Big Bar Landslide Response
Spring & Summer Works: Briefing

May 20, 2020
Key Points

1. DFO began planning contingencies in November, in the event fish passage in 2020 was not fully restored.

2. Hydraulic modelling and analysis indicates a low probability of fish migration past slide site at all flow conditions

3. Design, preparation and delivery required for alternate fish passage systems

4. Planning for emergency conservation enhancement of priority salmon populations

5. Timelines are tight and driven by the spring freshet
Contingency Planning – Decision-Making Process

- Structured process
- Hydrological, engineering and biological consultants advising and conducting data collection, analytical and design work
- Internal DFO technical experts working closely with consultants
- Information, planning and design discussed weekly with DFO, PSPC, SNC-L, Kiewit and all DFO Consultants
Contingency Planning – Decision-Making Process Pt. 2

- 2 External Technical Teams consisting of experts and stakeholders, including First Nations
  - Reviewing and advising on the work of DFO and consultants
  - Alternative Fish Passage Team
  - Conservation Enhancement Team
- New information from all sources is required to be analysed and evaluated quickly, and incorporated into planning, design and construction activities.
- Precautionary approach required to manage project uncertainties and risks
Shifting from Contingency to Spring Operations
Alternative Fish Passage

- Hydrological Engineering Firm, Northwest Hydraulics Consulting (NHC) has produced modelling results based on ongoing bathymetric analysis of the slide area.
- NHC’s modelling results indicate there is a low probability of fish being able to get through slide site at all flow conditions.
Key Technologies Evaluated

- Assorted styles of engineered and natural fish ladders / fish ways considered
- A variety of pumping systems exist
- Trap & Truck and other mechanical means were assessed
- Very few options are suited to the unique and difficult Big Bar site
- Extensive evaluation of options was conducted against weighted criteria
Key Evaluation Factors

• Reliability – Expected to perform throughout the work period
• Efficiency and Fish Health - Minimise delay, injury, stress and handling
• Effectiveness – Has a reasonable possibility of working in an untested location
• Availability - Is presently available for use on site
• Procurement – Able to be acquired in time
• Adaptable and Expandable – work in different flow conditions and pass small numbers of fish, as well as large numbers
Assisted Passage Options

- No single technology can work under all conditions
- Multiple components allow for redundancy
- Various components perform at different water levels and velocities

<table>
<thead>
<tr>
<th>Fish Passage System</th>
<th>Passage Difficulty</th>
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<tbody>
<tr>
<td>Component #1</td>
<td>Full Passage</td>
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<tr>
<td>Nature-like fishway</td>
<td>Moderate Difficulty / Delay</td>
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<tr>
<td>Component #2</td>
<td></td>
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<tr>
<td>Pneumatic Pump</td>
<td>High Impact / Full Blockage</td>
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<tr>
<td>Component #3 - Truck &amp; Transport @ slide</td>
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<tr>
<td>Component #3 - Truck &amp; Transport Downstream</td>
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Component #1 – Fishway

Construct a highly designed surface on the west bank, providing a nature-like fishway

- This is an engineered design in which large boulders are carefully placed on a prepared bench to create a hydraulic effect with eddies and jump steps.
- This approach is often incorporated into restoration projects.
Component #2 – Fish Pump

- A pneumatic fish pump will be primary fish passage system once the flows in the river create passage delays
- This system is intended to capture and transport past the slide site, with minimal delay and handling.
Component #2 Fish Ladder

- For the fish pump to work, we needed to safely capture them
- Constructed a temporary fish ladder to draw the fish out of the Fraser River
Component #3 - Truck Transport

• If #1 and #2 are not sufficiently successful, access road along the west side of the river will be used for truck transport of fish

• Fish will be collected at the work platform and transported to French Bar Creek, north of the slide
Conservation Enhancement

Plans for Conservation Fish Culture:
• Draft plan developed by a team of internal and external experts
• Approach based on response to success of winter work
• Balancing of biological risks
• Additional to planned conservation enhancement

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<tr>
<th>Passage Ability</th>
<th>Transport</th>
<th>Capture Location</th>
<th>Strategy</th>
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<tbody>
<tr>
<td>Good (Volitional Passage)</td>
<td>No assisted transport</td>
<td>No</td>
<td>Maybe</td>
</tr>
<tr>
<td>Poor (Limited Volitional Passage, similar to 2019)</td>
<td>Assisted transport</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Significant Impact (No Volitional Passage / Delay)</td>
<td>Assisted transport</td>
<td>Yes</td>
<td>No</td>
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Stock Specific terminal collection, depending on escapement
Collect fish downstream of slide, and if possible in natal streams. Focus on early run stocks, and summer if flow/passage conditions do not improve
Collect fish downstream of slide, focus on all early run and summer run stocks
• Move ~400 Early Stuart Sockeye to CLL (move whatever CLL can handle) – genetic testing to occur at CLL

• Consider natal stream brood collection for Early Stuart, Taseko, Bowron if they can be captured and consider Late Stuart, Nadina, Stellako, Chilko, Quesnel if needed

• Have a contingency plan for later Sockeye stocks (Quesnel or Chilko) if required, catch at slide, hold locally in net pens in lakes, field egg takes – culture at Shuswap hatchery

• Other than Early Stuart, all other Sockeye culture to be conducted at Shuswap Falls hatchery

• Max incubation capacity 1.5M at Shuswap
• Sort and hold chinook at French Bar Creek – PIT tagging/genetic testing to occur while Chinook are at French Bar.
• Chinook selected for enhancement go to QRRC for extended holding, the others are released upstream. Primary incubation at QRRC and likely transfer of eyed eggs to another site. QRRC is preferred to manage handling stress and minimize fish moves.
• Consider natal stream brood collection for Chinook enhancement (field egg takes), primary incubation at QRRC
• Priorities for collection at slide site, if required: Tete Jeune, Willow, Bowron, Slim
• MGL tasked to see if there are other populations that are closely associated genetically, and may be able to be captured in sufficient numbers to be able to find at the slide.
• If collecting fish natally, will need criteria to determine if they will be collected
Fish Monitoring

- Use radio tags and sonar units to determine salmon migration past slide site
- Will inform real-time passage and enhancement decisions and actions
Contingency Overall

- Critical to complete plans and get necessary procurements completed in coming weeks / months
- Each project adaptively managed throughout season
- Critical monitoring will inform real-time passage and enhancement decisions and actions
- Will engage and employ FN’s in significant portions of both projects
- External technical teams have been engaged in reviewing plans and directions.
- All aspects of this project are fraught with challenges