Impacts of Tŝilhqox (Chilcotin River) Landslide on Salmon… Just the Beginning

February 12, 2025

Context/purpose

The Tŝilhqot’in are the “River People”. The Tŝilhqot'in Nation has fought hard and made huge sacrifices to conserve salmon over the years, including protecting the headwaters in their Title lands where salmon return to spawn and rear.

The Tŝilhqot’in Territory is a recognized Salmon Stronghold.

TNG engages at all levels to advance the protection and recovery of salmon stocks that return to the Tŝilhqot'in Territory, including ongoing direct engagement with the PSC.

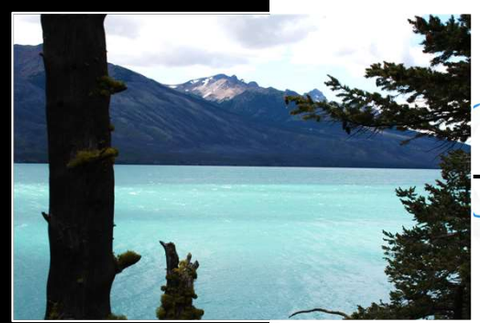
Today – we are here to share with you the ongoing impacts of the Chilcotin Landslide on Chilcotin Watershed salmon, and we are here to ask you –

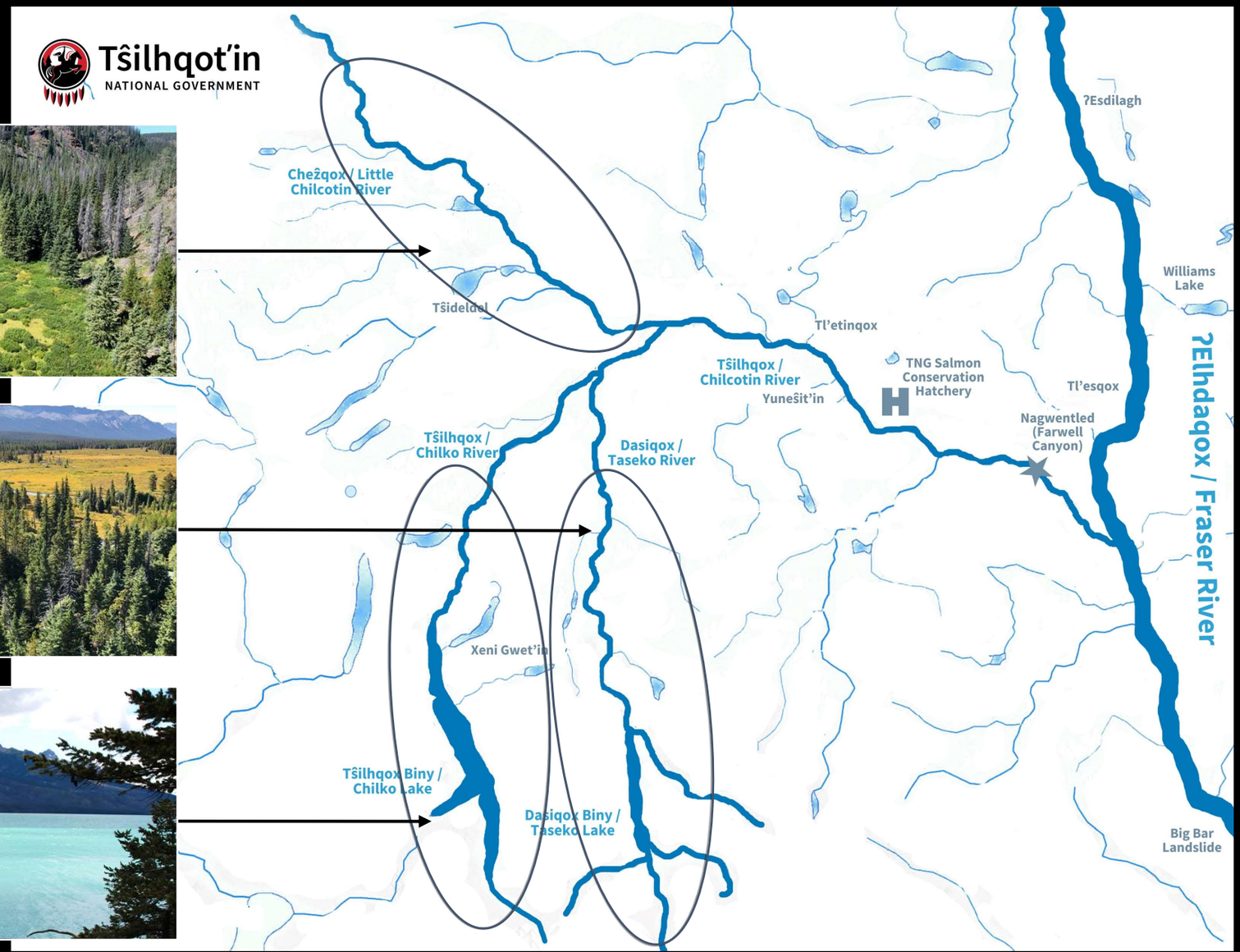
How can the PSC family work together and with TNG to best utilize our roles and levers to implement a new approach that meaningfully addresses the unprecedented challenges facing the salmon?

The Tŝilhqot’in Territory is a Salmon Stronghold

Headwaters of the three major Chilcotin tributaries are all nurseries for salmon populations.

- Two systems are glacial headed and virtually pristine – Taseko and Chilko (very cold water, instant cooling effect leaving the Fraser)
- Hard migration – salmon have to be very strong





Importance of Chilcotin Watershed Stocks:
Regional and International Importance

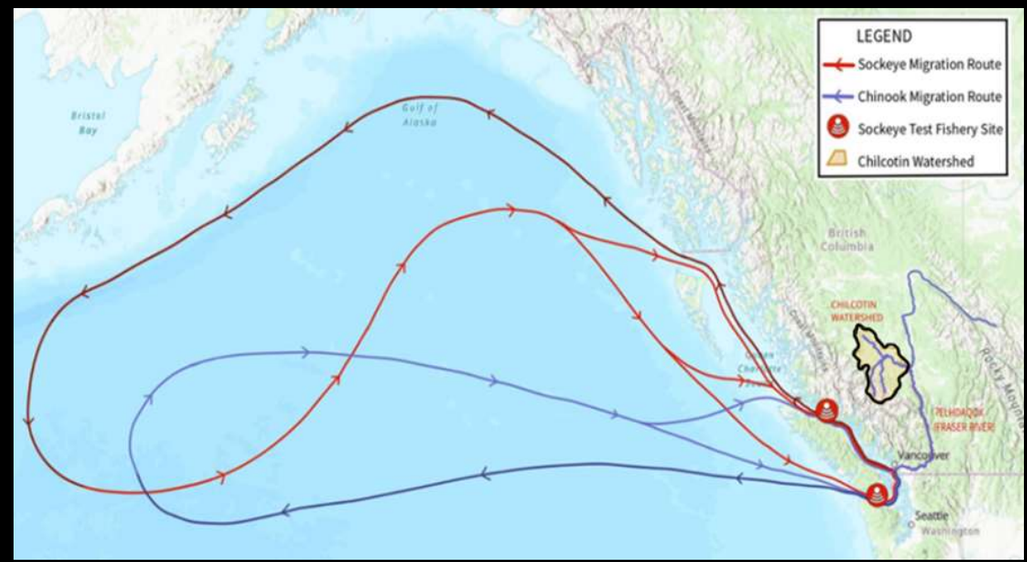
Salmon biodiversity is the foundation for the Tŝilhqot'in Nation's food fishery. Timing of returns span from early May (early-timed Chinook) through until Nov (coho and steelhead).

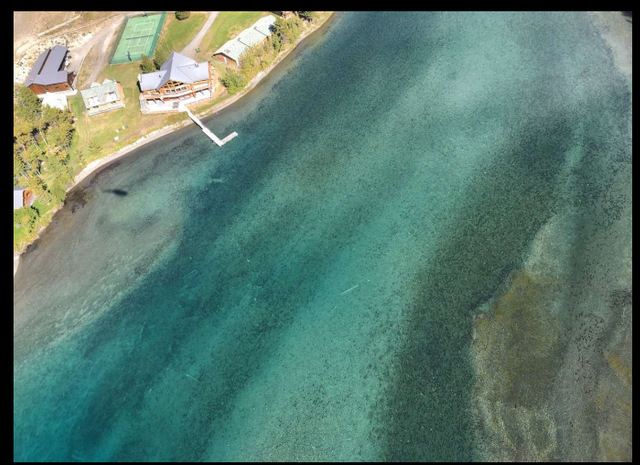
<u>Salmon Biodiversity</u>

- 5 distinct populations of Chinook within two SMU's
- A sub-population of IFC
- 3 distinct populations of sockeye, including the strongest annual Fraser Sockeye population
- Chilcotin River Steelhead
- Pink salmon on odd years

<u>Stocks of Specific Interest to PSC</u>

- Chilko sockeye – forecast to be 50% of 2025 Fraser sockeye return
- Interior Fraser Coho (IFC) – in low status under PST
- 2 Coded Wire Tag (CWT) Chinook stocks



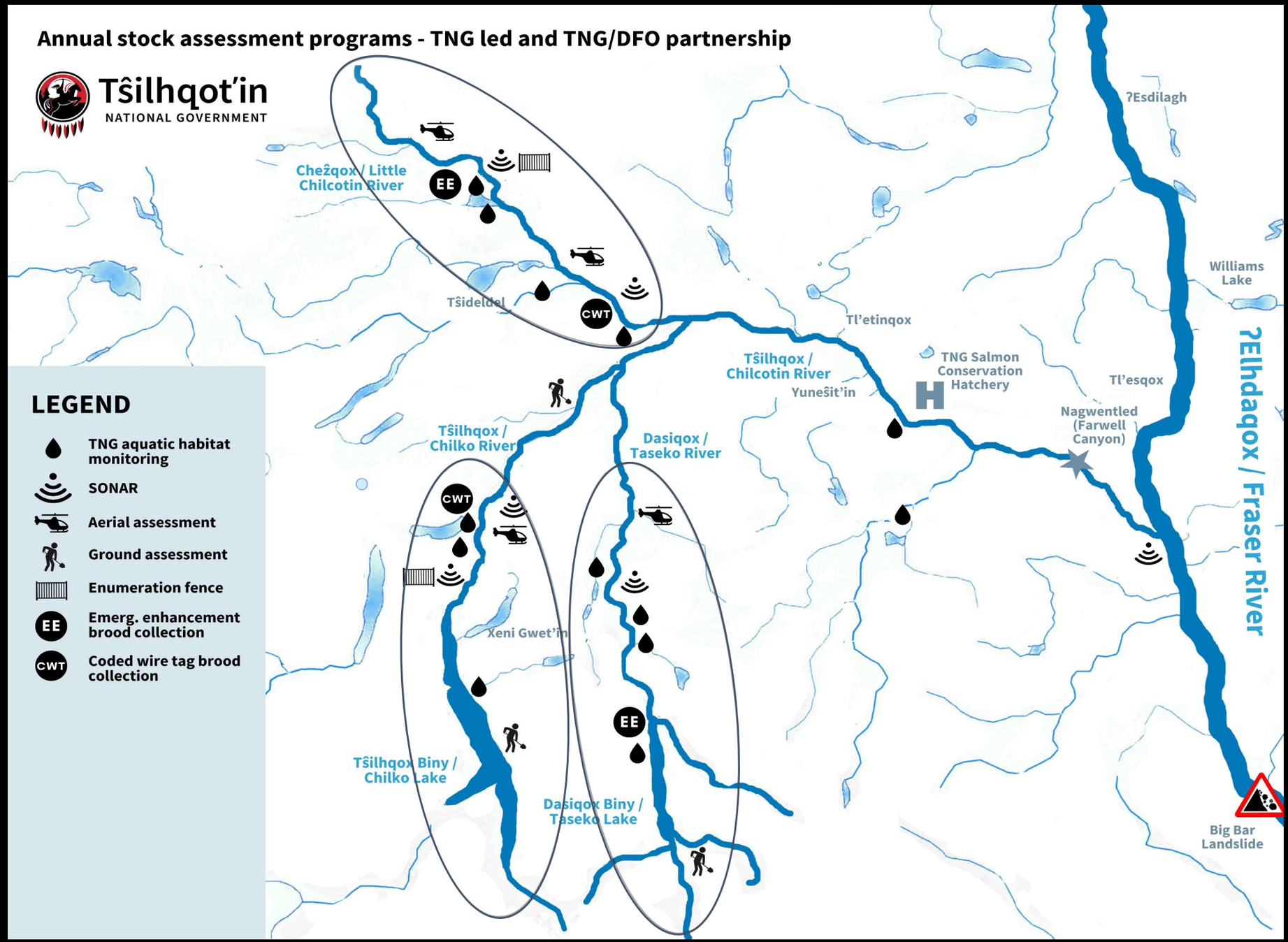


Leading Research and Monitoring

Our expanding stock assessment and monitoring programs have resulted in one of the richest data sets in BC.

This work directly informs:

- TNG pre-season fishing plans
- In-season fisheries management
- Recovery planning and initiatives



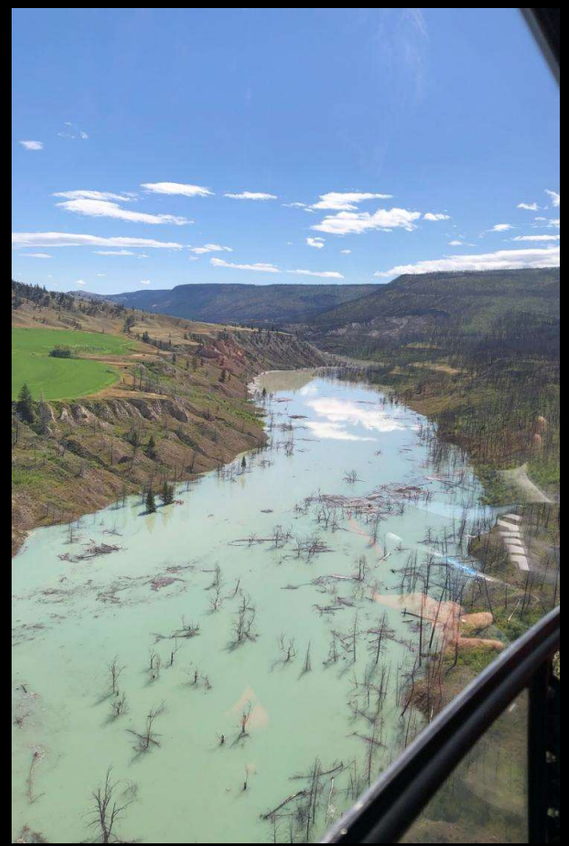
Tŝilhqox (Chilcotin) Landslide: A significant event

- Large landslides are relatively common in the Chilcotin watershed. However – **the impacts from the 2024 landslide and breakout flood appear to have been significant and unique.**
- On July 30 , a landslide blocked the Chilcotin River – full-head blockage hillslope to hillslope approx. 600m across, 30m deep.
- The slide occurred downstream of all sockeye and chinook spawning grounds, during key migration window.

July 31, 2024 - 12 hours after slide event

2024 Tŝilhqox (Chilcotin) Landslide: Impoundment and dewatering

- The water blocked by the slide filled the river valley, forming a lake (impoundment) that extended approx. 11km upstream
- The lake inundated the river's banks and hillslopes which are largely fine soils, resulting in extensive sloughing of hillslopes and wood/debris accumulation into the temporary lakes
- Downstream, the Chilcotin River was completely de-watered from July 30-Aug 5, except for minor inputs from downstream tributaries



2024 Chilcotin Landslide: Breakout Flood

- On Aug 5, the impounded water (lake) breached the dam. Within hours, the river exceeded typical peak freshet levels.
- The estimated peak of the breakout flood was ~4x the 1 in 1000-year flood level, making it an extreme event.
- The flood waters were heavily laden with logs and woody debris – the equivalent of 2.5M dump trucks were moved by the flood.

2024 Tŝilhqox (Chilcotin) Landslide: Post-breakout flood

- The extreme high flows and debris from the Aug. 5 breakout flood created massive erosion, destabilization and recontouring in the channel downstream of the dam.
- Turbidity levels in the Chilcotin River downstream of the slide remained consistently high until a gradual decrease started in late Aug.
- Following the initial breakout flood, remobilization of slide debris resulted in two subsequent river blockages on Sept. 16 and 18 (both breached within 24 hours), resulting in temporary downstream dewatering and spiked turbidity post-breach.

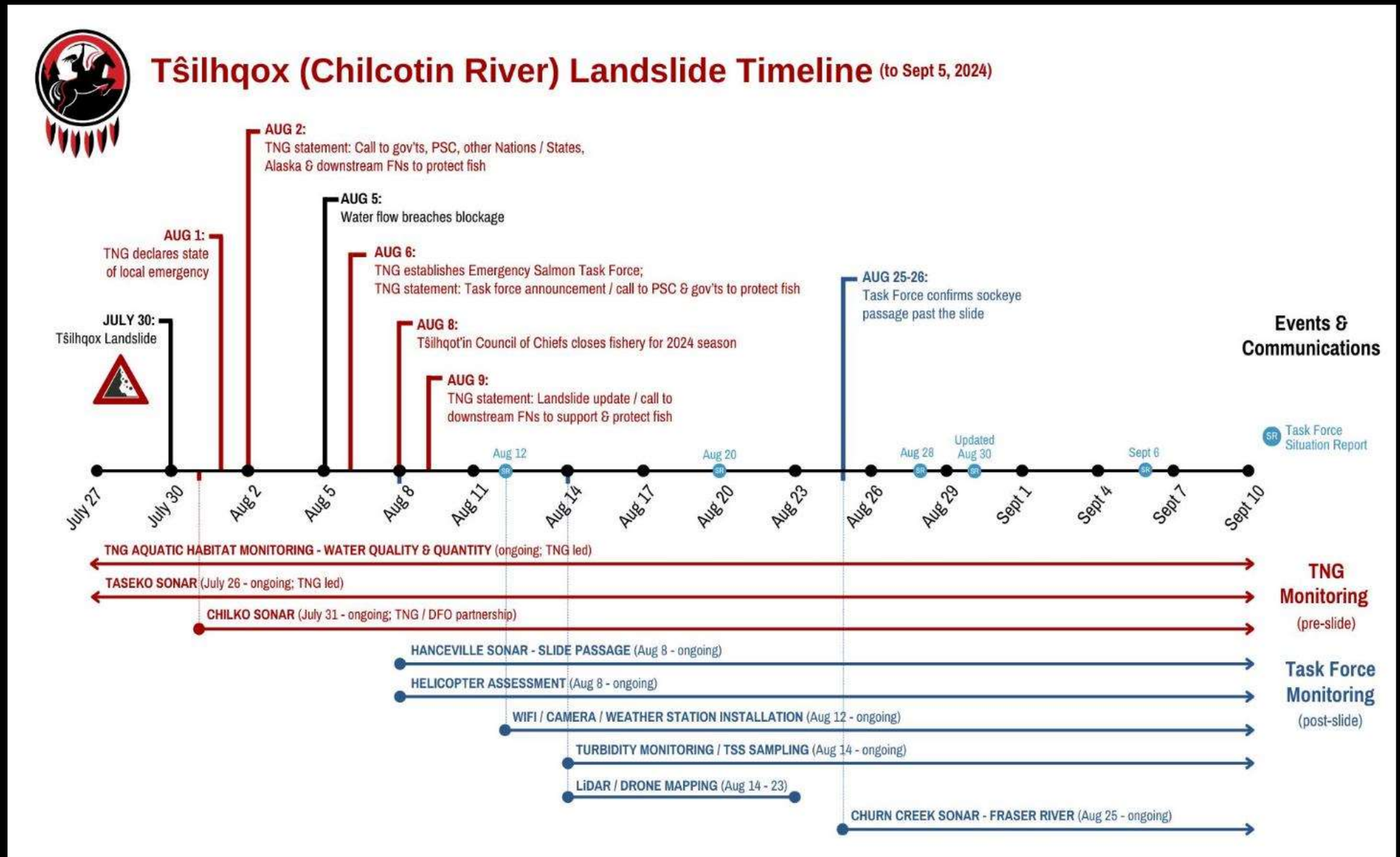
TNG Leads Collaborative Landslide Response

July 30 – landslide occurs

Aug. 2 – TNG calls on US/CA/PSC, downstream FN to protect impacted fish

Aug. 6 – TNG establishes collaborative tripartite Emergency Salmon Taskforce – TNG-led, with TNG, DFO and BC governments, with UFFCA indigenous partner and Ecofish Research technical support.

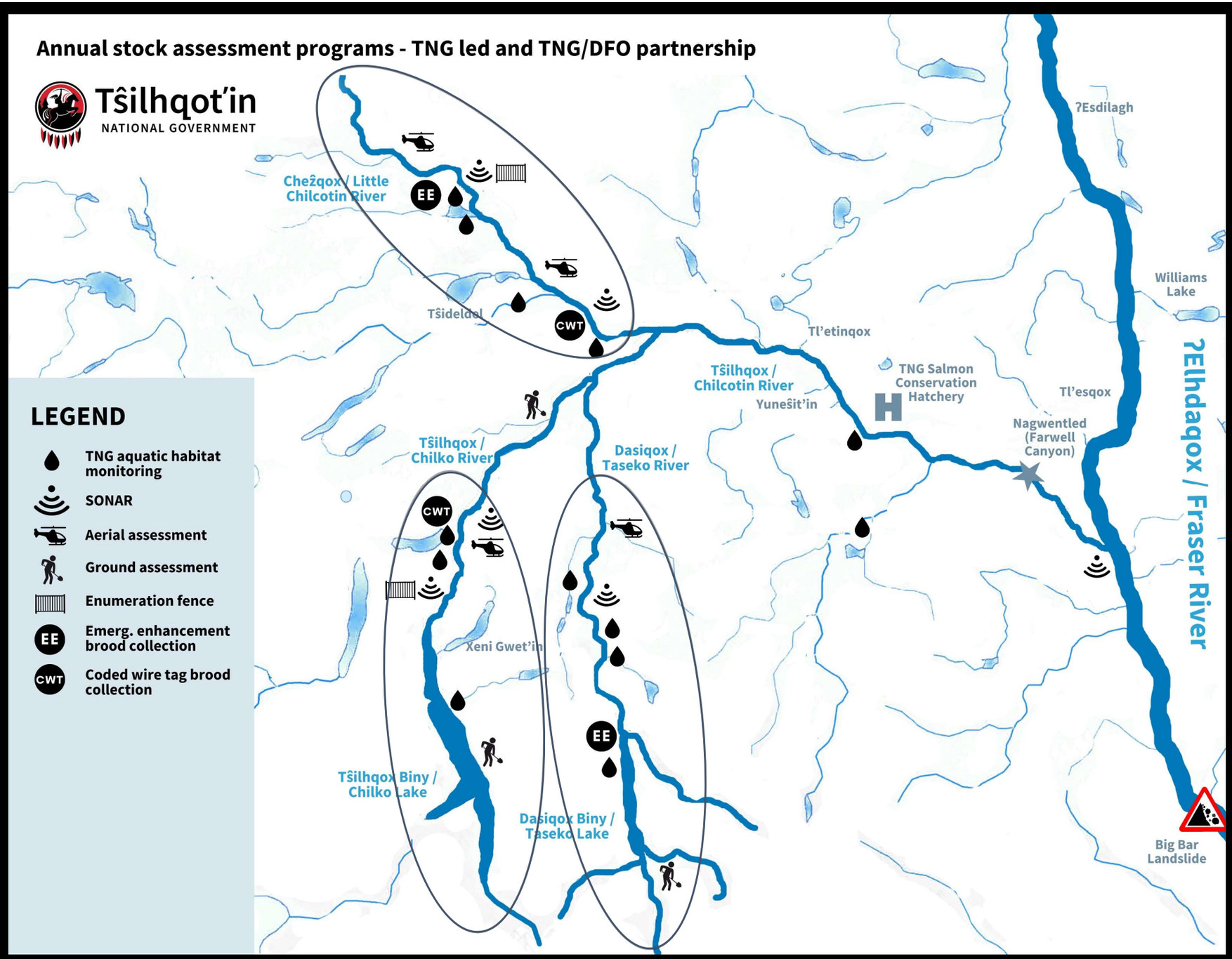
Aug. 8 – TNG-led taskforce begins monitoring programs



TNG-led Taskforce – Landslide Monitoring Programs

- Installation of Hanceville sonar
- Additional helicopter assessments
- Wifi camera/weather stations
- Turbidity monitoring/TSS sampling
- LiDAR/drone mapping

TNG's leadership has resulted in a highly responsive, collaborative and technically rigorous process with tripartite TNG DFO and BC governments, UFFCA indigenous partner and Ecofish Research technical support.



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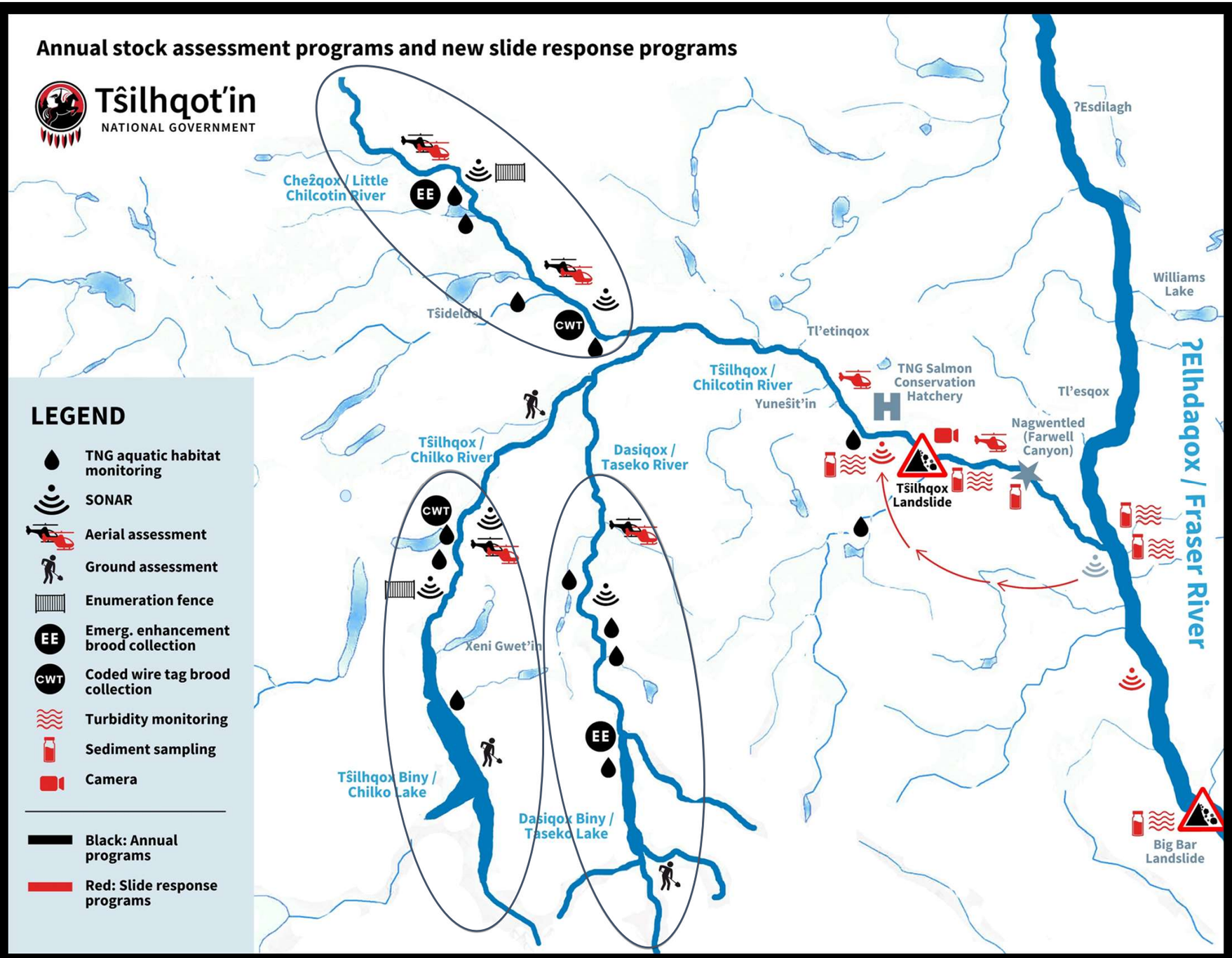


2024 impacts on salmon – in season

1. What we saw/experienced in season
    1. Major turbidity
    2. holding fish
    3. delayed fish
    4. physically impacted fish
    5. evidence of mortalities downstream of spawning areas.
    6. Subsequent sloughing/dewatering events causing physical barriers

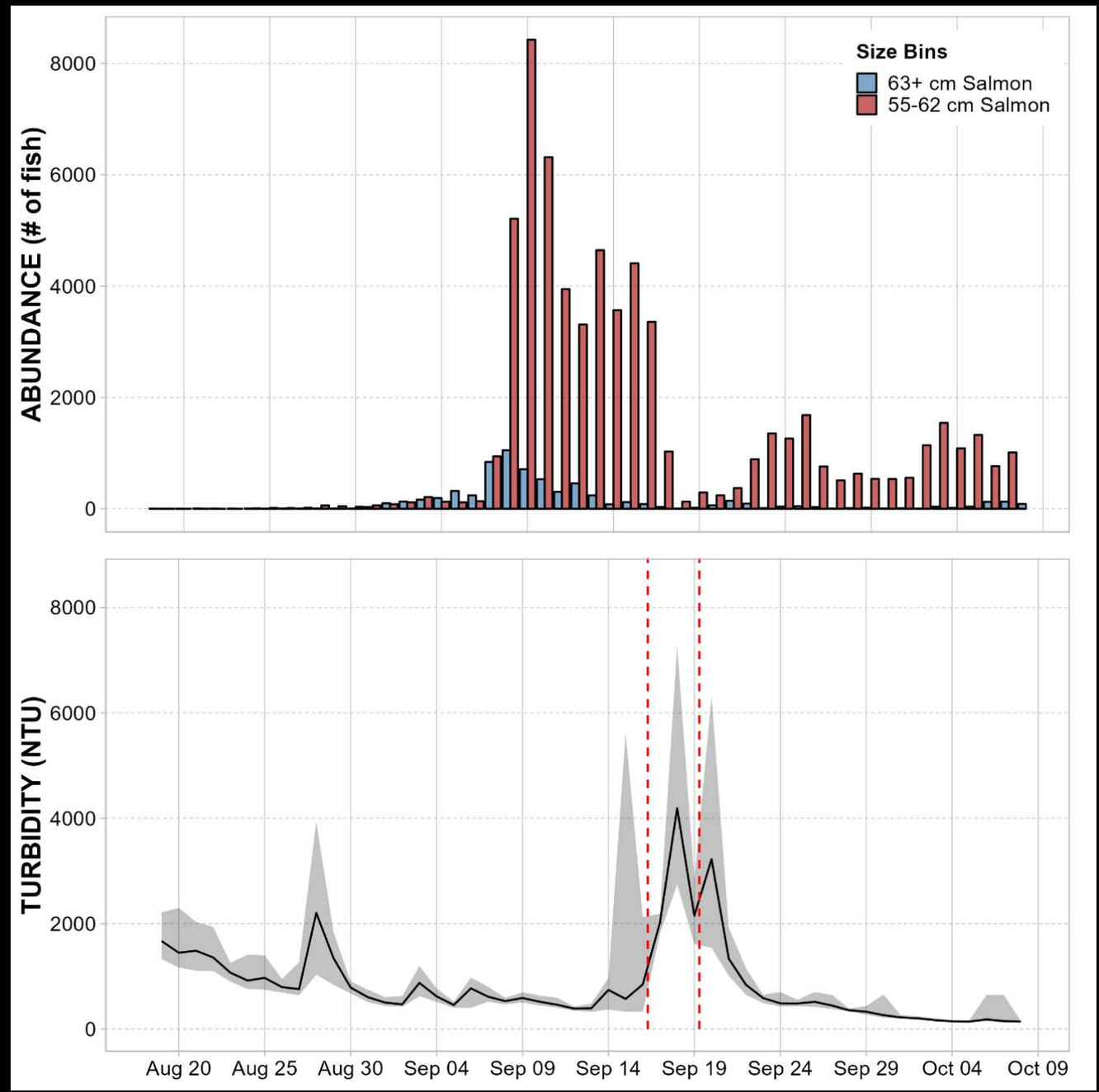
Impacts on salmon

Chilko sockeye – physical damage

2024 impacts on salmon –

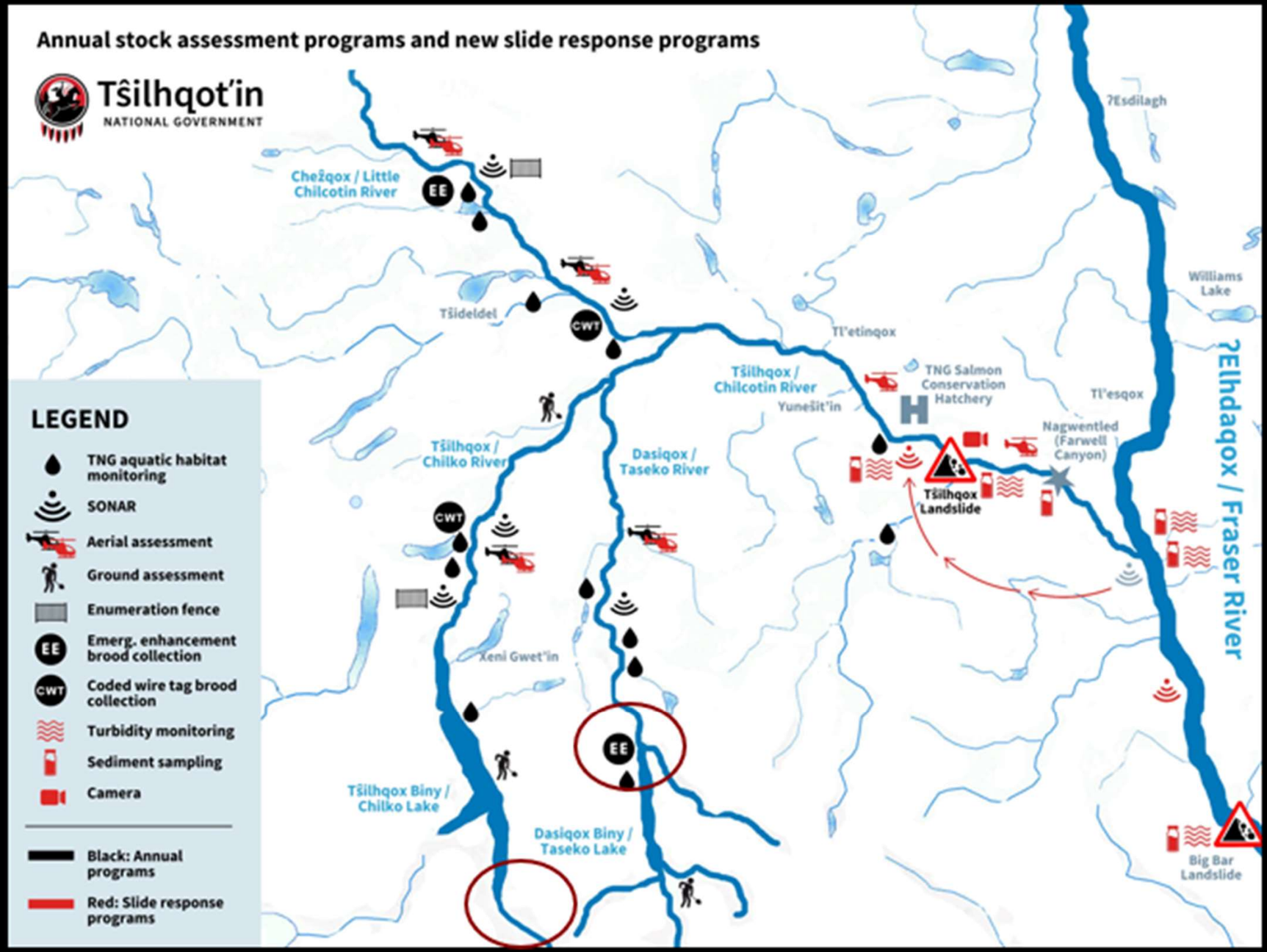
Turbidity and passage

1. What we are learning: Chinook and sockeye were delayed by combos of high turbidity and physical barriers from sloughing events
2. There is on-going post-season analysis.



2024 impacts on salmon –
Early timed sockeye

1. The impacts on early timed sockeye populations were <u>extreme</u>.
2. Early timed Taseko and South end Chilko had <u>near zero returns</u>.
    - We could not collect brood stock for emergency enhancement on Taseko sockeye



2024 impacts on salmon –
Chilko sockeye

1. Impacts on Chilko sockeye – **~3 week delay**
2. En route mortality impact – **50% loss of Chilko sockeye** from ocean return in-season estimate to spawning grounds
3. **Sex ratio skew: 2024 30% Females, 70% Males (**inverted from 2023)
   - Generally higher proportion of females than males in Chilko for past 6 years:
   - Exceptions are when real significant passage challenge. 2019 (big bar), 2024 (hot Fraser, Chilcotin slide).
4. **Significant physical damage** - sandblasted by turbidity

2024 impacts on salmon –
2024 cumulative effects

Chilcotin Landslide impacts were cumulatively added to existing stressors :

- **Fraser River temperatures were higher than average and generally not favourable to sockeye – these conditions persisted throughout the migration period.**
    - High Fraser temperatures created stress/mortality, and migration delay due to slide resulted in even longer exposure to these high temperatures (compared to cold water reprieve they would typically experience entering the Chilcotin River).
- All Chilcotin Watershed salmon stocks are trending downward and/or are of low status
    - Even the strong Chilko Sockeye population is trending down, 2024 was the lowest forecasted return on record.
    - Chinook stocks are generally declining. Lower Chilcotin and Chilko Chinook were delayed 2-3 weeks by slide (early days of analysis).
    - Interior Fraser Coho are of low status and Chilcotin River Steelhead are critically endangered.

Future impacts moving forward

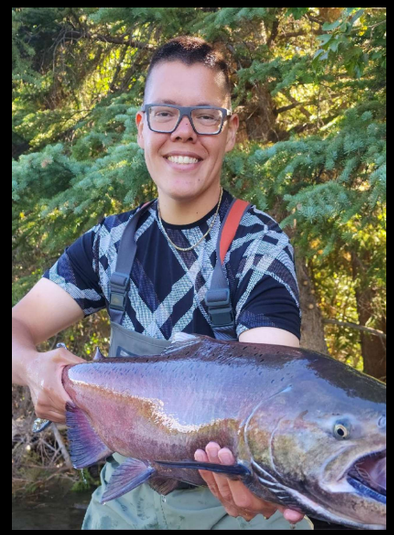
We are now starting to understand the impacts from the slide and breakout flood. Effects assessment to-date find:

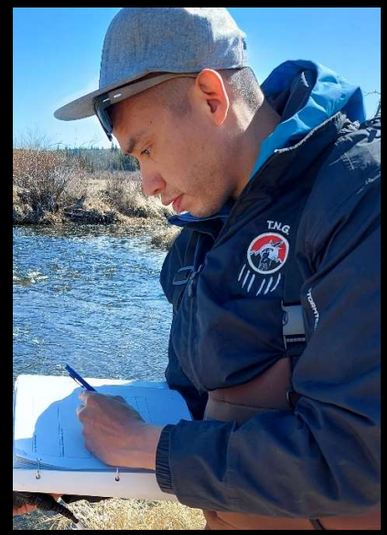
- The outbreak flood and rapid drawdown of the upstream impoundment resulted in extensive erosion and localized bank failures from the top of the impoundment to the confluence of the Fraser River. These banks and slopes remain unstable and are subject to further slides that in some cases could result in full river blockages and turbidity impacts.
- Erosion at Farwell Canyon that would normally occur over a very long period resulted in a high risk of hillslope failure and rockfall in the short-term and a high risk of impediment to fish passage.
- The risks and impacts of the slide on Tŝilhqox (Chilcotin River) salmon are not over – the most significant impacts may be ahead of us.
- TNG and collaborative taskforce working to continue to understand impacts to support development of mitigation options in advance of events.
- Ongoing resourcing and focus required over next years to address these impacts on populations returning to this watershed

Ongoing Chilcotin Slide Risks and Implications for 2025 Management

- We know there will be continued slide impacts in years to come – rock fall and sloughing events are considered imminent, with river ecology and fish passage impacts.
- How can the PSC family work together and with TNG to best utilize our roles and levers to implement a new approach that meaningfully addresses the unprecedented challenges facing the salmon?
- What we can do in advance:
    - Anticipated cumulative impacts, now including known future impacts from the slide, can be integrated into the overall management framework to provide the buffer for healthy salmon returns to support recovery and that prioritizes the Tŝilhqot'in Nation's priority right to harvest.
    - We can develop a responsive management approach that will adapt as slide conditions change and the significance of impacts are understood – pre-season, in-season, and related to the full fish life cycle.
- TNG's leadership in the Chilcotin slide response has resulted in a highly responsive, collaborative and technically rigorous tripartite process with TNG DFO and BC governments and our indigenous partner UFFCA - a model for how we can continue to work together. We continue to invite proactive, collaborative approaches to address this new challenge that impacts salmon that are important to all of us.

Sechanalyagh / Thank You:





Thank you to members of the TNG-led Taskforce – TNG, DFO and BC governments, Indigenous partner UFFCA, and technical support from Ecofish Research.

TNG Fisheries Team and TNG Rangers