Apr 6th, 8:45 AM - 9:00 AM

Evaluating common trends in Chinook density and the influence of temperature and salinity patterns among distributary channels in a large river estuary to aid evaluation, planning, and prioritization of restoration activities

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How landscape patterns in Chinook distribution can inform restoration effectiveness and prioritization in a large river delta.

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The Snohomish River Estuary

Habitat loss: Historic vs. Current
≈50% of Historic Habitat Extent

High Restoration Potential

Legend
- Current tidal wetlands
- Restoration Projects
- Historic tidal wetland extent
• Stratified the landscape
• Extensive and Intensive fishing effort
• Continuous monitoring of temperature and salinity

Snohomish Estuary Monitoring Sampling Design
Spatial And Temporal Distribution Patterns

Snohomish Estuary Monitoring

Trend 1

Trend 2

Time
Spatial And Temporal Distribution Patterns

Snohomish Estuary Monitoring

Normalized Mean Chinook Density (#fish/ha)

State 1


State 2

Tidal Habitat Distribution in Snohomish estuary
Temperature Patterns

Snohomish Estuary Monitoring

January  
February  
March  
April  

May  
June  
July  
August  

September  
October  
November  
December  

Average Temp (C)

0.0 - 1.0  
1.1 - 2.0  
2.1 - 3.0  
3.1 - 4.0  
4.1 - 5.0  
5.1 - 6.0  
6.1 - 7.0  
7.1 - 8.0  
8.1 - 9.0  
9.1 - 10.0  
10.1 - 11.0  
11.1 - 12.0  
12.1 - 13.0  
13.1 - 14.0  
14.1 - 15.0  
15.1 - 16.0  
16.1 - 17.0  
17.1 - 18.0  
18.1 - 19.0  
19.1 - 20.0

2 km
Temperature Effects on Distribution

Snohomish Estuary Monitoring

Mean Monthly Surface Temperature (C)

Mean Surface Temperature (C)

Chinook density (#fish/ha)

Temperature (C)

2012 2013 2014 2015
Conclusions

• Spatial/Temporal patterns in Chinook density captured by two trends
  • Pulsed outmigration and rearing signals
  • Rearing pattern coincides with areas of available habitat
• Temperature determines how long and how many
Casey Rice

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Salinity Patterns

Snohomish Estuary Monitoring

JUL-OCT
Extreme Low Flow

NOV-APR
Low Flow

MAY-JUN
High Flow

Legend
- CW3
- 0 - 0.5 ppt
- 0.5 - 5 ppt
- 5 - 18 ppt
- 18 - 30 ppt

Critical Habitat
How can our science help inform restoration planning?

1. How are Chinook salmon distributed throughout the Snohomish River estuary?

2. How does temperature and/or salinity affect Chinook distribution?
2 Trends + Temperature

Trend 1: Seasonal Outmigration

Trend 2: Potential rearing signal