

Where salmon go in the ocean



Laurie Weitkamp
NOAA Fisheries
Northwest Fisheries Science Center
Newport Research Station

Knowing ocean location is important because...

... it's the first step to indicator selection

- Where are they during **critical periods** when high mortality and strong influence from environmental drivers
- Exploration of indicators throughout entire ocean phase (salmon move)
- Each species/stock uses the ocean differently



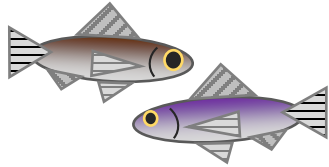
Three phases of ocean residence

Ocean
stage &
fish size

Expected
mortality

Factors
affecting
survival

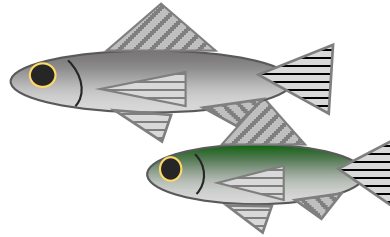
1st spring/summer
CRITICAL PERIOD



High and highly
variable

Abundant high quality
prey to fuel rapid
growth to out-grow
predators

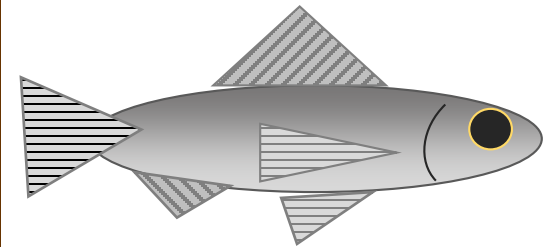
Subsequent winters &
summers



Lower and less
variable?

Grow in summer to
avoid winter
starvation?
1st Winter = **CRITICAL**
PERIOD

Last spring or
summer



Low and constant

Salmon too large for
most predators; need
prey for final growth
& gonad development

Three phases of ocean residence

Ocean
stage &
fish size

Expected
mortality

Factors
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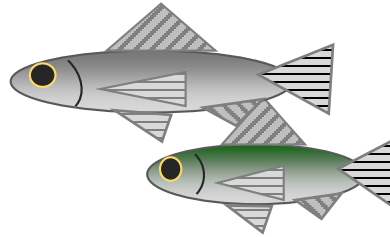
1st spring/summer
CRITICAL PERIOD

Most
mortality
occurs

during 1st
spring/
summer

High and highly
variable
Abundant high quality
prey to fuel rapid
growth to out-grow
predators
= critical
period

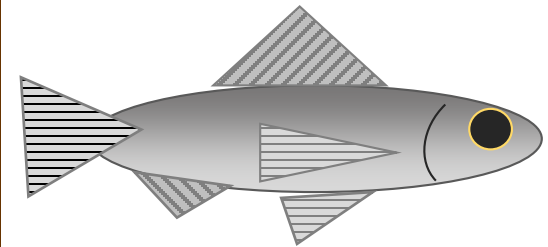
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Species name

First summer/fall



Coho	}	1 winter in ocean
Pink		
Chum	}	>1 winter in ocean
Sockeye		
Chinook		

Very broad-brush descriptions. Considerable variation within and among populations

Species name

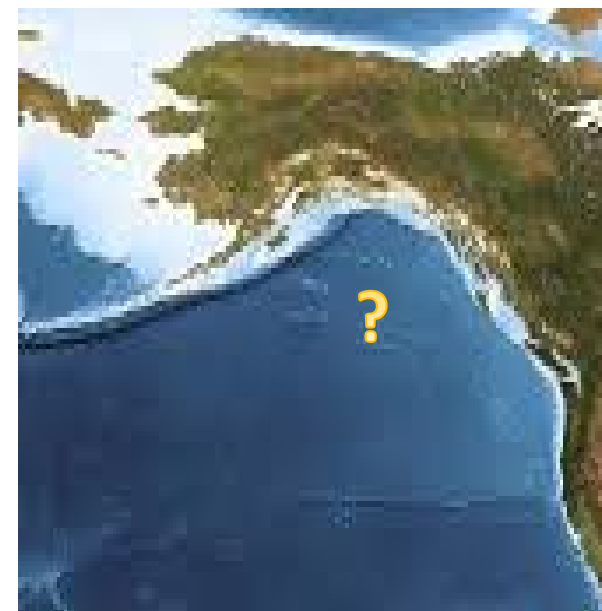
First summer/fall



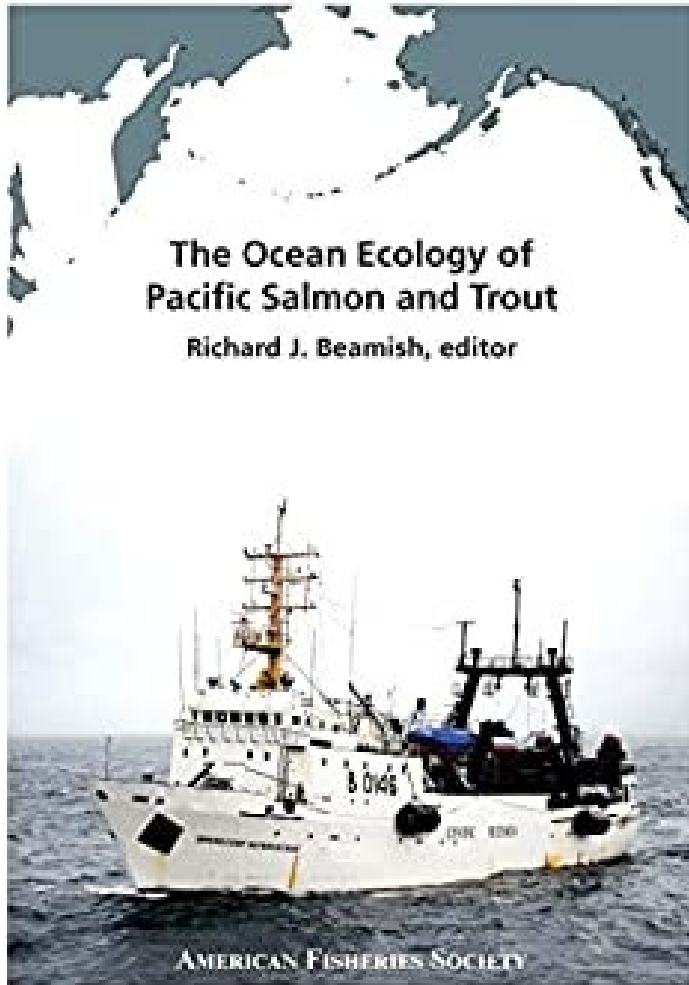
Winters/summers



Last summer



Data sources for salmon locations



KNOWN OCEAN RANGES OF STOCKS OF PACIFIC SALMON AND STEELHEAD AS SHOWN BY TAGGING EXPERIMENTS, 1956-1995

by

Katherine W. Myers, Kerim Y. Aydin, and Robert V. Walker
University of Washington
FISHERIES RESEARCH INSTITUTE
Box 357980
Seattle, Washington 98195-7980

and

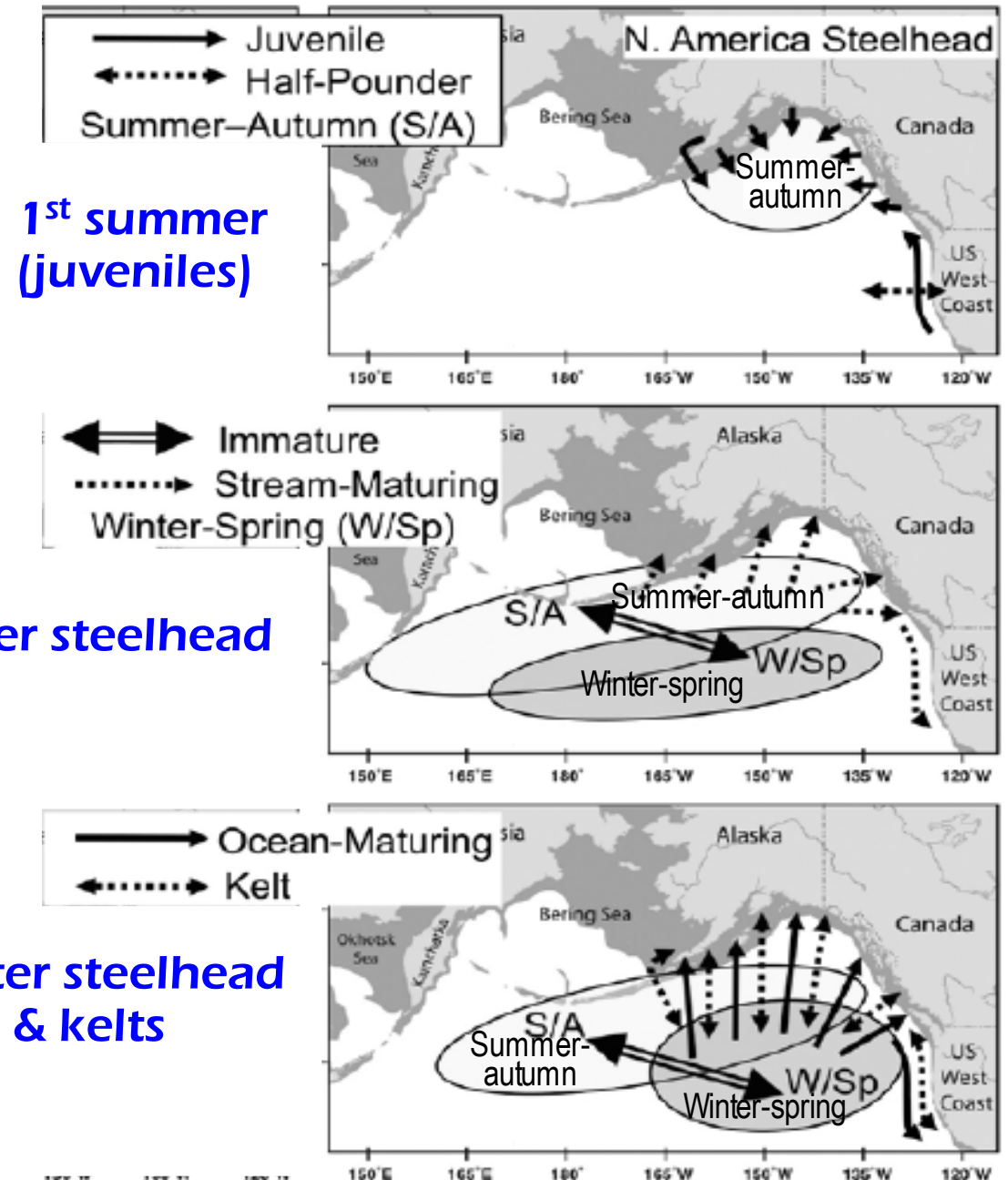
Susan Fowler and Michael L. Dahlberg
U.S. National Marine Fisheries Service
Alaska Fisheries Science Center
AUKE BAY LABORATORY
11305 Glacier Highway
Juneau, Alaska 99801-8626

1996

Steelhead are different!

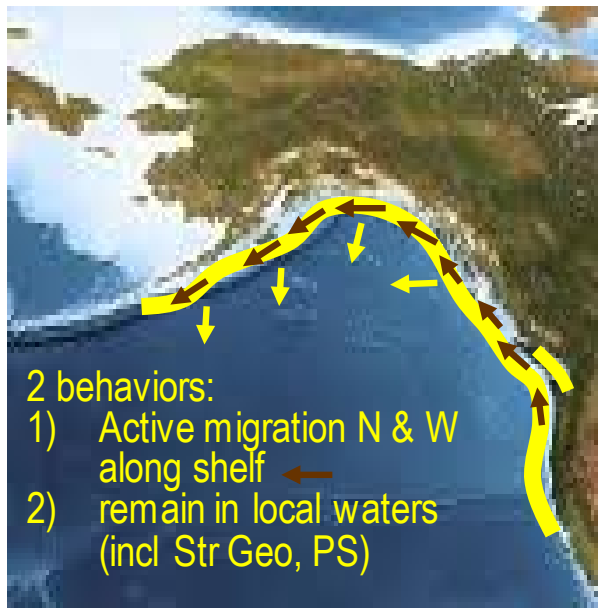
- Head directly offshore during 1st summer.
- Across the N Pacific during subsequent winters and summers
- Return from offshore

Myers, K. 2018. Ocean ecology of Steelhead. Ch. 7 in *The Ocean Ecology of Pacific Salmon and Trout*.



Coho salmon (1 winter in ocean)

First summer/fall



Winter



Last summer/fall

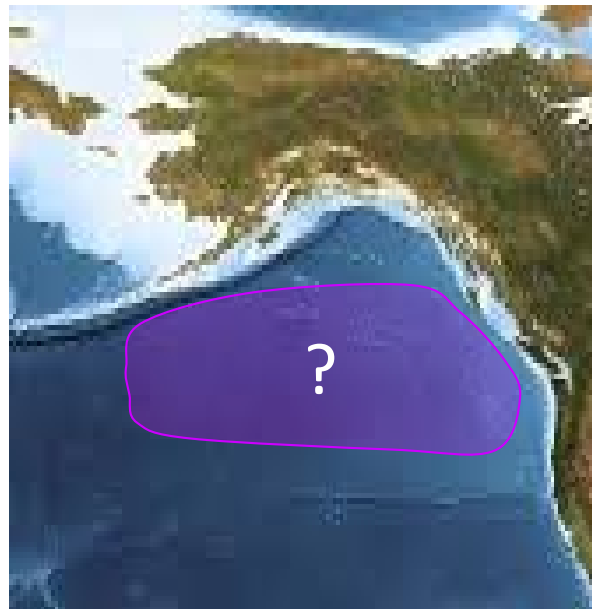


Pink salmon (1 winter in ocean)

First summer/fall



Winter



Last summer



Radchenko et al. 2018. Ocean ecology of Pink salmon. Ch. 1 *in* The Ocean Ecology of Pacific Salmon and Trout.

Chum salmon (>1 winter in ocean)

First summer/fall



Winters/summers



Last summer/fall

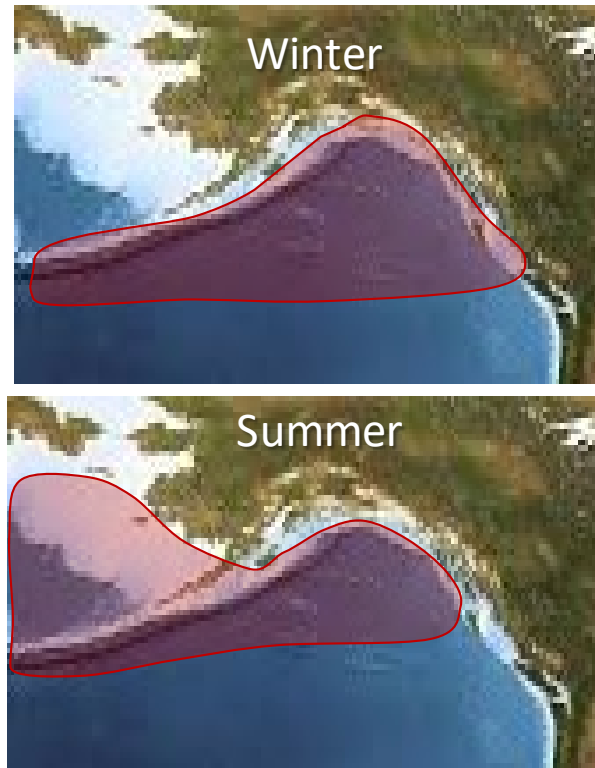


Sockeye salmon (>1 winter in ocean)

First summer/fall



Winters/summers



Last summer/fall

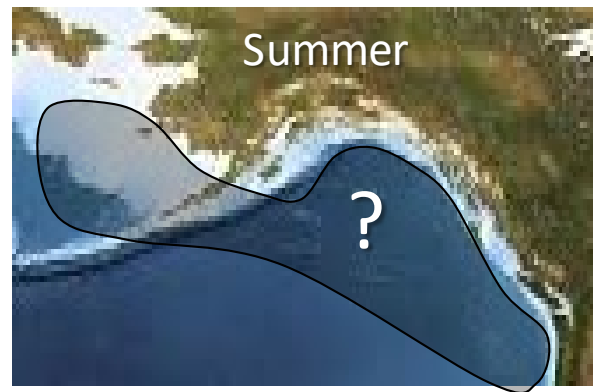


Columbia Spring Chinook salmon

First summer/fall



Winters/summers



Last spring

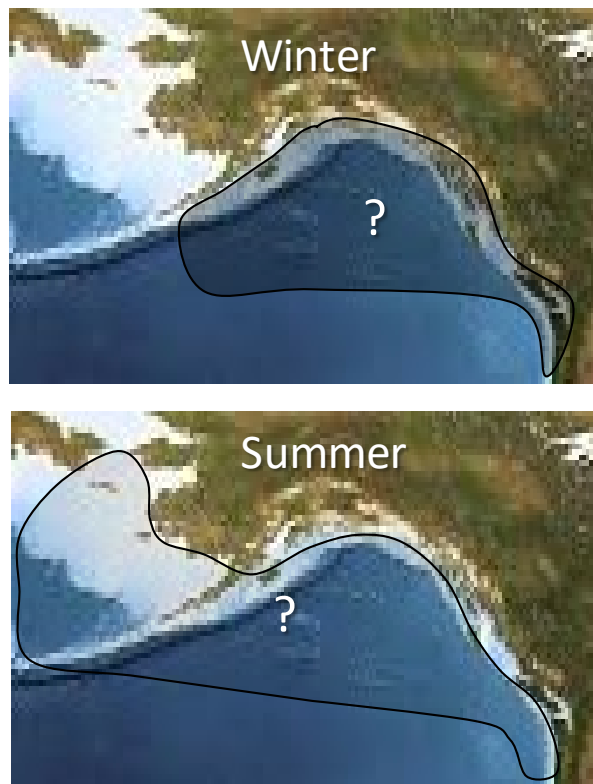


Other Chinook salmon (>1 winter in ocean)

First summer/fall



Winters/summers



Last summer/fall



Summary of first summer patterns

1. Rapidish north & west movements along continental shelf

Pink, chum, sockeye, some coho, Columbia spring Chinook



2. Resident along continental shelf or Bering Sea (not moving rapidly)

Western Alaskan salmon (all species)



Subsequent summer/winters

Movement between Gulf of
Alaska and Bering Sea (summer)

All species (Chinook includes
continental shelf)



Summary of last summer patterns

1. Move from offshore,
limited time on continental
shelf

Pink, chum, sockeye, Columbia
spring & AK, NBC Chinook



2. On continental shelf for
extended period before
reaching home stream

Chinook from S BC, WA,
OR, Columbia (fall), coho





Lots of new stock-specific location information is being published from genetic stock identification methods

Contact Laurie.Weitkamp@noaa.gov for suggested readings