


Ecosystem Monitoring Program 2016 Fish Sampling Update

**Lyndal Johnson, Sean Sol, Dan Lomax, and Paul
Moran**

NOAA Fisheries Northwest Fisheries Science Center, Seattle, WA,
USA



**Lower Columbia Estuary
Partnership Science Workgroup
Meeting
October 25, 2016**

2016 Update

- **2016 Field sampling**
 - Fish habitat occurrence and salmon condition at five trend sites
 - Pilot sampling with tidal cycle at Ilwaco Slough, Welch Island, Whites Island, and Campbell Slough
- **Additional data from 2015**
 - Chinook salmon stock composition for trend sites
 - Chinook salmon stock composition for Grays River and Lewis River 2015 tributary pilot study
- **PIT tag array update**

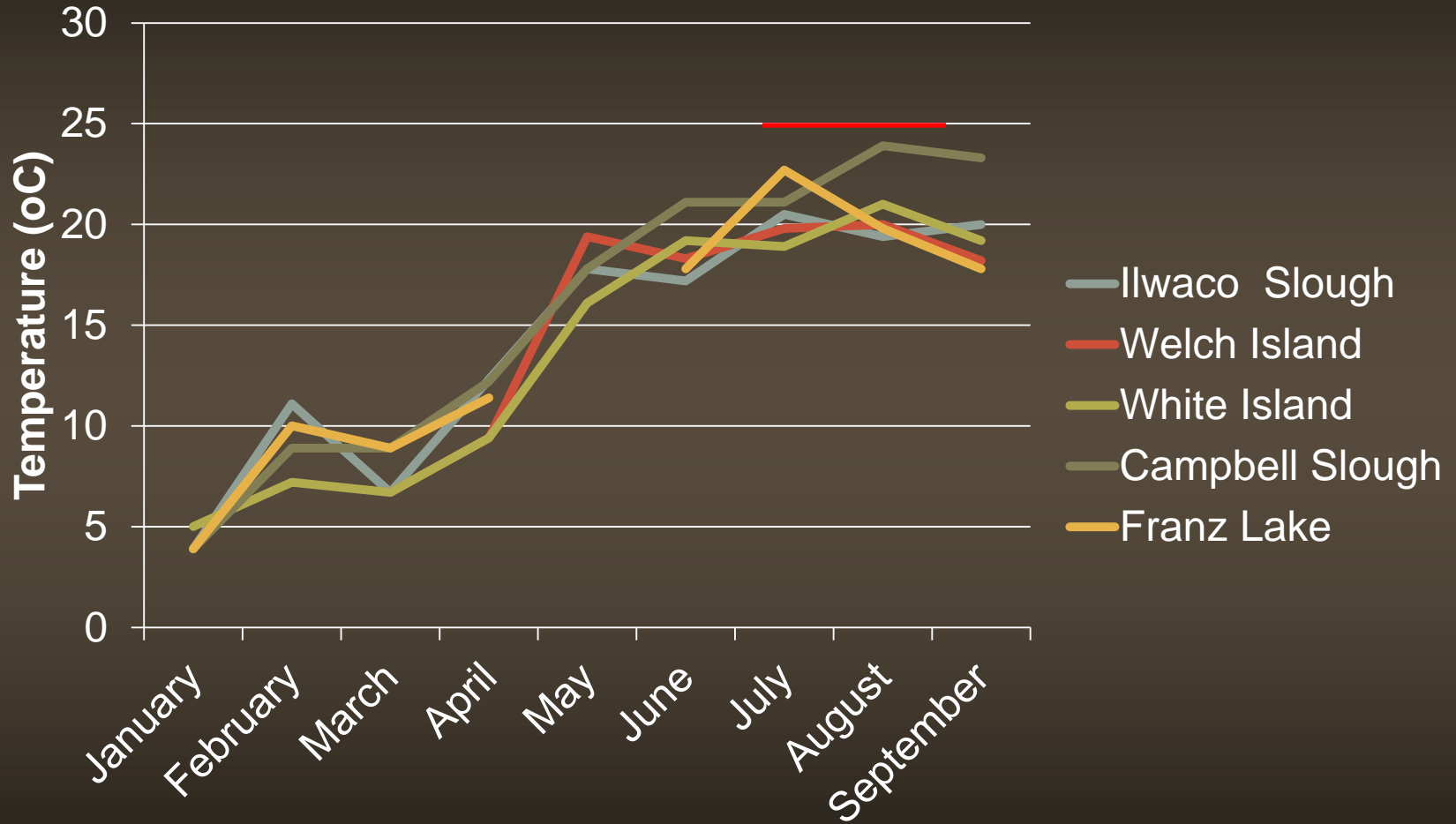
2016 Fish Sampling Sites



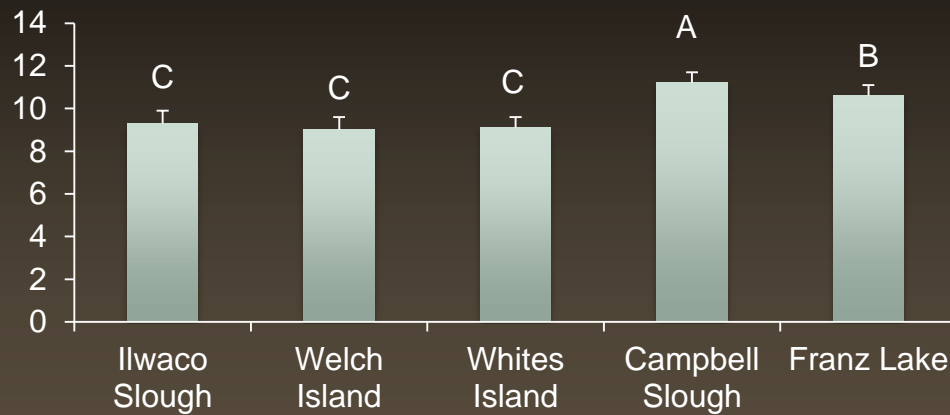
Parameters measured

- **Fish community**
 - Species richness
 - Species diversity
 - % non-native species
 - % fish that could be salmon predators
- **Salmon species composition and habitat occurrence**
 - % of salmon species in catches
 - Density of salmon species
 - Chinook salmon stock composition
- **Salmon condition**
 - Length, weight, condition factor, size ranges
 - Lipid content
 - Growth rate (otoliths)
 - Contaminants

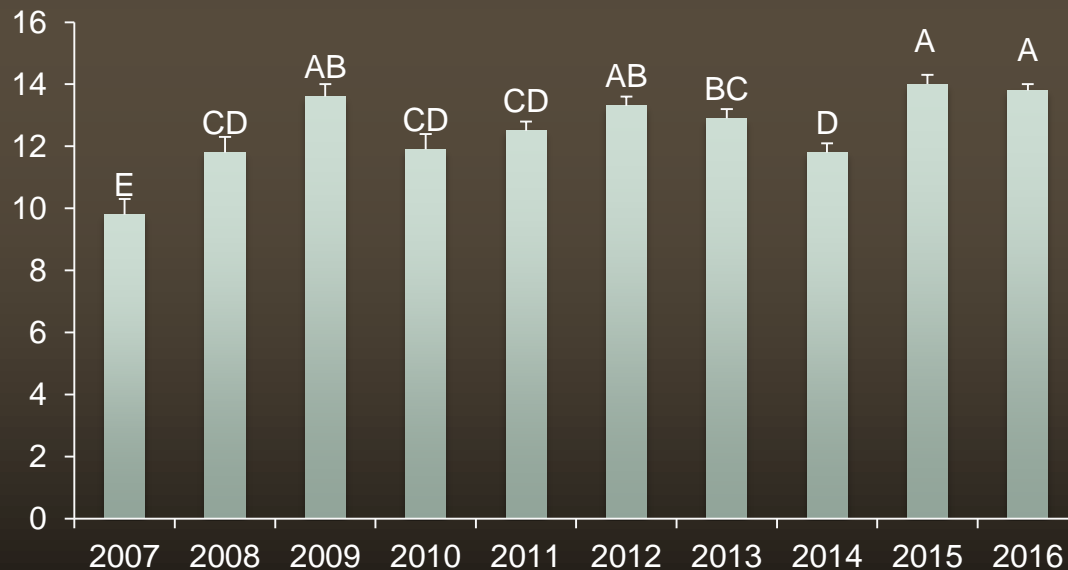
Water Temperature Trends



Water Temperature Trends



Higher temperatures at Campbell Slough and Franz Lake, adjusting for sampling month and site ($p < 0.05$).

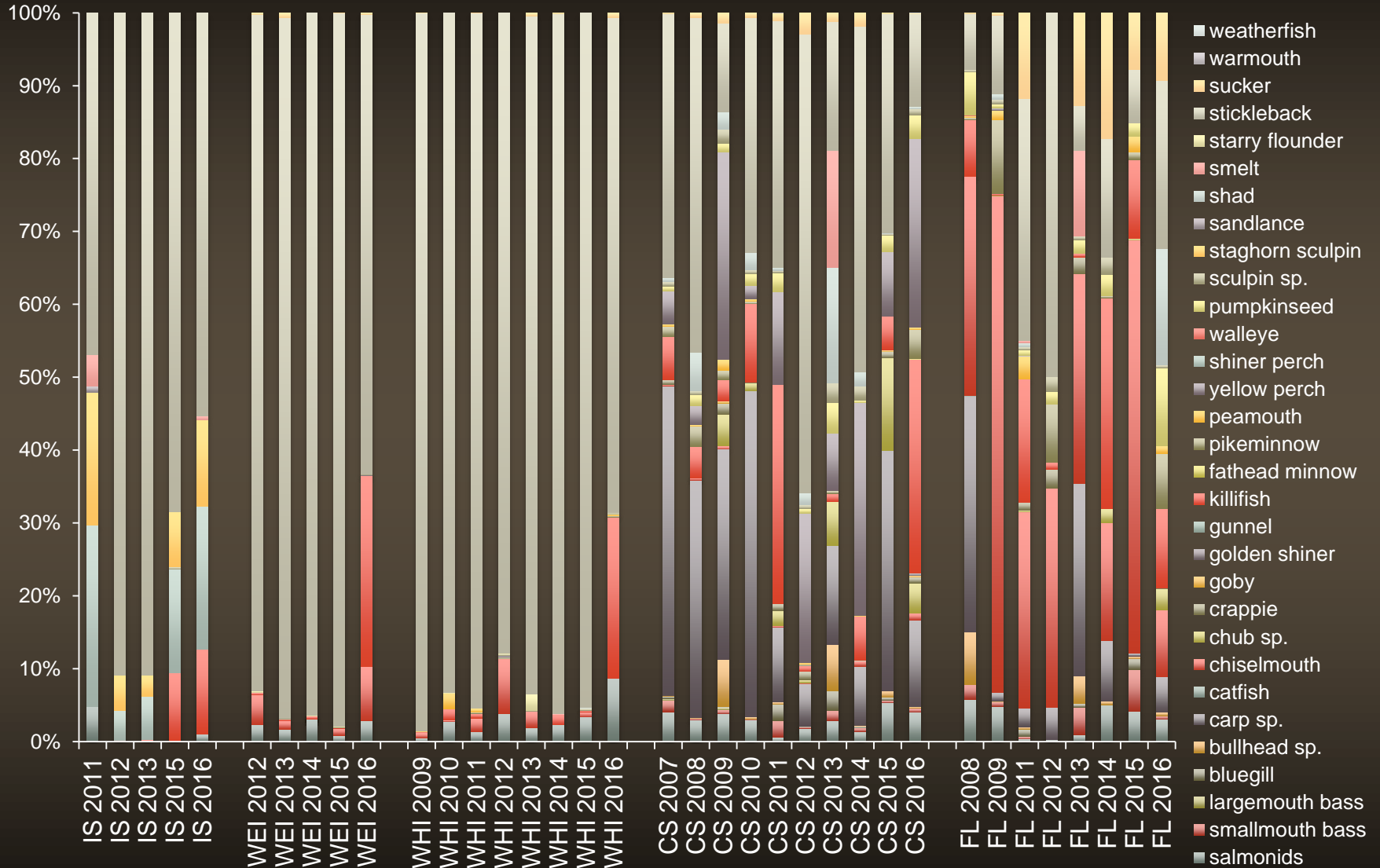


Higher temperatures in 2015 and 2016, adjusting for sampling month and site ($p < 0.05$).



Fish Community Characteristics

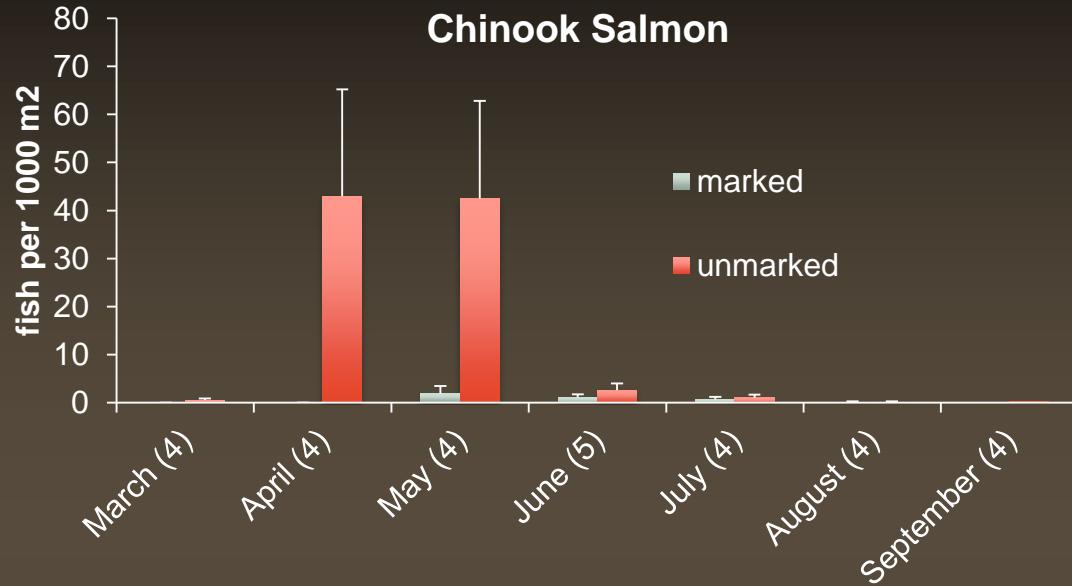
Fish Community Composition





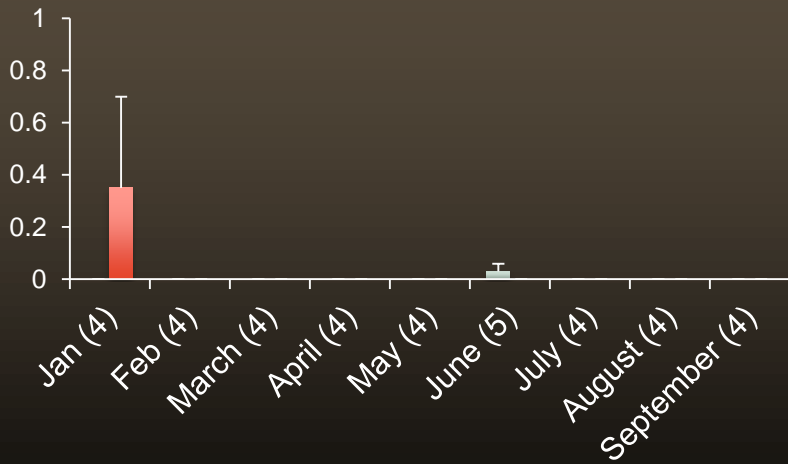
Salmon Habitat Occurrence

Season salmon occurrence

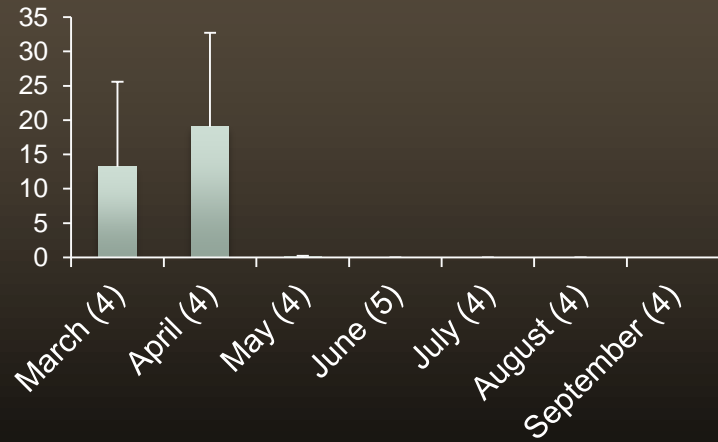


- Chinook present through September, but only low numbers after May
- Chum present in April and May
- Sockeye salmon and trout spp. absent in 2016; coho rarely observed

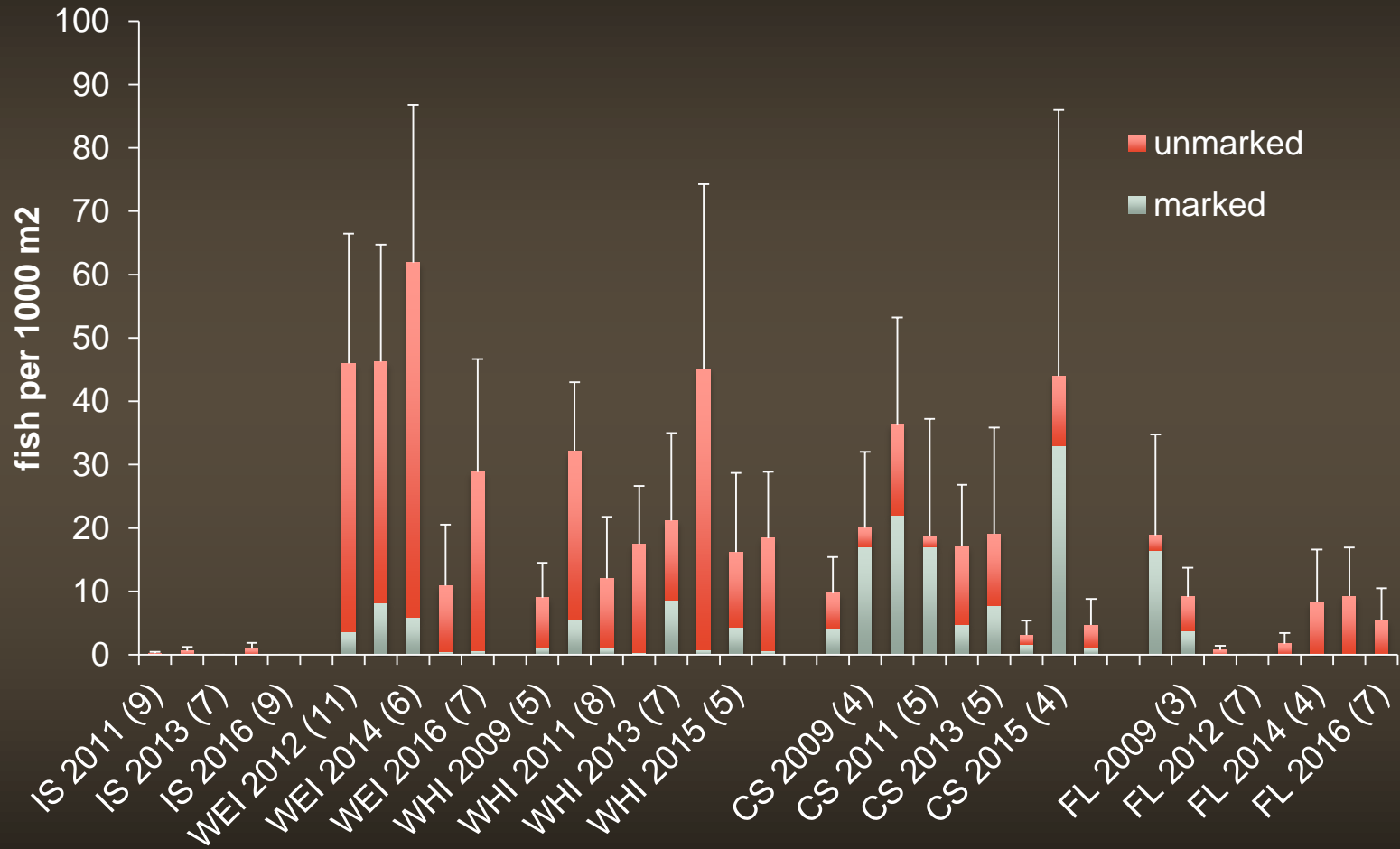
coho salmon



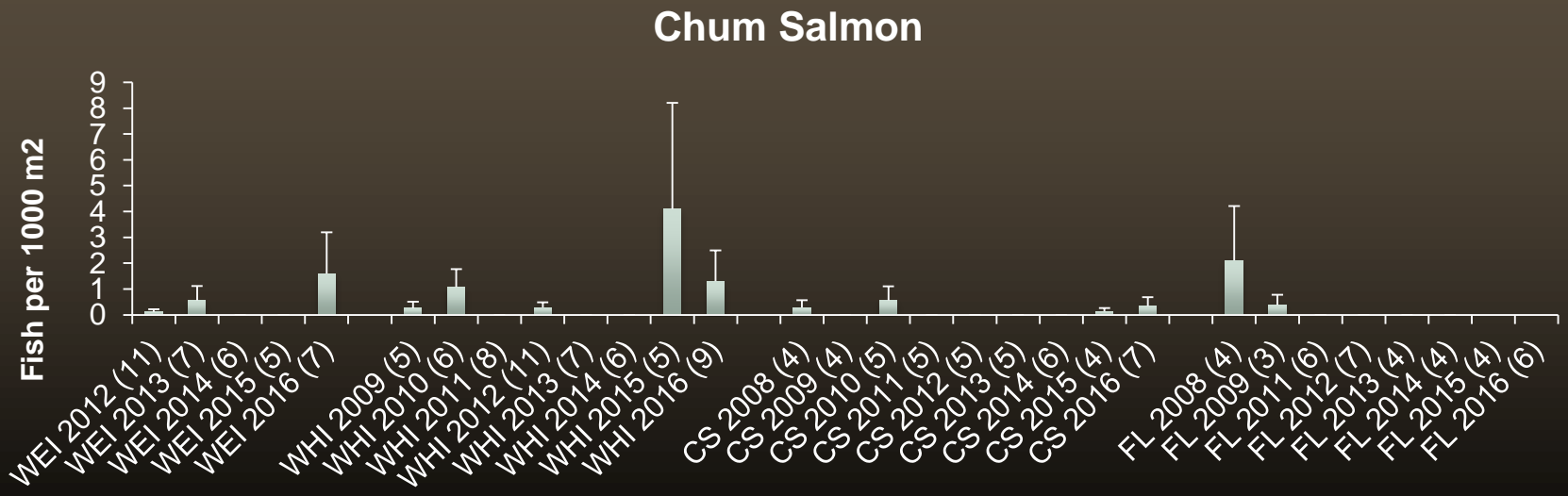
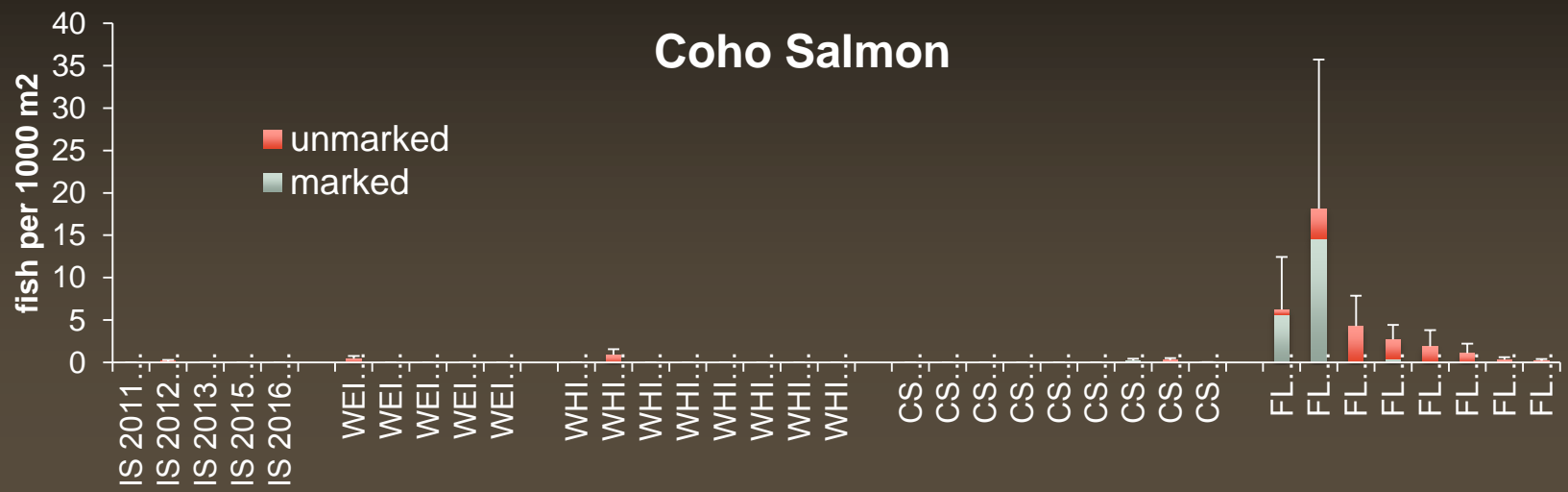
Chum salmon



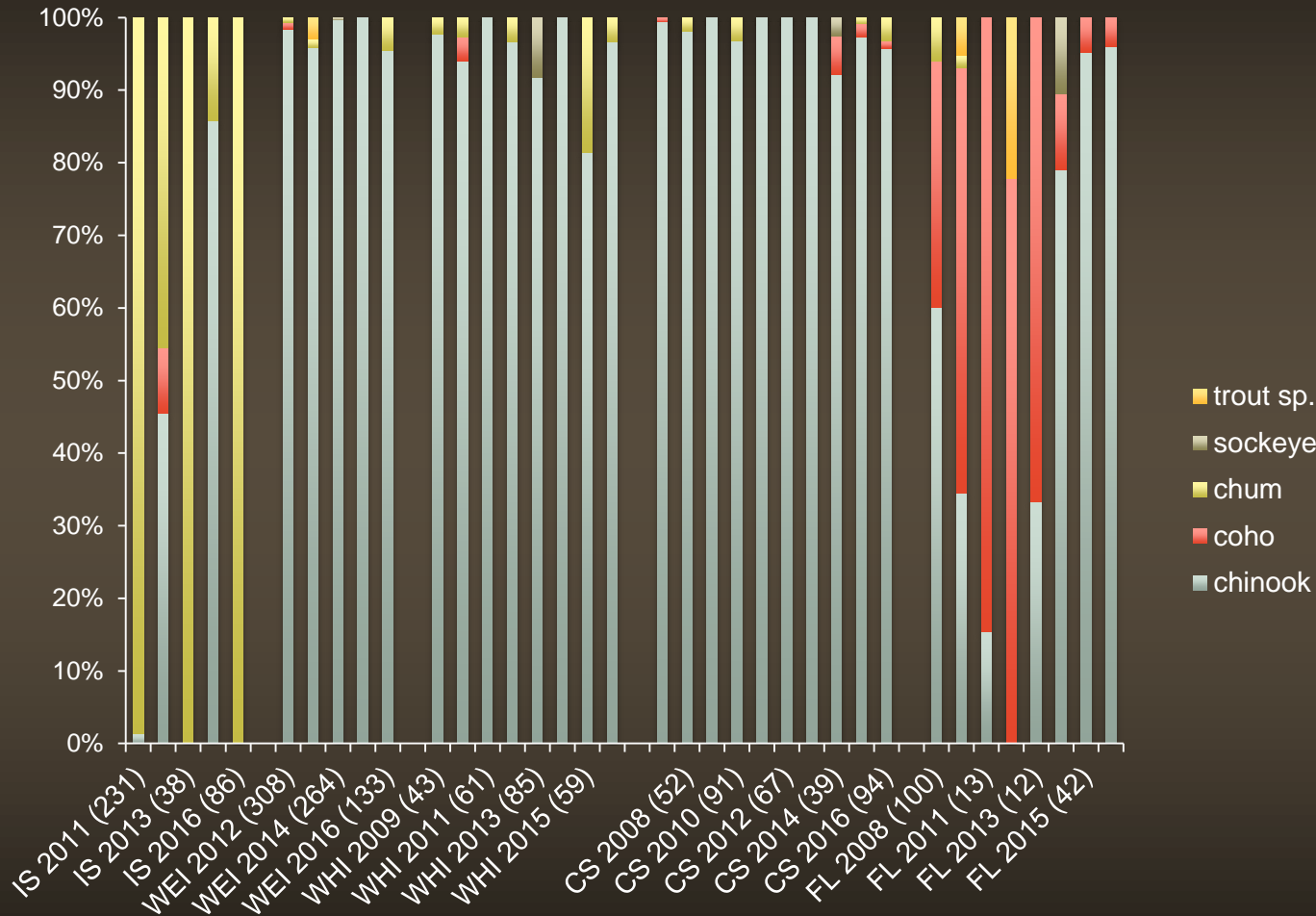
Chinook salmon catches - temporal trends



Coho and Chum salmon catches - temporal trends



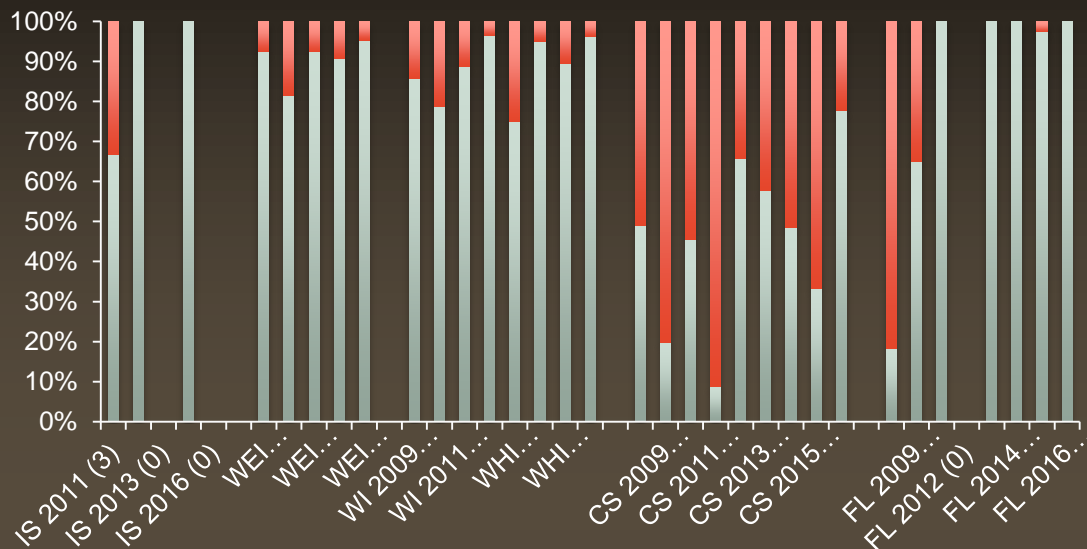
Salmon species composition: 2016 vs. previous years



- Generally similar patterns at Welch Island, Whites Island and Campbell Slough
- Variable catch at Ilwaco Slough, only chum in 2016
- Less diversity at Franz Lake from 2014-2016, mostly Chinook
- No trout or sockeye salmon in 2016

Proportions of marked and unmarked salmon

Chinook salmon



- Unmarked Chinook predominate at all sites except Campbell Slough

- Trend of fewer marked chinook at Franz Lake

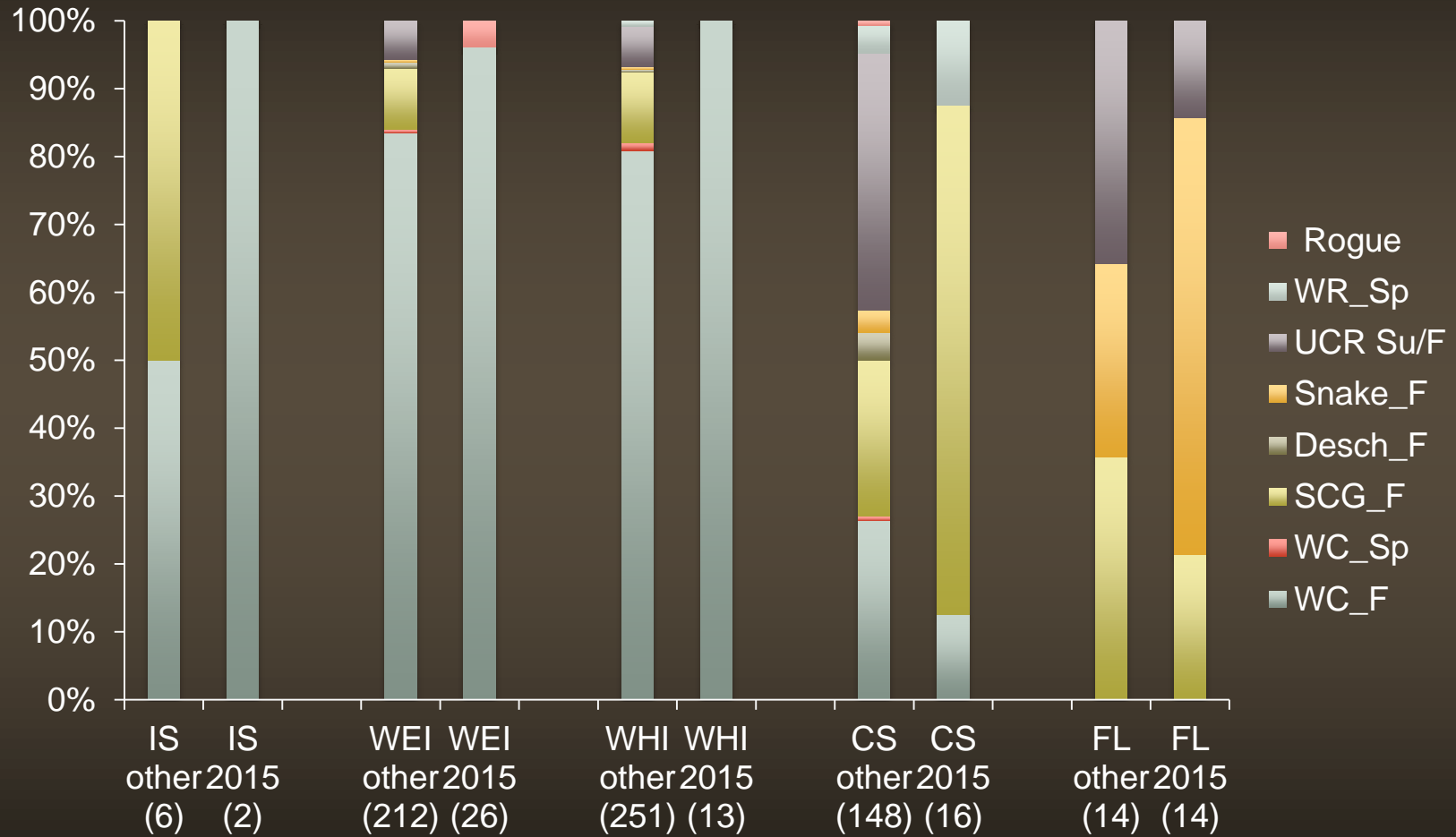
- Coho found consistently only at Franz Lake and not recently

Coho salmon



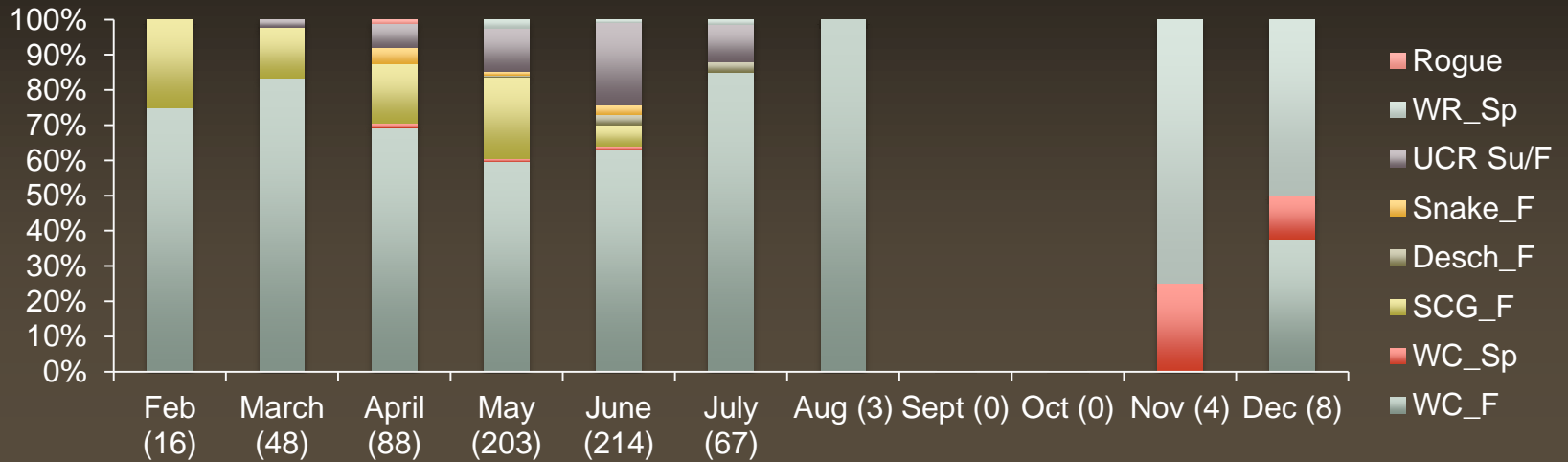
- Trend of fewer marked coho at Franz Lake

Spatial distribution of Chinook stocks (unmarked)

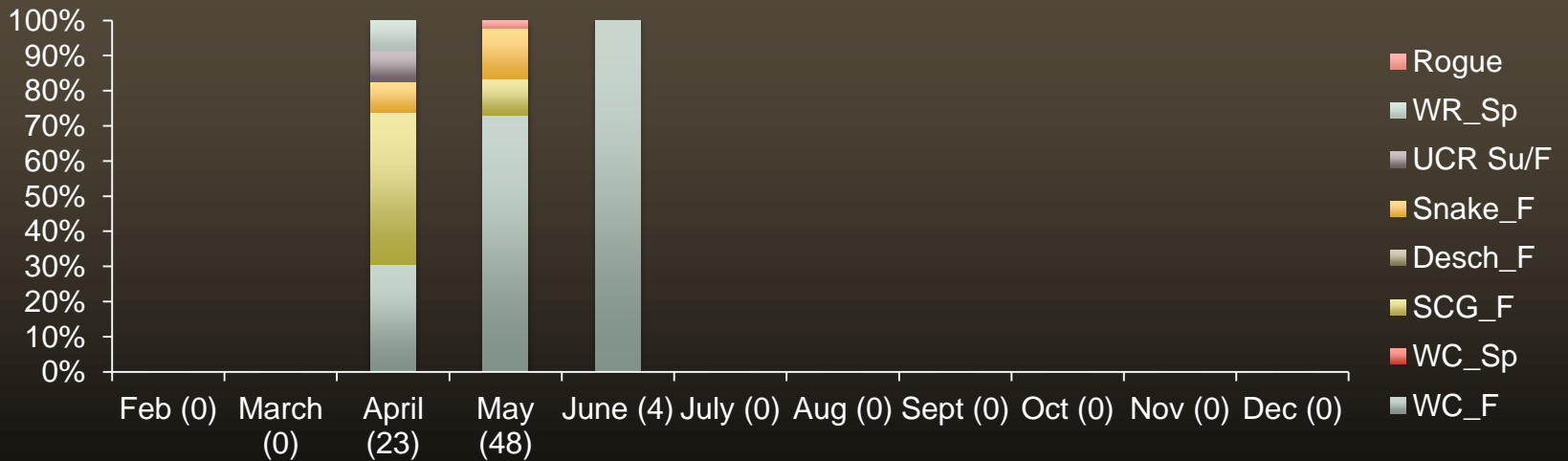


Seasonal distribution of Chinook stocks (unmarked)

Other years



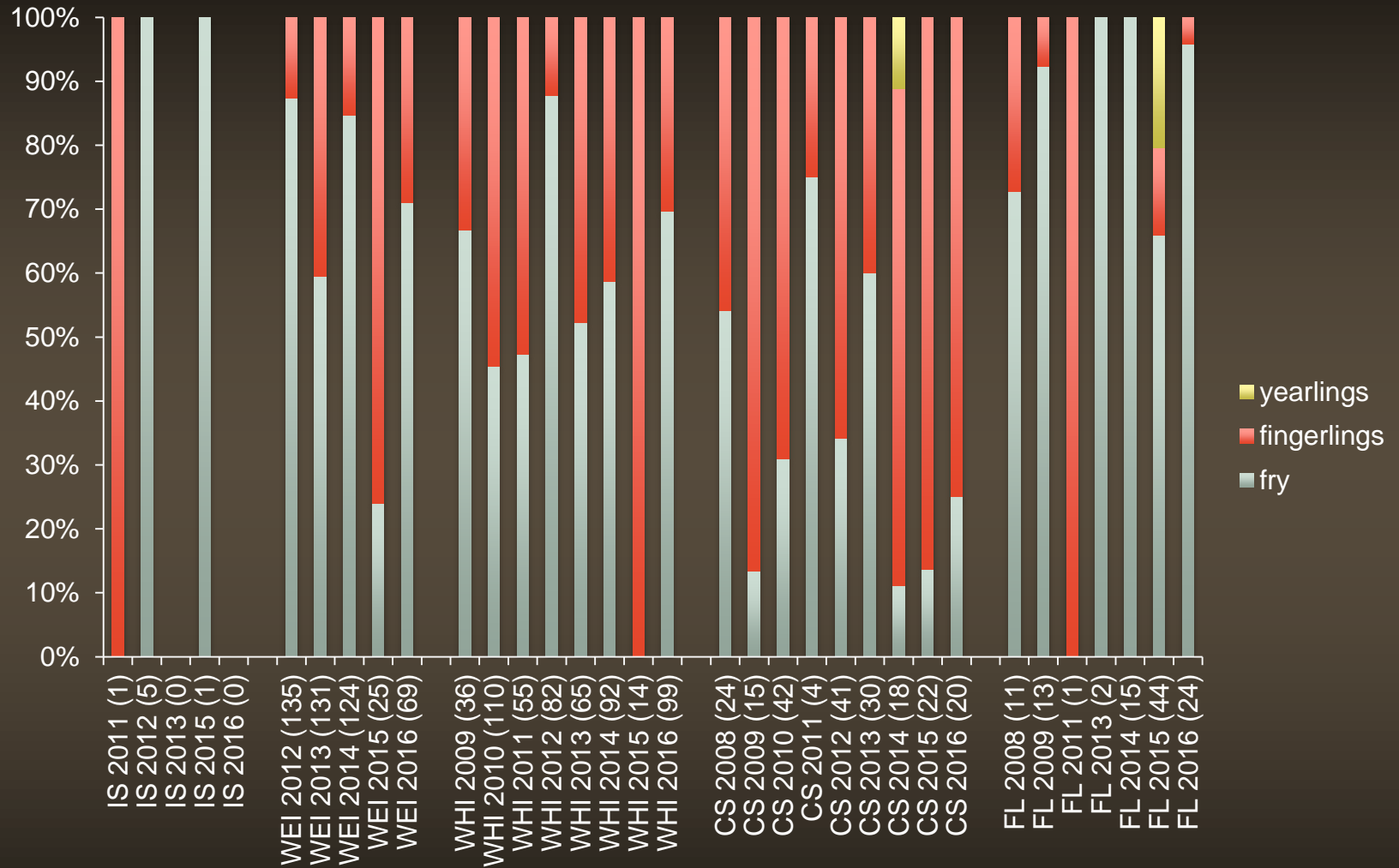
2015



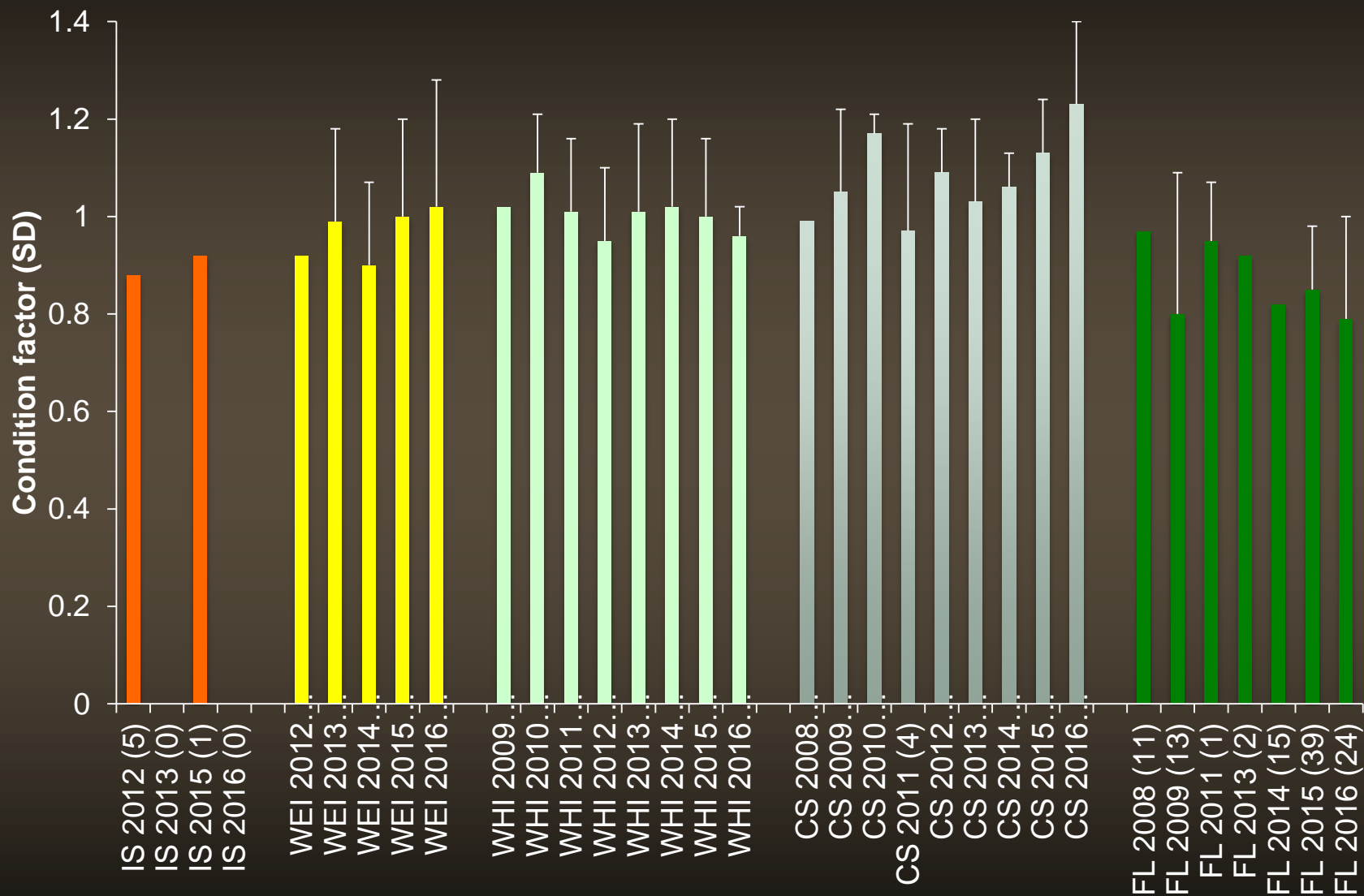


Salmon Health
and Condition

Unmarked chinook size class distribution- temporal trends



Unmarked Chinook Condition Factor - temporal trends



Highlights

- Water temperatures relatively high in 2016, but not as high as 2016
- Overall fish community patterns similar to previous years
- More typical period of estuary occurrence for Chinook and chum salmon
- Proportions of fry higher at Welch and White Island higher than in 2015 and more comparable to other years
- Continued trend toward lower numbers of marked coho and total coho at Franz Lake, as well as numbers of marked Chinook
- No sockeye or trout in 2016 and few coho
- Genetic stock composition for 2015 shows low proportions of interior stocks

PIT tag array studies



PIT tag array summary

Horsetail

- System started working in March but with only 6 antennas operating; a second comes online in late March and 8 working by May
- Antennas generally working properly until summer; charging problems and battery failure by late summer
- Problems with data acquisition and data losses partly due to failed USB drive

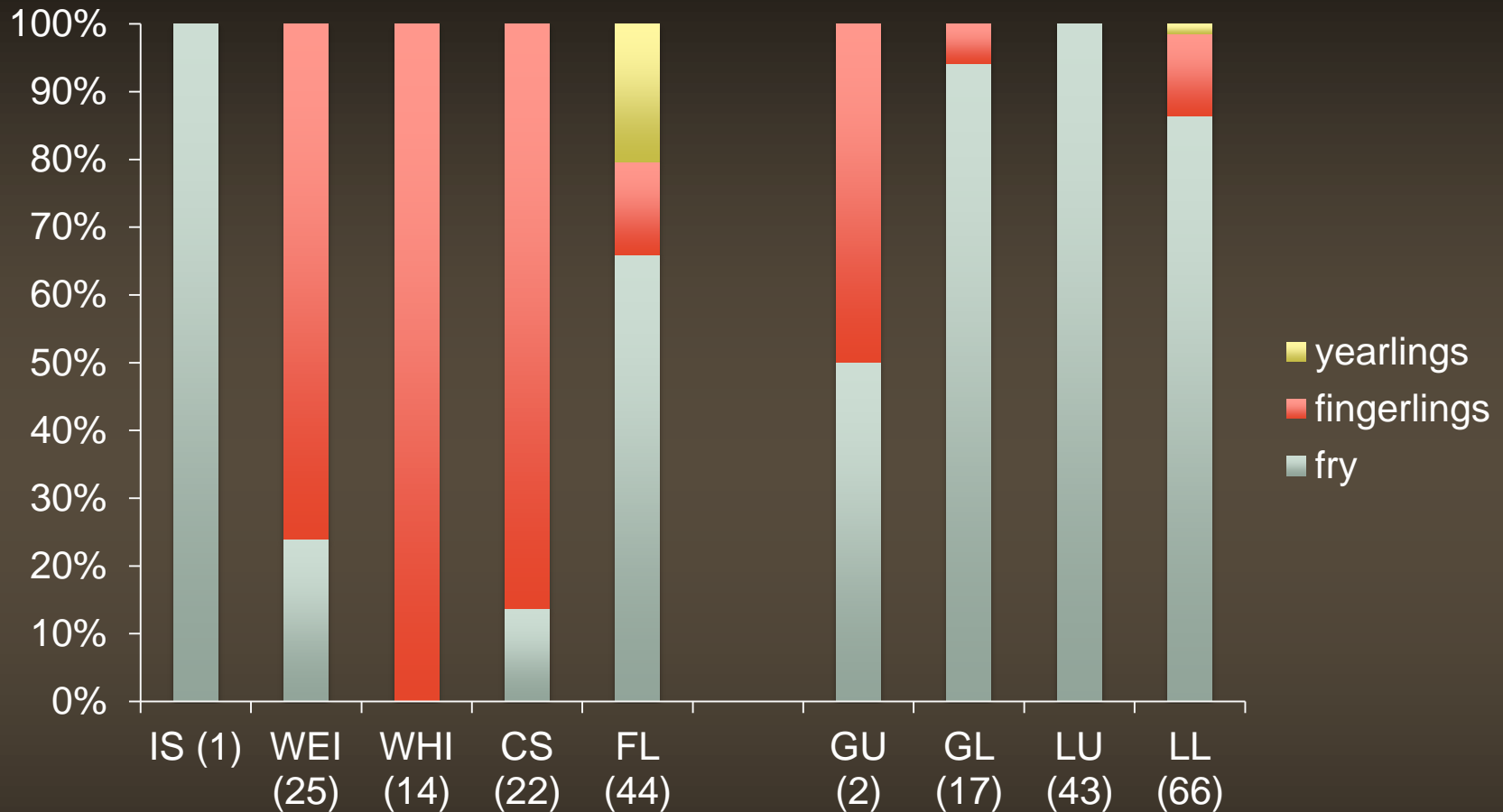
Campbell Slough

- System started up in early May and functioning well, but with only 1 antenna; second antenna installed in early July but went offline in August; the other is still operating in October
- 2 tags detected in early and mid May, but neither are found in PTAGIS database

Chinook occurrence in tributaries 2015

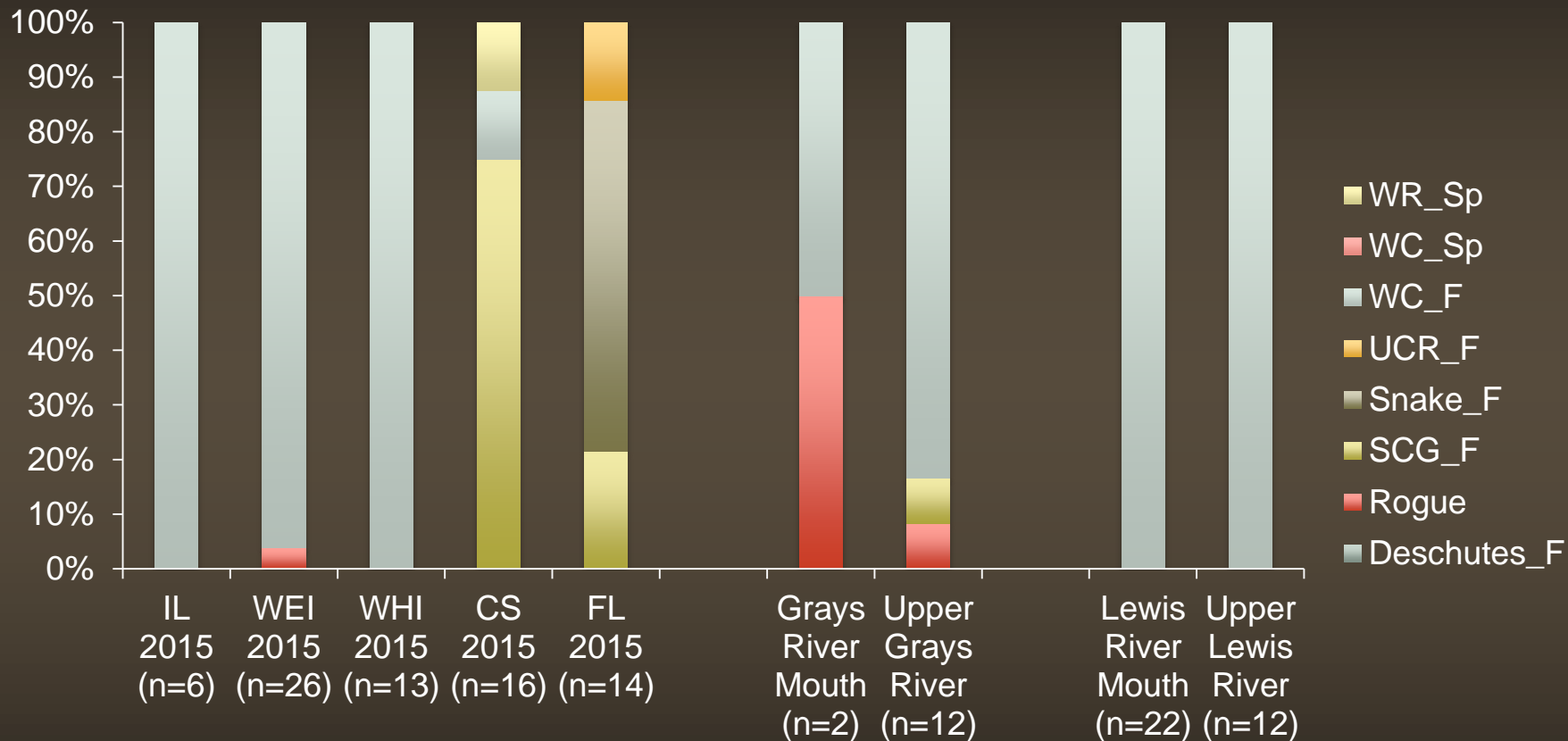


Chinook size classes in tributaries



High proportion of fry as compared to river sites; suggests may be of local origin

Chinook stocks in tributaries



Primarily West Cascades fall Chinook, a lower Columbia River stock

Changes in fish community with the tidal cycle

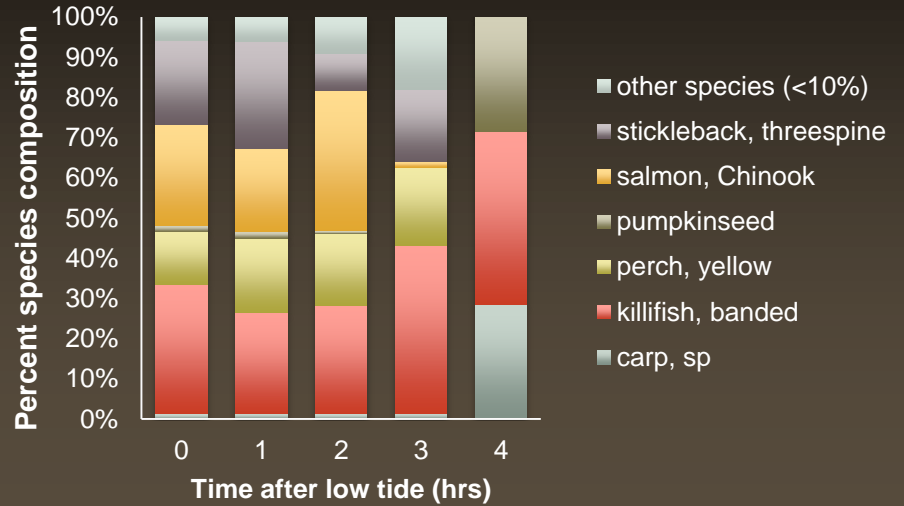
- Sampling was conducted at Ilwaco Slough, Whites Island, and Campbell Slough
- Fish were collected using a Puget Sound beach seine, similar to regular EMP sampling
- Each site was sampled at low tide and then hourly for 3-4 hours until just before the site was completely submerged (and not fishable)
- All fish collected were counted and identified, and catch composition and density were determined

Changes in fish community with the tidal cycle

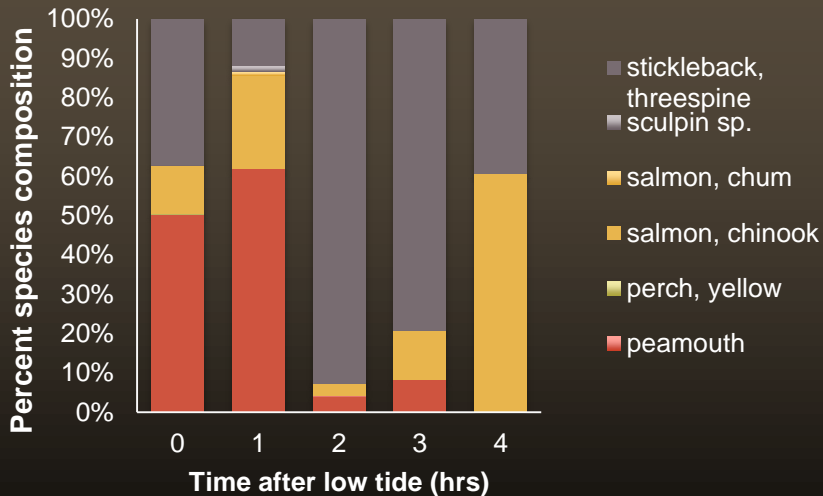
Ilwaco Slough



Campbell Slough



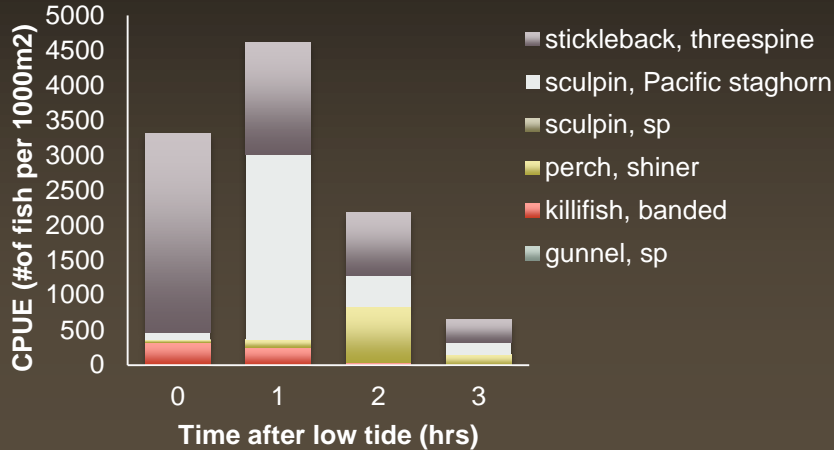
Whites Island



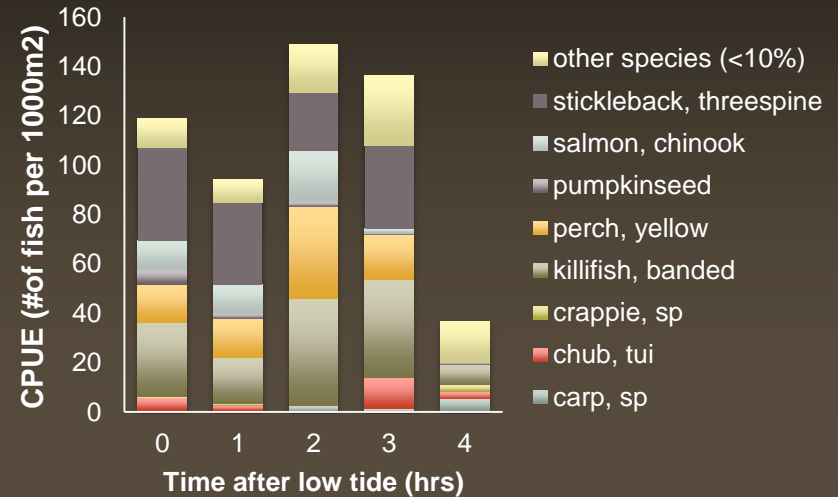
- Differences in species composition at all three sites
- Differences in proportions of Chinook salmon at Campbell Slough and Whites Island

Changes in fish community with the tidal cycle

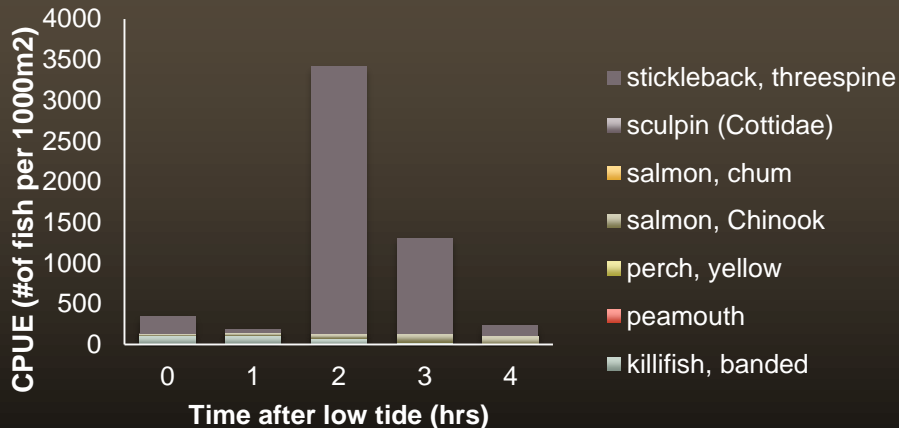
Ilwaco Slough



Campbell Slough



Whites Island



- Differences in fish density (CPUE) at all three sites
- At all sites tended to be low at the highest tide, but otherwise variable

A scenic landscape featuring a dense forest of tall, thin trees, likely birches, reflected in a calm body of water. The trees are mostly bare, suggesting a late autumn or winter setting. The water is still, creating a clear mirror image of the forest. In the background, there are faint outlines of mountains under a pale sky. The text "Questions??" is overlaid in the center of the image in a large, white, sans-serif font.

Questions??