Yukon River Salmon Management

Deena Jallen – Summer Season

Christy Gleason – Fall Season

ADF&G Yukon Area Management Biologists

One Health Meeting March 15

Alaska Department of Fish and Game (ADF&G)

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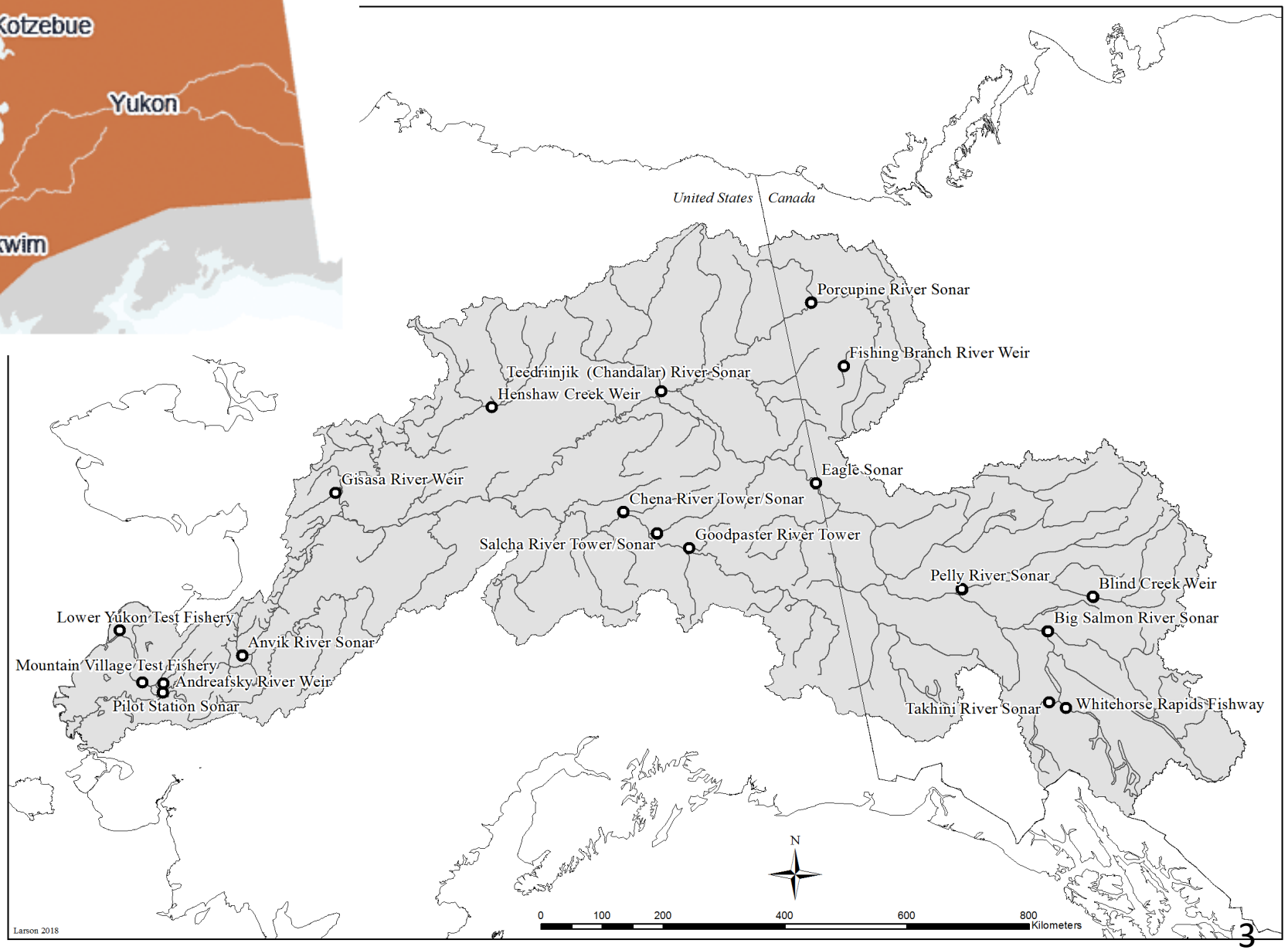
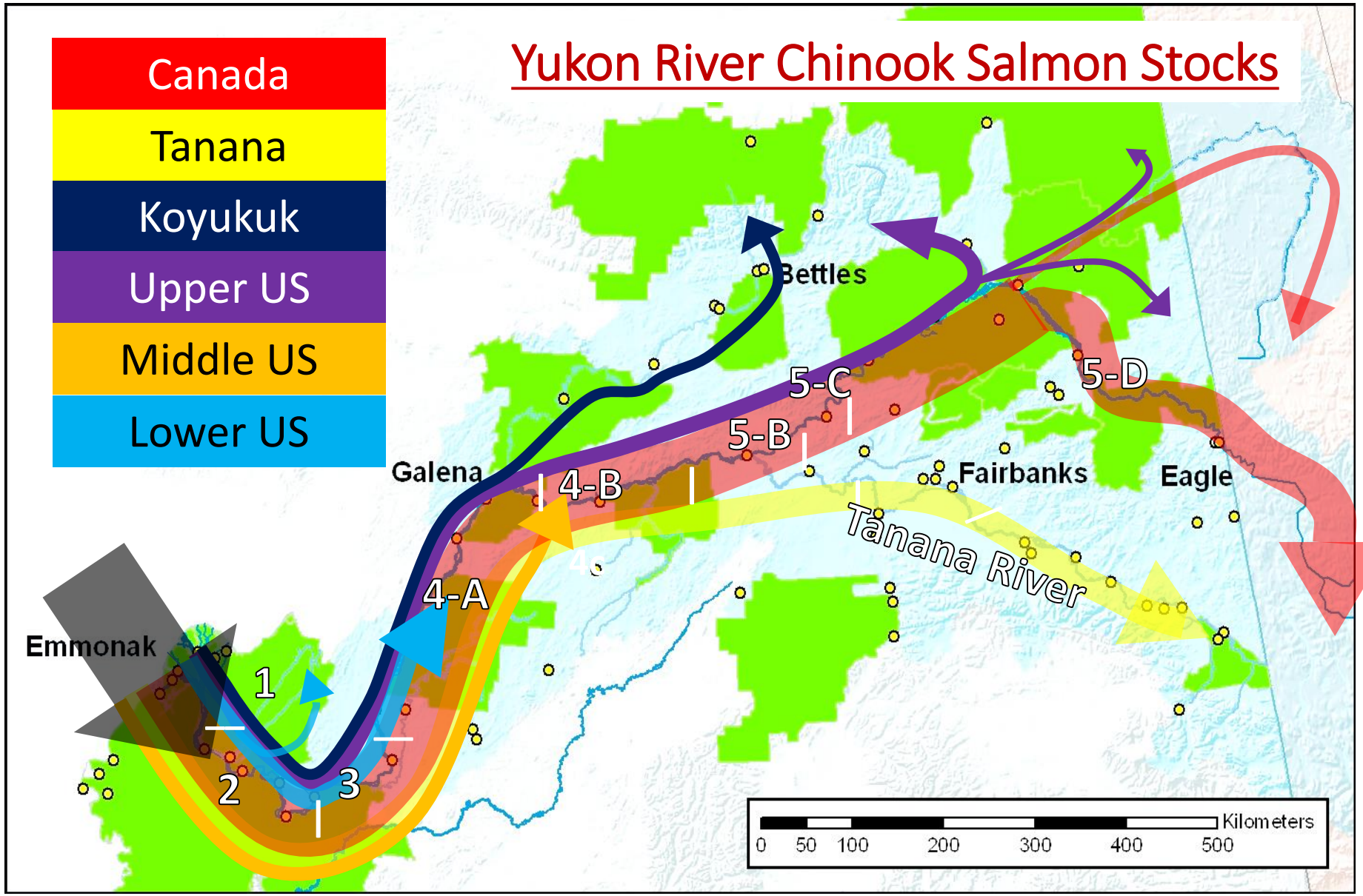
ADF&G - DCF

- The mission of the Division of Commercial Fisheries is to manage subsistence, commercial, and personal use fisheries in the interest of the economy and general well being of the citizens of the state, consistent with the sustained yield principle, and subject to allocations through public regulatory processes.

Yukon River Drainage

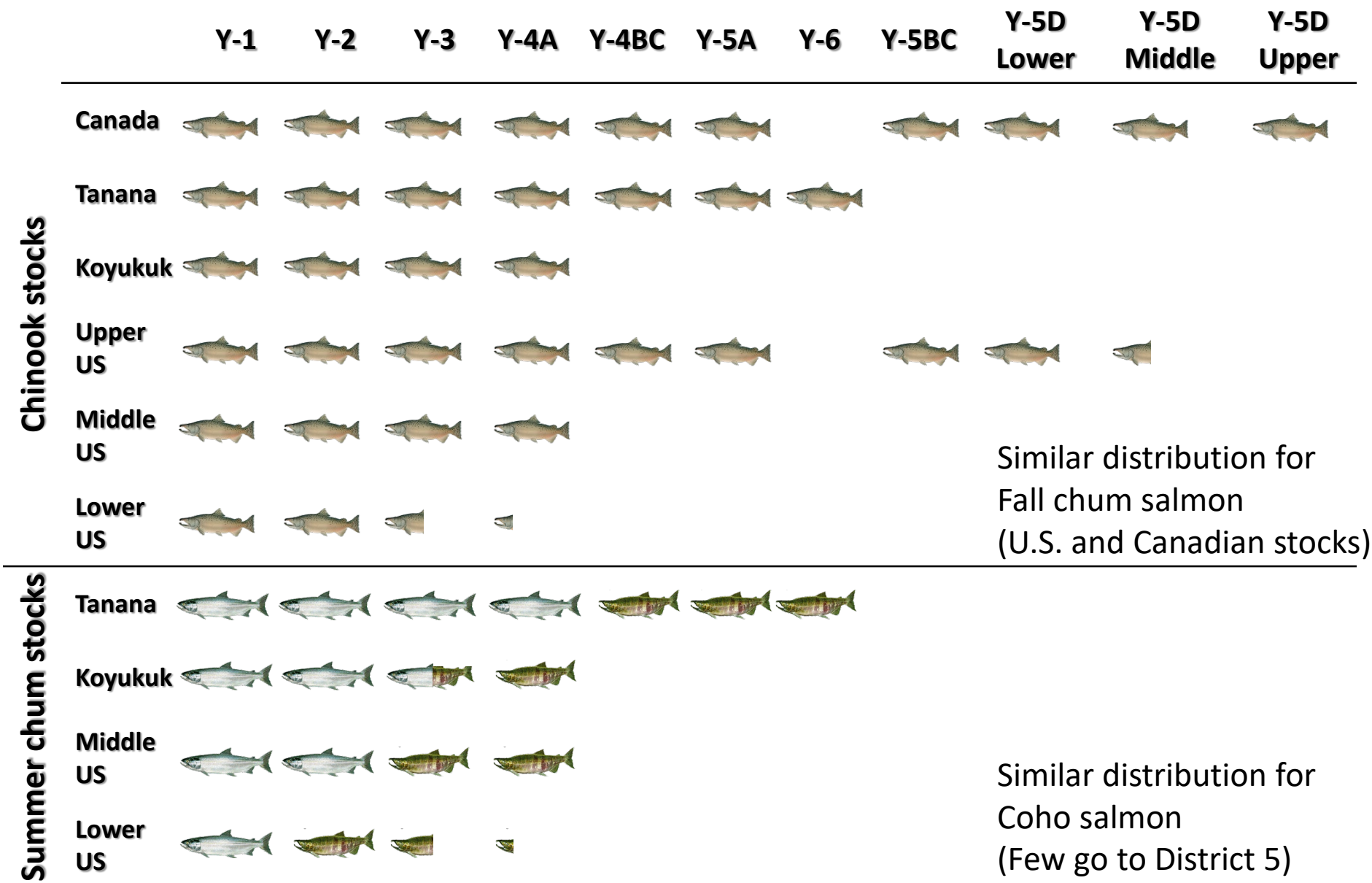


Yukon River Chinook Salmon Stocks

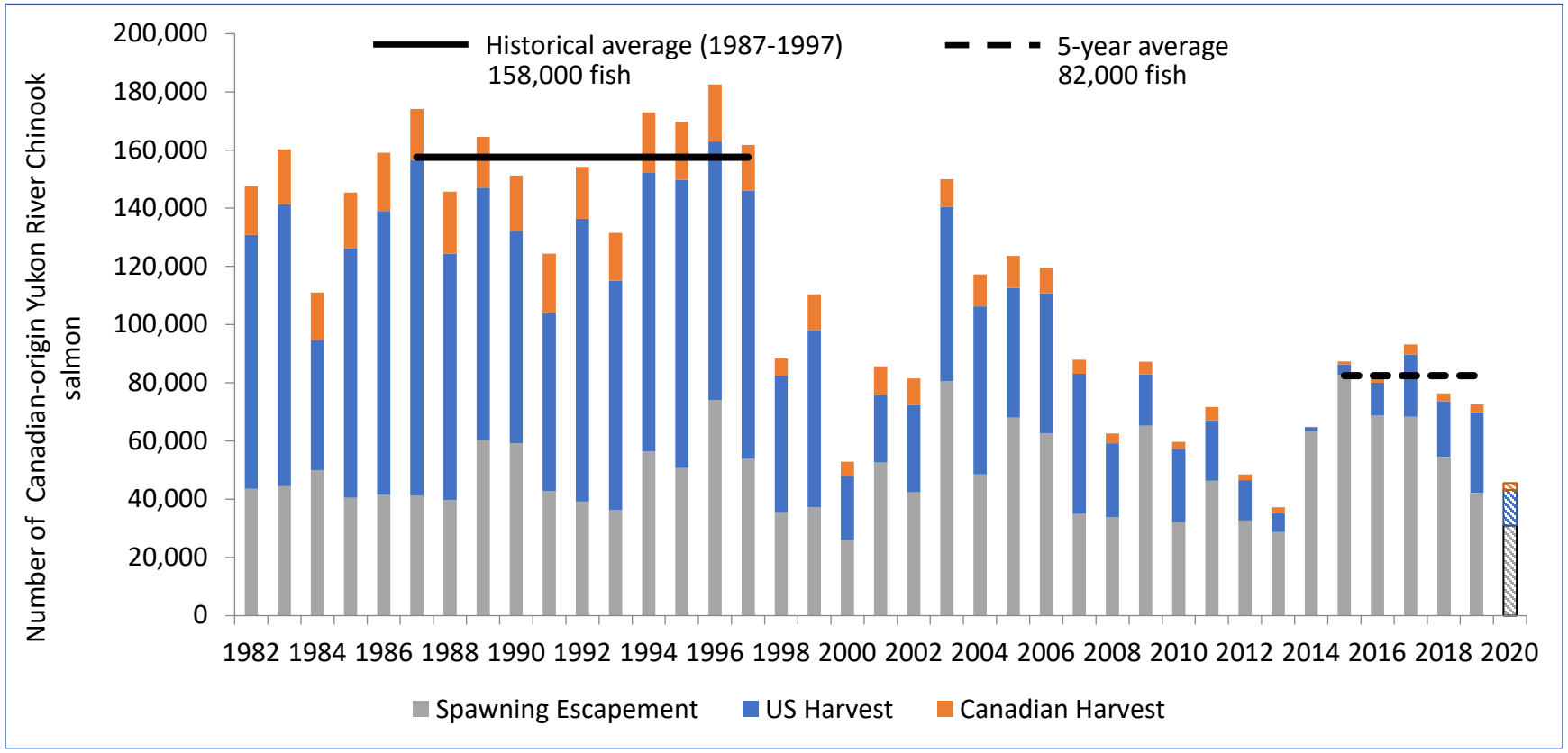


Map courtesy of USFWS

What fish does each district "see"?



Low Chinook salmon run in 2021 (Canadian-origin)

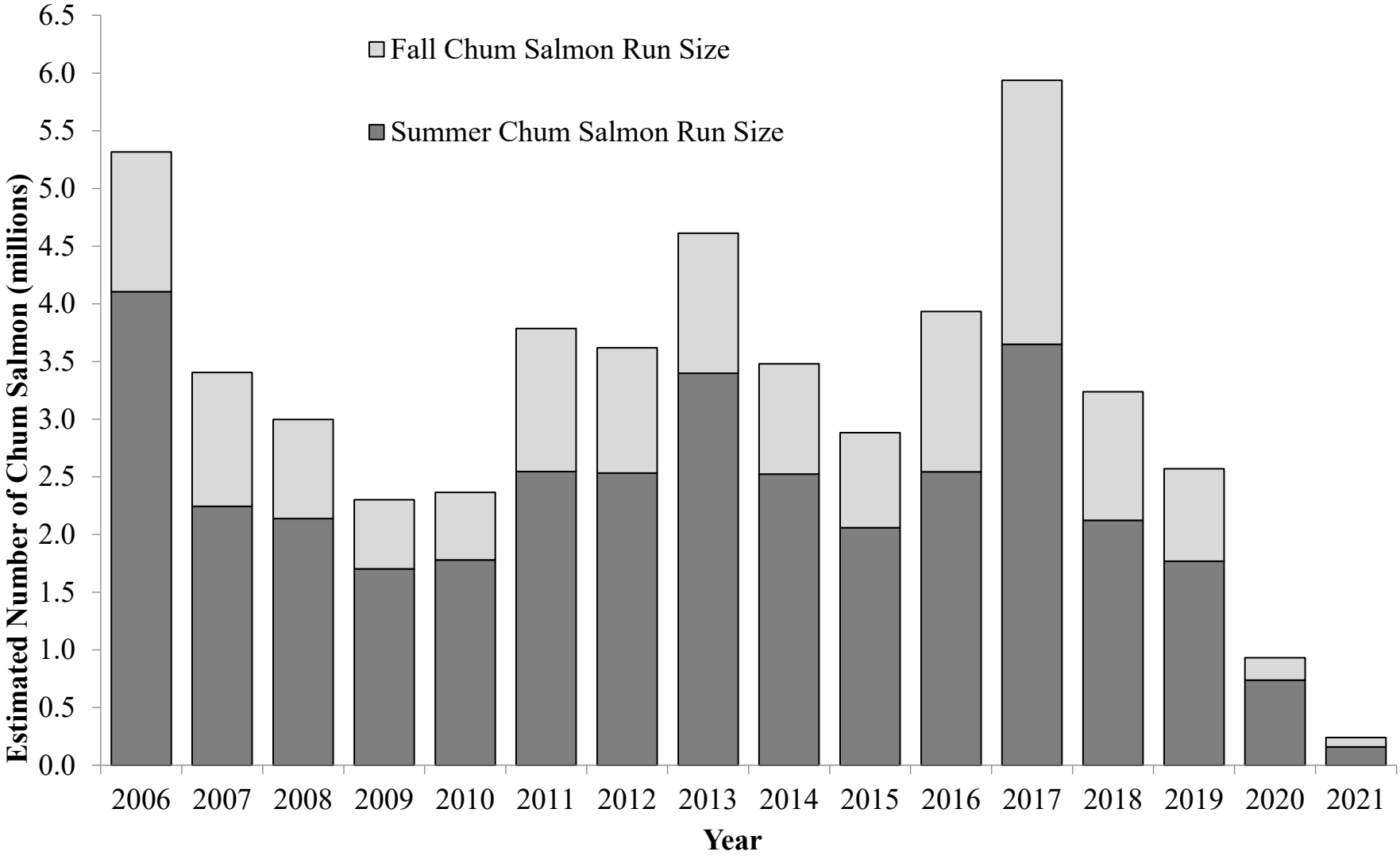


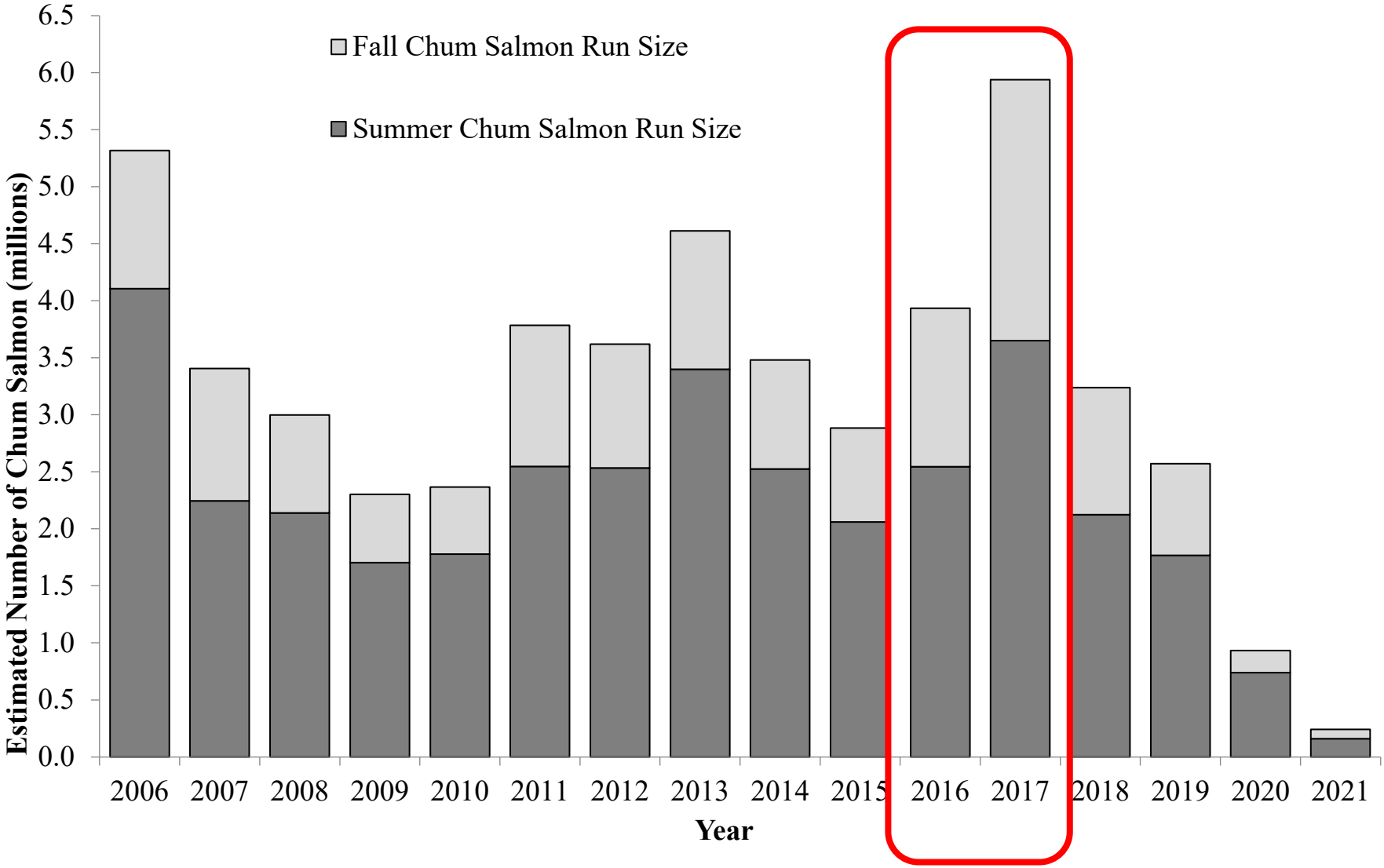
- A large component of the Chinook salmon run is of Canadian-origin
- Estimated escapements have been fairly stable over time
- Shift in productivity compared to the 1980s and 1990s

Low chum salmon runs in 2020 and 2021

- Chum salmon parent years exceeded escapements
- Decline seen across western Alaska

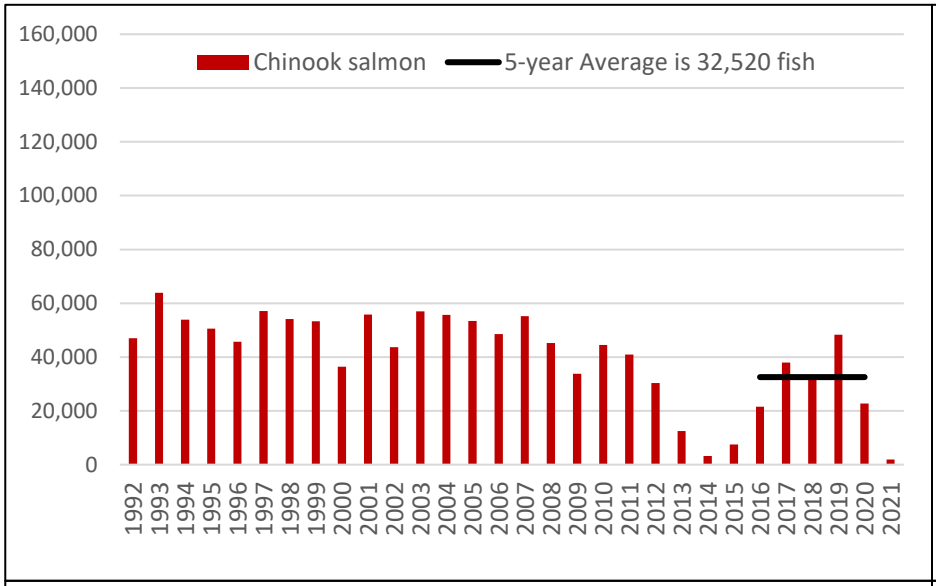
Chum salmon runs in 2020 and 2021

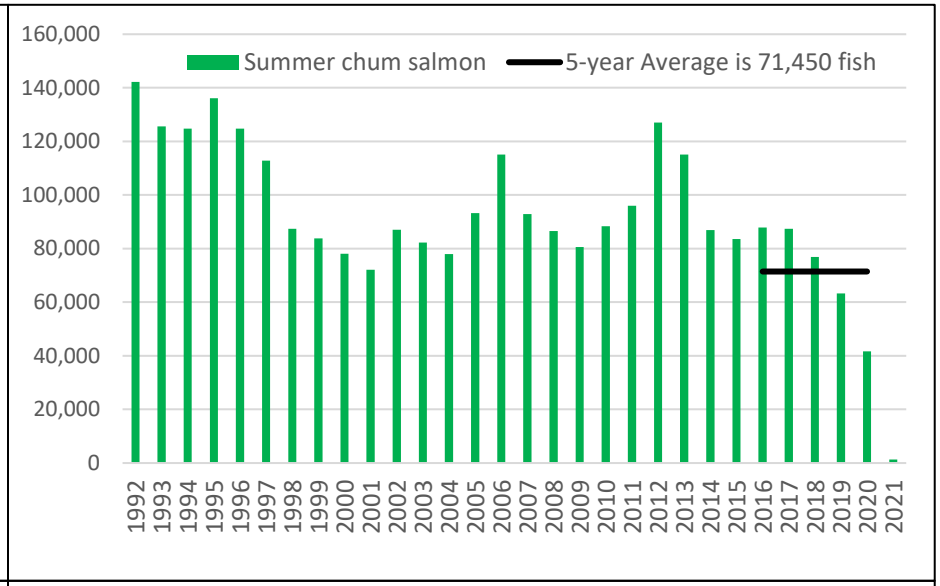


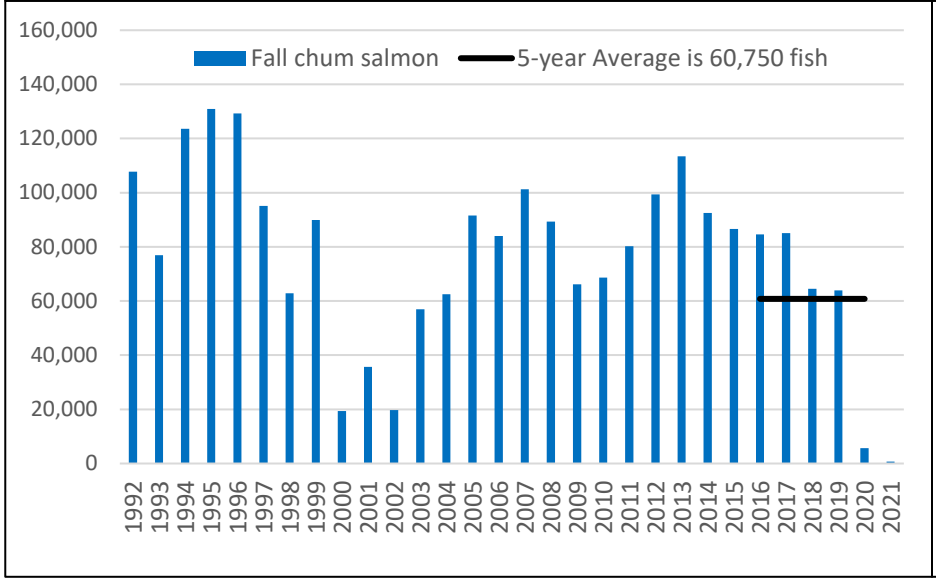


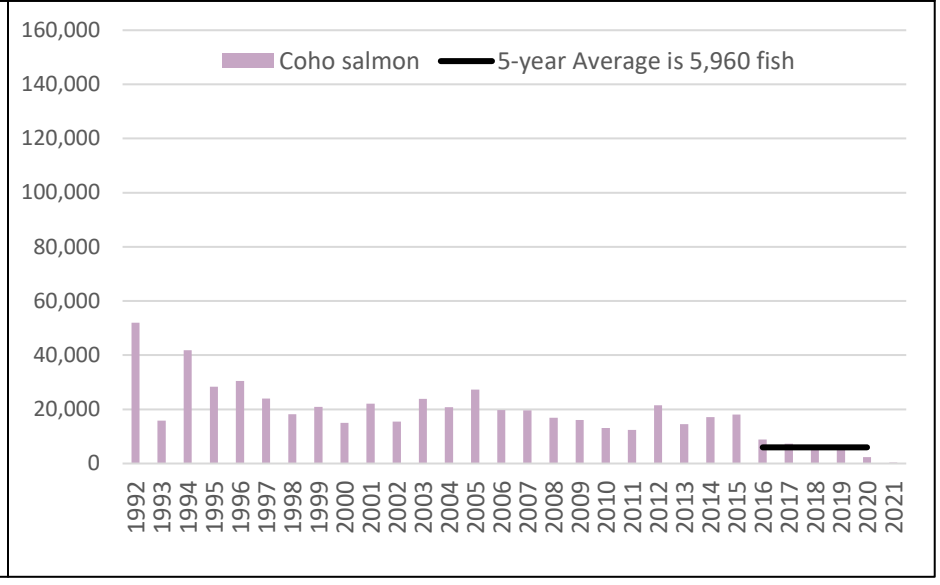
Most chum return as 4- and 5-year-olds. The parents of the 2021 run would have spawned in 2016 and 2017. These years had large runs and met escapement goals.

Subsistence salmon harvests 1992-2021









2021 harvests: 1,950 Chinook, 1,250 summer chum, 700 fall chum, and 300 coho salmon

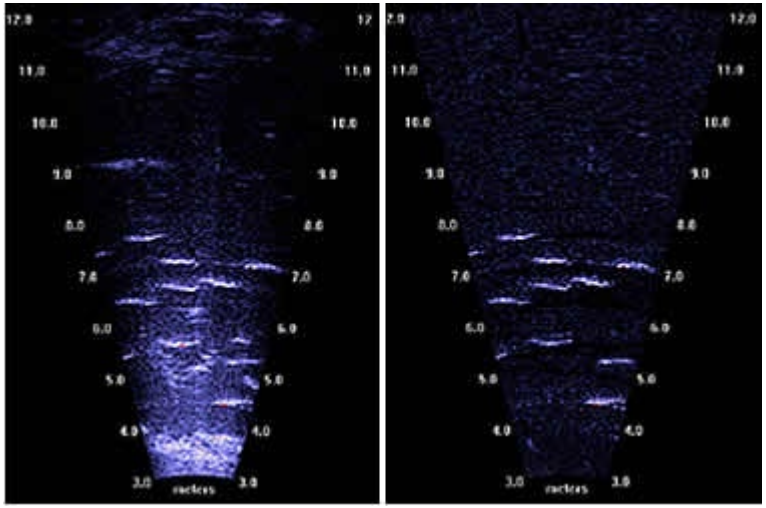
How we manage fisheries

- Management is guided by plans directed by the Board of Fisheries
- Run size outlooks are based on previous years information and trends
- Our current forecast tells us what run size to expect
- Outlooks give fishermen, processors, agencies, etc. an idea of what to expect and how to prepare for the season

The best information about the run and available harvest will happen once fish start entering the river

Inseason Management: Guided by assessment

- Lower Yukon Test Fishery: fish timing and relative abundance
- Fishermen reports: fish timing/presence
- Pilot Station sonar: fish abundance
- Genetic sampling at Pilot: composition of run
- Weirs and towers: escapement into spawning tributaries
- Eagle Sonar: escapement into Canada



Preliminary 2022 outlooks

- Chinook salmon
  - Similar to 2021 or lower
- Summer chum salmon
  - Larger than 2021, but below the drainagewide escapement goal and with considerable uncertainty
- Fall chum salmon
  - Similar to 2021, but with considerable uncertainty
  - One of the best predictors for the fall chum salmon run will be the summer chum salmon run
- Coho salmon
  - Similar or lower than 2021
- Based on the outlooks, management will be similar to 2021, with salmon fishing closures possibly necessary for the whole season

Yukon River Salmon Declines and Research

Photo by Christy Gleason

Chum Salmon Decline in Western Alaska 2020 and 2021

- Starting in 2020, chum salmon showed drastic decline in Arctic–Yukon–Kuskokwim (AYK) Management Areas
- Low chum salmon runs across the North Pacific Ocean - Canada, western U.S. states, Japan, and Russia
- Yukon River experienced worst declines

Yukon River Salmon- Different Life Histories

Chum

Ocean 2-5 years

Coho

Freshwater 2 years

Ocean 1 year

Chinook

Freshwater 1 year

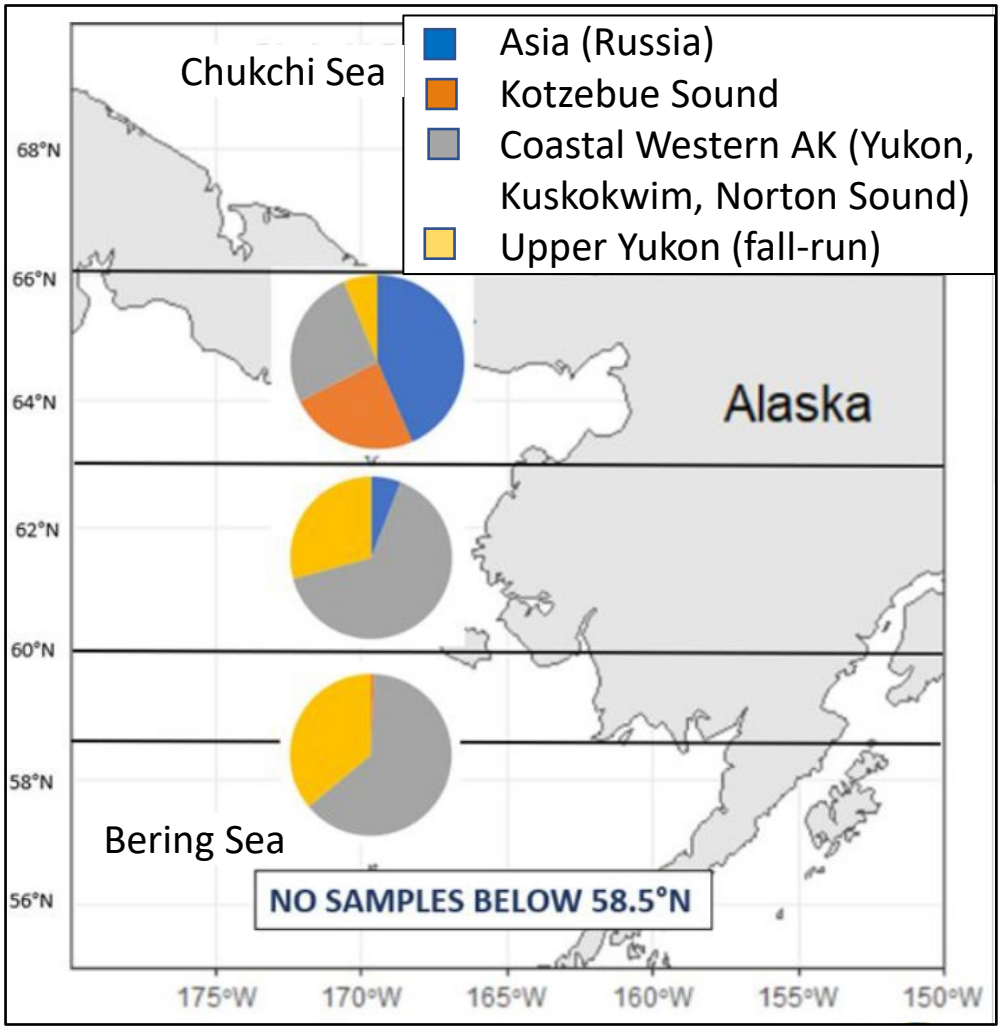
Ocean 2-6 years

Northern Bering Sea Trawl and Ecosystem Surveys

- Study juvenile salmon's first year in ocean
- Research distribution and abundance, marine habitat, origin (genetics), age & growth, diet, nutrition and more
- For research updates visit: https://www.facebook.com/ADFGUnderseaWorldOfSalmonAndSharks

For more information, contact Jim Murphy (NOAA) jim.murphy@noaa.gov; Sabrina Garcia (ADF&G) sabrina.garcia@alaska.gov; Katie Howard (ADF&G) kathrine.howard@alaska.gov

Juvenile Chum Salmon Composition



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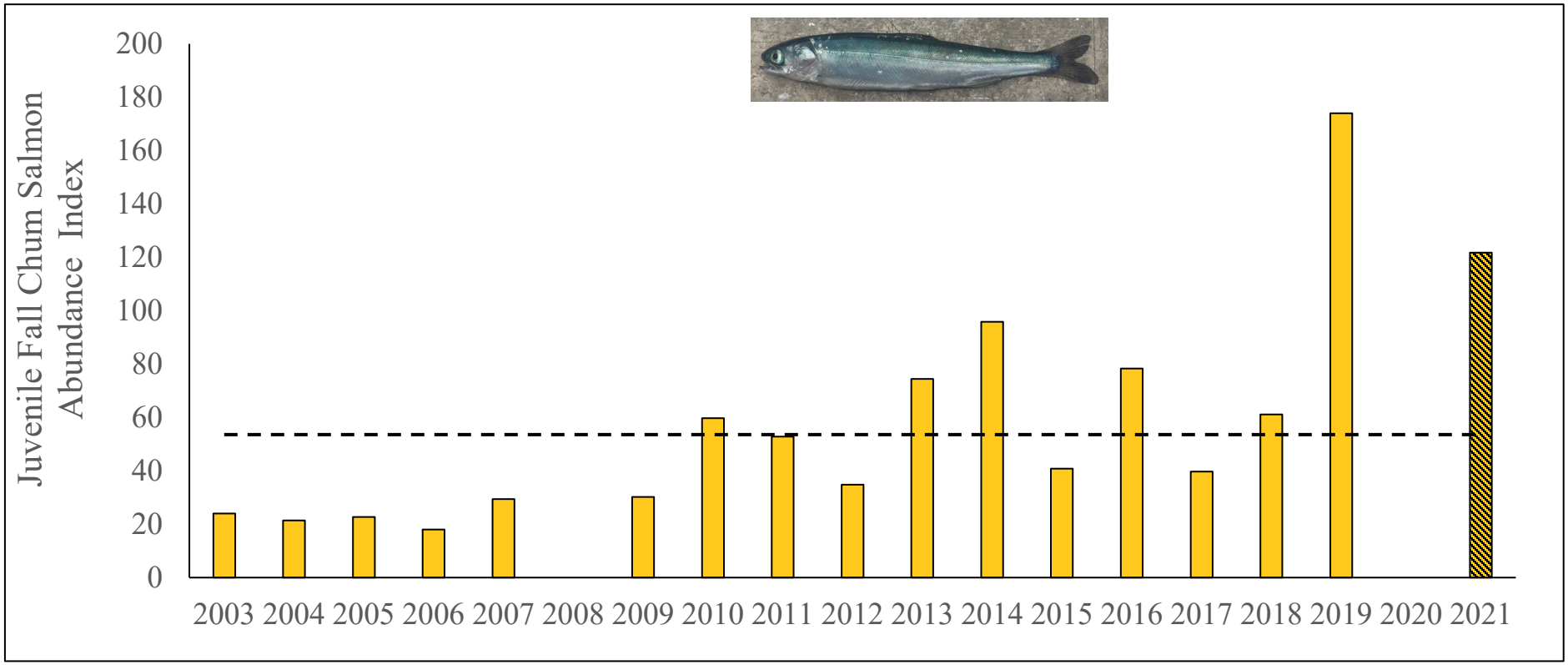
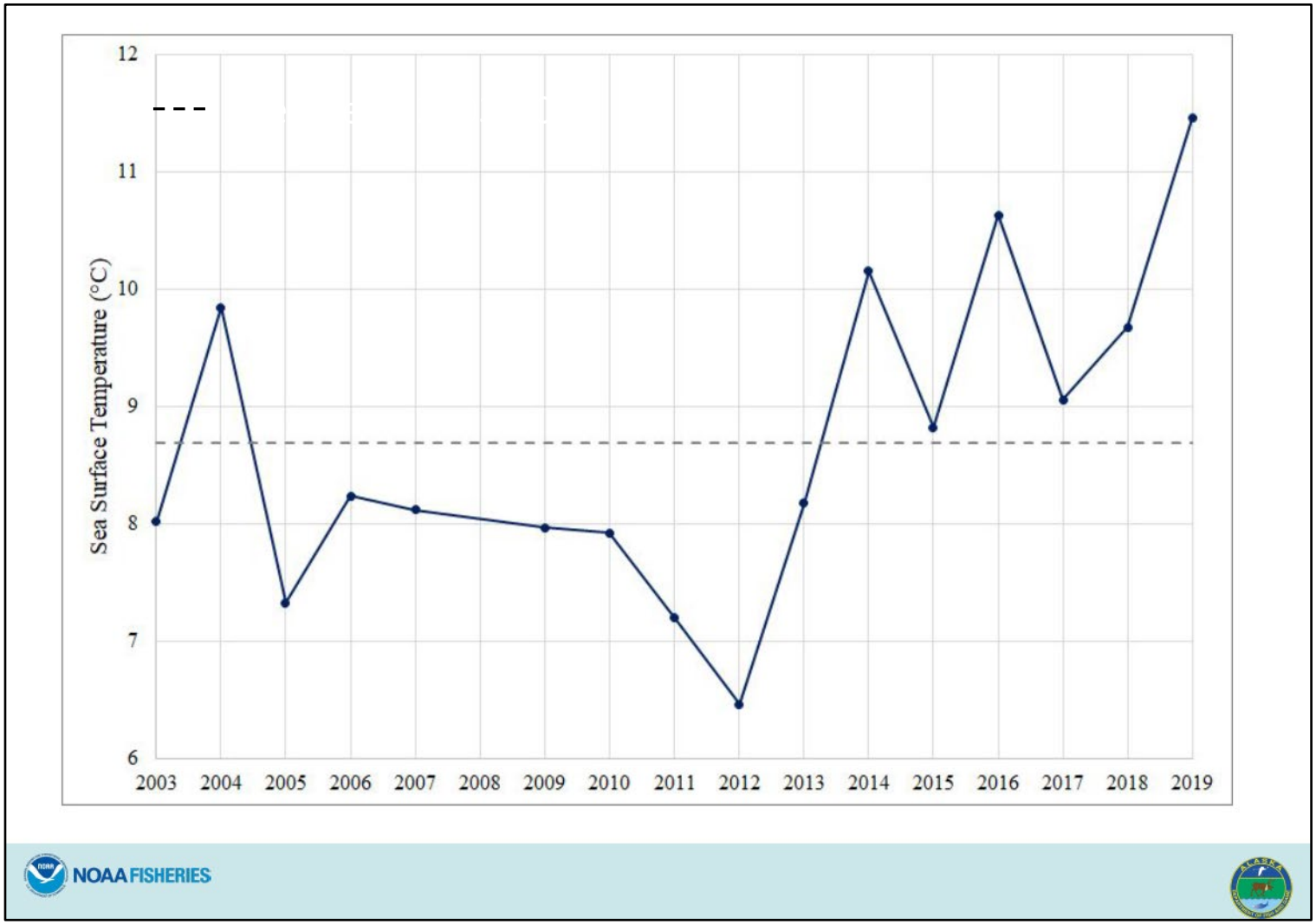
Juvenile Yukon Fall Chum Salmon Abundance Index



- Estimate yearly abundance of juvenile chum salmon
- Yukon fall chum salmon juvenile abundance high in 2019 and 2021
- Juvenile abundance to predict adult returns model in development

For more information, contact Sabrina Garcia (ADF&G) sabrina.garcia@alaska.gov; Jim Murphy (NOAA) jim.murphy@noaa.gov; or Katie Howard (ADF&G) Kathrine.howard@alaska.gov

Surface Water Temperature Trends Northern Bering Sea



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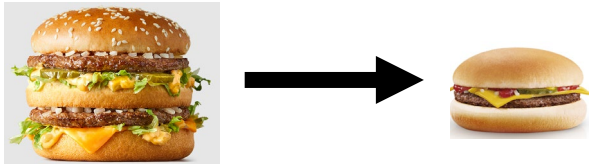
Juvenile Chum Salmon: What is Contributing to the Decline?

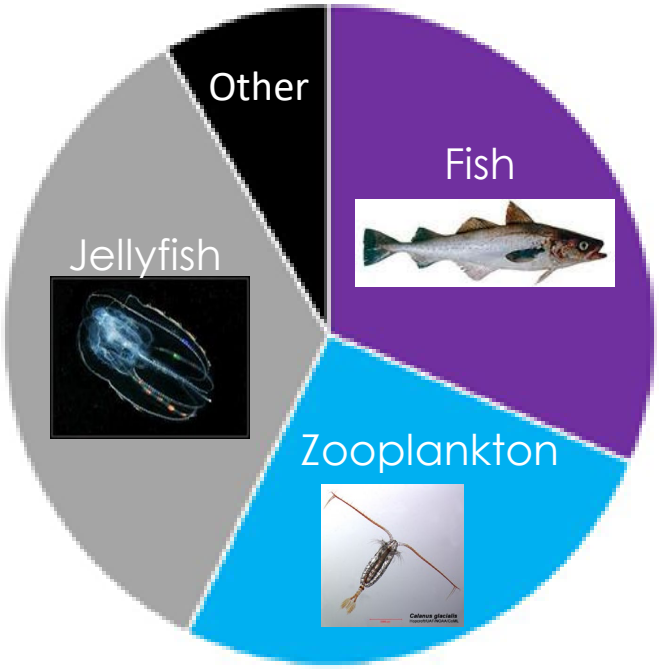
Observations since 2016:

- Later marine mortality in Yukon fall chum salmon
- Shift in the zooplankton food available to chum (large and fatty to little and skinny).



- Chum salmon had more **jellyfish** in their stomachs in 2016
- Some evidence chum salmon had lower fitness
- Change likely due to warming in the Bering Sea and loss of sea ice

Juvenile Chum Salmon Diets 2004-2019



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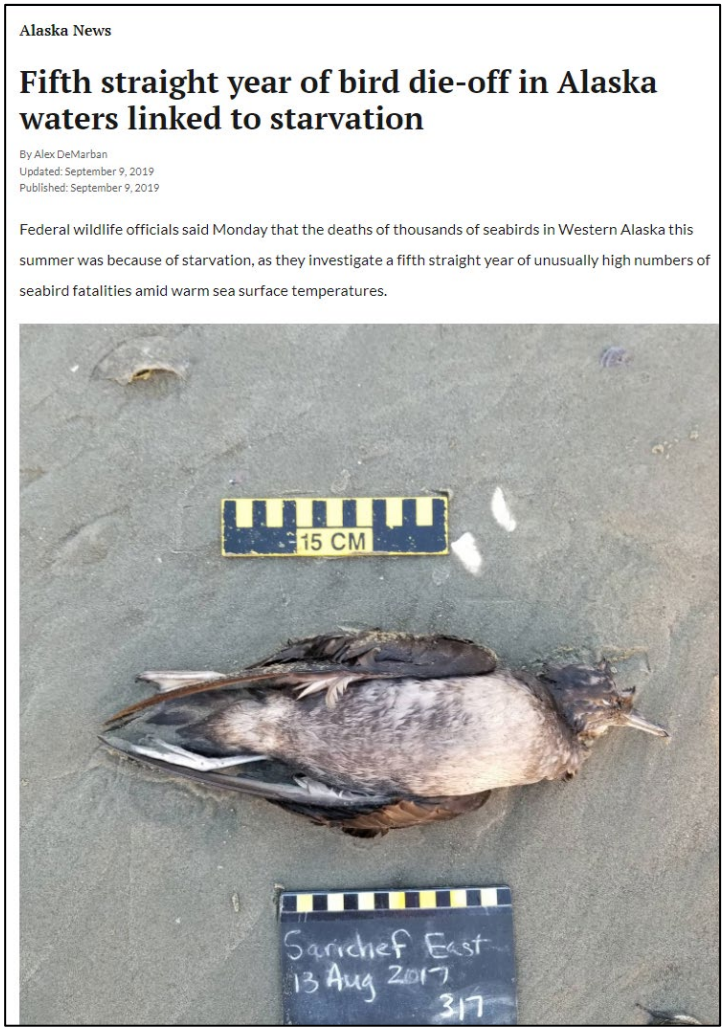
Other Declines In Bering Sea Ecosystem

- This Bering Sea food shift, along with marine heatwaves in the North Pacific Ocean, may have played a role in why there was a sudden drop in productivity
- Seabird die offs, unusual mortality events in ice seals, and rapid declines of crab stocks also point to big ecosystem disturbances in the Bering Sea
- New research has been initiated to understand AYK chum abundance declines



Alaska News

Fifth straight year of bird die-off in Alaska waters linked to starvation

By Alex DeMarban
Updated: September 9, 2019
Published: September 9, 2019

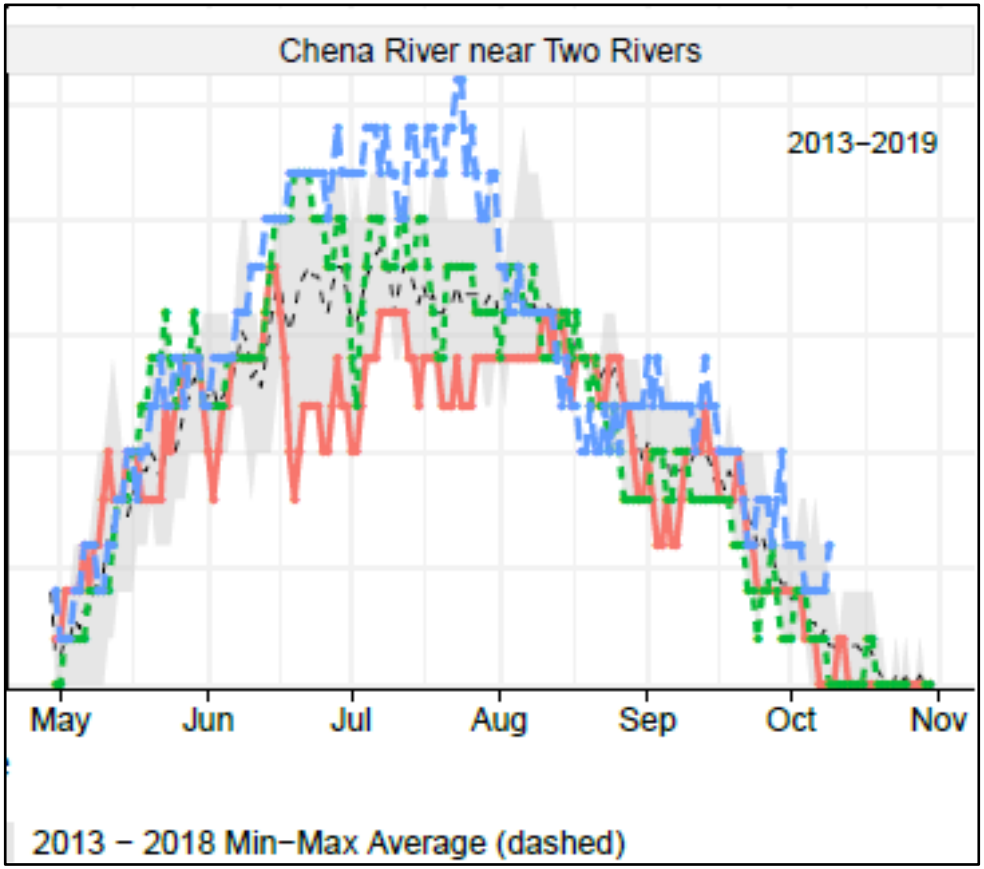
Federal wildlife officials said Monday that the deaths of thousands of seabirds in Western Alaska this summer was because of starvation, as they investigate a fifth straight year of unusually high numbers of seabird fatalities amid warm sea surface temperatures.

For more information, contact Sabrina Garcia (ADF&G) sabrina.garcia@alaska.gov; Jim Murphy (NOAA) jim.murphy@noaa.gov; or Katie Howard (ADF&G) Kathrine.howard@alaska.gov

Yukon River Environmental Monitoring and Events

Salmon Migration and Spawning

Monitor Daily Water Level and Temperature During Salmon Migrations



- Monitor environmental conditions- migration and spawning
- Assessment projects (test fisheries, weirs, sonar study sites) and spawning areas
- Share with public, receive daily email. Sign up here: http://list.state.ak.us/mailman/listinfo/yukonriverdailyupdate

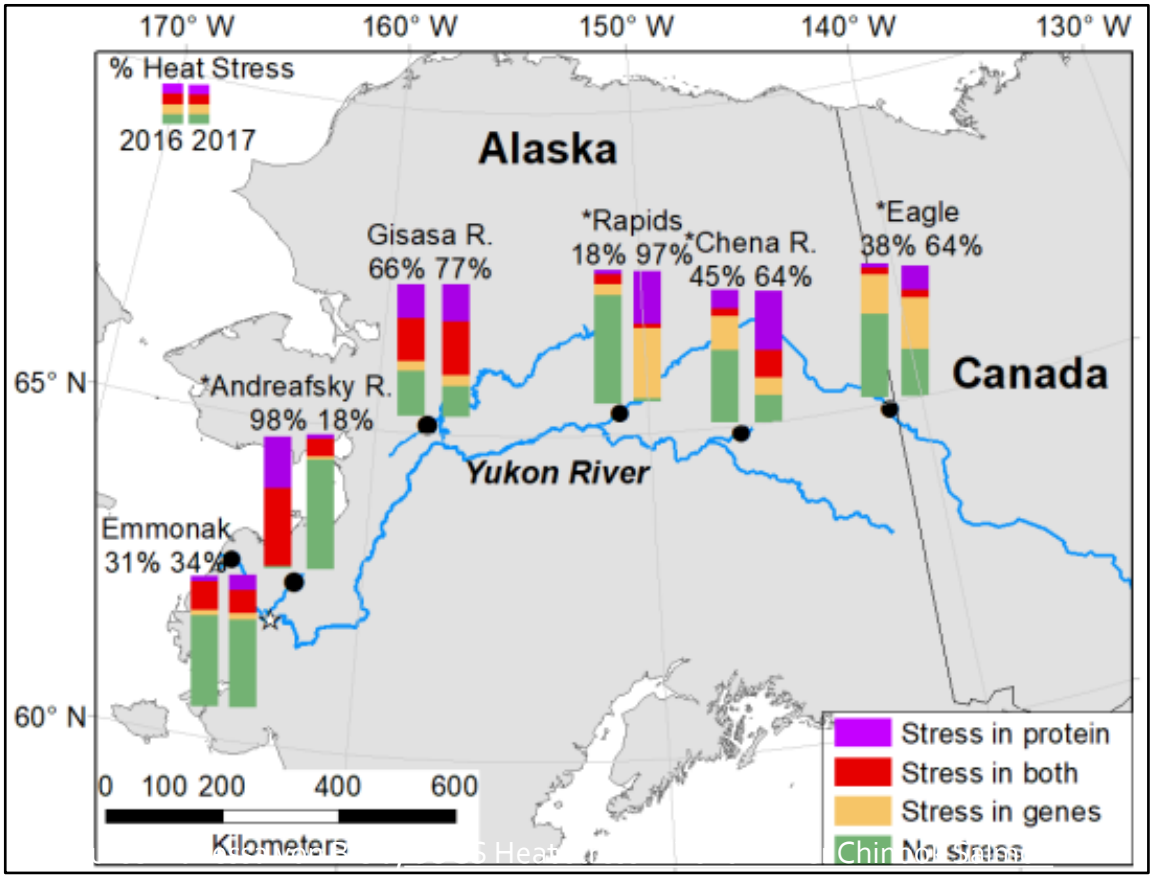
Abnormal Warm Water Temperatures Summer Chum Salmon Dieoff June and July 2019

- Local fishermen's reports – Koyukuk River
- Summer chum and Chinook salmon migration
- Slower swimming speeds
- Heat stress
- Enroute mortality prior to spawning
- Low escapements on spawning grounds

Photos by ADF&G staff

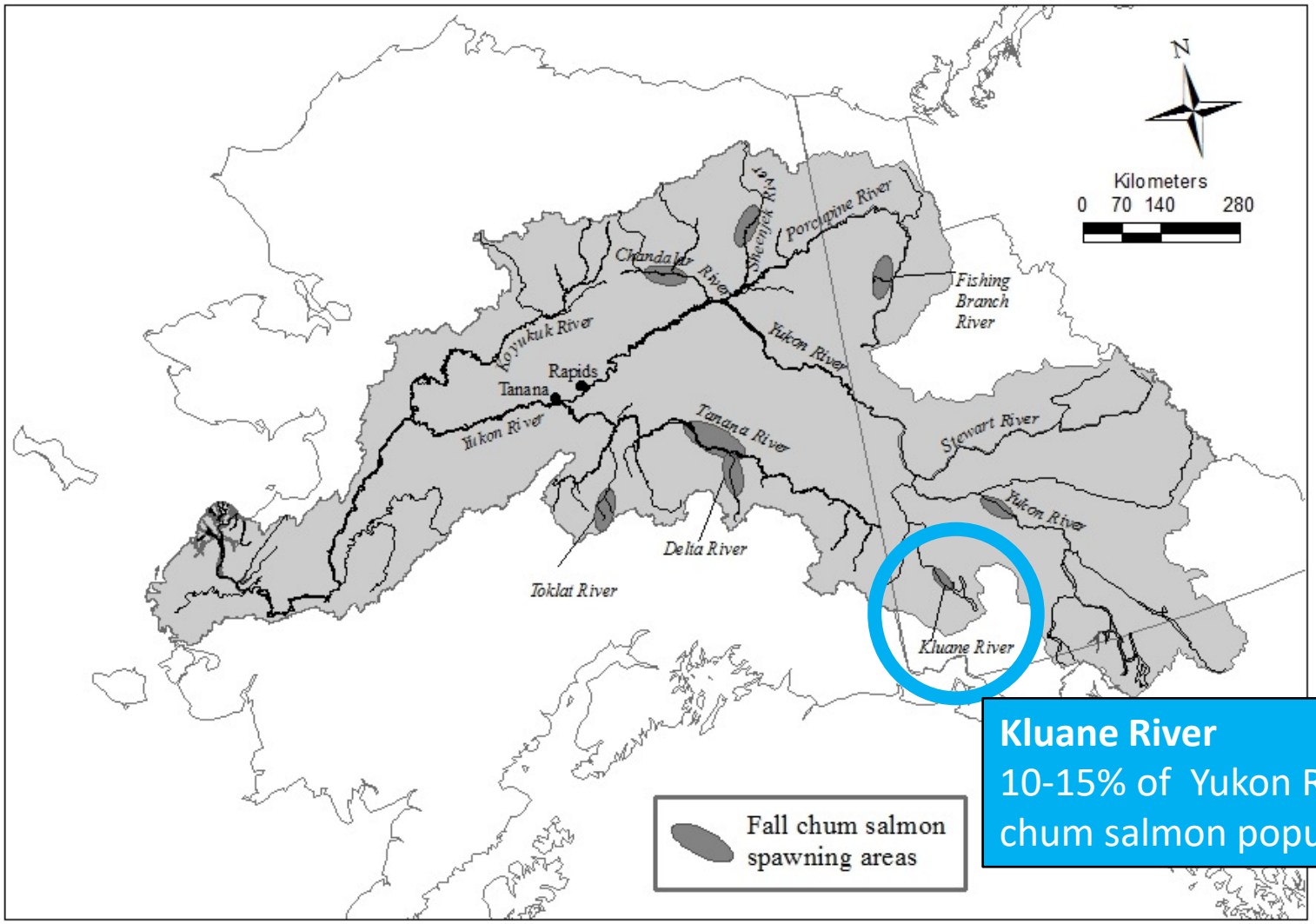
Heat Stress in Migrating Chinook Salmon June and July, 2016 and 2017

- Warm river water temperatures reached ~ 65-70 degrees F during Chinook salmon migration to spawning areas
- 54% of the sampled Chinook salmon (477 fish) had signs of heat stress



For more information, contact Dr. Vanessa von Biela, vvonbiela@usgs.gov. For full article, see Evidence of Prevalent Heat Stress in Yukon River Chinook Salmon at https://cdnsciencepub.com/doi/10.1139/

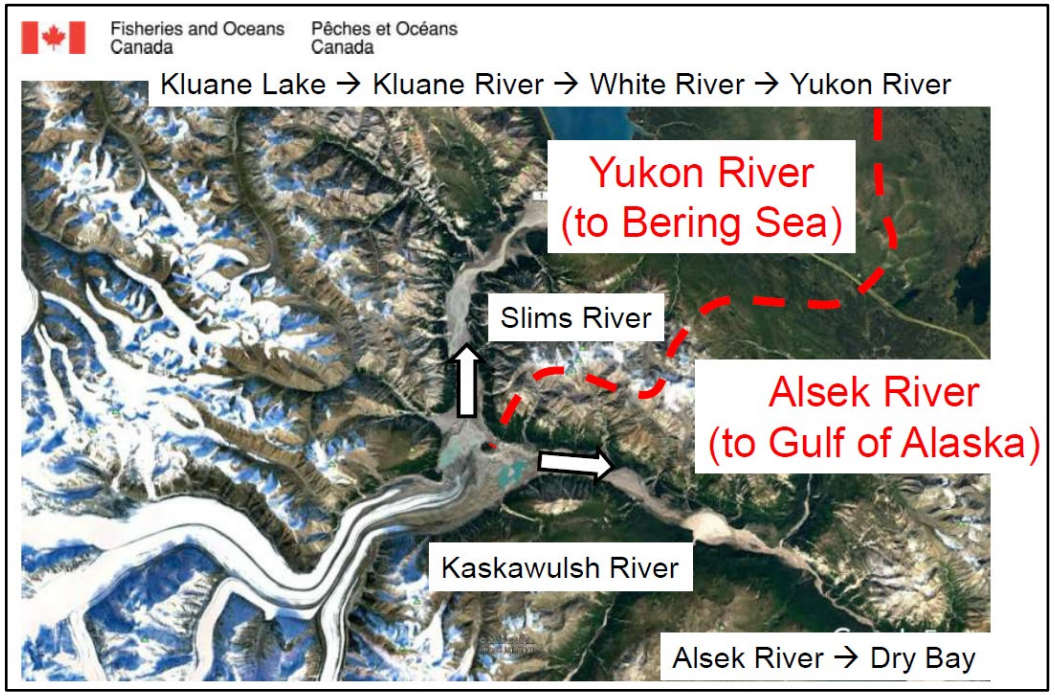
Fall Chum Salmon Spawning Areas



Kluane River
10-15% of Yukon River fall chum salmon population

Glacial Retreat Diverts River, 2016

- Potentially significant impacts to spawning habitat
- Lower water levels and dewatering some spawning areas in Kluane Lake and Kluane River
- **2020 and 2021** are first year of observed fall chum salmon offspring after this hydrological event
- Impacts to fall chum salmon productivity?

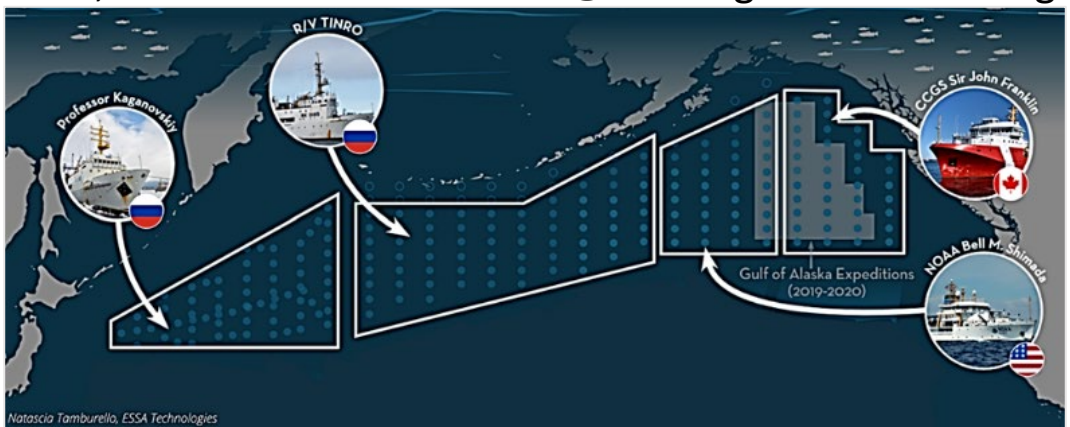


Sources: Department of Fisheries and Oceans (DFO). 2018. Impacts to Kluane Fall Chum Salmon Stock from a Major Hydrological Change, CRE-145-17N Final Report. Fisheries and Oceans Canada. Yukon / Transboundary Rivers Area.CRE-145-17-Impacts-to-Kluane-Fall-Chum.pdf, Impacts to the Kluane Fall Chum Salmon Stock from a Major, Natural Hydrological Change | Yukon River Panel

What Are We Doing to Understand the Marine Life of Salmon?

- ADF&G Salmon Ocean Ecology Program and NOAA:
  - Study juvenile salmon in Northern Bering Sea (~20 years)
  - Developing a fall chum salmon juvenile model to predict adult returns to the Yukon River
- Study how North Pacific salmon abundance and age/size are impacted by:
  - Climate change
  - Competition at sea
  - The role of predators at sea
- Future research: Study marine life history of fall chum salmon such as year specific growth, stress, and reproductive patterns (pursuing funding in 2022)

For more information, contact kathrine.howard@alaska.gov and sabrina.garcia@alaska.gov



2022 New In-River Research

Coho Salmon

- Radio telemetry project to understand distribution within the Yukon River drainage

Fall Chum Salmon

- Restart Sheenjek River sonar project to monitor spawning population

Chinook Salmon

- Expand genetics baseline
- Study Ichthyophonus disease (3-year project)
- Salmon shark (predator) tagging
- Salmon hormone biochronology investigation
- Study heat stress and thiamine levels


Photo: ADF&G


Photo: Alaska Fish Radio

Upcoming meetings

- **Yukon River Panel Meeting (U.S./Canada)**
  - April 5 & 6
  - www.yukonrivepanel.com
- **Yukon Salmon Preseason Meeting**
  - March 24
  - Embassy Suites, Anchorage
- **Yukon Salmon Inseason Teleconferences**
  - June to August every Tuesday 1pm
  - 1(800) 315-6338, and enter code: 98566#
- **Local Advisory Committee and Regional Advisory Council Meetings**
  - Talk to your local representatives for meeting information

Questions or Comments?

For more information, contact Research Staff

Alaska Marine Salmon Fisheries Research

Marine research and salmon declines- Dr. Katie Howard, Fisheries Scientist, kathrine.howard@alaska.gov, 907-267-2141

Northern Bering Sea Survey Research

Jim Murphy, Alaska Fisheries Science Center Research Biologist, jim.murphy@noaa.gov, 907-789-6651

Sabrina Garcia, Marine Research Biologist, sabrina.garcia@alaska.gov, 907-267-2180

Heat Stress in Yukon River Chinook Salmon

Dr. Vanessa von Biela, Research Fishery Biologist, vvonbiela@usgs.gov, 907-786-7073

Ichthyophonus Research in Salmon

Fred West, Yukon River Research Biologist, fred.west@alaska.gov, 907-267-2237

Photo by: ADF&G staff