

BULL TROUT HABITAT IN THE BABINE WATERSHED
An estimation of the extent of habitat and the amount of habitat
protected in the various Management Zones
(Project 2008–3)

Final Report



Prepared for:



Babine Watershed Monitoring Trust
c/o 1090 Main Street, PO Box 847,
Smithers, BC V0J 2N0

Prepared by:



Ralph Kossman, R.P.Bio.
McElhanney Consulting Services Ltd.
3907-4th Avenue, PO Box 787,
Smithers, BC V0J 2N0

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Appendices

- Appendix I - Data Analyses Results (CD attached)
- Appendix II - Assorted Bull Trout Notes

1.0 Introduction

Bull Trout, *Salvelinus confluentus*, a species of concern in BC, and designated as “blue-listed” by the BC Conservation Data Centre have been identified as a monitoring priority for the Babine Watershed Monitoring Trust (BWMT). The BWMT Monitoring Framework is designed to determine the effectiveness of strategies (and associated indicators or targets) set out in the land-use plans for the Babine Watershed (Price and Daust 2005). The intention of the BWMT is to continually update the framework with new data (as it becomes available) and subsequently reassess monitoring priorities.

The objective of the project is to estimate the amount of potential, probable and known bull trout habitat within the various validated management zones (e.g. Protected Areas, Special Management Zone, Core Ecosystems, Landscape Riparian Corridors, etc.) of the BWMT area. Due to a limited budget, BWMT has recommended a GIS map-based approach.

The information gained from this project will be used to reduce uncertainty for the preliminary risk curves created in 2005. Additionally, the results of this project will be used to update the monitoring framework, identify knowledge gaps, and to perhaps identify indicators that could be monitored to evaluate the effectiveness of the objectives in the land-use plans that provide protection to bull trout populations in the Babine River watershed.

2.0 Background

1:20,000 Reconnaissance Fish and Fish Habitat Inventory mapping was completed to Resources Inventory Committee (RIC) standards for the Bulkley TSA by Triton Environmental Consultants Ltd. through PIR and FRBC between approximately 1996 and 1998. Despite this inventory, the extent of bull trout distribution within the Babine watershed is still largely unknown. This may stem from the lack of differentiation between bull trout and Dolly Varden in these earlier inventories. Juveniles of both species are very similar morphologically and both species are “blue-listed” by the BC Conservation Data Centre. From the licencees’ point of view and for the Forest Practices Code, fish presence and absence along with stream width, were the two essential pieces of data necessary to meet management requirements when working around streams. More recently, from 2000 to 2002, inventory work carried out by the Ministry of Water, Land and Air Protection (MWLAP) and Triton Environmental Consultants Ltd. in the Shelagyote River watershed, a major tributary to the middle Babine River, has identified known bull trout staging, spawning, overwintering and rearing habitat. As this work was limited to the Shelagyote, bull trout distributions in the remainder of the Babine River watershed are still not well known.

No less than six government approved land-use plans or higher level plans contain goals or objectives that could provide for the protection of bull trout within the BWMT area. These plans include:

1. Xsu gwin lik’l’inswx: West Babine Sustainable Resource Management Plan (March 2004).
2. Babine Landscape Unit Plan (Sept 1999)

3. Nilkitkwa Landscape Unit Plan (Sept 1999)
4. Bulkley Land and Resource Management Plan (Dec 2000)
5. Kispiox Land and Resource Management Plan (April 1996, amended March 2001)
6. MANAGEMENT DIRECTION STATEMENT for Babine River Corridor Park (Sept 2000)

The West Babine Landscape Unit is not included in the landscape units covered by the Kispiox LRMP Higher Level Plan Objectives for Biodiversity, Visual Quality and Wildlife (January 2006). Land use in the West Babine Landscape Unit is covered by **Xsu gwin lik'inswx: West Babine Sustainable Resource Management Plan** (March 2004).

Of the six land-use plans, only the *Kispiox LRMP* and *West Babine SRMP* (Secⁿ. 3.1.2.5, pp32) contain wording that explicitly states a management direction for bull trout. This direction was originally contained in the Kispiox LRMP and is as follows:

- to maintain or increase populations of bull trout; and
- to protect sensitive populations and habitats within stream reaches having identified bull trout populations

The West Babine Sustainable Resource Management Plan (SRMP) includes an objective to conserve critical bull trout habitat in the Shelagyote River and its tributaries. As the Shelagyote River and its tributaries are largely contained within the Atna/Shelagyote Special Management Zone (SMZ); a no resource development zone (except for mineral exploration); this objective is easy to monitor. The West Babine SRMP notes that many habitats are either buffered by core ecosystems or riparian corridors, or are in the Atna/Shelagyote SMZ. The Bulkley LUPs do not include any objectives for bull trout. The Babine River Corridor Park Management Direction Statement (MDS) includes objectives to “protect the park’s fish”.

Based on information discovered from the Shelagyote River Bull Trout Inventory work, a single objective for bull trout was identified in the West Babine SRMP: “to conserve critical bull trout habitat in the Shelagyote River and its tributaries¹”. The other valid land-use plans governing the Babine River watershed implicitly provide management direction and protection for bull trout through other objectives and goals.

In January of 2005, preliminary risk curves were developed for the BWMT based on two objectives identified in the land-use plans: to maintain fish habitat, and to maintain bull trout. These objectives were established to achieve the overall goal of maintaining fish populations in the Babine Watershed. At the time the risk curves were developed, the only measureable indicator identified in the land-use plans was the distance of known bull trout staging areas from a proposed bridge crossing site on the Shelagyote River. Much of the uncertainty in the preliminary risk curves is a direct result of a lack of knowledge of bull trout distributions and habitat in the Babine River watershed. Without greater knowledge of bull trout distributions and habitat, it is extremely difficult to identify measureable objectives and indicators by which to conduct effectiveness evaluations.

¹ **Xsu gwin lik'inswx: West Babine Sustainable Resource Management Plan** (March 2004), Table.8, pp32.

3.0 Methods

To achieve the desired outcomes of this project, a number of preliminary tasks needed to be completed to get to the point where the analyses could be conducted. Two GIS analyses were proposed; the first to determine the amount of known and probable bull trout **presence** classes protected in the various valid management zones that govern resource extraction in the Babine River watershed. The second analysis was to determine the amount of known and probable bull trout **habitat importance** classes protected in the various management zones.

The first task was to conduct an overview review of relevant bull trout information and literature. This included a review of the Ministry of Environment's (MOE) stream files for the Babine River watershed and other sources such as the reports for the Shelagyote bull trout inventory work. The second task, which was essentially a continuation of the review of relevant information and literature, was to query the Babine River fish lodges, MoE staff, First Nations and other sources with knowledge of the Babine River. Some of the results of the reviews and queries are noted in point form in Appendix II. Following these two "information gathering" steps, the next task was to prepare an attribute table. Information obtained from the literature reviews and queries that could be mapped was entered into a spread sheet which was then linked to points on the base map(s) of the watershed area. This allowed the information to be included on the maps to assist in refining the probabilities of bull trout presence and habitat importance.

The fourth task involved obtaining all the available fish inventory data for the Babine River watershed area from sources such as the Fisheries Data Inventory System (FDIS) and Fisheries Information Summary System (FISS). This data was added as a GIS map layer. A 1:50K scale base map was used for this project rather than the 1:20K TRIM base. Data sources for the project are listed in Table 1. Plotting this information on a map of the watershed area was one of the first steps in producing a map of known and probable bull trout presence. It also provided a quick visual reference of the lack of known bull trout presence. Other than the Shelagyote River watershed, which had seen a concerted effort to identify bull trout presence and habitat², there were very few other known bull trout observations in the BWMT watershed.

The other information required to run the two analyses was a list of the valid management zones. The relevant land-use plans were reviewed, a list of management zones created, and each zone evaluated for the ability to provide protection to bull trout populations (see Table 2). After identifying the management zones that would provide some protection to bull trout, the management zones were rated for the level of protection they could provide. A rating of 1 provided the highest protection while the lowest protection was rated 8th (See Table 4.). As an example, the Babine River Corridor Park was rated a 1 while Grizzly Bear MU2 – Nichyeskwa South was rated an 8. The list of management zones in Table 4 were used as the valid management zones against which to analyse the Potential of BT Presence classes (first GIS analysis) and the BT Habitat Importance classes (second GIS analysis).

² Reconnaissance (1:20,000) Fish and Fish Habitat Inventory of the Shelagyote River (Shelagyote River Planning Area) WSC 480-069500 to WSC 480-195700, Attachment VII, Bull Trout Inventory.

Table 1. Meta-data description and source

Description	Source
Base features built on enhanced geotiff raster files	Prov of BC/BMGS
Babine watershed boundary	Prov of BC, Babine Watershed Monitoring Trust
Observed fish species	Prov of BC, MOE
Historical fish distribution	Prov of BC, MOE
Fish obstacles	Prov of BC, MOE
Lakes identified as critical fish habitat	Triton Env. Consultants Ltd.
Streams identified as critical fish habitat	Triton Env. Consultants Ltd.
BC Macro reaches	Prov of BC, MOE
dki Core Ecosystems and Riparian corridors	Prov of BC, MOF/RNI/DSS
dki Hi-value Grizzly Bear Habitat	Prov of BC, MOF/RNI/DSS
dki Special Management Zones	Prov of BC, MOF/RNI/DSS
dki Resource Management Plan Zones	Prov of BC, MOF/RNI/DSS
dbu LRMP Management Zones	Prov of BC, MOF/RNI/DSS

(provided by W. Elliott, Azimuth Geo-Spatial).

In validating the management zones, it was assumed that bull trout could be protected in three ways; 1) by eliminating or reducing un-natural sources of mortality, 2) maintaining water quality, and 3) by maintaining fish access. The provincial fishing regulations do not protect bull trout. The daily catch quota for bull trout in Region 6 is 3, and the possession limit is 2 daily quotas³. Bull trout are highly susceptible to mortality through fishing due to their aggressive feeding behaviour; therefore any management zone that restricts access to known or probable bull trout streams will provide a measure of protection from angling mortality. Likewise, any management zones that have reduced or no timber harvesting as an objective, should provide better water quality and maintain fish access than areas without these objectives. This was based on the assumption that an increase in disturbance to the landbase in the watershed would result in increased sediment inputs to watercourses and potentially increase fish passage obstacles (even where best management practices have been followed).

3.1 Critical Stream Reach Inventories

The first map produced (Map 1) summarized the Critical Stream Reach Inventories completed for the Bulkley and Kispiox TSAs by Triton Environmental. This map was an important additional information layer in developing the Known and Potential Bull Trout Presence map (Map 2) and the Bull Trout Habitat Importance map (Map 3).

³ BC Freshwater Fishing Regulations Synopsis 2009-2011, Region 6, pg 59.

Table 2. Management Zones from the various Land-Use Plans

Management Zone Source	Management Zone	Objective	Indicator	Threshold/ Measure	Management Strategies	Management Implications for BT	Management Zone valid ? (& relevant to BT)
Xsu gwin lik'l'inswx: West Babine Sustainable Resource Management Plan (March 2004)	Protected Areas (Babine River Provincial Park)	Park, no development. Natural disturbance only.	None identified.	None identified.		Full protection from harvesting <u>but</u> still fishing pressure from fishing lodges and from general public at areas accessible from road	Yes
	Atna Shelagyote Special Management Zone	Ecological Backcountry Tourism.	None identified.	None identified.	No commercial logging or road building.	Full protection from harvesting, fishing only at lowest reach of Shelagyote from Silver Hilton (BT not target species, prob. only incidental catch)	Yes
		To conserve critical bull trout habitat in the Shelagyote River and its tributaries.(Sec ^a . 3.1.2.5, pp 32)	Distance of permanent access structures relative to known bull trout staging areas.	No permanent bridge within 750m of known bull trout staging areas on the Shelagyote River			
	Core Ecosystems	Biodiversity: Old Forest			No logging or road building (Harvesting timber in CE only when necessary for forest health or isolation of THLB)	Good protection	Yes
	Landscape Riparian corridors	Biodiversity: Connectivity			Logging restricted, no road building	Mod. Protection	Yes
	Babine River SMZ	Wildlife (Moose, grizzly bear) Wilderness			No permanent motorized access, winter harvest only, openings < 15 ha in size	Mod. Protection	Yes
	Shelagyote/Babine Tourism Node	Tourism, Visual Quality, High value Grizzly Bear Habitat			No logging. Access control for road.	Full protection from harvesting,	Yes
	High Value Grizzly Bear Habitat	Protect/maintain grizzly bear habitat			Restricted logging and road building adjacent to critical habitats	Good-Mod. Protection	Yes
	Shenismike Corridor	Wildlife (Goat, grizzly bear, Grizzly Drop)			No roads.	Mod. Protection No access at present except by heli or water (raft or kayak)	Yes
	Berry Management Areas	Botanical Forest Products			Harvest and silviculture practices that promote berry growth.	Little to No Protection	No

Management Zone Source	Management Zone	Objective	Indicator	Threshold/ Measure	Management Strategies	Management Implications for BT	Management Zone valid ? (& relevant to BT)
Xsu gwin lik'l'inswx: West Babine Sustainable Resource Management Plan (March 2004)	Pine Mushroom Habitat	Botanical Forest Products: pine mushrooms			Maintaining 60% of habitat > 80 years old.	Little to No Protection	No
	Visual Quality Objective: Retention	Tourism: Visual Aesthetics			Alterations due to logging are not visually apparent.	Little to No Protection	No
	Visual Quality Objective: Partial Retention	Tourism: Visual Aesthetics			Alterations due to logging remain visually subordinate to the characteristic landscape and blend with the dominant landscape elements	Little to No Protection	No
	Visual Quality Objective: Modification	Tourism: Visual Aesthetics			Alterations due to logging borrow from the natural line and form and are comparable to natural occurrences.	Little to No Protection	No
	Integrated Management Area	All values. (includes resource development)			Resource development must follow management direction from the Forest and Range Practices Act and from the Biodiversity Seral Stage, Patch Size objectives and water quality	No protection except under FRPA. Includes <i>Managing Identified Wildlife, RMZs based on Stream classif^c, etc.</i>	No
	Indian Reserve					No protection	No

Management Zone Source	Management Zone	Objective	Indicator	Threshold/ Measure	Management Strategies	Management Implications for BT	Management Zone valid ? (& relevant to BT)
Babine Landscape Unit Plan (Sept 1999)	Protected Areas (Babine River Provincial Park)	Park, no development. Natural disturbance only.				Full protection from harvesting <u>but</u> still fishing pressure from fishing lodges and from general public at areas accessible from road	Yes
	Babine River SMZ (SMZ 2)	Buffer the park boundary.				Mod. Protection	Yes
	IRMZ	All values. (includes resource development)				No protection except under FRPA.	No
	Babine River Ecosystem Network	Biodiversity: Connectivity					Yes
	Core Ecosystem	Biodiversity: Old Forest			Harvesting timber in CE only when necessary for forest health.		Yes
	Landscape Corridors	Biodiversity: Connectivity					Yes
	Enhanced Timber Zone	Intensive management of the timber resource.				No protection except under FRPA. Includes <i>Managing Identified Wildlife, RMZs based on Stream classif^e. etc.</i>	No
	Grizzly Bear (high value)	Protect/maintain grizzly bear habitat			Restricted logging and road building adjacent to critical habitats. Access control points.	Good-Mod. Protection	Yes
	Goat	Protect/maintain mountain goat habitat					No
	Indian Reserve						No
Management Zone Source	Management Zone	Objective	Indicator	Threshold/ Measure	Management Strategies	Management Implications for BT	Management Zone valid ? (& relevant to BT)
Nilkitkwa Landscape Unit Plan (Sept 1999)	IRM	All values. (includes resource development)				No protection except under FRPA.	No
	Barbeau (SMZ 1)	Maintain watershed in a primitive state to protect goat, grizzly bear etc.				Good Protection. No development at present.	Yes
	Landscape Corridors	Biodiversity: Connectivity					Yes
	Enhanced Timber Zone	Intensive management of the timber resource.				No protection except under FRPA	No
	Goat	Protect/maintain mountain goat habitat				No protection	No
	Grizzly Bear (high value)	Protect/maintain grizzly bear habitat			Restricted logging and road building adjacent to critical habitats. Access control points.	Good-Mod. Protection	Yes

Management Zone Source	Management Zone	Objective	Indicator	Threshold/ Measure	Management Strategies	Management Implications for BT	Management Zone valid ? (& relevant to BT)
Bulkley LRMP Objectives set by Government (Sept 2006)	Protected Areas (Babine River Provincial Park)	Park, no development. Natural disturbance only.				Full protection	Yes
	Core Ecosystems	Biodiversity: Old Forest					Yes
	Landscape Corridors	Biodiversity: Connectivity					Yes
	Babine LU Grizzly Bear Mgmt Units – Boucher Creek	Protect/maintain grizzly bear habitat			Restricted logging and road building adjacent to critical habitats. Access control points. Limit duration and # of entries.	Good-Mod. Protection	Yes
	Babine LU Grizzly Bear Mgmt Units – Nicheyskwa North	Protect/maintain grizzly bear habitat and movement			Restricted logging and road building adjacent to critical habitats. Access control points. Limit duration and # of entries.	Good-Mod. Protection	Yes
	Babine LU Grizzly Bear Mgmt Units – Nicheyskwa South	Protect/maintain grizzly bear habitat and movement			Restricted logging and road building adjacent to critical habitats. Access control points. Limit duration and # of entries.	Good-Mod. Protection	Yes
	Grizzly Bear – High Value	Protect/maintain grizzly bear habitat and movement			Restricted logging and road building adjacent to critical habitats. Access control points. Limit duration and # of entries.	Good-Mod. Protection	Yes
	Grizzly Bear – Mixed Forest	Protect/maintain grizzly bear habitat (provide diverse understorey)			Restricted logging and road building adjacent to critical habitats. Access control points. Limit duration and # of entries.	Good-Mod. Protection	Yes

Management Zone Source	Management Zone	Objective	Indicator	Threshold/ Measure	Management Strategies	Management Implications for BT	Management Zone valid ? (& relevant to BT)
Bulkley Land and Resource Management Plan – Higher Level Plan Order (Dec 2000)	Core Ecosystems	Biodiversity: Old Forest			Harvesting timber in CE only when necessary for: <ul style="list-style-type: none"> Protecting the integrity & function of the ecosystem Mineral and energy exploration and development Providing access to timber outside the CE that would otherwise be isolated Forest health control where there is risk to operable timber outside of the CE 	Good protection	Yes
	Landscape Corridors	Biodiversity: Connectivity				Good-Moderate protection	Yes
	Grizzly Bear	Protect/maintain grizzly bear habitat			Restricted logging and road building adjacent to critical habitats. Access control points.	Good-Moderate protection	Yes
	Fish Habitat and Water Quality						Yes
	Barbeau Creek SMZ (SMZ1)					Good protection	Yes
	Babine River RMZ (SMZ2)	Buffer the park boundary.				Good protection	Yes
Management Zone Source	Management Zone	Objective	Indicator	Threshold/ Measure	Management Strategies	Management Implications for BT	Management Zone valid ? (& relevant to BT)
Management Direction Statement for Babine River Corridor Park (Sept 2000)	No management zones.	Protect the park's fish.	None	None	None	Not specified, could be but no thresholds or indicators identified.	Yes

3.2 Known and Potential Bull Trout Presence

In order to produce a map of known and probable bull trout presence (Map 2), a gradient analysis was generated for the Babine watershed. The five gradient classes mirrored those in the Fish Stream Identification Guidebook⁴ and are referred to as “Potential of Presence” classes.

Table 3. Reach Gradient and Potential Bull Trout Presence.

Gradient (%)	Potential of Bull Trout Presence
0 – 8%	Very high potential
8 – 12%	Moderate to high potential
12 – 16%	Moderate potential
16 – 20%	Low potential
greater than 20%	Very Low potential

A sixth class was added, known bull trout streams. This was any stream identified through 1:20K Reconnaissance Inventories or 1:5K Operational Inventories, or from anecdotal information collected during the queries, which was known to support or contain bull trout. The entire stream length downstream of a known BT observation was classified as known BT presence, however; the reaches upstream of the known BT observation were classified only on the gradient class. Other features included on Map 2 are:

- Observed Dolly Varden,
- Historical Bull Trout and Dolly Varden Points,
- Stream Obstacles \geq 2m,
- Cascades and Falls,
- documented Bull Trout Habitat, and
- Fish Guide Camps

It should be noted that stream obstacles are not always reliable barriers to fish presence. Isolated resident populations can and do occur upstream of known barriers to upstream fish migration which is one of the reasons the Fish Stream Identification Guidebook recommends sampling for presence upstream of identified barriers.

3.3 Bull Trout Habitat Importance

Bull trout habitat importance was divided into three groups; Known Critical Habitat, Important Habitat and Other Habitat. *Known Critical Habitat* corresponded to those stream reaches identified as critical stream reaches in the Critical Stream Reach Inventories for the Bulkley and Kispiox TSAs. While these reaches have been identified as critical habitat in the Critical Stream Reach Inventory studies, they were not necessarily critical bull trout habitat. However; the interpretation of critical used by Triton was “habitat that if lost or degraded, could result in a

⁴ Fish Stream Identification Guidebook, FPC of BC, pp.24.

noticeable decrease in the productive capacity for a target fish species within the study area”.⁵ This interpretation focused on “habitat for species with a limited distribution and/or with habitat requirements for specific life history stages that are limited within the study area”.⁶ Bull trout, with their preference for smaller tributary streams for spawning and use of specific staging areas for spawning migrations fit into this interpretation; therefore, for this project it was assumed that these reaches would also be critical bull trout habitat.

Important Habitat is habitat that was identified as Important in the Critical Stream Reach Inventories, streams with known bull trout presence and reaches classified Very High Probability of Presence (see Map 2). *Other Habitat* captures all other “Potential of Presence” classes and any habitat not falling into the Known Critical Habitat or Important Habitat classes.

3.4 Validated Management Zones

In order to determine the valid management zones it was assumed that bull trout populations could be protected in three basic ways.

1. by eliminating un-natural sources of mortality,
2. by maintaining water quality, and
3. by maintaining fish access.

Angling mortality was thought to be the predominant outside source of mortality due to the aggressive feeding behaviour of bull trout. The simplest method of reducing angling pressure on bull trout is to limit access to waters where they may be present. By maintaining water quality (stream temperature, sediment introduction, adequate water levels, suitable stream substrates etc.) and fish access at road crossings, bull trout should be able to complete life cycle and migration requirements. The applicable management zones in the higher level plans affecting the BWMT area were assessed against these criteria (see Table 2). The list of validated management zones that provide some level of protection to bull trout through the objectives for each management zone is found in Table 4. These zones are in either the Kispiox and/or Bulkley TSA portions of the BWMT area.

The thirteen management zones are:

- Protected Areas (Babine River Corridor Park) – Kispiox and Bulkley TSA
- Atna Shelagyote SMZ – Kispiox TSA
- Barbeau Creek SMZ (SMZ1) – Bulkley TSA
- Shelagyote/Babine Tourism Node – Kispiox TSA
- Core Ecosystems – Kispiox and Bulkley TSA
- Shenismike Corridor – Kispiox TSA
- High Value Grizzly Habitat – Kispiox and Bulkley TSA

⁵ Triton Environmental Consultants Ltd. March 2006. Kispiox and Cranberry TSA Critical Stream Reach Inventory. Prince George, BC.

⁶ Triton Environmental Consultants Ltd. March 2006. Kispiox and Cranberry TSA Critical Stream Reach Inventory. Prince George, BC.

- Babine River SMZ – Kispiox TSA
- Babine River SMZ (SMZ2) – Bulkley TSA
- Grizzly Bear MU1 Boucher Creek – Bulkley TSA
- Grizzly Bear MU3 Nichyeskwa North – Bulkley TSA
- Landscape Riparian Corridors – Kispiox and Bulkley TSA
- Grizzly Bear MU2 Nichyeskwa South – Bulkley TSA

There are nine management zones in the Bulkley TSA portion of the BWMT watershed area that were determined to provide protection to bull trout and bull trout habitat. In the Kispiox TSA portion of the watershed, there are eight management zones that were determined to provide protection to bull trout and bull trout habitat.



Table 4. Management Zone Protection Ranking

Management Zone	TSA	Management Zone Source(s)	Objective	Indicator Threshold/ Measure	Target/Measure	Management Implications for BT	Management Zone valid ? (& relevant to BT)	Protect ^{II} Ranking Highest=1 Lowest=8
Protected Areas (Babine River Corridor Provincial Park)	Bulkley / Kispiox	Xsu gwin lik'l'inswx: West Babine SRMP (2004) / Babine Landscape Unit Plan (Sept 1999)	“to protect a nationally significant unregulated river corridor, high salmonid values, a Class 1 angling river, and critical grizzly bear habitat”		Park, no development. Natural disturbance only?	Full protection from harvesting but still seasonal fishing pressure from fishing lodges and from general public at areas accessible from road network.	Yes	1
Atna Shelagyote SMZ	Kispiox	Xsu gwin lik'l'inswx: West Babine SRMP (2004)	“to maintain provincially significant scenic resources, backcountry recreation opportunities, grizzly bear denning habitat, mountain goat habitat and extensive wetlands in the upper Sicitine and Shelagyote valleys.” Ecological Backcountry Tourism		Commercial timber harvesting deferred. (except where required for mineral exploration or mine development)	Full protection from harvesting, fishing only at lowest reach of Shelagyote from Silver Hilton (BT not target species, prob. only incidental catch)	Yes	2
Barbeau Creek SMZ (SMZ1)	Bulkley	Nilkitkwa Landscape Unit Plan (Sept 1999)	Maintain watershed in a primitive state to protect goat, grizzly bear etc.		No commercial timber harvesting, limit tree cutting for approved mineral exploration and development purposes including access	Good protection	Yes	2

Management Zone	TSA	Management Zone Source(s)	Objective	Indicator Threshold/ Measure	Target/Measure	Management Implications for BT	Management Zone valid ? (& relevant to BT)	Protect ² Ranking Highest=1 Lowest=8
Shelagoyote/Babine Tourism Node	Kispiox	Xsu gwin lik'l'inswx: West Babine SRMP (2004)	Tourism, Visual Quality, High value Grizzly Bear Habitat		No commercial logging within node. (except draft CP 991-201 and single proposed road*.) *from SCI Carnaby's Draft 2001-2007 FDP	Good protection (since the SCI Carnaby closure the proposed CP and road are likely defunct although BCTS and Gitxsan Forest Enterprises have inherited former SCI timber tenures)	Yes	3
Core Ecosystems	Bulkley / Kispiox	Xsu gwin lik'l'inswx: West Babine SRMP (2004) / Babine Landscape Unit Plan (Sept 1999) / Nilkitkwa Landscape Unit Plan (Sept 1999)	Biodiversity: Old Forest		Generally no logging or road building except for forest health reasons, mineral and energy exploration and/or alienation of timber beyond CE.	Good protection	Yes	4
Shenismike Corridor	Kispiox	Xsu gwin lik'l'inswx: West Babine SRMP (2004)	Wildlife (Goat, grizzly bear) (Grizzly Drop – grizzly foraging area for live fish) pp.i-ii		No roads.	Good – Mod. protection	Yes	5
High Value Grizzly Habitat (includes mixed forest habitats)	Bulkley / Kispiox	As above	Protect grizzly habitat and grizzly bears.		Restricted logging and road building adjacent to critical habitats (mapped high value habitats). Access control points. Seasonal activity?	Good – Mod. protection	Yes	6

Management Zone	TSA	Management Zone Source(s)	Objective	Indicator Threshold/ Measure	Target/Measure	Management Implications for BT	Management Zone valid? (& relevant to BT)	Protect ^a Ranking Highest=1 Lowest=8
Babine River SMZ	Kispiox	Xsu gwin lik'l'inswx: West Babine SRMP (2004)	"to protect and buffer the river-based resource values" pp.38		No permanent motorized access within SMZ. All temporary access will remain at least 300m from the Park boundary. Block size less than 15Ha.	Moderate protection	Yes	7
Babine River SMZ (SMZ2)	Bulkley	Babine Landscape Unit Plan (Sept 1999)	To protect and buffer the river-based resource values. pp.22		No permanent motorized access within SMZ. All temporary access will remain at least 300m from the Park boundary. Block size less than 15Ha. Winter harvest only	Moderate protection	Yes	7
Grizzly Bear MU1 Boucher Creek	Bulkley	Babine Landscape Unit Plan (Sept 1999)	Allow for the movement of grizzly bears between the Van Fire, Bait Range and Babine River.		Winter logging preferred, access restriction from May1-Nov 1.	Moderate protection	Yes	7
Grizzly Bear MU3 Nichyeskwa North	Bulkley	Babine Landscape Unit Plan (Sept 1999)	Allow for the movement of grizzly bears between feeding areas and reduce the potential of human-bear contact.		No net loss of poplar-Douglas maple habitat, winter harvesting only, access restriction from May1-Nov 1.	Moderate protection	Yes	7
Landscape Riparian Corridors	Bulkley / Kispiox		Biodiversity: Providing habitat connectivity within the landscape permitting movement and dispersal of plant and animal species.		Logging restricted, no road building (should be temporary unless no other alternative)	Moderate protection	Yes	7
Grizzly Bear MU2 Nichyeskwa South	Bulkley	Babine Landscape Unit Plan (Sept 1999)	Allow for the movement of grizzly bears between feeding areas and reduce the potential of human-bear contact.		Winter harvesting in high-value habitat	Moderate protection	Yes	8

- Higher Level Plan that applies in the Kispiox portion of the Babine River watershed is the Xsu gwin lik'l'inswx: West Babine SRMP (March 2004). The Kispiox LRMPP Higher Level Plan for Biodiversity, Visual Quality and Wildlife (Jan 2006) does not apply to the West Babine Landscape Unit.
- Higher Level Plans that apply in the Bulkley portion of the Babine River watershed are Babine Landscape Unit Plan (Sept 1999), Nilkitkwa Landscape Unit Plan (Sept 1999), and Bulkley LRMPP – Higher Level Plan Order (2000), and Bulkley LRMPP – Objectives set by Government (Sept 2006).
- MANAGEMENT DIRECTION STATEMENT for the Babine River Corridor Provincial Park, Skeena District (Sept 2000) – management objective is to “protect the park’s fish”. No indicators or mgmt zones established.

4.0 Results

Three analyses were completed. The first two analyses were the length of Stream Reach in metres classified for Known Presence and Probability of Presence by Management Zone and the length of Stream Reach in metres classified for Habitat Importance by Management Zone. The third query was to determine the length of Stream Reach for Known Presence and Probability of Presence and for Habitat Importance outside the validated management zones.

The total length of all the streams on the 1:50K base maps in the BWMT area was determined to be 4,657,128 m. The Kispiox TSA portion of the Babine River watershed contained 2,994,357 m of streams (64.3%) while there were 1,653,899 m of streams (35.6%) in the Bulkley TSA portion of the watershed. The total length of streams in the validated management zones that provide some protection to bull trout and bull trout habitat in the BWMT area is 3,185,954 m. Therefore, approximately 68.5% of all the streams in the BWMT area fall within management zones that directly or indirectly provide some protection to bull trout, even when there is a very low probability of BT presence.

In the Bulkley TSA portion of the watershed, 1,044,862 m of stream reaches out of the total 1,653,899 m of stream reaches (63.2%) fall into management zones that were identified as providing some form of habitat protection to bull trout. In the Kispiox TSA portion of the watershed, 71.5% of all the stream reaches (2,141,092 m of the total 2,994,357 m) fall into one of the eight management zones that were identified as providing some form of habitat protection to bull trout.

A total of 1,471,174 m of stream length (31.5%) falls outside of the validated MZs in the BWMT area. In the Bulkley TSA portion of the BWMT watershed, this equals approximately 612,730 m of streams outside of the MZs (36.8%), while in the Kispiox TSA portion of the BWMT watershed this equals about 858,440 m of streams outside of the MZs (28.5%).

4.1 Analysis of the amount of known and potential bull trout presence classes protected in the various valid management zones.

Bulkley TSA

Stream Reach length in metres. Classified for Known Presence and Probability of Presence by Management Zone							
Stream Probability of Presence Class	Known (m)	Very High (m)	Moderately High (m)	Moderate (m)	Low (m)	Very Low (m)	
Management Zone	1	2	3	4	5	6	Total
Protected Areas dbu	34,812	33,502	3,812	2,634	397	1,153	76,309
Barbeau Creek SMZ dbu	0	120,361	31,518	16,603	19,110	32,816	220,407
Core Ecosystems dbu	0	68,278	28,067	15,441	12,762	23,308	147,857
High Value Grizzly Habitat dbu	3,352	75,226	5,238	1,844	3,313	3,576	92,549
Babine River SMZ2 dbu	2,544	54,714	1,794	980	1,714	0	61,745
Grizzly Bear MU1 Boucher Creek dbu	0	33,800	8,613	2,306	291	0	45,010
Grizzly Bear MU3 Nichyeskwa North dbu	0	50,918	1,210	3,058	1,169	1,295	57,650
Landscape Riparian Corridors dbu	87,148	203,538	12,893	3,391	3,955	7,714	318,640
Grizzly Bear MU2 Nichyeskwa South dbu	0	22,983	1,291	0	256	165	24,694
Total	127,856	663,320	94,435	46,258	42,967	70,026	1,044,862

The largest amount of known bull trout habitat in the Bulkley TSA portion of the BWMT area is located within Landscape Riparian Corridors. The next largest amount of known bull trout habitat occurs within the Babine River Corridor Park protected area. Together these two management zones account for 121,960 m of the known bull trout habitat in the nine management zones that provide protection to bull trout. For the Very High Probability of Presence class, the Barbeau Creek SMZ, High Value Grizzly Habitat and Landscape Riparian Corridors protect the most habitat. Altogether over 660,000 m of Very High Probability of Presence stream reaches are protected to a certain degree. Very High Probability of Presence stream reaches in the Bulkley TSA are found in all nine of the validated management zones. Altogether the Known and Very High Probability of Presence classes account for 791,176 m (75.7 %) of all the stream reaches in the nine validated management zones of the Bulkley TSA portion of the Babine River watershed.

Kispiox TSA

Stream Reach length in metres. Classified for Known Presence and Probability of Presence by Management Zone							
Stream Probability of Presence Class	Known (m)	Very High (m)	Moderately High (m)	Moderate (m)	Low (m)	Very Low (m)	
Management Zone	1	2	3	4	5	6	Total
Protected Areas dki	56,469	27,189	19,095	24,486	12,583	11,926	151,748
Atna/Shelagyote SMZ dki	41,513	202,731	80,142	61,558	62,570	566,649	1,015,164
Shelagyote/Babine Tourism Node dki	3,879	1,132	6,419	2,903	6,251	2,547	23,131
Core Ecosystems dki	18,684	90,449	14,892	12,155	4,581	19,768	160,528
Shenismike Corridor	1,751	6,663	1,677	5,891	0	1,519	17,501
High Value Grizzly Habitat dki	662	194,939	48,381	67,987	38,263	105,555	455,787
Babine River SMZ dki	0	24,971	5,300	17,172	5,601	3,115	56,160
Landscape Riparian Corridors dki	12,831	170,509	19,450	15,682	14,750	27,851	261,073
Total	135,788	718,582	195,356	207,834	144,599	738,932	2,141,092

The largest amount of known bull trout habitat in the Kispiox TSA portion of the BWMT area is located within the Babine River Corridor Park protected area. The next largest amount of known bull trout habitat occurs within the Atna/Shelagyote SMZ. Together these two management zones account for 97,982 m of the known bull trout habitat in the eight management zones that provide protection to bull trout. For the Very High Probability of Presence class, the Atna/Shelagyote SMZ, High Value Grizzly Habitat and Landscape Riparian Corridors protected the most amount of habitat. Altogether, almost 720,000 m of Very High Probability of Presence stream reaches are protected to a certain degree. Very High Probability of Presence stream reaches in the Kispiox TSA are also found in all eight of the validated management zones.

Altogether the Known and Very High Probability of Presence classes account for 854,370 m (39.9 %) of all the stream reaches in the eight validated management zones of the Kispiox TSA portion of the BWMT watershed area. The more mountainous terrain of the Kispiox TSA portion of the BWMT watershed area is responsible for the very high proportion (41.3%) of Low and Very Low Probability of Presence classes in the Kispiox TSA.

Total BWMT Area

Stream Reach length in metres. Classified for Known Presence and Probability of Presence by Management Zone							
Stream Probability of Presence Class	Protection Ranking	Known (m)	Very High (m)	Moderately High (m)	Moderate (m)	Low (m)	
Management Zone	---	1	2	3	4	5	
						Very Low (m)	
						6	
						Total	
Protected Areas dki	1	56,469	27,189	19,095	24,486	12,583	151,748
Protected Areas dbu	1	34,812	33,502	3,812	2,634	397	76,309
Atna/Shelagyote SMZ dki	2	41,513	202,731	80,142	61,558	62,570	1,015,164
Barbeau Creek SMZ dbu	2	0	120,361	31,518	16,603	19,110	220,407
Shelagyote/Babine Tourism Node dki	3	3,879	1,132	6,419	2,903	6,251	23,131
Core Ecosystems dki	4	18,684	90,449	14,892	12,155	4,581	160,528
Core Ecosystems dbu	4	0	68,278	28,067	15,441	12,762	147,857
Shenismike Corridor dki	5	1,751	6,663	1,677	5,891	0	17,501
High Value Grizzly Habitat dki	6	662	194,939	48,381	67,987	38,263	455,787
High Value Grizzly Habitat dbu	6	3,352	75,226	5,238	1,844	3,313	92,549
Babine River SMZ dki	7	0	24,971	5,300	17,172	5,601	56,160
Babine River SMZ2 dbu	7	2,544	54,714	1,794	980	1,714	61,745
Grizzly Bear MU1 Boucher Creek dbu	7	0	33,800	8,613	2,306	291	45,010
Grizzly Bear MU3 Nichyeskwa North dbu	7	0	50,918	1,210	3,058	1,169	57,650
Landscape Riparian Corridors dki	7	12,831	170,509	19,450	15,682	14,750	261,073
Landscape Riparian Corridors dbu	7	87,148	203,538	12,893	3,391	3,955	318,640
Grizzly Bear MU2 Nichyeskwa South dbu	8	0	22,983	1,291	0	256	24,694
Sub-Total in Management Zones	N/A	263,644	1,381,902	289,791	254,092	187,566	3,185,954
Non-Management Zone	N/A	8,562	758,870	249,378	133,676	105,058	1,471,174
Total	N/A	272,206	2,140,772	539,169	387,768	292,625	4,657,128

Altogether the Known bull trout presence class accounts for 263,644 m (8.3%) of the 3,185,954 m of Probability of Presence classes in the validated management zones in the BWMT area. Another 8,562 m of known bull trout presence class occurs outside the validated management zones. Over 95% of the habitat with known bull trout presence is protected to some extent. The Very High Probability of Presence class accounts for 1,381,902 m (43.4%) of the 3,185,954 m and combined the two classes represent 51.7% of all the Probability of Presence classes in the validated management zones. Together, the Known and Very High Probability of Presence classes represent 51.8% (2,412,978 m of the 4,657,128 m total stream length) of all the stream reaches in the BWMT watershed with the Very High Probability of Presence class accounting for 89% of the two classes. The Very High Probability of Presence class also accounts for slightly over 50% of all the stream reaches outside the validated management zones. Of the Known and Very High Probability of Presence classes, 521,588 m (11.2%) of all the streams in the BWMT area are situated in the five management zones that provide the most protection (yellow shading).

4.2 Analysis of the amount of Critical, Important and Other bull trout habitat importance classes protected in the various valid management zones.

Bulkley TSA

Stream reach length (m). Classified for Habitat Importance by Management Zone				
Habitat Importance Class	Critical Importance (m)	Important (m)	Other (m)	
Management Zone	1	2	3	Total (m)
Protected Areas dbu	33,500	34,814	7,996	76,309
Barbeau Creek SMZ dbu	13,435	106,926	100,047	220,407
Core Ecosystems dbu	1,378	66,900	79,579	147,857
High Value Grizzly Habitat dbu	3,381	75,197	13,971	92,549
Babine River SMZ2 dbu	169	57,089	4,487	61,745
Grizzly Bear MU1 Boucher Creek dbu	0	33,799	11,210	45,010
Grizzly Bear MU3 Nichyeskwa North dbu	0	50,918	6,732	57,650
Landscape Riparian Corridors dbu	13,051	277,635	27,954	318,640
Grizzly Bear MU2 Nichyeskwa South dbu	0	22,983	1,711	24,694
Total	64,914	726,262	253,687	1,044,862

The largest amount of Critically Important bull trout habitat in the Bulkley TSA portion of the BWMT area is located within the Babine River Corridor Park protected area. The next largest amount of Critically Important bull trout habitat occurs within the Barbeau Creek SMZ. Together these two management zones account for 46,935 m of the Critically Important bull trout habitat in the nine management zones that provide protection to bull trout. For the Important habitat class, the Barbeau Creek SMZ, High Value Grizzly Habitat and Landscape Riparian Corridors protected the most amount of habitat. Altogether, almost 730,000 m of Important habitat class stream reaches are protected to a certain degree. Important habitat class stream reaches in the Bulkley TSA are found in all nine of the validated management zones.

Kispiox TSA

Stream reach length (m). Classified for Habitat Importance by Management Zone				
Habitat Importance Class	Critical Importance (m)	Important (m)	Other (m)	
Management Zone	1	2	3	Total (m)
Protected Areas dki	4,512	79,145	68,091	151,748
Atna/Shelagyote SMZ dki	2,349	241,896	770,919	1,015,164
Shelagyote/Babine Tourism Node dki	3,879	1,132	18,120	23,131
Core Ecosystems dki	0	109,133	51,396	160,528
Shenismike Corridor dki	0	8,414	9,087	17,501
High Value Grizzly Habitat dki	0	195,601	260,187	455,787
Babine River SMZ dki	0	24,971	31,189	56,160
Landscape Riparian Corridors dki	3,015	180,324	77,733	261,073
Total	13,755	840,615	1,286,721	2,141,092

The largest amount of Critically Important bull trout habitat in the Kispiox TSA portion of the BWMT area is located within the Babine River Corridor Park protected area. The next largest amount of Critically Important bull trout habitat occurs within the Shelagyote/Babine Tourism Node. Together these two management zones account for 8,391 m of the Critically Important bull trout habitat in the eight management zones that provide protection to bull trout. The Atna/Shelagyote SMZ and Landscape Riparian Corridors are the only other management zones that contain Critically Important bull trout habitat. For the Important habitat class, the Atna/Shelagyote SMZ, High Value Grizzly Habitat and Landscape Riparian Corridors protected the most amount of habitat. Altogether, about 840,000 m of Important habitat class stream reaches are protected to a certain degree. Important habitat class stream reaches are found in all eight of the validated management zones in the Kispiox TSA portion of the BWMT area.

Total BWMT Area

Stream Reach length (m). Classified for Habitat Importance by Management Zone					
Habitat Importance Class	Protection Ranking	Critical Importance (m)	Important (m)	Other (m)	
Management Zone		1	2	3	Total
Protected Areas dki	1	4,512	79,145	68,091	151,748
Protected Areas dbu	1	33,500	34,814	7,996	76,309
Atna/Shelagyote SMZ dki	2	2,349	241,896	770,919	1,015,164
Barbeau Creek SMZ dbu	2	13,435	106,926	100,047	220,407
Shelagyote/Babine Tourism Node dki	3	3,879	1,132	18,120	23,131
Core Ecosystems dki	4	0	109,133	51,396	160,528
Core Ecosystems dbu	4	1,378	66,900	79,579	147,857
Shenismike Corridor dki	5	0	8,414	9,087	17,501
High Value Grizzly Habitat dki	6	0	195,601	260,187	455,787
High Value Grizzly Habitat dbu	6	3,381	75,197	13,971	92,549
Babine River SMZ dki	7	0	24,971	31,189	56,160
Babine River SMZ2 dbu	7	169	57,089	4,487	61,745
Grizzly Bear MU1 Boucher Creek dbu	7	0	33,799	11,210	45,010
Grizzly Bear MU3 Nichyeskwa North dbu	7	0	50,918	6,732	57,650
Landscape Riparian Corridors dki	7	3,015	180,324	77,733	261,073
Landscape Riparian Corridors dbu	7	13,051	277,635	27,954	318,640
Grizzly Bear MU2 Nichyeskwa South dbu	8	0	22,983	1,711	24,694
Sub-Total in Management Zones	N/A	78,669	1,566,877	1,540,408	3,185,954
Non-Management Zone	N/A	0	767,432	703,742	1,471,174
Total	N/A	78,669	2,334,310	2,244,150	4,657,128

Altogether the Critically Important bull trout habitat class accounts for 78,669 m (2.5%) of the 3,185,954 m of the Habitat Importance classes in the validated management zones in the BWMT area. The Important bull trout habitat class accounts for 1,566,877 m of the 3,185,954 m (49.2%) and combined the two classes represent 51.7% of all the Habitat Importance classes in the validated management zones and 51.8% (2,412,979 m of the 4,656,128 m total stream length) of all the stream reaches in the BWMT watershed. Almost 75% (57,675 m) of all the Critically Important habitat (78,669 m) is within the 5 management zones ranked highest for bull trout protection (yellow shaded areas in the above table). There is no Critically Important habitat outside the valid management zones. Also, a significant proportion; 13,051 m, of the Critically Important habitat class is within Landscape Riparian Corridors in the Bulkley TSA.

For the Important habitat class, 463,913 m (19.9%) out of the total Important habitat class (2,334,310 m) occurs in the five management zones ranked highest for bull trout protection. The Babine River Corridor Park, Atna/Shelagyote SMZ in the Kispiox TSA and the Barbeau Creek SMZ in the Bulkley TSA account for most of the well protected (yellow shading) Important habitat class. The remainder largely occurs in core ecosystems, high value grizzly habitat and

landscape riparian corridors. About one third (32.8%) of all the Important habitat class falls outside the management zones that provide some protection to bull trout.

5.0 Discussion and Recommendations

Since this project was considered a first approximation of the amount of bull trout habitat in the BWMT area, utilizing TRIM base maps for this project would have been overkill. TRIM maps would have given basically the same results from the analyses for the known and important classes and would have likely resulted in just more stream length in the lower “Probability of Presence” classes and the “Other” habitat importance class. It provided more than enough detail to identify information gaps for areas with little bull trout inventory information. Map 2 provides a quick visual indication of the lack of known bull trout observations in the BWMT area.

The Shelagyote River watershed has seen a concerted effort to identify bull trout presence and habitat⁷; however, there are very few other known bull trout observations in the BWMT watershed. A lot of the fish inventory information for the Bulkley TSA portion of the BWMT area (and probably the Kispiox TSA also) was collected between 1996 and 1998. Virtually all of the *salvelinus spp.* encountered at that time were identified as Dolly Varden rather than bull trout, although fisheries consultants would generally have been aware of the identification methods to differentiate the species. The reason for the lack of differentiation between the two species may lie in the fact that both species are very similar morphologically and also from a management point of view as they are both blue-listed species. For the forest licences the management implications were the same, whether it was bull trout or Dolly Varden that were present.

As a result of this anomaly, it is strongly suspected that bull trout are present in the Nilkitkwa River, Nichyeskwa Creek and Shedin Creek watersheds, due in part to the number of Dolly Varden observations and historical Dolly Varden and bull trout points in the watersheds. Inventory information for the three watersheds shows many Dolly Varden observations (Map 2) throughout each of the watersheds. The Nilkitkwa River watershed in particular has similarities to the Shelagyote River watershed, a watershed with known bull trout presence and high bull trout habitat values. Both watersheds are glacially fed and have relatively low gradients. Over-wintering habitat is present throughout the Nilkitkwa River watershed, with extensive wetlands and numerous small lakes present in the upper reaches.

The management zones with a protection ranking of 1 through 3 (yellow shaded area in tables) provide the most protection to bull trout habitat as they are no development zones or deferred from timber harvesting. Whatever type of habitat is "well protected", it will be at low risk as long as the management zones providing the best protection remain in effect. The remaining validated management zones provide lesser degrees of protection to bull trout populations and habitat, corresponding inversely with increased degrees of timber development. Areas outside the management zones (Non-Management Zone) would provide the least protection to bull trout.

⁷ Reconnaissance (1:20,000) Fish and Fish Habitat Inventory of the Shelagyote River (Shelagyote River Planning Area) WSC 480-069500 to WSC 480-195700, Attachment VII, Bull Trout Inventory.

Although timber and resource development is still regulated in the Non-Management Zone areas, they pose the greatest risk to bull trout as they allow the most modification to the landscape.

Almost all the Known presence class and all of the Critical Importance class are within the validated management zones and therefore are protected to various degrees. The largest amount of bull trout habitat that occurs outside the management zones is in the Very High probability of presence class (Map 2) and the Important habitat class (Map3). These two classes represent the single largest amount of habitat outside the management zones where there is no protection to bull trout. They therefore represent the largest “unknown” and the most “at-risk” knowledge gap in the BWMT bull trout knowledge base.

In rating the management zones identified in the various higher level plans for protection of bull trout and bull trout habitat, it became evident that very few management zones had identified measures, thresholds, or indicators against which to assess the effectiveness of the management zones. Although unrelated to this project, the identification of measurable indicators for the various management zones in the BWMT area to use in effectiveness evaluations of the management zones could be another project of interest to the BWMT.

5.1 Recommendations

The most effective course of action based on the results of this project would be to increase the knowledge base outside of the management zones or in management zones that provide less protection, as they pose a higher overall risk to the Babine River bull trout population. For instance, there is a large amount of habitat (known presence, high probability of presence and important) outside of the management zones (a little more than 16% of all the stream reaches in the BWMT area) which provide no additional protection over and above basic forestry regulations such as the Forest Practices Code and Forest and Range Practices Act. Focusing on areas that provide the least protection (higher overall risk) and have large amounts of habitat with a very high probability of presence, would likely be the best approach to reducing the uncertainty around the risk curves.

Looking at Map 2 - Known and Potential Bull Trout Presence, it is immediately apparent that except for the Shelagyote River watershed, known bull trout observations in the BWMT watershed are very rare. However, three of the other larger watersheds in the BWMT watershed area have numerous Dolly Varden observations within them. Due to the lack of differentiation between bull trout and Dolly Varden in the inventory work conducted in the latter 1990s in the BWMT area, it is strongly suspected that many of these observations were bull trout and that they are therefore present in the Nilkitkwa River, Nichyeskwa Creek and Shedin Creek watersheds.

Combining the rationale in the two above paragraphs, efforts to increase the bull trout knowledge base within the BWMT area should focus on presence/absence work in areas outside of the validated management zones in the Nilkitkwa River, Nichyeskwa Creek and Shedin Creek watersheds first. Where possible, some of the inventory work for the watersheds should take place within the critical stream reaches identified in the Critical Stream Reach Inventory studies

conducted by Triton Environmental. By using this approach, the BWMT will increase the bull trout knowledge base in the most at-risk areas first. It will allow the BWMT to incrementally increase the bull trout knowledge base, working in the direction from the most at-risk to the least at-risk, on a management zone by management zone or watershed by watershed basis. This would facilitate doing the work in a series of smaller contracts that would always build on the previous work.

There is road access to the lower and upper reaches of the Nichyeskwa and Shedin Creek watersheds but the mid reaches are less accessible. The lower reaches of the Nilkitkwa River watershed have road access, but the upper reaches of the watershed are helicopter accessible only. Initial inventory efforts should focus on establishing bull trout presence or absence (for all life stages), however determining adult presence will require angling and/or electrofishing, methods that will be more intrusive and time consuming than minnow trapping. Aerial surveys during periods of low flow and high water clarity may also be utilized to determine adult bull trout presence; however consideration must be given to the ease and accuracy of correctly identifying fish species from the air and the costs/benefits of obtaining the information by this method. Positively establishing bull trout presence in head-water areas would infer that the stream-shed below the sample sites is also bull trout habitat. Once additional basic knowledge of the presence/absence of bull trout is known, more in-depth methods such as tagging, radio tracking etc. could be considered to further expand the knowledge base of bull trout distribution and habitat use in the BWMT area.

Another useful follow-up activity to this project would be to explore using existing indicators or identifying other suitable indicators for monitoring the effectiveness of the different management zones in providing protection to bull trout and bull trout habitat.

5.2 Limitations

This project should only be considered a very rough first approximation of the amount of bull trout habitat in the BWMT area. With the exception of the Shelagyote River watershed, known bull trout observations in the existing fish inventory databases are almost nonexistent for the BWMT area. *Probabilities of Presence* and *Habitat Importance* are based primarily on stream gradient classes from the Fish Stream Identification Guidebook and do not consider any other habitat qualities. There is considerable uncertainty attached to these maps and the analyses performed with the data, therefore all results and findings must be treated accordingly.

5.3 Incorporation into Existing BWMT Framework

The results gained from this project will be used to reduce uncertainty for the preliminary risk curves created in 2005 that are in the current Framework. For the objective to maintain bull trout habitat and bull trout populations, the project results can be applied to identify knowledge gaps in the Knowledge Base to further refine the level of risk for bull trout in the Babine River watershed. The results may also be useful in identifying indicators that could be monitored to evaluate the effectiveness of the objectives in the land-use plans that provide protection to bull trout populations in the Babine River watershed.



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Appendix I.

Data Analyses Results - See attached CD.





Appendix II.

Assorted Bull Trout Notes



General notes on bull trout life (from overview review of relevant bull trout information and literature and personal communications, etc).

- BT considered more of an “interior” species while DV considered more of a “coastal” species. However, both BT and DV are present in the Babine Watershed. Also, BT and DV can and do cross breed but literature suggests crosses are not as fit.
- BT have three life history strategies; 1-stream residents, 2-adfluvial (spawn in trib streams and reside in lakes), 3-fluvial (spawn in trib streams and reside in mainstem rivers)
- BT and DV both coldwater species, fall spawners and have very similar morphology (esp. juveniles). BT usually not sexually mature until at least 4 or 5 years of age. In Shelagyote BT inventory study, fish usually found to be sexually mature at six years of age and greater than 40cm fork length. BT can make long migrations to spawning locations (100km +).
- Easiest way to tell them apart in the field is to count branchiostegal rays, >24 equals BT and <24 equals DV, however this method is not 100% reliable. A *Linear Discriminant Function* (LDF) has been shown to be 100% effective in distinguishing Dolly Varden from bull trout (Haas and McPhail 1991). The linear discriminant function is based on four variables; total branchiostegal ray number, total anal ray number, and the ratio of total upper jaw length to standard length. These variables are used in the following equation to determine LDF scores for individuals:

$$\text{LDF} = 0.629N_b + 0.178N_a + 37.310 L_j/L_s - 21.8$$

Where:

LDF = Linear Discriminant Function score

N_b = Total number of branchiostegal rays

N_a = Total number of anal fin rays

L_j = Total length of upper jaw

L_s = Standard length of fish

All fish with LDF scores greater than 0 are bull trout, and scores less than 0 are Dolly Varden. This method can be employed in the field but usually requires anesthetizing the specimen.

- General consensus from steelhead lodge owners or managers is that there has been a trend toward fewer and smaller bull trout in the Babine River over time (pers. comm. Pierce Clegg, Bill Chanasyk and Brian Schneider.)
- Pierce Clegg noted that the Nilkitkwa River contributes a lot of sediment to the Babine River and that the Nilkitkwa River watershed has been extensively developed for forestry purposes.
- Bill Spent, Fisheries Biologist, Lake Babine Nation, noted that they had little bull trout information, their fisheries concerns were mostly focussed on Babine Lake and the salmon runs. He said they occasionally caught bull trout as by-catch in the nets when fishing for sockeye for the sustenance fishery near the mouths of Fulton River and Pinkut Creek.

