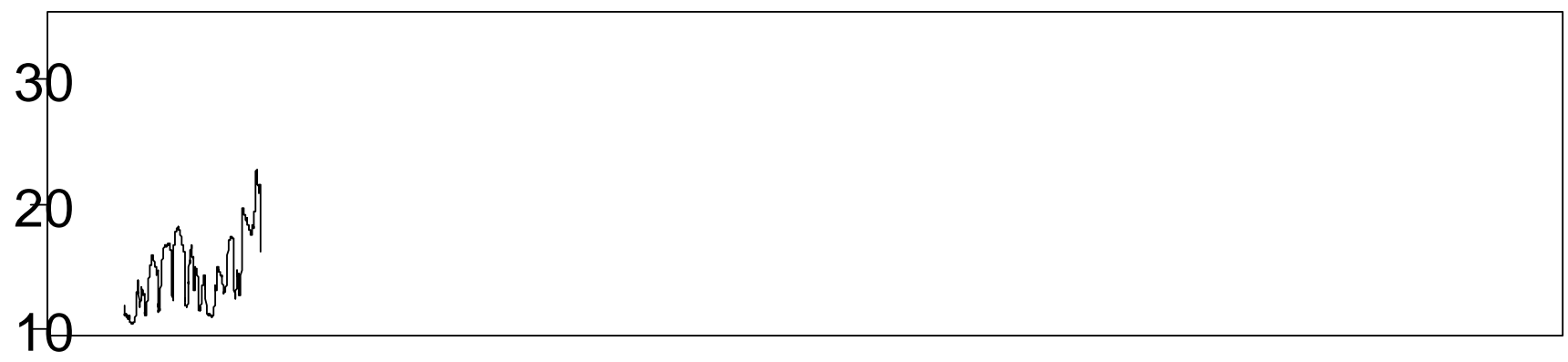
Water Quality (USGS)

Vegetation Monitoring (PNNL)

Invertebrate prey (NOAA Fisheries)

Fish (NOAA Fisheries)

Temp. (°C)



Estuary Partnership's Ecosystem Monitoring Program

Major Program components:

Water Quality (USGS)

Vegetation Monitoring (PNNL)

Invertebrate prey (NOAA Fisheries)

Fish (NOAA Fisheries)

Dominant plant species at Campbell Slough and Franz Lake



Wapato ()

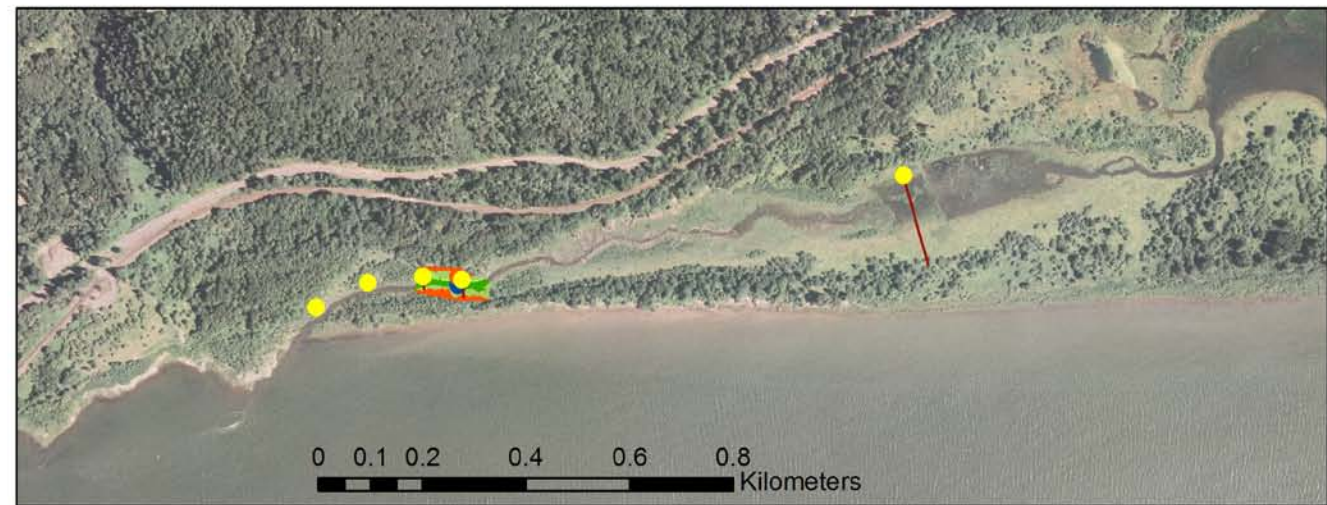
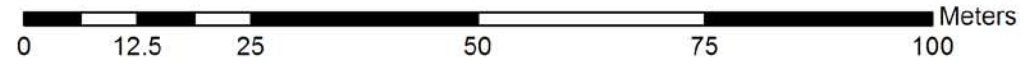
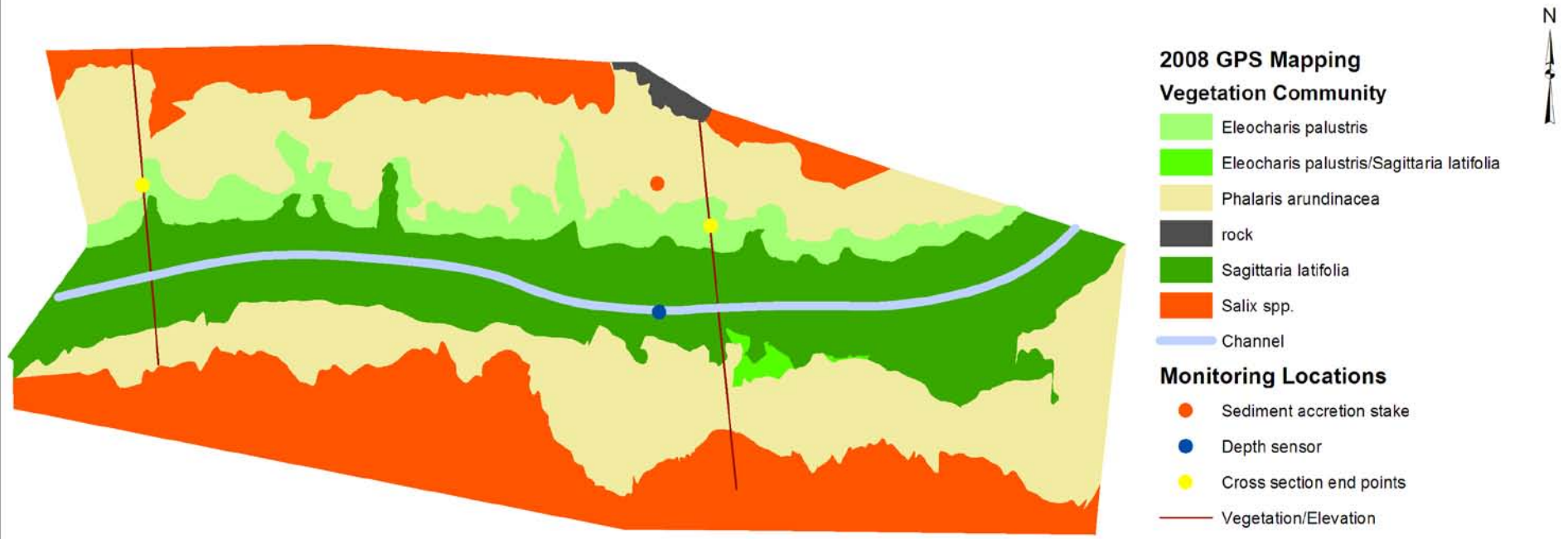


Common spikerush ()



Canary reed grass ()

Franz Lake



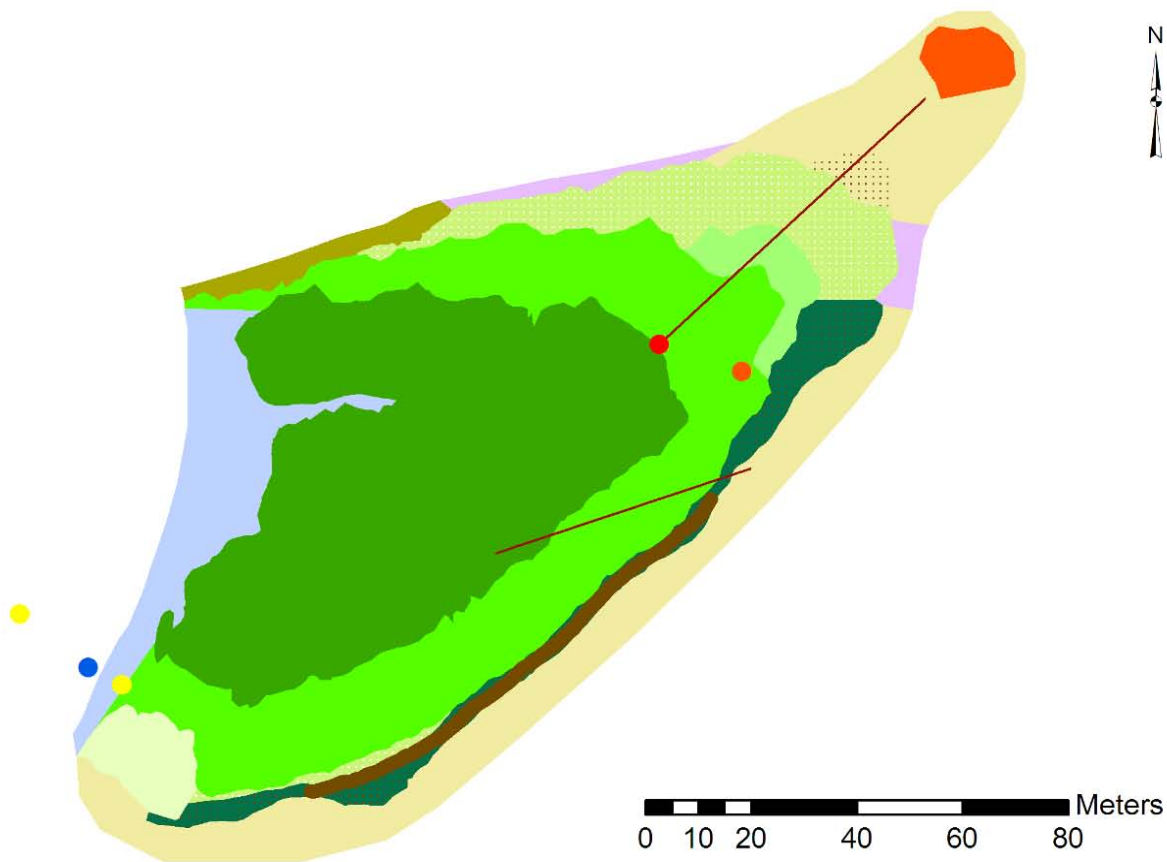
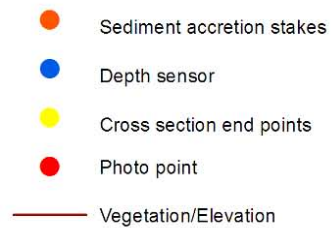
Campbell Slough

2009 GPS Mapping

Vegetation Community



Monitoring Locations



Estuary Partnership's Ecosystem Monitoring Program

Major Program components:

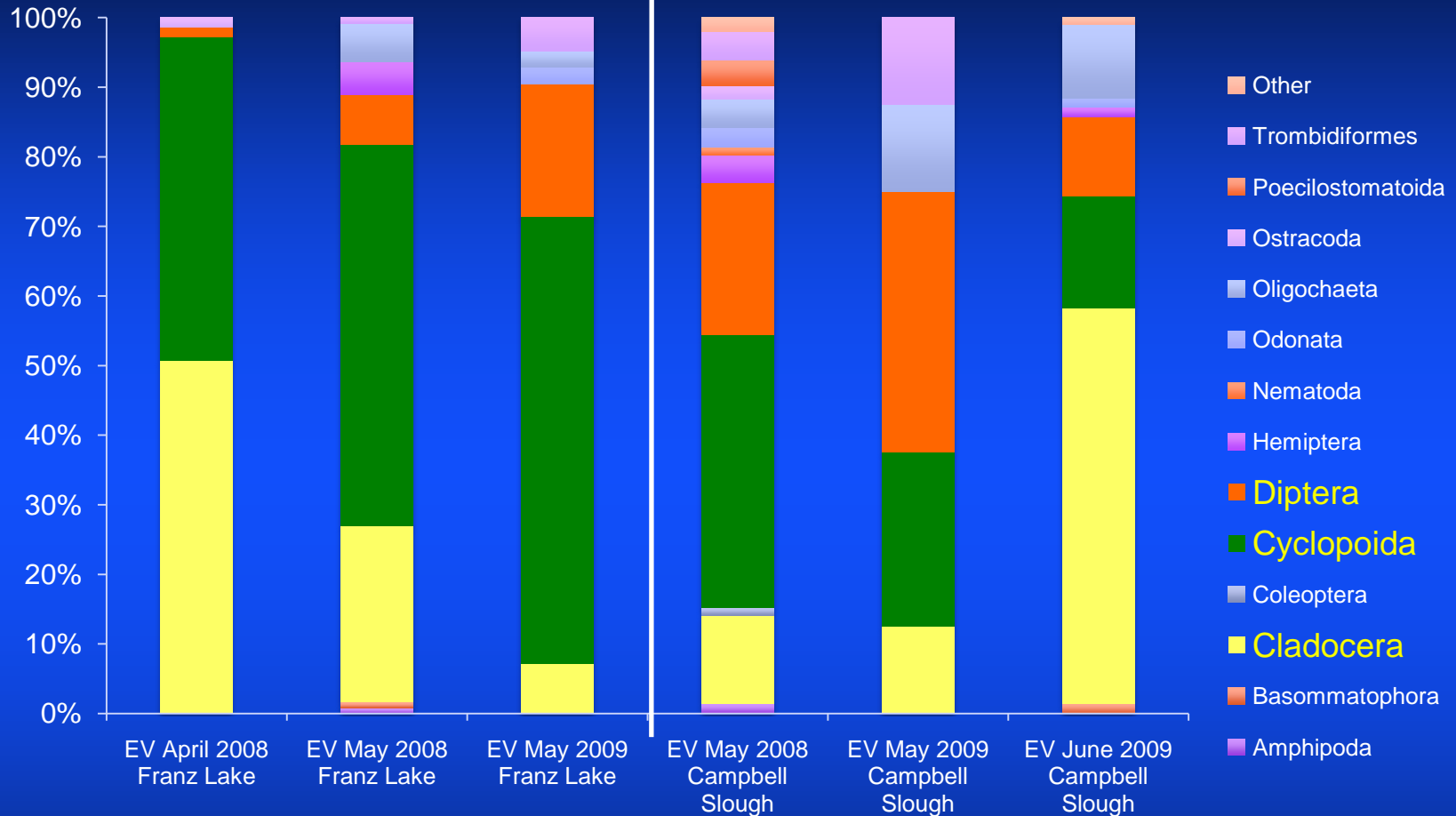
Water Quality (USGS)

Vegetation Monitoring (PNNL)

Invertebrate prey (NOAA Fisheries)

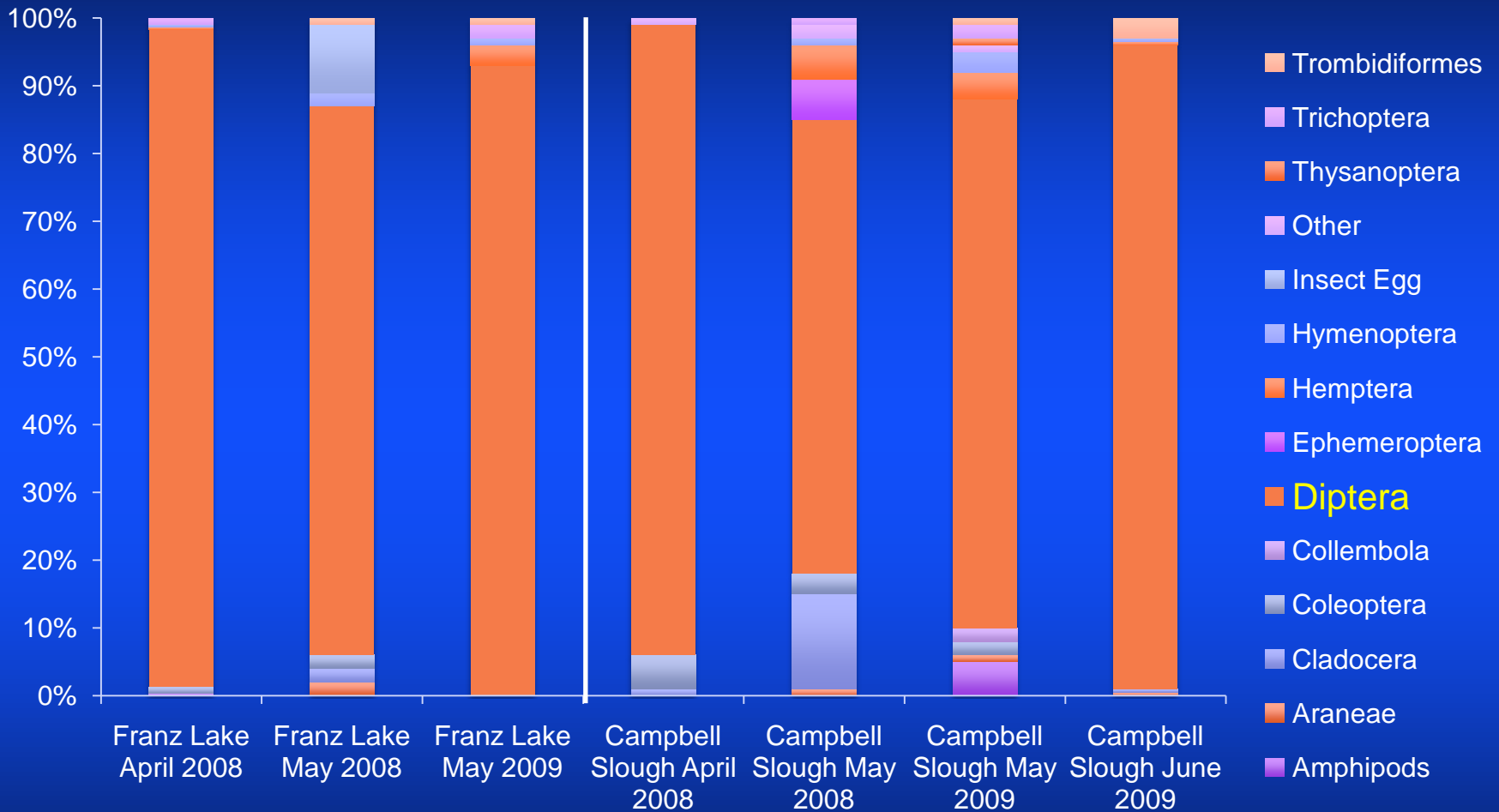
Fish (NOAA Fisheries)

Prey Availability – Emergent Vegetation Tows



Dominant Species are Dipterans (Chironomids), Cladocerans, and Cyclopoid copepods

Juvenile Chinook Salmon Diets



Juvenile Chinook from both sites show a strong preference for Dipterans

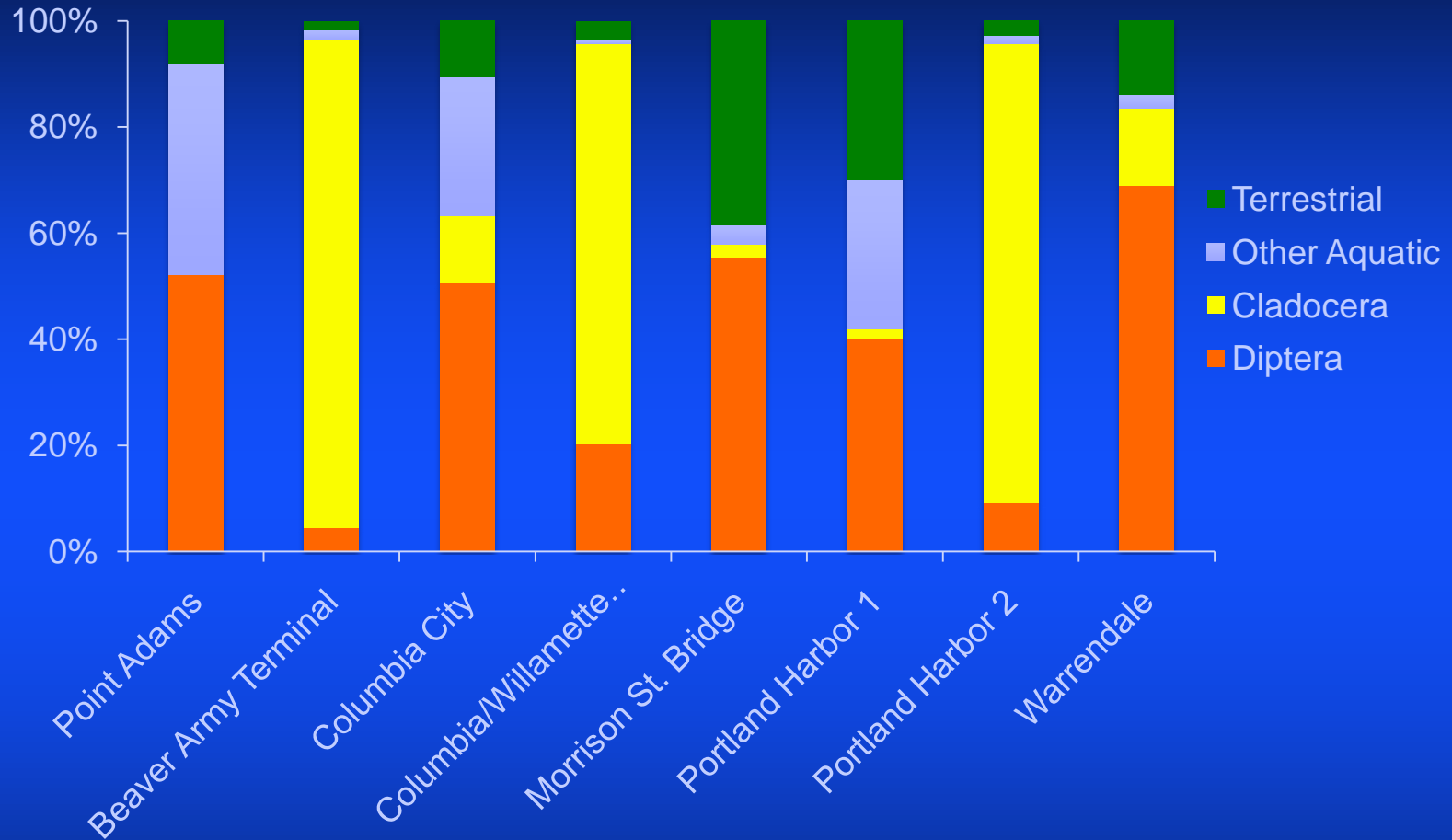


open water

emergent
vegetation

Dipterans 7x
more abundant
in tows through
emergent
vegetation

Juvenile Chinook Diets – Mainstem/Disturbed Sites



Dipterans also consumed at these sites, but high proportions of Cladocerans and more terrestrial species in diet – preferred food may not be available.

Estuary Partnership's Ecosystem Monitoring Program

Major Program components:

Water Quality (USGS)

Vegetation Monitoring (PNNL)

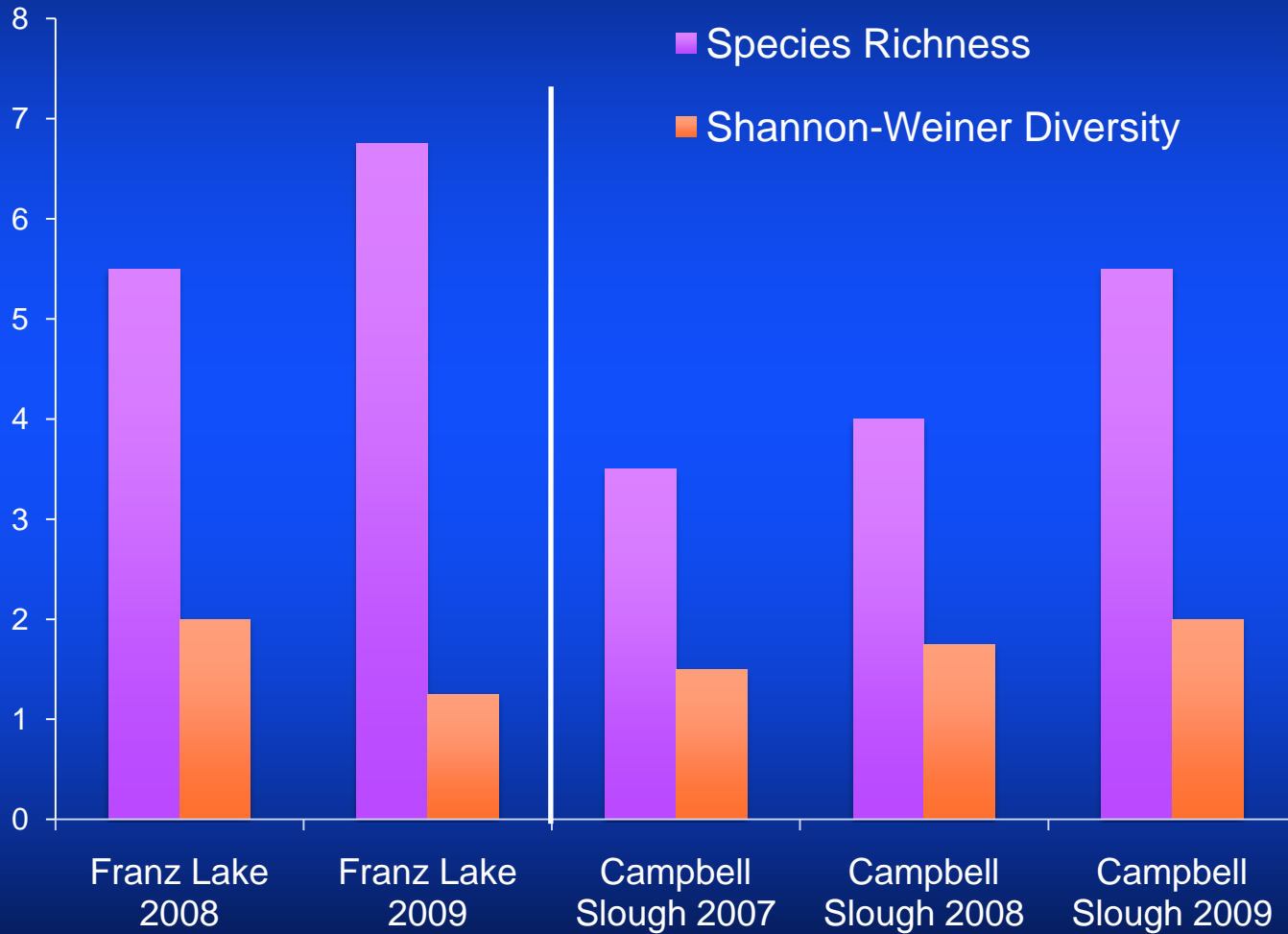
Invertebrate prey (NOAA Fisheries)

Fish (NOAA Fisheries)

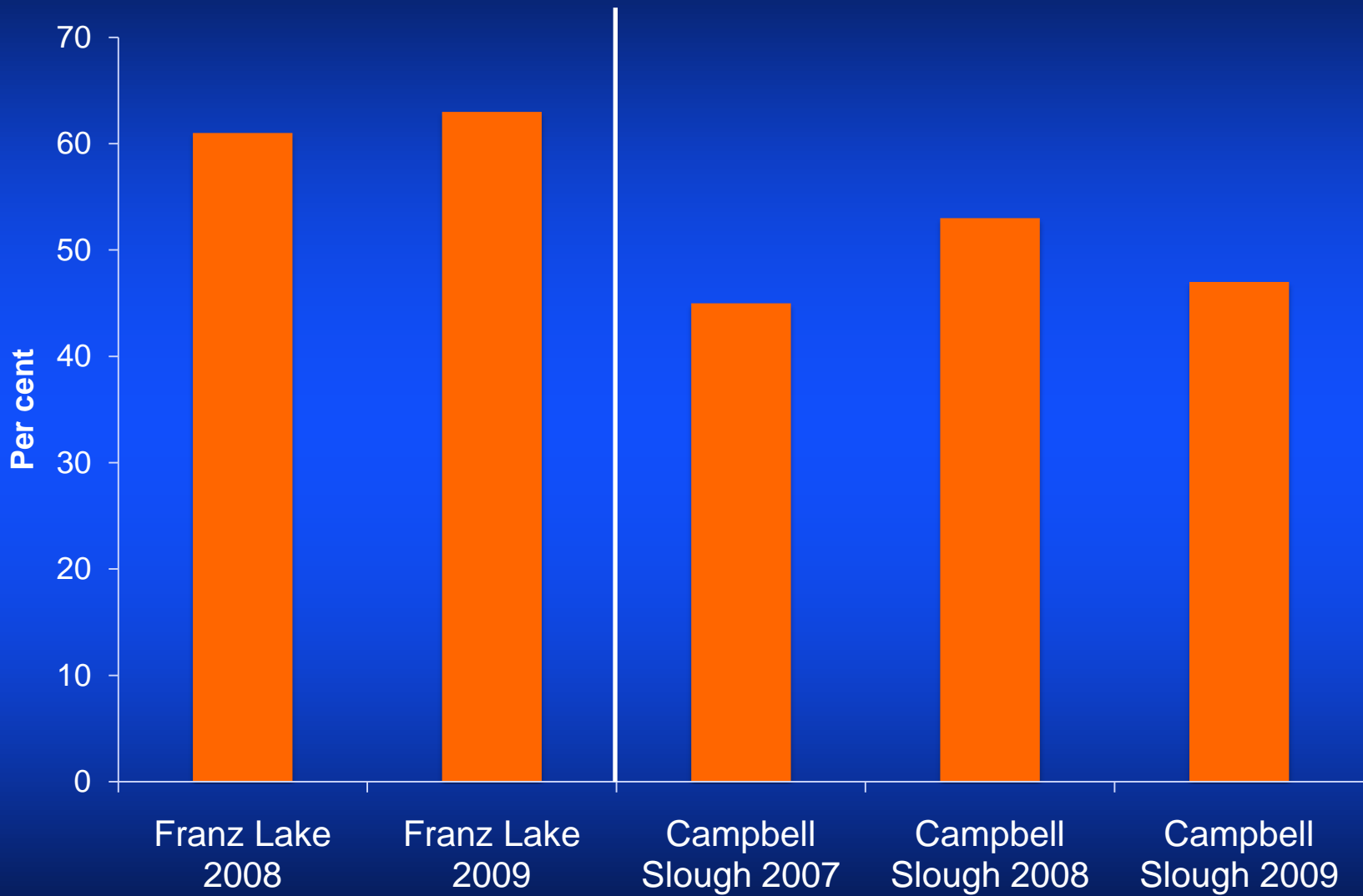
Fish Community Characteristics



Fish Species Diversity and Species Richness



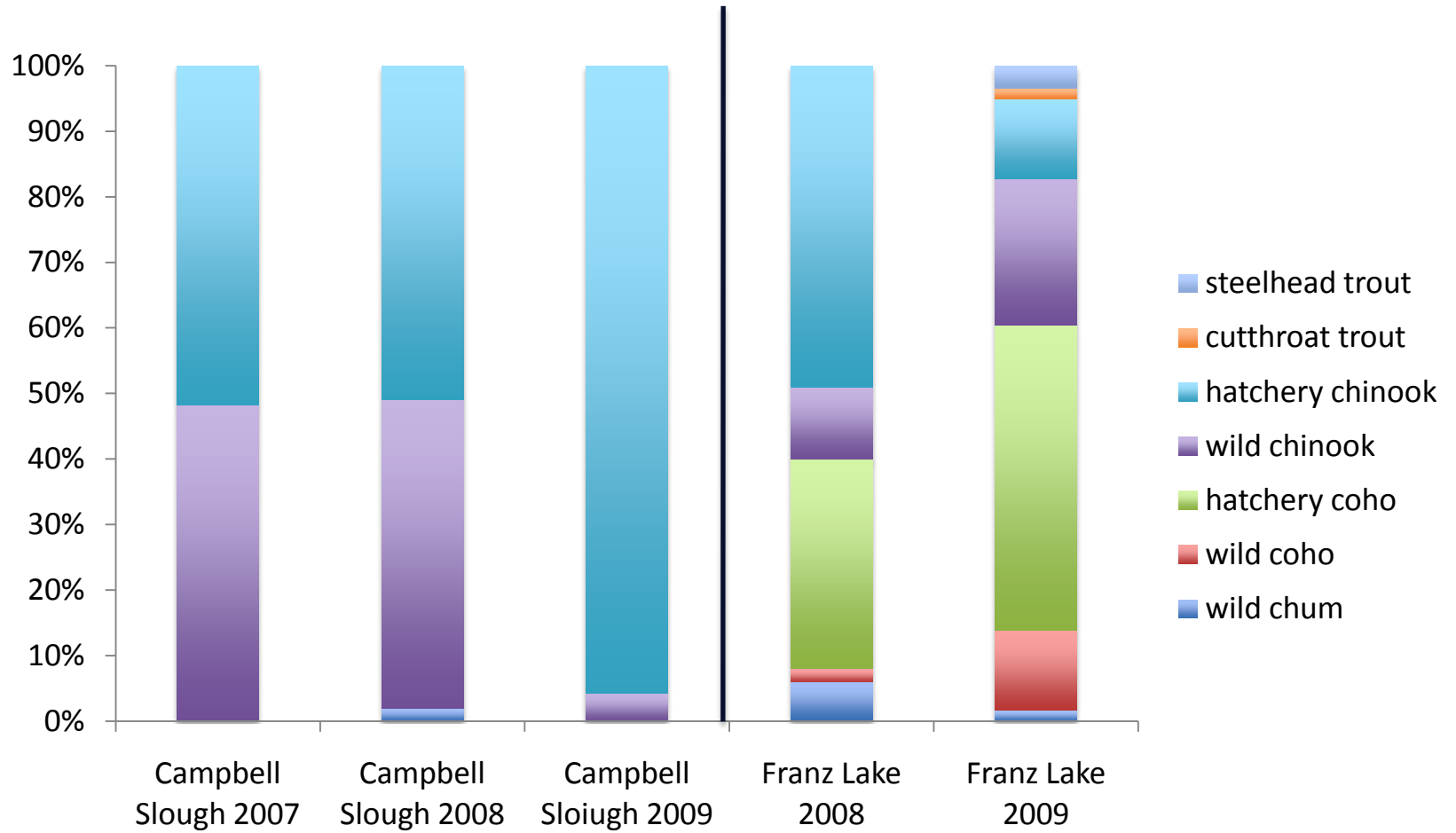
Per cent Native Species



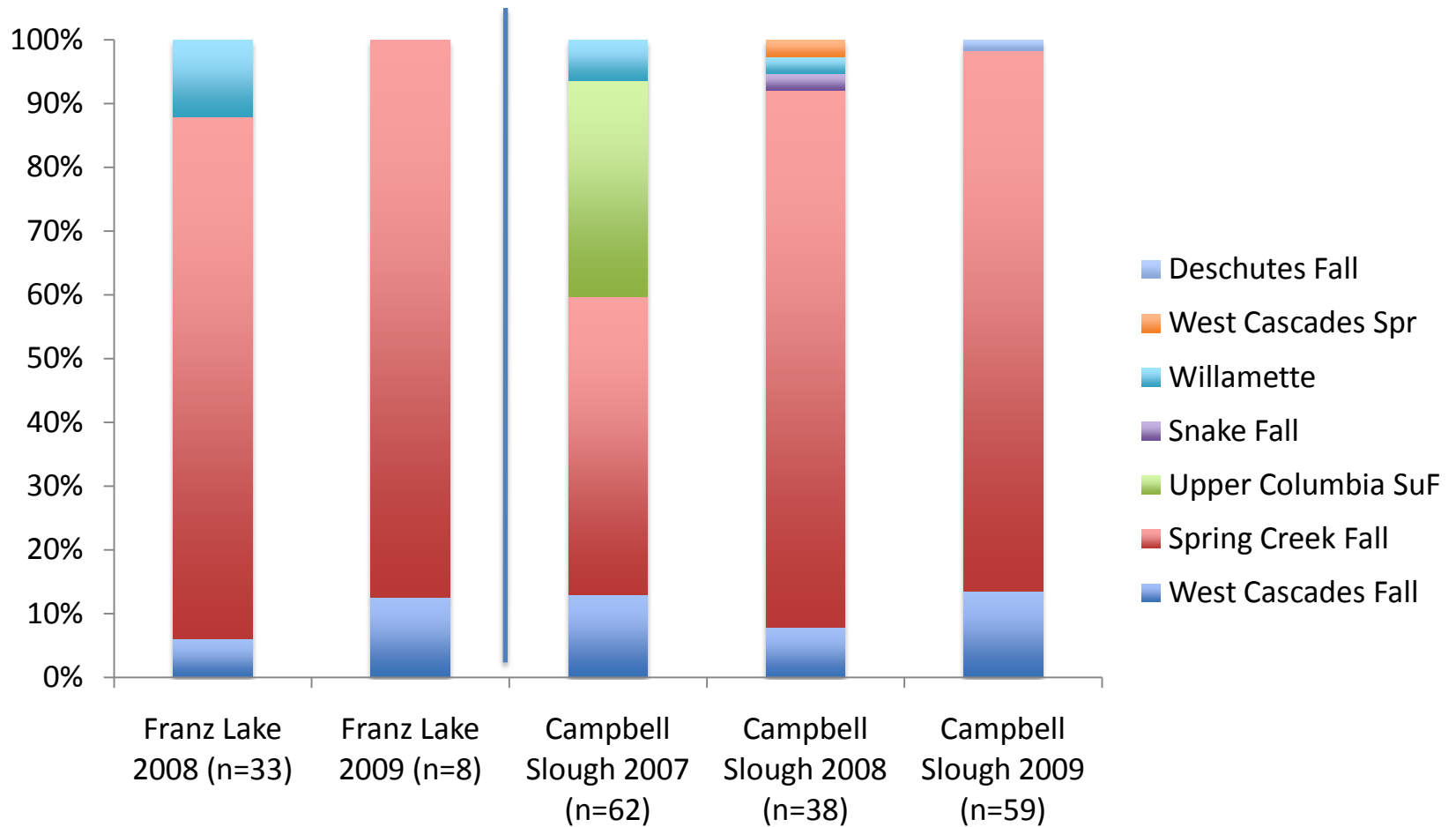
Juvenile Salmon Occurrence and Characteristics



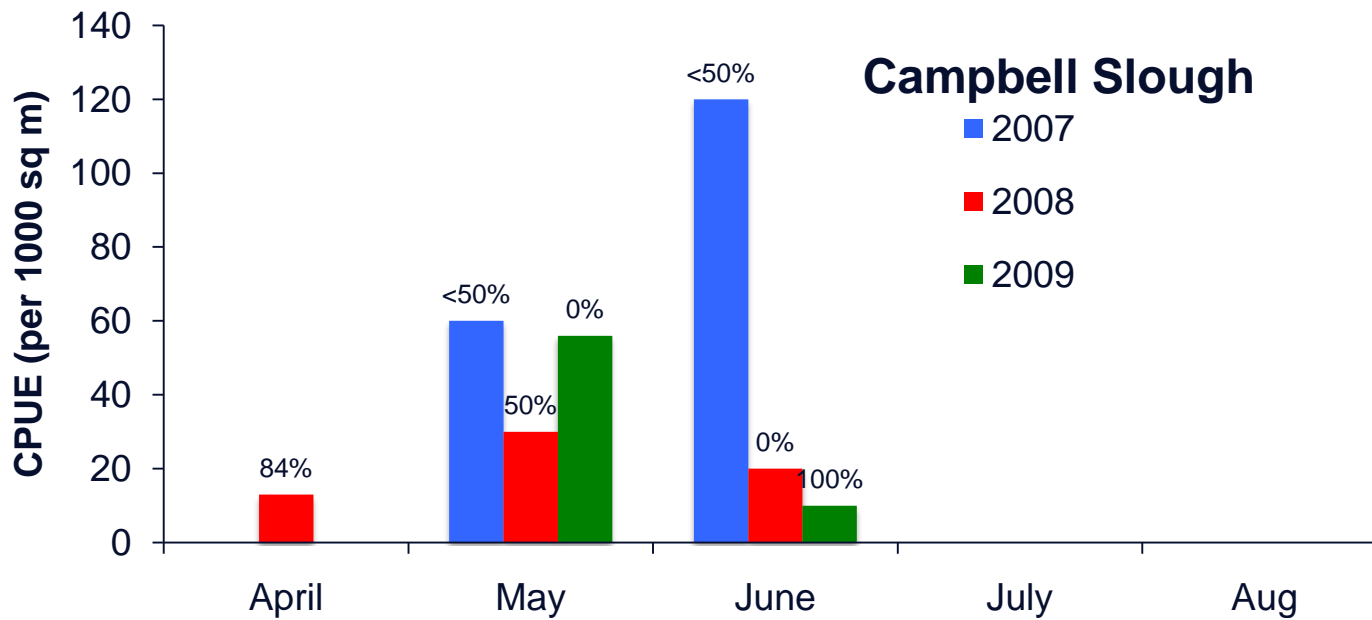
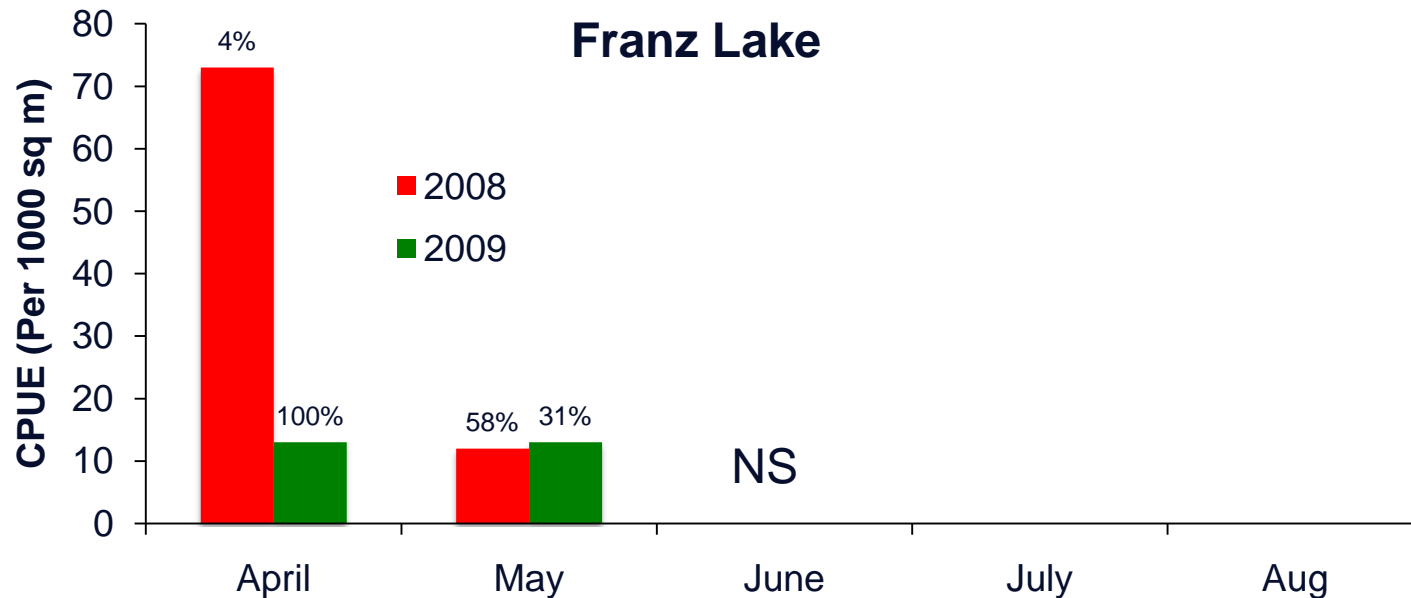
Salmon species



Chinook Stocks



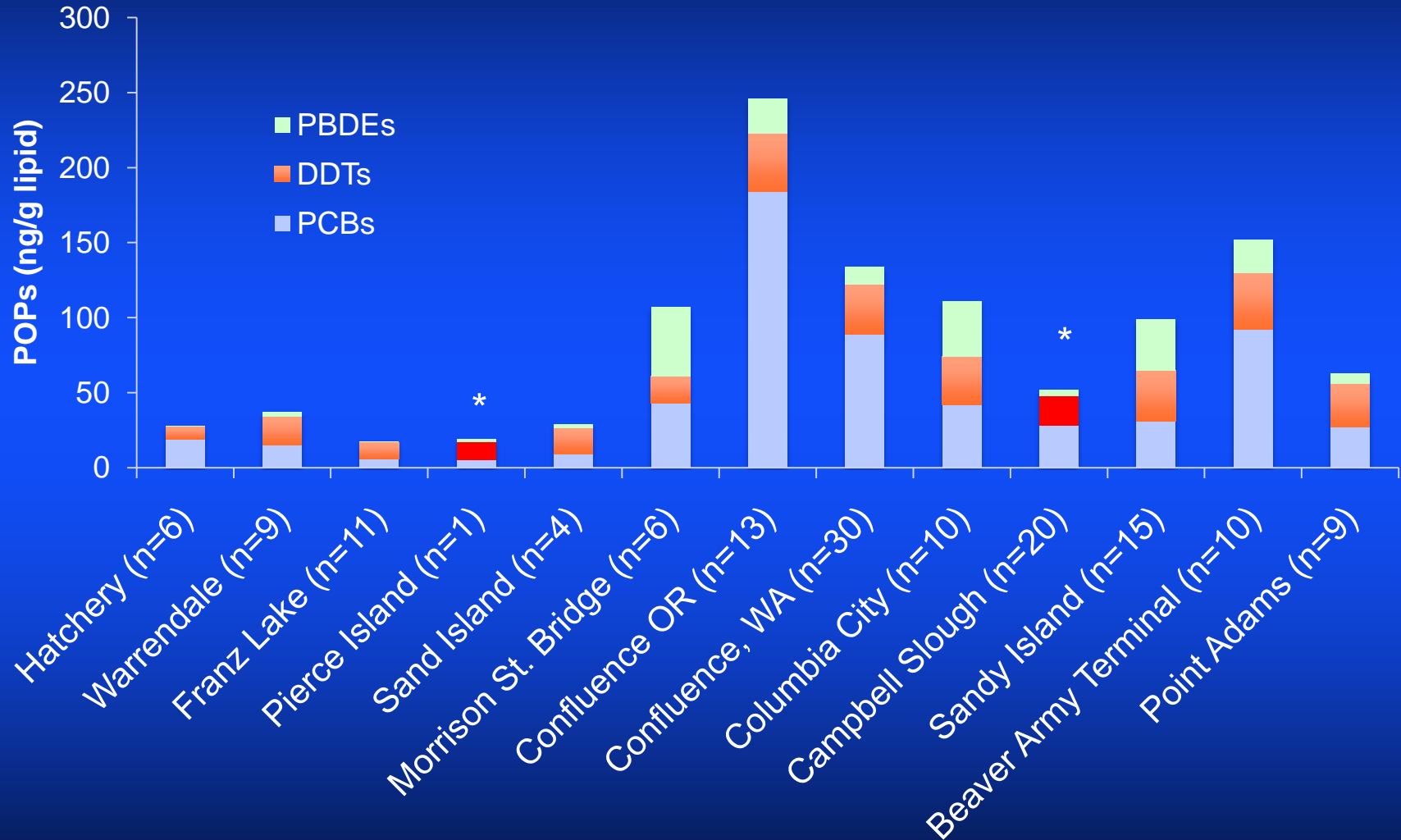
Seasonal trends in Juvenile Chinook catch



Factors affecting length, weight, and condition

- Hatchery vs. Wild
 - Hatchery fish larger and heavier than wild fish.
 - Condition factor not significantly different
- Month of Capture
 - Fish length, weight, and condition tend to increase from April to June
- Year of Capture
 - Fish length, weight, and condition tend to be lower in 2009 than in 2008
- Site of Capture
 - NO significant difference in length, weight, or condition

Chemical Contaminants in Juvenile Chinook Salmon



Summary: Many Similarities Between Sites

Water Conditions:

- Temperature and DO profiles similar

- Conditions unsuitable for salmon after June at both sites

Vegetation:

- Dominant species: reed canary grass, spike rush and wapato

- Boundaries between plant communities comparable at both sites

Prey:

- A wide range of prey availability; common species Dipterans, Cladocerans, and Cyclopoid copepods;

- Preferred prey in diet were Dipterans

- Most abundant in samples collected nearshore and associated with emergent vegetation

Fish:

- Salmon using both sites from April through May/June

- Although wild salmon were present at both sites, hatchery salmonids made up substantial proportions of the fish

- Fish community characteristics (number of species, species richness and diversity) were similar between sites

Summary: Intersite Differences

- Landscape at two sites is different (Campbell Slough further removed from mainstem)
- Water conditions: Inundation periods probably different
- Fish:
 - » The Franz Lake site had a greater diversity of salmonids;
 - » Percentage of non-native species tended to be higher at Campbell Slough;
 - » Contaminant concentrations tended to be higher in juvenile Chinook salmon from Campbell Slough;

Differences in fish occurrence patterns could be related to site location (reach) in river, proximity to human disturbance; conditions ESUs using sites experienced before accessing sites (no measurement of residency of fish at sites)

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