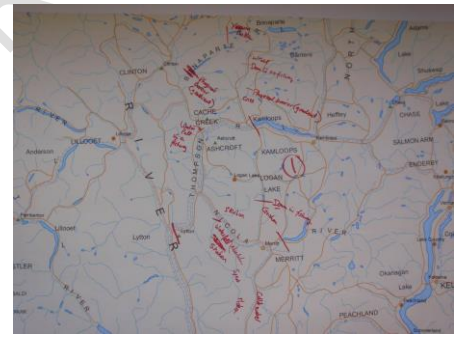


# Thompson Steelhead Recovery and Management Plan

DRAFT as at 23 November 2016



Cook's Ferry  
Indian Band  
Nlaka'pamux Nation



Fisheries and Oceans  
Canada

Pêches et Océans  
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<b>Contents</b>	
<b>Executive Summary</b> .....	<b>3</b>
<b>Chapter 1 - Introduction</b> .....	<b>3</b>
Background.....	3
Thompson Steelhead Working Group .....	3
Methodology .....	4
Deliverables .....	4
Limitations.....	5
Acknowledgments.....	5
List of Acronyms Used .....	6
<b>Chapter 2 - Current Situation</b> .....	<b>7</b>
Biology and Life History .....	7
Current Status of Thompson Steelhead .....	7
Species at Risk Assessment.....	7
Who Fishes What Species with What Gear, Where .....	7
Fishing Regulations.....	8
Summary Hydrology for Water Survey of Canada Stations .....	9
Fisheries Plans, processes and decisions influenced .....	10
Land and Resource Management Plans, Processes and Decisions Influenced .....	13
<b>Chapter 3 - Step 1 - Identify Proposed Planning Priorities</b> .....	<b>15</b>
Planning Areas.....	15
Issues, Threats or Constraints Affecting Steelhead by Planning Area .....	16
Information Gaps, Better Tools, Better Monitoring .....	17
Interim (Recovery) Objectives for Steelhead.....	17
<b>Chapter 4 - Step 2 - Resource Management Opportunities</b> .....	<b>18</b>
<b>Chapter 5 - Step 3 - Biological, Social and Economic Objectives</b> .....	<b>33</b>
<b>Chapter 6 - Step 4 - Assess the Likely Impacts of the Resource Management Opportunities</b> .....	<b>34</b>
<b>Chapter 7 - Step 5 - Recommend Preferred Management Opportunities</b> .....	<b>44</b>
<b>References</b> .....	<b>45</b>
Appendix 1 – Planning Framework Outline Approved Nov 13, 2015 .....	46
Appendix 2 – Steelhead Distribution in Thompson River Watershed .....	47
Appendix 3 – Current Fisheries and Regulations for Steelhead.....	48
Appendix 4 – Rationale and Background for draft Steelhead recovery objectives .....	52
Appendix 5 – Coarse Filter Evaluation, 3 June to 25 July 2016 .....	56

# Executive Summary

To be completed

## Chapter 1 - Introduction

### *Background*

Thompson Steelhead are in decline. They are influenced by many factors, from the freshwater systems of the Nicola, Deadman and Bonaparte river systems, to the ocean. Some of these factors are likely directly caused by humans and their activities: for instance, fishing by-catch, water withdrawals or habitat modifications. Other factors are likely caused by indirect human activity driving changes in the environment: for instance, global and regional climate cycles or ocean conditions. Other factors are likely caused through the management of other resources: sea lion populations in Strait of Georgia or forest management activities post-Mountain pine beetle.

It is likely that a combination of these factors are impacting Thompson Steelhead. These factors are compounded by the multi-jurisdictional management of steelhead by both the federal and provincial governments. Which factors, and the science or evidence to prove which factors are affecting steelhead is limiting; therefore knowledge and certainty of which management actions to take to address the decline of Thompson Steelhead is uncertain. Some factors may have no management actions to take, such as global and regional climate cycles. Yet action must be taken to address the decline in Thompson Steelhead in a manner that balances the incomplete science, the need for timely decisions given the extreme conservation concern of Thompson Steelhead, and due consideration to impacts of management decisions on other resource sectors, such as agriculture, commercial fishing or forestry.

### *Thompson Steelhead Working Group*

The Thompson Steelhead Working Group (TSWG) is a unique, collaborative initiative involving three orders of government: federal; provincial; and First Nations (Secwepemc and Nlaka'pamux). It aims to address the jurisdictional challenges with a species in conservation concern that has historically been managed by the federal and provincial governments. The following are the individuals involved in the TSWG:

- Dean Allan, Fisheries and Oceans Canada
- Rob Bison, Ministry of Forests, Lands and Natural Resource Operations
- Michael Burwash, Ministry of Forests, Lands and Natural Resource Operations
- Stu Cartwright, Fisheries and Oceans Canada (Nov 2015 to Jan 2016)
- Ashley Dobko, Fisheries and Oceans Canada (from Aug 2016)
- Karl Klingbeil, Ministry of Forests, Lands and Natural Resource Operations (from Jan 2016)
- Pat Matthew, Secwepemc Fisheries Commission
- Brigid Payne, Fisheries and Oceans Canada
- Rob Purdy, Ministry of Forests, Lands and Natural Resource Operations (to Dec 2015)
- David Walkem, Chief, Cook's Ferry Indian Band

The purpose of the Thompson Steelhead Working Group, and the development of the Thompson Steelhead Recovery and Management Plan is to look at all opportunities that may improve outcomes for Thompson Steelhead, regardless of what current policy, practice or barriers are in place.

The Thompson Steelhead Working Group has been facilitated by, or had secretariat support provided by the impartial non-profit Fraser Basin Council.

## ***Methodology***

The following is the methodology for the development of the recovery and management plan. A planning framework approach, or a structured decision making process, is being used to develop this integrated plan for the management and recovery of steelhead. It is based on the steps outlined in the Wild Salmon Policy.

The planning framework steps used are as follows (see Appendix 1 for more details)

1. Identify Proposed Planning Priorities
2. Resource Management Opportunities
3. Biological, Social and Economic Objectives
4. Assess the Likely Impacts of Resource Management Opportunities
5. Recommend Preferred Management Opportunities

The Thompson Steelhead Working Group created the planning framework outline in 2015, and presented it at the Thompson Steelhead Assembly in Spence's Bridge on November 13, 2015. The First Nations, DFO fisheries management and MFLNRO participants endorsed the planning framework outline, the proposed steps, and for the TSWG to proceed with the development of the plan. Thus authority was granted in a tri-partite environment to proceed.

The TSWG has developed the content of the recovery and management plan through regular monthly meetings, using their own expertise and knowledge, relying on other content experts from the provincial and federal governments as needed. Resource management opportunities identified in Step 2 (Chapter 4), are a broad range of possible actions to address the issues identified, have been brainstormed at the TSWG meetings. In that way, the TSWG and the creation of the recovery and management plan is unlike a regular, existing, annual operating plan or process; it is a "safe table" which enables fisheries managers from the three orders of government to step back, look outside of the current policies, and explore some "what if" scenarios to address the needs of Thompson Steelhead.

Consultation (with other First Nations, commercial and sport fishermen, resource industries affected by management opportunities), science review by DFO, MFLNRO and other technical experts, and evaluation of the opportunities to assess, let alone devise preferred management opportunities, has not formally taken place to date for any of the opportunities presented in this draft plan.

## ***Deliverables***

The key proposed final product, or deliverable of the planning framework process would be an **integrated plan** that addresses recovery and management of Thompson steelhead. The ultimate goal of the recovery and management plan is to recommend preferred management opportunities and identify general directions for statutory decision makers to consider that will have real-world positive outcomes for steelhead, with details around:

- Likelihood or certainty of a positive outcome for steelhead (low, medium, high)
- Timeframe for response of the management action (months, years, decades)
- Impacts to other sectors of the proposed management opportunities
- Resources needed to implement the preferred management opportunities (human, financial, etc.)
- Proposed next steps, including consultation, referrals, and implementation mechanisms

While many existing planning and decision making processes exist for fisheries, the intent with this plan is to act on immediate, short-term opportunities to influence existing decisions being made, as well as look long-term and at the bigger context of fisheries and natural resource planning and management. The intent with this plan is to identify, through a government to government process (known as Tier 2 processes within DFO) how things can be improved for Thompson steelhead to recover populations and manage more sustainably in the future.

During the development of the draft recovery and management plan, there are other key deliverables that have come about:

- Improved understanding and coordination of DFO and MFLNRO approaches to Thompson Steelhead management, existing planning processes and decision making both for fisheries management, and other land and resource management activities
- Input into existing planning processes and decision making - this has taken place throughout 2016 as a result of improved understanding and coordination

The content of the draft recovery and management plan is from the TSWG members, captured at meetings. This current version is what has been captured by Fraser Basin Council, the impartial secretariat support to the TSWG. The **audience** for this plan is therefore the orders of government that worked on its content (federal, provincial, First Nations), as well all stakeholders who have an interest in the public resource that is Thompson Steelhead.

The **ideal scenario** is that this is a jointly recommended plan where consensus is reached on all content, which is then endorsed by the highest levels of the federal, provincial and First Nations governments, and then an implementation plan is created for which order of government takes the lead on which component, along with a monitoring component. It is anticipated that this integrated plan would be an evergreen, or living document; it would be updated from time to time as new information is brought forward.

### ***Limitations***

The limitations of this draft recovery and management plan is that it may not necessarily be endorsed by the senior managers and/or ministers of the orders of government that participated in its creation.

### ***Acknowledgments***

All members of the TSWG (individual names listed above) are acknowledged for their time, expertise and commitment to this initiative. Other topic experts have contributed to meetings, including Eric Valdal, Rich McCleary, Ryan Whitehouse and Christa Pattie of MFLNRO.

Funding for the process to date has come from the following: Cook's Ferry Indian Band; Secwepemc Fisheries Commission; MFLNRO; Skeetchestn Indian Band and DFO. In-kind time and expenses have been contributed from the following: Cook's Ferry Indian Band; Secwepemc Fisheries Commission; MFLNRO; and DFO. The Freshwater Fisheries Society of BC and Kinder Morgan (Trans Mountain) provided funds to support the 2016 Thompson Steelhead Assembly.

## ***List of Acronyms Used***

AAC - annual allowable cut  
BCFDF - BC Federation of Drift Fishers  
CEFT - critical environmental flow threshold  
COSEWIC - Committee on the Status of Endangered Wildlife in Canada  
CSFP - critical summer flow period  
CWFP - critical winter flow period  
d/s - downstream  
DFO - Department of Fisheries and Oceans  
EFN - environmental flow needs  
ENGO - environmental non-governmental organization  
FBC - Fraser Basin Council  
FSP - Forest Stewardship Plan  
FSW - fisheries sensitive watershed  
GN - gill net  
IFMP - Integrated Fisheries Management Plan  
KDFGA - Kamloops & District Fish and Game Association  
MFLNRO - Ministry of Forests, Lands and Natural Resource Operations  
MOTI - Ministry of Transportation and Infrastructure  
NTA - Nicola Tribal Association  
NWSFA - Nicola Watershed Stewardship and Fisheries Authority  
RAR - Riparian Area Regulation  
SFC - Secwepemc Fisheries Commission  
SN - seine net  
TSA - Timber Supply Area  
TSR - timber supply review  
TSWG - Thompson Steelhead Working Group  
u/s - upstream  
WSA - Water Sustainability Act

## Chapter 2 - Current Situation

The purpose of this chapter is to explain the current situation with respect to fisheries, water and drought conditions, existing planning processes and decisions about fisheries and land and resource management, endangered species processes, and other relevant information. The *Independent Review of the Science and Management of Thompson River Steelhead* (Levy, 2014) was commissioned by the Thompson Steelhead Technical Committee, found that key threats are reduced ocean survival, fishing mortality, and habitat impacts. Findings from Levy (2014) drove the development of this draft recovery and management plan.

Many significant pieces of work are completed to date, or are underway. These are detailed in Step 2 (Chapter 4) for a detailed list of issues affecting Thompson Steelhead by geographic area, which also lists research, initiatives or management actions underway to address the issues.

There are many information gaps that still exist, including but not limited to: current Thompson Steelhead spawning ground habitat status; current barriers to fish; current areas of habitat concerns; current sediment levels and concerns; foraging concerns; current survival rates in each life phase; current Steelhead hatchery programs; and cumulative impacts assessment results.

### ***Biology and Life History***

See Levy (2014) and other sources for the life history of steelhead. See Appendix 2 Steelhead Distribution for a map of the Thompson River watershed and where steelhead exist.

### ***Current Status of Thompson Steelhead***

As mentioned in Chapter 1, Background, Thompson Steelhead are in decline. The issues or threats to their population are numerous, ranging from freshwater habitat and water quantity/temperature threats, to fishing by-catch mortality, to ocean conditions and global/regional climate cycles. See Step 2 (Chapter 4) for a detailed list of issues affecting Thompson Steelhead by geographic area.

As of early November 2016, the in-season spawner abundance is estimated at 325 steelhead for the Thompson system. There is a 79% chance that steelhead will be classed as an extreme conservation concern. These are the new record low return numbers ever recorded. See Appendix 3 Rationale and background for Recovery Objectives for a more detailed review of population trends by watershed over the past few decades.

### ***Species at Risk Assessment***

Thompson steelhead have been submitted for assessment by COSEWIC to determine whether the species should be listed under species at risk legislation. The Marine Fish Subcommittee has to date completed a preliminary status assessment, and a threat assessment.

### ***Who Fishes What Species with What Gear, Where***

See Appendix 3 - Current Fisheries and Regulations for Steelhead for a list of all possible fisheries that may impact steelhead. Note that not all of the fisheries listed below occur each year; the tables below are intended to list all possible fisheries that may take place. The tables in Appendix 3 also focus on fisheries that either target steelhead, or possibly intercept steelhead as bycatch because of

gear types. Fisheries in geographic areas that don't intercept Thompson steelhead are not listed (North Coast in-shore ocean fishing areas; river fishing on Vancouver Island; ocean sport fishing; etc.).

### **Fishing Regulations**

The following are the current fishing regulations by area, and by abundance management class, and by order of government.

MFLNRO manages the sport fishery in the Thompson River system by management abundance class:

- Management abundance (spawning population abundance >1200): catch and release to Dec 31; no angling for balance of season
- Conservation concern (spawning population abundance 400-1200): >850, catch and release to Dec 31, no angling for balance of season; <850, catch and release to Oct 31, no angling for balance of season
- Extreme conservation concern (spawning population abundance <400): catch and release to Oct 31; no angling for balance of season
- Average peak of migration for Thompson River system is Oct 28; 5<sup>th</sup> and 95<sup>th</sup> percentiles are Sept 27 and May

See Appendix 3 - Current Fisheries and Regulations for Steelhead for by-catch requirements for steelhead for commercial salmon fisheries, US fisheries and First Nations fisheries.

Average peaks, and range of migration periods for Thompson Steelhead by area:

Area	Average peak of migration	Average spread of run (5th and 95th percentile)
Area 12 GN*	17-Sep	Aug 17 to Oct 18
Area 12 SN	17-Sep	Aug 17 to Oct 18
Area 13 GN	20-Sep	Aug 20 to Oct 21
Area 13 SN*	20-Sep	Aug 20 to Oct 21
Area 21 GN	21-Sep	Aug 21 to Oct 22
US 4b,5,6c GN Treaty Indian	28-Sep	Aug 28 to Oct 29
US Areas 7 and 7a GN All Citizen	30-Sep	Aug 30 to Oct 31
US Areas 7 and 7a SN All Citizen		
US Areas 7 and 7a GN Treaty Indian	03-Oct	Sept 2 to Nov 3
US Areas 7 and 7a SN Treaty Indian		
Area 29 SN	05-Oct	Sept 4 to Nov 5
Area 29 GN	08-Oct	Sept 7 to Nov 8
Fraser Modified Seine	08-Oct	Sept 7 to Nov 8
Fraser Drift Net	Oct 8 d/s of Mission; Oct 13 Mission to Harrison; Oct 15 Harrison to Hope	Sept 7 - Nov 8 d/s of Mission; Sept 12-Nov 13 Miss to Harr; Sept 14-Nov 15 Harr to Hope
Fraser Set Net	Oct 8 d/s of Mission; Oct 13 Mission to Harrison; Oct 15 Harrison to Hope	Sept 7-Nov 8 d/s of Mission; Sept 12-Nov 13 Miss to Harr; Sept 14-Nov 15 Harr to Hope
Fraser Beach Seine	N/A	N/A
Thompson River	Oct 28	Sept 27 to May

\*GN = gill net; SN = seine net



## Summary Hydrology for Water Survey of Canada Stations

Using 10% of mean annual flows as the critical environmental flow threshold, the following was compiled by MFLNRO about drought history of stream reaches with steelhead:

Stream	All data			Last 10 years		
	# obs'ns	% of weeks below CWFP*	% of weeks below CSFP*	# obs'ns	% of weeks below CWFP*	% of weeks below CSFP*
Guichon at mouth	32	21	11	9-10	14	4
Guichon Cr. at Nicola R.	22	71	74	None	No data	No data
Nicola R. at outlet Nicola L.	33	4	1	10-11	0	0
Coldwater R. at Merritt	54	10	35	10-11	2	48
Spius Cr. at Canford	52	8	27	7-8	4	33
Nicola at Spences' Bridge	69	2	1	10-11	0	0
Thompson R. at Sp. Bridge	63	0	0	8	0	0
Deadman R. above Criss Cr.	63	10	3	63	4	0
Criss Cr. near Savona	61	35	40	10	34	33
Bonaparte R. near Cache Cr.	54	1	2	10	0	0

\*CWFP = critical winter flow period; CSFP = critical summer flow period

The following summarizes which Thompson Steelhead watersheds have which kind of water monitoring:

Stream/system	Real time flow	Real time temperature	No station
Deadman	Y	To be confirmed	
Criss	Y	To be confirmed	
Bonaparte (Loon)	Y	To be confirmed	
Nicola - dam	Y	To be confirmed	
Nicola - Spence's Bridge	Y	Y	
Skuhun			Y
Nooaitch			Y
Spius	Y		
Guichon	Y	To be confirmed	
Coldwater	Y	Y	

***Fisheries Plans, processes and decisions influenced***

NOTE THAT THIS TABLE IS UNDER CONSTRUCTION. In addition to any specific management opportunities identified in this plan, it was acknowledged that recognition of steelhead concerns can be addressed through improved communication and information sharing with the existing FISHERIES plans, processes and current decision making process within each of the geographic areas. This would address some of the jurisdictional complexity.

<b>Jurisdiction and type of fishing</b>	<b>Planning Area (this document)</b>	<b>Group name</b>	<b>Plan or Process</b>	<b>Who is involved</b>	<b>When does it take place</b>	<b>What is the outcome/purpose</b>	<b>Timing to provide input for Steelhead</b>
International - all salmon fishing	In-shore; off-shore	<a href="#">Pacific Salmon Commission (PSC)</a>	Pacific Salmon Treaty	USA, Canada	3 meetings/year - Jan, Feb, Oct	provides regulatory advice and recommendations to the two countries, and oversees implementation of Treaty.	
	In-shore; Fraser R. downstream of Mission	Fraser River Panel	responsible for in-season management of fisheries that target on Fraser River sockeye and pink salmon	Bi-lateral panel with USA; Canada represented by DFO, FNs	3 meetings/year - Jan, Feb, Oct  Pre-season sessions  Bi-weekly meetings in season	Prior to the fishing season, the Panel recommends a fishery regime and a management plan for Panel Area fisheries to the Pacific Salmon Commission (PSC	
	In-shore; Fraser R. downstream of Mission	Southern Panel	salmon originating in rivers with mouths south of Cape Caution, with the exception of Fraser River sockeye and pink salmon - focus is coho, chum	Bi-lateral panel with USA; Canada represented by DFO, FNs	2 meetings per year	Prior to the fishing season, the Panel recommends a fishery regime and a management plan for Panel Area fisheries to the Pacific Salmon Commission (PSC	
	In-shore; Fraser R.	Fraser River Integrated Management Planning Team (FRIMPT)	Integrated management planning on sockeye, pink (not chum)	DFO region, South Coast, and Fraser Area	In-season; July to Oct/Nov	Support to panel process; input on FSC, domestic and DFO sport fishing	
National/domestic - commercial salmon fishing	In-shore, Fraser R.	N/A?	Integrated Fisheries Management Plan (IFMP)	DFO leads; province, FNs, other fishing sectors, ENGO's	Year round cycle	IFMP provides a broad context to the management of the Pacific salmon fishery	Jan-Mar

Jurisdiction and type of fishing	Planning Area (this document)	Group name	Plan or Process	Who is involved	When does it take place	What is the outcome/purpose	Timing to provide input for Steelhead
						and the interrelationships of all fishing sectors involved in this fishery	
	In-shore, Fraser R.	Fraser Joint Technical Working Group? (or separate row?)	Fraser Conservation Harvest Forum (Forum)	FRAFS for FNs; LFFA; DFO;	4 meetings, Jan-Mar	Recommendations for IFMP	
	In-shore, Fraser R.	Fraser River Aboriginal Fisheries Secretariat (FRAFS)	Communication; representation; organizes FORUM	Fraser R. and approach FNs, DFO	Year-round, 3-4 forum meetings per year	Representation in multiple processes	
	In-shore, Fraser R.	Integrated Harvest Planning Committee (IHPC)		DFO leads; some FN involved (not south); sport, commercial and conservation organizations	Twice per year: late spring, fall	Integrated harvest plans; directed by IFMP	
	In-shore, Fraser R.		Commercial fishing plans	DFO, commercial fishing industry			
	In-shore, Fraser R.	In-season Chum Fisheries Industry Planning Group	In-season chum fisheries coordination	DFO, commercial fishing industry	Sept-Nov		
	In-shore, Fraser R.	Commercial Salmon Advisory Board, and Area Harvest Committees (Areas A to H)		DFO, commercial fishing industry			
National/domestic - commercial salmon fishing (and other?)	In-shore, Fraser R., Thompson R.	Fraser Salmon Management Council (FSMC)	Collaboration...	DFO, FNs		the mandated Tier 1 governance organization by which First Nations will negotiate with DFO a management agreement over Fraser salmon. The goal is to ensure a meaningful decision-making role for First Nations	
National/domestic - FN commercial salmon fishing	In-shore, Fraser R.	N/A?	Comprehensive Fisheries Agreements	DFO leads negotiations with FNs		Fisheries agreements with First Nations - catch amounts	

Jurisdiction and type of fishing	Planning Area (this document)	Group name	Plan or Process	Who is involved	When does it take place	What is the outcome/purpose	Timing to provide input for Steelhead
National/domestic - commercial fishing and aquaculture	In-shore	Pacific Fisheries and Aquaculture Committee (PFAC)	Info exchange only; collaborative	DFO, province			
	In-shore	BC Seafood Secretariat	Advisory only	BC Min Ag leads; MOU with MFLNRO/Ag; industry involved, not DFO			
National/domestic - sport fishing for salmon	In-shore, Fraser R., Thompson R.	N/A	Sport Fish Advisory Process	DFO, sport fishing interests		Recommendations to recreational salmon fishing - salt and fresh water	RB anticipates little to no impact on Thompson Steelhead
National/domestic - sport fishing non-salmon	Fraser R. Thompson R.	Provincial committee, and regional committees	BC Sport Fishing Regulation Process	MFLNRO, input from any interested groups	2 year cycle for updates; input received ongoing	Sport fishing regulations - timing, catch limits	
FN steelhead fishing (FSC)	Fraser R., Thompson R.	None	None				

In addition to the plans, processes and decisions influenced, there are numerous organizations that do not making fishing-related decisions themselves, but represent either certain species, certain activities, or certain groups not listed above, including but not limited to:

- Secwepemc Fisheries Commission
- Nicola Watershed Stewardship Fisheries Authority (part of Nicola Tribal Association)
- Nlaka'pamux Nation Tribal Council
- Steelhead Society
- Spence's Bridge Steelhead Advocacy Association

**GAPS IDENTIFIED IN EXISTING PLANNING PROCESSES:**

- Allocation decisions for food, social, ceremonial use of steelhead
- Input on gear type for Lower Fraser First Nations Agreements

***Land and Resource Management Plans, Processes and Decisions Influenced***

NOTE THAT THIS TABLE IS UNDER CONSTRUCTION. In addition to fisheries plans, it was acknowledged that other **land and resource management** activities impact steelhead, and can be addressed through improved communication and information sharing.

Jurisdiction	Planning Area (this document)	Plan or Process	Who is involved	When does it take place	What is the outcome/purpose*	Timing to provide input for Steelhead	Comments
Provincial	Thompson River	Forest Stewardship Plans (FSPs)	Forest industry, BC Timber Sales - they develop and implement the plans; approved by MFLNRO	FSPs are updated every 5 years (approximately)	Guides forest management operations  Outlines how industry will address temperature sensitive streams, fisheries sensitive watersheds, riparian management	Ongoing  New FSPs or amendments to existing ones have to be advertised; input accepted then	Multiple licensees over three timber supply areas (TSAs)  Includes First Nations Woodland licences, community forests as well as major companies (e.g., West Fraser)
Provincial	Thompson River	Timber supply review (TSR)	MFLNRO leads this; Chief Forester approves	At least every 10 years	To determine an annual allowable cut (AAC)  Many factors are considered in establishing the AAC; during the process social, economic and environmental issues are considered and balanced.	Kamloops TSR - cut last determined in 2008; review process began Sept 2015.  Merritt TSR - Decision made March 2016.  100 Mile House TSR - AAC determined 2013. Provide input next cycle	Note that TSR on tree farm licences are completed by the licensee, and approved by MFLNRO
Provincial	Thompson River, Fraser River	Development of Water Sustainability Act (WSA) regulations	MFLNRO, MOE	Regulations under development now	Details of how the WSA will be implemented: <ul style="list-style-type: none"> <li>▪ Environmental flow needs (EFN)</li> <li>▪ Critical env flow thresholds (CEFT)</li> <li>▪ Groundwater</li> </ul>	Now	Andy Oetter is involved at Province.

Jurisdiction	Planning Area (this document)	Plan or Process	Who is involved	When does it take place	What is the outcome/purpose*	Timing to provide input for Steelhead	Comments
Provincial	Thompson River, Fraser River	WSA s.43 water objectives, Division 4	MFLNRO, MOE	Not underway yet?			
Provincial	Thompson River	Water storage and management: <ul style="list-style-type: none"> <li>▪ Nicola L. outlet</li> <li>▪ Bonaparte L. outlet</li> <li>▪ Deadman R.</li> <li>▪ Guichon Cr.</li> </ul>	MFLNRO?  Bonaparte Water Stewardship Society?  Deadman Water Board	Throughout year?  At freshet and through growing season?	Manage water flows for various purposes	?	MFLNRO operates Nicola dam; unsure who operates Bonaparte outlet or Deadman  Other dams?
Provincial	Thompson River	Water licencing and amendments	MFLNRO, agriculture sector	Infrequently	Regulate water extraction, irrigation	When opportunity arises	Relates to EFN, CEFT and new WSA
Multiple	Thompson River	Environmental farm planning initiatives: <ul style="list-style-type: none"> <li>▪ livestock fencing</li> <li>▪ riparian planting</li> </ul>	Provincial, federal, industry collaborative	Ongoing; new agreements and new funding commitments roughly annual	Livestock fencing to minimize trampling, sedimentation  Riparian planting to stabilize banks, provide shade	?	Could more incentives be offered for riparian planting?
Local government	Thompson River	Riparian Area Regulation (RAR)	Local government (TNRD, Cariboo RD), private landowners	Ongoing			
Provincial	Thompson River	Water discharge permits and amendments	Teck Highland Valley Copper; MOE	Discharges ongoing  Amendments when required	Address flow needs; contamination concerns	When an amendment is initiated	Could more be discharged in summer to augment low flows?
First Nations, federal	Thompson River	Indian Reserve land management	Indigenous and Northern Affairs Canada; First Nations	Ongoing	Minimize sedimentation; plant riparian areas; etc.	?	Intent here is to improve riparian condition on all IRs where steelhead habitat exists
Provincial	Thompson River	Off road vehicle					Regulations?
Provincial	Thompson River	Highways and road maintenance	MOTI	Ongoing	Sedimentation, other?	?	Low priority?
Provincial	Thompson River, Fraser River	Agricultural Land Reserve (ALR)					

\*general, or in relation to Thompson Steelhead

## Chapter 3 - Step 1 - Identify Proposed Planning Priorities

### Step 1 - Identify Proposed Planning Priorities (biological, management)

- Consider key **management issues** in the Levy Report (March 2014)
  - Ocean survival
  - Fishing mortality
  - Habitat impacts - local, regional
  - Water utilization
- Consider information gaps, better tools, better monitoring
- Identify recovery objectives for Thompson Steelhead

### ***Planning Areas***

The following planning areas were defined:

1. Thompson River System (see map in Appendix 2)
  - From confluence with Fraser River at Lytton, upstream to include all tributaries where steelhead exist
  - Thompson River - upstream to Kamloops Lake outlet
  - Bonaparte River - upstream to Young Lake outlet
  - Deadman River - upstream approximately 13km to a dam (*it was noted that a lake is approximately 2km upstream that would serve as a natural barrier*)
  - Criss Creek - upstream to a natural gradient barrier
  - Nicola River - upstream to Nicola Lake outlet
  - Guichon Creek - upstream to Mammette Lake outlet
  - Skuhun Creek - whole system
  - Coldwater River - whole system
  - Spius Creek - whole system
  - Nooaitch Creek - whole system
  - Shackan Creek - upstream to a waterfall
2. Fraser River
  - From confluence with Thompson River at Lytton, downstream to its mouth at Vancouver/Richmond
3. In-Shore Ocean Fishing Areas
  - Inclusive of fishing areas in the Salish Sea, Johnstone Strait, Strait of Georgia, Juan de Fuca Strait, Puget Sound, and surrounding Vancouver Island
  - American and Canadian waters
4. Off-Shore
  - Pacific Ocean beyond the in-shore fishing areas
  - International waters

It is acknowledged that other Interior Fraser River steelhead populations exist, in tributaries west of the Fraser River (Bridge, Nahatlatch, Stein, Seton Rivers) and in the Chilcotin River.

## *Issues, Threats or Constraints Affecting Steelhead by Planning Area*

### 1. Thompson River System

- Physical habitat degradation (bank erosion, siltation, loss of riparian structure and function), including parr habitat quality (stream length, gradient)
- Water quantity (decreased flows)
- Water temperature
- Regional and global weather trends
- Risk of life history shift from anadromous to non-anadromous
- Fishing effects - sport
- Fishing effects - First Nations
- Gill netting on Thompson River in certain years
- General population decline of wild steelhead
- Restoration of abundance of steelhead
- Data and uncertainty
- Freshwater bottleneck (fry to smolt)

### 2. Fraser River

- Fishing mortality (bycatch from commercial fishing, test fisheries, First Nations fishing (FSC))
- Fishing mortality from sport fishing (handling stress)
- Water quality/pollution in mouth of Fraser (assumed a minimal issue; limited time spent here)
- Jurisdictional issues, collaboration
- Data and uncertainty

### 3. In-Shore Ocean Fishing Areas

- Fishing mortality (bycatch from commercial fishing), in particular in these areas (anecdotal, not based on confirmed data):
  - Southeast Alaska
  - Johnston Strait
  - Area 29 (mouth of Fraser River)
  - Area 21 (SW coast of Vancouver Island)
  - Area 20 (Canadian side of Juan de Fuca Strait)
  - US Areas 4B, 5, 6C (US side of Juan de Fuca Strait)
  - US Area 7, 7A (North Puget Sound)
- Ocean conditions (inclusive of all parameters, but including impacts from Victoria sewage, fish farms, other factors)
- Changes in species composition in the ocean
- Predation by numerous predators
- Adequacy of protection windows for steelhead migration (fixed marine parks would be of little value to a migratory fish; regulations for certain activities that impact steelhead during their migration in the in-shore ocean area would be more important)
- Jurisdictional issues, collaboration
- Data and uncertainty

### 4. Off-Shore

- Ocean conditions (inclusive of all parameters, including food in the ocean)
- Global climate and ocean cycles
- Hatcheries of steelhead and other species in other Pacific countries
- Management of wild steelhead and other species in other Pacific countries
- Fishing mortality from other country's fleets (likely a minimal issue, as regulations have improved)



## ***Information Gaps, Better Tools, Better Monitoring***

Not completed yet; details to follow.

### ***Interim (Recovery) Objectives for Steelhead***

Establishment of recovery objectives must take into account biological and social considerations. Different participants in the plan development and review will undoubtedly assign different levels of priority to each objective.

The following high-level, long term objectives have been proposed by the working group and/or constituents with considerations noted in brackets afterwards (from Thompson Steelhead Committee, draft terms of reference, June 23, 2015) (note that some are long term, some short term; some process or task oriented; some indicators; they are all to be considered draft):

- Increase Thompson steelhead population numbers (additional work required: consider Wild Salmon Policy, increase to what maximum number, for what purpose, and specific numbers per tributary)
- There are sufficient steelhead for First Nations' use, in the Thompson River system and downstream (best case scenario is ceremonial, sustenance and an economic fishery; minimal scenario is ceremonial fishery)
- There are sufficient steelhead for sport fishing opportunities (best case scenario is harvest opportunity; minimal scenario is catch and release; also consider timing and length of season)
- There are sufficient steelhead such that there is increased flexibility to conduct commercial salmon fisheries
- Management information gaps are identified and there is a plan to address them (balance information needs with decision making; don't enter a *data death spiral* where decisions are paralyzed)
- Improve communication and transparency of information and decision making between First Nations, federal and provincial governments (build relationships, involve First Nations in recovery and management planning, recognize existing agreements (e.g., Reconciliation Framework Agreements))

The following **draft quantitative recovery objectives** were created based on discussion of the information provided in Appendix 3, with the intent that they are minimum recruitment numbers. (Note that there has been no DFO science or joint technical review of these objectives, or alternative methodologies to create these objectives).

Consideration should also be given to the additional information being sought below, and that feedback be sought from existing committees or working groups.

- Nicola - 1500 steelhead (consider delineation of a separate objective for Coldwater system, as part of this total)
- Deadman - 500 steelhead
- Bonaparte - 400 steelhead

Considerations:

- Have recovery objectives that increase over time
- Have a range, or a minimum recovery objective
- Revise current numbers delineating management (i.e., 1200 is conservation concern, 400 is extreme conservation concern)
- Terminal fisheries or spawners?

## Chapter 4 - Step 2 - Resource Management Opportunities

At the 3 June, 13 June and 25 July meetings, the issues and resource management opportunities were coarsely evaluated (see Appendix 5 for detailed evaluation questions, process and results). *The resource management opportunities in bold italics were deemed to have a high likelihood of leading to a positive real outcome steelhead, in a reasonable time frame.*

AREA:Thompson River System	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
Physical habitat degradation (consider breaking up by life stage)	<p>Restoration initiatives by DFO and other groups</p> <p>Fisheries Sensitive Watershed underway for Spius, Coldwater (2016), Criss (TBC)</p> <p>Private landowner initiatives (e.g., Environmental Farm Plans) and incentives with private landowners and s.16 WSA required mitigation</p> <p>Parr habitat mapped out by R. Bison through parr survey</p> <p>SHIM/AHI completed for Deadman</p> <p>SHIM/AHI underway for Nicola (Merritt to Spence's Bridge) in 2016/17</p>	<p>Erosion, loss of riparian habitat and shading, sedimentation</p> <p>Bank instability and siltation from forestry, agriculture (Millar et al. 1997)</p> <p>Increased flows, sedimentation, deforestation of lower private lands. Lower mainstem of Nicola, Coldwater and Bonaparte and Deadman - weakening of streambanks, elongation and widening of stream channel, decreased gradient.</p>	<p><b><i>T1: Restore degraded habitats - in stream and riparian, including shading</i></b></p> <p>Focus restoration on "riffles and rapids downstream of Spius Creek [that] are more typical of steelhead habitat;" re-fortifying riparian areas, stabilizing banks, restoring processes</p> <p><b><i>T2: Enhanced riparian management upstream, including FSW designations under FRPA</i></b></p> <p>T3: Sensitive stream designation WSA s.128</p> <p><b><i>T4: Identify sediment sources upstream, and reduce unnatural sediment input upstream; substrate will clean</i></b></p>	<p>DFO, MFLNRO, landowners, stewardship groups</p> <p>Forest industry, BCTS, mining, other</p>	<p>Restoration tools are very effective (planting, fencing, boulders) if the right restoration practices in the right areas are used</p>		<p>Millar et al. (1997) referenced in Levy (2014, p.48-49)</p> <p>Bennett presentation at 12nov15 public forum</p> <p>Tributaries aren't as affected for parr habitat quality as mainstems</p>

AREA:Thompson River System	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
		Substrate size decreases, fills in rearing space	<i>out naturally over a few seasons</i>				
Water quantity	<p>Water Sustainability Act (WSA) came into force 29 Feb 2016.</p> <p>Groundwater - will be regulated under WSA; need increased understanding of surface-groundwater impacts (some of this work underway)</p> <p>Environmental Flow Needs (EFN) - has been around as a policy for 1.5 years, will be required under WSA. EFN is the optimal amount for aquatic ecosystems; for the Nicola River, this is 5.6m<sup>3</sup>/second.</p> <p>Critical Environmental Flow Threshold (CEFT) - the flow below which significant or irreversible harm to the aquatic ecosystem is likely to occur. This is the level to which existing licences are regulated, not EFN. Summer 2015 saw flows of 3m<sup>3</sup>/second in the Nicola</p> <p>Nicola Water Use Management Plan (WUMP) from 2006-2012 did numerous background studies and generated 36</p>	<p>Nicola, Deadman systems are fully allocated for water licences</p> <p>Environmental flow needs have not been appropriately considered in past years-decades</p> <p>Water supply concerns such as low flows due to irrigation, agricultural withdrawals (Millar et al. 1997)</p> <p>Severe drought and chronic low flows in July-Sept, and fry emerge in July (Levy, 2014 p.49)</p> <p>Impacts from Craigmont Mine, increased number of dairy farms, and</p>	<p>T5: Water Sustainability Plans (WSA Div. 4) - could be requested to be initiated on watersheds with water quantity concerns; need to clarify who can initiate this</p> <p>T6: Water licence reviews - under the new WSA, reviews of existing licences can occur after 30 years</p> <p><b>T7: Restrict water licence withdrawals from July-Sept to protect emerging fry under WSA</b></p> <p>T8: Water storage - instream vs dams are 2 different optios. Structures already exist - modify or fine-tune to meet fish needs?</p> <p><b>T9: Restrict over-use of water in rearing tributaries by local government</b> and water purveyors (KDFGA 25jan16 letter, 4feb16 email)</p>	<p>MFLNRO issues and manages water allocation</p> <p>Water licensees</p> <p>Water licences that are applying for new applications - the only option is storage</p> <p>Water officers for monitoring</p>		<p>Monitoring of actual vs. licensed amounts of water withdrawals</p>	<p>From Oct 30 TSWG meeting</p> <p>Note that EFN only applies to new licence applications, and amendments to existing licences; unless an existing licence is amended, or reviewed, this does not apply to existing licences, and the Nicola system is fully allocated.</p> <p>Millar et al. (1997) referenced in Levy (2014, p.48-49)</p> <p>For info on the Nicola Water Management Tool, see <a href="http://www.nicolaplan.ca">www.nicolaplan.ca</a> and info box on right hand side</p> <p>Agriculture Water Demand Model for Nicola watershed available <a href="#">here</a></p> <p>Agriculture Water Demand Model for Bonaparte watershed available <a href="#">here</a></p>

AREA:Thompson River System	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
	<p>recommendations. It found that every Nicola sub-basin has a water deficit from July-Oct in drought years (1 in 10).</p> <p>Nicola Water Management Tool being developed; in use for 2016</p> <p>Deadman - water flow being managed for fish and agriculture needs below dam by Deadman Water Board, includes Skeetchestn</p> <p>Bonaparte dam - MFLNRO operates</p>	<p>increased use of large agricultural pivot irrigation systems (Levy, 2014 p.49)</p>	<p><b>T10: Better monitoring by water officers of actual vs. licensed amounts</b></p>				
Water temperature	<p>Michelle Walsh SFC exploring thermal imaging of temperature along reaches for Deadman River in 2016.</p> <p>Temperature sensitive stream designation underway for Nicola system (TBC)</p> <p>Thermal mapping for Nicola (Merritt to Spence's Bridge) underway in 2016</p>	<p>Riparian clearing, loss of cold water inflows, increase in warm water sources</p> <p>Severe drought and chronic low flows in July-Sept, and fry emerge in July (Levy, 2014 p.49)</p>	<p>T11: Identify cold water refugia and manage appropriately (i.e., don't license groundwater wells in these areas; use in the triage of Fish Protection orders and shut down licenses from these areas first; target for future mitigation such as fencing off cattle)</p> <p><b>T1: Riparian shading</b></p>	<p>MFLNRO, DFO, everybody involved in fisheries (SFC, NTA, NNTC)</p>	<p>New technology using drones to detect cold water areas</p>		<p>Millar et al. (1997) referenced in Levy (2014, p.48-49)</p>
Regional and global weather trends	<p>Increased air temperatures in both summer and winter</p> <p>US Fish &amp; Wildlife Service and Environmental</p>	<p>Global climate cycles, increased CO<sub>2</sub></p> <p>Most likely causes are</p>		<p>Long term...</p>			<p>From Levy (2014, p.52-53)</p> <p>Adults less susceptible to high temperatures since they migrate in fall</p> <p>Address juvenile and fry stages, in which</p>

AREA:Thompson River System	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
	Protection Agency are seeing simultaneous decline in steelhead populations in CA, OR and WA and have classified 12/15 pop'n segments as threatened or endangered	biological conditions in North Pacific Ocean that are reducing ocean survival					steelhead are more susceptible to high temperatures and associated impacts
Risk of life history shift from anadromous to non-anadromous	Research on this is extensive by OSU, MFLNRO in Canada, USA, and others.	Relative survival	T12: Conserve steelhead spawner abundance to conserve rebuilding potential, conserve rainbow trout to insure against possible extinction of anadromous population.	DFO, Provincial and FN Fisheries managers			Verbal input, TSWG 4mar16
Fishing effects - sport	<p>Angling regulation includes zero quota, season restriction, inseason closure option, bait ban, hook restriction, no angling from boats, no commercial angling guiding.</p> <p>Sport fishery is implemented and monitored with a River Guardian program and CO Service patrols</p> <p>Formal statistical survey of fishery characteristics and fishing mortality are conducted annually</p>	Incidental mortality from catch and release - 1% or less depending on inseason closure.	T13: Restrict all sport fishing for several life cycles (KDFGA, 25jan16 letter)	MFLNRO	<p>Complete closure may be detrimental to maintaining low fishing mortality and may be detrimental to maintaining public interest in conservation of Thompson Steelhead.</p> <p>Presence of catch and release fishery makes illegal harvesting more difficult.</p>		From Levy (2014, p.47) unless o/w noted
Fishing effects - First Nations	Cursory effort monitoring via River Guardian Program.	Food social and ceremonial rights to fish	T14: Monitor and regulate FN fisheries targeting rainbow and				

AREA:Thompson River System	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
	Skeetchestn has a fishing bylaw		steelhead; keep rainbows, release steelhead  T15: Elder influence				
Gill netting on Thompson River (certain years)		Low but chronic interception rate in net fisheries	T16: Ensure all intercept fisheries are selective (BCFDF, 4feb16 email)				From Levy (2014, p.47) unless o/w noted  Not known to be a significant factor
General population decline of wild steelhead	COSEWIC assessment is under consideration; Kamloops Fly Fishers are pursuing it		<b>T17: List as endangered species under Species at Risk Act</b>		To date, no Pacific Salmon have been listed under SARA due to economic considerations (e.g. Cultus Sockeye, Sakinaw Sockeye, Interior Fraser Coho).	Improve precision of spawner abundance estimation for Nicola Steelhead	
Restoration of abundance of steelhead			T18: Hatchery augmentation to provide fishing opportunities and protein/sustenance opportunities for First Nations - despite current provincial policy and steelhead framework				

AREA: Fraser River	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
Fishing mortality - commercial by-catch, test fisheries, FSC	Fishing mortality for many Fraser species have been reduced over the past two decades in response to declining trends in abundance of many stocks. However in the last 6 years, fishing mortality on Interior Fraser Steelhead has increased despite record low abundance.	<p>Low but chronic interception rate in net fisheries, and incidental mortality from catch and release, FSC in non-terminal areas</p> <p>Fishing in mixed species migration corridors using fishing gear and methods that cause significant mortality on bycatch species.</p>	<p><b>Adjust <i>TIMING</i> of Fraser River fisheries:</b></p> <p><b>F1: coho closure for gillnetting in September from Mission u/s to Sawmill Creek for FN economic fisheries.</b></p> <p><b>F2: change timing of chum gillnet fishery to avoid peak steelhead migration.</b></p> <p><b>F3: From Sept 7 to Nov 8, use selective gear for FN economic and Area E fisheries; before and after these dates, use non-selective gear.</b></p> <p><b>F4: Avoid non-selective gear for FSC fisheries during peak steelhead migration period.</b></p> <p><b>F5: Delay or close FSC fisheries until after a certain date when x% of</b></p>	DFO, Province, commercial fishermen, FN	Both	<p>Steelhead abundance and status - Various constraints limits the availability of steelhead information to the following: steelhead abundance and abundance status, but only after pink and late sockeye fisheries but before chum fisheries at the earliest. Status is confirmed during the following salmon fishing season.</p> <p>In-season abundance assessment of target stocks.</p> <p>Catch monitoring (target salmon species and stocks)</p> <p>Improve spatial and temporal resolution of southern BC chum and pink migration routes, abundance, timing and status. Information will serve to better understand opportunity to relocate non-selective gear and methods to off-mixed species corridor areas</p> <p>Estimation of overall fishing mortality remains not feasible at this time and for the foreseeable future. Monitoring of fishing mortality is limited to monitoring of relative change over time (non-absolute).</p>	<p>From Levy (2014, p.47) unless o/w noted</p> <p>General options provided, before they were refined to numbered options:</p> <ul style="list-style-type: none"> <li>Provide financial assistance or incentives to those seeking to change fishing gears and methods.</li> <li>Conduct test fishing projects in off-corridor areas.</li> <li>Relocate enhancement locations of target species to make more opportunity in off-corridor areas for the more conventional gear types and method.</li> <li>Adjust timing and/or zone of chum fishery to Nov 1 to minimize interception with steelhead migration (S. Rice, 12nov15 forum; Kamloops Fly Fishers' letter 27nov15)</li> <li>Ensure all intercept fisheries are selective (BCFDF, 4feb16 email)</li> </ul>

AREA: Fraser River	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
			<p><i>steelhead have migrated.</i></p> <p><i>Adjust AREAS of Fraser River fisheries:</i></p> <p><i>F6: Move FN commercial fisheries to Harrison for pink, chum, sockeye</i></p> <p><i>F7: Explore opportunity to license different FN fisheries in different areas (Stave, Chiliwack, Pitt).</i></p> <p><i>F8: Explore opportunity to move Area E commercial fishery into Stave or Pitt Rivers for chum.</i></p> <p><i>F9: Continue promoting FSC fisheries in Pitt, Chiliwack Rivers.</i></p> <p><i>F10: Monitor and promote ESSR (excess salmon to spawning requirements) fisheries in terminal areas</i></p>			<p>A strategy is to minimize uncertainty in the level of fishing mortality due to bycatch by reducing non-selective fishing within the steelhead migration corridor and favouring selective fishing opportunity in those times and places. Lower the potential fishing mortality from fisheries where steelhead catch data are too difficult to collect will improve the ability to estimate and monitor steelhead status and recovery potential. This strategy will also prepare the fishery to harvest target species with less consequence and uncertainty to steelhead in times when target species abundance is harvestable.</p> <p>Need to establish a framework for fisheries management decision making based o agreed to impact model options</p>	



AREA: Fraser River	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
			<p><i>Manage the <b>GEAR</b> to reduce by-catch of steelhead - keep out of mixed-species corridors:</i></p> <p><i>F11: Eliminate all use of gillnets for FN economic fisheries.</i></p> <p><i>F12: Use beach seines as options for sockeye fishing, FN economic fishery.</i></p> <p><i>F13: Use fish wheels for FN economic fishery u/s of Mission.</i></p> <p><i>F14: Use experimental gear types (mechanized fish wheel; tooth tangle nets; river-bottom oriented gill nets) in FN economic fishery d/s of Mission.</i></p> <p><i>F15: Use weir-type structures to direct fish, then selective gear, in FN economic fishery d/s of</i></p>				

AREA: Fraser River	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
			<p><i>Mission.</i></p> <p><i>F16: Use beach seines or experimental gear types (mechanized fish wheel; tooth tangle nets; river-bottom oriented gill nets) for Area E commercial fishery.</i></p> <p><i>F17: Encourage transferability of shares (licensing or policy issue, not gear) from Area E to FN fisheries, which are more selective.</i></p> <p><i>F18: Use weir-type structures to direct fish, then selective gear, in Area E fishery.</i></p> <p><i>F19: Use fish wheel for FSC fishery.</i></p> <p><i>F20: Use weir-type structures to direct fish, then selective gear in FSC fishery.</i></p> <p><i>F21: Hot pick the</i></p>				

AREA: Fraser River	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
			<p><i>gill net (someone always present) in FSC fishery.</i></p> <p>F22: address unauthorized fishing through better C&amp;E, Fisheries Officers, FN involvement, education, or authorizing steelhead licenses or FSC for First Nations.</p>				
Fishing mortality - sport fishing	Angling regulation includes zero quota	Incidental mortality from catch and release; near zero fishing mortality on account of low effort and low catch (Agassiz only)	<p>Restrict all sport fishing for several life cycles (KDFGA, 25jan16 letter)</p> <p>Creel census and assessment program (BCFDF, 4feb16 email)</p>			Does DFO creel census collect info on steelhead?	<p>From Levy (2014, p.47)</p> <p>Very small directed effort in the Agassiz area. Mixture of Interior Fraser Steelhead stocks present, not only Thompson stocks.</p>
Water quality/pollution in mouth of Fraser River							Assumed a minimal issue since limited time spent here
Jurisdictional issues, collaboration	<p>Ongoing Federal Provincial dialogue and information sharing.</p> <p>Thompson Steelhead Working Group</p>	Fractured fisheries management jurisdiction	<p><b>Management planning and co-management, exploring innovation in fishing practices and sustainability of fisheries</b> (separate local vs. regional/national level, policy)</p>	Fed, Prov, FN	Proven but requires political leadership		Interception of summer steelhead in BC inshore areas is a longstanding management problem in many areas of the province (e.g. Skeena, Dean, Fraser, Alberni).

AREA: In-shore ocean fishing areas	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
<p>Commercial fishing mortality:</p> <ul style="list-style-type: none"> <li>▪ Southeast Alaska</li> <li>▪ Johnston Strait</li> <li>▪ Area 29 (mouth of Fraser River)</li> <li>▪ Area 21(SW coast of Vancouver Island)</li> <li>▪ Area 20 (Canadian side of Juan de Fuca Strait)</li> <li>▪ US Areas 4B, 5, 6C (US side of Juan de Fuca Strait)</li> <li>▪ US Area 77 (North Puget Sound)</li> </ul>	<p>Measures implemented since mid-1980s have significantly reduced by-catch from 70% to 10%</p> <p>Fishing mortality for many Fraser species have been reduced over the past two decades in response to declining trends in abundance of many stocks. However in the last 6 years, fishing mortality on Interior Fraser Steelhead has increased despite record low abundance</p>	<p>Low but chronic interception rate in net fisheries, and incidental mortality from catch and release</p> <p>No improvement in fishing locations or methods for over a decade and during the lowest abundances observed for Interior Fraser Steelhead</p>	<p><i>Adjust timing of fisheries - generally</i></p> <p><i>Adjust areas of fisheries - generally (migration corridors, off-corridor)</i></p> <p><i>Manage the gear to reduce by-catch of steelhead - keep out of mixed-species corridors</i></p> <p>Ensure all intercept fisheries are selective (BCFDF, 4feb16 email)</p> <p>Provide financial assistance to those seeking to change fishing gears and methods.</p> <p>Conduct test fishing projects in off-corridor areas.</p> <p>Relocate enhancement locations of target species to make</p>	<p>DFO, Washington State and Northwest Indian Fisheries Commission</p>		<p>Information for US 4B, US Treaty Indian fisheries</p> <p>Steelhead abundance and status - Various constraints limits the availability of steelhead information to the following: steelhead abundance and abundance status, but only after pink and late sockeye fisheries but before chum fisheries at the earliest. Status is confirmed during the following salmon fishing season.</p> <p>In-season abundance assessment of target stocks.</p> <p>Catch monitoring (target salmon species and stocks)</p> <p>Improve spatial and temporal resolution of southern BC chum and pink migration routes, abundance, timing and status. Information will serve to better understand opportunity to relocate non-selective gear and methods to off-mixed species corridor areas</p> <p>Estimation of overall fishing mortality remains not feasible at this time and for the foreseeable future. Monitoring of fishing mortality is limited to monitoring of</p>	<p>From Levy (2014, p.47)</p> <p>In 2013 and 2014, the proportion of Interior Fraser Steelhead released from non-selective salmon gears and methods is estimated at approximately ½ of the steelhead run.</p>

AREA: In-shore ocean fishing areas	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
			<p>more opportunity in off-corridor areas for the more conventional gear types and method.</p> <p>Stock identification of samples of steelhead catch from the southeast Alaska salmon fishery. Address through Pacific Salmon Treaty?</p>			<p>relative change over time (non-absolute).</p> <p>A strategy is to minimize uncertainty in the level of fishing mortality due to bycatch by reducing non-selective fishing within the steelhead migration corridor and favouring selective fishing opportunity in those times and places. Lower the potential fishing mortality from fisheries where steelhead catch data are too difficult to collect will improve the ability to estimate and monitor steelhead status and recovery potential. This strategy will also prepare the fishery to harvest target species with less consequence and uncertainty to steelhead in times when target species abundance is harvestable</p>	
Ocean conditions	<p>See Off-Shore table on next page</p> <p>Various research projects</p>	Possible factors include increase in marine mammal predation due to increase in marine mammal abundance since late 1970s.	None identified at this time.				
Changes in species composition in the ocean			Not determined to date				

AREA: In-shore ocean fishing areas	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
Predation by numerous predators	Marine Survival Project led by PSF and Long Live the Kings - <a href="#">hypothesis #2</a> : "Top-down processes have also changed. Primarily, there are more predators eating steelhead, resident salmon and larger forage fish"		Not determined to date				
Adequacy of protection windows for steelhead migration	<p>Protection for steelhead was recently reduced in Fraser River commercial gillnet fishery for chum</p> <p>Protection for steelhead has been maintained in Area 21 chum fishery</p> <p>No steelhead protection windows for any other chum fisheries or for pink and late sockeye fisheries.</p>	Short term salmon fishing interests have precluded protection windows for steelhead	<p>Restrict allowable gear and methods according to steelhead protection windows within the steelhead migration corridor and times.</p> <p>Increase opportunity for more traditional selective gear and methods</p>	Fed		Uncertainty and disagreement whether these restrictions on gear and methods are in place and/or sufficient	
Jurisdictional issues, collaboration	<p>Ongoing Federal Provincial dialogue and information sharing.</p> <p>Thompson Steelhead Working Group</p>	Fractured fisheries management jurisdiction	<b>Management planning and co-management, exploring innovation in fishing practices and sustainability of fisheries</b> (separate local vs. regional/national level, policy)	Fed, Prov, FN	Proven but requires political leadership		Interception of summer steelhead in BC inshore areas is a longstanding management problem in many areas of the province (e.g. Skeena, Dean, Fraser, Alberni).

AREA: Off-shore	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
Ocean conditions	<p>Studies related to declines in smolt to adult survival ratios</p> <p>Marine Survival Project led by PSF and Long Live the Kings:</p> <p><a href="#">hypothesis #3:</a> Additional factors are exacerbating these ecological shifts, including toxics, disease, competition, and the cumulative effect of significant top-down and bottom-up shifts occurring simultaneously</p> <p><a href="#">hypothesis #1:</a> “Bottom-up processes—including weather, water, and plankton—that drive juvenile Chinook, coho and forage fish prey availability have changed, and salmon aren’t able to compensate. This is limiting salmon growth and survival”</p>	Physical oceanography and climactic conditions in the North Pacific that are manifested by altered temperature distributions and changes in upwelling	Appear limited			Many	<p>From Levy (2014, p.46) unless o/w noted</p> <p>Consult Kate Myers and colleagues</p>
Global climate and ocean cycles		Short-term variations induced by climactic phenomena such as El Nino and/or Pacific Decadal	These climactic-oceanographic processes are outside the influence of fisheries			Many	<p>From Levy (2014, p.46)</p> <p>Consult Nathan Mantua and colleagues</p>

AREA: Off-shore	What is currently being done?	What are the causal factors?	Resource management opportunities?	Who needs to implement them?	Are they tested/proven, or is this a research or pilot project?	Are there data gaps or uncertainty?	Comments
Issue							
		oscn's	management				
Hatcheries of steelhead and other species, other Pacific countries	High seas monitoring programs for steelhead and salmon have been reduced (consults Kate Myers for history)					Many	
Management of wild steelhead and other species in other Pacific countries						Many	Consult Randal Peterman, Brigette Dorner, Tom Ruggerone and colleagues

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## Chapter 5 - Step 3 - Biological, Social and Economic Objectives

The following are biological, social and economic objectives to be used in Step 4 in evaluating resource management opportunities.

### Biological Objectives:

1. Thompson Steelhead population numbers are increased to target recovery objectives
2. Thompson Steelhead exist in all places of historic distribution in the Thompson system

### Social Objectives:

1. Sufficient Thompson Steelhead exist for First Nations ceremonial and sustenance purposes, in the Thompson system and downstream
2. Sufficient Thompson Steelhead exist for sport fishing with a harvest opportunity

### Economic Objectives:

1. A First Nations economic fishery for Thompson Steelhead exists.
2. Economic value of sport fishing are realized in communities and small businesses.
3. Disruption to existing commercial and First Nations fisheries is minimized.

## Chapter 6 - Step 4 - Assess the Likely Impacts of the Resource Management Opportunities

### Step 4 - Assess the Likely Impacts of the Resource Management Opportunities

- For each of the management issues, and the resource management opportunities:
  - How likely is the management opportunity to achieve the desired effect for steelhead? When?
  - Is the science proven, or is this research/pilot project/speculation or theory?
  - Who needs to “buy in” or who needs to be involved in implementation? (e.g., other sectors such as agriculture, forestry, private landowners)
  - What are the impacts to different fishing or conservation groups? (e.g., commercial, sports, first nations, non-profit groups)
  - What plans are influenced or impacted, for which geographic scope?
  - What resources are needed to implement the management opportunity? Do the resources exist, or how likely is it to acquire them? (e.g., human resources, expertise, cash, equipment)
  - How do they address the objectives from step 3?

AREA:Thompson River System	Resource management opportunities	Evaluation of objectives: how would the option contribute to the objective? (☺ or ☹ or no effect or can't tell/lack of info)							Comments - define more specific opportunities (where, when, how); other considerations
Issue		B1	B2	S1	S2	E1	E2	E3	
Physical habitat degradation	<p><b>T1: Restore degraded habitats - in stream and riparian, including shading</b></p> <p>Focus restoration on “riffles and rapids downstream of Spius Creek [that] are more typical of steelhead habitat;” re-fortifying riparian areas, stabilizing banks, restoring processes</p> <p><b>T2: Enhanced riparian management upstream, including FSW designations under FRPA</b></p> <p>T3: Sensitive stream designation WSA s.128</p>								

AREA:Thompson River System	Resource management opportunities	Evaluation of objectives: how would the option contribute to the objective? (✓ or ✗ or no effect or can't tell/lack of info)							Comments - define more specific opportunities (where, when, how); other considerations
Issue		B1	B2	S1	S2	E1	E2	E3	
	<p><i>T4: Identify sediment sources upstream, and reduce unnatural sediment input upstream; substrate will clean out naturally over a few seasons</i></p>								
Water quantity	<p>T5: Water Sustainability Plans (WSA Div. 4) - could be requested to be initiated on watersheds with water quantity concerns; need to clarify who can initiate this</p> <p>T6: Water licence reviews - under the new WSA, reviews of existing licences can occur after 30 years</p> <p><i>T7: Restrict water licence withdrawals from July-Sept to protect emerging fry under WSA</i></p> <p>T8: Water storage - instream vs dams are 2 different optios. Structures already exist - modify or fine-tune to meet fish needs?</p> <p><i>T9: Restrict over-use</i></p>								

AREA:Thompson River System	Resource management opportunities	Evaluation of objectives: how would the option contribute to the objective? (☺ or ☹ or no effect or can't tell/lack of info)							Comments - define more specific opportunities (where, when, how); other considerations
Issue		B1	B2	S1	S2	E1	E2	E3	
	<p><i>of water in rearing tributaries by local government</i> and water purveyors (KDFGA 25jan16 letter, 4feb16 email)</p> <p><b>T10: Better monitoring by water officers of actual vs. licensed amounts</b></p>								
Water temperature	<p>T11: Identify cold water refugia and manage appropriately (i.e., don't license groundwater wells in these areas; use in the triage of Fish Protection orders and shut down licenses from these areas first; target for future mitigation such as fencing off cattle)</p> <p><b>T1: Riparian shading</b></p>								
Risk of life history shift from anadromous to non-anadromous	<p>T12: Conserve steelhead spawner abundance to conserve rebuilding potential, conserve rainbow trout to insure against possible extinction of anadromous population.</p>								

AREA:Thompson River System	Resource management opportunities	Evaluation of objectives: how would the option contribute to the objective? (✓ or ✗ or no effect or can't tell/lack of info)							Comments - define more specific opportunities (where, when, how); other considerations
Issue		B1	B2	S1	S2	E1	E2	E3	
Fishing effects - sport	T13: Restrict all sport fishing for several life cycles (KDFGA, 25jan16 letter)								
Fishing effects - First Nations	T14: Monitor and regulate FN fisheries targeting rainbow and steelhead; keep rainbows, release steelhead  T15: Elder influence								
Gill netting on Thompson River (certain years)	T16: Ensure all intercept fisheries are selective (BCFDF, 4feb16 email)								
General population decline of wild steelhead	<b>T17: List as endangered species under Species at Risk Act</b>								
Restoration of abundance of steelhead	T18: Hatchery augmentation to provide fishing opportunities and protein/sustenance opportunities for First Nations - despite current provincial policy and steelhead framework								

AREA: Fraser River	Resource management opportunities	Evaluation of objectives: how would the option contribute to the objective? (☺ or ☹ or no effect)							Comments - define more specific opportunities (where, when, how); other considerations
Issue		B1	B2	S1	S2	E1	E2	E3	
Fishing mortality - commercial by-catch, test fisheries, FSC	<p>Adjust <b>TIMING</b> of Fraser River fisheries:</p> <p><i>F1: coho closure for gillnetting in September from Mission u/s to Sawmill Creek for FN economic fisheries.</i></p> <p><i>F2: change timing of chum gillnet fishery to avoid peak steelhead migration.</i></p> <p><i>F3: From Sept 7 to Nov 8, use selective gear for FN economic and Area E fisheries; before and after these dates, use non-selective gear.</i></p> <p><i>F4: Avoid non-selective gear for FSC fisheries during peak steelhead migration period.</i></p> <p><i>F5: Delay or close FSC fisheries until after a certain date when x% of steelhead have migrated.</i></p> <p>Adjust <b>AREAS</b> of Fraser River fisheries:</p>								

AREA: Fraser River	Resource management opportunities	Evaluation of objectives: how would the option contribute to the objective? (☺ or ☹ or no effect)							Comments - define more specific opportunities (where, when, how); other considerations
Issue		B1	B2	S1	S2	E1	E2	E3	
	<p><i>F6: Move FN commercial fisheries to Harrison for pink, chum, sockeye</i></p> <p><i>F7: Explore opportunity to license different FN fisheries in different areas (Stave, Chiliwack, Pitt).</i></p> <p><i>F8: Explore opportunity to move Area E commercial fishery into Stave or Pitt Rivers for chum.</i></p> <p><i>F9: Continue promoting FSC fisheries in Pitt, Chiliwack Rivers.</i></p> <p><i>F10: Monitor and promote ESSR (excess salmon to spawning requirements) fisheries in terminal areas</i></p> <p><i>Manage the <b>GEAR</b> to reduce by-catch of steelhead - keep out of mixed-species corridors:</i></p> <p><i>F11: Eliminate all use of gillnets for FN economic fisheries.</i></p>								

AREA: Fraser River	Resource management opportunities	Evaluation of objectives: how would the option contribute to the objective? (☺ or ☹ or no effect)							Comments - define more specific opportunities (where, when, how); other considerations
Issue		B1	B2	S1	S2	E1	E2	E3	
	<p><i>F12: Use beach seines as options for sockeye fishing, FN economic fishery.</i></p> <p><i>F13: Use fish wheels for FN economic fishery u/s of Mission.</i></p> <p><i>F14: Use experimental gear types (mechanized fish wheel; tooth tangle nets; river-bottom oriented gill nets) in FN economic fishery d/s of Mission.</i></p> <p><i>F15: Use weir-type structures to direct fish, then selective gear, in FN economic fishery d/s of Mission.</i></p> <p><i>F16: Use beach seines or experimental gear types (mechanized fish wheel; tooth tangle nets; river-bottom oriented gill nets) for Area E commercial fishery.</i></p> <p><i>F17: Encourage transferability of shares (licensing or policy issue, not</i></p>								



AREA: Fraser River	Resource management opportunities	Evaluation of objectives: how would the option contribute to the objective? (☺ or ☹ or no effect)							Comments - define more specific opportunities (where, when, how); other considerations
Issue		B1	B2	S1	S2	E1	E2	E3	
	<p><i>gear) from Area E to FN fisheries, which are more selective.</i></p> <p><i>F18: Use weir-type structures to direct fish, then selective gear, in Area E fishery.</i></p> <p><i>F19: Use fish wheel for FSC fishery.</i></p> <p><i>F20: Use weir-type structures to direct fish, then selective gear in FSC fishery.</i></p> <p><i>F21: Hot pick the gill net (someone always present) in FSC fishery.</i></p> <p>F22: address unauthorized fishing through better C&amp;E, Fisheries Officers, FN involvement, education, or authorizing steelhead licenses or FSC for First Nations.</p>								
Fishing mortality - sport fishing	<p>Restrict all sport fishing for several life cycles (KDFGA, 25jan16 letter)</p> <p>Creel census and assessment program (BCFDF, 4feb16 email)</p>								

AREA: Fraser River	Resource management opportunities	Evaluation of objectives: how would the option contribute to the objective? (↕ or ↗ or no effect)							Comments - define more specific opportunities (where, when, how); other considerations
Issue		B1	B2	S1	S2	E1	E2	E3	
Jurisdictional issues, collaboration	<i>Management planning and co-management, exploring innovation in fishing practices and sustainability of fisheries</i> (separate local vs. regional/national level, policy)								

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AREA: In-shore Ocean Fishing Area Issue	Resource management opportunities	Evaluation of objectives: how would the option contribute to the objective? (☺ or ☹ or no effect)							Comments - define more specific opportunities (where, when, how); other considerations
		B1	B2	S1	S2	E1	E2	E3	
Commercial fishing mortality	<p>Monitoring of catch - strategic - when and where suspected steelhead bycatch is expected</p> <p>Fishing practices and selective fishing techniques and handling</p> <p>Consider Area B, D, E perspectives - what are the options? Ones that currently exist, and ones not currently available?</p>								

Thoughts on assessment processes for the management opportunities:

- Timeframe for response - would management action x result in a response in weeks, months, years or decades?
- Certainty of having a positive outcome for steelhead - low, medium or high?
- Impact on licensed rights - low, medium or high?
- Economic costs

## Chapter 7 - Step 5 - Recommend Preferred Management Opportunities

### Step 5 - Recommend Preferred Management Opportunities

- Tradeoffs to consider include but are not limited to:
  - Resource availability
  - Timelines
  - Buy-in (in particular from other sectors)
  - Implementation mechanism (e.g., voluntary, regulatory, or a combination)
  - Need for tangible results compared to plans, process (e.g., visibility to various groups)

#### After Step 5:

It is understood that before anything gets implemented, there are existing consultation, referral and communications processes that must be followed to get feedback on what is being considered.

## References

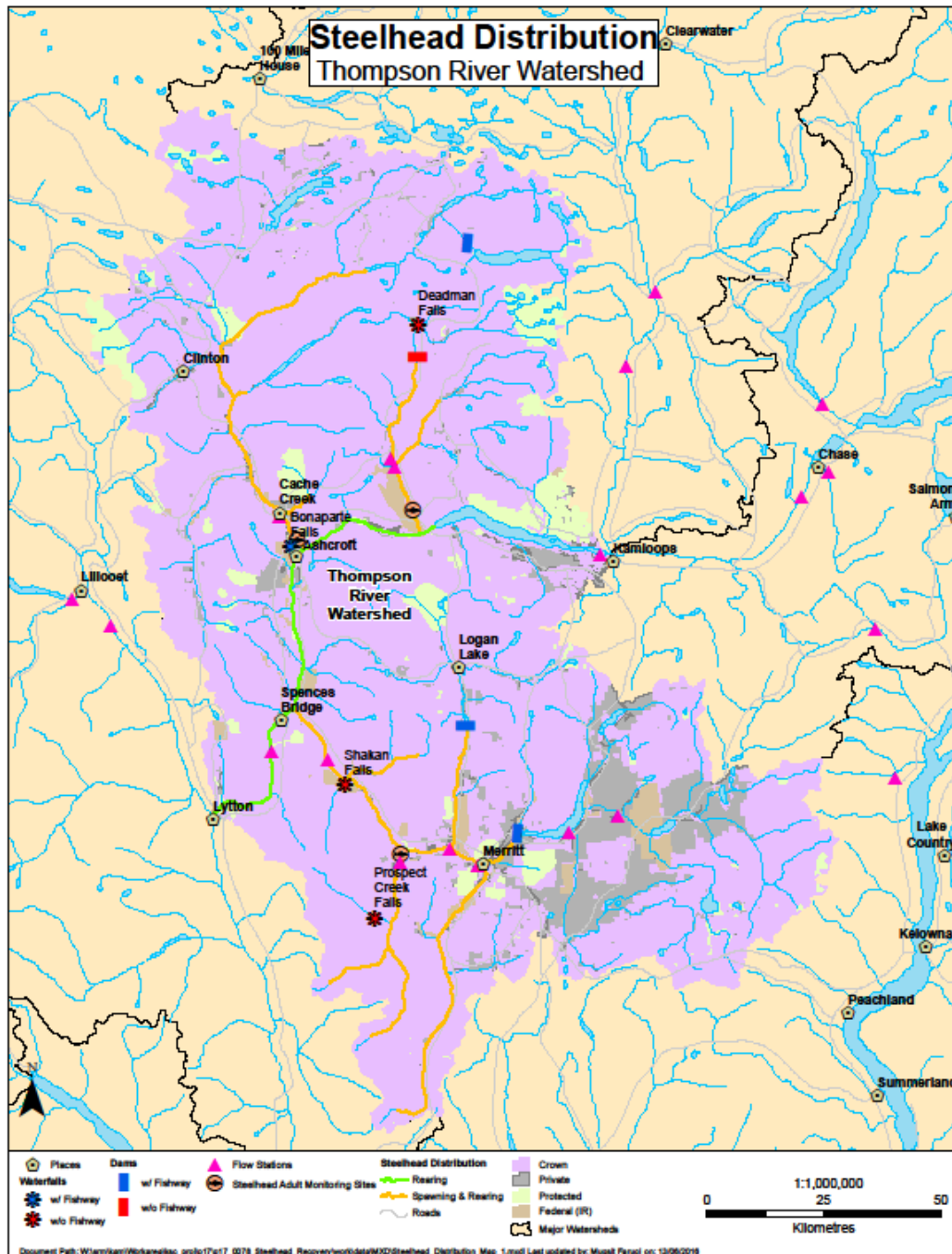
- Levy, D. 2014. *Independent review of the science and management of Thompson River steelhead*. Prepared for Thompson Steelhead Technical Subcommittee c/o Cook's Ferry Indian Band. Available at [http://www.fraserbasin.bc.ca/\\_Library/TR/steelhead\\_independent\\_review\\_march-2014.pdf](http://www.fraserbasin.bc.ca/_Library/TR/steelhead_independent_review_march-2014.pdf)

## Appendix 1 - Planning Framework Outline Approved Nov 13, 2015

This outline of a planning framework is a structured decision making process to support the management and recovery of steelhead, to be developed by the Thompson Steelhead Working Group in 2015/16.

<p><b>Proposed Planning Framework</b> (as per steps outlined in Wild Salmon Policy)</p>
<p><b>Step 1 – Identify Proposed Planning Priorities (biological, management)</b></p> <ul style="list-style-type: none"> <li>▪ Consider key <b>management issues</b> in the <a href="#">Levy Report</a> (March 2014) <ul style="list-style-type: none"> <li>○ Ocean survival</li> <li>○ Fishing mortality</li> <li>○ Habitat impacts – local, regional</li> <li>○ Water utilization</li> </ul> </li> <li>▪ Consider information gaps, better tools, better monitoring</li> <li>▪ Identify recovery objectives for Thompson Steelhead</li> <li>▪ Develop a communications plan</li> </ul>
<p><b>Step 2 – Resource Management Opportunities</b></p> <ul style="list-style-type: none"> <li>▪ For each of the issues identified in Step 1 above: <ul style="list-style-type: none"> <li>○ What is currently being done?</li> <li>○ What are the causal factors?</li> <li>○ What resource management options are available to address the issue?</li> <li>○ Who needs to implement the options?</li> <li>○ Are the options tested/proven, or is this research or a pilot project?</li> <li>○ Alternatives to achieving recovery objectives – hatchery, habitat, or harvest?</li> </ul> </li> </ul>
<p><b>Step 3 – Biological, Social and Economic Performance Objectives</b></p> <ul style="list-style-type: none"> <li>▪ Define objectives for each management option, by sector</li> </ul>
<p><b>Step 4 – Assess the Likely Impacts of the Resource Management Opportunities</b></p> <ul style="list-style-type: none"> <li>▪ For each of the management issues, and the resource management options: <ul style="list-style-type: none"> <li>○ How likely is the management alternative to achieve the desired effect for steelhead? When?</li> <li>○ Is the science proven, or is this research/pilot project/speculation or theory?</li> <li>○ Who needs to “buy in” or who needs to be involved in implementation? (e.g., other sectors such as agriculture, forestry, private landowners)</li> <li>○ What are the impacts to different fishing or conservation groups? (e.g., commercial, sports, first nations, non-profit groups)</li> <li>○ What plans are influenced or impacted, for which geographic scope?</li> <li>○ What resources are needed to implement the management alternative? Do the resources exist, or how likely is it to acquire them? (e.g., human resources, expertise, cash, equipment)</li> <li>○ How do they address the performance indicators from step 3?</li> </ul> </li> </ul>
<p><b>Step 5 – Recommended Preferred Management Opportunities</b></p> <ul style="list-style-type: none"> <li>▪ Tradeoffs to consider include but are not limited to: <ul style="list-style-type: none"> <li>○ Resource availability</li> <li>○ Timelines</li> <li>○ Buy-in (in particular from other sectors)</li> <li>○ Implementation mechanism (e.g., voluntary, regulatory, or a combination)</li> <li>○ Need for tangible results compared to plans, process (e.g., visibility to various groups)</li> </ul> </li> </ul>

## Appendix 2 - Steelhead Distribution in Thompson River Watershed



### Appendix 3 - Current Fisheries and Regulations for Steelhead

#### AREA:Thompson River System

Sub-area	Species	Type of fishery; who undertakes it	Gear type
All	Steelhead	Sport	Rod and reel
All	Steelhead	First nations	Mixed
Thompson R.	Various	Aboriginal fishery	Gill nets

#### AREA: Fraser River\*

Sub-area	Species	Type of fishery; who undertakes it	Gear type
Lytton to Mission	Sockeye	Commercial aboriginal fishery - Yale treaty	Set nets, drift nets
	Pink	Commercial aboriginal fishery - Yale treaty; during September coho closure	Beach seine
	Sockeye, pink	Upstream of Yale, Siska has limited fishery	Dip nets
	Chum	Commercial aboriginal fishery in October	Beach seine where beach available; limited gill nets
	Chinook	Sport/recreational fishery	Rod and reel
	Sockeye	Sport/recreational fishery, every 4 years on dominant run	Rod and reel
	Interior Fraser Steelhead	Sport/recreational fishery at Agassiz, regulated by MFLNRO	Rod and reel
	Sockeye, chinook or steelhead	Unauthorized fisheries/poaching	Mixed
Lytton to Sawmill Creek	Sockeye, chinook, pink (no chum fishing)	FSC	Set nets for sockeye; no gill nets during coho closure; some dipnet, rod and reel; some gill net fishing for chinook before sockeye fishery. 8" mesh gill nets for sockeye and chinook. Gill net or dip net for pinks.
Downstream of Sawmill Creek	Chum, pink, sockeye	Economic opportunity fishery for Lower Fraser Fisheries Alliance	Beach seine
	?	Demonstration fisheries	?
	All anadromous species	FSC for Sto:lo	Chinook 8" mesh gill nets, late April to start of sockeye fishery; sockeye fishery with set net, drift net in August; pink fishery with beach seines; chum in Oct d/s Harrison R. with gill nets; pink d/s Port Mann Bridge with shallow seine nets
Mission to mouth of Fraser (2 mgmt units for First Nations: Mission to Port Mann Bridge;	Sockeye	First Nations economic fisheries	Gillnet
	Pink	First Nations economic fisheries - during coho closures	Beach seines almost exclusively u/s Port Mann Bridge
	Chum	First Nations economic fisheries	Majority with beach seines; small portion with gill nets late Oct.



Sub-area	Species	Type of fishery; who undertakes it	Gear type
then d/s to mouth)			
Mission to mouth of Fraser (note Area E extends beyond mouth)	Sockeye, chum (pink not harvested; chinook are recreational, FSC priority)	Commercial non-Aboriginal fishery, Area E. Generally restricted to after Oct 25, with exception of one 24 hr opening	Gill nets are only authorized gear for Area E by definition.
Entire Area	All species	Test fisheries	?

\*NOTES: sockeye and pinks generally stay in Fraser; chum move into tributaries. No in-season assessment for coho; no adjustments made from plans. Most gains for Steelhead were felt to be from Mission downstream.

#### AREA: In-shore Ocean Fishing Areas

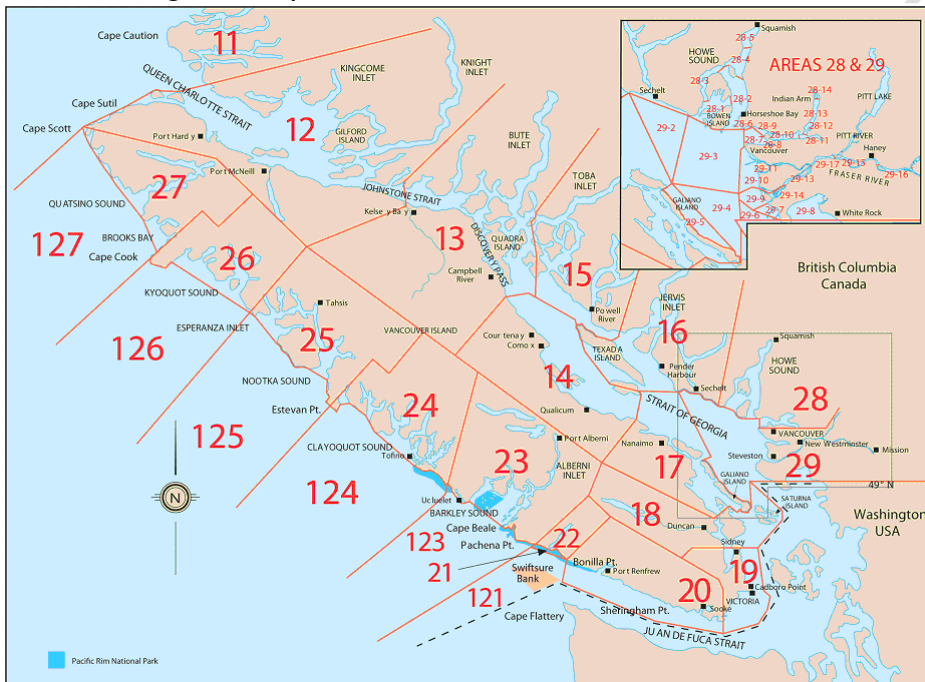
Sub-area	Species	Type of fishery; who undertakes it	Gear type
Johnstone Strait mainly	All	First Nations FSC	Troll, seine, gill net
Queen Charlotte Strait to Juan de Fuca Strait, and West Coast Vancouver Island "inlets"	All	Salmon Area B - commercial fishery	Seine
Queen Charlotte Strait to Strait of Georgia, and West Coast Vancouver Island "inlets"	All	Salmon Area D - commercial fishery	Gill net
Strait of Georgia to Juan de Fuca Strait, Fraser River		Salmon Area E - commercial fishery	Gill net
Washington State Area 7 and 7a - MERGE	Sockeye, pink, chum, some hatchery coho	Non-treaty commercial fishery All Citizens fishery	Gill net, seine, reef net
Northwest Indian Fisheries Commission - MERGE Areas 7, 7a, 4b-5-6c	Sockeye, pink, chum, some hatchery coho	Treaty Indian fishery (C+S or ceremonial and subsistence)	Gill net, reef net
Everywhere	All	Test fisheries	

\*Generally, trolling is more effective for fishing chinook and coho; seine is used for everything (larger seine nets for sockeye and pink, less so for chum); gill nets used for everything (less so for pink). Roughly 30% of the commercial licenses are held by Aboriginals; 70% non-Aboriginals.

The following is from p.332 of the 2016/17 IFMP:

Pacific Salmon Fishing Area	Gear	Corresponding Pacific Fisheries Management Areas (PFMA)
Salmon Area A	Seine	Areas 1 to 10, Subarea 101-7
Salmon Area B	Seine	Areas 11 to 29 and 121
Salmon Area C	Gill net	Areas 1 to 10, Subarea 101-7
Salmon Area D	Gill net	Areas 11 to 15 and 23 - 27
Salmon Area E	Gill net	Areas 16 to 22, 28, 29 and 121
Salmon Area F	Troll	Areas 1 to 10, 101 to 110, 130 and 142
Salmon Area G	Troll	Areas 11, 20 to 28, 111, 121, 123 to 127 and Subareas 12-5 and 12-6
Salmon Area H	Troll	Areas 12 to 19, 28 and 29

The following is from p.18 of the 2016/17 IFMP:



## Fishing Regulations

The following are the current fishing regulations by area, and by abundance management class, and by order of government.

MFLNRO manages the sport fishery in the Thompson River system by management abundance class:

- Management abundance (spawning population abundance >1200): catch and release to Dec 31; no angling for balance of season
- Conservation concern (spawning population abundance 400-1200): >850, catch and release to Dec 31, no angling for balance of season; <850, catch and release to Oct 31, no angling for balance of season

- Extreme conservation concern (spawning population abundance <400): catch and release to Oct 31; no angling for balance of season
- Average peak of migration for Thompson River system is Oct 28; 5<sup>th</sup> and 95<sup>th</sup> percentiles are Sept 27 and May

DFO has regulations for minimizing by-catch of steelhead by area:

Area	Release regulations	Gear regulations	Timing regulations	Other regulations
Area 12 GN	Mandatory bycatch release	Revival boxes		
Area 12 SN	Mandatory bycatch release	Brailing and revival tanks		Observer coverage (demonstration fishery) & dockside verification of landings
Area 13 GN	Mandatory bycatch release	Revival boxes		Mandatory non-retention of SH
Area 13 SN	Mandatory bycatch release	Brailing and revival tanks		Observer coverage (demonstration fishery) & dockside verification of landings
Area 21 GN	Mandatory bycatch release	Revival boxes	No fishing for chum salmon before Oct 1; maximum of 2 days per week until Oct 15	
US 4b,5,6c GN Treaty Indian				
US Areas 7 and 7a GN All Citizen	Mandatory bycatch release in non-treaty fisheries	Recovery boxes		Gillnet soak time not to exceed 45 minutes per set Oct 10-17
US Areas 7 and 7a SN All Citizen	Mandatory bycatch release in non-treaty fisheries	Brailing and recovery boxes or dipnetting or hand pulling the bunt onto the vessel without the use of hydraulic or mechanical assistance		
US Areas 7, 7a GN Treaty Indian				
US Areas 7, 7a SN Treaty Indian				
Area 29 SN	Mandatory bycatch release	Brailing and revival tanks		
Area 29 GN	Mandatory bycatch release	Revival boxes		
Fraser Modified Seine	Mandatory bycatch release			
Fraser Drift Net	Mandatory bycatch release			
Fraser Set Net	Mandatory bycatch release			
Fraser Beach Seine	Mandatory bycatch release			
Thompson River				

USA and US Treaty Indian regulations

- Not documented yet

First Nations

- No documented regulations available (?)

## Appendix 4 - Rationale and Background for draft Steelhead recovery objectives

### Nicola

The steelhead bearing waters of the Nicola watershed include the tributary watersheds of the Coldwater and Spius watersheds, the Nicola River mainstem downstream of Nicola Lake, Guichon Creek downstream of Mamit Lake, Nooaitch Creek, Shuhun Creek, Shakan Creek downstream of falls located approximately 1 km upstream of the confluence with Nicola River, and the Thompson River mainstem. Spawning occurs within the Nicola watershed over a combined stream length in excess of 200 km with higher concentration of spawning in the tributaries to the Nicola River mainstem. The rearing of juveniles occurs in the Nicola watershed as well as the Thompson River mainstem. The length of the Thompson River from the Nicola River confluence to the Fraser is 42 km.

The proportion of Thompson River steelhead spawner abundance in the Nicola watershed averages 62% over a 29 year monitoring time frame beginning in 1987 (SD=11%). All Thompson steelhead stocks exhibit similar declining trends in abundance over this time period suggesting that factors governing change in productivity and abundance has been common to all stocks. Estimates of time varying productivity and potential abundance are available for the Thompson aggregate as a whole. The monitoring time frame begins with the 1984 brood year and represents a 33 year monitoring period to date (Figure 1).

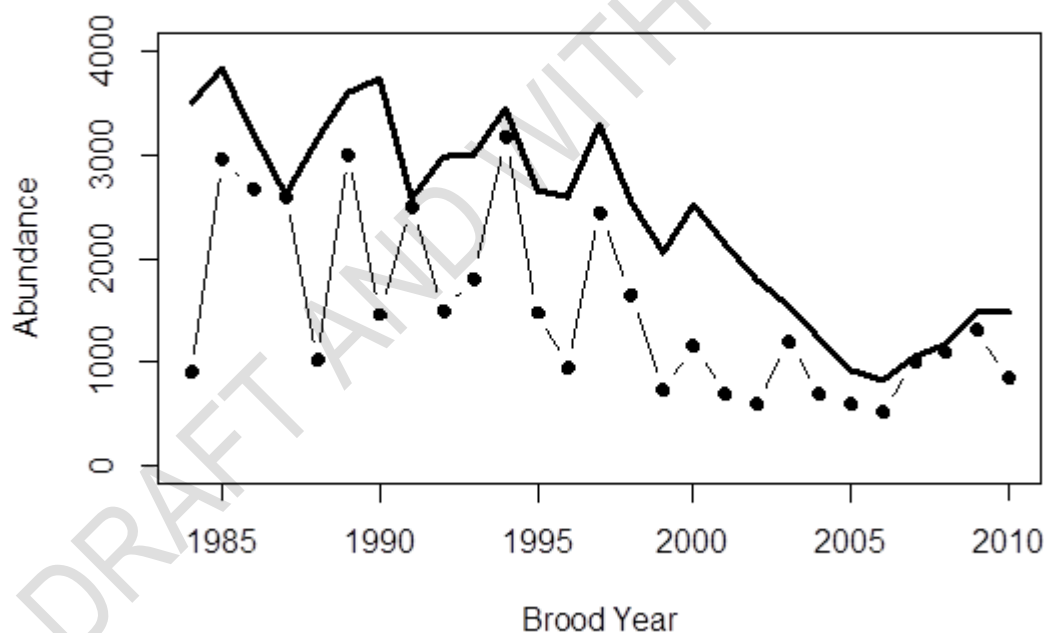


Figure 1. The past and the near present. Time varying estimates of potential prefishery recruitment of adult Thompson River steelhead (thick line) and observed spawning stock abundance (thin line).

Over this time period, estimates of potential prefishery recruitment of adult steelhead declines from 3000-4000 range to a minimum observed in the 2006 brood year of 830. It is noteworthy that productivity and abundance of adult steelhead immediately prior to the monitoring time frame was

higher, but cannot be quantified directly due to data limitations. The 2006 brood year corresponds for the most part with the 2010 fishing season as the majority of Thompson River steelhead return from sea part way through their 4th year of life, spawning as they approach 5 years of age. In that year, the prefishery abundance estimate of Thompson River steelhead is 580 of which 520 spawned, which is a record low. An estimated 58% (300 steelhead) spawned in the Nicola watershed that year. The potential prefishery recruitment of Thompson River adult steelhead increases somewhat since the 2006 brood year. The most recent estimate of potential prefishery recruitment is 1500 and is for the 2010 brood year. Returns from the 2010 brood year will mostly be observed in 2015 as the abundance of 5 year old spawners. This latest recruitment estimate implies that the most recent abundance potential for Nicola steelhead is approximately 930 (62% of the latest potential for the Thompson aggregate of 1500). To date, productivity trends of Thompson steelhead are significantly auto-correlated over 3 year time lags suggesting that the estimation of prefishery return abundance 1-3 years into the future are somewhat informative. There is little basis at the present time for estimation of potential recruitment beyond 3 years into the future and it is noteworthy that productivity has not been stable since the beginning of the monitoring time frame.

The average potential recruitment over the entire monitoring time frame to date (brood year 1984 to 2010) is 2400 steelhead for the Thompson as a whole which suggests that average potential prefishery recruitment for the Nicola has been 1500 over this time period. Decker et al. (2015) estimate potential recruitment for Nicola of 1100 adult steelhead based on a shorter and more recent monitoring time frame (brood year 2000 to 2010) and based on the observed abundance of parr in relation to the spawner abundance of steelhead (Figure 2). It is reasonable that potential recruitment based on the more recent time frame based on parr abundance is lower than the estimate based on the longer monitoring time frame for adult steelhead because the observed productivity and abundance has declined over the monitoring time frame. Applying the parr results over the longer and more comparable time frame from brood year 1984 to 2011, Decker et al. (2015) estimate that average potential recruitment of Thompson steelhead is 2500 which compares favourably with the estimate of 2400 based adult recruitment patterns. Similarly, the potential recruitment for the Nicola steelhead based on parr results applied over the 1984 to 2011 time period is 1800 which is similar to the estimate of 1500 based on adult recruitment patterns.

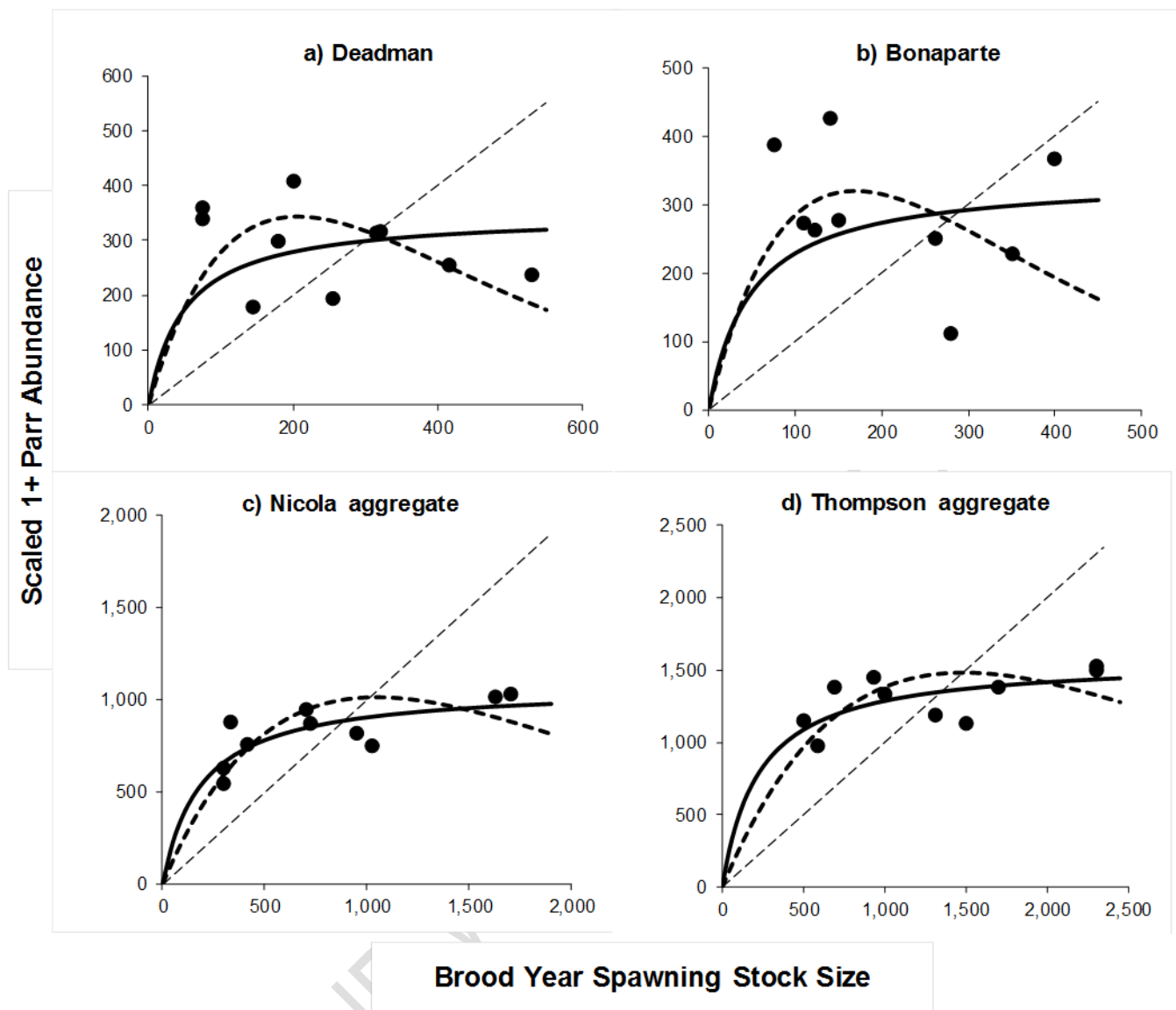


Figure 2. Beverton-Holt (solid line) and Ricker (stippled line) stock-recruitment curves fit to brood spawner escapements and age-1+ steelhead parr standing stock scaled to equivalent adult returns (see Section 2.9) for the a) Deadman, b) Bonaparte, c) Nicola aggregate (including Nicola, Coldwater, Spius, and reach T3 of the Thompson River), and d) Thompson aggregate stocks; the latter represents the combined totals for the entire study area. The dashed diagonal line is the 1:1 replacement line (from Decker et al., in prep).

### Deadman

The steelhead bearing waters of the Deadman watershed include the Deadman River mainstem from Mowich Lake downstream which is 36 stream km in length, the lower most 13 km of Criss Creek and the Thompson River mainstem. Spawning occurs within the Deadman watershed while juvenile rearing occurs in the Deadman watershed as well as the Thompson mainstem. The length of the Thompson River from in the vicinity of the Deadman River and downstream, from Kamloops Lake to the confluence with the Bonaparte River, is 40 km. The proportion of Thompson River steelhead spawner abundance in the Deadman watershed averages 21% over a 29 year monitoring time frame beginning in 1987 (SD=9%). The average potential recruitment over the entire monitoring time frame to date (brood year 1984 to 2010) is 2400 steelhead for the Thompson as a whole which suggests that

average potential prefishery recruitment for the Deadman has been 500 over this time period. Decker et al. (2015) estimate potential recruitment for Deadman of 350 adult steelhead based on a shorter and more recent monitoring time frame (brood year 2000 to 2010) and based on the observed abundance of parr in relation to the spawner abundance of steelhead (Figure 2). It is reasonable that potential recruitment based on the more recent time frame based on parr abundance is lower than the estimate based on the longer monitoring time frame for adult steelhead because the observed productivity and abundance has declined over the monitoring time frame.

## **Bonaparte**

The steelhead bearing waters of the Bonaparte watershed include the Bonaparte River mainstem from Young Lake downstream which is 100 stream km in length, the lower 1.4 km of Loon Creek, and the Thompson River mainstem. Spawning occurs within the Bonaparte watershed while juvenile rearing occurs in the Bonaparte watershed as well as in the Thompson mainstem. The length of the Thompson River from the Bonaparte River confluence to the Nicola River confluence is 43 km. The proportion of Thompson River steelhead spawner abundance in the Bonaparte watershed averages 17% over a 29 year monitoring time frame beginning in 1987 (SD=5%). The average potential recruitment over the entire monitoring time frame to date (brood year 1984 to 2010) is 2400 steelhead for the Thompson as a whole which suggests that average potential prefishery recruitment for the Bonaparte has been 400 over this time period. Decker et al. (2015) estimate potential recruitment for Bonaparte of 340 adult steelhead based on a shorter and more recent monitoring time frame (brood year 2000 to 2010) and based on the observed abundance of parr in relation to the spawner abundance of steelhead (Figure 2). It is reasonable that potential recruitment based on the more recent time frame based on parr abundance is lower than the estimate based on the longer monitoring time frame for adult steelhead because the observed productivity and abundance has declined over the monitoring time frame.

## **References:**

Decker, A.S, Hagen, J. and Bison, R.G. 2015. Annual distribution and abundance of steelhead *Oncorhynchus mykiss* parr in the lower Thompson River basin in relation to spawner abundance and habitat characteristics, 2001-2012. BC Ministry of Natural Resource Operations, Fish & Wildlife Branch, Kamloops, BC. 67 p.

Johnston, N.T. 2013. Management reference points for the Thompson and Chilcotin late summer-run steelhead (*Oncorhynchus mykiss*) stock aggregates. BC Fish & Wildlife Branch, UBC, Vancouver, BC. 27p.

## **Appendix 5 - Coarse Filter Evaluation, 3 June to 25 July 2016**

Recognizing that there are likely no quantitative data to support the evaluation of opportunities, a proposed modified approach has been taken from the Chinook Assessment process building on the “qualitative, expert elicitation approach” to utilize the expertise in the TSWG.

Purpose is to sort issues with high likelihood of real outcomes for steelhead, and with a short-term response time.

Things to consider when using the expert elicitation approach:

- Use your gut reaction; over-analyzing things often makes you second-guess your original instinct
- Real-world outcomes are intended for steelhead; not just policies, regulations that sound good
- Do not apply today’s resource constraints when considering whether we\* can influence an issue; think more about what is in the realm of the possible
- This is a coarse filter approach; there will be plenty of opportunity later to assess the detailed opportunities

The following questions are to be asked and input sought from individuals at the next meeting. Each individual’s input will be captured; consensus is not necessary.

1. For each ISSUE, what is the degree to which we\* can influence this issue in regards to real-world outcomes? (L, M, H) (*\*We is intended here to be either fisheries managers, land and resource managers, an order of government (First Nations, provincial, federal), or more generally, human populations*)
  - a. If it can be influenced, what is the time frame? (less than 1 year; 1-5 years; 5-10 years; >10 years)
2. Where resource management OPPORTUNITIES have been identified:
  - a. What is the likelihood of a positive, real-world outcome for steelhead? (L, M, H)
  - b. What is the timeframe for positive, real-world outcome for steelhead? (immediate; less than 1 year; 1-5 years; >5 years)
  - c. What level of human resources are needed to implement the option? (L, M, H)
  - d. What level of financial resources are needed to implement the option? (L, M, H)
  - e. What is the degree, level or severity of implications to other sectors? (L, M, H)

***The resource management opportunities in bold italics were deemed to have a high likelihood of leading to a positive real outcome steelhead, in a reasonable time frame.***



AREA: Thompson River System

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
Physical habitat degradation	M (n=4) H (n=3)	5-10yr (n=5) >10yr (n=2)	<p><i>Restore degraded habitats - in stream and riparian</i></p> <p>Focus restoration on “riffles and rapids downstream of Spius Creek [that] are more typical of steelhead habitat”</p> <p><i>Enhanced riparian management upstream</i></p> <p><i>FSW designations under FRPA</i></p> <p>Sensitive stream designation s.6 Fish Protection Act</p> <p>Being conscious of hydrograph and forestry activities - watershed assessment and management</p> <p>Re-fortifying riparian areas, stabilizing banks,</p>	<p>L to create the specific habitat, H n=6</p> <p>Flesh out details later</p> <p>H (n=7)</p> <p>H (n=7)</p> <p>?</p> <p>Connected to enhanced riparian mgmt.</p> <p>Sub-bullet under restoration</p>	<p>&gt;5yr (n=7)</p> <p>&lt;1yr (n=2), 1-5yr (n=4), &gt;5yr (n=1)</p> <p>&gt;5yr (n=7)</p> <p>Connected...</p>	<p>M (n=4), H (n=3)</p> <p>L (n=7)</p> <p>L (n=7)</p>	<p>H (n=6) L for indirect (n=1)</p> <p>L (n=6), M (n=1)</p> <p>L (n=7)</p>	<p>Not allowing status quo to continue - therefore H in terms changes in practice; some L as it will benefit them. RANGE</p> <p>Forest industry M-H, grazing M-H</p> <p>Forestry and grazing; M-H</p>

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
			restoring processes and natural erosion rates  <i>Identify sediment sources upstream, and reduce unnatural sediment input upstream;</i> substrate will clean out naturally over a few seasons	above  Part of watershed assessment  H (n=7)	>5yr (n=7)	M (n=7)	M to identify (n=7) H to implement (n=7)	Depends
Water quantity	L (n=3), M (n=4)	1-5yr (n=6) 5-10yr (n=1)  1-5yr in Coldwater; longer for forestry changes	Water Sustainability Plans (WSA) - could be requested to be initiated on watersheds with water quantity concerns; need to clarify who can initiate this  Water licence reviews - under the new WSA, reviews of existing licences can occur after 30 years  <i>Restrict water licence withdrawals from July-Sept</i> to protect emerging fry under Fish Protection Act	Don't know enough yet...        H (n=7), depends on the year and drought	Immediate for all	H if drought plan in place	M (n=7)	H for agriculture, municipalities, water purveyors (n=7)

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
			<p>Water storage or diversion in new locations - instream vs dams are 2 different options. Structures already exist - modify or fine-tune to meet fish needs?</p> <p>Management of existing dams - Bonaparte, Nicola, Deadman - manage flows better</p> <p><b>Restrict over-use of water in rearing tributaries</b> and local government and water purveyors (KDFGA 25jan16 letter, 4feb16 email)</p> <p>Sensitive stream designation s.6 Fish Protection Act?</p> <p><b>Better monitoring by water officers of actual vs. licensed amounts</b></p>	<p>Coldwater, Spius, Skuhun, Criss or mainstem tributaries M (n=3), H (n=1)</p> <p>L (n=4) uncertain</p> <p>See above for ag (H n=7)</p> <p>Local Gov and water purveyors H (n=7) Coldwater, Bonaparte?</p> <p>Unknown</p> <p>H (n=4) but depends - likely water purveyors know details, ag may not</p>	<p>&lt;1yr (n=4)</p> <p>&lt;1yr if excess water available (L=4)</p> <p>Immediate</p> <p>Immediate</p> <p>1-5 yr and depends (n=4)</p>	<p>H (n=4)</p> <p>L (n=4)</p> <p>Drought response plan to inform</p> <p>M (n=4)</p> <p>H (n=4)</p>	<p>H (n=4)</p> <p>L (n=4)</p> <p>L-M (n=4)</p> <p>H (n=4)</p>	<p>H if storage locations in low elevation; could be benefits for other sectors</p> <p>L (n=3); M (n=1) any tweaking of overallocated system will have impacts - depends H on Nicola than others</p> <p>H (n=4)</p> <p>Fish Protection Act now Riparian Areas Regulation</p> <p>Don't know - depends on actual vs. licensed</p>

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
Water temperature	M (n=5) H (n=2)	1-5yr (n=2) 5-10yr (n=3) >10yr (n=2)	Identify cold water refugia and manage appropriately (i.e., don't license groundwater wells in these areas; use in the triage of Fish Protection orders and shut down licenses from these areas first; target for future mitigation such as fencing off cattle)	M (n=3), H (n=1)	>5yr (n=4) to identify and manage  Once we have identified them, could be <1yr impacts	H (n=4)	H (n=4)	Depends if your licence or property is affected  M (n=4)
			<b>Riparian shading</b>	H (n=4), Localized benefits (i.e., Coldwater - Kingsvale to Lower Nicola; Bonaparte; Deadman)	1-5yr (n=3), 5-10yr (n=1)	H (n=4)	H (n=4)	H (n=4) - takes up land to establish
Regional and global weather trends	L (n=7) - lower than low	>100yr (n=7)	Adults less susceptible to high temperatures since they migrate in fall  Address juvenile and fry stages, in which steelhead are more susceptible to high temperatures and associated impacts	To be addressed by restoration, shading, water quantity				

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
Risk of life history shift from anadromous to non-anadromous	L (n=2) M (n=5)	5-10yr (n=4) >10yr (n=3)	Conserve steelhead spawner abundance to conserve rebuilding potential, conserve rainbow trout to insure against possible extinction of anadromous population.	Address through fishing mortality; reduce rainbow trout production...				
Fishing effects - sport	H (n=7)	<1yr (n=3) 1-5 yr (n=4)	Restrict all sport fishing (other fishing proceeds) for several life cycles (KDFGA, 25jan16 letter)  Restrict timing of ALL sport salmon fishing, in-shore, Fraser, Thompson	Only if it influenced other fisheries  L (n=4)  No guarantee - if ocean survival remains same - M (n=1), H (n=3)	<1yr on any steelhead there; real outcomes >5yr; 1-5yr (n=1)  5-10yr since more to close, more processes; 1-5yr (n=1)	L (n=4)  M (n=3), H (n=1)	L (n=4)  M (n=3), H (n=1)	H (n=4)  H (n=4)
Fishing effects - First Nations	H (n=7)	<1yr (n=4) 1-5 yr (n=3)	Monitor and regulate FN fisheries targeting rainbow and steelhead  Elder influence  Catch rainbow trout, release steelhead					

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
Gill netting on Thompson River (certain years, 2 of 4 for sockeye for Secwepemc; every year for Nlaka'pamux)	H (n=7)	<1yr (n=5) 1-5 yr (n=2)	Ensure all intercept fisheries are selective (BCFDF, 4feb16 email)	L (n=4)	Immediate	L (n=4)	L (n=4)	L (n=3), M (n=1)
General population decline of wild steelhead	M (n=4) H (n=3)	5-10yr (n=5) >10yr (n=2)	<i>List as endangered species under Species at Risk Act</i>	H (n=4)	Immediate to <1yr (n=4) (likely takes 3 years for the process)	H (n=3)	H (n=3)	H (n=3) - more Fraser and marine chum than sockeye or pink
Restoration of abundance of steelhead	M (n=4) H (n=3)	5-10yr (n=4) >10yr (n=3)	Hatchery augmentation to provide fishing opportunities and protein/sustenance opportunities for First Nations, sport - despite current provincial policy and steelhead framework	Limited by parr habitat - L (n=3) Collateral damage to other stocks (i.e., Chilcotin, West Fraser steelhead)	At whim of marine survival - if it stays the same, 5 yr (n=3)	H (n=3)	H (n=3)	M (n=3) from conservation sectors and some sport fishing sectors

AREA: Fraser River

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities?	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
Fishing mortality - commercial by-catch, test fisheries, FSC	H (n=7)	<1yr (n=4) 1-5yr (n=3)	<p><i>Adjust timing of Fraser River fisheries - generally</i></p> <p><i>Adjust areas of Fraser River fisheries - generally (migration corridors, off-corridor)</i></p> <p><i>Manage the gear to reduce by-catch of steelhead - keep out of mixed-species corridors</i></p> <p>Provide financial assistance or incentives to those seeking to change fishing gears and methods.</p> <p>Conduct test fishing projects in off-corridor areas to find new off-corridor fishing area.</p> <p>Relocate or reduce</p>	<p>H (n=4), M (n=1)</p> <p>H (n=5)</p> <p>H (n=5)</p> <p>M - depends on uptake, and on fishery</p>	<p>Immediate (n=5)</p> <p>Immediate (n=5)</p> <p>Immediate (n=5)</p>	<p>L for test fisheries (n=5)</p> <p>H for FSC fisheries DFO staff, L for FNs</p> <p>L for commercial DFO</p> <p>H depends on who rolls it out</p>	<p>L for test fisheries (n=5)</p> <p>H for FSC fisheries DFO staff</p> <p>L for commercial DFO</p> <p>H depends on who funding</p>	Variable - not assessed in detail

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities?	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
			<p>enhancement locations of target species to make more opportunity in off-corridor areas for the more conventional gear types and method.</p> <p>Adjust timing and/or area of chum fishery to Nov 1 to minimize interception with steelhead migration (S. Rice, 12nov15 forum; Kamloops Fly Fishers' letter 27nov15)</p> <p>Ensure all intercept fisheries are selective (beach seines, fish wheels) (BCFDF, 4feb16 email)</p>	<p>M (n=4)</p> <p>Commercial gillnet timing: L-M (n=4)</p> <p>Area: need more info</p> <p>Consistent with gear piece above</p>	<p>5-10 years (n=4) to establish, one cycle of production</p> <p>Immediate by timing and area, excluding time for consultation - H (n=4)</p>			



Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities?	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
Fishing mortality - sport fishing	H (n=7)	<1yr (n=7)	Restrict all sport salmon fishing for several life cycles (KDFGA, 25jan16 letter)  Creel census and assessment program (BCFDF, 4feb16 email)	No consequence as it would encourage illegal, "remove eyes" - L (n=4)  DFO creel should include info on steelhead	Immediate, could be a negative  Close the data gap			
Water quality/pollution in mouth of Fraser River	H (n=7)	>10yr (n=7)						
Jurisdictional issues, collaboration	H (n=7)	1-5yr (n=2) 5-10yr (n=5)	<b>Management planning and co-management, exploring innovation in fishing practices and sustainability of fisheries</b> (separate local vs. regional/national level, policy)	H (n=4)	Varies on the issue, 1-5yr (n=3), 5-10yr (n=2)			
Data and uncertainty	H (n=7)	1-5yr (n=7)						

**AREA: In-shore Ocean Fishing Areas**

Issue	Degree to which we can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities?	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
<p>Fishing mortality:</p> <ul style="list-style-type: none"> <li>▪ Southeast Alaska</li> <li>▪ Johnston Strait</li> <li>▪ Area 29 (mouth of Fraser River)</li> <li>▪ Area 21(SW coast of Vancouver Island)</li> <li>▪ Area 20 (Canadian side of Juan de Fuca Strait)</li> <li>▪ US Areas 4B, 5, 6C (US side of Juan de Fuca Strait)</li> <li>▪ US Area 77 (North Puget Sound)</li> </ul>	<p>H (n=7)</p>	<p>1-5yr (n=7)</p>	<p><i>Adjust timing of fisheries - generally</i></p> <p><i>Adjust areas of fisheries - generally (migration corridors, off-corridor)</i></p> <p><i>Manage the gear to reduce by-catch of steelhead - keep out of mixed-species corridors</i></p> <p>Ensure all intercept fisheries are selective (BCFDF, 4feb16 email)</p> <p>Move the more harmful gear and methods away from the mixed species corridors to off-corridor areas. Make better use of the spatial differences between the target species and the bycatch species.</p> <p>Restrict fishing to</p>	<p>H (n=4) depends on migration route (Johnston Strait purse seine fishery has biggest impact?)</p> <p>H (n=4)</p> <p>H (n=4)</p>	<p>Immediate (n=4) Uncertainty around which migration route</p> <p>Immediate (n=4)</p> <p>Immediate (n=4)</p>			

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities?	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
			<p>the most selective gears and methods within the mixed species migration corridors and times.</p> <p>Provide financial assistance to those seeking to change fishing gears and methods.</p> <p>Conduct test fishing projects in off-corridor areas.</p> <p>Relocate enhancement locations of target species to make more opportunity in off-corridor areas for the more conventional gear types and method.</p> <p>Stock identification of samples of steelhead catch from the southeast Alaska salmon fishery. Address through Pacific Salmon Treaty?</p>					
Ocean conditions	L (n=7)	>>10yr (n=7)	None identified at this time.					

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities?	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
Changes in species composition in the ocean	L (n=2), M (n=5)	>10yr (n=7)	Not determined to date					
Predation by numerous predators	L (n=2) M (n=4) H (n=1)	1-5yr (n=1) 5-10yr (n=4) >10yr (n=2)	Not determined to date					
Adequacy of protection windows for steelhead migration	H (n=7)	<1yr (n=2) 1-5yr (n=5)	Restrict allowable gear and methods according to steelhead protection windows within the steelhead migration corridor and times.  Increase opportunity for more traditional non-selective gear and methods					
Jurisdictional issues, collaboration	H (n=7)	1-5yr (n=2) 5-10yr (n=5)	<b>Management planning and co-management, exploring innovation in fishing practices and sustainability of fisheries</b> (separate local vs. regional/national level, policy)					
Data and uncertainty	H (n=7)	1-5yr (n=7)	Improve spatial and temporal resolution of southern BC chum and pink migration routes, abundance,	H (n=4)	Varies on the issue, 1-5yr (n=3), 5-10yr (n=2)			

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities?	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
			timing and status. Information will serve to better understand opportunity to relocate non-selective gear and methods to off-mixed species corridor areas.					

DRAFT AND WITHOUT PREJUDICE

AREA: Off-shore

Issue	Degree to which we* can influence this issue in regards to real-world outcomes? (L, M, H)	Time frame of influence? (<1yr, 1-5yrs, 5-10yr, >10yr)	Resource management opportunities?	Likelihood of a positive effect of real outcomes for steelhead? (L, M, H)	Time frame of real outcomes? (immediate, <1yr, 1-5yr, >5yr)	Level of human resources needed to implement the option? (L, M, H)	Level of financial resources needed to implement the option? (L, M, H)	Degree, level or severity of implications to other sectors? (L, M, H)
Ocean conditions	L (n=7)	>>10yr (n=7)	Appear limited					
Global climate and ocean cycles	L (n=7)	>>10yr (n=7)	These climactic-oceanographic processes are outside the influence of fisheries management					
Hatcheries of steelhead and other species, other Pacific countries	H (n=7)	5-10yr (n=7)						
Management of wild steelhead and other species in other Pacific countries	H (n=7)	5-10yr (n=7)						