

# Achieving late summer flows in the Nicola River watershed through reservoir releases and curtailment of surface water and groundwater withdrawals

Rich McCleary and Kim DeRose

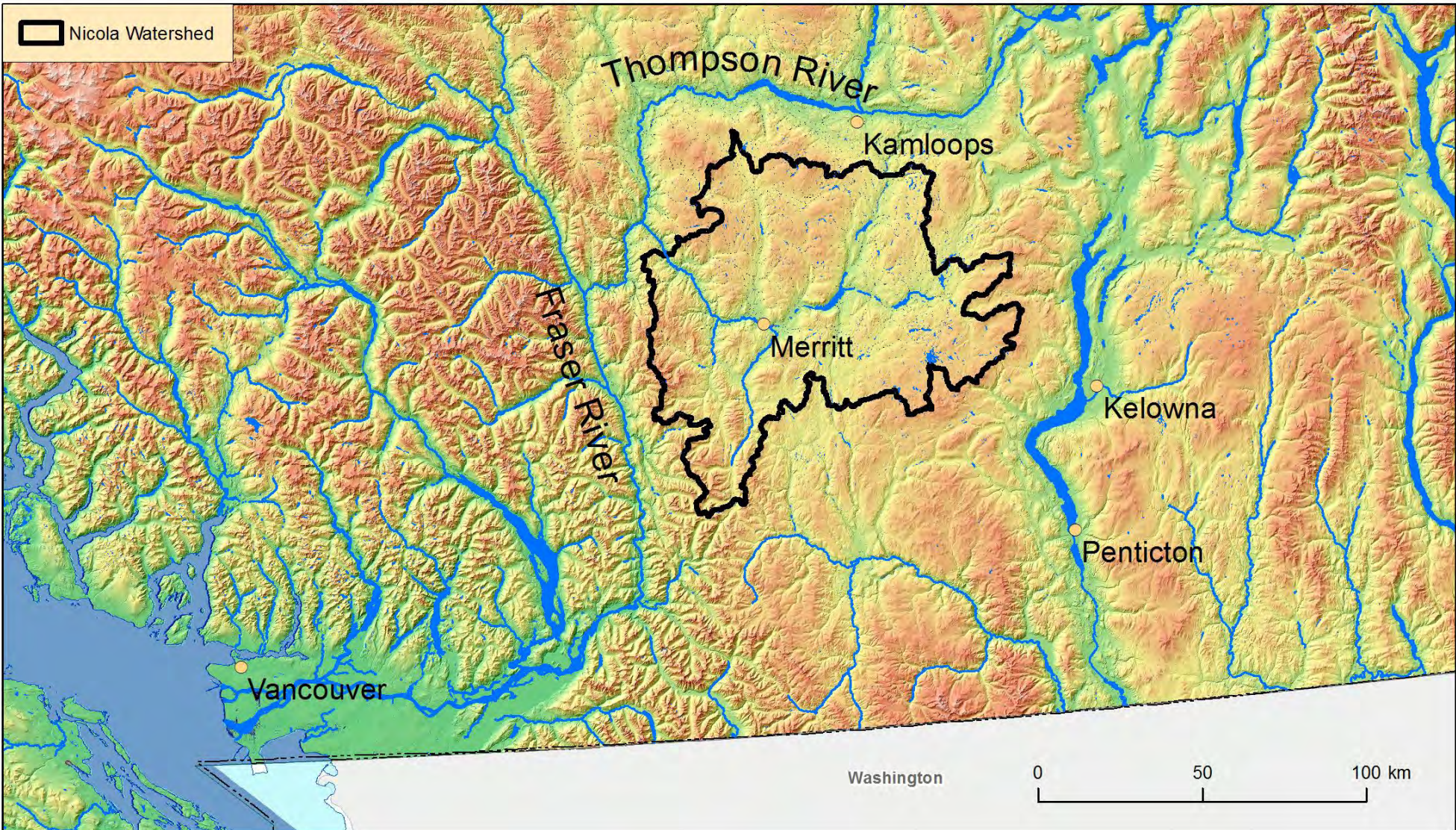
Ministry of Forests, Lands, Natural Resource Operations and Rural Development [rich.mccleary@gov.bc.ca](mailto:rich.mccleary@gov.bc.ca) 250-671-6321 [kim.derose@gov.bc.ca](mailto:kim.derose@gov.bc.ca) 250-378-8431

Conclusion

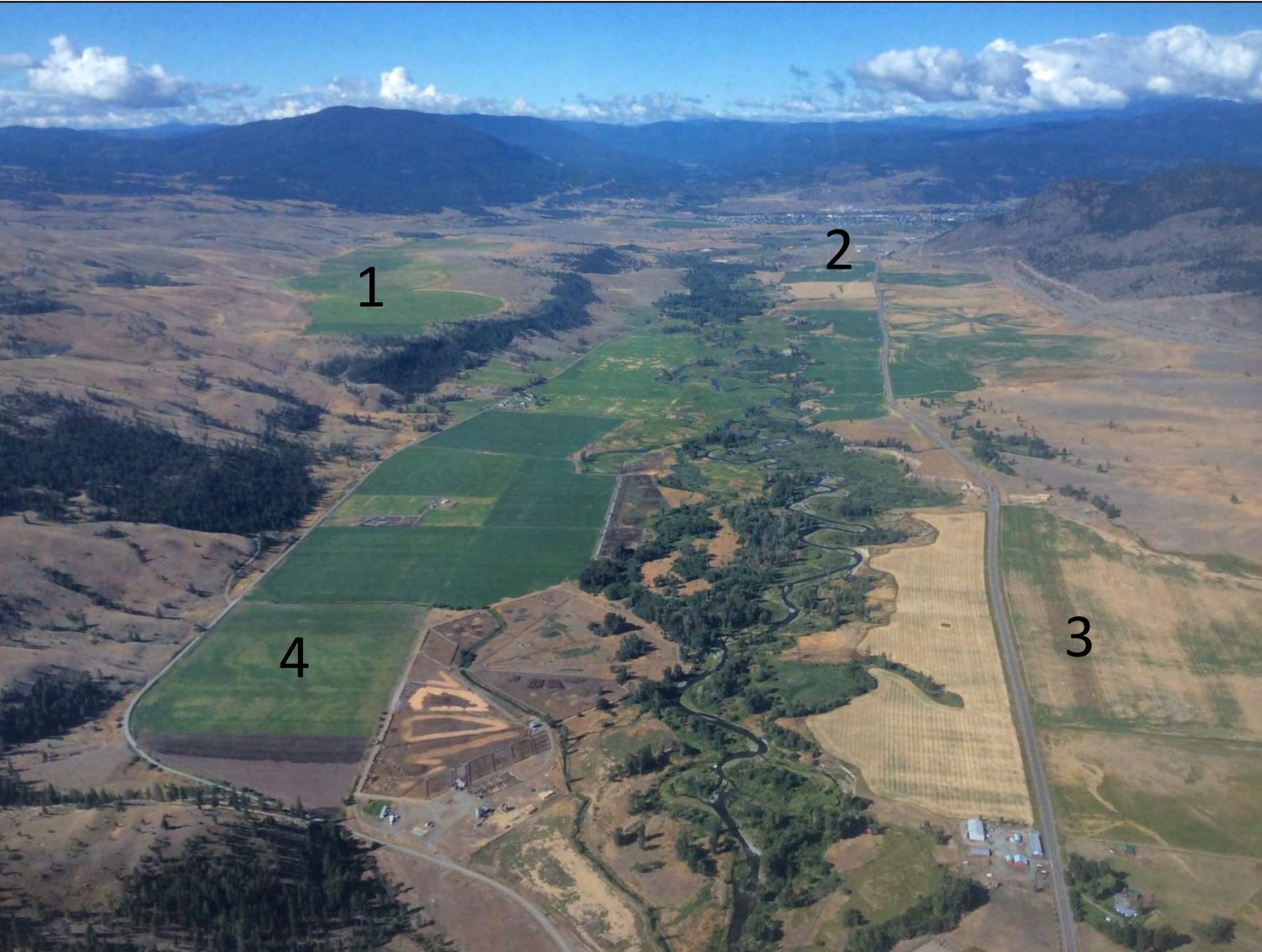
Recent advances in the legal, technical and cultural frameworks provide a timely opportunity to implement additional mitigations to reduce water-use related stresses that are contributing to the steady decline in anadromous fish populations in the Nicola River.

Introduction

The Nicola River is a Fraser River tributary that lies in the rain shadow of the Coast Mountains. The arid watershed provides spawning and rearing habitat for chinook salmon, threatened coho salmon and endangered steelhead. In addition to their ecological and commercial values, these fish are integral to the indigenous peoples’ culture. Low water levels and high temperatures in the late summer limit fish survival.



Water is required for industrial agriculture and municipal purposes. In the late summer, water is supplied from four different sources as shown below. Laws relating to use and curtailment are specific to each source.



Late Summer Water Source

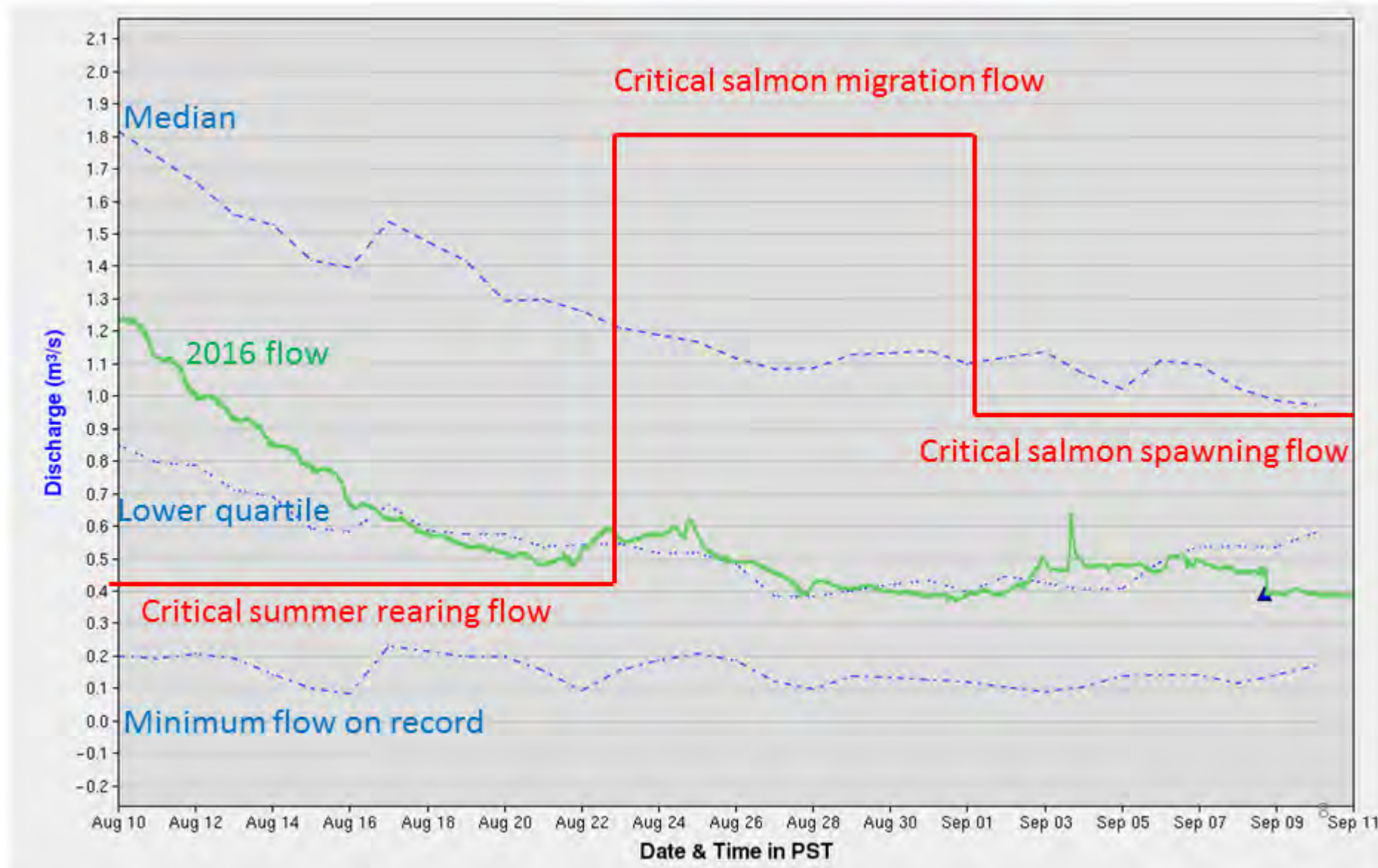
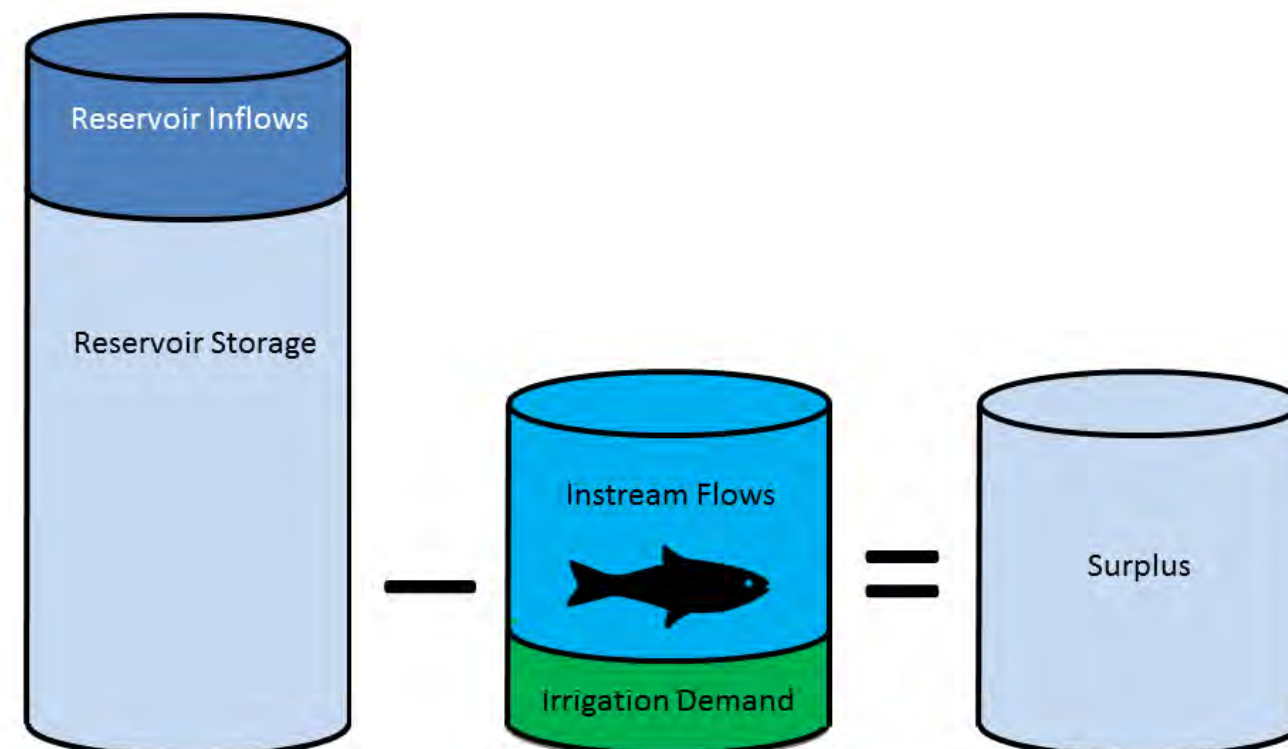
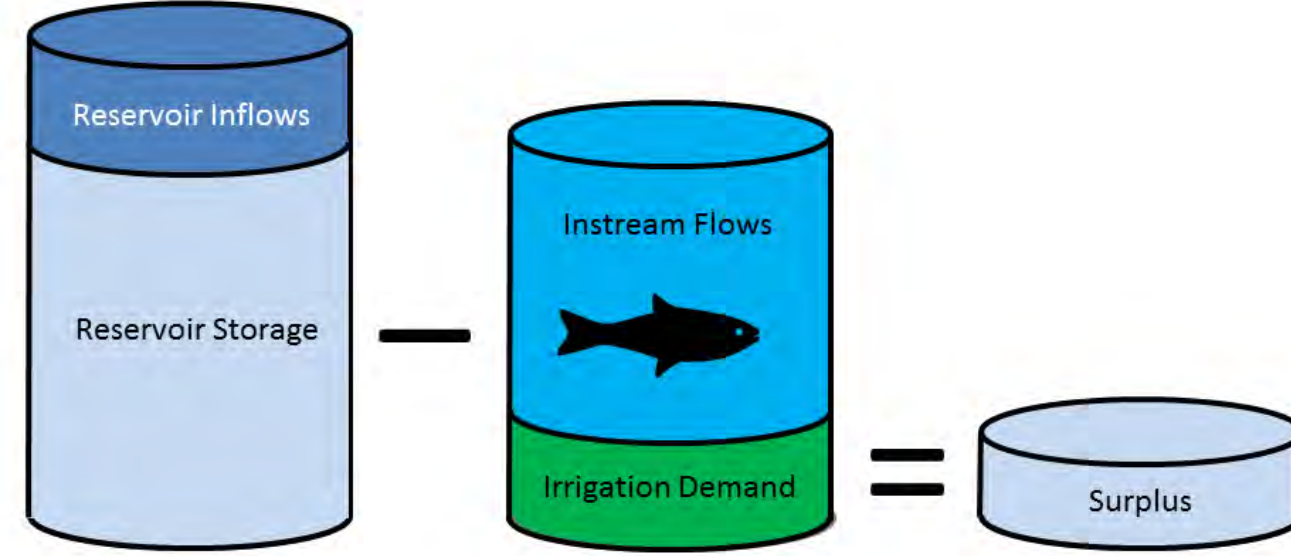
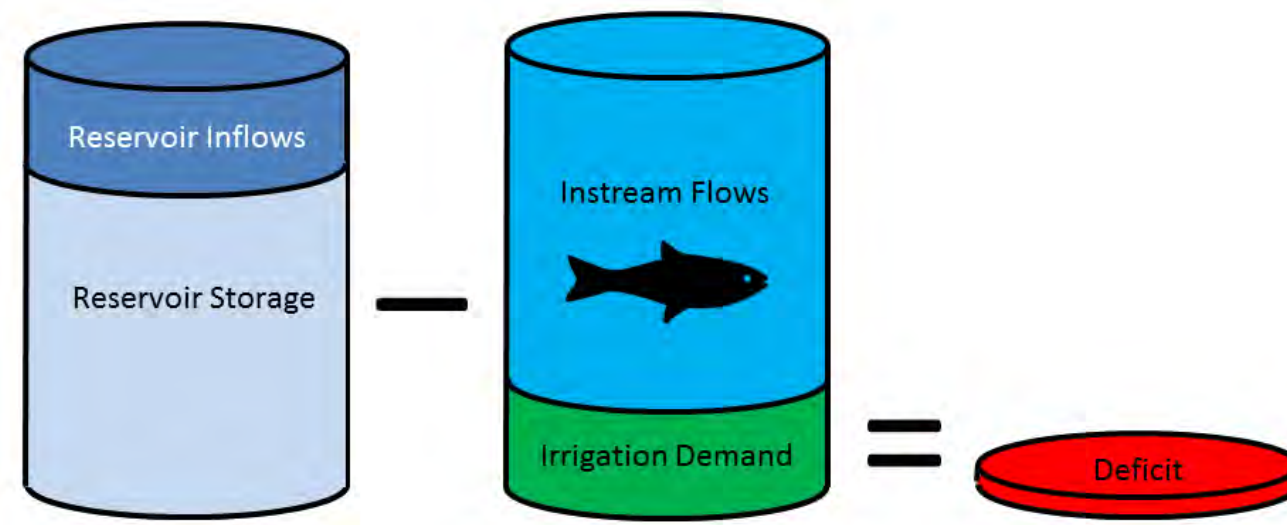
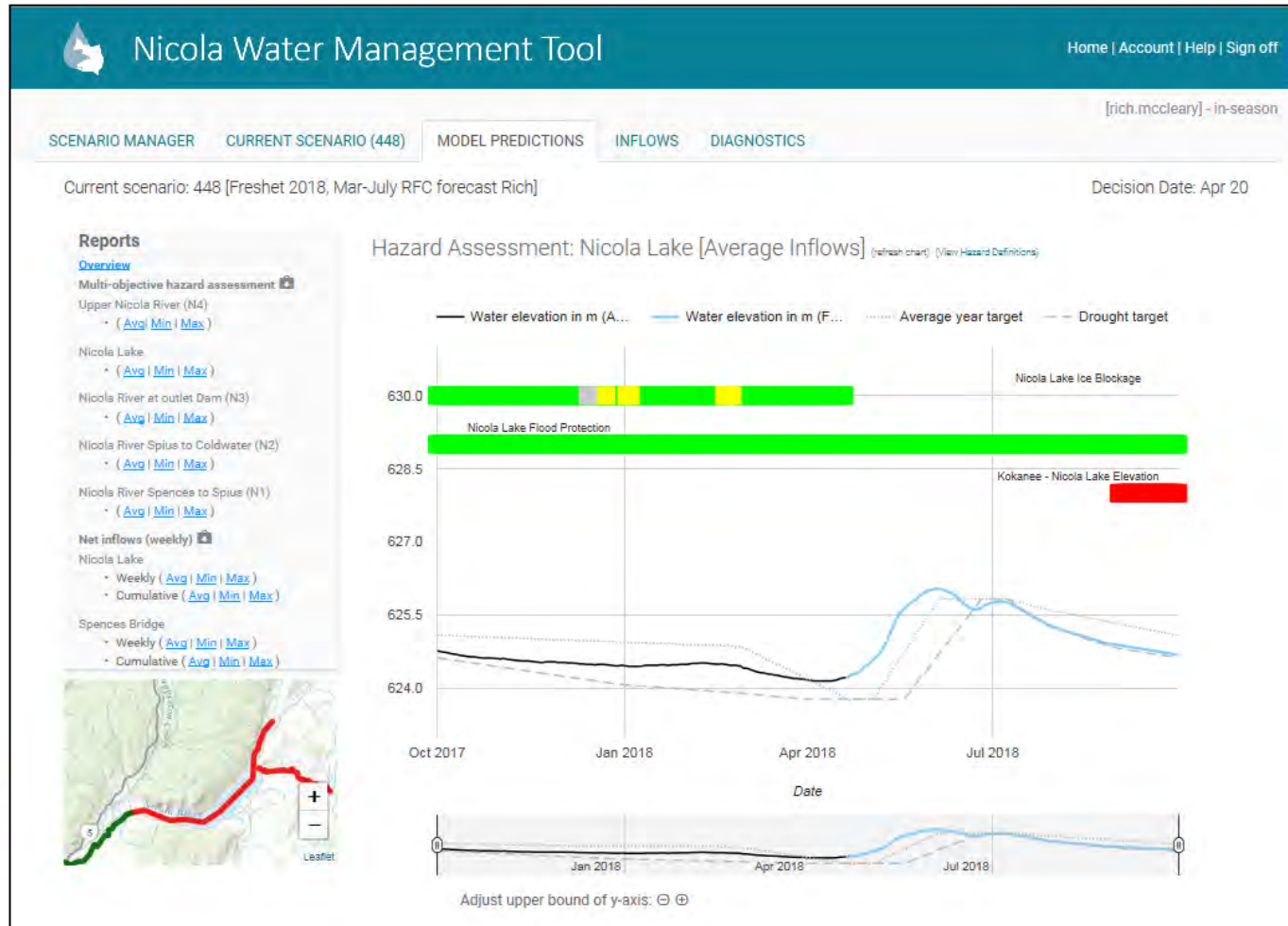
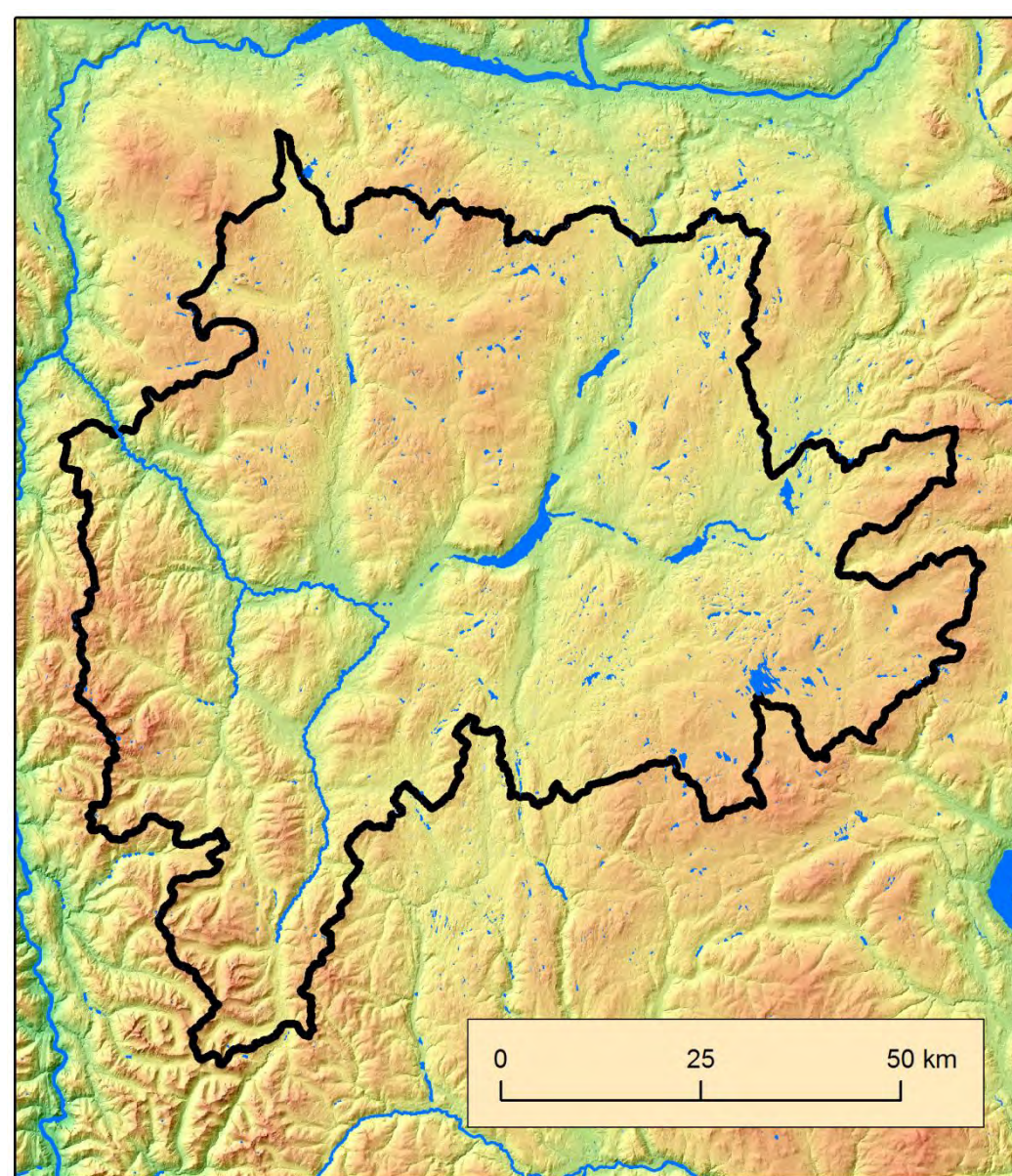
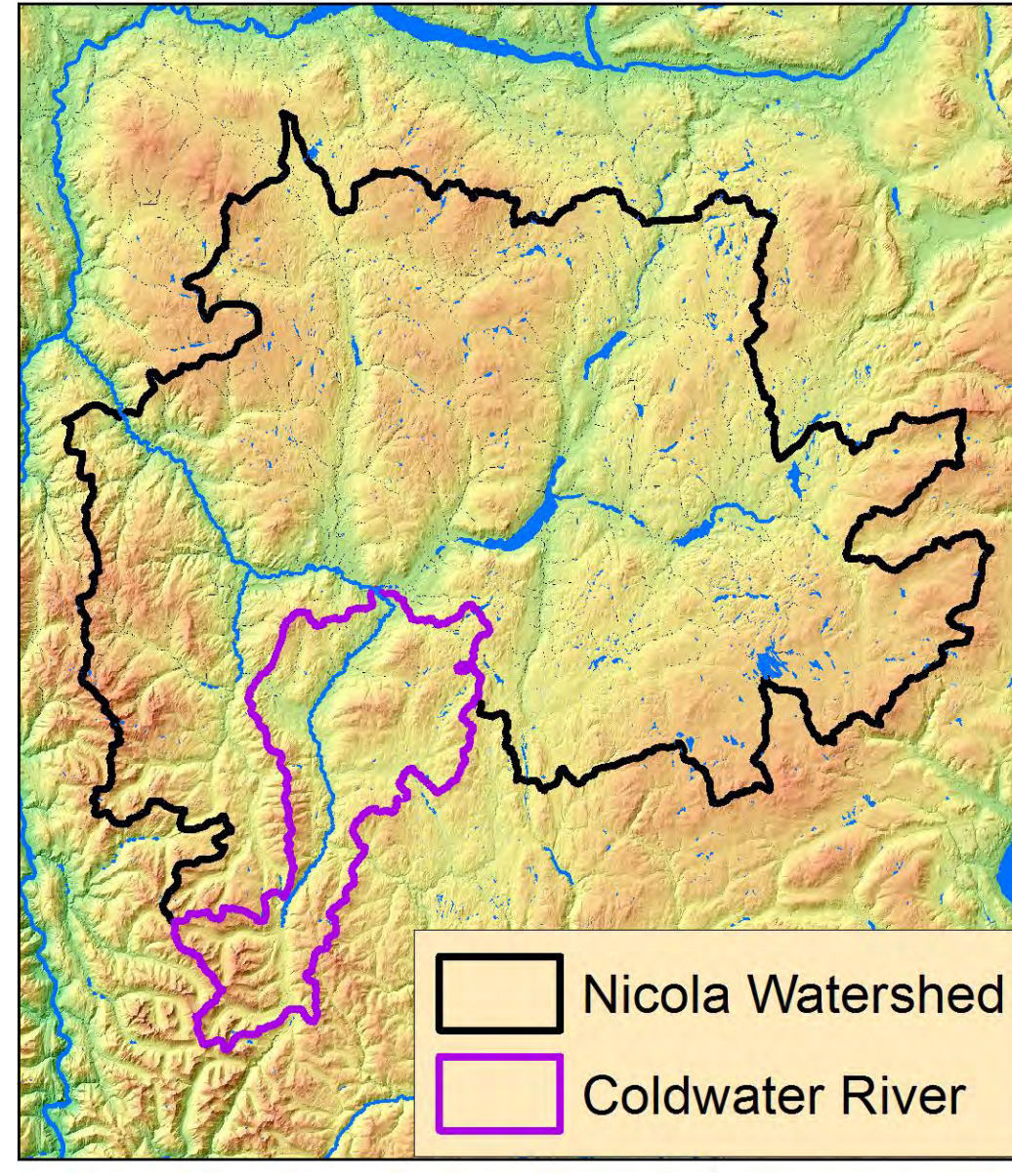
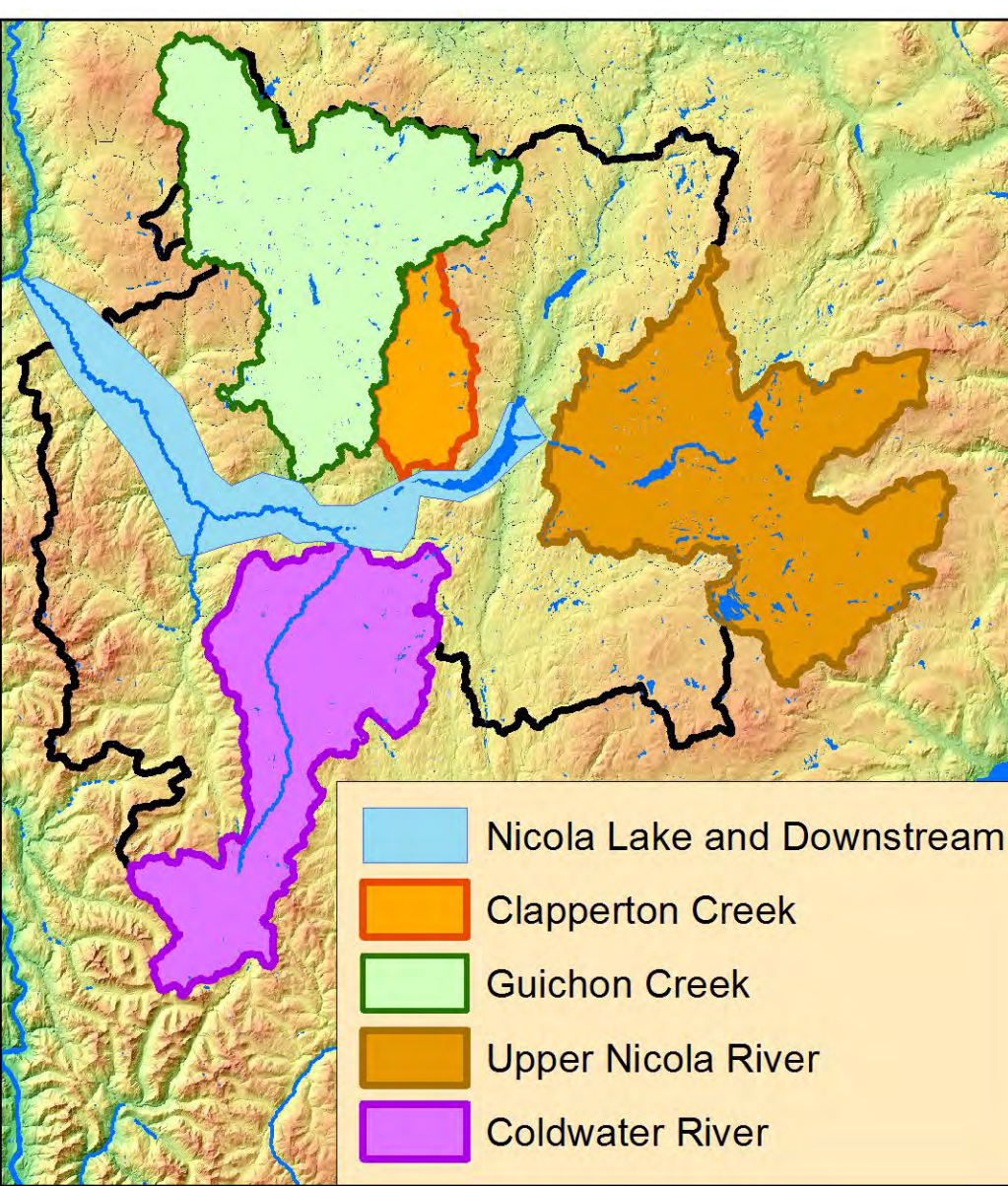
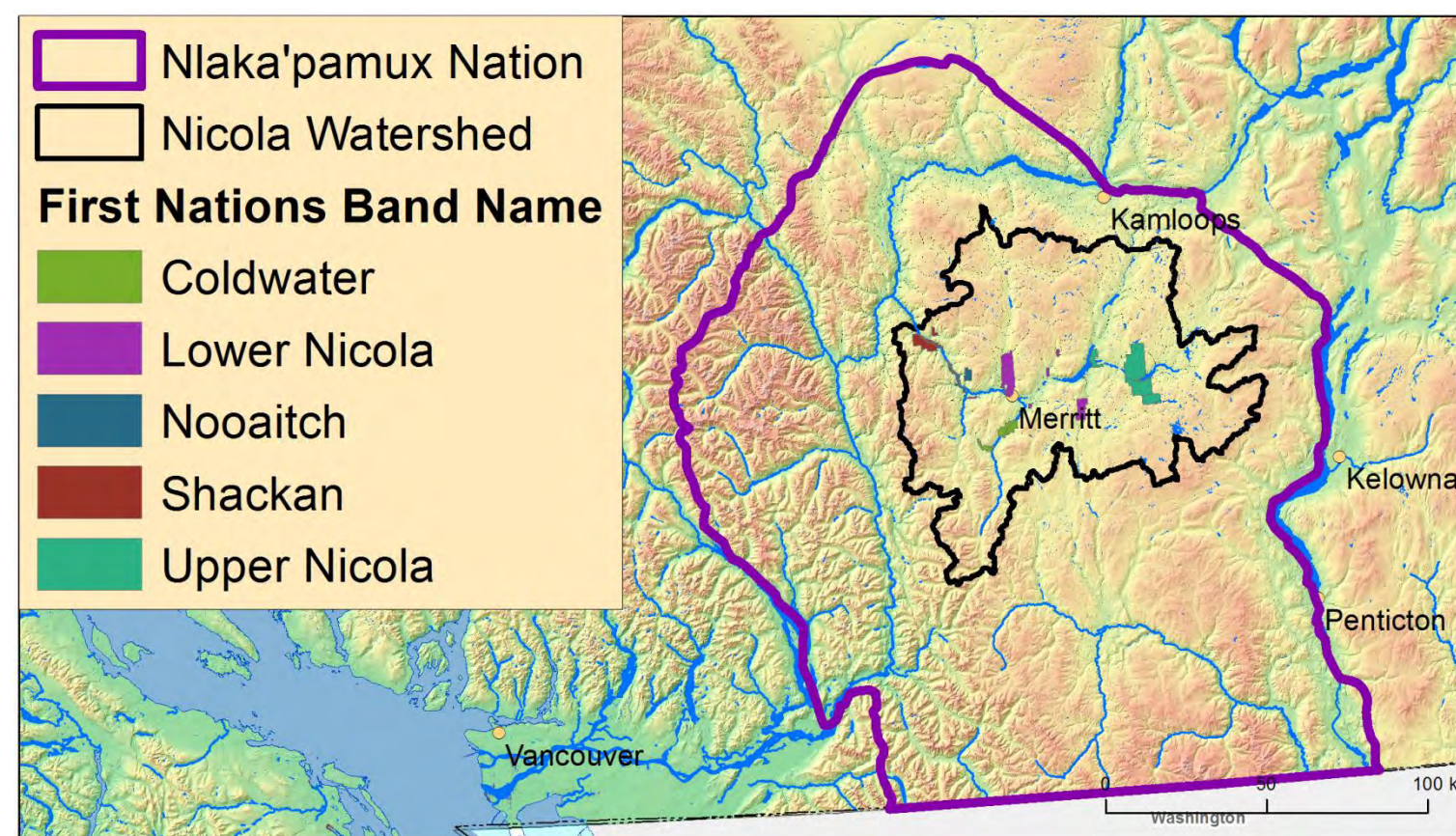
1. Deep aquifer
2. Hydraulically connected aquifer
3. Storage reservoir
4. Stream base-flow

Since 2015, each year has brought a new extreme climatic event (e.g., hottest summer, earliest freshet, driest summer) to exasperate the typical late summer drought.

In 1997, legal provisions were instated to restrict surface water extractions when flows drop below a critical threshold whereby fish populations are at risk of irreversible damage. More recent water management changes in the Nicola watershed result from the new British Columbia Water Sustainability Act (WSA) (2016), new water supply forecasting tools (2017) and increased recognition of the legal requirement to consider the rights of indigenous people (2018).

Prior to 2016, there were no provisions to licence groundwater extractions. The WSA now requires a licence for groundwater withdrawals and includes provisions to curtail both connected groundwater and stream base-flow withdrawals when flows drop below the critical threshold. Curtailment of water extractions is particularly challenging in the Nicola because releases from upstream storage are also considered.

Our poster describes the legal, technical and cultural frameworks that integrate reservoir releases with surface water and groundwater extractions to conserve the range of watershed values. We also consider this poster to be a 5 year work-plan for projects as we move ahead.

| Framework                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                 | Time Period                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                             | Past (1997)                                                                                                                                                                                                                                                                                                                                                                                                                     | Present (2016 – 2017)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Future (2018 +)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Legal                                                                                                                       | <p><b>Fish Protection Act</b></p> <p><b>Sec 9:</b> If, because of a drought, the flow of water in a stream is or is likely to become so low that the survival of a population of fish in the stream may be threatened, the minister may make temporary orders regulating the diversion of water by holders of licences.</p>                   | <p><b>Water Sustainability Act (Surface water Licensing)</b></p> <p>A <b>critical environmental flow threshold (CEFT)</b> is a short-term flow threshold, below which significant or irreversible harm to the stream's aquatic ecosystem is likely to occur.</p> <p><b>Sec 86-87: Protection of Critical Environmental Flow Thresholds using FITFIR</b></p> <p><b>Sec. 88: Fish Population Protection Order</b><br/>If the flow of water in a stream becomes so low that the survival of a fish population is threatened, a fish population protection order may restrict the uses of water from the stream and hydraulically connected aquifers.</p> | <p><b>Water Sustainability Act (Surface water and Groundwater licensing in 2019)</b></p> <p>- Ongoing challenge meeting CEFT for fall spawners.<br/>- Orders will apply to withdrawals from connected aquifers.</p>                                                                                                                                                                                                                                                                                              |
| Technical                                                                                                                   | <p>July – Nov Water Budget for 1-in-10 Year Low Flow</p>                                                                                                                                                                                                                                                                                     | <p>July – Nov Water Budget for 1-in-10 Year Low Flow</p>  <ul style="list-style-type: none"><li>• Design storage not achieved</li><li>• August flow pulse for chinook spawning</li></ul>                                                                                                                                                                                                                                                                                                                                                                         | <p>July – Nov Water Budget for 1-in-10 Year Low Flow</p>  <ul style="list-style-type: none"><li>• Additional storage constraints to prevent icing</li><li>• Higher fish flows to mitigate temperatures may be needed</li></ul>                                                                                                                                                                                             |
| (B) Drought Level Assessment and Reporting: decreasing basin size over time to focus restrictions where they have an effect |  <p><b>Drought Level and Restrictions</b></p> <ul style="list-style-type: none"><li>Level 1: normal, no restrictions</li><li>Level 2: 10 % voluntary reduction</li><li>Level 3: 30 % voluntary reduction</li><li>Level 4: Maximum reduction</li></ul>  |  <p><b>Create Water Source Maps</b></p> <ol style="list-style-type: none"><li>1. Deep aquifer</li><li>2. Hydraulically connected aquifer</li><li>3. Storage reservoir</li><li>4. Stream base-flow</li></ol>                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Cultural: Indigenous Participation                                                                                          |                                                                                                                                                                                                                                                                                                                                             | <p><b>Consultation</b></p> <p>Resolving Conflict Building Trust</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <p><b>Government to Government Partnership</b></p> <p>March 2018: Nicola Pilot – Recognizes Aboriginal Rights and Title</p>  <p><b>United Nations DECLARATION on the RIGHTS of INDIGENOUS PEOPLES</b></p> <p>Commitments to Implementation:<br/>2016 - Canada<br/>2017 - British Columbia</p> <p>Chief Sumexheltza<br/>Lower Nicola</p> <p>Chief Joe Shackan<br/>Shackan</p> <p>Minister Fraser</p> <p>Chief McLeod<br/>Upper Nicola</p> <p>Chief Shackelly<br/>Nooaitch</p> <p>Chief Spanan<br/>Coldwater</p> |

Acknowledgements: The technical team working to improve the management of water to meet environmental and human needs in the Nicola River watersheds includes: Sara Martin - Nicola Tribal Association; Doug Edwards and Richard Bailey - Fisheries and Oceans Canada; Clint Alexander and Frank Poulsen - ESSA Technologies Ltd.; Tracy Thomas, Fraser Basin Council; Ron Ptolemy – BC Ministry of Environment; and Andrew Petersen – Ministry of Agriculture.

For more information visit: [British Columbia Drought Information Portal](#)