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# UPPER BULKLEY AND MORICE WATER AND SALMON SUSTAINABILITY VIEWS

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INVENTORY OF INTERESTS, ACTIVITIES AND  
POTENTIAL COLLABORATIVE OPPORTUNITIES  
AMONG 36 ORGANIZATIONS

*Cover photo courtesy of Walter Joseph, Office of the Wet'suwet'en Fisheries Manager*

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# CONTENTS

Figure 1 Skeena Watershed	1
Figure 2 Upper Bulkley and Morice	1
Executive Summary	2
Introduction	4
Methods	5
Questions	6
Results	7
Conclusions	16
Endnotes	18
Appendix 1 - List of Organizations and Their Participants	20
Appendix 2 - Graphic Depiction and Explanation of 7 Stepping Stones to Watershed Governance	24
Appendix 3 - Responses	26



*Photo: Ian Sharpe*

## Acknowledgements

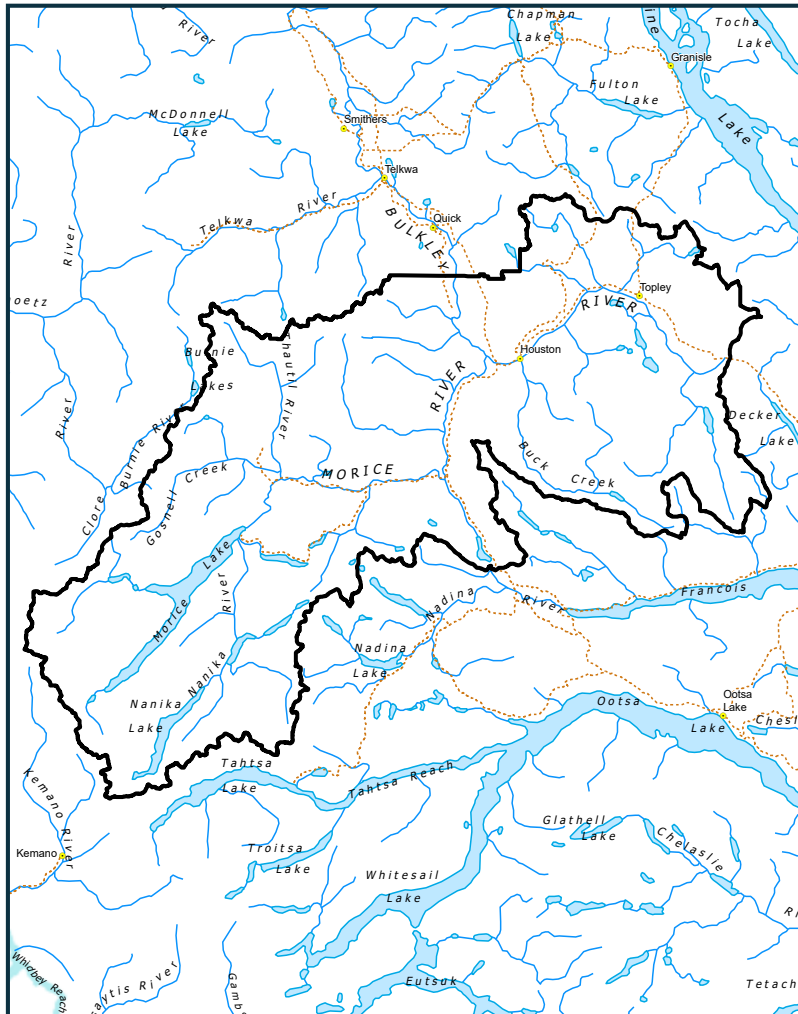
The author thanks the 57 individuals representing 36 organizations who participated in the inventory of views on water and salmon sustainability. These individuals freely expressed their thoughts as representatives of their specific organizations, and many of them helped identify others from their own, and other organizations that could be included in the inventory. Given this large number of participants, their names and affiliations are not duplicated here, but can be found in Appendix 1 and 3. As the concept of the inventory was developing, valuable advice was obtained from Don Morgan (BC Ministry of Environment and Climate Change Strategy), Ivan Thompson (Tides Canada), Lana miller (Fisheries and Oceans Canada) and Leigh-Ann Fenwick (formerly of the Bulkley Valley Research Centre, now BC Forests Lands Natural Resource Operations and Rural Development). Photos included throughout the report were graciously provided by Sam Pittman (BC forests Lands Natural Resource Operations and Rural Development), Walter Joseph (Office of the Wet'suwet'en), Dean Peard (BC Ministry of Environment and Climate Change Strategies), Cindy Verbeek (A Rocha Project), Michael Price (SkeenaWild Conservation Trust) and Ian Sharpe (report author). This report benefitted from detailed review by Don Morgan, and Sheena Briggs (Bulkley Valley Research Centre). Thank you also to Tides Canada as funder, Niki Cherewyk as graphic designer of this report, and the Bulkley Valley Research Centre as the administrator of the project.

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FIGURE 1: SKEENA WATERSHED



FIGURE 2: UPPER BULKLEY AND MORICE



# EXECUTIVE SUMMARY

In the Upper Bulkley and Morice basins of the Skeena watershed (Figure 1), climate change and human induced stresses are contributing to the degradation of aquatic resources, including salmon populations. It is apparent that collaborative efforts to better manage and adapt to these stresses are needed. This project was an initial attempt to determine who might contribute to this collaboration. Interviews occurred with over 50 people representing 36 organizations, selected for their likely interests in water and salmon sustainability in general, and specifically in the Upper Bulkley and Morice basins. These organizations span multiple levels of government, including the Office of the Wet'suwet'en, non-government organizations, research institutions and industries. Views were solicited using three questions designed to discover interests in water and salmon sustainability in general, and specific to the Upper Bulkley and Morice basins, activities related to those interests, and views on how collaboration with others related to shared interests might occur.

This report contains answers to the three questions from each of the respondents, and presents themes derived from grouping responses based on organization type: 1) Governments (federal, provincial, local and First Nation), 2) Non-Government Fisheries Management / Advisory / Advocacy, 3) Research / Academia, 4) Non-Government Funders / Enablers, 5) Environmental Non-Government Organizations, 6) Industries: Agriculture, Forestry. Mining, 7) Transportation: Rail, Highway.

Results indicate that there is universal interest in water and salmon sustainability, among the respondents, and a large majority of interests expressed also apply to the Upper Bulkley and Morice basins. All respondents provided details of activities that are consistent with their general and basin specific interests and described means by which collaboration on resolving water sustainability issues could occur. From these results it is apparent that the necessary collaboration for any water sustainability planning process that might occur for the Upper Bulkley and Morice basins is possible. It is also apparent that much of the scientific groundwork for such a planning process is well underway.

Given that this report represents an initial attempt to gauge support for water sustainability work, it is important to determine if there are other organizations that have similar views to those already expressed (e.g. oil and gas sector and a broader range of relevant research and water management organizations involved in aquatic studies and organizational processes).

ORGANIZATIONS PARTICIPATING IN THE INVENTORY WERE CLASSIFIED AS FOLLOWS:



Photo: Dean Peard



Photo: Michael Price



Photo: A. Rocha

GOVERNMENTS : FEDERAL, PROVINCIAL, FIRST NATION, LOCAL/REGIONAL

Federal Department of Fisheries and Oceans (DFO), Provincial Ministries of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), Environment and Climate Change (MOC), and Agriculture, Office of the Wet'suwet'en (OW), Regional District of Bulkley Nechako (RDBN) and the District of Houston, Ministry of Transportation and Infrastructure (MOTI)

NON-GOVERNMENT FISHERIES MANAGEMENT / ADVISORS / ADVOCACY

Skeena Fisheries Commission (SFC), A Rocha Project, BC Freshwater Fisheries Society (BCFFS), Skeena Knowledge Trust, BC Federation of Flyfishers (BCFF), Bulkley Valley Rod and Gun Club (affiliated with BC Wildlife Federation) and Upper Skeena Sport Fishing Advisory Committee, (part of the DFO led Upper Skeena Fishery Advisory Board)

RESEARCH / ACADEMIA

University of Northern BC - UNBC, Simon Fraser University - SFU, Geoscience BC and the Bulkley Valley Research Center - BVRC

NON-GOVERNMENT FUNDERS / ENABLERS

Tides Canada, BC Water Funders BC Freshwater Legacy Initiative, University of Victoria POLIS Project on Ecological Governance Water Sustainability Project



Photo: Walter Joseph



Photo: Niki Cherewyk



Photo: CN



ENVIRONMENTAL NON-GOV-ERNMENT ORGANIZATIONS

Morice Water Monitoring Trust - MWMT, Skeena Wild Conservation Trust, Friends of the Morice and Bulkley

INDUSTRIES: AGRICULTURE, FORESTRY, MINING

BC Agriculture Council / Agriculture Research & Development Corporation, BC Agriculture and Food Climate Action Initiative, Smithers Farmer's Institute, Pleasant Valley Cattlemens Association / Skeena Region Cattlemen's Association, BC Cattlemens Association, Woodlot Association, Canfor, West Fraser Industries Goldcorp

TRANSPORTATION: RAIL, HIGHWAY

Canadian National Railway - CN, Ministry of Transportation and Infrastructure (MOTI)

OTHERS TO BE DETERMINED

It is important to include all organizations who may have interests in waterways of this area.

# INTRODUCTION

The Upper Bulkley and Morice basins are subject to evolving natural and human related influences, that are affecting water and salmon sustainability<sup>1</sup>. Although it is recognized that commercial fishing, stock enhancement and ocean survival issues affect salmon sustainability in the watershed, this project focuses on inland water sustainability interests, activities and collaborative opportunities. In the Upper Bulkley, climate change related stresses on aquatic ecosystems are primarily flow related (e.g. late summer flows were at historic lows and coincident high water temperatures in 2018<sup>2</sup>), while human caused stresses are related to alteration of channel morphology and water quality, as well as flows. These stresses are a result of reduced forest cover, riparian disturbance, water withdrawals, and waste discharges<sup>3</sup>. The Morice basin, adjacent to the Upper Bulkley is also subject to climate change and human related influences that may affect water and salmon sustainability. Although there are some areas of human habitation and industrial influence in the lowest reach of the Morice (Canfor mill is adjacent), most of the Morice basin is unpopulated. Key human influences in the watershed are largely related to climate change and forest harvesting (e.g. channel morphology, flow and water temperature alteration<sup>4</sup>). In addition, mining exploration has occurred sporadically in the Morice basin, and as a result, metals contamination in these areas is possible<sup>5</sup>.

This document describes an initial attempt to determine whether, and to what degree various public and private groups are involved in efforts to understand and mitigate these stresses and their effects so that aquatic resources including salmon in the Upper Bulkley and Morice can be sustained over the coming decades.



# METHODS



Representatives of over 36 groups with potential interests in water and salmon sustainability issues were identified and canvassed in person and by phone, to determine interests, efforts, and willingness to collaborate on resolving key issues (See Appendix 1, for list of organizations and their participants). Organizations were chosen based on interviews with DFO staff at the beginning of the project, and then added to through advice from inventory participants throughout the project. While the list was being built, care was taken to favor local organizations, but to also include representation of regional and provincial levels. The list of organizations chosen is by no means comprehensive and should be treated as a cross-section of organizations that likely have interests in water sustainability in the Upper Bulkley and Morice basins.

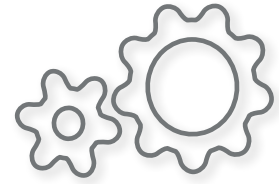
Participants in the inventory can be grouped as follows:

- Governments: Federal, Provincial, First Nation, Local/Regional
- Non-Government Fisheries Management / Advisory / Advocacy
- Research / Academia
- Non-Government Funders / Enablers
- Environmental Non-Government Organizations
- Industries: Agriculture, Forestry, Mining
- Transportation

A list of three questions were asked of all participants to help focus the dialogue (see below). Themes based on the results are presented in this report. In providing this information to those canvassed, and also to others through wider publication, it is hoped that new collaborative arrangements will form, and ultimately assist in restorative measures in the Upper Bulkley and Morice basins.<sup>6</sup> This approach is consistent with that advocated in Overduin et al, 2019<sup>7</sup>: , in that it addresses some of the initial activities in a proposed multi-step process aimed at supporting collaborative watershed initiatives (see Appendix 2).



# QUESTIONS TO STIMULATE DIALOGUE



Interviews and reporting were conducted by Ian Sharpe under contract to the Bulkley Valley Research Centre and funded by Tides Canada. Privacy provisions under the BC Freedom of Information Act have been followed, and this document includes only information that has been agreed upon by those providing it.

ALL INTEREST GROUPS STARTED WITH THE FOLLOWING THEMES AND QUESTIONS:

1

INTERESTS:

Do you have an interest in water sustainability including salmon and does it extend to the Upper Bulkley and Morice river basins?

2

ACTIVITIES:

What activities are you: doing, planning, discussing with others, or thinking about that could have an effect on salmon sustainability?

3

COLLABORATION:

Do you see any opportunities to collaborate with others to improve the chances of sustaining salmon populations in the Upper Bulkley and Morice watersheds?

## STARTING THE DISCUSSION ON COLLABORATION

EACH INVENTORY PARTICIPANT'S RESPONSES TO THE THREE QUESTIONS ARE SHOWN IN APPENDIX 3.

# RESULTS:





Government agency representatives surveyed included the Federal Department of Fisheries and Oceans (DFO), Provincial Ministries of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), Environment and Climate Change (MOE), Agriculture, Transportation and Infrastructure (MOTI), Office of the Wet'suwet'en, Regional District of Bulkley Nechako and the District of Houston. All themes derived from these agencies are grouped under this heading, with the exception of MOTI. These themes are described under the heading of Transportation, along with CN, as the themes are closely linked as a result of the nature of the corridor they share.

### Q1 INTERESTS

All those surveyed indicated an interest in water sustainability in general.

DFO, and the OW indicated that key aspects of salmon sustainability are central to their mandates, and both have reason to focus on the Upper Bulkley and Morice basins. Provincial staff interviewed cover a wide variety of interests and disciplines related to both water and fish sustainability. Most of this work deals with regulatory matters under various acts and regulations, including:

- Fisheries management (recreational fisheries, fish habitat)
- Surface and ground water management/authorizations
- Land tenure administration (compliance promotion and management)
- Agriculture and forestry management
- Hydrology/geomorphology research
- Public/industry education
- Cumulative effects management including land and water uses and climate change planning, and environmental monitoring (e.g. habitat, ecosystems, water quality and quantity)

Local government (RDBN and District of Houston) water sustainability interests center around developing and maintaining infrastructure for solid waste, domestic water source, and sewage system to environmental standards.

### Q2 ACTIVITIES

The majority of federal and provincial staff interviewed recognized the need to understand climate change effects on aquatic resources, and that this knowledge, along with better understanding of resource use effects on water resources and values is key to future planning and decision making (regulatory and voluntary -

e.g. existing authorization systems, new Regulations, Best Management Practices). Much of current and planned activities are focused on building scientific knowledge to better understand cumulative effects of climate change and human activities, and the potential effectiveness of regulatory, monitoring and planning tools to protect aquatic resources (e.g. ensuring that all aspects of Environmental Flow Needs - EFNs<sup>8</sup> are met, using stock assessments to track fish populations, developing new DNA based bio-monitoring tools). This includes affecting timing and volumes of water use, runoff quantity and general water quality, among other aspects.

Some key current activities include monitoring and modeling future climate change related water temperatures and flows. Other current and planned activities include:

- Further developing watershed assessment tools, and the concept of Water Objectives under the Water Sustainability Act (e.g. EFNs)
- Carrying out habitat restoration, including fine tuning what measures may be successful in a range of locations and circumstances
- Improving the understanding of effects of hatchery fish on wild stocks
- Building relationships and collaboration with industries to encourage compliance
- Participation in planning processes, and voluntary protective and restorative action (e.g. agriculture, forestry, mining sector participants)
- Finding ways to harmonize requirements under various acts and regulations to simplify and strengthen watershed management
- Determining ways to more effectively include industries, First Nations and other communities in water sustainability efforts, and looking for opportunities for collective action (e.g. shared water storage and use systems that benefit agriculture and fish)

Office of the Wet'suwet'en staff are most concerned with Chinook and Sockeye salmon stock declines due to habitat degradation in the Upper Bulkley, and recovery efforts are being discussed through the Upper Bulkley Round Table. Similarly, Sockeye Recovery Planning for the Nanika and Morice lakes areas is occurring in partnership with DFO. The OW is currently mapping and assessing the remaining high quality habitats and enumerating the fish that occupy them and building a water quality monitoring program. Future work will focus on identifying Environmental Flow Needs (EFNs), starting with tributaries to the Upper Bulkley, then the Morice, identifying alternative management practices for land and water activities, exploring opportunities for off channel water storage using spring runoff, and encouraging higher levels of management of the range land and water use activities. The two local governments' (Regional District of Bulkley Nechako and District of Houston) activities are generally centered around maintaining waste management and domestic water systems in a manner that protects aquatic values (e.g. complying with requirements and using best management practices).

## Q3 COLLABORATIVE OPPORTUNITIES

Various government staff described collaborative efforts through planning and activity based forums (e.g. the First Nations centered Environmental Stewardship Initiative and other Nation to Nation forums, Upper Bulkley Round Table<sup>9</sup>, Morice Water Monitoring Trust, Sockeye Recovery Planning, Fisheries Sensitive Watershed designation process, Range Use Planning, Groundwater/Surface Water Interaction Project), and research organizations (e.g. University of Northern British Columbia, Geoscience BC). Most of these partnership efforts include some government funding and asking collaborators to provide in-kind resources (e.g. personnel/labour, administration etc.).



## NON-GOVERNMENT FISHERIES MANAGEMENT / ADVISORY / ADVOCACY

### Q1 INTERESTS

The Skeena Fisheries Commission (SFC)<sup>10</sup> works on behalf of First Nations in the Skeena watershed, and addresses science, management, and conservation of fisheries and watersheds in the Skeena River basin and adjacent North Coast. The A Rocha Canada Project<sup>11</sup> promotes environmental values and manages a hatchery in the Houston area. The Freshwater Fisheries Society of BC (FFS)<sup>12</sup> enhances and conserves freshwater fisheries for public benefit. It works in partnership with government, industry and anglers to sustain recreational fishing through enhancement and conservation of freshwater fish resources. Other organizations with interests in sustaining recreational fishing opportunities in the Skeena watershed include BC Federation of Flyfishers (BCFF)<sup>13</sup>, Bulkley Valley Rod and Gun Club (affiliated with the BC Wildlife Federation)<sup>14</sup> and Upper Skeena Sport Fishing Advisory Committee, (part of the DFO led Upper Skeena Fishery Advisory Board)<sup>15</sup>.

### Q2 ACTIVITIES

The SFC is involved in a wide variety of watershed and salmon related management, monitoring and predictive projects. (e.g. climate change, fish enumeration and stock assessment, water quality and quantity, community fisheries monitoring, limnology, hydroacoustic juvenile sockeye salmon enumeration, fisheries, habitat and environmental assessment, and others).

The A Rocha Canada Project (Houston BC), is staffed by one part time person and 40 volunteers. It operates a Coho hatchery/stream keepers lab and engages in habitat restoration in the Upper Bulkley.

The BC FFS operates a hatchery, promotes recreational fishing and education, and a province wide lake fish stocking program.

Recreational fishing advisory and advocacy focused organizations are largely interested in fishing opportunities through a range of activities (e.g. understanding climate change and other influences on fish populations,

advising governments on fishing management, habitat restoration and education) Each organization has a different set of activities depending on their specific purpose.

### Q3 COLLABORATIVE OPPORTUNITIES

The SFC has identified and is pursuing opportunities for collaboration on monitoring, restoration, research, land management planning, fisheries rehabilitation and conservation, policy development, and public outreach and communication. The A Rocha Canada Project is focused on collaboration opportunities associated with habitat restoration. The FFS follows Provincial government lead on fish stocking policy but could collaborate on Morice basin activities in future. Other recreational fishing oriented organizations are largely volunteer based, and therefore collaborative opportunities are viewed in the context of limited time and resources.

## RESEARCH / ACADEMIA



### Q1 INTERESTS

For the BC research community, a small fraction of those involved in water and fish sustainability research was included in the inventory, which included representatives from two universities; University of Northern BC (UNBC), Simon Fraser University (SFU), and two independent research organizations (Geoscience BC and the Bulkley Valley Research Centre (BVRC)<sup>16</sup>. All four research oriented organizations have a general interest in water and salmon sustainability, with varying degrees of current interest in the Upper Bulkley and Morice basins. Geoscience BC water sustainability mandate is tied to natural resource management and development. The consensus is that most of the research is both broadly relevant to BC, and specifically to the Upper Skeena, especially given climate change patterns.

### Q2 ACTIVITIES

Researchers at SFU and UNBC are studying climate change and land use related hydrologic, thermal and biological changes at watershed scale using monitoring and modeling tools. Geoscience BC's current research is in northeast BC. The BVRC's water and salmon sustainability research support and promotion activities are focused locally. This has included assisting with establishment of the Morice Water Monitoring Trust and the Skeena Knowledge Trust. The BVRC is currently administering a number of projects (including this inventory) that are providing information for water management in the Upper Bulkley and Morice basins. Future participation could include organizing workshops and other educational venues, as well as ongoing support for water and salmon sustainability research in the area. Geoscience BC's current research is aimed at understanding the effects of unconventional natural gas development on groundwater (e.g. development interactions with groundwater in confined aquifers) using airborne geophysics tools, and through an expanded groundwater monitoring network.

### Q3 COLLABORATIVE OPPORTUNITIES

Each participant described well established patterns of collaboration across organizations and disciplines, and a willingness to consider future collaboration specific to the Upper Bulkley and Morice basins. This could take the form of translating findings from elsewhere, and/or expanding studies to include the Upper Bulkley and Morice basins.



## NON-GOVERNMENT FUNDERS / ENABLERS

### Q1 INTERESTS

Representatives from two funding organizations (Tides Canada, and BC Water Funders BC Freshwater Legacy Initiative), and an academia based water governance advocacy/research organization (University of Victoria POLIS Project on Ecological Governance: Water Sustainability Project) were interviewed. They are working to promote water sustainability in BC through funding and water governance innovation and are interested in opportunities to support efforts where watershed governance and planning are gaining momentum (e.g. Skeena watershed, including Upper Bulkley and Morice basins).

### Q2 ACTIVITIES

Funding activities of Tides Canada are focused on piloting new tools and opportunities to deal with the combination of climate change and other land and water use related negative effects on water and salmon, including in the Upper Bulkley and Morice basins. The BC Water Funders focus is on nurturing innovation in watershed governance, facilitating partnerships that bring terrestrial and aquatic interests together at watershed scale, and decision making informed by science and indigenous knowledge. These efforts draw on local experience and expert advice and provide capacity investments in leadership and innovation at the watershed scale. Future BC Water Funder activities will include sharing experiences and successes from initial efforts with others. Polis is researching and employing new water governance tools enabled by the 2016 Water Sustainability Act. Desired outcomes of using these tools are more effective water and land use practices. Priorities are to make progress in the Nicola, Skeena, and Cowichan watersheds (considering the Columbia basin as well).

### Q3 COLLABORATIVE OPPORTUNITIES

All 3 organizations are interested in opportunities to support collaboration where watershed governance, information gathering, planning and innovation are gaining momentum (e.g. assisting in making connections among potential collaborators, especially where First Nations are equal partners).

## ENVIRONMENTAL NON-GOVERNMENT ORGANIZATIONS (ENGOS)



### Q1 INTERESTS

Representatives from four regionally based ENGOS were interviewed. They included Morice Water Monitoring Trust ( MWMT)<sup>17</sup>, Skeena Knowledge Trust (SKT), SkeenaWild Conservation Trust and Friends of the Morice and Bulkley. The MWMT's focus is on water monitoring in the Upper Morice Water Management Area, a Special Management Zone created as part of the Morice Land and Resource Management Plan (LRMP). The Trust is for the benefit of the Wet'suwet'en people, and the intention is to transfer knowledge gained in the upper Morice to the rest of Wet'suwet'en traditional territory, including the Upper Bulkley. Skeena Knowledge Trust manages scientific data related to water and salmon sustainability. This includes archiving and presenting this information on a publicly accessible web site. SkeenaWild emphasizes the development of long-term solutions: 1) habitat and species protection 2) science and research, 3) sustainable fisheries management, 4) community engagement<sup>18</sup>. Salmon and water quality are at the root of all activities. Upper Bulkley and all of the Morice are of high interest. Friends of Morice-Bulkley is a watershed stewardship organization formed originally to deal with Northern Gateway pipeline issues and the associated potential for degradation of fish habitat in the area<sup>19</sup>.

### Q2 ACTIVITIES

The MWMT is funded through an endowment from the Gordon and Betty Moore Foundation, and past annual contributions from BC Ministry of Environment. The annual water monitoring program measures existing water quality and comparisons are made with desired aquatic life protection outcomes (Water Quality Guidelines). Field work is conducted by Wet'suwet'en Fisheries staff. Future work will also include hydrometric, biomonitoring and limnology components. Skeena Knowledge Trust is currently conducting a knowledge search using multiple sources. Information acquired is stored in the Salmon Data Center. This work will expand through community outreach and relationship building as funding allows, and there is a long range plan to expand operations to the coast. SkeenaWild's Michael Price is completing a PhD at SFU, the subject of which is Sockeye recovery planning for the Wet'suwet'en. The Morice/Atna Salmon Conservation Unit (CU) is a priority, followed by the Upper Bulkley (Sockeye, and Chinook). Issues include climate change (flow and temperature) and habitat. SkeenaWild researcher Adrienne Burchfold is studying water quality issues in the watershed with emphasis on mining. Friends of the Morice-Bulkley is an intervenor in major project review processes where there are potential effects on water resources in the Bulkley and Morice watersheds and will continue this work as proposals in the area occur. The organization is hoping to engage in more stewardship/restoration, as new resources become available



## Q3 COLLABORATIVE OPPORTUNITIES

MWMT is working with the Upper Bulkley Round Table. Skeena Knowledge Trust has a long list of collaborators, and is building new relationships in BC beyond the Skeena watershed. SkeenaWild has collaborative arrangements with the Office of the Wet'suwet'en, DFO and SFU. Friends of Morice-Bulkley collaborate with Friends of Wild Salmon<sup>20</sup> and SkeenaWild.

### INDUSTRIES – AGRICULTURE, FORESTRY, MINING



## Q1 INTERESTS

Agricultural sector organizations (BC Agriculture Council/Agriculture Research & Development Corporation - ARDCorp<sup>21</sup>, BC Agriculture and Food Climate Action Initiative<sup>22</sup>, Smithers Farmer's Institute, Pleasant Valley Cattlemens Association/Skeena Region Cattlemen's Association, BC Cattlemens Association<sup>23</sup>) have water and salmon sustainability interests at multiple levels (e.g. Bulkley/Morice farms, region, province). Much of the water focused work is in helping farmers adapt to climate change effects on social, economic and environmental sustainability. Forest sector organizations (Bulkley Woodlot Association<sup>24</sup>, Canfor, West Fraser Industries) have regulatory and general interests in water and salmon sustainability and apply them to their forest management activities, including the Upper Bulkley and Morice basins. Goldcorp's closed Equity mine discharges treated mine effluent to the Foxy and Buck Creeks, both tributary to the Upper Bulkley<sup>25</sup>, and there are no similar discharges to the Morice basin. Goldcorp has both regulatory and general interests in water and salmon sustainability. Stakeholder interests are viewed as company interests.

## Q2 ACTIVITIES

For the agriculture sector, two examples of programs aimed at environmental sustainability, including water, are Environmental Farm Planning, and the Farmland Riparian Interface Stewardship Program. A third program (Climate Action Initiative) focuses partly on managing water use and availability, given a long term trend towards drier summers in areas such as the Bulkley/Nechako. Forest industry water related activities follow legislated requirements (e.g. riparian reserve/retention zones, participation in the Forest and Range Evaluation Program, additional protections under a Government Actions Regulation (GAR) Order - Fisheries Sensitive Watershed Order), and a variety of accepted guidelines and practices (e.g. sedimentation avoidance measures). Some areas have additional protections where there are specific species of concern (e.g. Bull trout spawning areas). Plans (e.g. Forest Sustainability Plans) have also been developed and implemented to meet specific objectives (e.g. protect against increases in water temperature, establishing Equivalent Clearcut Area thresholds at the watershed scale to protect runoff and stream flows<sup>26</sup>). Forest product certifications demand additional water and salmon sustainability activities such as establishment and use of public advisory committees. At Equity mine, a long standing annual Environmental Effects Monitoring (EEM) program is the key activity.

### Q3 COLLABORATIVE OPPORTUNITIES

All of the agricultural organizations included in the inventory currently collaborate with others (e.g. Upper Bulkley Round Table has representation) and would consider other collaborative arrangements. Forest Industry organizations represented in the inventory are receptive to opportunities for water sustainability collaboration provided that legislated requirements are respected, and that existing efforts are factored into any new work that arises. The Equity Mine Public Advisory committee (EMPAC) is a network of stakeholders through which consensus based projects occur.

## CORRIDOR RELATED INDUSTRIES – RAIL, HIGHWAY



### Q1 INTERESTS

CN is a public company operating railways in Canada and the US. Ministry of Transportation and Infrastructure is a provincial government entity with responsibility for the highway system throughout BC. Both have interests in water and salmon sustainability, are tied to regulatory requirements and are both general, and specific to location. Both organizations have policies, procedures and objectives to prevent aquatic habitat damage, and to restore it where practical.

### Q2 ACTIVITIES

Activities include restoring fish passage and habitat restoration where transportation infrastructure occurs. Internal planning sets out the priority locations for this work. Priorities are set in consultation with other agencies and communities.

### Q3 COLLABORATIVE OPPORTUNITIES

Internal planning includes collaboration with others. External water planning collaboration could occur upon request, although resources for this type of work are limited.

- **What activities are you: doing, planning, discussing with others, or thinking about that could have an effect on salmon sustainability?**
- **Do you have an interest in water sustainability including salmon and does it extend to the Upper Bulkley and Morice river basins?**
- **Do you see any opportunities to collaborate with others to improve the chances of sustaining salmon populations in the Upper Bulkley and Morice watersheds?**

# CONCLUSIONS

As a first approximation of interests, activities and collaborative tendencies on the subject of water and salmon sustainability, it is safe to say that all those interviewed have a stake in the subject. The vast majority of those interviewed also felt that this interest is either specific to or could be specific to the Upper Bulkley and Morice basins.

The inventory results demonstrate that there would be ample opportunity to ensure both broad, and effective participation in any water sustainability planning for the Upper Bulkley and Morice that might occur. Of particular importance are those organizations that have indicated a direct stake in the subject. This includes the Office of the Wet'suwet'en, three local Trusts (Skeena Knowledge Trust, Morice Water Monitoring Trust and SkeenaWild Conservation Trust), Federal and Provincial government agencies with regulatory and planning roles, other users of aquatic resources, including industries, local government and recreational fishers, and researchers developing and using the available science to help resolve water and salmon sustainability issues.

It is important to determine if there are other organizations that have similar views to those already expressed. This could be explored further. In particular, there are gaps in the range of organizations successfully canvassed that could be filled in.



*Photo: Niki Cherewyk*

These include:

- The oil and gas sector (Oil and Gas Commission as a provincial pipeline regulator, Trans Canada Energy and its proposed Coastal GasLink natural gas pipeline project<sup>27</sup>)
- Additional researchers, especially those with interests not only in water and salmon sustainability, but also those with expertise and interests in social aspects of consensus building, planning and problem resolution
- Organizations affiliated with those already canvassed, or similar in mandate, especially if they operate at different geographic scales (e.g. no national organizations other than DFO and CN were included in the inventory)

It is likely that the publication of this report could be a catalyst to generate a wider discussion, opening the door to further collaboration and action through water sustainability planning.

A means to continue on this path could be the development of a communication forum, the nucleus of which could be the participants in this inventory. Ultimately, this will move the Upper Bulkley and Morice well down the path of the Seven Stepping Stones to Water Governance (See Appendix 2).



Photo: Sam Pittman



**THIS PROJECT FOCUSES ON INLAND WATER SUSTAINABILITY INTERESTS SO THAT AQUATIC RESOURCES INCLUDING SALMON IN THE UPPER BULKLEY AND MORICE CAN BE SUSTAINED OVER THE COMING DECADES.**

# ENDNOTES

1 Tamblyn 2005, A Plan to conserve and Protect Morice Watershed Fish Populations <http://www.dfo-mpo.gc.ca/Library/315477.pdf> and Schell, 2003. A Brief Overview of Fish, Fisheries and Aquatic Habitat Resources in the Morice TSA, Morice Land and Resource Management Plan.

2 Lana Miller DFO Resource Restoration Biologist, Smithers pers comm, 2019

3 see <https://www.houston-today.com/news/extremely-dry-drought-level-in-houston-region/> and Connors, B.M.; Pickard, D.C.; Porter, M.; Farrell, G.; Bryan, K.; Casely, S.; Huang, S. (2013) Conservation Unit snapshots: Upper Bulkley Chinook CU, Pacific Salmon Foundation Vancouver, BC, [http://salmonwatersheds.ca/library/lib\\_409/](http://salmonwatersheds.ca/library/lib_409/)

4 David Bustard and Associates Ltd. 2002, Conserving Morice Watershed Fish Populations and Their Habitat, <http://www.dfo-mpo.gc.ca/Library/315091.pdf> and Office of the Wet'suwet'en, 2013 Morice Fish & Aquatic Habitat review 2013. [https://data.skeenasalmon.info/dataset/morice-fish-and-aquatic-habitat-review-2013/resource/8e2159e0-26b7-4200-ab6e-06298cbbfc75?inner\\_span=True](https://data.skeenasalmon.info/dataset/morice-fish-and-aquatic-habitat-review-2013/resource/8e2159e0-26b7-4200-ab6e-06298cbbfc75?inner_span=True)

5 Numerous exploration projects, including land disturbance and drilling have taken place in the Morice basin over the past few decades (e.g. recent work: New Moon Mountain, Lucky Ship among others- see:

New Moon Mountain: <http://minfile.gov.bc.ca/Summary.aspx?minfilno=093E%20%20011>,

Lucky Ship <http://minfile.gov.bc.ca/Summary.aspx?minfilno=093L%20%20053>

NW BC Exploration Summary, Paul Wojdak, Regional Geologist, 2008: <http://mineralsnorth.ca/images/uploads/pdf/17-exploration-in-northwest-bc.pdf>

6 At present there are some efforts to understand the state of aquatic resources in the Upper Bulkley and Morice basins, given the potential for a collaborative water sustainability planning process under the 2016 Water Sustainability Act. The information gathered in this inventory may provide further impetus to those discussions and may help to “kick start” efforts under such an arrangement should it occur.

7 Natasha Overduin, Tim Morris, Rosie Simms, Jennifer Archer, Oliver M. Brandes, and Sutton Eaves, April 27th, 2019, Handbook for Water Champions: Strengthening Decision-Making and Collaboration for Healthy Watersheds. “This handbook is a practical guide intended for local groups, collaborative organizations, and Indigenous and Crown governments seeking to better understand watershed governance. It offers guidance on how to work with different partners, as well as the steps needed to build effective collaborative watershed initiatives. It was co-published by the POLIS Water Sustainability Project and the Centre for Indigenous Environmental Resources,” (<https://poliswaterproject.org/polis-research-publication/handbook-water-champions/>)

8 See: <http://riverfoundation.org.au/wp-content/uploads/2017/02/THE->

BRISBANE-DECLARATION.pdf <https://riversymposium.com/about/brisbane-declaration/>

9 Upper Bulkley Round Table: <https://data.skeenasalmon.info/organization/upper-bulkley-roundtable>

10 SFC: <http://www.skeenafisheries.ca/>

11 A Rocha Canada: <https://arocha.ca/> <https://arocha.ca/event/houston-celebration/>

12 FFS <https://www.gofishbc.com/>

13 BCFF: <https://www.bcfff.bc.ca/>

14 BV Rod and Gun Club: <https://www.facebook.com/bvrodandgun/?rc=p>, <https://bcwf.bc.ca/>

15 Upper Skeena Sport Fishing Advisory Committee: <https://www.pac.dfo-mpo.gc.ca/consultation/smon/sfab-ccps/north-nord-eng.html>

16 In addition, under the “Governments” heading, there is also mention of some relevant government research (DFO and FLNRORD)

17 MWMT: <http://moricetrust.ca/>

18 Excerpt from SkeenaWild: <http://skeenawild.org/story/>

19 The Friends of the Bulkley and Morice participated in the NEB pipeline review and submitted information relevant to salmon sustainability <http://friendsofmoricebulkley.ca/>

20 Friends of wild Salmon: <https://www.friendsofwildsalmon.ca/>

21 ARDCorp: <https://ardcorp.ca/>

22 <https://www.bcagclimateaction.ca/>

23 Cattlemens Associations: <https://www.cattlemen.bc.ca/regloc.htm>

24 Bulkley Woodlot Association: <https://woodlot.bc.ca/contact-associations/>

25 The only other authorized effluent discharge is District of Houston’s treated sewage effluent discharge to the Upper Bulkley close to its confluence with the Morice.

26 Equivalent Clearcut Area: <https://www.for.gov.bc.ca/hfd/pubs/Docs/En/En118.htm>

27 The Coastal GasLink project would cross the Upper Morice basin.



Photo: Sam Pittman

# APPENDIX 1

## LIST OF ORGANIZATIONS AND THEIR PARTICIPANTS

### GOVERNMENTS, FEDERAL, PROVINCIAL, FIRST NATION, REGIONAL, LOCAL

#### DFO / UPPER BULKLEY ROUND TABLE

Barry Finnegan, Biologist [barry.finnegan@dfo-mpo.gc.ca](mailto:barry.finnegan@dfo-mpo.gc.ca), 250-847-3916, Lana Miller, Resource Restoration Biologist - Smithers [lane.miller@dfo-mpo.gc.ca](mailto:lane.miller@dfo-mpo.gc.ca) 250-847-4892, Natalie Newman: DFO Community Advisor upper Skeena Enhancement Program, [natalie.newman@dfo-mpo.gc.ca](mailto:natalie.newman@dfo-mpo.gc.ca), 250-847-5298

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### SKEENAWILD CONSERVATION TRUST

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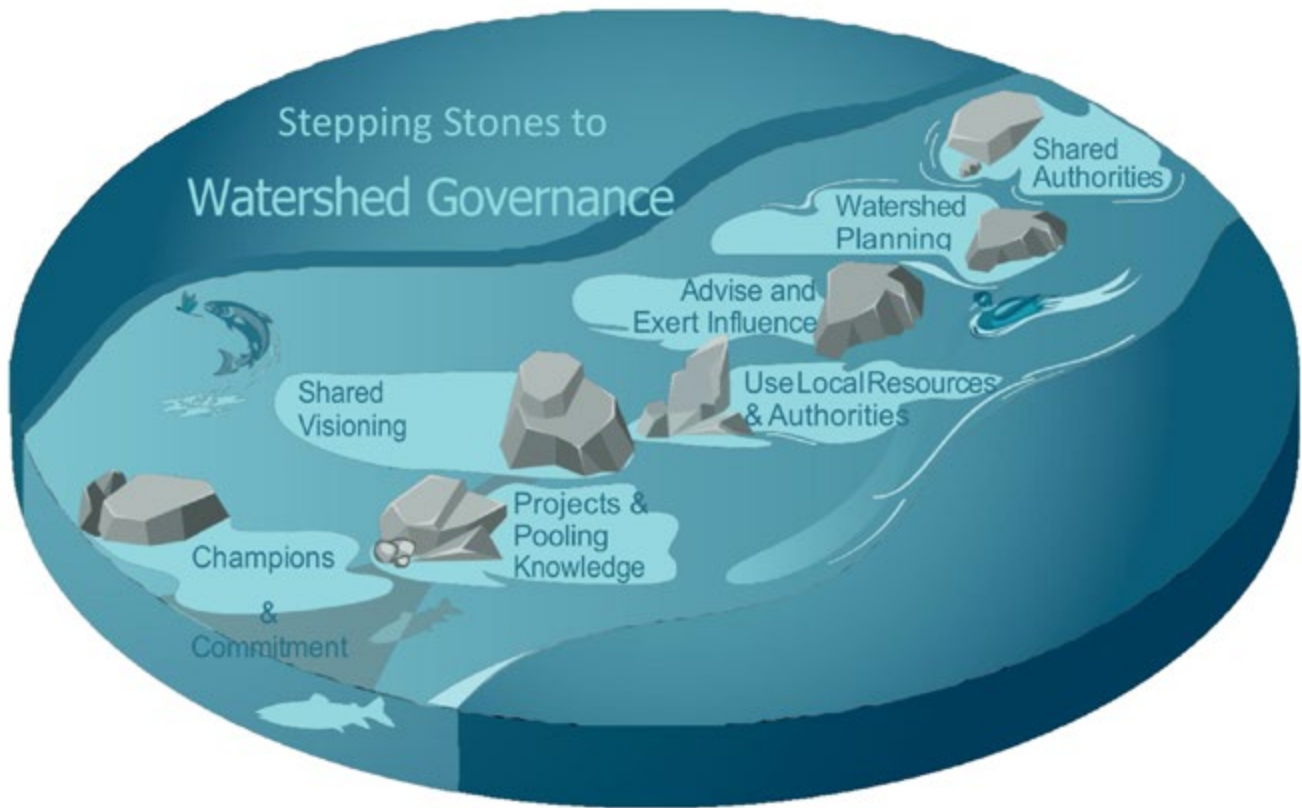
Kathryn Graham, Regional Environmental Manager, kathryn.graham@gov.bc.ca, 250-565-7024

(referenced under Governments, with participant response themes described under Transportation)

# APPENDIX 2

## GRAPHIC DEPICTION AND EXPLANATION OF 7 STEPPING STONES TO WATERSHED GOVERNANCE

Excerpted from page Vii from the Executive Summary of Natasha Overduin, Tim Morris, Rosie Simms, Jennifer Archer, Oliver M. Brandes, and Sutton Eaves, April 27th, 2019, Handbook for Water Champions: Strengthening Decision-Making and Collaboration for Healthy Watersheds.



See <https://poliswaterproject.org/polis-research-publication/handbook-water-champions/>

# AT A GLANCE: SEVEN STEPPING STONES TO WATERSHED GOVERNANCE

## 1. CHAMPIONS AND COMMITMENT

This step is about building support within your organization or government for action on water and preparing for more intensive work down the road.

## 2. PROJECTS AND POOLING KNOWLEDGE

The goals at this stage are to: 1) get out into the watershed via boots-on-the ground projects that enhance ecosystem health and knowledge, and, 2) start fostering positive early partnerships and relationships with other governments and organizations as a basis for longer-term collaboration.

## 3. SHARED VISIONING AND SETTING PRIORITIES

This step is about co-creating a shared vision for the watershed and honing in on the solutions that are needed to protect and wisely share water resources.

## 4. USE LOCAL RESOURCES AND AUTHORITIES

This step is about Indigenous governments, local governments, and non-profit organizations using their existing authority and resources to support implementation of watershed goals and priorities.

## 5. FORMALIZE AN ADVISING ROLE AND EXERT INFLUENCE

At this step, with demonstrated expertise, a track-record of substantive achievements, applied local science and information, and proven credibility, collaborative groups can seek to formalize their role in advising decision-making and shaping the outcomes of policy and regulatory development.

## 6. COLLABORATIVE WATERSHED PLANNING

This step entails identifying which legal and non-legal tools, across all levels of government, are needed to achieve goals and tangible improvements in ecological health, and making a holistic, watershed-wide approach for dealing with inter-related land-water pressures and addressing cumulative impacts.

## 7. SHARED AUTHORITIES

This step ventures into lesser-known territory by going beyond the advisory body role. At this stage, decisions are made by watershed entities that are formally mandated, local, and co-governed. Decisions are grounded in Indigenous or Crown laws, or both.

# APPENDIX 3 RESPONSES

## UPPER BULKLEY AND MORICE WATER AND SALMON SUSTAINABILITY SCAN: INVENTORY OF VIEWS, ACTIVITIES AND POTENTIAL COLLABORATIVE OPPORTUNITIES

Organization	Contact	Question #1 Do you have an interest in water sustainability including salmon and does it extend to the Upper Bulkley and Morice river basins?	Question #2 What activities are you: doing, planning, discussing with others, or thinking about that could have an effect on salmon sustainability?	Question #3 Do you see any opportunities to collaborate with others to improve the chances of sustaining salmon populations in the Upper Bulkley and Morice watersheds?
<b>GOVERNMENTS, FEDERAL, PROVINCIAL, FIRST NATION, REGIONAL, LOCAL</b>				
DFO / Upper Bulkley Round Table	<p>Barry Finnegan, Biologist barry.finnegan@dfo-mpo.gc.ca, 250-847-3916</p> <p>Lana Miller Resource Restoration Biologist - Smithers lana.miller@dfo-mpo.gc.ca 250-847-4892 cell 250-615-7619</p> <p>Natalie Newman: DFO Community Advisor upper Skeena Enhancement Program, 250-847-5298, natalie.newman@dfo-mpo.gc.ca</p>	<p>Barry Finnegan: Yes and yes. DFO is focussed on Chinook in the upper Bulkley, and Sockeye in the Morice. Between the 2, Chinook is the higher priority due to the dwindling unique stock (has its own Conservation Unit). For either of these species in these locations, significant expenditures by DFO would be predicated on being SERA or Species at Risk listed (which is not yet the case). Outside of such designation it is likely that DFO will remain interested by virtue of its Wild Salmon Policy, and will therefore continue to devote some personnel and \$ to these 2 areas and species.</p> <p>Lana Miller: Upper Bulkley Round Table (UBR) started as an ad hoc set of groups/organizations (OW, DFO, FLNRO), interested in data collection (water temperature and flows). Data was needed to better understand apparent degradation of fish habitat. Small amounts of \$ have been spent in the last 2 years. At present there is a technical working group, but no official Terms of Reference, although the goal is to document conditions and work towards improvements in sustainability of Chinook ((there is a Conservation Unit specific to Chinook) and Sockeye (small river type population), also Coho and Steelhead.. The upper Bulkley is one of the most heavily affected areas in terms of fish and fish habitat in northern BC. DFO's overall interest in this area is to focus on recovery planning.</p> <p>Natalie Neuman: The DFO Community Advisor role includes working with groups on water sustainability / protection issues (e.g.Houston Hatchery Society, Upper Bulkley River Round Table) on a range of issues including riparian restoration, critical flows and water temperature monitoring.</p>	<p>Barry Finnegan: There are limited opportunities to address the 2 key climate change related influences on the upper Bulkley in consequential ways. (decreasing summer flow and increasing summer water temperature - which go hand-in-hand). There are, however opportunities to affect timing of water use and water conservation practices by the ag sector (e.g. tillage practices, timing of crops, irrigation volume reduction and timing, field flooding, riparian restoration and management - excluding livestock from riparian zone, livestock watering). Prior activities: DFO previously completed an analysis of opportunities to augment summer low flows (e.g. Impoundments in existing basin - Maxan and Bulkley Lakes). The conclusion was that such efforts would have limited success given the volumes that would need to be stored to make a difference, and the consequences of flooding new ground due to the shapes of the basins considered. Fish enumeration in the Morice and upper Bulkley is done yearly, and this will continue . Morice watershed efforts have included 1980s fertilization of Morice Lake. This is “on the table” again as part of the Sockeye Recovery planning that is underway.</p> <p>Lana Miller: DFO hatchery Program: need to keep track of emerging science e.g. genomics. Several studies have found decreasing fitness of hatchery fish. This needs further study to help evolve hatchery programs. DFO scientists are working on these issues (Terry Beecham and Ruth Withler at the Molecular Genetics lab). UBR will start looking at recovery/restoration projects on cooperative farmers' properties, so will be applying for \$ from SRIF, starting with improving baseline knowledge, designing and implementing projects and effectiveness evaluations (Maggie Branton to be involved). DFO and UBR would also be open to restoration options beyond discrete projects - ie wetland recharge systems, forest management, pilot approach.</p> <p>Natalie Neuman: Past work has included watershed restoration projects during the FRBC era (1990s), and development of the hatchery (currently at 10,000 fish released yearly - not enough to build stocks significantly, but a great education tool. There is now a good volunteer base associated with the hatchery and the new Water Stewardship Center. Current work includes watershed monitoring in collaboration with the UBR, OW, FLNRO Water Stewardship and agricultural producers on habitat restoration projects, including structures and riparian planting (e.g. Johnny David project). Workshops are planned for future, potentially 2019 to bring partners together to discuss protection / restoration project strategies. Applying for project \$ through the Salmon Restoration Investment Fund (SRIF <a href="https://www.dfo-mpo.gc.ca/fm-gp/initiatives/fish-fund-bc-fonds-peche-cb/index-eng.html">https://www.dfo-mpo.gc.ca/fm-gp/initiatives/fish-fund-bc-fonds-peche-cb/index-eng.html</a>) to add to this work.</p>	<p>Barry Finnegan: DFO will collaborate in planning exercises and projects, including ag sector, Wet'suwet'en, and the province. This could include engineering advice and design. Forest sector and regulators need to be involved to see what silvicultural practices might improve habitat quality.</p> <p>Lana Miller: DFO / UBR will continue to collaborate with others as opportunities arise. Collaboration could expand to better include landowners, tenure holders, provincial Ministries (Agriculture, MOTI) CN, local governments (RDBN, District of Houston), First Nations, Nadina Community Futures, Steelhead Society, angling community (guides, BC fly fishers, BV Rod and Gun Club)</p> <p>Natalie Neuman: Future collaboration will include historic partners and will also include forest sector, District of Houston, and more agricultural producers. This will include promotion of Environmental Farm Planning.</p>

<p>BC Ministry of Forests Lands Natural Resource Operations and Resource Development (FLNRORD) (1)</p>	<p>Sean Staplin, Senior Licensed Science Officer (water allocation), 250-847-7362 sean.staplin@gov.bc.ca: Sam Pittman, Authorizations Specialist (groundwater research), 250-847-7493, samuel.pittman@gov.bc.ca Kasia Kistowska Ecosystems Biologist kasia.kistowska@gov.bc.ca 250-847-7564 Dave Wilford Research Hydrologist david.wilford@gov.bc.ca, Matt Sakals Research Geomorphologist Drone Specialist 250-847-6322 matt.sakals@gov.bc.ca</p>	<p>Sean Staplin: Duties focus on Implementation of the WSA including authorization decision making (water allocation, etc), advising on policy development, outreach including awareness sessions and stakeholder meetings, and flood and drought response planning / management. Sam Pittman - Upper Bulkley Groundwater Interaction Research Project (UBGIP), not an explicit part of the mandate, but an important knowledge piece that informs statutory decision making requirements. Focus on allocation and current system function in the context of resource management and durable/informed decision making, research to inform decision making, in short. Small scale collaboration is happening as the project is iterative and grows into places where collaboration is valuable. Spin off research is very possible (and positive) but is not a stated study objective. Kasia Kistowska : Lakes TSA focus: Peak Flow Sensitivity Tool developed for Lake Babine watershed with Lake Babine Nation via SK Consultants. FSW work completed or historical work: Owen, Lamprey, Foxy, McQuarrie, Morice Lower Bulkley, Babine Lake and Upper Nechako. Dave Wilford: Hydrology research in support of FLNRORD mandates. PhD research was on forest management on alluvial fans and in the watersheds of alluvial fans - pertinent to water and salmon sustainability. Dave Wilford: Hydrology research in support of FLNRORD mandates. PhD research was on forest management on alluvial fans and in the watersheds of alluvial fans - pertinent to water and salmon sustainability. Matt Sakals: Specialist in drone imaging applications. Works with others to train personnel and develop/implement drone applications, many of which are aimed at water sustainability studies.</p>	<p>Sean Staplin: FLNRORD staff are currently involved in scientific/ technical Information gathering in partnership with others (e.g. Upper Bulkley Round Table, ESI Nations), and will continue to participate as opportunities arise (e.g. use of WSA tools including development and implementation of new Water Sustainability Plans, regulations and Water Objectives). Sam Pittman: Looking at allocation and current system function in the context of resource management and durable/informed decision making. Aiming to build and synthesize datasets which inform all levels of gov't and serve as a complementary and supplemental piece to existing and planned works or studies. Kasia Kistowska: Peak Flow Sensitivity Tool developed in Lake Babine watersheds. The tool provides low risk Equivalent Clearcut Area triggers that would require licensees to perform secondary ground assessments of watersheds. FSWs focus on priority watersheds with the highest sensitivities, this tool was developed to ensure all watersheds are considered for their peak flow sensitivity which can relate to low flow and salmon habitat concerns. The application of such a tool would require changes in FRPA and district manager abilities. This tool presents and provides for an operational platform for reconciliation and G2G collaboration to manage a landscape and watershed needs. At this moment there is a lack of direction on how to promote this tool. Skeena ESI has been presented this tool and there is hope they could adopt its methodology. FSW for Tildesley and Pierre (high value salmon habitat) in the Lake Babine watershed has been developed and is undergoing THLB sensitivity analysis during the Lakes TSR. Due to the socio economic tensions in the Lakes TSA, there is no direction on when consultation could start. No FSWs have been designated in the Skeena to this date. Dave Wilford: Provided advice to the FLNRORD Environmental Stewardship Initiative (ESI) Scientific Technical Committee regarding hydrological aspects of salmon sustainability (Environmental Flow Needs related to low flows on the Upper Bulkley). Encouraging others to help test and revise the NW Water Tool. Need to include flow variability in the outputs (a proposal to this end has been submitted to ESI North Area). Want to add 3rd party data and PCIC modeling (<a href="https://www.pacificclimate.org/">https://www.pacificclimate.org/</a>) for this purpose – so people monitoring streamflow, water temperature and weather are encouraged to contact Dave. Currently planning related work on water storage in temperature sensitive streams and alternative forest practices (cutblock configurations, stand density management to increase snow accumulation and delay melt). a number of types of monitoring would be required: stream flow, temperature, climate/weather, snow, etc. Would include Upper Bulkley and Morice in this new work. Matt Sakals: Assisted with development of thermal imaging drone project for Upper Bulkley.</p>	<p>Sean Staplin: Groundwater Project partners include: Office of the Wet'suwet'en; Wet'suwet'en First Nation; Upper Bulkley River Streamkeepers; District of Houston; Regional District of Bulkley-Nechako; Fisheries and Oceans Canada; and the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development. Sam Pittman: Collaboration is, and will be in the context of those with interests in water allocation, but logical collateral interests are incorporated. Kasia Kistowska: There is opportunity to apply the Peak Flow Sensitivity Tool to the U. Bulkley and Morice watersheds to establish ECA benchmarks based on watershed sensitivities. There is opportunity to work with First Nations to calculate the ECA benchmarks and peak flow sensitivity scores, as well as develop a G2G management strategy. There is opportunity to involve licensees in this process from an operational standpoint. Dave Wilford: Working with others in forest sector roles to determine interest in new water conservation research related to forest management practices. Geoscience BC is a potential collaborator. They have recently created a new strategic plan which includes water, and there is a new ad hoc working group on the subject. Matt Sakals: Will provide drone training and guidance as needed.</p>
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<p>BC Ministry of Forests Lands Natural Resource Operations and Resource Development (FLNRORD) (2)</p>	<p>John Rex, Research hydrologist (aquatic thermal modeling research), 250-561-3464 john.rex@gov.bc.ca Jane Woods, authorizations Officer (Range), MFLNRORD Jane. woods@gov.bc.ca 250-847-6364, Ken Chalmers, Nadina District Range Officer, 250-692-2238 ken.chalmers@gov.bc.ca.</p>	<p>John Rex: Water and fish population sustainability are part of the hydrology research scope in the Omineca Region. Much of the ongoing research may be applicable to the Upper Bulkley and Morice basins bearing in mind regional differences. Applying applicable parts of the research to the Skeena would be a good next step, and could be done through counterparts in FLNRO. Jane Woods and Ken Chalmers: Involvement in water sustainability has been through planning, tenure administration and associated compliance management.</p>	<p>John Rex: Some of the projects that may be relevant include the small streams (S4) riparian management study, a regional watershed evaluation program, and a climate change influence on stream temperature and bull trout habitat project. Small streams (S4/S6) have no mandated forest harvesting reserves, but are valuable contributors to fish habitat and watershed function/condition. Best management practices (BMPs) were proposed based on research findings that could be adopted as guidelines or requirements. The Omineca regional watershed evaluation project is based on work out of the Thompson-Okanagan by Doug Lewis and others. It was applied and then regionally calibrated using a combination of professional overview and field validation. The protocol applies some of the development indicators from the Interior Watershed Assessment Procedure (IWAP) along with some measures of watershed sensitivity. It was developed to aid decision support by providing relative hazards for sedimentation, peak flow, and riparian condition across watersheds. Drought hazard will be added to the protocol in collaboration with Vanessa Foord and others who developed a stand-level drought risk assessment tool to predict tree mortality by BEC zone and tree species. A current project is aimed refining a climate change related stream temperature prediction model developed in the PNW by Isaak et al to identify future thermal refugia for temperature sensitive species for application in our region and then others. This is a collaborative project including other FLNRO staff (Vanessa Foord, Nikolas Gantner, Ray Phillipow, Ian Spendlow) and UNBC (Dr. Eduard Martins). Initial model calibration is focused on the Bowron watershed. Once calibrated, the approach will be adapted for use in other watersheds (e.g. in Skeena can include Upper Bulkley and Morice basins - referenced Len Vanderstar's Nadina work as an opportunity for geographic expansion of the modeling approach). Jane Woods and Ken Chalmers: Focus is on relationship building and education involving range users, First Nations and other stakeholders (co-education - understanding the needs and perspectives of these groups). Planning is a collaborative effort, and government monitoring tracks plan adherence and effectiveness in protecting water and terrestrial values.</p>	<p>John Rex: All of the current and proposed research and aquatic management tool development work could be transferrable to the Upper Bulkley and Morice basins through regional collaboration, such as through the Environmental Stewardship Initiative (ESI). Jane Woods and Ken Chalmers: Collaboration is through Range Use Planning. Range staff could also collaborate with other provincial efforts to make and administer new water sustainability related policies that may affect range use. Range staff could also be involved in ensuring that range users are aware of, and understand the need for these new policies.</p>
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<p>BC Ministry of Forests Lands Natural Resource Operations and Resource Development (FLNRORD) (3)</p>	<p>Megan Peloso, Land and Resource Coordinator (Skeena Regional Initiatives), work phone: 250-847-7711, e-mail: megan.peloso@gov.bc.ca  Vanessa Foord, Climatologist, (climate models, predictions) 250-561-3459 vanessa.foord@gov.bc.ca  Andrea Follett, Water Authorizations Officer MFLNRORD andrea.follett@gov.bc.ca 250-847-7520  Kenji Miyazaki Fisheries Biologist 250-847-7292 kenji.miyazaki@gov.bc.ca</p>	<p>Megan Peloso: Modernized land use planning focus ties into reconciliation, climate change mitigation, building long-term relationships, and creative problem-solving to the growing pressures on land and water. Megan views collaborative watershed governance and the integration of tools in the Water Sustainability Act (WSA) as part of the evolution of land use planning. She sees a need to shift from the terrestrial bias and parceled approach to traditional land use planning, to include whole watershed sustainability thinking with incentivized voluntary and legal tools. Megan is committed to the watershed planning process in the Upper Bulkley/Morice.  Vanessa Foord: Much of current communication with others is about effects of climate change on aquatic environments (e.g. temperature, flows).  Andrea Follett: Water Sustainability Act allows for transition to new requirements for non-domestic existing groundwater users. Existing users have until March 1, 2022 to apply for authorizations. Currently doing consulting with First Nations groundwater users on the transition. Consultations will continue.  Kenji Miyazaki: Interest in all watersheds including Upper Bulkley and Morice, currently engaged at peripheral level on the upper Bulkley River. FLNRO Fisheries staff core focus is on recreational fisheries management and sustainability of fisheries across the region. Fish habitat management aspects have traditionally been dealt with through the role of Ecosystems staff.</p>	<p>Megan Peloso: Megan is working with other provincial staff to explore how WSA planning tools can evolve with modernized land use planning (including how WSA might interface with other Acts and policies). For example, she is pursuing pilots for collaborative watershed planning (such as WSA Water Objectives) in the Skeena region. She is also involved in land use planning engagement with the Ministry of Indigenous Relations and Reconciliation. Work on the Upper Bulkley and Morice has the possibility to advance co-governance and reconciliation by integrating First Nations policies and cultural protocols as well as addressing water sustainability issues in the territory. Megan has also assisted in the Environmental Stewardship Initiative (ESI) for the Skeena Region, which is a collaborative government-to-government initiative. The results of ESI monitoring and assessment, particular around aquatic ecosystems and wetlands, will be instrumental in future watershed planning in the Upper Bulkley and Morice.  Vanessa Foord: Climate change projections and assessments at the District level are available for the area - they are not specifically aimed at salmon, but are applicable. The information is currently being used for water allocation decisions, and by Ecosystem Biologists for a variety of purposes, including work on aquatic ecosystems. Communications with First Nations are generally focused on how to better engage in climate/weather monitoring e.g. (filling gaps in the current monitoring system) to aid in understanding of how local environments, (emphasis on salmon and wildlife) are responding to climate change. At present, there are a few weather stations either in, or bordering on the Upper Bulkley and Morice basins. They are being used for a variety of ecosystem related assessments, including forest health trials.  Andrea Follett: Water Sustainability Act allows for transition to new requirements for non-domestic existing groundwater users. Existing users have until March 1, 2022 to apply for authorizations. Currently doing consulting with First Nations groundwater users on the transition. Consultations will continue.  Kenji Miyazaki: In the Morice watershed fisheries staff are currently engaged in stock assessment activities do fish enumeration, including redd surveys for bull trout. There are also 12+ water temperature monitoring locations where temperature sensitivity may occur, across the region. The objective is to apply Bull trout char protection related temperature guidelines, where applicable, to be used to manage recreational fishing - threshold exceedances (16 C.) would signal need to potentially curtail/close recreational fisheries. In July this year, the following rivers had periods of threshold exceedances: Bulkley, Kispiox, Nadina, Lakelse, Meziadin. Collaboration with Sam Pittman on groundwater/surface water interactions (identification of cold water refugia in the Upper Bulkley) is under way. This will feed into temperature related fish protection measure as well.</p>	<p>Megan Peloso: As an upper Bulkley Project Coordinator, Megan will continue to work collaboratively with interested groups.  Vanessa Foord: Future collaboration will follow Ministry priorities (e.g. collaboration with John Rex and others is currently focussed on climate change related management of Bull Trout in the Bowron watershed. This work could be adapted for use in salmonid management in the Skeena. Other work is aimed at developing tools for tree retention to improve water values, especially related to drought).  Andrea Follett: Future water management initiatives Consultation efforts and future authorization processes will provide an opportunity for collaboration with others on water sustainability activities.  Kenji Miyazaki: Collaboration with others will continue through stock assessment and other recreational fisheries management work - links into habitat management and water sustainability activities.</p>
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<p>BC Ministry of Environment and Climate Change</p>	<p>Don Morgan Systems Ecologist Conservation Science Section - Smithers don.morgan@gov.bc.ca 250-887-3199</p> <p>Jennifer Vigano – (Director, Watershed Sustainability, (WSA Water Objectives and Water Sustainability Plans policy), jennifer.vigano@gov.bc.ca 250-565-6424</p> <p>Greg Tamblyn, Monitoring Assessment and Stewardship Section Head, 250-847-7269, greg.tamblyn@gov.bc.ca</p> <p>Jessica Penno, Water Quality Objectives Specialist, 250-489-8587 jessica.penno@gov.bc.ca</p> <p>Jolene Raggett, Aquatic Resource Biologist, Water Science and Adaptation (Nelson) (WQOs, WSA WO, Biomonitoring - CABIN, etc.).</p>	<p>Don Morgan: Interest is mainly in species at risk (e.g.) Bull trout) and climate change adaptation. Indirect interests are through supporting policy development for the Water Sustainability Act, and supporting the Forest and Range Evaluation Program (FREP) - the wetland component. Currently looking at Owen and Lampreye basin in the Morice.</p> <p>Jennifer Vigano: WSA is all about water sustainability. Policies being developed could be informed by work in the context of the Upper Bulkley and Morice basins.</p> <p>Greg Tamblyn: Ensure that water quality is safe for all users (people, ecosystems). In this case, key regulatory role is authorizing the discharge of effluents to aquatic environments, keeping them from negatively affecting Water Quality and ecosystems. Beyond the regulatory, another role is to monitor and assess water quality (water, sed and biota) - using water quality guidelines for the protection of specific uses and other tools.</p> <p>Jessica Penno: Water Quality Objectives for protection of values, including aquatic life are set for areas within watersheds in BC. Current Plan for BC includes Morice and Bulkley basins.</p> <p>Jolene Raggett: Interest is in biomonitoring tool development and support - Canadian Aquatic Biomonitoring Network - CABIN models for benthic macroinvertebrates - Skeena: working with Wet'suwet'en on maintaining CABIN reference sites. In future will fill higher elevation gaps in the CABIN system. Biomonitoring data relevant to aquatic ecosystem health, but not specific to fish.</p>	<p>Don Morgan: Past and current work involvement included a cumulative effects assessment in the Morice, hydrology/flow scenario analysis for the Skeena watershed, Morice Land and Resource Management Plan (LRMP) related Timber Supply Review (TSR), Morice Innovative Forest Practice Agreement (IFPA) - habitat and forest management modeling. Planned work includes involvement in Morice and Upper Bulkley land use planning, Environmental Stewardship Initiative (ESI) related monitoring and assessment in the Upper Bulkley and Morice- grizzly bear, wetlands and fish habitat components.</p> <p>Jennifer Vigano: Currently working on policy for Water Objectives and Environmental Flow Needs (EFN) especially requirements for regulatory decision makers - will be available for review, starting with First Nations and then other entities with interests. The Nicola Water sustainability Planning (WSP) pilot is testing ideas - governance is as important as watershed issues to resolve. Using a root cause analysis approach, and it is leading to progress. Additional watersheds will build on the Nicola pilot - best bets are where First Nations are willing and able to work in parallel with title issues. As the WSA tools mature, MOE will be in a support and policy making role, with FLNRO in a lead role.</p> <p>Greg Tamblyn: Prior water monitoring activities in the Upper Bulkley and Morice have included aquatic ecosystem monitoring tools (e.g. water and sediment physical/chemical sampling and analysis, CABIN system, periphyton, fish tissue chemistry) . Water Quality Objectives attainment monitoring has been used in to assess impacts in the Upper Bulkley (e.g. Houston sewage treatment plant and livestock production). Other Upper Bulkley projects have included a weight of evidence based Environmental Effects Monitoring approach to assess treated mine effluent at the closed Equity Silver mine (e.g. water, sediment, tissue chemistry, toxicity testing). There has also been past work with agricultural producers to improve practices through BMPs, and restoration efforts. Currently, there is annual funding to assist the Morice Water Monitoring Trust in its water monitoring program in the upper Morice basin. This work will lead to setting Water Quality Objectives to assist in addressing ecosystem health issue related to forest harvesting and mining exploration. Future work may focus on re-evaluating authorized discharges in the face of the trend to lower summer flows in the Upper Bulkley.</p> <p>Jessica Penno: WQOs being developed now have evolved in terms of use in water protection and management - can be used for sustaining, improving and/or allocating capacity for discharges to occur. Provincial priorities are currently being set for WQO development and monitoring. Bulkley and Morice are on the list for priority setting. Bulkley has older WQOs that could be updated. Morice WQO development is occurring through the work of the Morice Water Monitoring Trust.</p> <p>Jolene Raggett: Collaboration with others on biomonitoring system development and maintenance occurs as opportunities occur (e.g. new developments in CABIN system involving application of eDNA).</p>	<p>Don Morgan: Future collaboration will occur through the Morice Water Monitoring Trust (MWMT - Trustee) , Skeena Knowledge Trust (trustee), ESI, and involvement in the Pacific Salmon Foundation work.</p> <p>Jennifer Vigano: Collaboration will be in the context of the support and policy making roles.</p> <p>Greg Tamblyn: Collaborative work is ongoing (e.g. funding Morice Water Monitoring Trust monitoring efforts). There is interest in future collaboration on water sustainability issues in the Upper Bulkley as part of any land/water use planning processes.</p> <p>Jessica Penno: Work is currently underway for the Morice, and Upper Bulkley collaboration will depend on the provincial priority setting process.</p> <p>Jolene Raggett: Moving in the direction of collaboration with First Nations and Environment and Climate Change Canada.</p>
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BC Agriculture	<p>John Stevenson, Regional Agrolgist, 250-847-6379 email: john.J.stevenson@gov.bc.ca</p> <p>Andrew Petersen Water Management Specialist, 778-696--2293 andrew.peterson@gov.bc.ca</p>	<p>John Stevenson: Key interests are around water supply for agricultural use. The combination of domestic and livestock water supplies are most important for Upper Bulkley. Climate change may cause a general shift from livestock to drought resistant cultivated crops in the north. In the mid and lower Bulkley area, access to water for dairy farming will remain paramount. Beef production throughout the Bulkley basin could require less water, especially if range tenures can be better utilized. Although irrigation can be a big use, there are few operations authorized for the purpose in this area. - may be 1 or 2 irrigation licenses, and its unclear if there are any withdrawals occurring. It is likely that river water usage for irrigation will not increase in this area. However, there is an increasing interest in rain and other surface water capture for agriculture. On the environmental side, the main interest is in balancing water use with environmental needs, and maintaining/restoring riparian zones adjacent to farm operations.</p> <p>Andrew Peterson: interest in water protection related to agricultural water use - what use is occurring - what irrigation and stock watering systems are being used, and should be used based in the range of circumstances.</p>	<p>John Stevenson: We would like to have more representation for agricultural use in land use planning. Current efforts include workshops on riparian protection and maintenance - providing advice on how to access tools and cost shared funding for offstream watering infrastructure (intakes, watering devices to get cows away from stream banks. other restoration. Pleasant Valley Cattlemen are interested in this work. Encouraging environmental farm planning which has the benefit of being peer to peer oriented. Hoping to build momentum in the next few years with a province wide agriculture environmental code of practice including a water quality component and a push to increase uptake of water authorizations. Need more hydrometric and aquifer data to make this work. Tried to do an agricultural water demand model through the BNRD, but couldnt quantify use. Need to know/predict available quantities and timing of flows to understand what to ask for in any planning forum.</p> <p>Andrew Peterson: Climate Change will alter irrigation and watering needs/circumstances - involved in the Nicola WSP pilot, providing advice. Have determined that in the Upper Bulkley Basin, agricultural related licensed water withdrawals are all domestic - but there could be irrigation demand in future as climate change proceeds. The BC agricultural water calculator tool is quite valuable (<a href="http://www.bcagriculturewatercalculator.ca/">http://www.bcagriculturewatercalculator.ca/</a>) as a first approximation of potential irrigation water needs. It includes- mapping, water authorizations, wells, and can give calculations of irrigation water needs on a given parcel of land.</p>	<p>John Stevenson: Looking for agro-forestry opportunities on the crown land base with a cross-section of stakeholders. Cross agency initiatives have begun in the Cariboo and could be spread to the NW.</p> <p>Andrew Peterson: Advice may be available upon request when agricultural land could be affected, but limited due to prior commitments.</p>
Ministry of Transportation and Infrastructure	<p>Sean Wong, Biological Programs Manager, sean.wong@gov.bc.ca 250-213-8659</p> <p>Kathryn Graham, Regional Environmental Manager, kathryn.graham@gov.bc.ca, 250-565-7024</p>	<p>Kathryn Graham and Sean Wong: In addition to legislated requirements and relevant guidance, our Environmental Management Branch and various environmental policies, programs, guidance and procedures are developed to ensure sustainable highway developments, operations and maintenance, as well as for restoration (e.g. fish passage).</p>	<p>Sean Wong: Currently wrapping-up an extended field restoration project and have a number of others to be delivered</p> <p>Kathryn Graham:Responsible for regional and district projects including passing lanes, culvert replacement, bridge installation on a project by project basis. Project assessments typically have upstream and downstream evaluations of habitat and fish passability. When hydro-technical evaluations warrant, a broader look at the watershed level may occur.</p>	<p>Kathryn Graham: Annual work planning includes collaboration with DFO and FLNRORD to help prioritize projects, and get advice on potential water/fish issues. In some instances this collaboration may lead to remedial work to fix an existing issue. Broader water planning participation can occur when requested (e.g. Murray River watershed planning).</p>

Office of the Wet'suwet'en	David Dewit, Natural Resources Manager. david.dewit@wetsuweten.com Walter Joseph, Fisheries Manager walter.joseph@wetsuweten.com 250-847-3630	Walter Joseph: Salmon is always in the forefront of Wet'suwet'en peoples' minds. For any activity or project, the key issue is about impacts to salmon. David DeWit: The Wet'suwet'en have multiple interests, including cultural and food security aspects of water and salmon sustainability. The key to this is the means to be in a collaborative decision making role, and to be advocates for better use of information. The priority is convincing governments to affirm the role of Wet'suwet'en decision making for land water based activities.	Walter Joseph: It has been established that the Upper Bulkley currently has small populations of Chinook and Sockeye, which have been on the decrease for decades. Over this period, habitats have been degraded, and recovery efforts are being discussed broadly through the Upper Bulkley Round Table. Ongoing water and salmon sustainability work in the basin is focused on mapping the remaining high quality habitats (e.g. areas subject to groundwater influence) with a view to determining what can be done to maintain and enhance them. Similarly, there is also ongoing Sockeye Recovery Planning for the Nanika and Morice lakes areas to see what can be done to rebuild these runs. Past and current work with other First Nations generally follows a broad consensus that salmon conservation planning is needed (e.g. ESI programs in Upper and Lower Skeena). David dewit: A means to establish collaborative decision making that respects UN-DRIP is needed. Current technical work includes 1) hydrometric monitoring on the Upper Bulkley, 2) Fish Habitat Assessment Procedure (FHAP) assessments and fish enumeration in partnership with DFO. 3) water quality monitoring. In future we are planning to 1) identify Environmental Flow Needs (EFNs), starting with tributaries to the Upper Bulkley, then the Upper Bulkley, 2) identify alternative management practices for land and water activities, 3) explore opportunities for off channel water storage using spring runoff, 4) encouraging higher levels of management of the range of current and planned activities.	Walter Joseph: Almost any meaningful activity aimed at maintaining or restoring salmon stocks in either basin (Upper Bulkley or Morice) would be viewed as a potential collaboration opportunity by the OW. For example, lake fertilization to increase Sockeye runs is currently being explored through a multi-lateral planning process. David DeWit: Collaboration needs to happen on different tiers: 1) government decision making/legislation enhancement to enable use of Wet'suwet'en policies and laws, 2) technical work (e.g. Morice Water Monitoring Trust, Upper Bulkley Roundtable - a good breeding ground for collaboration, efficiency, governance change, developing relationships with agencies, industries and the public. This kind of collaboration will assist in building the trust and momentum to create the changes necessary for water sustainability.
Regional District of Bulkley Nechako	Janette Derksen, Deputy Director Environmental Services email: Janette.derksen@rdbn.bc.ca 250-692-3195	Janette Derksen: RDBN Board has interests in watershed quality and salmon. Environmental Services focusses on solid waste management, but has some involvement in water issues (e.g. through zoning work).	The Board is active on water issues and projects (e.g. Nechako reservoir management for Sturgeon in the Nechako River, sturgeon hatchery releases, lake stewardship/education - signage at Seymour Lake). Activities are limited by staff capacity.	Collaboration on projects depends on staff capacity and nature of the project.

District of Houston	Paul Gordon, Manager Engineering and Operations, 250-845-2238 cell 250-845-8236 email: engineering@houston.ca	There is a general interest in water sustainability related to the Upper Bulkley/Morice, primarily around potable water supply and treated sewage discharges of the District of Houston.	Water supply is from a groundwater aquifer (currently 1 licensed well). Two old wells are being de-commissioned and a new well as a “backup” is planned. Treated sewage discharge is to the Upper Bulkley. Discharge quality is well managed and in compliance with provincial requirements. Serious flooding within the town occurred about 20 years ago, and flood proofing diking was constructed to effectively limit the risk - some groundwater related flooding still occurs at high river flows, but risks to safety and infrastructure are well managed.	One of the recently de-commissioned wells has been offered to FLNRO as an observation well. Efforts are currently underway to create a water system emergency plan. Beyond these activities, the district of Houston would like to be informed of water sustainability efforts in the Upper Bulkley and Morice basins.
<b>NON-GOVERNMENT FISHERIES MANAGEMENT / ADVISORY / ADVOCACY</b>				
Skeena Fisheries Commission	Allison Oliver, Biologist, 250-842-2213 ext 26, allisonoliver@skeenafisheries.ca	The Skeena Fisheries Commission (SFC) addresses science, management, and conservation of fisheries and watersheds in the Skeena River watershed and adjacent North Coast. The Wet’suwet’en Nation, whose traditional territories include the Upper Bulkley and Morice Rivers, are a signatory nation of the SFC and therefore we reflect and provide support to their interest in the region.	The SFC is involved in a wide variety of watershed and salmon-related projects. These include the development and analysis of water quality and community fisheries monitoring programs, temperature and flow monitoring, climate change monitoring and prediction studies, limnology, hydroacoustic surveys for juvenile sockeye salmon enumeration, using genetic and population census approaches to developing escapement estimates of salmon, development of fisheries management approaches, habitat and environmental assessment, and others.	There are a variety of groups in the Upper Bulkley and Morice River watersheds with a wide range of both expertise and local knowledge that provide enormous opportunities for collaboration to sustain salmon populations in these areas. We identify a variety of topics for potential collaboration opportunity including monitoring, restoration, research, land management planning, fisheries rehabilitation and conservation, policy development, and public outreach and communication.
A Rocha Project / Upper Bulkley Streamkeepers	Cindy Verbeek, Buck Creek Canfor Hatchery Coordinator, local project of AROCHA Canada, cindy.verbeek@arocha.ca, 250-845-2222, cell 250-845-4540	Buck Creek Canfor Coho hatchery in the upper Bulkley basin is managed by A Rocha Canada, and participates in riparian restoration collaboration	The Buck Creek Canfor hatchery and Streamkeepers Lab has 1 part time staff person (Cindy), and 40 volunteers. It is very field oriented and is currently involved in the Upper Bulkley Round Table (UBR), generally helping others with research projects. The Coho hatchery is part of a larger stewardship program that includes bioblitz ( <a href="http://bioblitzcanada.ca/">http://bioblitzcanada.ca/</a> ), environmental education, events and watershed stewardship projects. Looking to develop restoration activities as capacity grows. Will continue to raise coho, conduct fish passage monitoring in fall, and record spawners. Have also done fry salvage, and helped spawners over barriers.	The hatchery and Streamkeepers Lab collaborates with the Province FLNRO, DFO and the Office of Wet-suweten as members of the Upper Bulkley River Round-table and have helped all three organizations in the field as they researched water quality, flow, and invertebrate sampling (CABIN).

Freshwater Fisheries Society of BC	Dana Atagi, Freshwater Fisheries Society of BC, Vice President Sport Fishing Division dana.atagi@gofishbc.com	The Society has a general interest in water sustainability. Specifically, Interest in the Upper Bulkley and Morice basins is through the lake fish stocking program. Choosing which lakes are stocked is the purview of the Province, and there are a least 2 stocking lakes in these basins (e.g. Clinger and Barret lakes) . There are no Society run hatcheries in the Upper Bulkley and Morice basins	Past, present and future activities related to water sustainability would be related to the Society's hatchery system and lake stocking programs.	The Upper Bulkley is closed to recreational fishing. However, it is possible that some collaboration related to the Morice basin could occur, but it is not currently in the Society's immediate plans.
BC Federation of Flyfishers	Jessea Grice, 250-846-5089 cell 250-877-1182, jessea.grice@gmail.com	BC Federation of Fly fishers is an umbrella group for regional groups. Interests in water and salmon sustainability are part of the organization's purpose, goals and objectives.	Recent activities have included Coho work on the Telkwa River. As membership grows, more work and collaboration would be possible (boots on the ground).	The Federation is intertwined with many other like minded groups It has a seat on Sportfish Advisory Committee, along with BV Rod and Gun, Upper Skeena Guides and others - The Thompson steelhead issue has brought groups together.
BC Wildlife Federation	Ken Franzen, Co-chair Tidal Waters Fishery 250-628-3303, kenfranzen@hotmail.com	General interest in water and fish sustainability. Interest in work on riparian zone restoration, and forest management. Would support local rod and gun club interests in water sustainability	Recent activities in the NW have been focused on sport fish allocation and participation in Sport Fish Advisory Board.	Collaboration would be through the local Rod and Gun club (BVR&G).
Bulkley Valley Rod and Gun Club (affiliated with BC Wildlife Federation)	Frank Guillon 250-847-2370, guillon@telus.net	Interest in water and fish sustainability is focused on the Bulkley Valley	Restoration work has been carried out on Club Creek in the vicinity of the Rod and Gun club facilities by members. Frank is involved in various consultations related to fish sustainability, and will continue to do so. A recent survey of that resulted in 50 responses identified 5 stressors on fish: - commercial harvest, climate change, recreational fishery, government fisheries management and Aboriginal fishery	Collaborative work "on the ground" is limited by the availability of members. Other types of collaboration including letters of support for collective action/projects are possible.
Upper Skeena Sport Fishing Advisory Committee part of the Upper Skeena Fishery Advisory Board	Sam Cooper, Upper Skeena Sport Fishing Advisory Committee, Upper Skeena Chair 250-877-6266	The DFO funded Sport Fish Advisory Committee (SFAC) has an advisory role, focussing on both conservation and sustainable fishing opportunities (not advocacy role) in fish management and has 3 tiers of organization. 1) provincial, 2) regional (North Coast) 3) local. Sam Cooper is the Chair of the local group (Upper Skeena), and has a seat at the North Coast table. The SFAC has a general interest in fish sustainability, and recognizes that salmon stocks are declining. The Upper Skeena group recognizes the Upper Bulkley and Morice basins as productive fish habitat and fishing oportunites (although there is currently a salmon fishing closure on the Upper Bulkley).	Past work has been to engage in dialogue about conservation and opportunities. Topics have included effects from climate change effects (e.g. flow and temperature), ocean survival, habitat dynamics and fishing, among others. Local groups have used their intimate knowledge of their areas to provide advice. There is ongoing discussion regarding salmon fishing closure on the upper Bulkley. future activities will focus on supporting committee recommendations to DFO, and helping DFO increase its effectiveness in communicating to the public regarding fishing opportunities (e.g. Fisheries Notices).	the local SFAC group is able to collaborate with others on fish sustainability topics.

RESEARCH/ACADEMIA

Bulkley Valley Research Centre	Leigh-Ann Fenwick, 250-847-2827 email leigh-ann.fenwick@bvcentre.ca	General interest in natural resource related research. Some affiliated researchers have an interest in water sustainability in the Upper Bulkley and Morice basins	Past activities have included helping to develop the Morice Water Monitoring Trust, and currently administering a number of projects (including this scan) that are providing information for water management in the Upper Bulkley and Morice basins. Future participation could include organizing workshop(s) and other educational venues, as well as ongoing support for water and salmon sustainability research in the area.	BVRC is open to future research and information sharing collaboration, and could find these opportunities through the Upper Bulkley Roundtable and any new water sustainability planning in the area.
Geoscience BC	Carlos Salas, salas@geosciencebc.com 604-662-4147 ext 28	A strategic focus of Geoscience BC includes water sustainability through the lens of natural resource development (e.g. mining, energy projects). It is conceivable that the organization's mandate could apply to the Upper Bulkley and Morice basins.	Recent activities in north-east BC have included studies of surface and groundwater related to unconventional gas development (e.g. studying natural gas development interactions in confined aquifers, using airborne geophysics tools for groundwater delineation), and expanding the existing groundwater monitoring network.	Current water research, is a collaboration of multiple scientific disciplines from various universities, with involvement from local First Nations and communities (e.g. contact with the Regional District, and open house forums). Future collaborations in other areas of the province are possible, subject to the Geoscience BC governance structure, and the internal approval process.
University of Northern BC	Stephen Dery, hydrology / hydrometeorology, sdery@unbc.ca, 250-960-5193 Eduardo Martins UNBC fisheries thermal ecology 250-960-5855 eduardo.martins@unbc.ca	Stephen Dery: Interest is focussed on climate change related hydrology research, including the Skeena drainage. Eduardo Martins: Area of study is freshwater fish thermal ecology - determining how fish respond to temperature changes in terms of behaviour, population effects demography and reproduction. Work includes BC watersheds other than Upper Bulkley and Morice.	Stephen Dery: Have participated with others in climate change related modeling of future hydrologic patterns, including the Bulkley and Morice watersheds. Have done some outreach/extension work with Dawson Creek related to understanding recent flood dynamics. Currently publishing on water temperature aspects of climate change in the Fraser basin. Looking for more temperature data from areas throughout BC to refine and expand modeled predictions. Future work in the Upper Fraser basin will focus more on snow accumulation patterns related to climate change. Eduardo Martins: - Past and present research has been focused on Arctic grayling, Bull trout and Sockeye. Areas under study include Fraser and Parsnip watersheds. Water temperature monitoring and modeling research in collaboration with others (e.g. FLNRORD - John Rex) is planned. Other collaborative work will include lakes (e.g. Babine Lake). Parsnip watershed work focus is grayling and Bull trout.	Stephen Dery: Currently collaborating with the Pacific Climate Impacts Consortium (PCIC), other universities, and the province on research. Eduardo Martins: Collaboration occurs through cross pollination with other research teams, publications (e.g. Mark Shrimpton has a PhD student working on the Nicola watershed - Will use these methods for work in the Parsnip watershed. There is also a FLNRO collaboration on effects of lake warming on fish behavior and demographics).

Simon Fraser University	Jonathan Moore, Professor of Aquatic Ecology and Conservation, jwmoore@sfu.ca 778-782-9246	The SFU Salmon Watersheds Group studies how aquatic ecosystems function, and applies this knowledge to conservation and management. Some of this work has occurred in partnership with the Wet'suwet'en. There is potential for more work in the Upper Bulkley and Morice basins.	Cited two prior papers touched on the Morice: (1) Michael Price's work on historical abundances of Skeena salmon, 2) identification of rearing Upper Bulkley/Morice Sockeye in the Skeena estuary (Flora Bank). as part of LNG terminal impact studies. Current efforts are focused on determining climate change effects on salmon watersheds (year 1 of a 5 year study - initial effort is a collaborative process to determine the approach. A project underway in the Nicola watershed uses river temperature as a master variable - largely controlling the aquatic ecosystem. This project includes >100 water temperature sensors, and will lead to "risk zone: mapping. A multi-watershed project (Fraser, Thompson, Babine) goes further by building models to link climate and watershed characteristics (including land use) to water temperature. Generally, the guiding principle in these projects is to find and fill key knowledge gaps where there are emerging challenges/industries - The Flora Bank work is a good example of this. Similarly, a lower Fraser project is helping to design fish friendly flood control works.	The SFU Salmon Watersheds Group is open to collaborative opportunities, and the Upper Bulkley and Morice basins are likely candidates. The challenge would be to align a defined project with personnel (grad students). For example, if a significant amount of habitat restoration occurs in the Upper Bulkley, there might be an opportunity for effectiveness evaluation studies, leading to improvements (e.g. continuous learning through comparative studies).
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**NON-GOVERNMENT FUNDERS/ ENABLERS**

Tides Canada	Ivan Thompson, Senior Advisor Wild Salmon Watersheds, Ivan.Thompson@tidescanada.org, 604-250-3525	Three circumstances have led to our current interest and activities in water sustainability: - 1) Predicted climate change related summer low flows will make water and salmon values more difficult to sustain. 2) New tools and opportunities to deal with other land and water use related negative effects on water and salmon are now available through the Water Sustainability Act (WSA). The Upper Bulkley and Morice basins have potential as candidates for testing these new tools. 3) There is a group of funders interested in supporting the piloting of new tools and approaches to watershed governance. This, along with government resources and tools attached to the WSA may assist in making a difference, especially by starting small (Upper Bulkley/Morice context), and building from there.	Activities past, present and future are focused on supporting water sustainability efforts through funding, and helping to organize and facilitate support from other potential funders (e.g. Real Estate Foundation, and Sitka Foundation)	Future collaboration would be through funding efforts on the ground, and helping others to collaborate and make connections (e.g. POLIS, BC Water Funders) to help focus \$ and effort.
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BC Water Funders Collaborative	Tim Morris, Project Director at BC Freshwater Legacy Initiative, Tim@bcwaterlegacy.ca, 705-446-6936	The BC Freshwater Legacy Initiative, emerged as a strategic project of the BC Water Funders Collaborative. It was founded by Real Estate Foundation of British Columbia, Gordon and Betty Moore Foundation, and Sitka Foundation working in partnership with Tides Canada to combine their resources to create the initiative. The Legacy Initiative is working to help advance innovative watershed governance in British Columbia. It is focused on opportunities to support watersheds where watershed governance and planning initiatives are gaining momentum (e.g. Nicola, Upper Bulkley /Morice, Cowichan, Nechako, Gitanyow). Focus is on nurturing innovation in watershed governance, facilitating partnerships that bring terrestrial and aquatic interests together at watershed scale, and decision making informed by western science and indigenous knowledge. Drawing on local experience and expert advice, this unique initiative makes capacity investments in leadership and innovation at the watershed scale to advance water sustainability throughout B.C.	Activities include: developing partnerships with the Province to support innovative watershed governance (eg. Nicola watershed), supporting community partnerships regarding governance (e.g. Cowichan Watershed Board) and indigenous water policy development/implementation - Gitanyow, Nahdle, Sekuz, Stelat'en. Future activities will include sharing learnings among communities and governments, strengthening governance and collaborative capacities of indigenous and non-indigenous communities/governments, supporting skill building related to watershed governance (eg. the tools available under the Water Sustainability Act) and advocating for a Water Sustainability Fund to help scale up watershed governance across the province.	The Legacy Initiative is open to opportunities to support innovation and collaboration on watershed governance and decision making where it is happening, especially where Crown and First Nations are equal partners at the table.
University of Victoria POLIS Project on Ecological Governance: Water Sustainability Project	Oliver Brandes, Project Lead, omb@uvic.ca, 250-208-3155	Excerpted from <a href="https://poliswaterproject.org/">https://poliswaterproject.org/</a> : Project focus is water sustainability through developing and sharing research centered on innovative law, policy, and governance solutions. Desired outcome is to increase understanding of freshwater issues and improve decision-making and management. Guiding principle is to work with people, places, policy, and pooling knowledge (4Ps) to assist the Province in moving towards more effective land and water planning and management. This starts with a holistic, well articulated vision for a given basin, based on principles of co-governance.	Activities are centered on researching and employing new water governance tools enabled by the 2016 Water Sustainability Act. Desired outcomes of using these tools are more effective water and land use practices to ensure proper functioning condition of watersheds. Priorities are to make progress in the Nicola, Skeena, and Cowichan watersheds (currently considering the Columbia as well).	Collaboration occurs through building networks (e.g. Water Leaders Network: <a href="https://poliswaterproject.org/files/2018/12/WaterLeadersLetterAndStatement.pdf">https://poliswaterproject.org/files/2018/12/WaterLeadersLetterAndStatement.pdf</a> ) to share and promote innovation in water sustainability planning and management.
<b>ENVIRONMENTAL NON-GOVERNMENT ORGANIZATIONS</b>				
Morice Water Monitoring Trust	Ian Sharpe, Trustee 250-643-4321, iansharp1955@gmail.com	MWMT focus in on water quality monitoring in the Upper Morice Water Management Area, a Special Management Zone created as part of the Morice Land and Resource Management Plan (LRMP). The Trust is for the benefit of the Wet'suwet'en people, and the intention is to transfer knowledge gained to the rest of Wet'suwet'en traditional territory, including the Upper Bulkley..	The Trust is funded through an endowment from the Gordon and Betty Moore Foundation, and past annual contributions from BC Ministry of Environment. Annual monitoring program helps to establish Water Quality Objectives, and includes attainment monitoring of these site specific objectives, as well as provincial water quality guidelines for the protection of aquatic life. Field work is conducted by Wet'suwet'en Fisheries staff. A technical review of the Trust's work occurred in 2018, and monitoring objectives have been adjusted accordingly. Future work will include hydrometric, biomonitoring and limnology components, as well as expanding water quality monitoring (see <a href="http://moricetrust.ca">moricetrust.ca</a> for more information).	Collaborative work with the Upper Bulkley Round Table is planned for the near future.



Skeena Wild Conservation Trust	Michael Price, Salmon Ecologist, <a href="mailto:pricem@skeenawild.org">pricem@skeenawild.org</a> , 250-638-0998	Skeena Wild is a nonprofit organization that emphasizes the development of long-term solutions: 1) Habitat and species protection 2) Science and Research, 3) Sustainable fisheries management, 4) Community engagement (Excerpt from <a href="http://skeenawild.org/story/">http://skeenawild.org/story/</a> ). Salmon and water quality are at the root of all activities. Upper Bulkley and Morice are of high interest.	Currently involved in PhD at SFU and Skeena Wild. Focus of both efforts is on fish biology, specifically Sockeye recovery planning for the Wet'suwet'en. The Morice/Atna conservation unit (CU) is a priority. The bulk of returns in this CU are to Nanika, which is the focus of the recovery plan. A second priority will be a recovery plan for the Upper Bulkley -Sockeye, and Chinook would be the target species. A past study was focused on finding Sockeye smolts at the outlet of Bulkley Lake - Chinook and Coho were found, but no Sockeye. Other work has focused on finding critical salmon habitats, to help in recovery planning. Currently working to resolve uncertainty as to the numbers of Upper Bulkley Sockeye and Chinook, and whether these Sockeye are river type (no lake rearing period). Historically there were traditional fisheries at the mouth of Foxy Creek, and in Maxan Lake -maybe Bulkley Lake too. In the Morice watershed, there have been historic fisheries at the mouth of the Gosnell and Upper Morice. With this in mind there is a proposal to use eDNA tools through water sampling to look for evidence of Sockeye in these and other locations, Habitat degradation is a big concern as well as climate change related changes in flow and temperature. In some years, flow is low enough to create migration barriers, especially at Bulkley Falls. Skeena Wild researcher Adrienne Burchfold is looking at water quality issues, and is looking into recent data, especially regarding mines (including closed mines such as Bell and Granisle mines, Topley concentrate loadouts and Equity Silver mine). See <a href="http://skeenawild.org">skeenawild.org</a> for more information.	Collaborators include OW and SFU researchers John Reynolds, Jonathan Moore and Brendan Connors. Looking to build collaboration with DFO for the Morice/Atna Sockeye Recovery Plan. Also want to further build relationships with Gitksan, and Gitanyow First Nations based on shared salmon sustainability concerns.
Friends of Morice-Bulkley	Dawn Remington <a href="mailto:info@friendsofmoricebulkley.ca">info@friendsofmoricebulkley.ca</a> , 778-210-0252	Friends of Morice, Bulkley is a watershed stewardship group formed in 2010 originally to deal with Northern Gateway pipeline issues and the associated potential for degradation of fish habitat in the area. The group participated in the NEB pipeline review and submitted information relevant to salmon sustainability.	Currently the group is an intervenor in other major project review processes where there are potential effects on water resources in the Bulkley and Morice watersheds, and will continue to do so when proposed projects may damage aquatic resources in these two basins. In future, the group is hoping to engage in more stewardship work that would include restoration and education/outreach. The group currently has capacity issues (people, \$) and has a lack of resources to tackle new issues as they arise. (see: <a href="http://friendsofmoricebulkley.ca/">http://friendsofmoricebulkley.ca/</a> ).	Current and past collaborations have been with Friends of Wild Salmon and Skeena Wild. For any planning process, this type of collaboration would continue.

### INDUSTRIES - AGRICULTURE, FORESTRY, MINING

BC Agriculture Council / Agriculture Research & Development Corporation (ARDCorp - Environmental Farm Planning)	Ray O'Farrell, Manager Environmental Programs 604-854-4483, <a href="mailto:program_manager@ardcorp.ca">program_manager@ardcorp.ca</a>	BC Agriculture Council is a non-profit, non-governmental "Council of Associations" representing nearly 30 farm associations. Vision is to "Grow B.C. into the most dynamic and robust agriculture province in Canada" by continually improving the social, economic and environmental sustainability of B.C. farms and ranches. ARDCorp is BCAC's wholly owned subsidiary which delivers farmer focused programs. Interest in water sustainability from agriculture industry perspective. Work at provincial and regional levels. Local farm associations such as the Smithers Farmer's Institute assist in program delivery at the local level.	Promotes and develops Environmental Farm Plans (EFPs) that include water sustainability specific elements (e.g. water conservation, pollution prevention, off-channel livestock watering systems use, erosion control), promotes environmental awareness in the agricultural sector (e.g. participated in salmon sustainability project - Fraser Valley Salmon Watch and Koksilah watershed planning, Creston Agricultural Area Plan). Administers the BC Agriculture and Food Climate Action Initiative (water sustainability is a key element), and promotes Species at Risk Partnerships on Agricultural Lands (SARPAL - focuses on SARa listed species).	Interested in opportunities to collaborate as they arise.
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BC Agriculture and Food Climate Action Initiative	Samantha Charlton, Project Manager, Regional Adaptation Program - Victoria Samantha@bcagclimateaction.ca 778-676-7657	Have key interest in helping the agriculture sector find ways and means to adapt to climate change related challenges facing the sector. Have developed a Strategy for agricultural adaptation in the Bulkley-Nechako and Fraer-Fort George region. The strategy development and implementation will be overseen by a local working group, which has been in place since Sept 2018. working groups in 2 areas in the north (Bulkley/Nechako and Fraser/Ft. George). On average, precipitation is increasing in the summer. However, there is a range. The range also includes summers that are up to 16% drier by 2050. So, producers have to be prepared for this lower end of the range, Wildfire and water shortage / water management are 2 of the main issues in play. (see: <a href="https://www.bcagclimateaction.ca/">https://www.bcagclimateaction.ca/</a> ).	Held 2 workshops in each of the 2 areas, then a joint session to explore possible projects. Currently writing a regional climate adaptation strategy for Bulkley / Bechako and, Fraser / Fort George combined - intending to publish end of July. (The plan is done now and public, available at: <a href="https://www.bcagclimateaction.ca/wp/wp-content/media/RegionalStrategies-BNFFG.pdf">https://www.bcagclimateaction.ca/wp/wp-content/media/RegionalStrategies-BNFFG.pdf</a> ). Two of the focal areas relate to Focus is on drier summers (available water and wildfire protection). Strategy will lead to projects on a priority basis. Strategy will include sections on communications related to water storage, (connecting to knowledge and assistance), documenting how freshet water may be stored. and co-benefits of storage. BC Cattlemen's Association has a report on co-benefits of agricultural dams (e.g. wildfire protection, ecological services), farm practices to conserve water e.g. irrigation systems, farm design, etc) that can be built upon. Once the Strategy has been published, research will occur on highest ranked projects, followed by a proposed shortlist, which will then be refined further. At present there is a \$300K fund available, and other co-funders will be sought. Ultimately the partnership will propose 3-5 projects.	The BC Agriculture and Food Climate Action Initiative will pitch proposed projects to the local working group working groups (e.g. Upper Bulkley, Morice), and it is hoped that momentum can be achieved by building on successes. This work could be used to collaborate on a WSP.
Smithers Farmer's Institute (Environmental Farm Planning),	Megan D'Arcy, Telkwa, Environmental Farm Planner, 250-846-9854 mdarcy@uniserve.com	Interest in Environmental Farm Planning (EFP) in the upper Bulkley area	Have completed some EFPs in the upper Bulkley basin. EFPs are confidential. Megan's work has been restricted to terrestrial and riparian based plans - not "fish specific". There is provision for "group plans"	Group plans could be useful as a means to collaborate in future.
Pleasant Valley Cattlemens Association / Skeena Region Cattlemen's Association	Linda Dykens, Pleasant Valley Cattlemen, and Skeena Region Cattlemen 250-845-3013 lindadykens@xplore.net.com	Pleasant Valley Cattlemen's Association covers Topley to Hungry Hill, so all of Upper Bulkley and Morice. There is general interest in water sustainability	Activities past, present and future include Pleasant Valley Cattlemen's Association members developing Environmental Farm Plans, and promoting communications among the members, The association puts on annual field days and public events(2019 Sept 20, 21 ag days in Houston aimed at public education and relationship building. Skeena Regional is currently working on a fencing brochure.	Would be willing to find an Association to collaborate
BC Cattlemens Association	Lee Hesketh, BC Cattlemen's Association Program Manager, Lumby, 250.547.6586. C:250.308.9623. FRISP@cattlemen.bc.ca.	From the website: The BC Cattlemen's Association (BCCA), has a program to address watershed resource concerns and encourage sustainable land management practices in support of the agricultural sector. The Farmland-Riparian Interface Stewardship Program (FRISP) assists agricultural producers to protect and enhance water quality, riparian vegetation, and fish habitat. Lee Hesketh: Work within the FRISP program, and also have an independent voice in water sustainability.	Working on watersheds across the province. Have started working on NW BC basins including Upper Bulkley and Morice with DFO and the local Cattlemens Association. Educating landowners is a large part of the work. Currently, there is a large list of projects in the NW to work on, including one on Buck Creek (site visit in the fall planned).	All planned projects have a collaborative/educational aspect to them.

Nadina Woodlot Association	Jonathan Seinen, 250-845-7080, jon-seinen@hotmail.com	Woodlot owners ensure buffers to protect water temperature and siltation effects. Beyond this, there is some personal interest (Jon) in water sustainability in the area.	Standard stream and riparian protection practices are followed. Suggestion: riparian zone fuels reduction could reduce wildfire spread up tributary creeks - they are often the means for rapid fire spread due to fuel loading. Current rules prohibit fuel management in these areas. A change in the regulation might be useful in protecting streams.	If an opportunity to involve woodlot owners further arises, Jon would pass it on to approximately 60 members.
Canadian Forest Products - Canfor	Kevin Skarda, Canfor Houston – Planning Forester Kevin.Skarda@canfor.com 250-845-5243	While we do not have direct interest in water sustainability or salmon in the upper Bulkley or Morice watersheds we do have interest in a healthy and fully functioning watershed and its effect on timber and associated values (wildlife, fish, timber, economics, cultural use, etc.)	<p>We manage water/salmon sustainability by minimizing disturbance to these features. This is largely accomplished through timber retention (reserve zones and special management zones) around streams/wetlands/lakes. While FRPA/FPPR sets minimum zone distances, these are exceeded through Canfor Houston's FSP which guides timber harvesting within our operating area in the Morice TSA. We also have a number of other stream-based objectives and legal orders we meet including:</p> <ul style="list-style-type: none"> <li>-The Bull trout spawning areas that receive enhanced protection under an order for the Morice River and its tributaries (these spawning areas are identified as polygons that overlap with identified high value spawning areas on the main stem of the Morice river and Gosnell Creek)</li> <li>-In another watershed (Nadina River) within the Morice TSA we manage for temperature sensitivity based on a report showing the vulnerability of that watershed to elevated temperatures.</li> <li>-We have implemented some additional retention along streams (not Bulkley or Morice watersheds) as identified by a First Nation as a watershed of significance for salmon production, these additional retentions were within our control, as the legislative retention required within that particular area allowed for it.</li> <li>-We manage each watershed to ensure our current and future harvesting does not exceed a defined ECA which aids in us not impacting peak runoff in any given watershed.</li> <li>-We have operational controls to control sedimentation around road/stream crossings.</li> <li>-We conduct public advisory group meeting (SFMP/Certification requirement) where we discuss many topics including watershed management.</li> <li>-We do alter normal practices where required when natural events such as wildfire necessitate it; in the case of wildfire, Canfor employees practices that exceed legislated minimum requirements to help ensure that we do not have a negative effect on siltation, water flow, mass wasting etc.</li> </ul>	We see many opportunities to collaborate with others as long as it is within our ability to manage watersheds within the legislative framework that governs forest companies and the requirements placed upon us to harvest timber for the economic benefit of the province.
West Fraser Industries	Dave Ripmeester, PIR Forestry Supervisor– Dave.Ripmeester@westfraser.com 250-847-6508	We are concerned and interested in managing the water resource and the sustainability of Upper Bulkley Salmon.	2) With regard to participation in this process, we have been asked to participate in FREP and MRVA monitoring/reporting – with a strong focus on the water resource. Although we were not included in initial ESI initiatives. We have also been asked to review draft protocols – with a strong focus on water and fisheries resources. In addition, we have been part of initial discussions regarding potential watershed or water related GARs that may receive future consideration. Now we are being asked to offer our perspectives and participate in your project, again with an emphasis on the water and fisheries resources. As these initiatives do overlap to a large degree, we will be consulting with the Regional Executive Director and the District Manager to better understand these initiatives and their desired goals, objectives and outcomes. This will aid in our determination of where we can participate effectively with our available resources.	Please keep us informed of developing opportunities to collaborate on these watershed sustainability initiatives

Equity Mine, Goldcorp	Cody Meints, Site Supervisor, Equity Mine. 250-845-7799 email: cody.meints@goldcorp.com	Interest is to maintain health of Buck and Foxy creeks (tributaries to the Bulkley River) as treated mine effluent discharge courses. Stakeholder interests are viewed as company interests.	A long standing annual Environmental Effects Monitoring (EEM) program is the key activity. Changes in both influenced and reference site water quality and biological monitoring are used to fine tune the EEM program. (e.g. Cadmium concentrations have trended upward at a reference site on Upper Buck Creek, so now exploring adding cadmium to fish tissue chemistry component of the EEM program). Some pit water dynamics have changed, but treated discharge chemistry is steady.	There is a good network of stakeholders through the Equity Mine Public Advisory committee (EMPAC), which does lots of consensus based projects.
<b>TRANSPORTATION - RAIL, HIGHWAY</b>				
Canadian National Railway - CN	Karla Graf, local Environmental Manager, Karla. graf@cn.ca, 604-679-8039	Duties are related to habitat and permitting. Interest in water and salmon sustainability is general. Area specific interests may depend on circumstances and expectations. Time commitments for external planning processes are difficult to make.	Work is focused on fish passage and habitat restoration. Work planning centers on one project / year in CN's Western Region. Fish passage restoration or improvement projects must engage CN infrastructure. Input into annual project selection from First Nations and Community Groups preferred. Project engineering staff will consider 1:200 year events for selected projects, as opposed to 1:100 year events; variable across regions.	Future external proposals would be read and considered.
BC Ministry of Transportation and Infrastructure (see Governments theme)	Sean Wong, Biological Programs Manager, sean.wong@gov.bc.ca 250-213-8659 Kathryn Graham, Regional Environmental Manager, kathryn.graham@gov.bc.ca, 250-565-7024	Kathryn Graham and Sean Wong: In addition to legislated requirements and relevant guidance, our Environmental Management Branch and various environmental policies, programs, guidance and procedures are developed to ensure sustainable highway developments, operations and maintenance, as well as for restoration (e.g. fish passage).	Sean Wong: Currently wrapping-up an extended field restoration project and have a number of others to be delivered Kathryn Graham: Responsible for regional and district projects including passing lanes, culvert replacement, bridge installation on a project by project basis. Project assessments typically have upstream and downstream evaluations of habitat and fish passability. When hydro-technical evaluations warrant, a broader look at the watershed level may occur.	Kathryn Graham: Annual work planning includes collaboration with DFO and FLNRORD to help prioritize projects, and get advice on potential water/fish issues. In some instances this collaboration may lead to remedial work to fix an existing issue. Broader water planning participation can occur when requested (e.g. Murray River watershed planning).

