

# Overlap of Southern Resident killer whales and Chinook salmon

Michael Ford, John Ford, Brad Hanson, Candice Emmons, Ken Balcomb, Laurie Weitkamp

# A few simple points

- The whales spend time in coastal waters all year, including the summer
- The whales' distribution overlaps with that of many Chinook salmon stocks

For details see:

Hanson and Emmons: *Annual residency patterns of southern resident killer whales in the inland waters of Washington and British Columbia* (workshop 1)

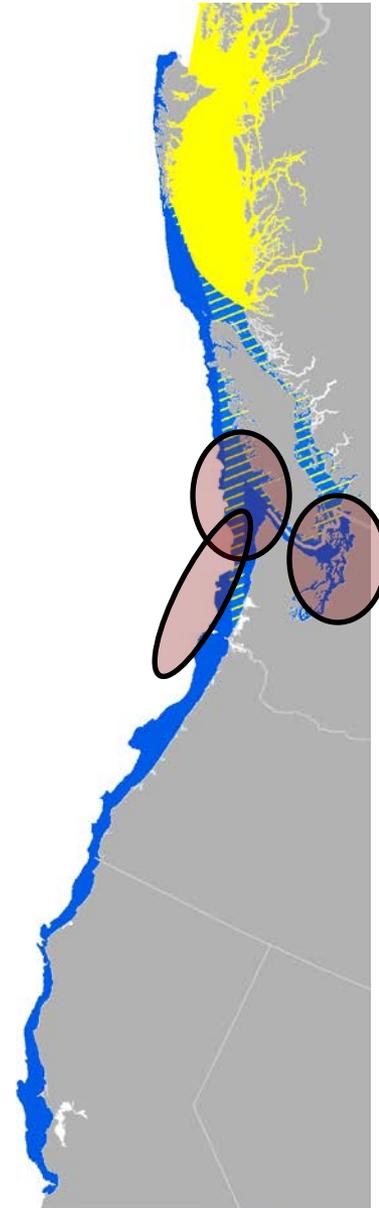
Hanson et al.: *Assessing the coastal occurrence of endangered killer whales using autonomous passive acoustic recorders* (manuscript, workshop 3)

Weitkamp 2010: *Marine Distributions of Chinook Salmon from the West Coast of North America Determined by Coded Wire Tag Recoveries*. TAFS 139:147-170

Riera 2012: *Patterns of seasonal occurrence of sympatric killer whale lineages in waters off Southern Vancouver Island and Washington state, as determined by passive acoustic monitoring*. Master of Science Thesis, School of Earth and Ocean Sciences, University of Victoria.

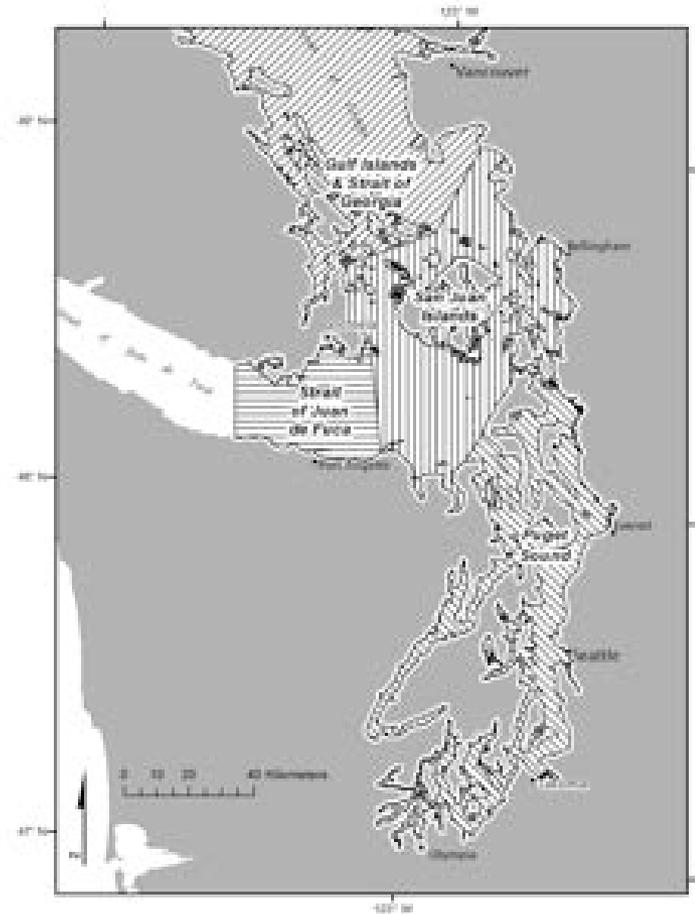
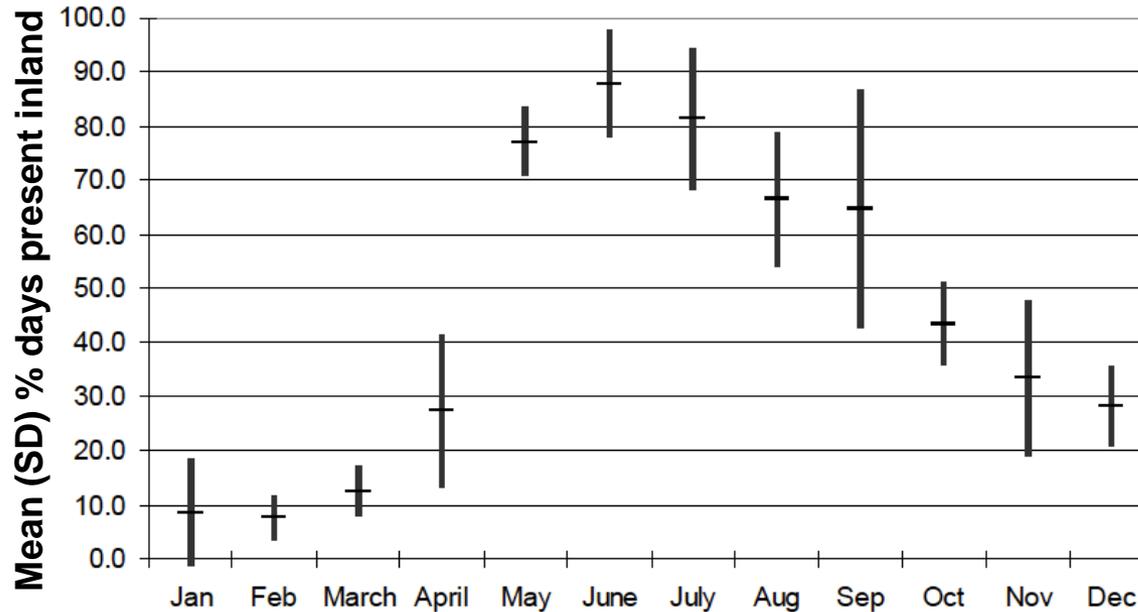
# Whale and salmon distribution – what we want to know

- Density of SRKW by location and time
- Density of salmon stocks by location and time

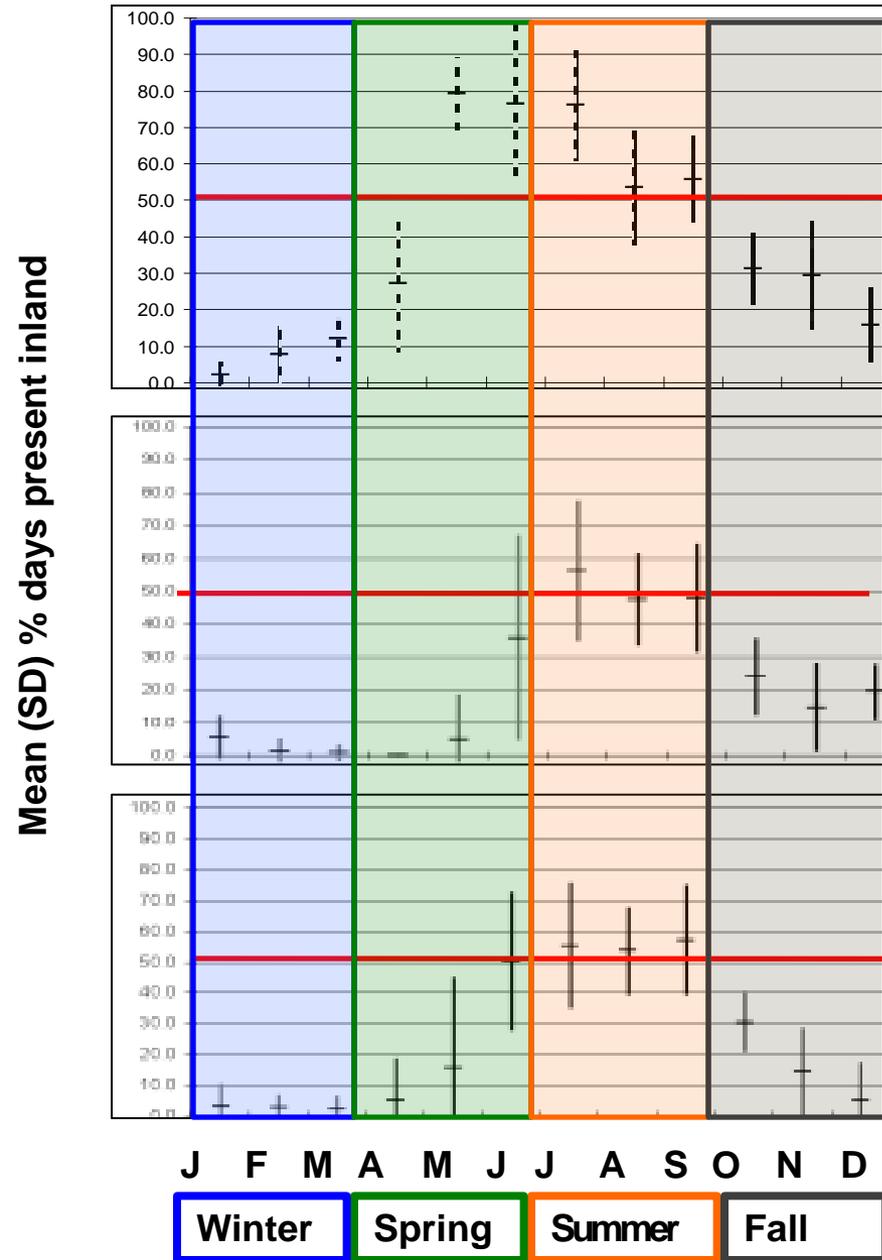


# Recent SRKW residency patterns - spatial

## Daily SRKW sightings from 2003-2009 – any pod



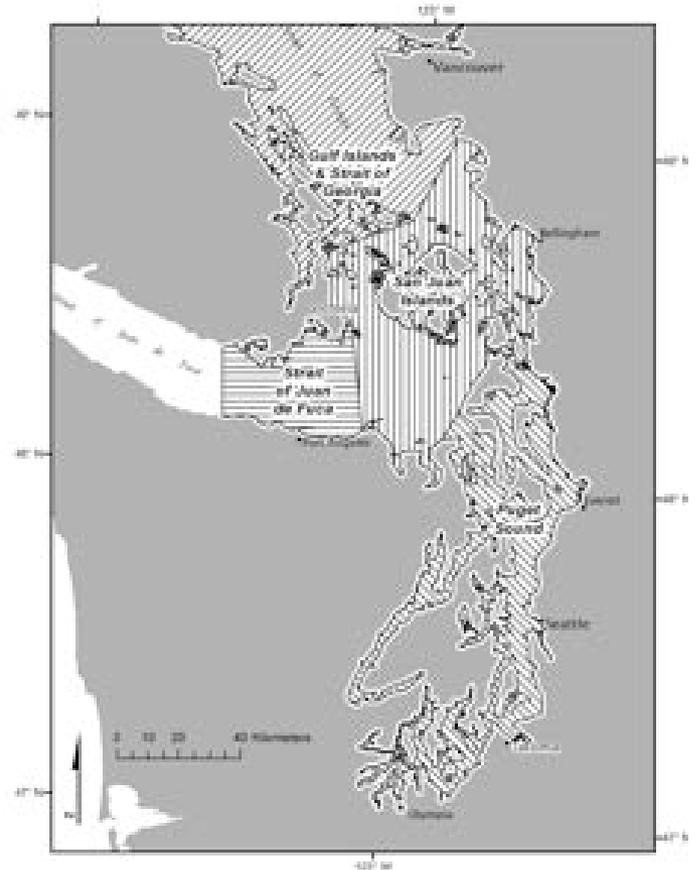
# SRKW residency patterns – by pod



J

K

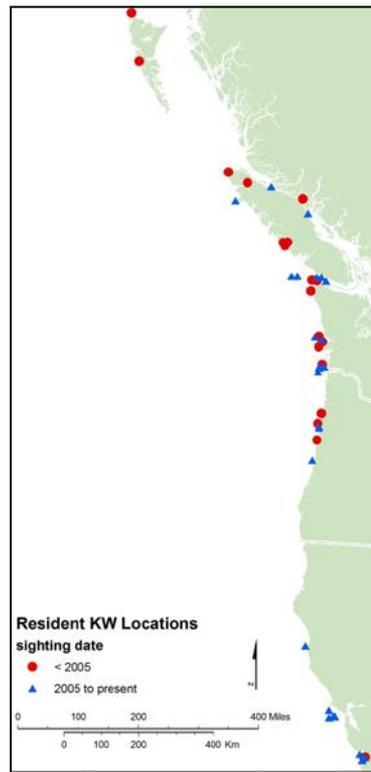
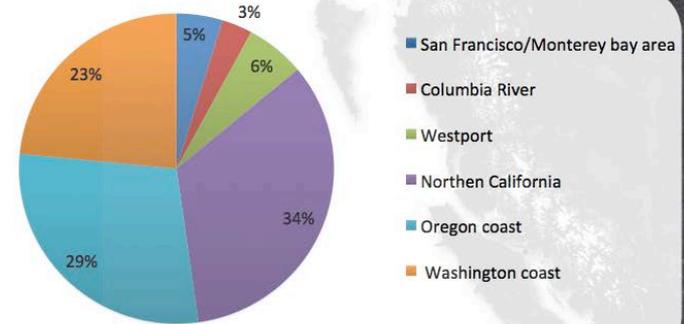
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# Data on coastal distribution

- Coastal sighting network (CWR)
- DFO sightings
- Other sightings

~35 coastal sightings since 1982



- 18 sighting days
- 436 whales possible
- 141 days spent on the coast
- 4721 whale days
- Approximately 47,000 fish within a 5yr period of known SRKW days

1108 Days = 23%

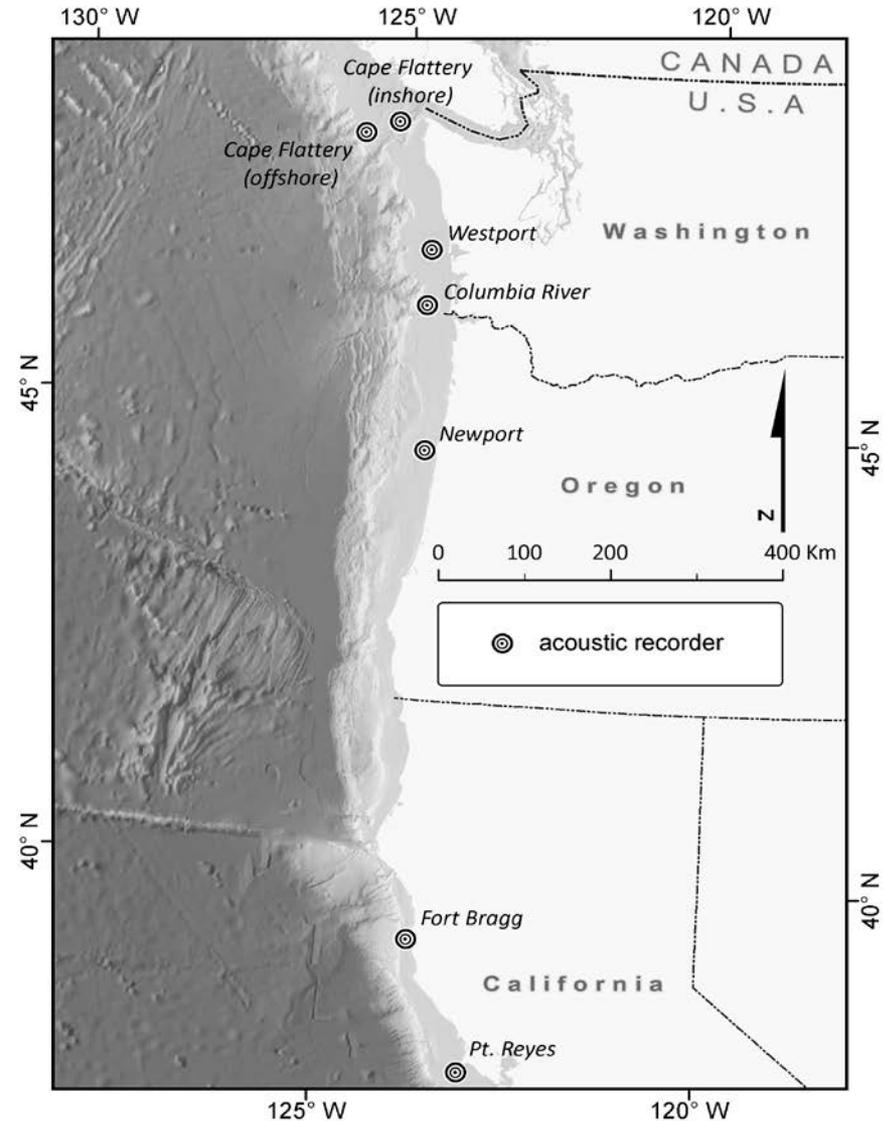
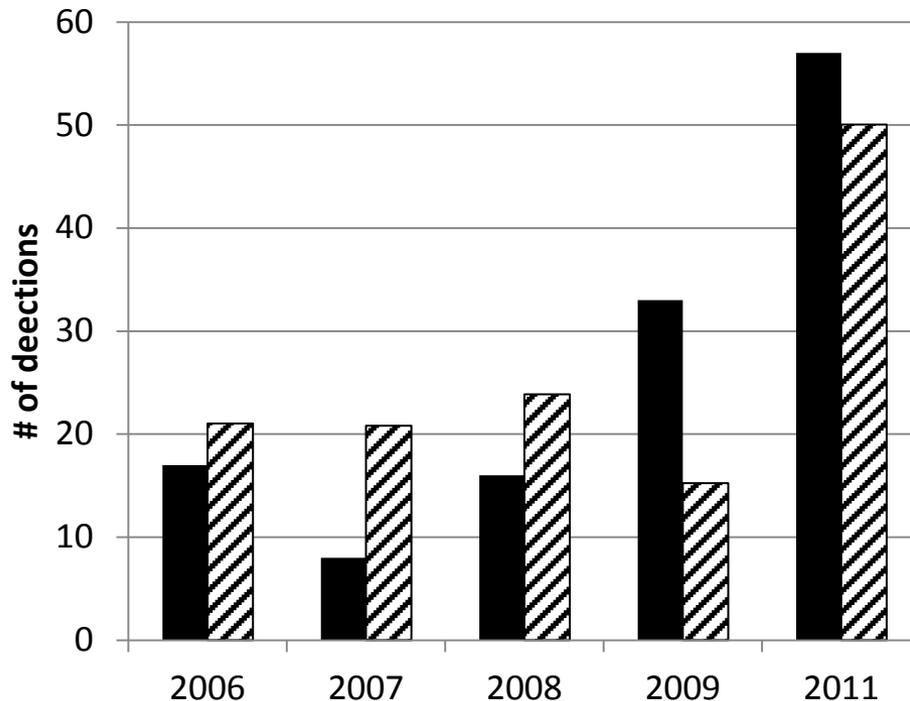
1358 days = 29%

1595 Days = 34%

Southern Resident Killer Whale Winter Coastal Habitat use from 2005 to 2012

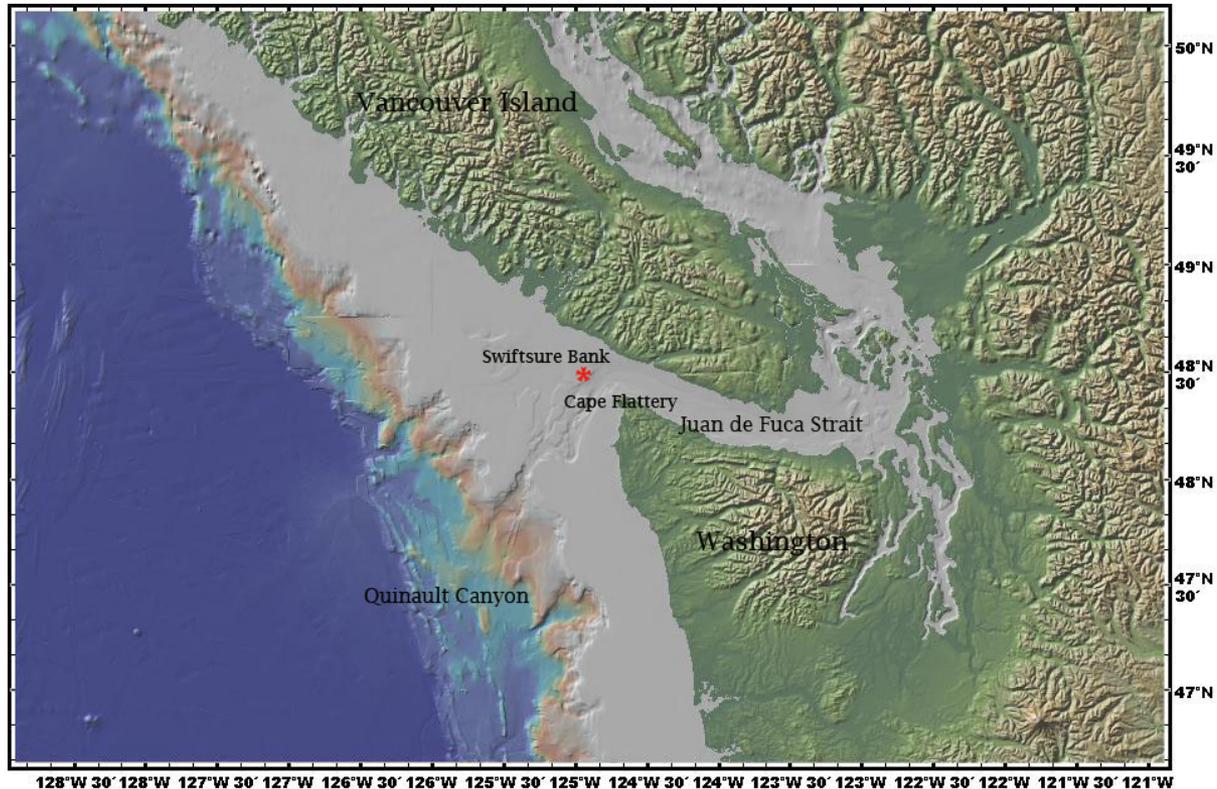
# NMFS Passive acoustic recorders

- 7 recorders
- 2964 days monitored, 2006-2011
- 131 detections



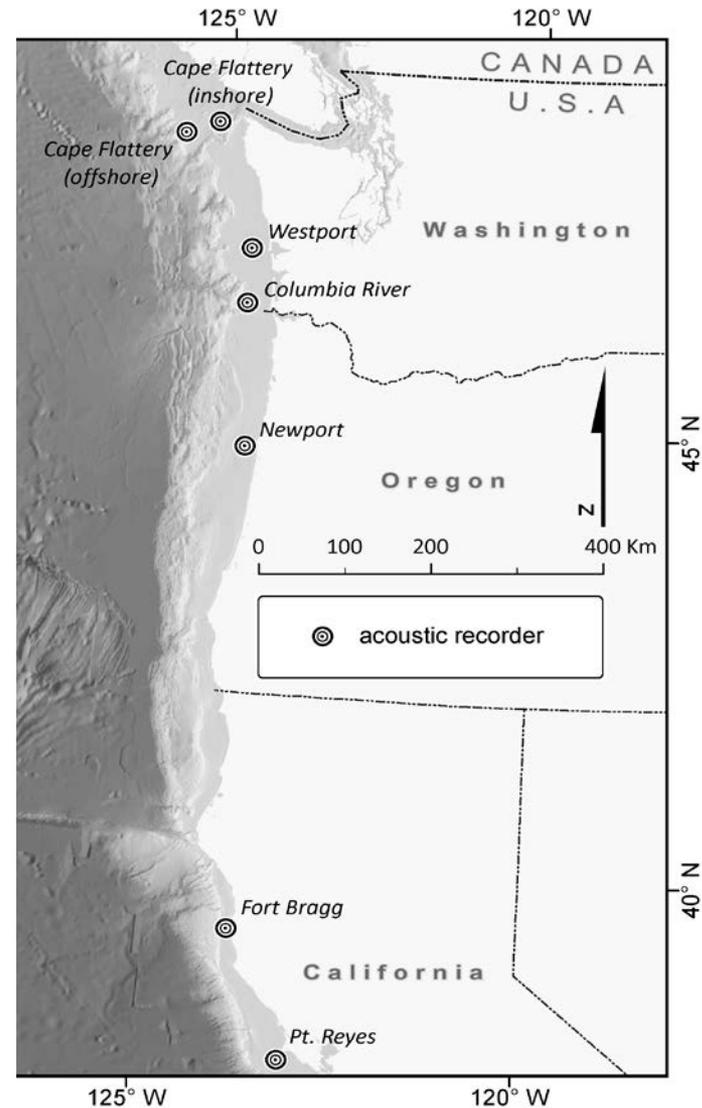
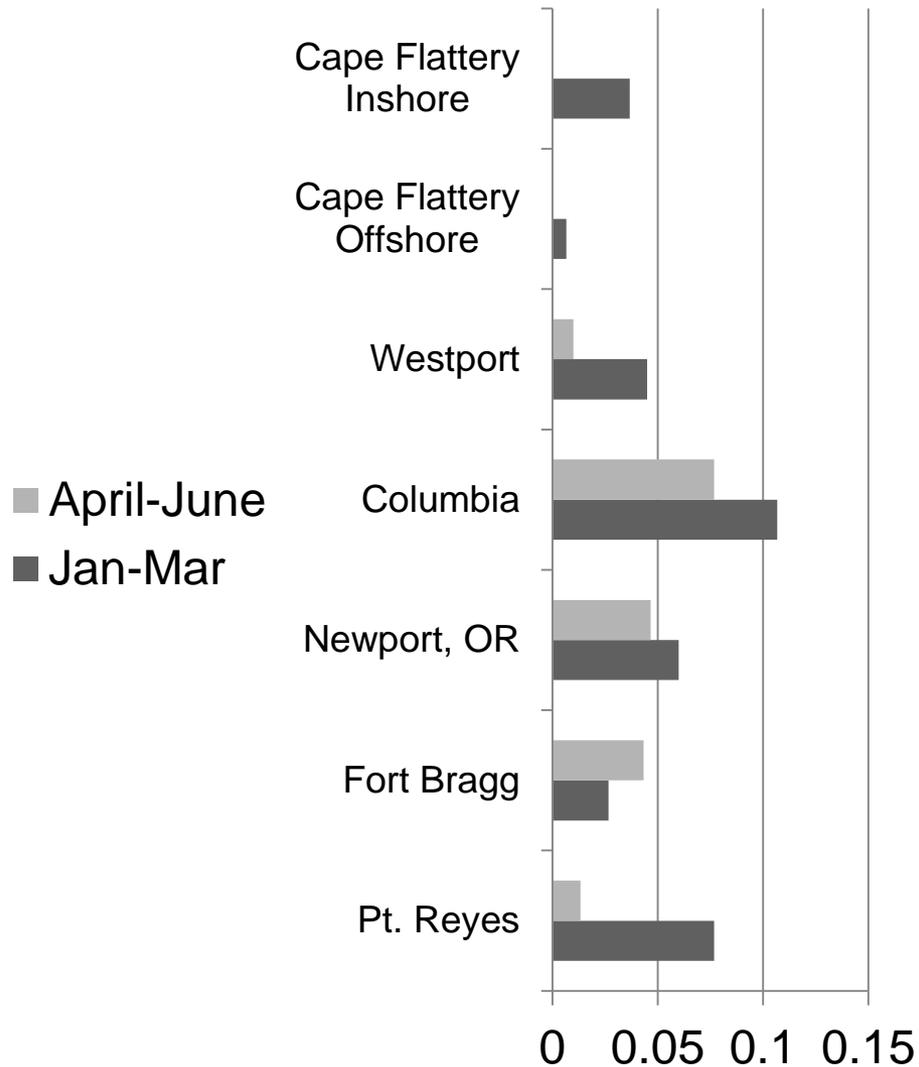
# DFO Acoustic Monitoring: Swiftsure Bank

- Recordings on 1/3 duty cycle (5 min on, 10 min off)
- Recording period August 2009 – July 2010

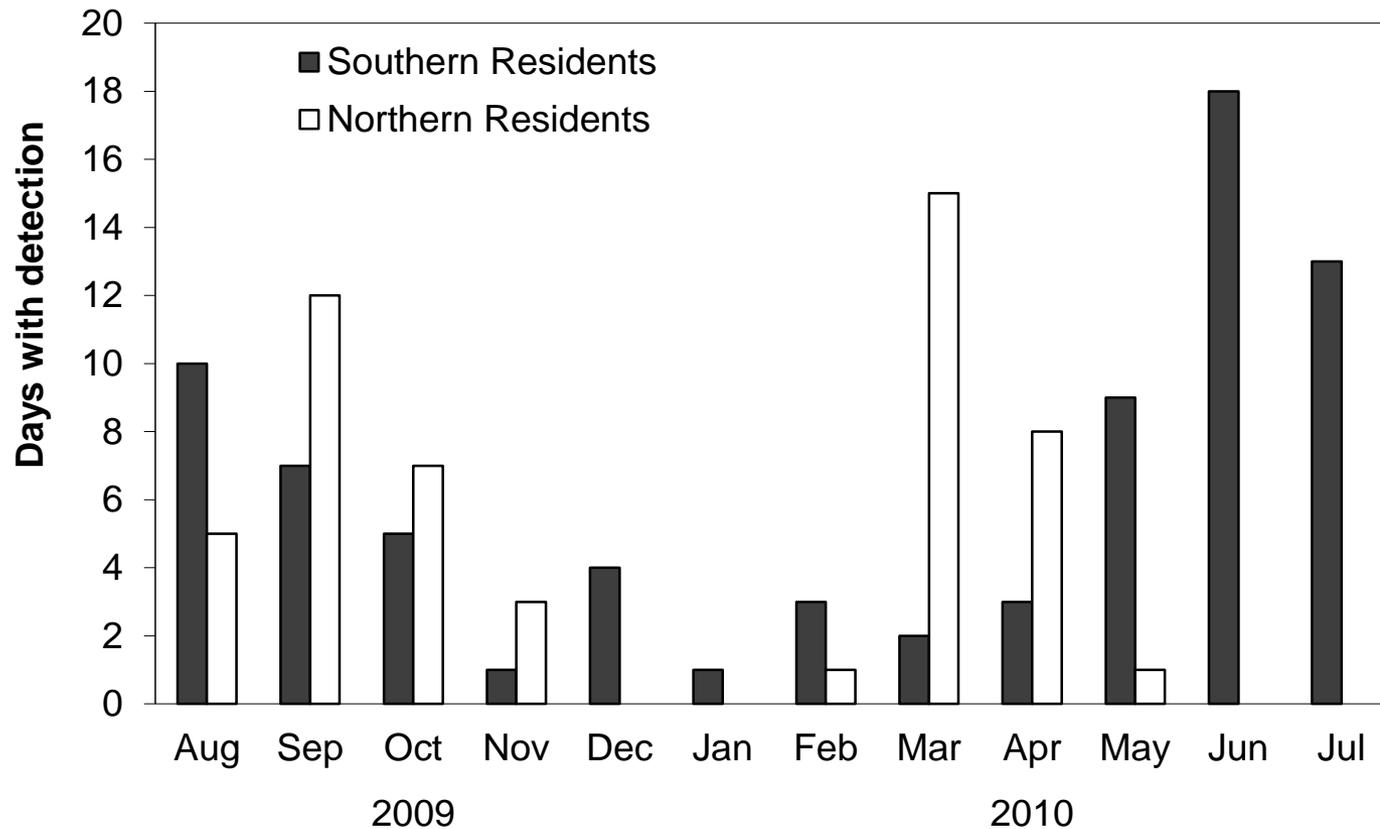


Source: Riera, Ford & Chapman. in prep.

# SRKW detections per unit effort

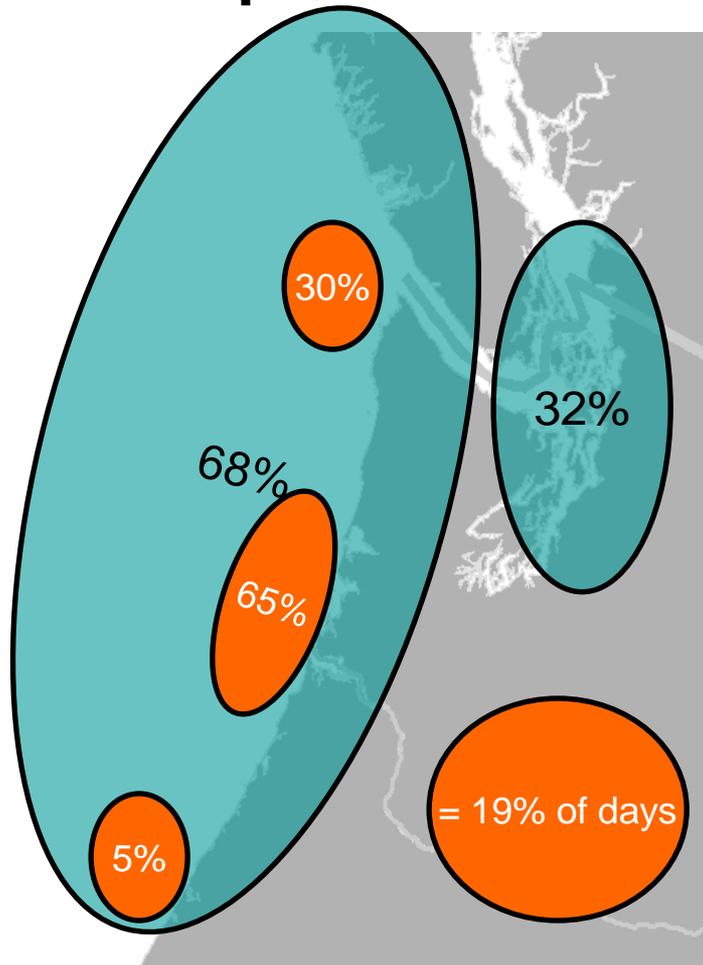


- Recordings on 1/3 duty cycle (5 min on, 10 min off)
- One year monitoring: August 2009 – July 2010
- 128 days (out of 365) with RKW detections: 76 SRKW, 52 NRKW

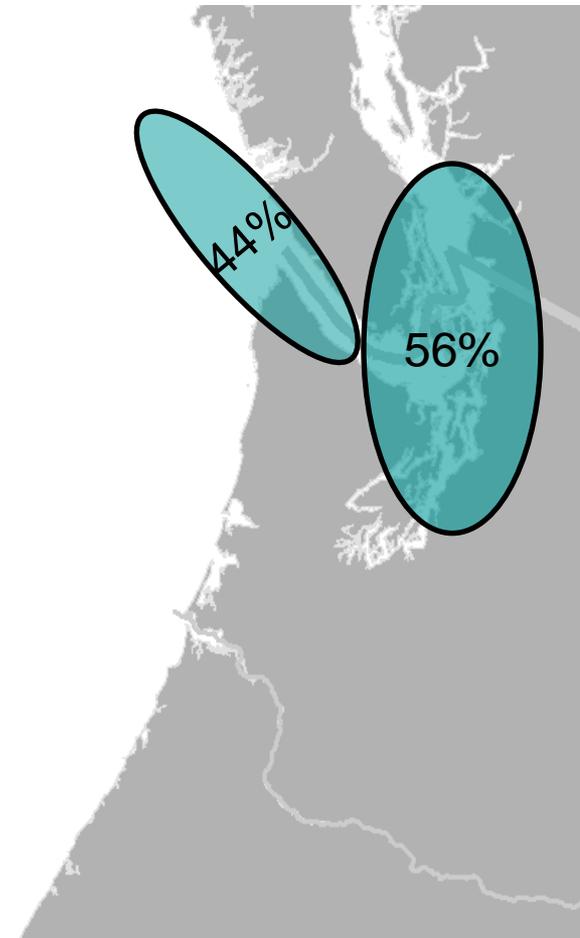


# Summary: SR whale distribution by season

**April - June**

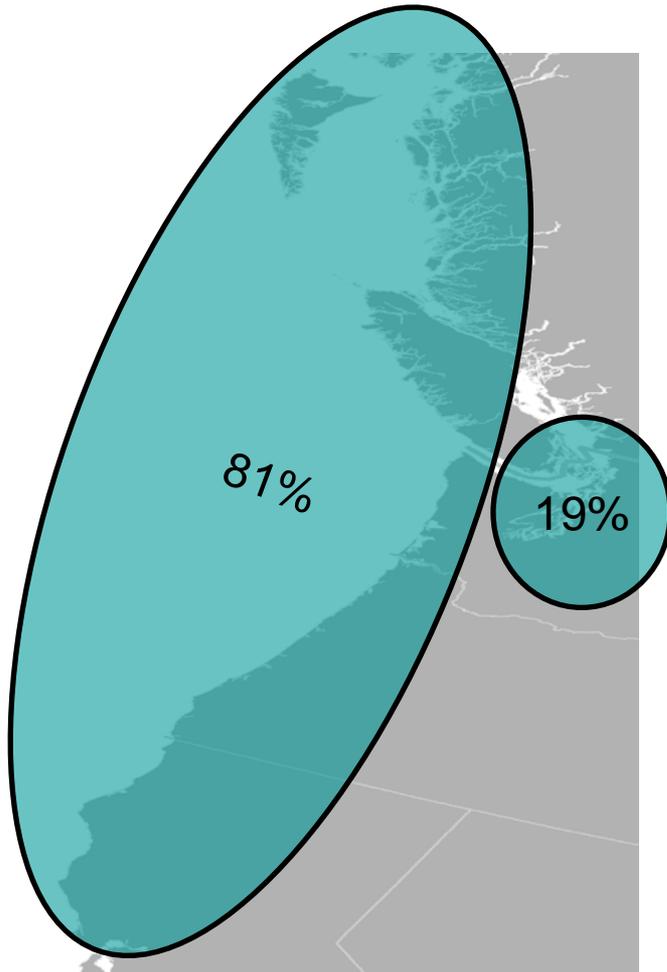


**July - Sept**

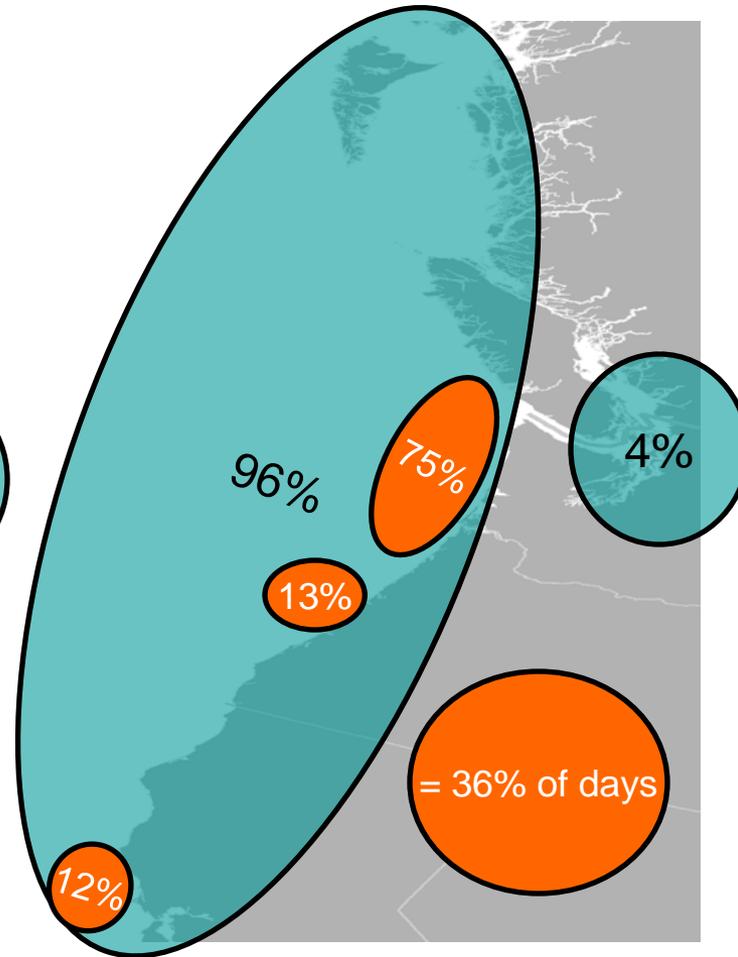


# Summary: SR whale distribution by season

Oct - Dec

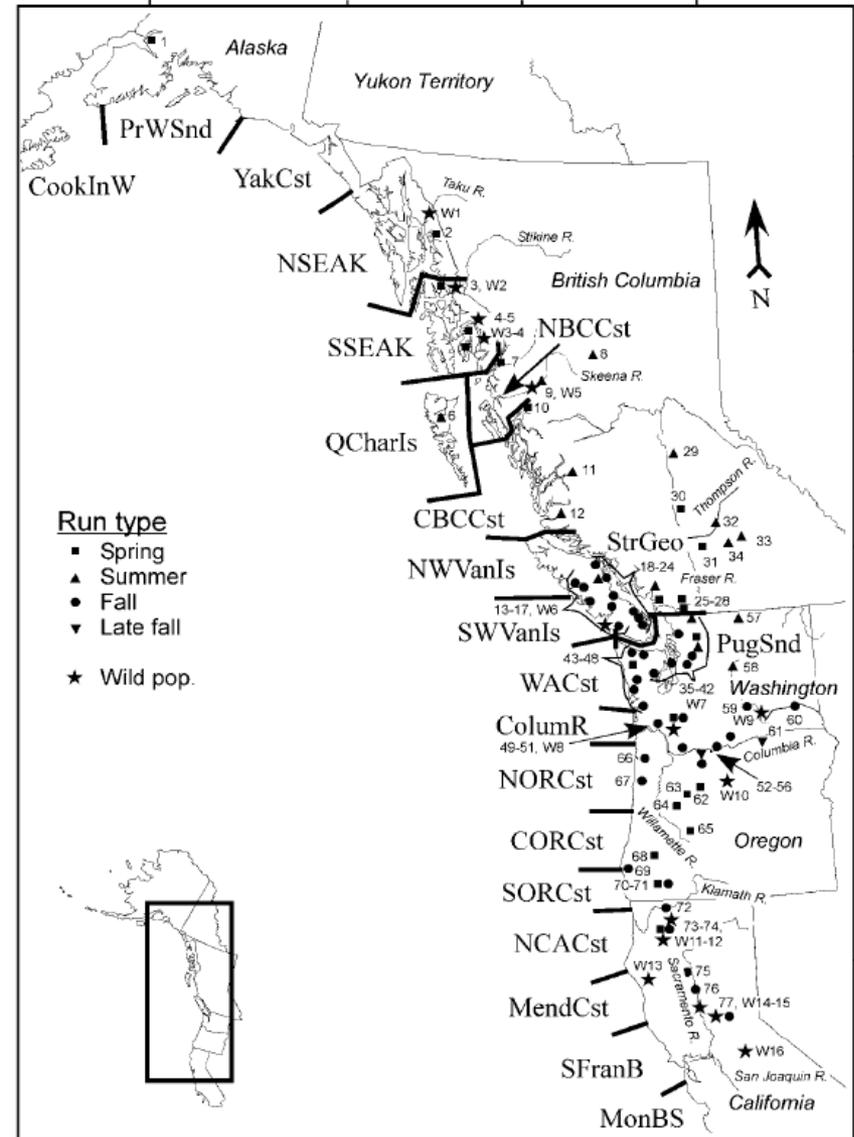


Jan - March



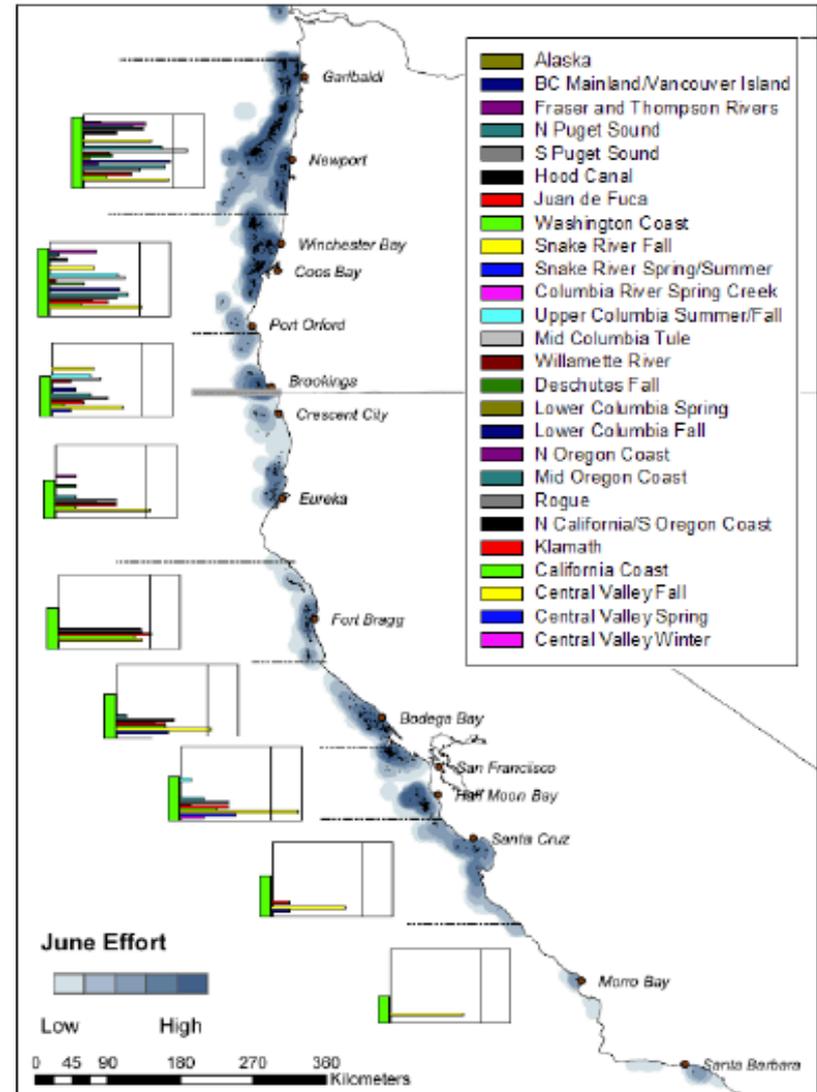
# What about Chinook stock distributions?

- Weitkamp 2010 Trans Am Fish Soc
- CWT analysis
- 1973-2007
- 154 hatcheries
- 1.7 million recoveries

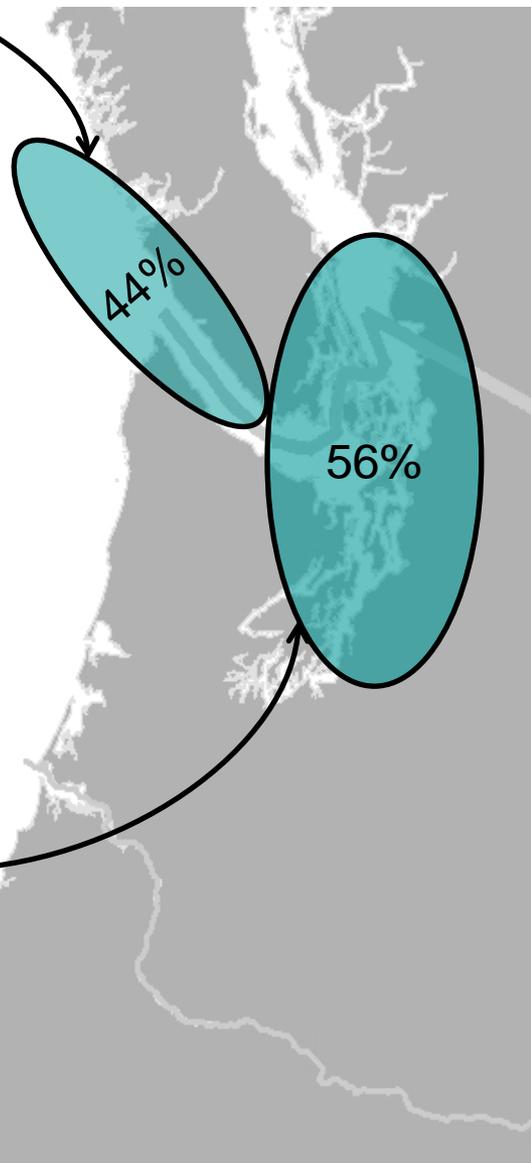
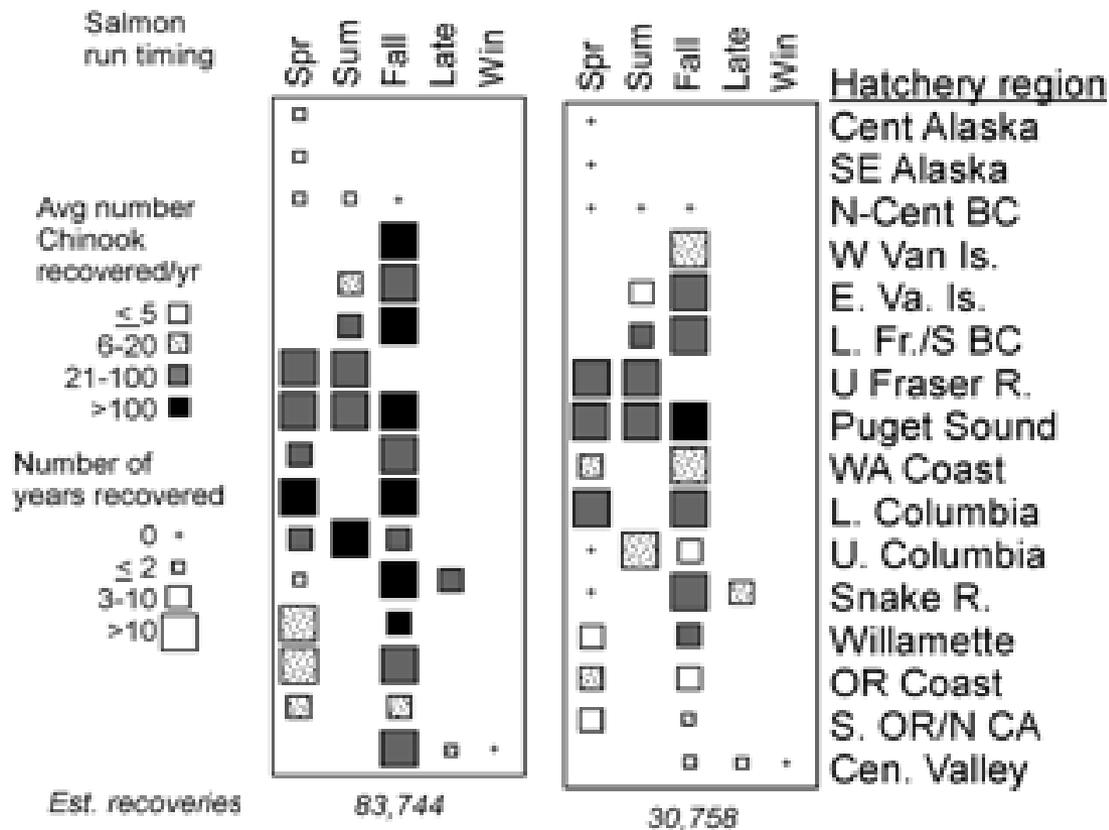


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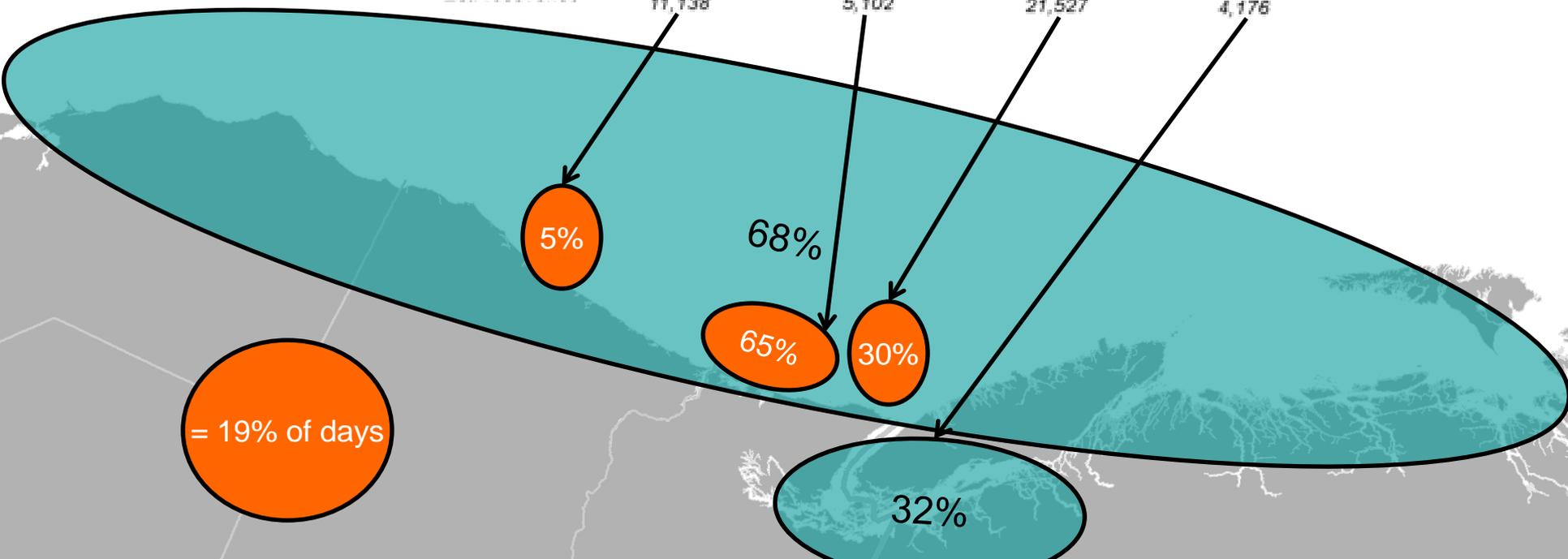
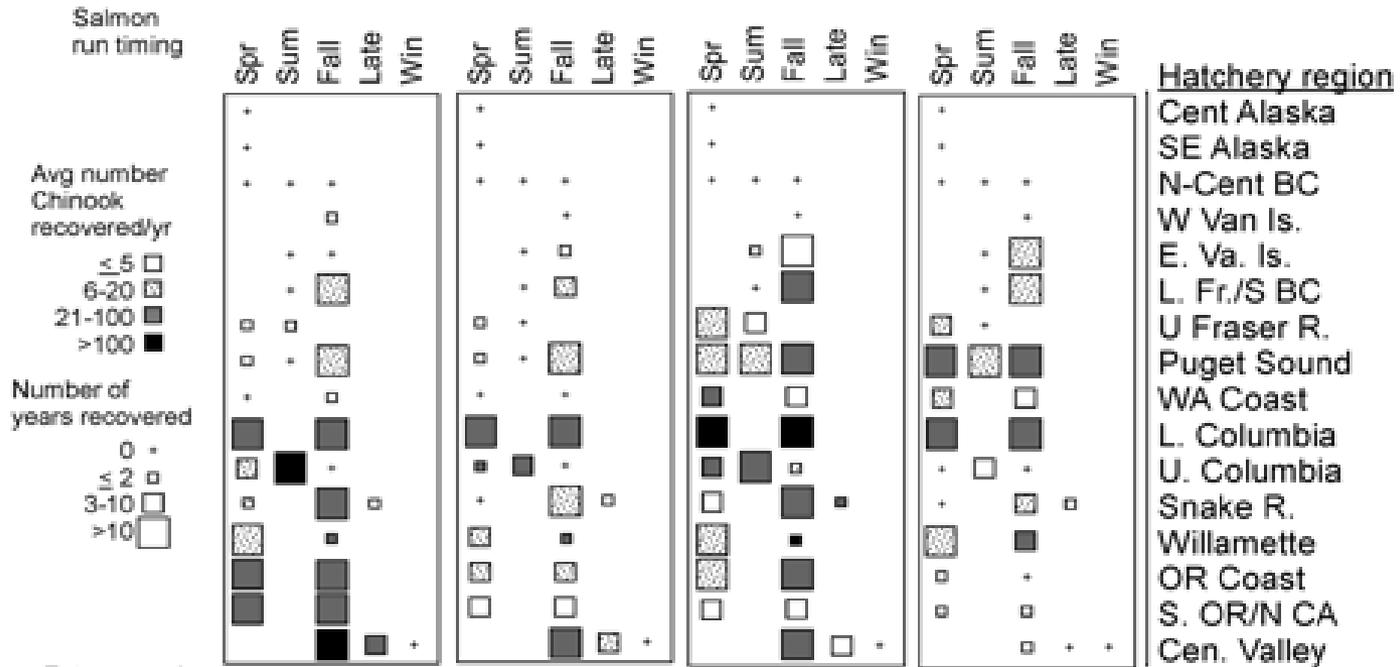
- Genetic stock ID data
  - West Coast GSI Collaboration
    - Oregon – Project CROOS
    - WA – WDFW
    - CA – NMFS SWC
  - DFO



# Summer



# Spring



Salmon  
run timing

Spr Sum Fall Late Win

Hatchery region

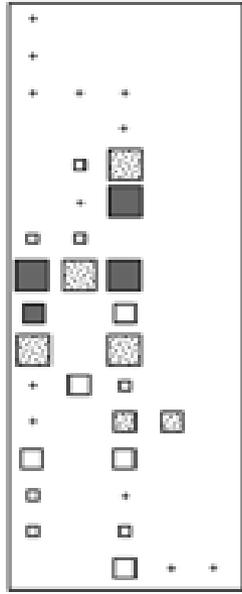
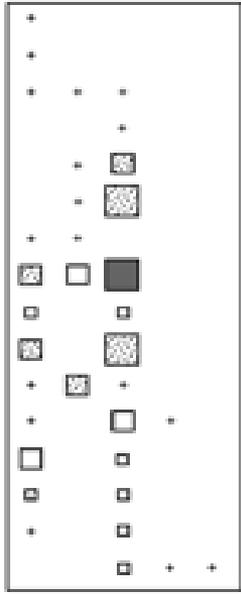
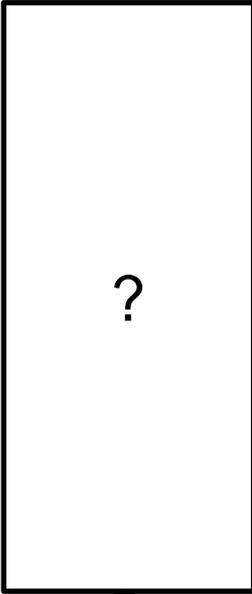
Winter

Avg number  
Chinook  
recovered/yr

≤ 5 □  
6-20 ▤  
21-100 ■  
> 100 ■

Number of  
years recovered

0 +  
≤ 2 □  
3-10 □  
> 10 □

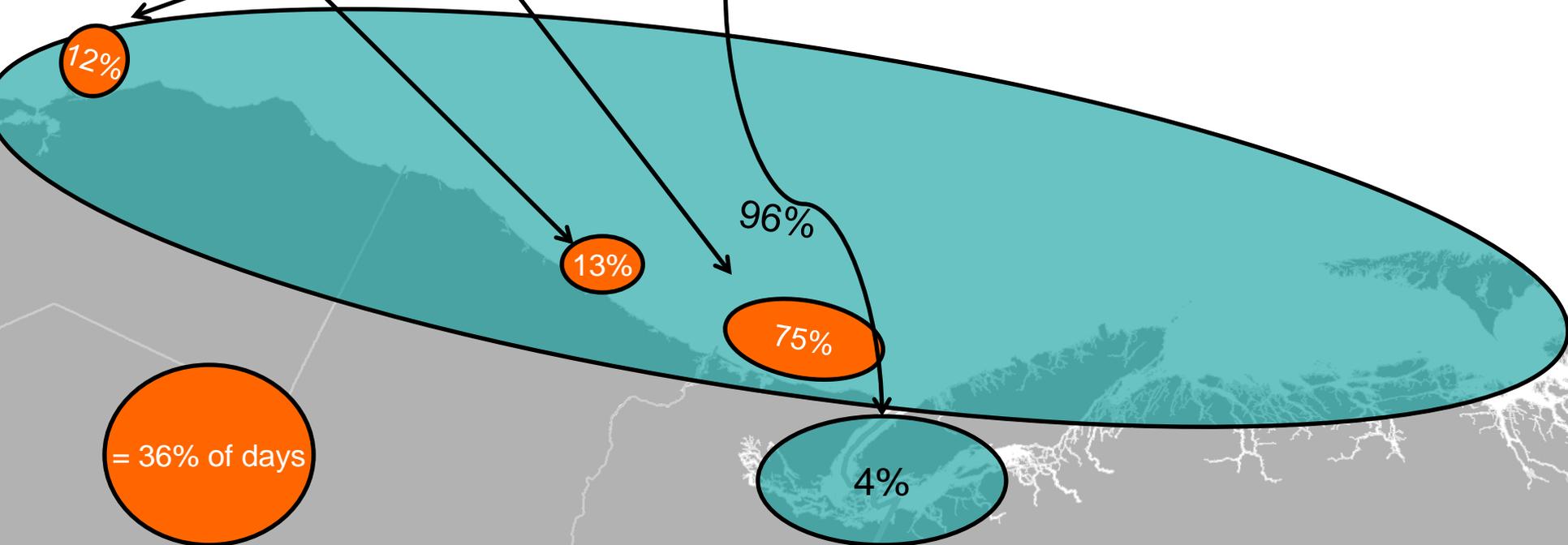


- Cent Alaska
- SE Alaska
- N-Cent BC
- W Van Is.
- E. Va. Is.
- L. Fr./S BC
- U Fraser R.
- Puget Sound
- WA Coast
- L. Columbia
- U. Columbia
- Snake R.
- Willamette
- OR Coast
- S. OR/N CA
- Cen. Valley

Est. recoveries

1,142

5,627



12%

13%

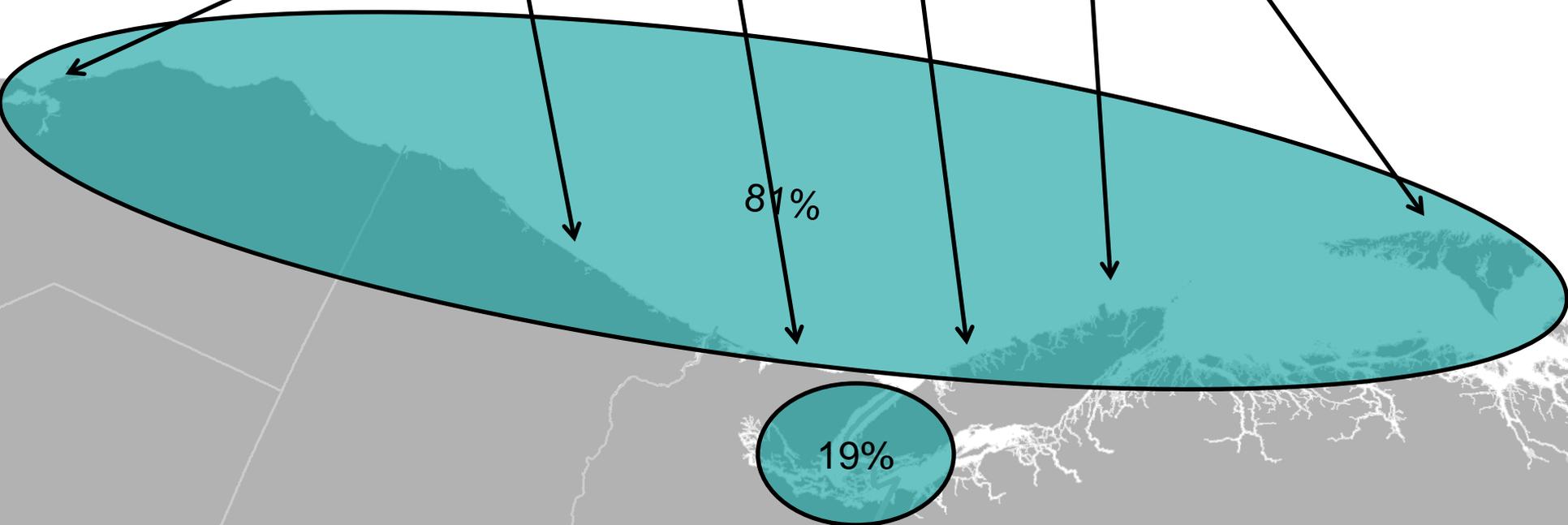
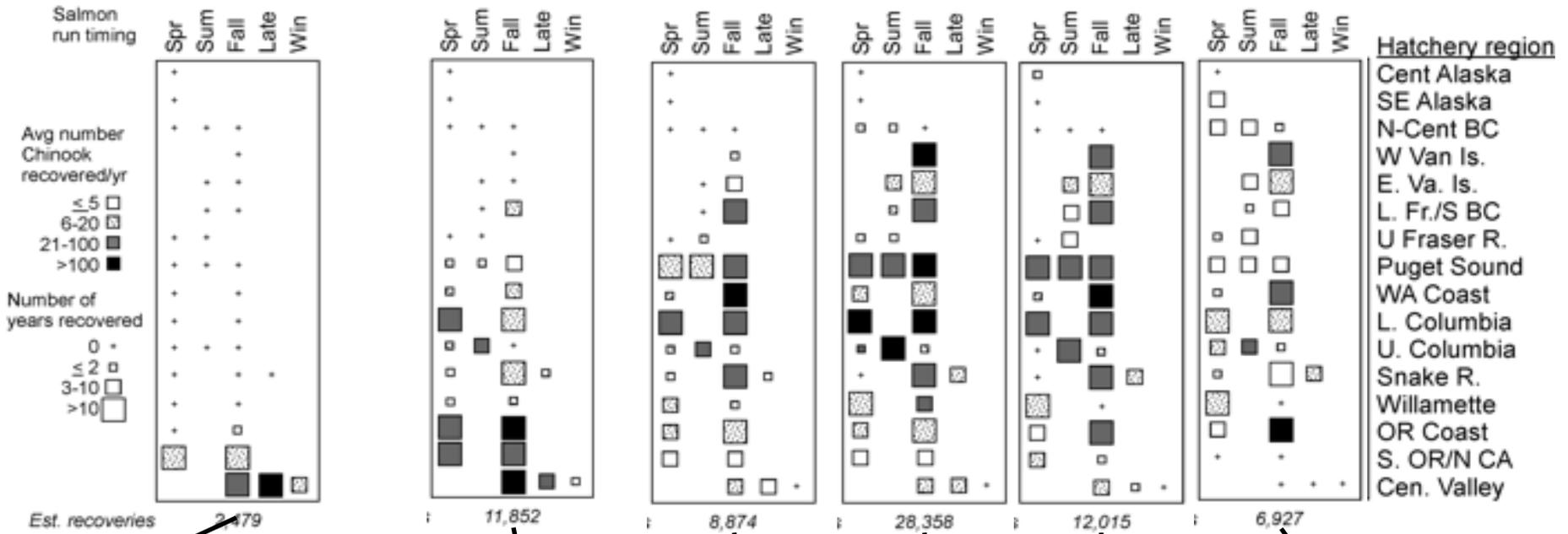
96%

75%

4%

= 36% of days

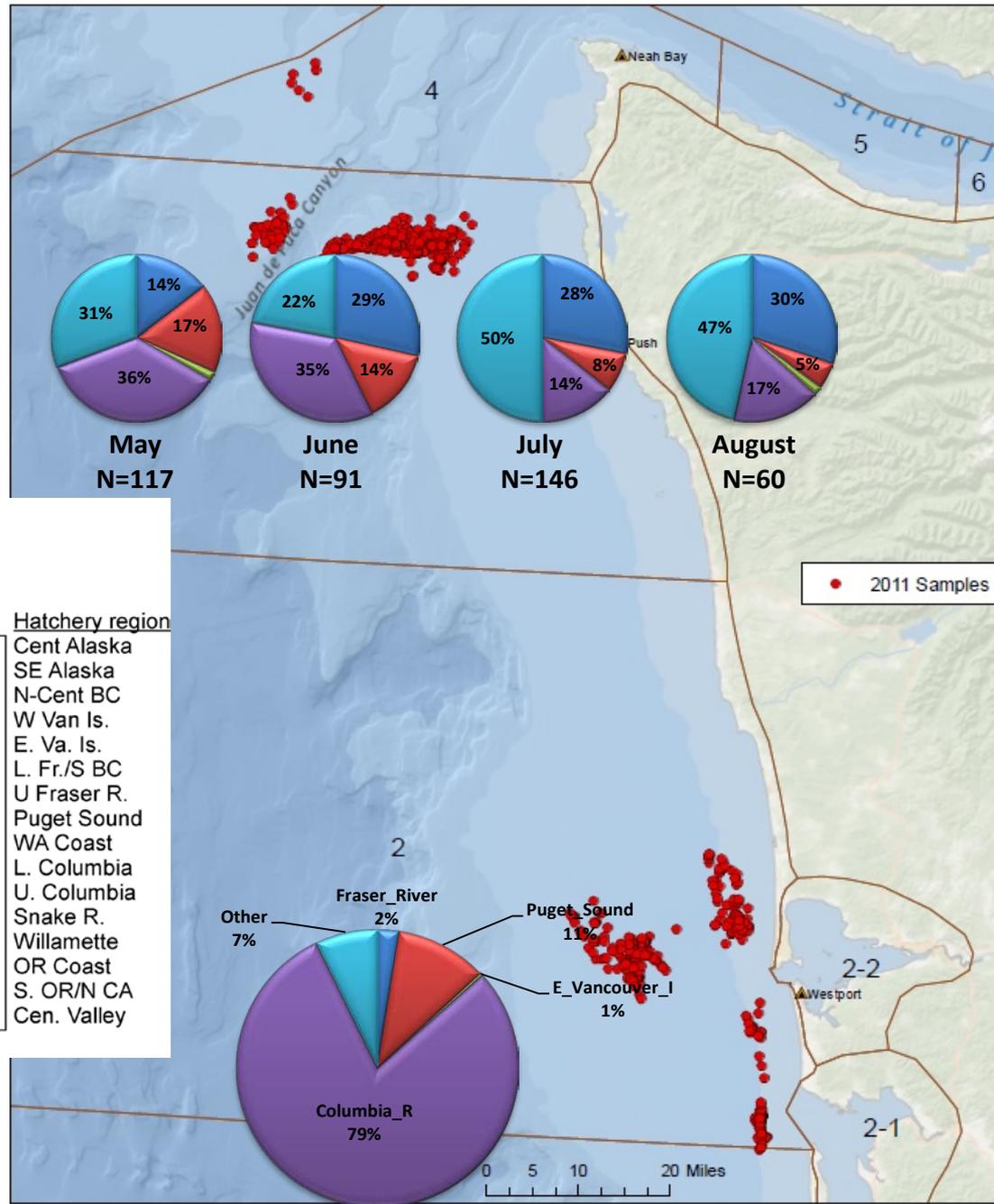
# Fall



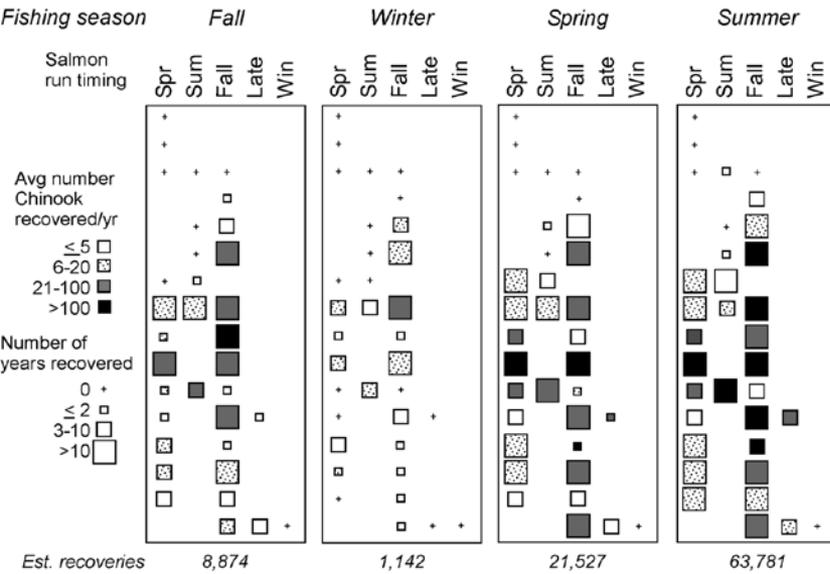
# Summary

- Whales spend >40% of their time west of central Juan de Fuca Strait in all seasons
  - Sightings
  - Acoustic monitoring
  - Pod variation
- April - Dec: whales overlap with all major stocks from south of central BC
- Jan - March: Very limited salmon data
- Consistent with whale demographic correlations with broad salmon indices

2011  
 Chinook Ocean Troll  
 Commercial Fishery  
 Composite  
 May - August  
 N = 737  
 WDFW

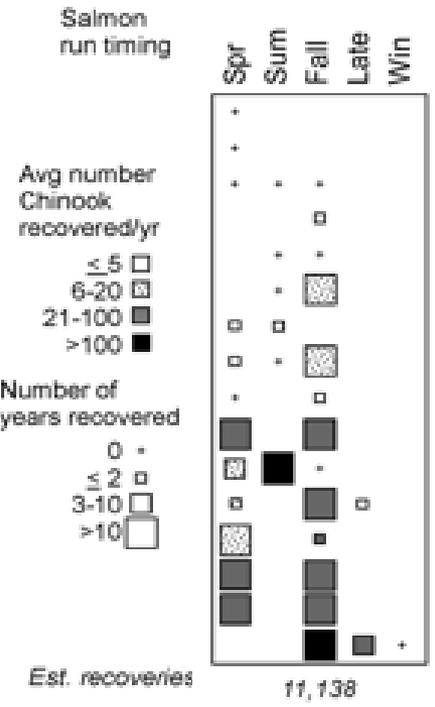


Washington Coast Recovery Area

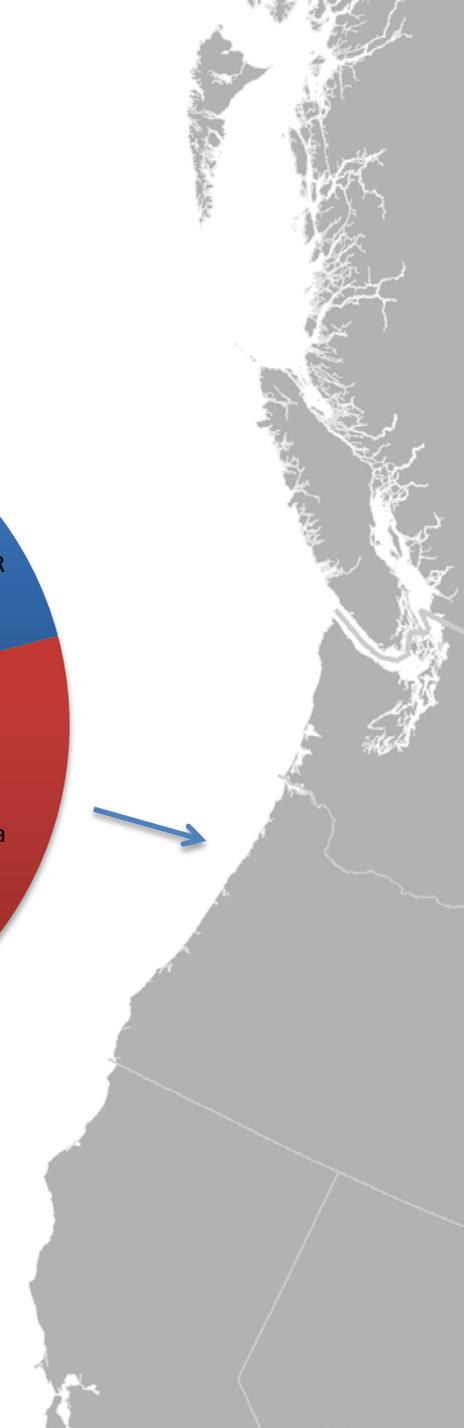
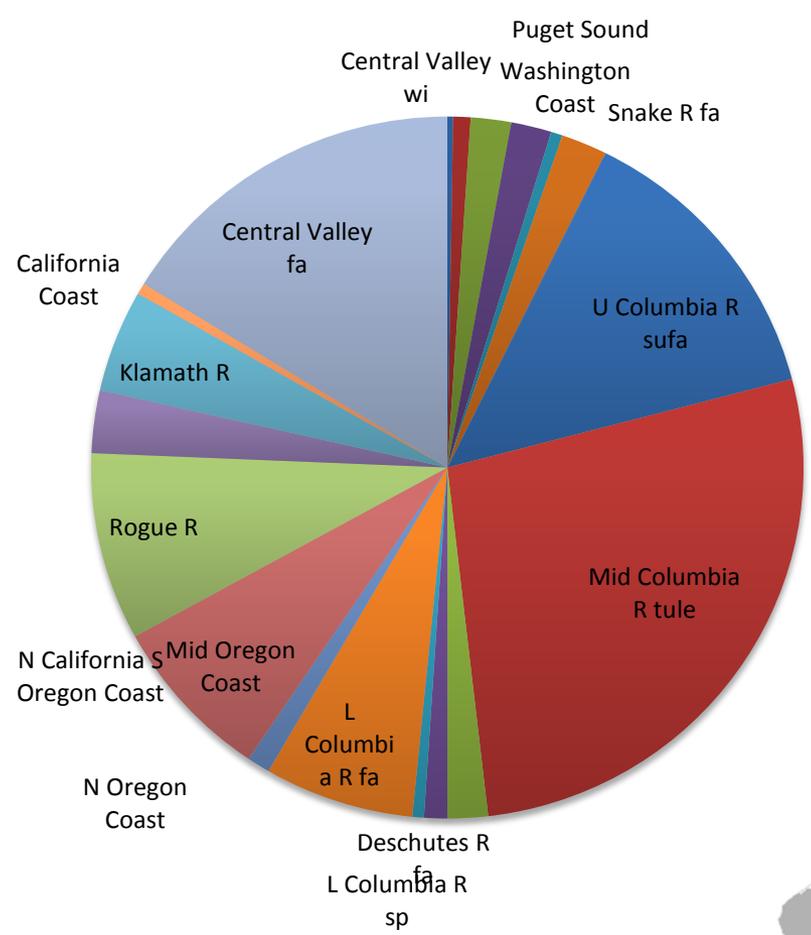


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- Cent Alaska
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  - WA Coast
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  - U. Columbia
  - S. Snake R.
  - Willamette
  - OR Coast
  - S. OR/N CA
  - Ken. Valley

# May



- Hatchery region**
- Cent Alaska
  - SE Alaska
  - N-Cent BC
  - W Van Is.
  - E. Va. Is.
  - L. Fr./S BC
  - U Fraser R.
  - Puget Sound
  - WA Coast
  - L. Columbia
  - U. Columbia
  - Snake R.
  - Willamette
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Genetic data collected by the WCSGSI Collaboration as summarized by Pete Lawson and Renee Bellinger.