The Future of Bull Trout populations and management in Washington and British Columbia
Wednesday, March 21st 2018, 3:20-5:00pm
Vineyard 3
Welcome to the Symposium, to Kelowna, & to BC, all!
We thank the Okanagan people for welcoming us on their traditional territory.

Chairs of this session:
Dr. Nikolaus Gantner, BC Ministry of FLNRORD, Prince George, BC
Shawna Warehime, Eastern Washington University, Cheney, WA
Rachel Chudnow, UBC Fisheries Centre, Vancouver, BC

Char of this session:
*Salvelinus confluentus*
Why hold a Bull Trout symposium?

- Bull Trout (BT) are federally listed with some level of conservation concern throughout their range.
- Environmental and anthropogenic stressors pose threats to BT in British Columbia and Washington.
- Climate change is one major stressor, as water temperature is often the most important environmental parameter delineating BT distribution.
- Land use practices (hydro, forestry and fisheries management practices) can further affect BT populations directly and indirectly.
The goals for today:

1. share lessons learned and success stories from the past
2. discuss future strategies to assess and manage BT.

Format for our Symposium:

• 5 x 20 min presentations, includes time for Q&A
• Contributions from BC Ministry, BC Hydro, Yakima Nation, & academia (UBC)
• Contributors asked to keep to the allotted time…
  • 5 min ‘wink’, 1 min ‘warning’, 0 min ‘hook and tackle’
Contributors this afternoon:

<table>
<thead>
<tr>
<th>Title</th>
<th>Presenter</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate change influence on Upper Fraser Watershed and Bull Trout habitat</td>
<td>Nikolaus Gantner</td>
<td>BC Ministry of Forest, Lands, Natural Resource Operations and Rural Development</td>
</tr>
<tr>
<td>Bull Trout in the Yakima basin: a proposal to prevent future declines</td>
<td>Todd Newsome</td>
<td>Yakama Nation</td>
</tr>
<tr>
<td>Predator-prey interactions between Bull Trout and juvenile Sockeye Salmon in Chilko Lake, British Columbia</td>
<td>Nathan Furey</td>
<td>University of British Columbia and University of New Hampshire</td>
</tr>
<tr>
<td>Evaluating the effectiveness of fish passage operations for resident Bull Trout at a flood storage dam in Southeastern British Columbia</td>
<td>Katy Jay</td>
<td>BC Hydro</td>
</tr>
<tr>
<td>Hierarchical bayesian meta-analysis to characterize cross-population variation in the stock-recruit relationship for Bull Trout (<em>Salvelinus confluentus</em>)</td>
<td>*Rachel Chudnow</td>
<td>The University of British Columbia</td>
</tr>
</tbody>
</table>
Climate Change Influence on Upper Fraser Watershed and Bull Trout Habitat

Nikolaus Gantner¹, Vanessa Foord², John Rex², Sean Barry², Susanne Williamson³, Ian Spendlow¹, and Ray Pillipow¹

¹Fisheries Team, BC Ministry of Forest, Lands, Natural Resource Operations and Rural Development (FLNRORD), Omineca Region, Prince George, BC
²Research and Stewardship Team, BC Ministry of FLNRORD, Omineca Region, Prince George, BC
³BC Ministry of the Environment and Climate Change Strategy, Omineca Region, Prince George, BC
Omineca 7A
~130,000 km²
Fraser River headwaters
~700-1300 rkm from Pacific

Three BT life histories
• Resident
• Fluvial
• Adfluvial

Chinook salmon (1200 rkm)
Sockeye salmon (900 rkm)
Omineca 7A: Middle and Upper Fraser Bull Trout studies

- Pacific and Arctic populations
- Moderate/slow growth
- Max age ~15 yrs
- Age at maturity ~7 yrs
- Adfluvial, fluvial, resident life history forms
- Highly mobile
- Spawn at high elevation (1000m), ground water streams.
- Highly vulnerable to exploitation
- Catch & release, retain 1 >50cm from lakes
- Vulnerable to habitat and temperature changes
BC’s Bull Trout conservation….

1994 Bull Trout are **Blue Listed** by the BC Conservation Data Centre, considered a “Species of Special Concern”

- Identified wildlife management strategy includes Bull Trout

2011 Provincial management planning & COSEWIC develops national BT conservation status update.

- Information synthesis and risk assessment for BC Bull Trout (Hagen and Decker 2011)
- National BT assessment produced (COSEWIC 2012) *DU5 “Pacific populations - NOT AT RISK”*

2013 expert workshops held provincially.

- BT management plan for BC (Pollard et al. 2015)
- BT management model introduced (van Poorten et al. 2015)
Regional management “metapopulation concept”

2011-2016 Bull Trout distribution evaluations mid-upper Fraser

- Spawner abundance: Redd counts
- Movements of fluvial BT from upper Fraser streams
  - 150 radio tags in natal systems
  - 350 PIT tagged in key-overwintering locations
- Otolith microchemistry (ongoing)
FLNRORD redd count data

Example: Goat River 2001-2016
Trend through ~1 BT generation
Regional management “metapopulation concept” (con’t)

2011-2016 Bull Trout distribution evaluations mid-upper Fraser

• DNA of Nechako overwintering BT suggests mixed stock

• Concurrent BT modelling by UBC -> Risks and trade-offs of sustainable fishing options

Taylor et al, in prep

Rachel Chudnow – this Symposium
Bull Trout Core Areas
• 15 putative metapopulations

Bull Trout Designated-Watersheds
• 51 unique stream networks delineated

ca. 2011

Hagen and Decker 2011

present

Hagen et al. 2017
Regional management “metapopulation concept”

Key recommendations:

• Priority regional areas to address information adequacy
• Further need to map/inventory critical habitat
• eDNA for rapid & widespread distribution mapping
• Thermal habitat suitability (i.e. cold water climate shield)
• New Case Study…
Case study: Bull Trout Climate Action project

Study site:
Bowron River Watershed

Objectives
1. Identify areas of potential risk to BT from climate change
2. Identify areas of potential climate refugia for BT
3. Provide science-based advice to decision makers regarding management actions

Fun fact: mid-1980s “Bowron Cut”: 300-plus-square-kilometre clear cut visible from space
Fig 9. : A) stream temperatures under Scenario 1 baseline and future deltas, B) Scenario 25 with no sensitivity adjustments
Climate change in the Omineca Region

- Mean annual air temperature increased by 1.3°C through past 100 years and is projected to further increase by 3.5°C by 2055.
- Recently experienced below average snowpacks coupled with warm, dry summers → increasing stream temperatures.
- Aligns with our Omineca Climate Action Plan and the ministry’s Climate Change Strategy
- 4 met stations throughout watershed
- Historical data available (1885-present)
The Bowron Watershed Hydrology

- one of 51 BT - Designated Watersheds
- Relative proximity to Prince George.
- Relevant model input data available.
- 50 air and water temperature loggers to be deployed this Aug
- Historical data explored
Bowron River Bull Trout

✓ BT presence / absence well documented
✓ Not major contributor to Nechako BT
✓ Identify most sensitive areas to stream and riparian air temperature increase.
✓ Inform fisheries habitat, water management, as well as conservation planning and management activities influenced by future climatic conditions.
✓ Implement watershed-specific forestry and riparian management practices to mitigate projected temperature increases to lower risk of future BT habitat loss.
Planned eDNA sampling 2018

COOP Student & PICS Intern
~50 sites + electro-fishing

Carim et al., 2016
Summary

• Bull Trout in the Upper Fraser are well studied and a Management Plan was recently established.
• BT are susceptibility to climate change, yet the extent is yet to be determined.
• Modelling stream temperatures to characterize BT resilience and susceptibility to Climate Change allows us to identify optimal management strategies to mitigate potential risk.
• Results are applicable to conservation of other salmonids, including Arctic Grayling across our region.
The Future of Bull Trout populations and management?
References:


