Climate -mediated cumulative stressors shape population dynamics of Upper Fraser River Chinook Salmon



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Trinity Consultants

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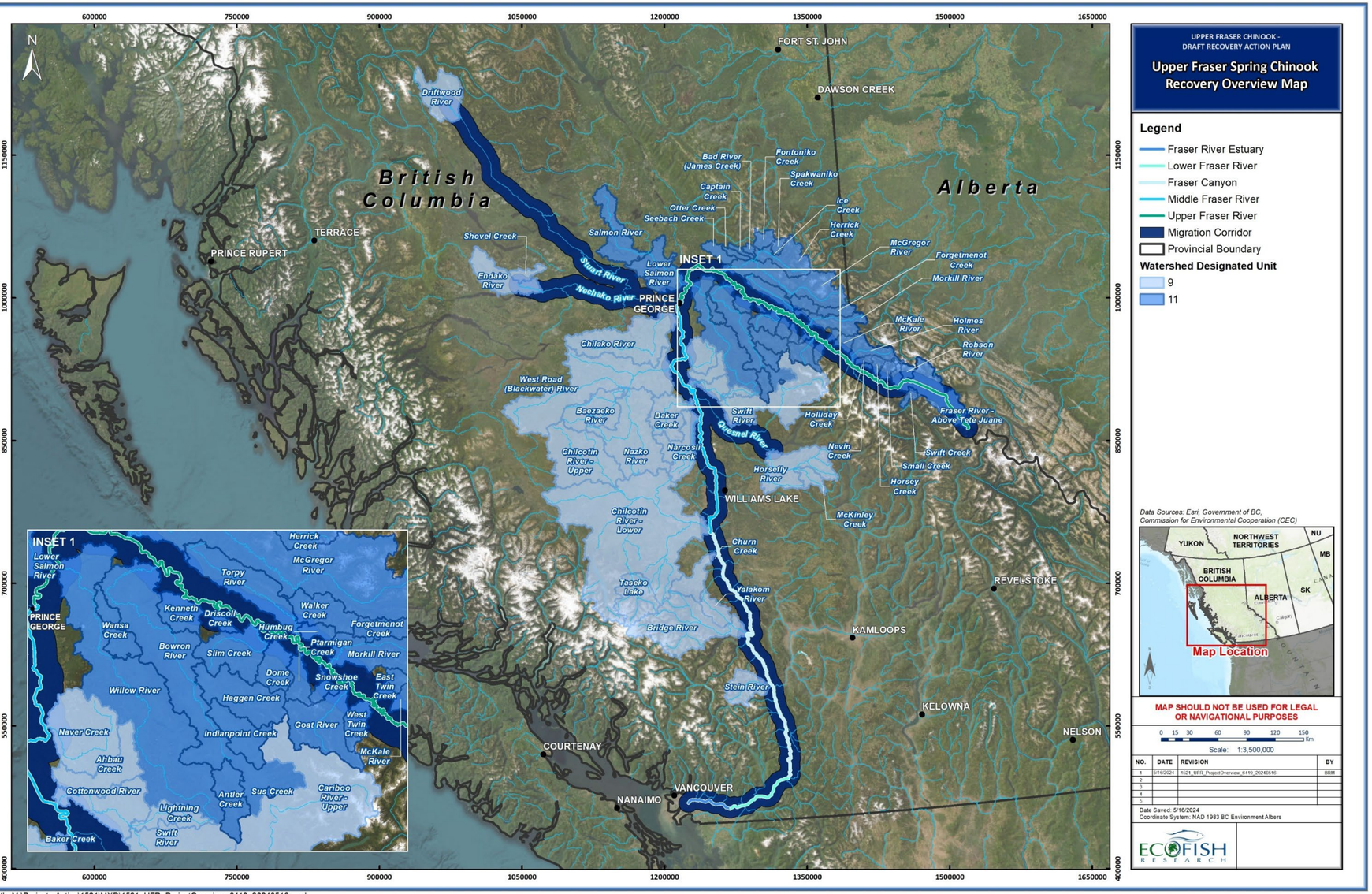
Background



- Upper Fraser River Spring 5_2 Chinook are important to ecosystems, people, and the economy
- Two populations: Upper Fraser Spring 5_2 and Middle Fraser Spring 5_2
- Over 60 distinct spawning streams

Questions

1. **What is the current status of Upper Fraser Spring 5_2 Chinook Salmon and their environments?**

2. What caused the decline of Upper Fraser Spring 5_2 Chinook Salmon and what is preventing their recovery?

3. What actions can be taken to stop the decline of UFR Spring 5_2 Chinook Salmon and promote their recovery?

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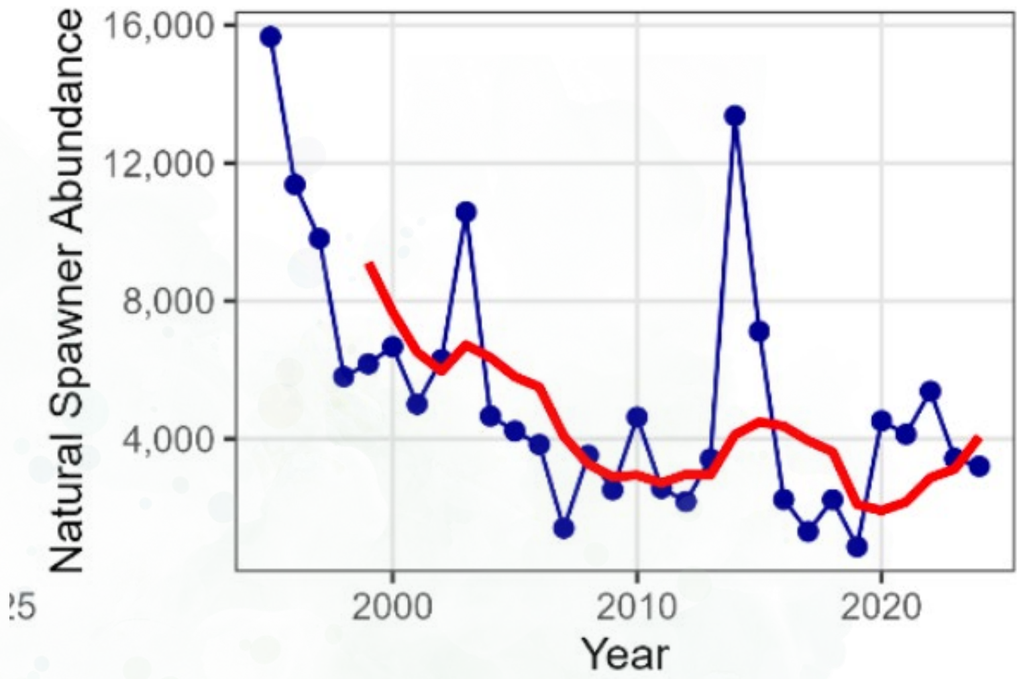
Status

- Assessed as Endangered / Threatened in 2016
- Significant fisheries management measures expanded in 2019
- Reassessed in 2024 and now at lower risk of extinction

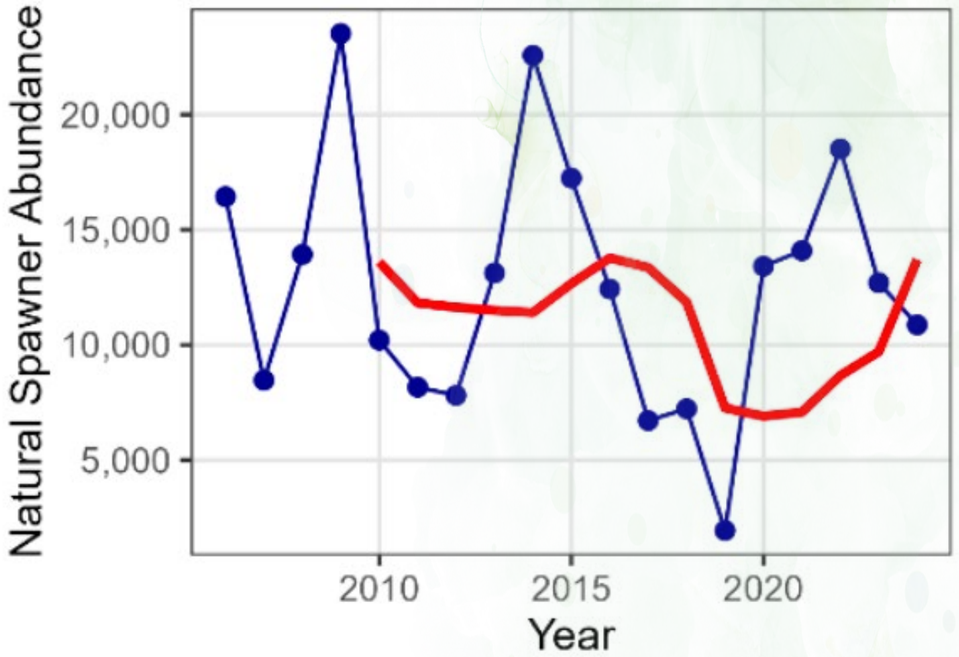


Status

Middle



UPPER



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THREAT ASSESSMENT

- Considered the full life cycle (i.e. all life stages) of UFR Spring 5_2 Chinook salmon;
- Included all major environment types (i.e. freshwater, estuarine, and marine) used during the Chinook salmon life cycle;
- Systematically assessed and ranked threats in each environment for each life stage



THREAT ASSESSMENT

Threats were scored based on:

- Spatial extent
- Timing
- Magnitude of impact



THREAT ASSESSMENT

TIER 1 :

- COMPETITION



COMPETITION

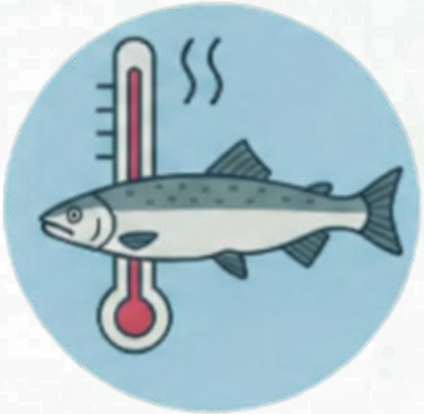
THREAT ASSESSMENT

TIER 2 :

- LOW STREAMFLOWS
- HIGHWATEr TEMPERATURE



LOW STREAMFLOWS



HIGH water temperature

THREAT ASSESSMENT

TIER 3 :

- PATHOGENS
- PREY ABUNDANCE
- FISHERY BYCATCH
- PREDATION



PATHOGENS



PREY ABUNDANCE



FISHERY BYCATCH



PREdation

Questions

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Actions

- Actions scored based on feasibility, cost, and how much they are expected to increase abundance
- Prioritize actions based on their overall benefit
- Also scored priority research actions



Actions

1. Increase conservation hatchery production
   - Low cost, high feasibility

2. Remove aquaculture sites along migration route
   - Low (direct) cost, high feasibility, uncertain benefit

3. Actions to reduce international pink and chum hatchery production
   - Lower feasibility and higher cost, but higher benefit

4. Support low-tech process-based restoration and recover hydrological integrity through revegetation
   - Very feasible, but expensive and moderate benefit

Limitations

- 1. Data gaps & uncertainty across life stages (especially marine)
- 2. Limited quantitative modelling →reliance on expert judgement
- 3.Broad scale may miss local dynamics and priorities
- 4. Recovery not straightforward due to interacting pressures & trade-offs

conclusions

- Declines driven by multiple interacting threats across the full life cycle
- Marine factors are the primary constraint on recovery
- Freshwater actions are important but insufficient on their own
- Recovery requires coordinated, adaptive, cross-jurisdictional action




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