Fisheries and Oceans Canada | Pêches et Océans Canada

Big Bar Landslide: Update

February 2, 2021

British Columbia | Canada

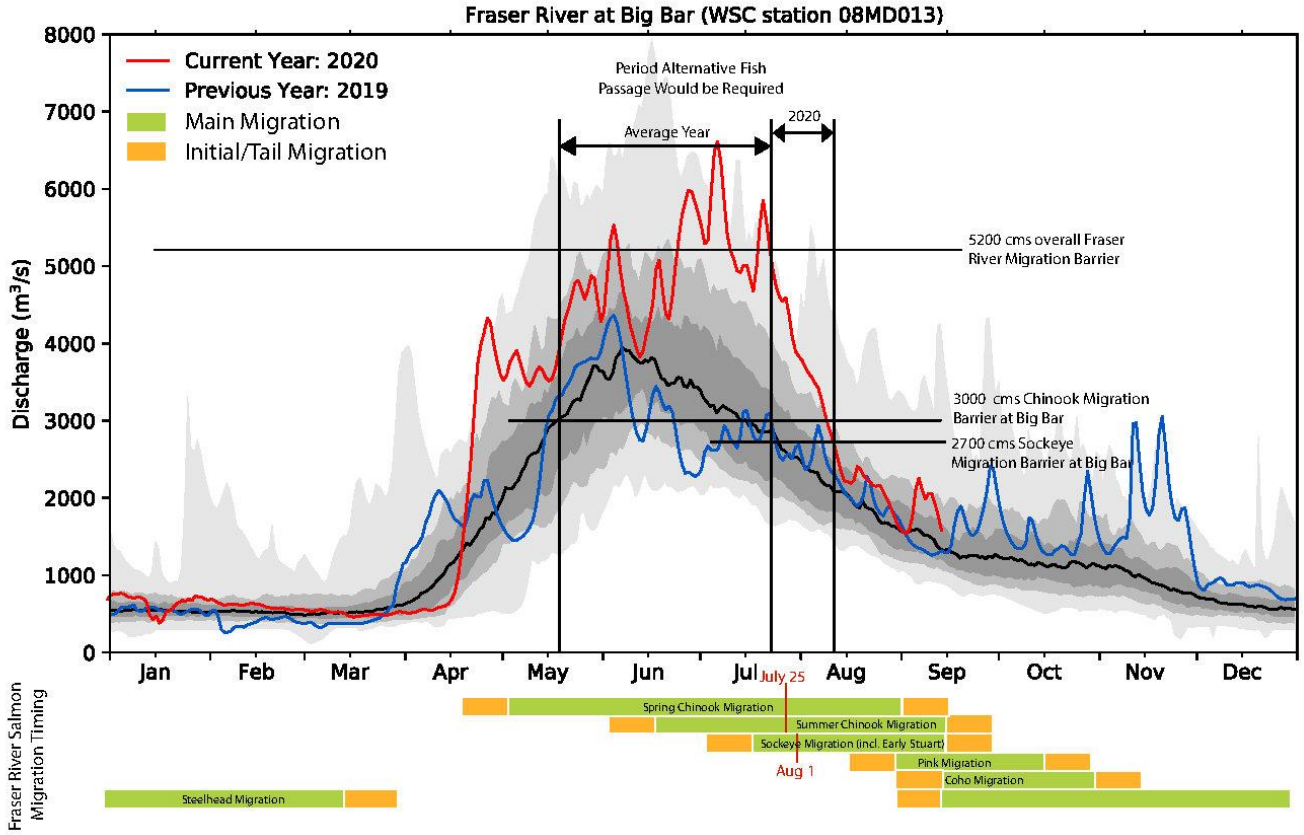
2020 Monitoring Overview

- Winter work improved passage between for the 2020 migration seasons
- Less delay
- Less mortality (especially Chinook in 2020)
- Early sockeye stocks still at risk
- More formal reports to come

2020 Monitoring Data Update

- Upper Fraser chinook and sockeye population escapement estimates are mostly finished
- Big Bar direct field programs are wrapped up
- Data verification is ongoing

2020 Migration



Notes: Light grey indicates the minimum and maximum values; the moderate dark grey represents the 90th percentile and 10th percentile; the dark grey represents the 75th percentile and 25th percentile; and the black line indicates the median based on the 1951-2015 synthetic time series for the Fraser River at Big Bar, which was scaled from the historical flow record of the Fraser River at Texas Creek (08MF040). The scaling function was derived from the overlapping flow record between both stations from 1951 to 1972. The current year represents observed flows at the Big Bar WSC gauge 08MD013. The forecasted flows are provided by the BC River Forecast Center. Observed flows at the Big Bar hydrometric gauge (08MD013) are collected by Water Survey of Canada, Environment and Climate Change Canada

nhc northwest hydraulic consultants

- Significant barriers to migration at 5,200 m^3/s and higher
- Chinook – 'unimpeded threshold' (~3,000 m^3/s) appears to be much lower than the maximum threshold (~3,800 m^3/s)
- Sockeye – similar pattern observed, but still being validated

Early Stuart Sockeye 2020

Tag based estimates:

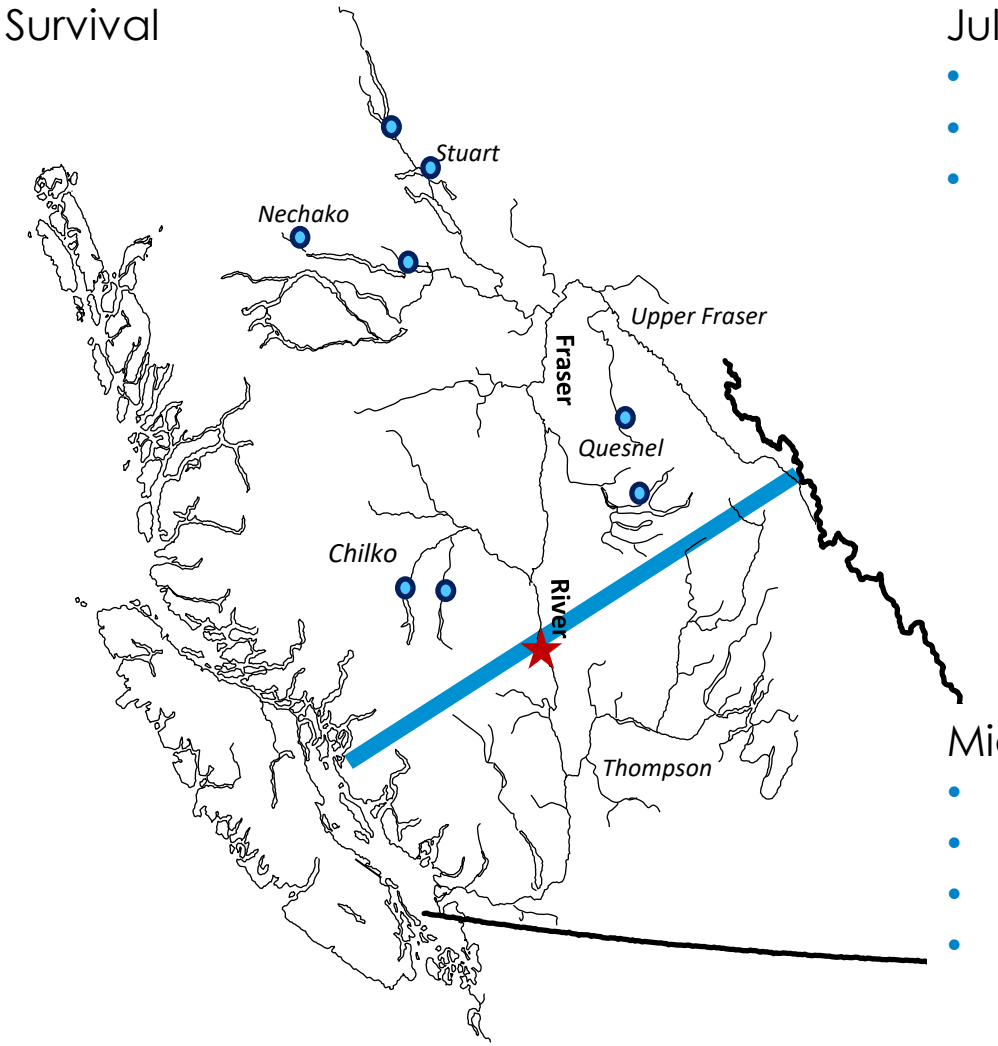
- 53 radio tags applied between July 24 – Aug 5 (GSI data results complete from MGL)
- 23 of these made it to the slide
- 5 through the slide
- 3 to Churn SONAR
- 1 past Chilcotin confluence
- 1 past Soda Creek station and never detected upstream again (stations at Cottonwood, Stone, Nechako operated by UFFCA) and our station at FSJ

Other sources of data:

- Early Stuart escapement ~ 30 salmon
- Early Stuart in-season run size estimate ~16,000 salmon
- 30/16000~0.1875% survival

Sockeye In-river Survival Estimate

Late July to Early Sept - 100% Survival
- Nadina



July Early Aug migrants < 1% survival
- Early Stuart - Endangered
- Bowron - Endangered
- Taseko - Endangered

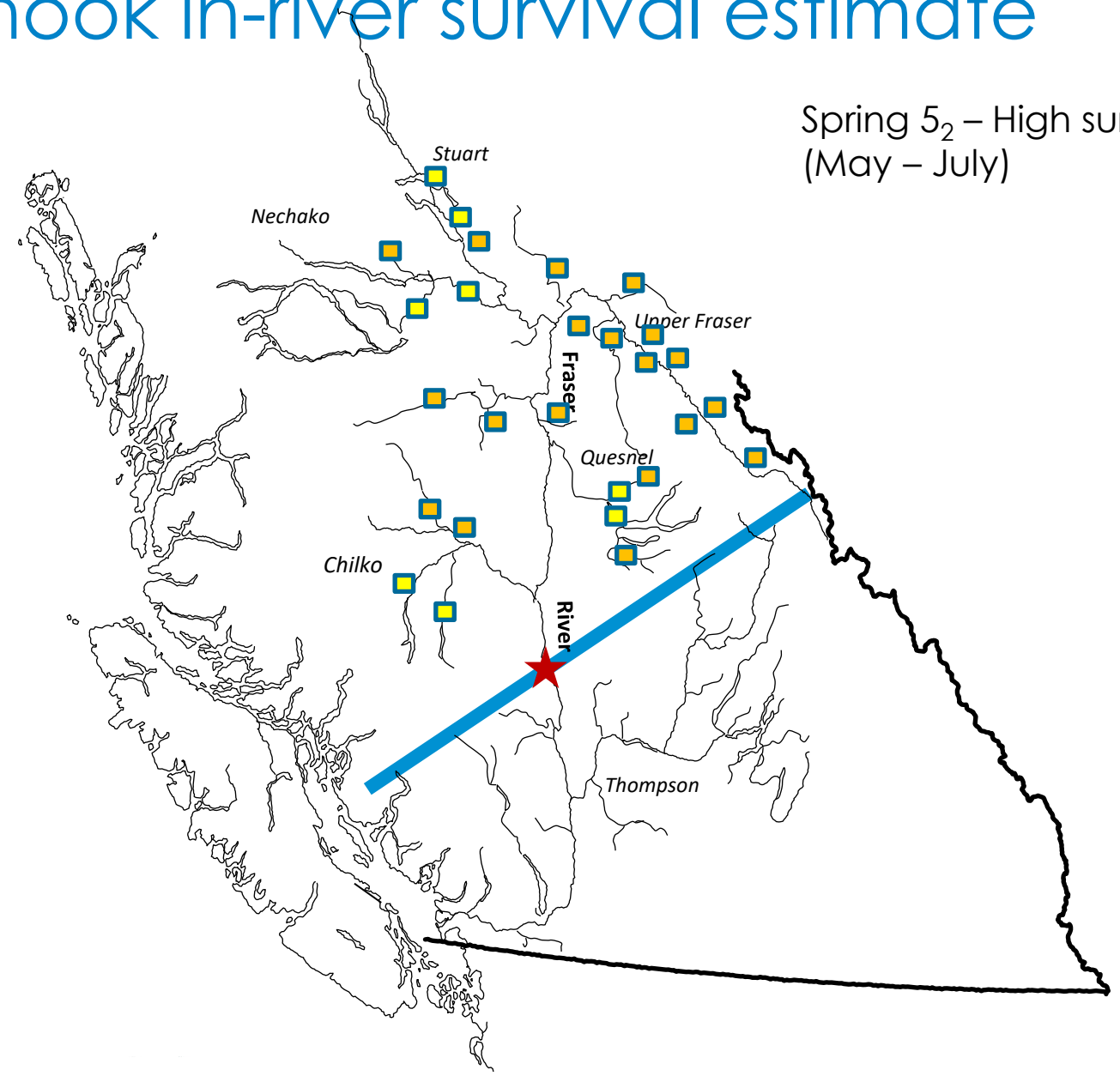
Mid-Aug thru Sept - > 90% Survival
- Late Stuart - Endangered
- Stellako - Special Concern
- Quesnel - Endangered
- Chilko

Data:
En route loss estimate in 2020 (DBE): Mission
PSC vs Spawners (StAD)

Status based on COSEWIC

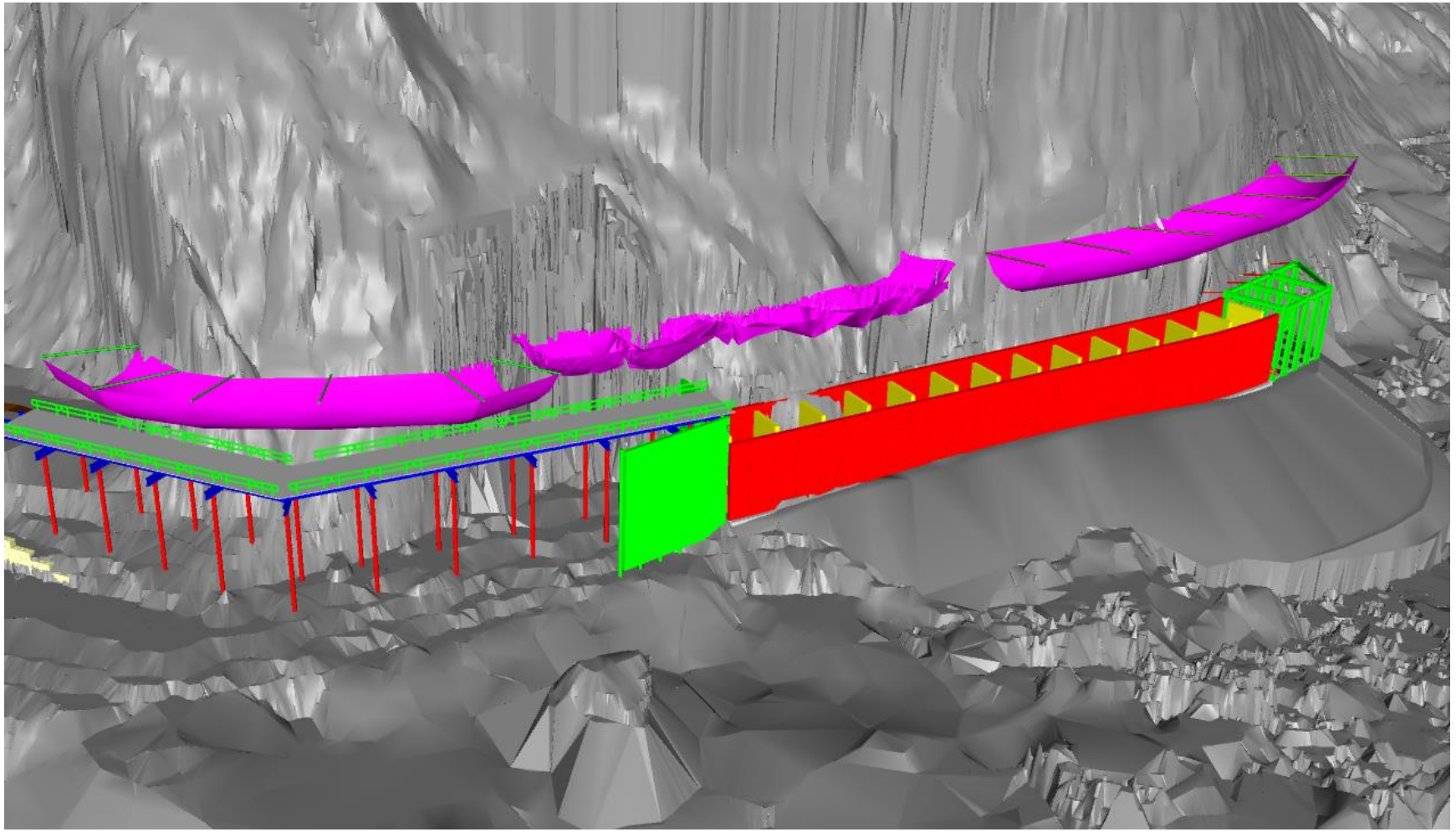
Chinook in-river survival estimate

Spring 5_2 – High survival
(May – July)



Summer 5_2 – High survival
(July – Aug)

Big Bar Fishway Concept Model



Permanent Fishway & "Nature-like" Fishway Design Parameters

- Maintenance Requirements:
  - Annual dewatering for repairs and sediment removal
  - Access to the top and length of the fishway for rock clearing
- Longevity:
  - Structure to last 50+ years
- Species:
  - Design to accommodate all species of salmonids present at the Big Bar site
- Capacity:
  - Design of the permanent fishway and the nature-like fishway to accommodate all expected run sizes

Permanent Fishway & "Nature-like" Fishway Design Parameters

- Permanent Fishway:
  - Upper working threshold of 5,500 m^3/s
  - Lower working threshold of 1,000 - 2,000 m^3/s
- "Nature-like" Fishway:
  - Upper working threshold of 3,500 m^3/s
  - Lower working threshold of 500 m^3/s
- Maximize the flow range at which fish will have two passage options
- Volitional passage of fish at a flow rate of 2 m^3/s across the full range of flows between 500 m^3/s and 5,500 m^3/s

Upcoming Project Tasks

- Task 1 – Preliminary Design
- Task 2 – Site Preparation
- Task 3 – Fishway Installation
- Task 4 – Fish Transport and Enhancement

Task 1 – Contractor's Preliminary Design

- Complete Specification Review
- Develop multiple concepts with basic dimensions and volumes to evaluate a best for project solution, including a construction methodology to optimize the schedule
- Develop a viable construction strategy
- Provide a preliminary design package to meet the project requirements for permanent fish passage

Task 2 – Site Preparation

- Personnel camp setup
- Rock fall protection and scaling
- Access road upgrades for equipment mobilization, fish transport and project personnel use
- West Beach service area upgrades
- "Nature-like" fishway modification
- KM96 and other laydown area preparations
- In-river rock manipulation and removal to maintain a "nature-like" fishway during the construction months and into the migration season

Onsite Conditions

Archeological Work on Razorback

Large Boulders Blasted for Rip Rap

Grizzly Screening Materials on Razorback

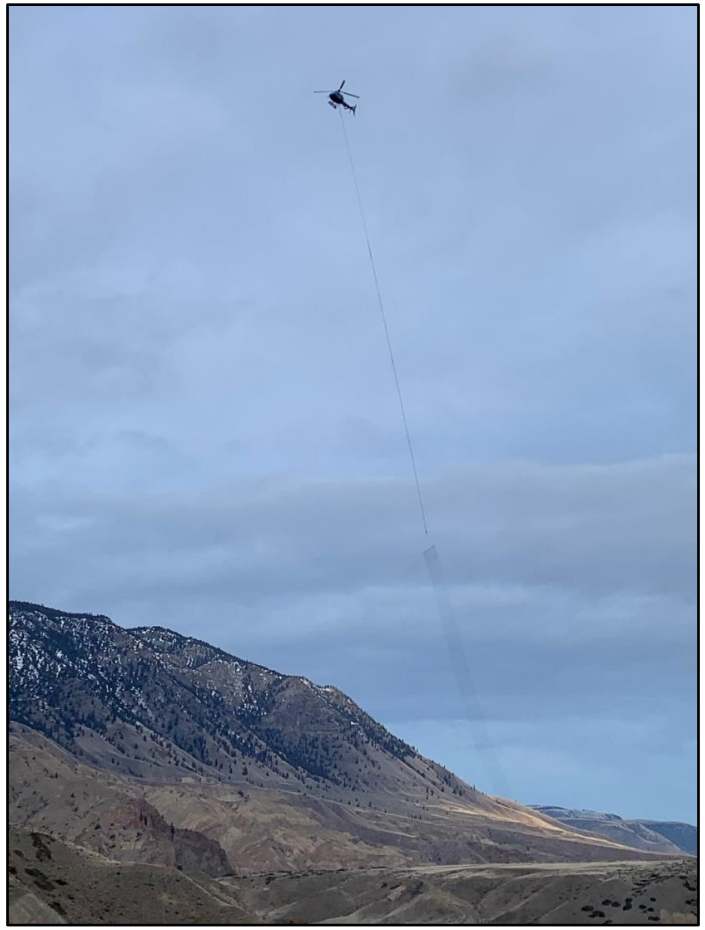
Sorting Rock on West Beach

Excavating Rip Rap Material

Rip Rap Placement on West Bank

Fishway Embankment Preparation

Safety Mesh Transported by Air



Task 3 – Fishway Installation

- Removal and replacement of the existing temporary "nature-like" fishway
- In-river temporary construction road access
- Rock fall protection upgrade
- Pile driving support installation
- Prefabricated concrete panel delivery and install
- Trestle access installation

Task 4 – Fish Transport & Enhancement

- Trap and Transport operations
- French Bar Creek release site operational setup
- Alternate Enhancement Program location setup
- Off-site hatchery upgrades

Key Points

1. Expect to conduct a 3rd season of assisted fish passage (2019-2020-2021)
2. Hydraulic modelling and analysis indicates a low probability of fish migration past slide site at all flow conditions in 2021
3. Conducted a Lessons Learned exercise of the 2019 and 2020 programs to plan and improve the program in 2021
4. Expect to run 3 main programs in summer 2021:
   - Design, preparation and delivery required for alternate fish passage systems
   - Planning for emergency conservation enhancement of priority salmon populations
   - Conduct a 3rd year of monitoring

Conservation Enhancement

- Even with significant delay, Chinook were able to migrate and spawn more successfully in 2020 than in 2019.
- Early Stuart sockeye suffered very high in-river mortality in 2020, similar to 2019.
- For 2021, plan is to continue Early Stuart sockeye brood capture at the slide site. Chinook brood capture will focus on natal stream collection, with a potential slide site contingency.
- Planning Task Teams created consisting of DFO and Indigenous technical experts:
  - 4 Enhancement groups: Planning; Facilities Review; Downstream Adult Brood Capture & Transportation; and Natal Stream Capture
  - 5 "Truck and Transport" groups: Planning; West Beach; Fish Wheel; Trucking; and French Bar

2021 Summer Planning Considerations

- Structured process
- Hydrological, engineering and biological consultants advising and conducting data collection, analytical and design work
- Close cooperation between DFO and Indigenous technical experts in reviewing and planning activities
- Precautionary approach required to manage project uncertainties and risks

Assisted Passage

Reviewing all operations – key findings:

- No single technology can work under all conditions
- Multiple components allow for redundancy
- Various components perform at different water levels and velocities
- Minimal to no handling is optimal for fish health

More Information

- Images: Province of BC's Flickr channel is updated with images of the work underway at the slide site:
  - Big Bar Landslide 2021
  - Big Bar Landslide 2020
  - Big Bar Landslide 2019
- Information Bulletins: Published alternate Mondays on DFO's website and the Province's website.