

IMPORTANCE OF EXPANDING WCC SECTION 11.20.025 (“TUBING BAN”) TO LOWER SOUTH FORK NOOKSACK

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On behalf of Nooksack Salmon Co-Managers

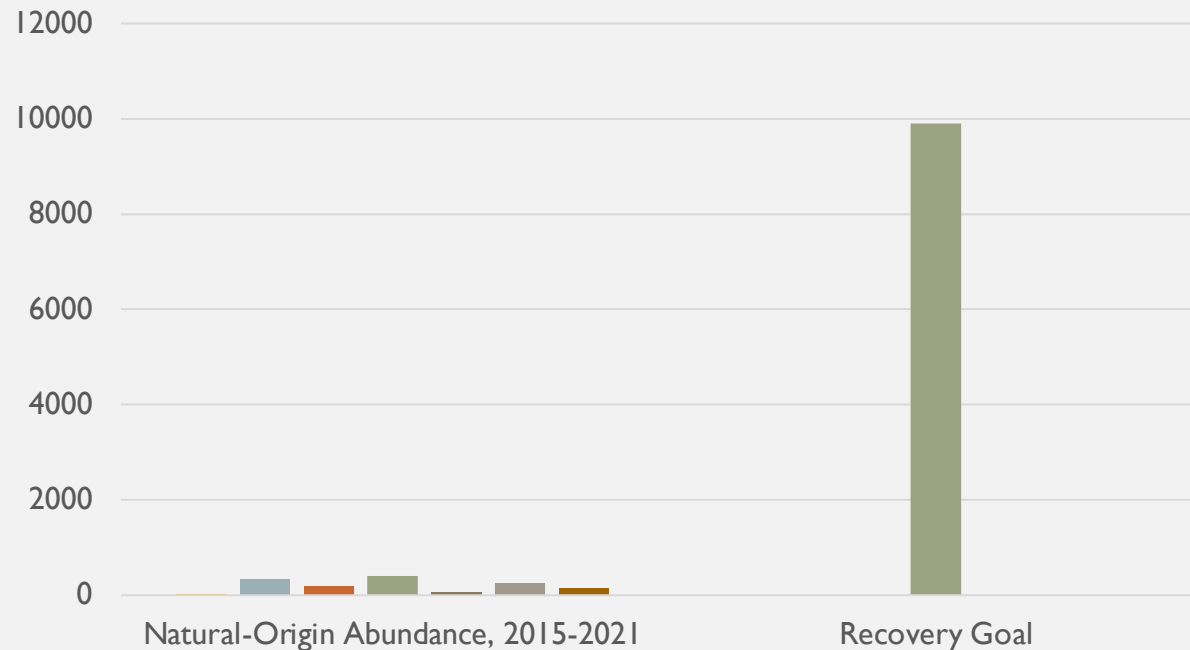
ORIGIN IS IMPORTANT



- Origin
 - “Natural origin” – spawned in a natural environment (river, stream)
 - “Hatchery origin” - fish that was propagated in a hatchery
- Puget Sound Chinook ESA Listing includes
 - Natural-Origin Chinook (NORs)
 - Hatchery-Origin Chinook (HORs) from specific hatchery programs
- However, NOR Chinook are important
 - Population status is evaluated by the number of **NOR** spawners
 - Fisheries are constrained by the number of **NOR** spawners

SOUTH FORK NOOKSACK CHINOOK ARE IMPORTANT BUT FAR FROM RECOVERY

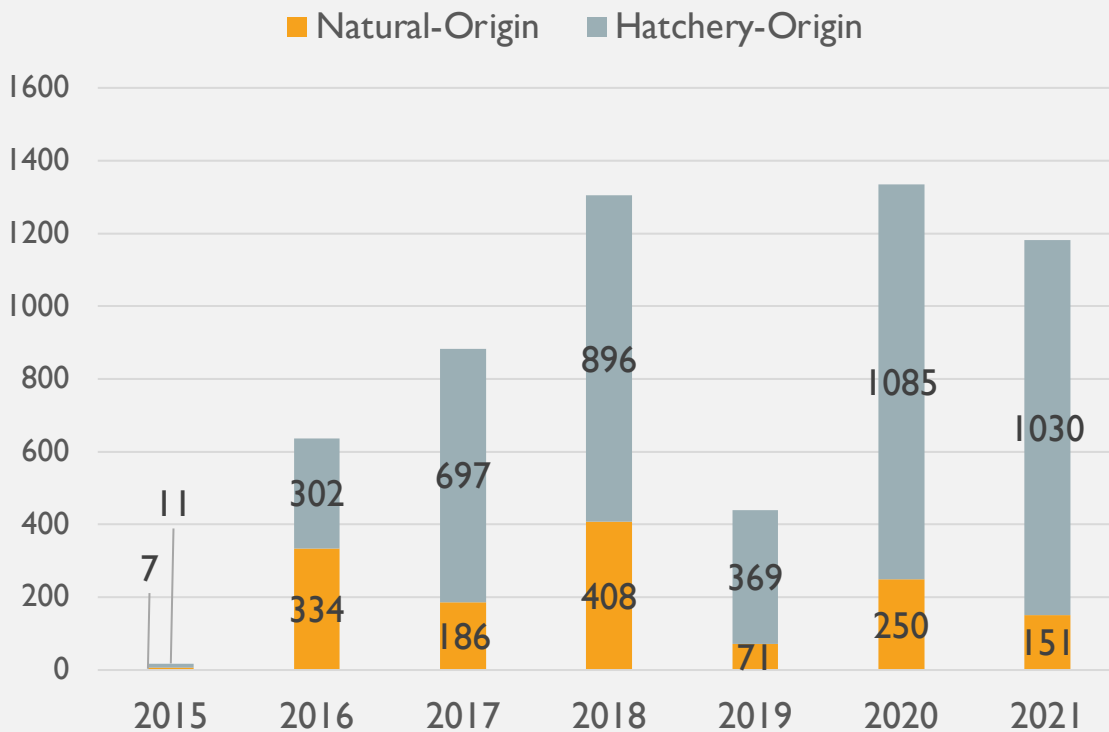
South Fork Nooksack Chinook NOR Spawners
relative to Recovery Goal



- Nooksack Early Chinook are essential for recovery
- From 2015 to 2021, SF Chinook abundance ranged from 7 to 408 NOR spawners
- Average recent abundance is 2% of our recovery goal.

SKOOKUM HATCHERY IS PROTECTING THE POPULATION FROM EXTINCTION

South Fork Nooksack Chinook Spawners



- Hatchery-origin fish comprise 47 to 97% of total SF Chinook spawners
- Skookum Hatchery is a success:
 - Sustains population
 - Provides fishing opportunity
 - Contributes to natural spawning

SF CHINOOK ARE DYING BEFORE THEY CAN SPAWN



Photo Credit: Lummi Natural Resources

- Summer 2021
 - Over 2400 Chinook died in the South Fork before they could spawn including
 - **43 NOR Chinook (31% of SF returns)**
 - Chinook pre-spawn mortalities found in all chinook-accessible reaches of the South Fork
- Response
 - Lummi declared **emergency**
 - Tribes petitioned Governor to address crisis
- Summer 2022
 - Lower, but still significant, numbers of pre-spawn mortalities

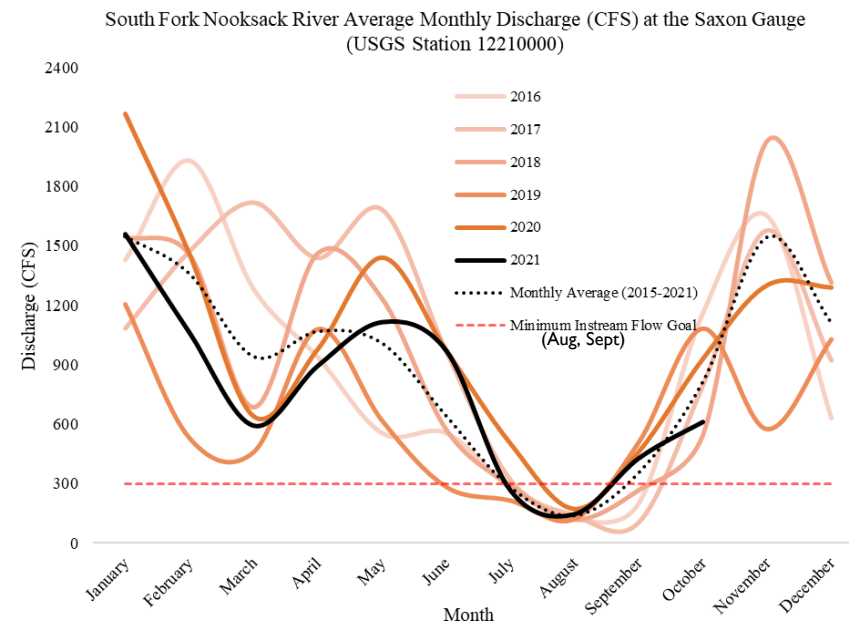
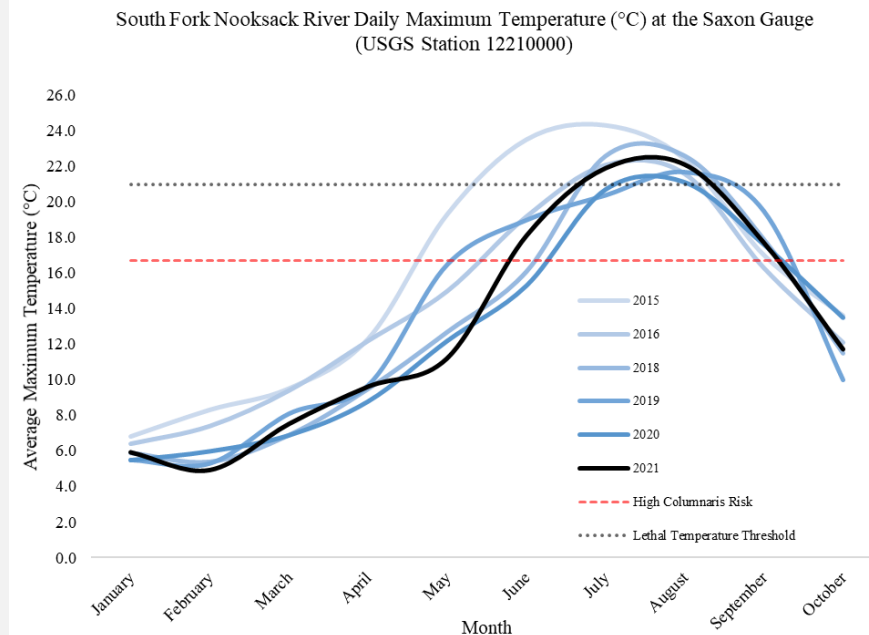
FISHERIES SEVERELY CONSTRAINED BY NUMBER OF NATURAL-ORIGIN SPAWNERS



- Fisheries are carefully managed
 - Harvest rate cannot exceed agreed to percentage
 - For decades, no directed commercial fishery on Nooksack early Chinook
 - Very limited ceremonial and subsistence fishery
 - Hatchery production has increased opportunity
- Prespawn mortality limits future fisheries
 - Number of NOR Chinook taken in fisheries compared to number of NOR Spawners
 - When fish die before they can spawn, fisheries get hit directly

HIGH TEMPERATURE, LOW FLOWS, DEGRADED HABITAT ARE TO BLAME

- Direct cause: 3 pathogens with temperature-related virulence (severity)
- Underlying causes: high temperatures, low flows, and degraded habitat
- We are working to address the underlying causes with restoration, but that will take time



IMPACTS OF RECREATION ON CHINOOK

Effects of temperature, flow,
and disturbance on adult
spring-run chinook salmon

University of California
Water Resources Center
Technical Completion Report
August 31, 1992

Investigators:

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Department of Wildlife & Fisheries Biology
University of California
Davis, California 95616

(916) 752-0205 and (916) 752-6355



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
Portland, Oregon 97232-1274

<https://doi.org/10.25923/40ty-4162>

Refer to NMFS No: WCRO-2022-00867

July 22, 2022

Charles Mark
Forest Supervisor
Salmon-Challis National Forest
1206 S. Challis Road
Salmon, Idaho 83467

Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens
Fishery Conservation and Management Act Essential Fish Habitat Response for the
Middle Fork Salmon River Recreational Floating Activities, Upper Middle Fork Salmon
River, 17060205; Lower Middle Fork Salmon River, 17060206; Middle Salmon-
Chamberlain, 17060207, Custer and Lemhi Counties, Idaho

Dear Mr. Mark:

Thank you for your email dated March 30, 2022, requesting initiation of consultation with
NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered
Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for Middle Fork Salmon River Recreational
Floating Activities. Thank you, also, for your request for consultation pursuant to the essential
fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation
and Management Act [16 U.S.C. 1855(b)] for this action. However, after reviewing the proposed
action, we concluded that there are no adverse effects on EFH. Therefore, we are hereby
concluding EFH consultation.

On July 5, 2022, the United States District Court for the Northern District of California issued an
order vacating the 2019 regulations adopting changes to 50 CFR part 402 (84 FR 44976, August
27, 2019). This consultation was initiated when the 2019 regulations were still in effect. As
reflected in this document, we are now applying the section 7 regulations that governed prior to
adoption of the 2019 regulations. For purposes of this consultation, we considered whether the
substantive analysis and its conclusions regarding the effects of the proposed actions articulated
in the biological opinion and incidental take statement would be any different under the 2019
regulations. We have determined that our analysis and conclusions would not be any different.

In this biological opinion (opinion), NMFS concludes that the action, as proposed, is not likely to
jeopardize the continued existence of Snake River spring/summer Chinook salmon. NMFS also
concurs with the Salmon-Challis National Forest (SCNF) determination that the proposed action
may affect, but is not likely to adversely affect Snake River sockeye salmon, Snake River Basin



AN ABSTRACT OF THE THESIS OF

Katherine Carey for the degree of Master of Science in Fisheries Science presented on
November 8, 2022.

Title: Prespawning Mortality of Fall Creek Willamette Chinook Salmon
(*Oncorhynchus tshawytscha*): Evaluation of the Effects of a New Trap at the Adult Fish
Collection Facility

Abstract approved:

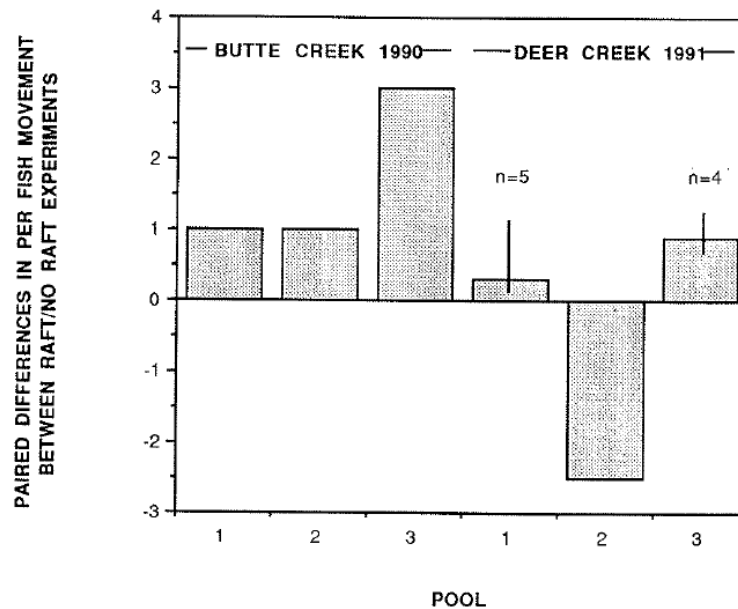
James T. Peterson

ABSTRACT

Annual rates of prespawn mortality (PSM) in adult Chinook salmon
(*Oncorhynchus tshawytscha*) trapped and transported upstream of dams in the
Willamette River basin are high (often >40%) and could limit the ability to restore
natural populations of spring Chinook salmon if not reduced. Improvements at the
U.S. Army Corps of Engineers trapping facilities at Fall Creek represent opportunities
to evaluate the effects of facility improvement on PSM, since historic rates have been
relatively high in this system. Results will likely be transferable to other Willamette
Basin reintroduction programs to help reduce PSM. Prespawn mortality was
evaluated in Fall Creek in summer and fall of 2020-2021, and the rates were
compared to those observed prior to improvements of the trapping and transport
facilities in 2010-2017. Field necropsies were performed on dead salmon detected
during daily surveys, and the tissues were brought back to the lab for
histopathological evaluation. Prespawn mortality was estimated using a novel
integrated Bayesian model and our 2020 estimate was among the highest of the pre-
trap improvement period. Exploratory analyses were used to evaluate relationships

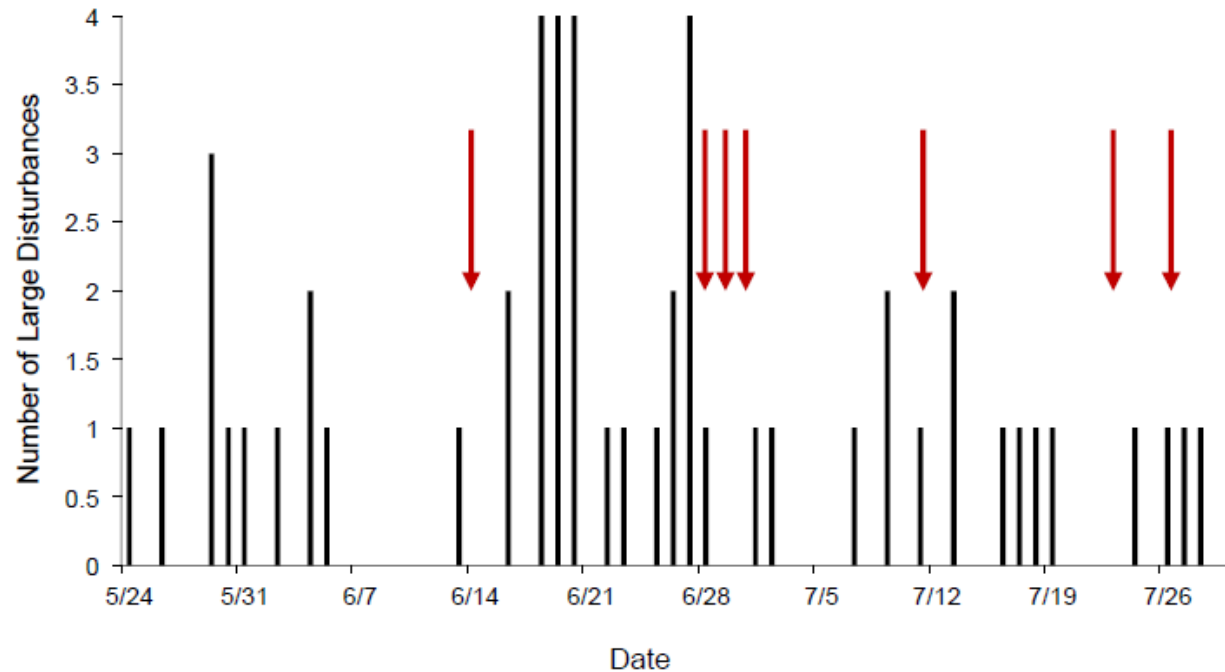
CAMPBELL AND MOYLE 1992

Figure 10. Median paired differences between raft/no raft experiments in movement of adult spring-run chinook salmon between upper and lower halves of six summer holding pools. Positive differences indicate more movement during a raft experiment, whereas negative differences indicate more movement during a no raft experiment. Number of pairs of experiments (n) in each pool is 1 unless otherwise indicated. Error bars represent upper and lower quartiles. Data were obtained through observation while snorkeling.



“We conducted a total of three rafting experiments in Butte Creek in 1990 and ten experiments in Deer Creek in 1991. We found a significant effect of rafting on the movement of adult spring-run chinook salmon... More upstream/downstream movement occurred during the rafting period in 12 of 13 paired experiments.”

CAREY 2023 THESIS



Pre-spawn mortality events

- Study of spring Chinook prespawn mortality in Fall Creek, OR, a tributary to the Willamette River
- Pre-spawn mortality events documented following swimming and fishing disturbances
- Disturbances coincided with highest measured temperatures
- “It is likely, therefore, that **human disturbance and stream temperature interact to increase stress and PSM risk during the months leading up to spawning.**”

CAREY 2023 THESIS

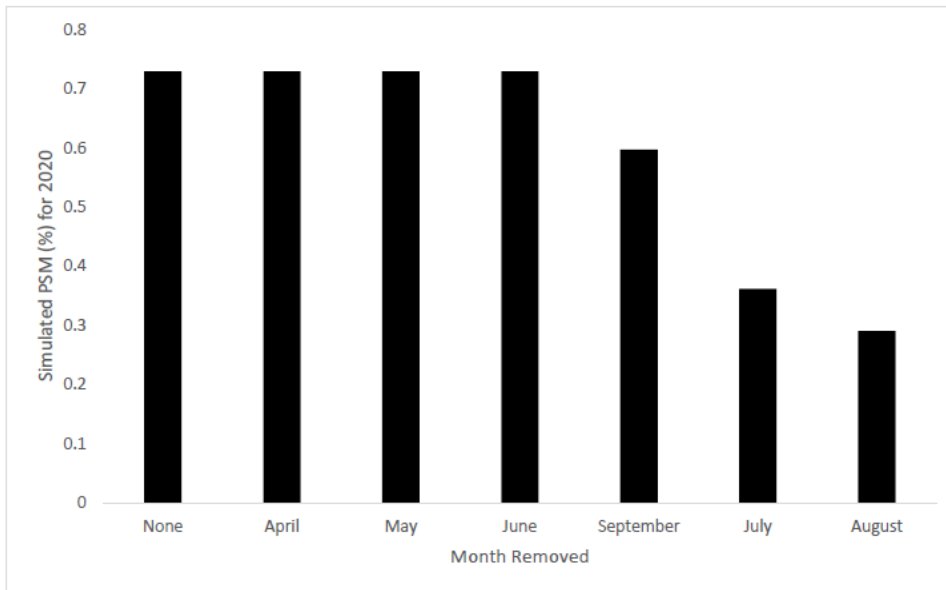


Figure 20. Annual prespawn mortality (PSM) rates for Fall Creek using the Chinook Salmon Simulation Model and 2020 USACE outplant data. Graph shows simulated PSM rates after removing recreational access (human disturbance) for National Forest Visitors for entire months during the holding period for fish.

- Developed pre-spawn mortality model for spring Chinook
- Modeled the effects of removing recreation for each month on pre-spawn mortality rate
- “This implies that management strategies aimed at reducing disturbance-based stress for fish should focus on limiting recreation and poaching during the late summer.”

NOAA CONSULTATION ON MIDDLE FORK SALMON RIVER RECREATIONAL FLOATING (JULY 2022)

- The proposed action has the potential to affect SR spring/summer Chinook salmon by disturbing adults and rearing juveniles. **Disturbance can lead to behavioral changes that can result in indirect effects through alteration in feeding success, increased exposure to predators, or displacement into less suitable habitat.**
- For adult Chinook salmon spawning, passing boats could influence spawning site pre-selection and selection, redd construction, and pre-spawning, spawning, and post-spawn behaviors. **Impacts are typically caused by boats floating over or near females that spook them off redds, which could cause stress. Stress could result in pre-spawning mortality or insufficient egg burial depth, if stress was extreme and stressed fish lacked adequate energy reserves.**
- Eggs and pre-emergent fry of Chinook salmon could potentially be displaced or damaged from boats or oars grounding on redd substrates. Post-spawn fish could be displaced from redds, potentially losing the protection provided by a fish defending the redd site. **Observations of boats floating by redds on the MFSR have shown repetitive disturbance of boats spooking fish off redds, and potential impacts from boats impacting redds, or boaters getting out of boats and wading on redds.**

SALMON RECOVERY PLAN IDENTIFIED IMPACT OF HARASSMENT IN LOWER SF

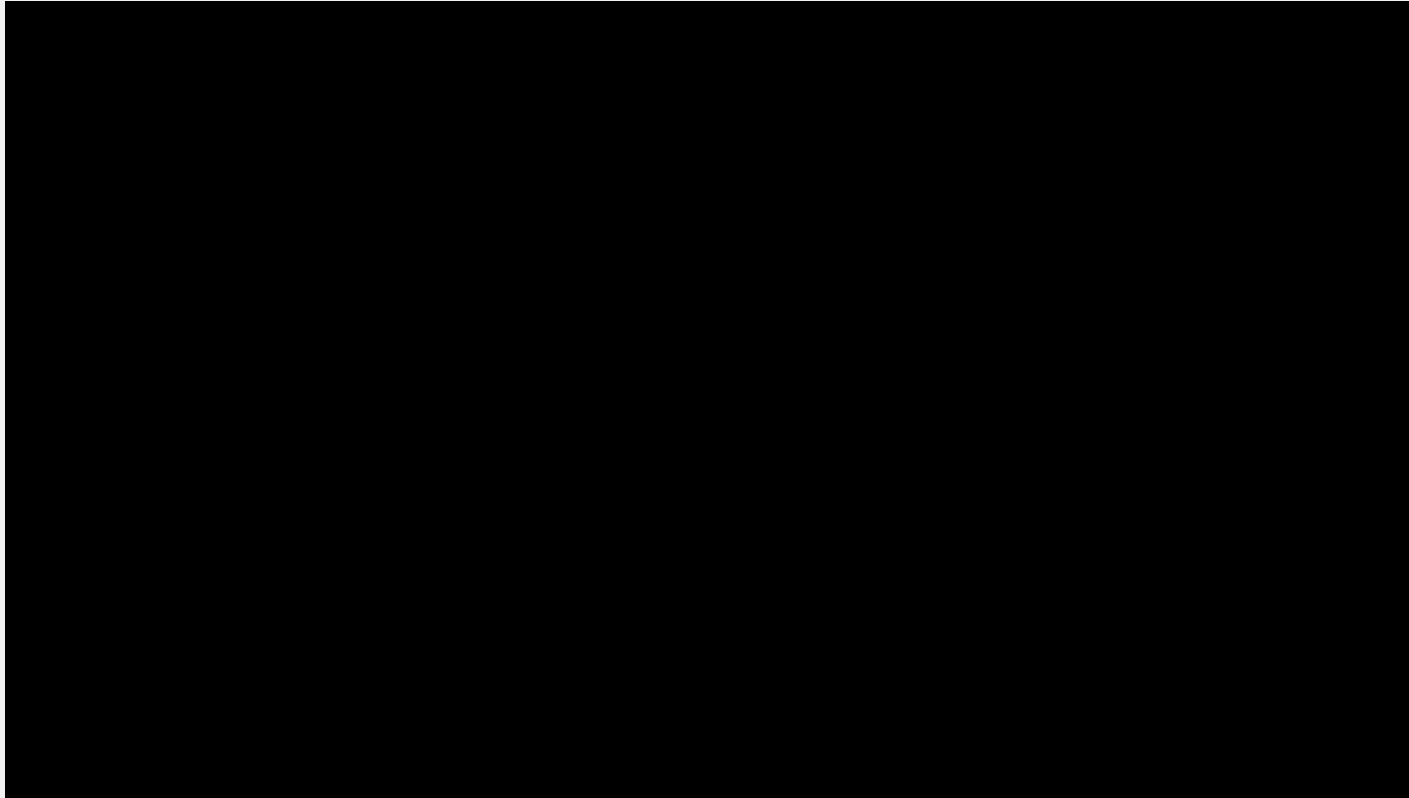


Photo Credit: Bellingham Herald

Stress is cumulative – the greater the stress, the higher the risk of prespawn mortality!

- 2005 *Salmonid Recovery Plan* identified harassment in lower South Fork as a **moderate limiting factor**:
 - *Harassment elicits avoidance behavior in upstream migrating, holding, and spawning chinook, which can use up limited energy stores or otherwise stress the fish and thereby reduce reproductive success. Redd trampling, which reduces survival to emergence, is also likely.*
 - *Summer recreational use of the lower South Fork, especially inner tubing, increases human-chinook encounters, thereby stressing holding and spawning chinook.*

CHINOOK STARTLE EASILY



- Chinook responding to a swimmer floating over a log jam-formed pool
- Startling increases stress and avoidance uses up limited energy reserves

Video taken recently in South Fork Nooksack River



UNLIKE OTHER RECREATION, TUBING IMPACT IS DISTRIBUTED

- Tuber put-in
 - Generally Acme area
- Tuber take-out
 - Strand Rd. (3.7 miles total length)
 - Potter Rd. (6.1 miles total length)
 - Confluence (8 miles total length)

TUBING HAS A SIGNIFICANT CUMULATIVE IMPACT

INDIVIDUAL
STARTLE
RESPONSE

×

NUMBER OF
STARTLES

×

NUMBER OF
TUBERS

=

CUMULATIVE
STRESS/ENERGY
EXPENDITURE

Floating over
fish elicits a
startle
response

Number of fish
encountered by
a tuber is
related to
length they
float

Number of
tubers any year
may vary, but
estimated # of
tubers on hot
days is several
hundred to
1000

Considerable
increase in stress,
energy
expenditure that
poses
unacceptable
risk to this
valued, imperiled
resource

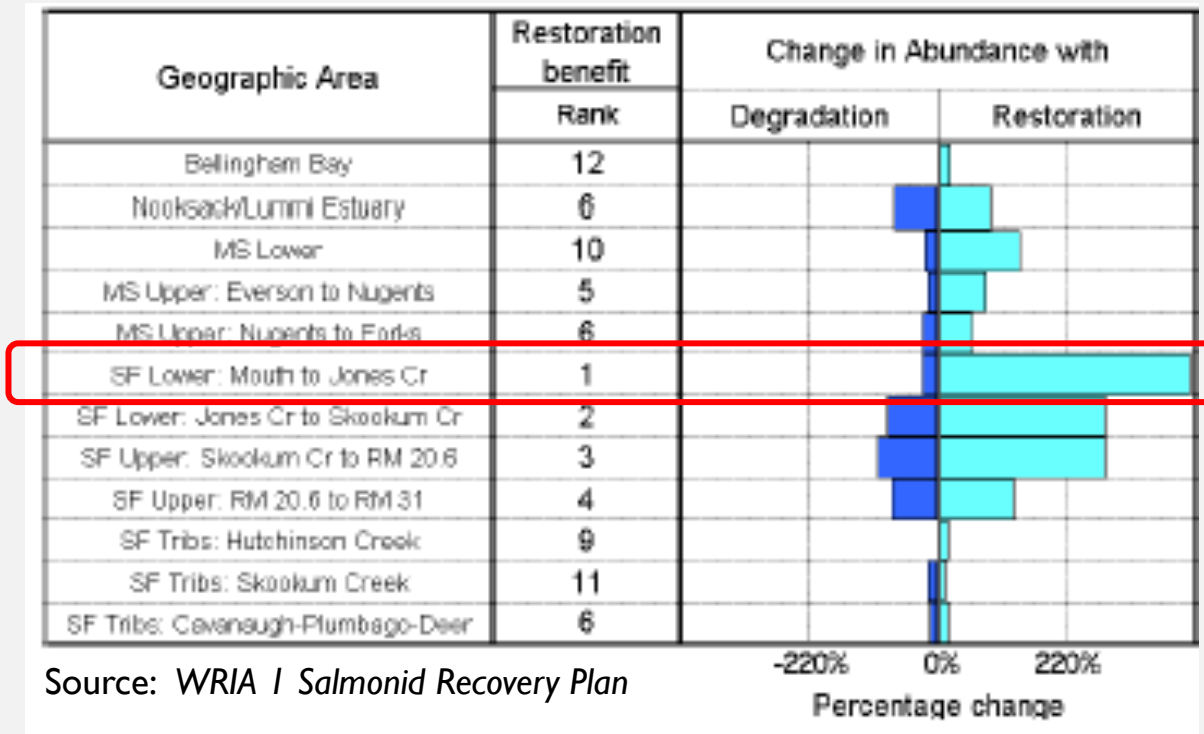
REDD TRAMPLING

- South Fork Chinook spawn throughout the lower South Fork
- 71 Chinook redds documented between Acme and Potter Rd. bridge in 2022
- Salmon eggs are very sensitive – in the first days, even a slight disturbance in the streambed can be fatal



LOWER SOUTH FORK HAS BEEN A PRIORITY FOR RESTORATION

Restoration Priorities for SF Chinook



- 2005 WRIA I Salmonid Recovery Plan identified the lower South Fork as the highest priority for restoration to benefit SF Chinook
- Lower South Fork provides critical migration, holding, spawning and rearing habitat for SF Chinook.



- Historically, our rivers choked with wood
- Log jams are a critically important feature of healthy salmon habitats
- Constructing log jams is a key recovery strategy

CONSIDERABLE INVESTMENT IN RECOVERY OF SF CHINOOK...



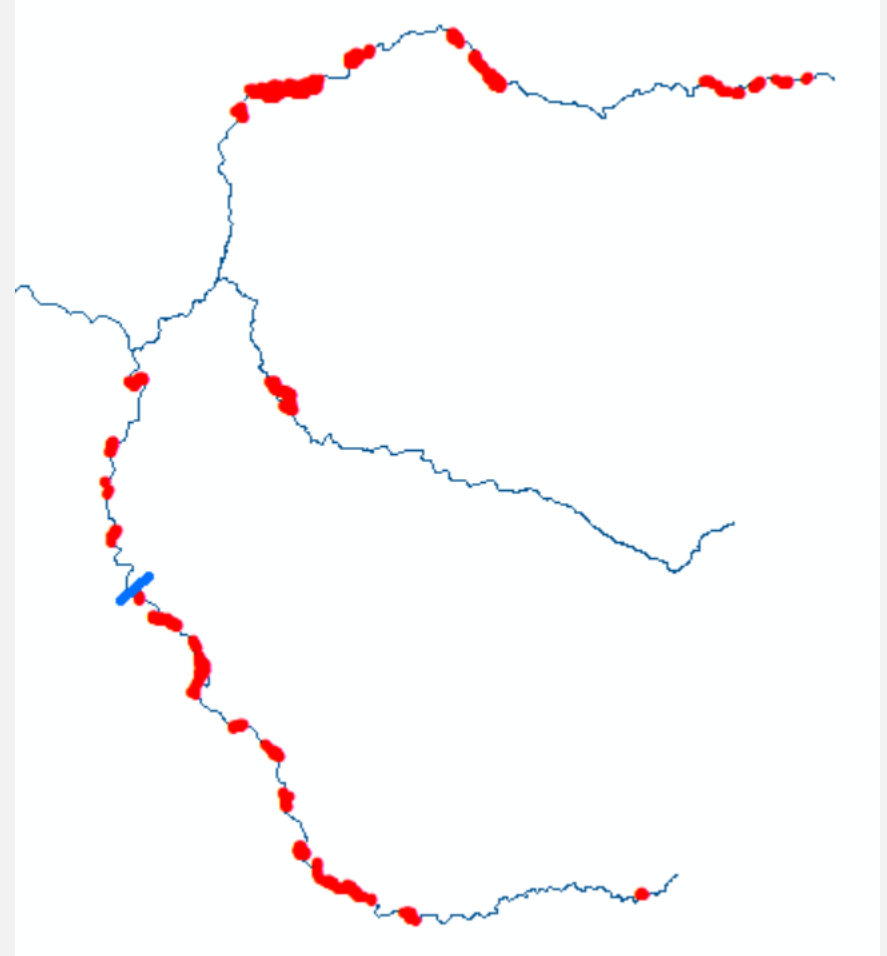
- >230 log jams
- >\$10M in SRFB funding alone for habitat restoration
- Pace limited by funding, benefits take time to accrue



- Significant investment in SF Chinook Rescue program, initiated 2006
- Program has been a success!
 - At least 300 hatchery-origin returns to SF annually since 2016

CONSTRUCTED LOG JAMS THROUGHOUT NOOKSACK RIVER FORKS

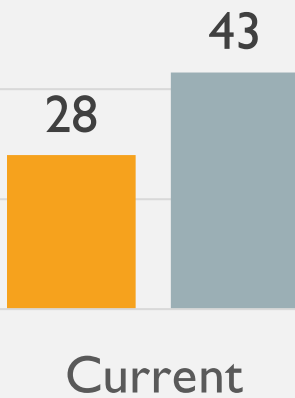
- Considerable work in the South Fork
- Restoration is designed with public safety in mind
- Improving river conditions for fish makes them worse for humans



RESTORATION IN LOWER SF

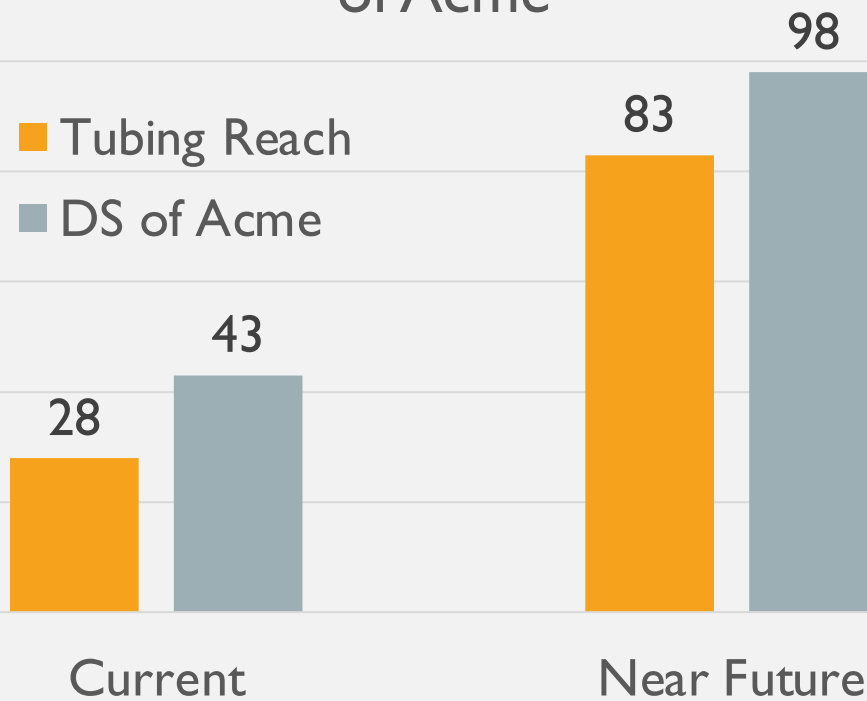
Number of Log Jams Downstream of Acme

■ Tubing Reach
■ DS of Acme



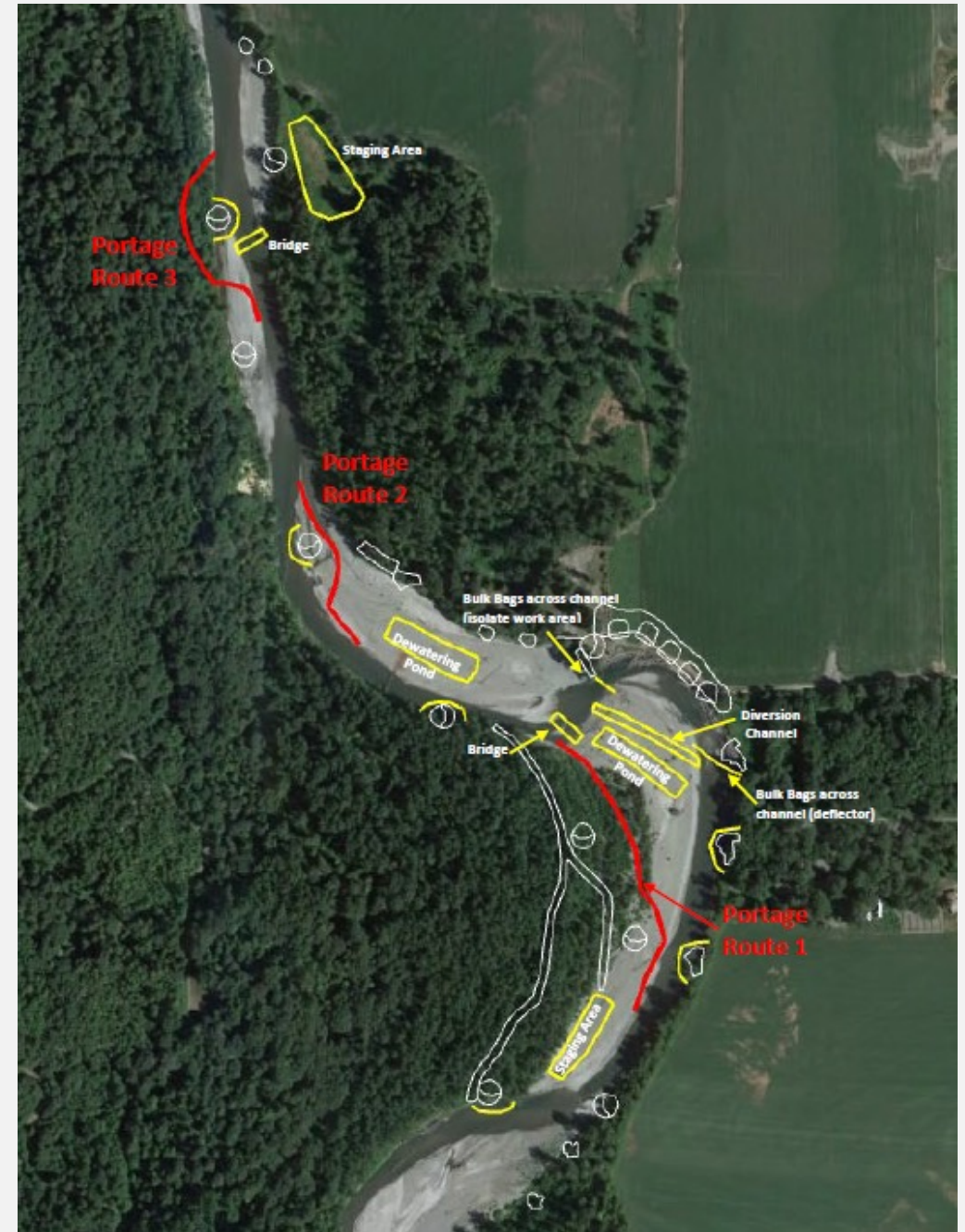
RESTORATION IN LOWER SF

Number of Log Jams Downstream
of Acme

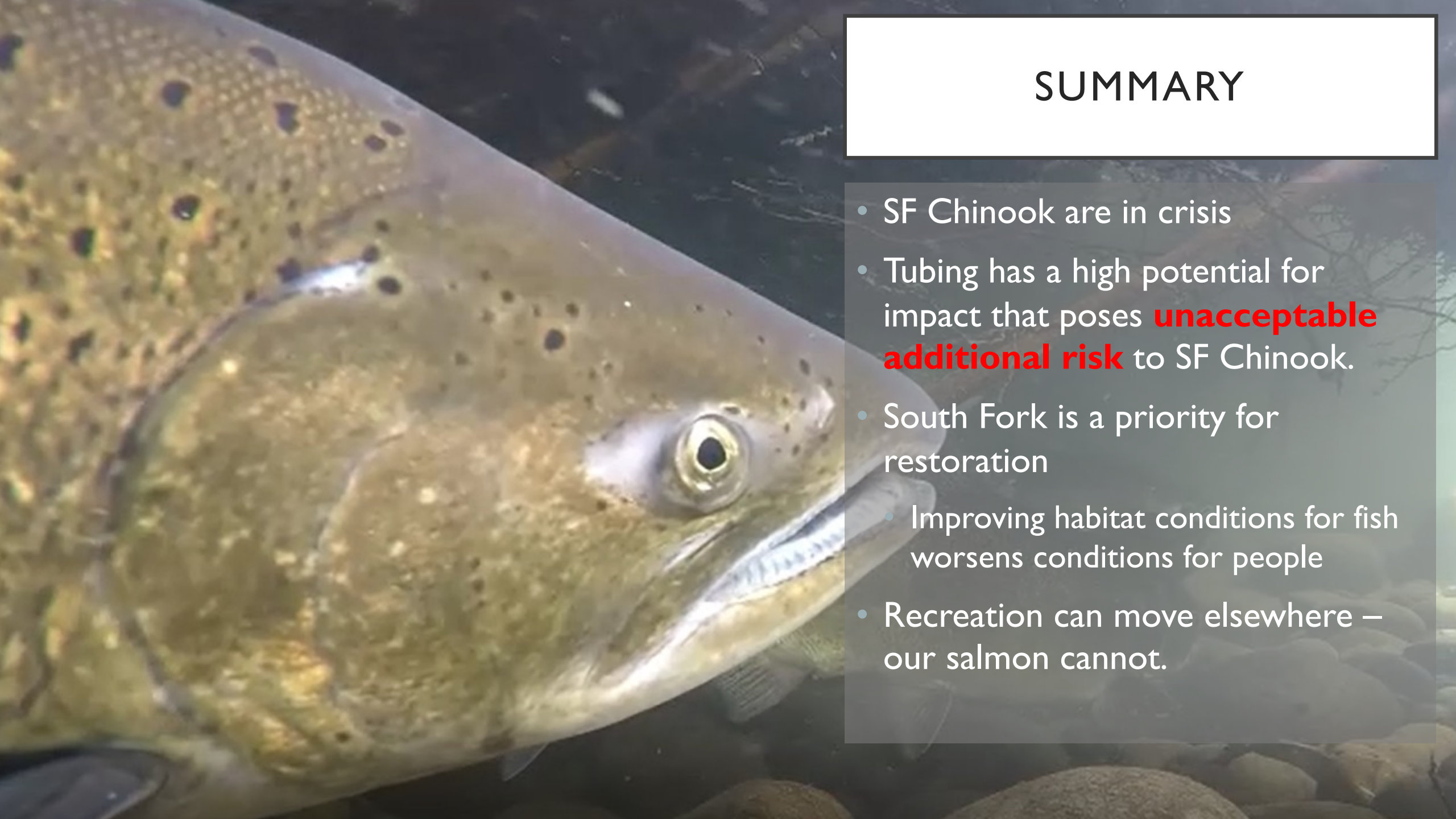


SF HOMESTEADER CONSTRUCTION PLANNED FOR SUMMER 2023 OR 2024

- Construction entails
 - Bridges spanning river
 - Heavy equipment in the channel
 - Bulk bags to deflect flow, isolate construction areas
- Protecting safety of tubers
 - Signage and full-time person notifying tubers of need to exit
 - Require 3 portages totaling about ½ mile
 - 1020'
 - 650'
 - 875'







SUMMARY

- SF Chinook are in crisis
- Tubing has a high potential for impact that poses **unacceptable additional risk** to SF Chinook.
- South Fork is a priority for restoration
 - Improving habitat conditions for fish worsens conditions for people
- Recreation can move elsewhere — our salmon cannot.