



Changes in Freshwater Keep
Salmon on the Run:
Understanding the
Interactions Between Stream
Fishes and Water
Temperatures



Drought and dry conditions impacting salmon across state

Dying Salmon, Wildfires, Heat Waves, Vanishing Ice: In Alaska, Climate Change Is Impossible to Ignore

Bristol Bay Salmon Are in Hot Water

This past summer, high water temperatures contributed to the deaths of more than 100,000 salmon.

by Nick Rahaim
September 11, 2019 | 700 words, about 3 minutes

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Unprecedented heatwave 'kills thousands of fish' in Alaska

'We're seeing not just stressful temperatures for salmon, but lethal temperatures,' experts say

Alaska's Salmon Dying in Warm Rivers

The water is so hot in Alaska it's killing large numbers of salmon



By **Ryan Prior**, CNN

Updated 7:23 AM ET, Sat August 17, 2019

Alaskan salmon deaths blamed on record warm temperatures

Warm waters across Alaska cause salmon die-offs

Thursday, August 22, 2019 6:44pm **NEWS** ALASKA OUTDOORS



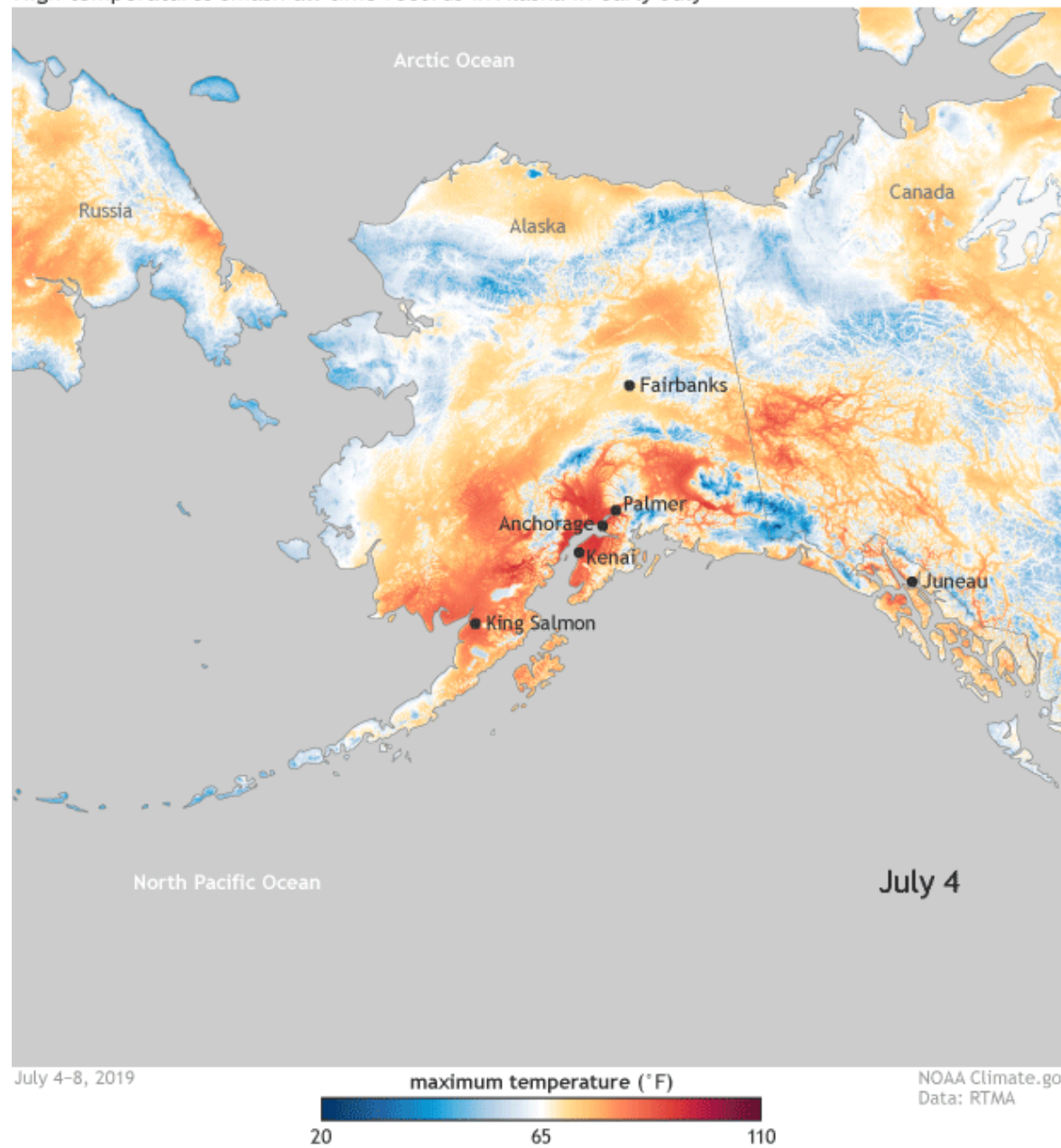
Record Warm Water Blamed for Salmon Deaths

Record-high temperatures in Alaska are believed to be the culprit behind salmon deaths in the western part of the state.



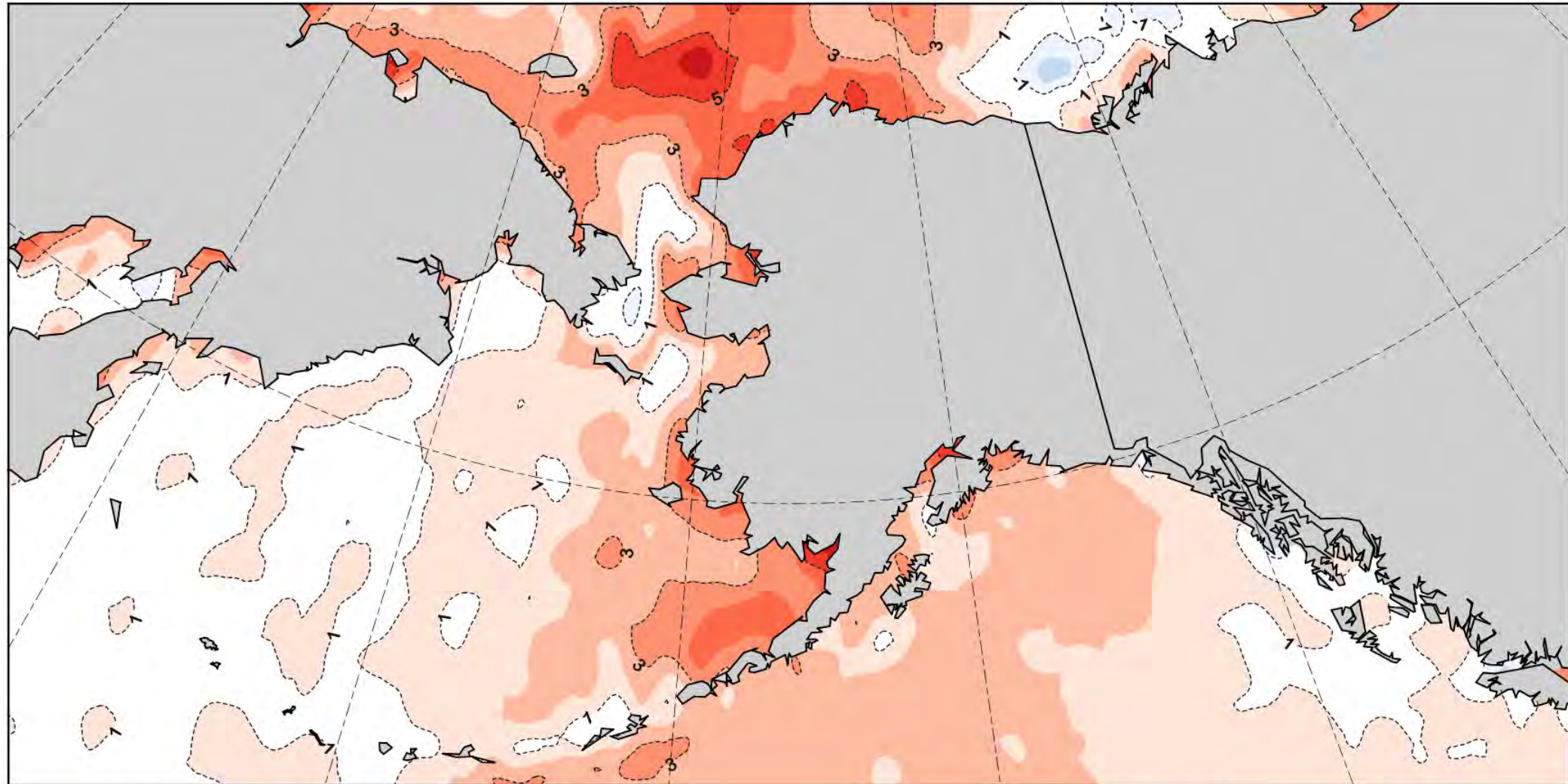


High temperatures smash all-time records in Alaska in early July

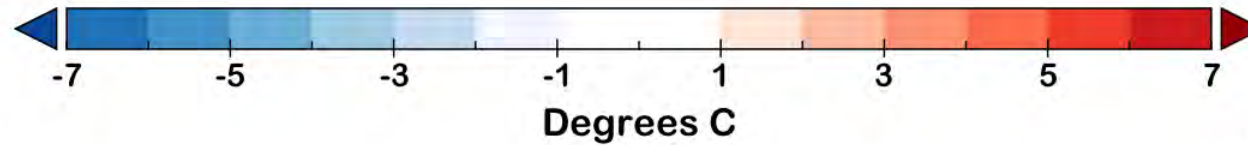


Average Sea Surface Temperature Departure from Normal

August 2019



Graphic by @AlaskaWx



1971-2010 Baseline

OISSTv2 courtesy of NOAA/PSD/ESRL

Species Need

- Life History
- Distribution
- Growth
- Survival
- Freshwater Production
- Ecological Relationship to water temperature

Species Current Condition

Threats

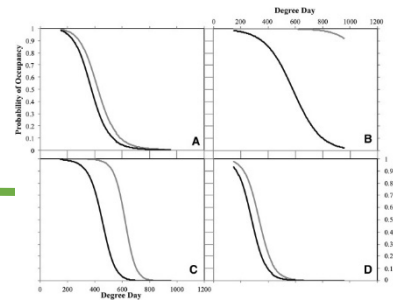
- Increase in water temperature
- Increase streamflow
- Habitat fragmentation
- AIS

Species Viability

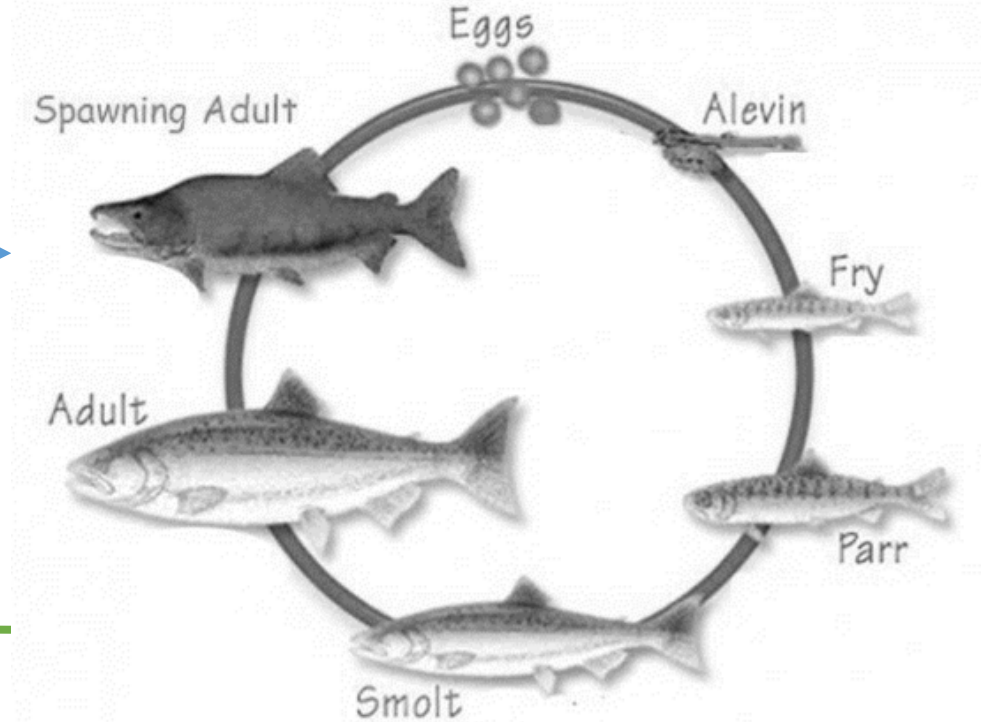
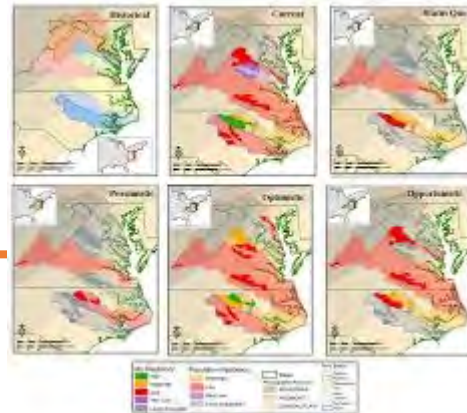
- Future Availability or condition Projections
- Connectivity
- Prioritization

Collect baseline information

Model Species Needs and Apply to Larger Geography – Multi-Scale Occupancy Models



Model Past, Current, Future Scenarios



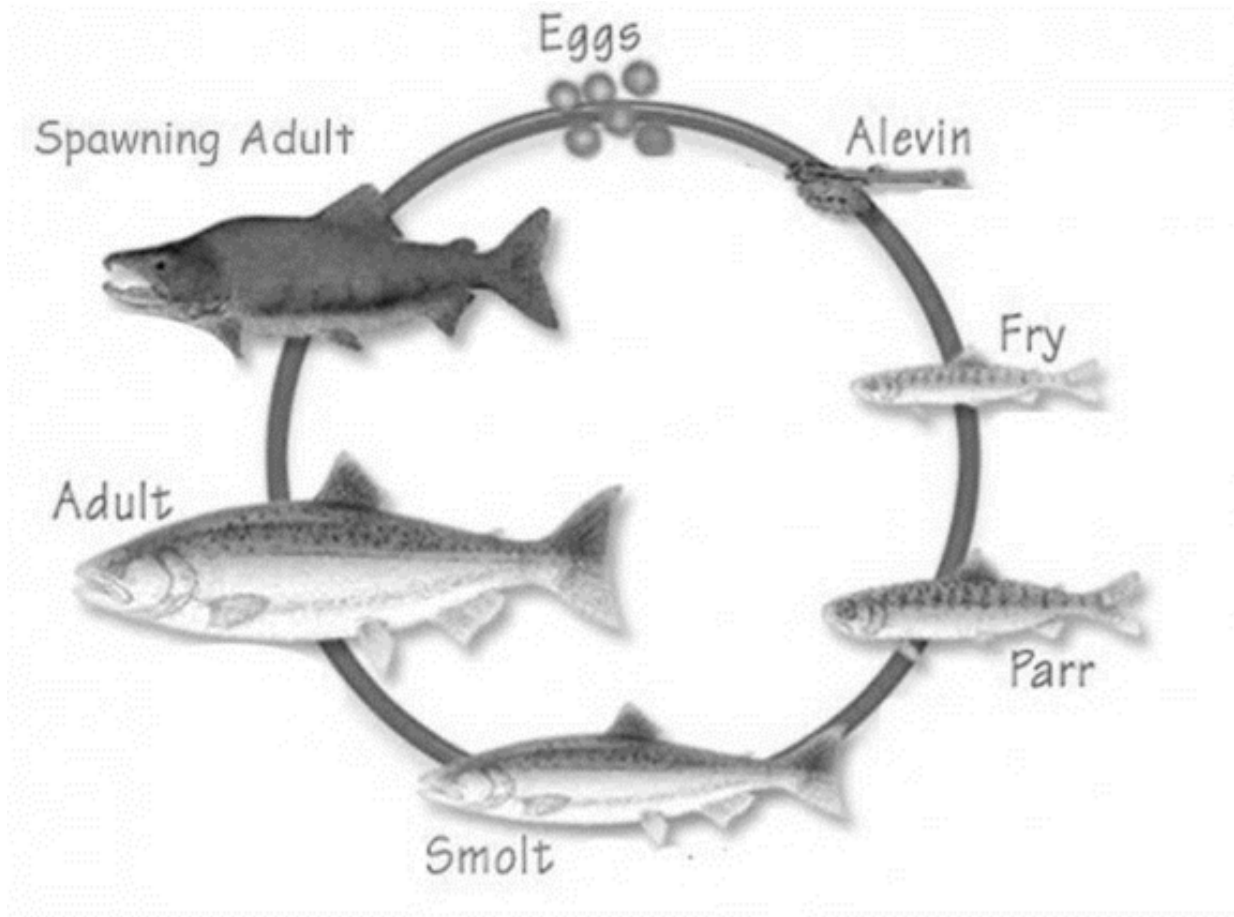
Fisheries Management

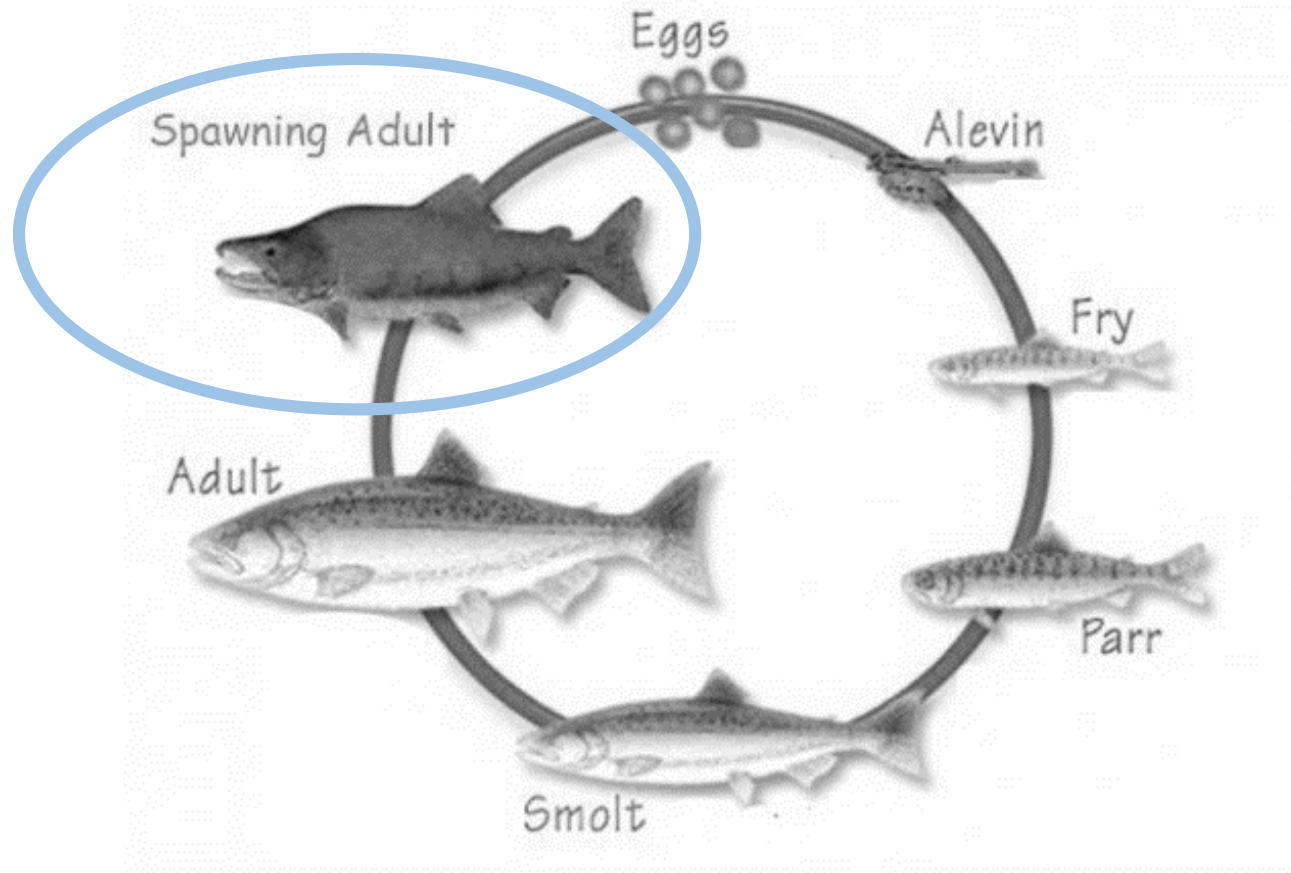
Understand change in subsistence, sportfish harvest

- Forecasts and escapement goals
- Mortality from high/low water or high water temps
- Distribution changes, relative abundance changes

Land Management

- Project Review
- Mitigation/Conservation Measures for future impacts
- Species Status Assessments
- Conservation Easements





Stressor:

Warm water temperature

Physiological Effects:

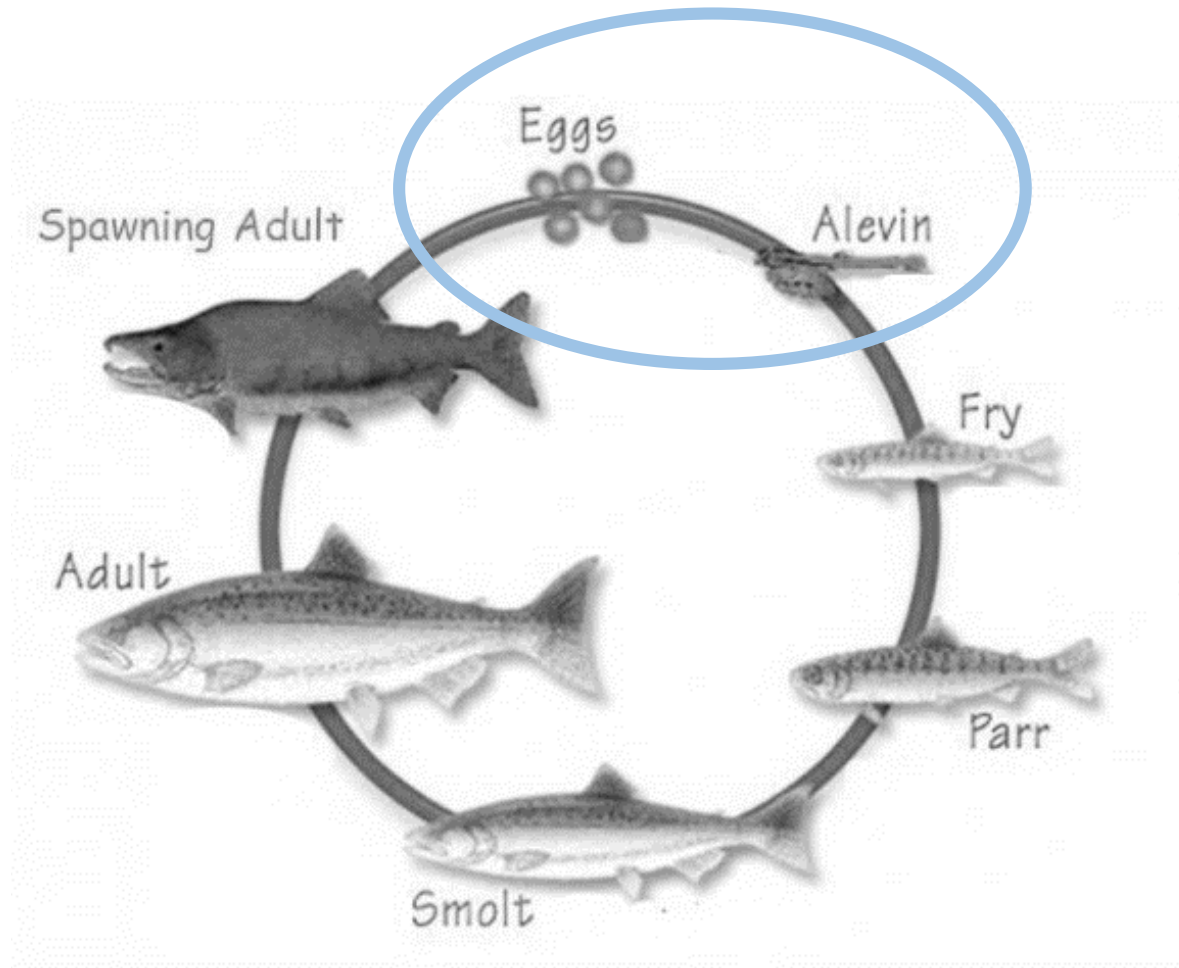
Reduced gamete viability

Disease

Reduced swimming performance

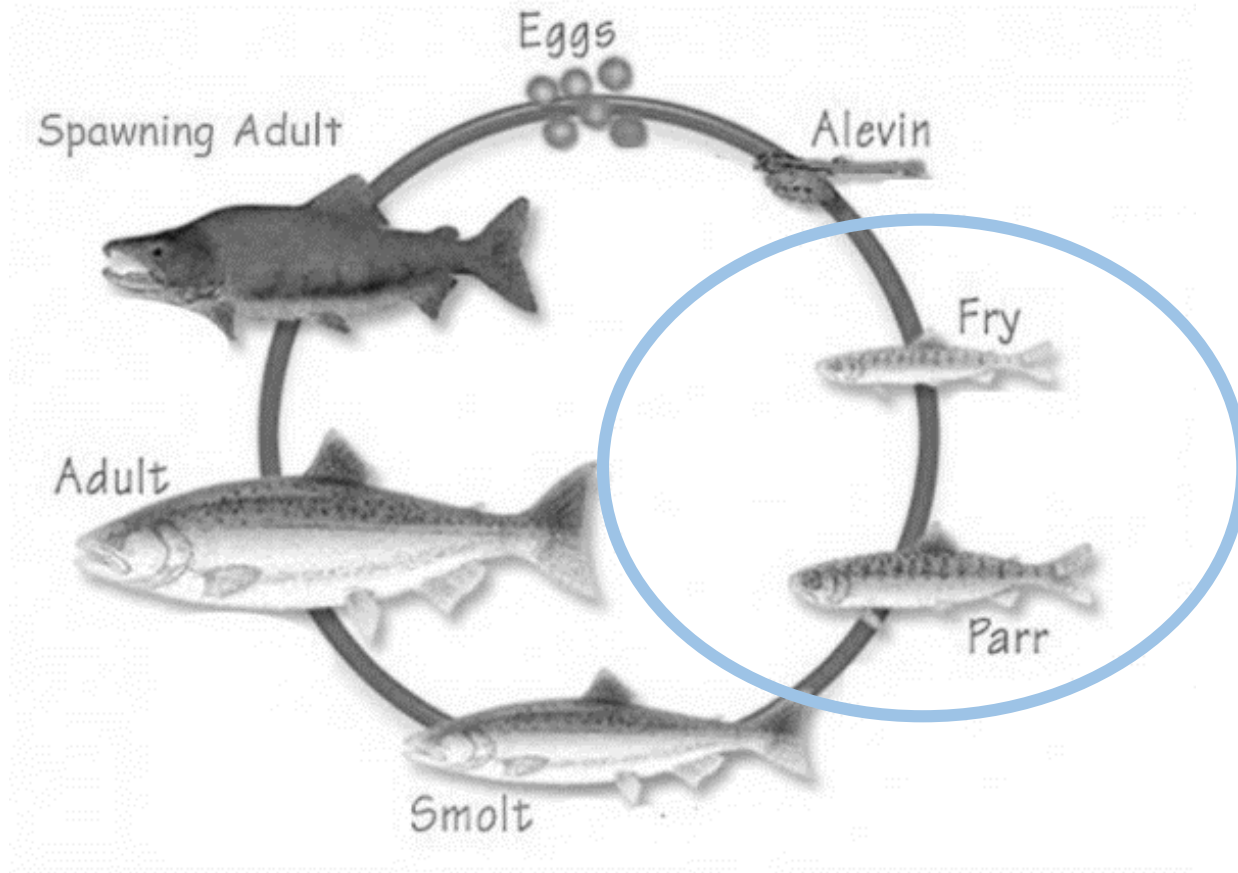
Behavioral Effects:

Migration delays



Stressor:
Warm water temperature

Physiological Effects:
Reduced egg viability
Late emergence



Stressor:

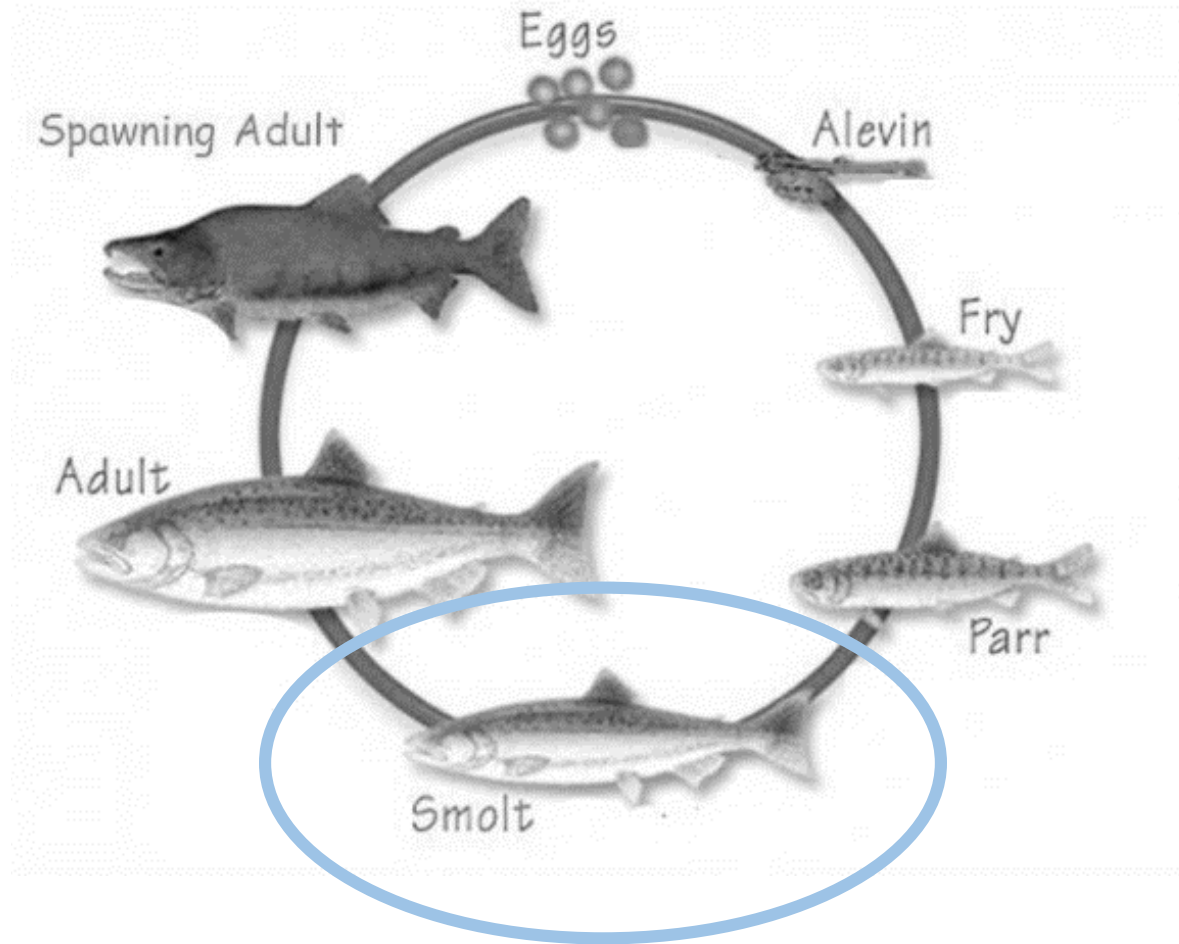
Warm water temperature

Physiological Effects:

Suboptimal feeding
Suboptimal growth

Behavioral Effect:

Redistribution



Stressor:

Warm water temperature

Physiological Effect:

Impairment to smoltification

Behavioral Effect:

Changes to outmigration timing



Summary

Stream temperature and discharge have profound influences on salmon and their habitats. As such, environmental conditions like warm temperatures and changes in flood frequencies have the potential to significantly alter the suitability of freshwater habitat for Alaskan salmon populations.



National Park Service

October 9 · 🌐

She is beauty and she is grace, she stuffed a lot of salmon in her face...

Your 2019 Heavyweight Champ!

#FatBearWeek

