A Review of the Fisheries Resources of Nichyeskwa Creek

(Watershed Code: 480-370100)

prepared by:

Chris Schell M.Sc., R.P. Bio
Box 4695
Smithers, BC, V0J 2N0
schell@bulkley.net

prepared for:

Babine River Foundation
Box 5016
Smithers, BC, V0J 2N0

January 2004

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGEMENTS

The documented information regarding fish values in Nichyeskwa Creek is relatively limited for most species. As a result, I relied heavily on the working knowledge of government biologist and stock assessment personnel to gather the most complete possible picture of fisheries resources in the watershed. In addition to interviews, some of these people procured for me reports I did not have access to. These include, in no particular order: Tom Pendray, Barry Finnegan, Mike Jacabouski, and Ivan Winther of Fisheries and Oceans Canada. Marc Beere, and Paul Giroux of Ministry of Water, Land, and Air Protection. Joe DeGisi, Dave Bustard, and Terry Turnbull.

Thanks also go to Pierce Clegg of the Babine River Foundation who contracted me to produce this report. It is my hope that this document will serve to inform the reader of the importance of the fisheries resource values in Nichyeskwa Creek.

1.0 Introduction

The purpose of this report is to gather, review and present all available information pertaining to the fisheries resource values of Nichyeskwa Creek. The Babine River Foundation commissioned this document in order to increase awareness of the high fisheries values of Nichyeskwa Creek and to lobby for increased habitat protection for this watershed.

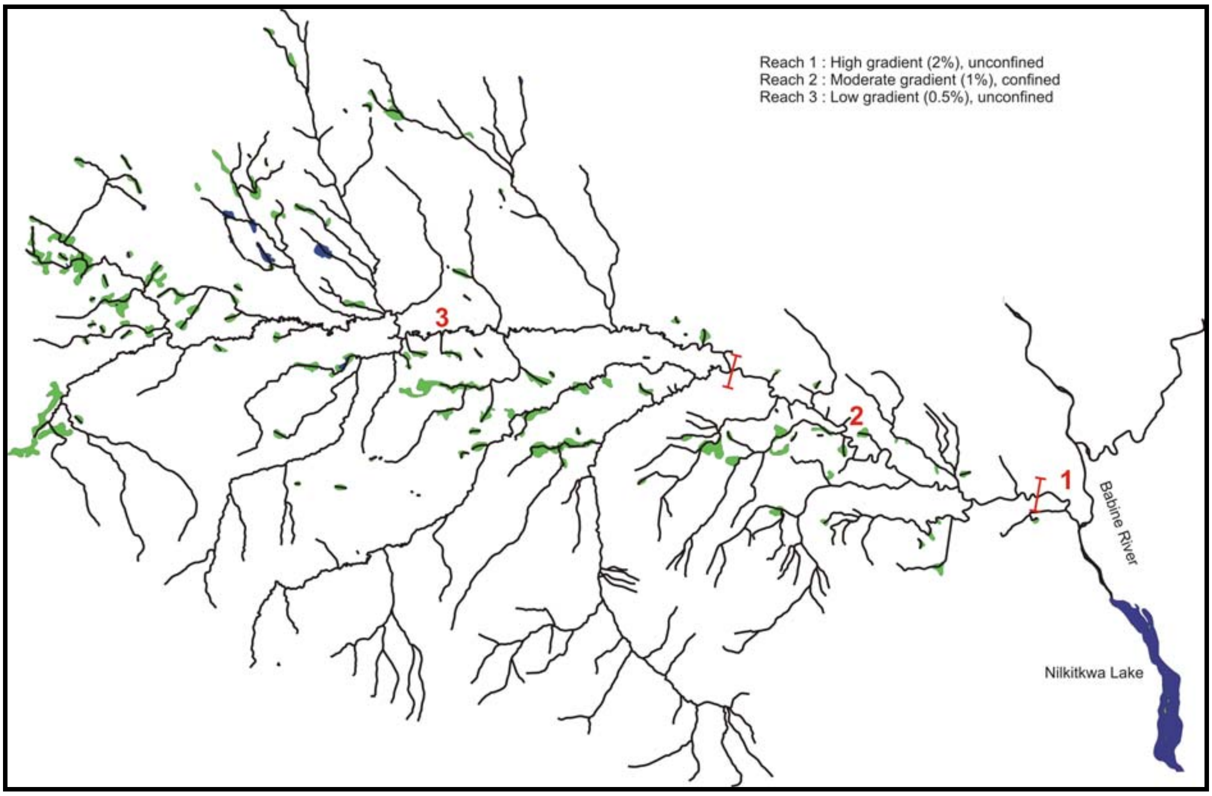
Nichyeskwa Creek (watershed code 480-3701000) is a 5th order system of a magnitude of 160 (1:50,000 map base) draining mountains in the Babine Range including Mt. Thoen and French Peak. It flows eastward and is tributary to the river-left bank of the Babine River immediately downstream of Nilkitkwa Lake. The watershed contains the Engelmann Spruce – Subalpine Fir (ESSF), Sub-Boreal Spruce (SBS), and Alpine Tundra (AT, on mountain peaks) biogeoclimatic zones. There are no large icefields in the watershed and the Nichyeskwa is generally a clear water system.

1.1 General Habitat Comments

The mainstem Nichyeskwa River is comprised of numerous reaches of different character, with fish habitat quality varying accordingly.

Near the mouth, and for ~1.5 km upstream, Nichyeskwa Creek is relatively unconfined, but at steep gradient (~2.0%) as it falls into the Babine River valley. Fisheries values here are relatively low due to the high gradient.

Figure 1. Base map of Nichyeskwa Creek showing the basic mainstem reaches. Reach 3 extends up into the headwaters, with no upstream limit shown on this map.



Upstream of the first reach, the gradient decreases (~1%), but the confinement increases, creating fast flow and few pools. The lack of deeper slack water and the associated course substrates creates moderate fisheries values. This second reach is roughly 13 km long, ending at the confluence with the Nichyeskwa's largest tributary (Watershed Code: 480-370100-29400).

Upstream of this confluence the gradient decreases again (~0-0.5%) and the creek becomes unconfined, and meandering. This ~20 km long reach ends in the headwaters and contains the highest fisheries values in the mainstem due to smaller substrates (gravels instead of cobble and boulders) and more abundant slack water. Beavers and wetlands impact the upper half of this reach, while the lower half runs relatively unhindered. The lower half of this reach is suitable for steelhead and most salmon spawning while the upper half contains high quality spawning and rearing habitat suitable for coho.

1.2 Comparison to Other Babine Tributaries

In order to appreciate the value of Nichyeskwa Creek, some context within the Babine watershed is useful. The primary, large tributary rivers to the Babine are listed in Table 1. Nichyeskwa Creek is the smallest of these primary tributaries and the only non-glacial system of this size. A relatively high amount of mainstem channel is accessible, and flows are some of the lowest, draining terrain that tends to be drier than the other watershed.

With respect to fish habitat, Nichyeskwa Creek's key characteristics are it's size, and non-glacial flow. The turbid, cold flow of glacial systems make them better suited to char (bull trout and Dolly Varden), as opposed to trout and salmon. Many of the non-glacial tributaries to the Babine are small in comparison to Nichyeskwa Creek.

While this comparison is somewhat oversimplified (both Nilkitkwa and Shelagyote contain clear water tributaries) the key point remains: Nichyeskwa Creek is unique amongst Babine Tributaries in the amount of non-glacial habitat it contains.

Table 1. Basic morphometric and hydrologic statistics for the major tributaries to the Babine River. Smaller tributaries (Hanawald, Cataline, Thomlinson, Sam Green, Shegisic, etc.) are not included. Units for average water yield are mean annual discharge per 100 km^2. Data from Sebastian (1988).

Watershed	Glacial	Watershed Area (km^2)	Mean Annual Discharge	Average Water Yield	Length Accessible habitat in Mainstem
Nichyeskwa	No	340	7 m^3/s	2.0	41 km
Nilkitkwa	Yes	900	28 m^3/s	3.1	98.2 km
Shelagyote	Yes	580	20 m^3/s	3.5	47.6 km
Shedin	Yes	560	18 m^3/s	3.2	2.0 km

1.3 Historical Fisheries Work

Most of the salmon producing streams in the Skeena have been surveyed for annual salmon escapement estimates since the early 1950's (DFO 2002). Escapement estimates and general habitat comments are recorded in the DFO's Catalogue of Spawning Streams of the Skeena River. Some of the earliest habitat assessment work in the Babine consisted of a biophysical survey conduct between 1976 and 1979 by the Resources Analysis Branch (Ministry of Environment 1976). Data collection consisted of selecting 23 sites and measuring habitat information. This data was then expanded to reaches delineated by air photo interpretation. Fish data collection included only visual observations and occasional electrofishing.

Data collection for a steelhead habitat model was conducted in the late 1980s (Sebastian 1988) but the bulk of the fisheries work was conducted in the 1990's and later with funding from Habitat Conservation Trust Fund (HTCF) and Forest Renewal BC (FRBC). A series of steelhead telemetry studies conducted in the early and mid 1990's (Beere 1991, 1994, 1997, and unpublished data) was funded by HTCF and reconnaissance fish and fish habitat inventory was funded by FRBC (discussed below). Concern for the Skeena Coho stocks has also mobilized some DFO funds for sampling Skeena coho producing streams, including the Nichyeskwa.

1.4 Watershed Based Fish and Fish Habitat Inventory

The first reconnaissance (1:20,000) level fish and fish habitat inventory of the Nichyeskwa was conducted in 1997 (Triton 1998). The watershed was inventoried again by Triton in 2001 (Triton 2002a). The latest inventory reviewed previous inventory products, operational (1:5,000) and reconnaissance (1:20,000), and the available WLAP database: the Fisheries Information Summary System (FISS). Fisheries based reports that include the Nichyeskwa, such as many of those discussed in this report, were not reviewed. As these inventories were conducted for Pacific Inland Resources Ltd., no work was conducted outside the Bulkley TSA, where PIR has its forest licence. As a result, the headwaters of Nichyeskwa Creek were excluded from the inventory.

One of the most useful products of the Resources Inventory Standards Committee (RISC) fish and fish habitat inventory deliverables are the inventory maps. These maps show basic reach information (reach break location, gradient), as well as site information for fish sample sites, both historic and current. The maps produced as part of the 2001 inventory were purchased from Triton and have been provided to the Babine River Foundation as a resource.

2.0 Steelhead

2.1 Population Characteristics

The Babine River recreational steelhead fishery has an international reputation for high quality fishing in a spectacular pristine environment. Only summer run steelhead use the Babine, migrating into the Babine in late summer, and overwintering in freshwater before moving to spawning habitat the following spring.

Attempts have been made to estimate the spawning population of Skeena Steelhead. Estimated using radio-tagged fish have ranged from an escapement of ~24,600 fish for the entire Skeena in 1994 (Koski *et al.* 1995) to ~25,500 for the watershed upstream of Terrace (Alexander *et al.* 1996). The Babine is generally thought to support approximately 15-25% of the Skeena steelhead stock (Koski *et al.* 1995, Alexander *et al.* 1996).

2.2 Spawning Habitat

Steelhead spawning habitat ranges from large rivers to smaller headwater systems. General habitat requirements for steelhead spawning are: 25 cm of water or more flowing at 0.4-0.9 m/s over substrates 0.6-10 cm in diameter (Bjornn and Reiser 1991).

Several radio-tracking studies have been undertaken involving Skeena steelhead (Koski *et al.* 1995, Alexander *et al.* 1996). These studies have tagged fish in the lower Skeena and tracked their migrations to overwintering tributaries, with the goal of elucidating the relative size of different stocks, differences in run timing, upstream migration rates, harvest estimates of different fisheries, and estimating Skeena escapement. Tagging occurred in late summer and tracking continued into the late fall and early winter, when the fish would be in their overwintering habitat. In the Babine, only the Babine River mainstem was used for overwintering. Tracking of fish tagged in Alexander *et al.* (1996) the following spring was conducted by Beere (unpublished data), and is reported below.

The most useful telemetry work identifying steelhead spawning habitat in the Babine was conducted by Beere (1991, 1996, 1997, and unpublished data). In the first telemetry study, Beere (1991) tracked fifteen adult steelhead that were captured in the Babine River upstream of the Shelagyote River in early April 1990. These fish were radio tagged, and tracked by regular helicopter flights during the month of May. Spawning locations were inferred by fish movement into areas with spawning potential. This study was the first to confirm the importance of the Babine River between the DFO counting weir and the outlet of Nilkitkwa Lake (near the mouth of Bucher Creek), as a key spawning area for Babine steelhead. Eleven of the fifteen fish were tracked to this area. Two fish were tracked to points lower down in the Babine River, another to the mouth of Hanawald Creek, and one transmitter appears to have been regurgitated.

In Beere (1996), twenty-five adult steelhead were captured, tagged and tracked in the spring of 1994 using similar methodologies to the 1990 study. In addition to the helicopter flights, a stationary receiver was placed at the DFO weir, to log movement into the heavily used spawning area upstream. Roughly half (48%) of the successfully tagged fish appear to have spawned upstream of the DFO counting weir. Seven fish spawned in Babine tributaries: three in the Nichyeskwa, two in Secrete Creek, and one in each the Nilkitkwa and Shelagyote. The three fish in the Nichyeskwa, representing 12% of the total, were located at 2, 13, and 20 km in the Nichyeskwa mainstem, well into the headwaters. The location of these tagged fish is shown in Figure 2.

In Beere (1997), thirty-nine adult steelhead were captured and tagged in the fall of 1994, and tracked using helicopter flights and fixed stations through to early June, 1995. The primary goal of this study was to measure the proportion of steelhead moving through the DFO fence and determine if an escapement estimate could be calculated using these counts and telemetry data. As with the previous studies, fish movements to spawning habitat was tracked.

Of the thirty-nine fish captured, nineteen appeared to have either died, regurgitated the transmitter, or the transmitter failed. Five of the twenty remaining fish were tracked above the DFO weir. Three entered the Nilkitkwa, and twelve remained in the Babine River below the weir, presumably spawning here or undetected in tributaries. Intervals between tracking flights can be up to two weeks, during which migrations into spawning tributaries can be missed. No steelhead were tracked into the Nichyeskwa during this study.

The last and most ambitious of the Babine steelhead telemetry studies was conducted in 1996 (Beere, unpublished data). Thirty fish were tagged in the fall of 1995, thirty more the following spring. In addition, Beere tracked twelve fish tagged in the Skeena by Alexander *et al.* (1996) that moved into the Babine. Of the sixty fish tagged in the Babine, nine (14.8%) were tracked in the Nichyeskwa during the spawning season. Of the twelve fish tagged in the Skeena, four (33%) appear to have spawned in the Nichyeskwa.

Of the 134 fish tracked to suspecting spawning locations in the Babine during the 1990s telemetry studies, 11.9% (16 fish) appear to have spawned in Nichyeskwa Creek. Totals for all tributaries and the mainstem are shown in Table 2. **This data indicates that Nichyeskwa Creek is one of the most important tributaries in the Babine River for spawning steelhead**, second only to the Babine River itself**.** The Nilkitkwa was also found to be important at 11.2%, but none of the other streams received more than 4% of the spawners. The upstream most tracked location of fish in Nichyeskwa Creek, assumed to be close to or downstream of the actual spawning location, is shown in Figure 2. The upper reach of Nichyeskwa Creek is a significant spawning location for Babine River steelhead. Use of the lower portion of the mainstem appears to be less somewhat less, though the importance of the holding habitat in this the reach and its role as a migration corridor is recognized. Beere (pers. comm.) noted that many of the steelhead that were tracked in the Nichyeskwa were located at the mouths of small tributary streams, suggesting that the fish may be spawning in smaller systems and not the mainstem channel.

Table 2. Upstream most tracked locations for all steelhead radio-tagged and tracked in the Babine River system.

Source	Year Tracked	Nichyeskwa Ck	Secrete Ck.	Nilkitkwa River	Boucher Creek	Shelagyote R.	Hanawald Crk.	Babine River	
								U/S of Nichyeskwa	D/S of Nichyeskwa
Beere 1991	1990						1	11	2
Beere 1996	1994	**3**	2	1		1		12	7
Beere 1997	1995			3				6	10
Beere Unpub. Data	1996	**13**	3	11	4	1	1	23	19
	Total	**16**	5	15	4	2	2	52	38
	Percent total	**11.9%**	3.7%	11.2%	3.0%	1.5%	1.5%	38.8%	28.4%

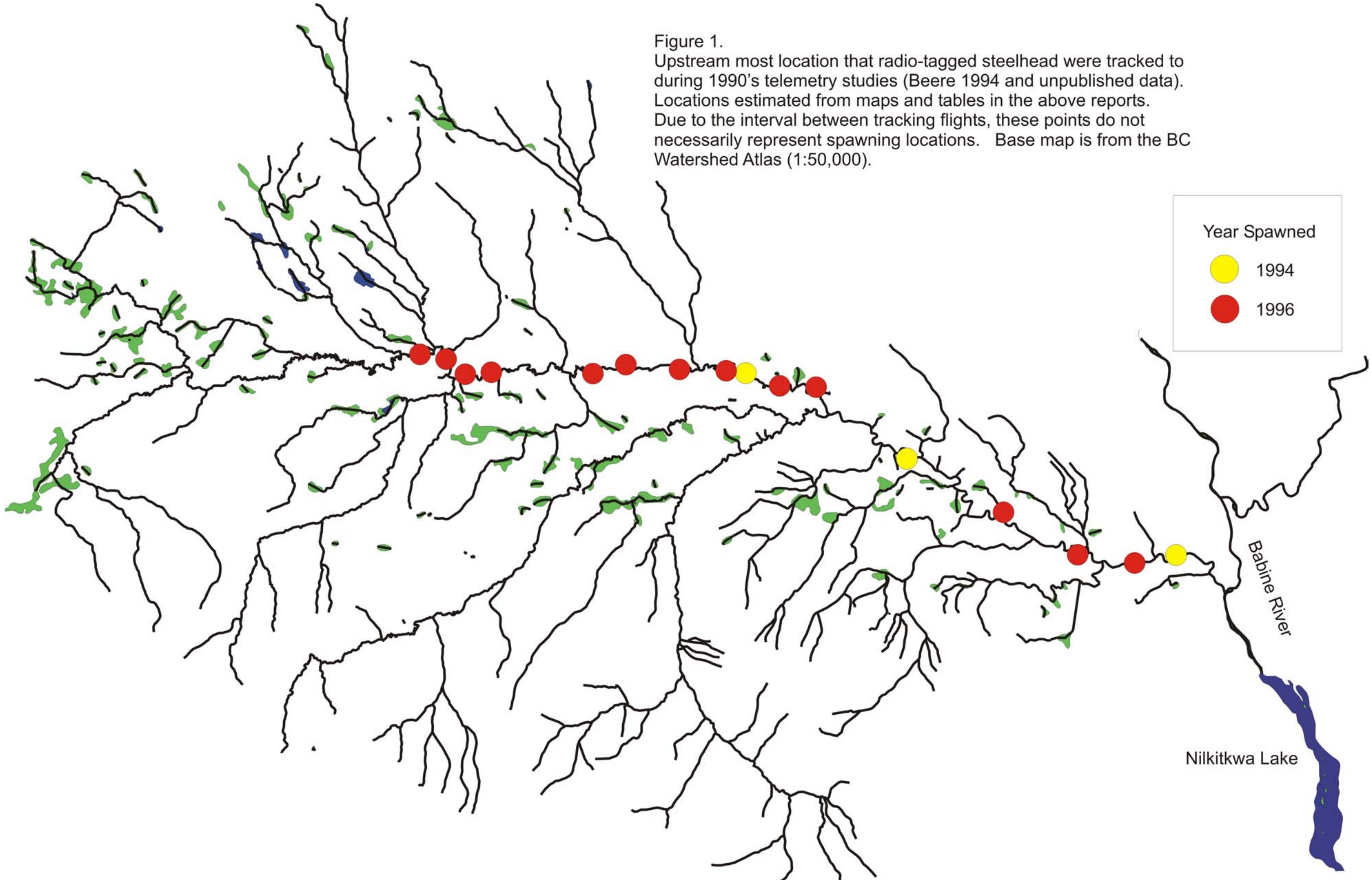


Figure 2. Upstream most location that radio-tagged steelhead were tracked to during 1990's telemetry studies (Beere 1994 and unpublished data). Locations estimated from maps and tables in the above reports. Due to the interval between tracking flights, these points do not necessarily represent spawning locations. Base map is from the BC Watershed Atlas (1:50,000).

2.3 Rearing Habitat

Sebastian (1988) is the only study focusing on juvenile steelhead habitat within the Babine watershed. Standard methods of the Fisheries Assessment and Improvement Unit (FAIU) were applied to several sites throughout the Babine mainstem and tributaries. These methods have been applied to many of the major steelhead producing rivers in the Skeena. This treatment includes estimating fish densities by electrofishing, then taking various habitat and hydrological measurements within the same site. Habitat suitability for fry and juveniles can then be estimated. In the Nichyeskwa, the site data was then expanded to the entire reach using various methods that include estimates of weighted usable area along the reach, as estimated by large scale air photos. Habitat capability was also estimated using a generalized model developed for BC streams that incorporates water temperature and fish size data to determine optimal levels of recruitment for sustained growth. Results of the estimates of available habitat are shown in Table 3.

The Nichyeskwa mainstem was stratified into three reaches as described in Section 1.1. Only one Nichyeskwa tributary was included in the analysis: the largest one flowing in from the south. Substrates were found to be large gravels and cobbles, providing excellent cover for steelhead fry. The authors noted a relatively high amount of sandy fines in the substrates, and recommended this system be identified as potentially sensitive to sediment inputs. Nilkitkwa and Shelagyote were also characterized this way.

Table 3. Some juvenile steelhead habitat areas and percent usability for the selected systems in the Babine River system. Channel length is that available to anadromous fish (ie: downstream of barriers). Data from Sebastian (1988). Note the Nichyeskwa has the highest percent usable habitat.

System	Channel Length (km)	Wetted Area (ha)	Usable Habitat for Steelhead Fry (ha)	Percent Usable for Steelhead Fry (%)
Babine River Mainstem	99.8	497.0	49.9	10.0%
Nichyeskwa	**41.0**	**39.5**	**22.9**	**58.0%**
Niklitkwa	98.2	261.0	52.2	20.0%
Shelagyote	47.6	113.5	20.4	18.0%
Shedin	2.1	5.0	0.8	16.0%
Boucher	7.5	4.0	2.7	67.5%

Fish sampling found that most sites in the Babine and Nichyeskwa Creek had the highest fry densities in the watershed. Densities in the the Babine, Nichyeskwa, and Boucher creeks were estimated to be either at, near or in some cases in the Babine, above levels required to saturate the habitat. Densities tended to be much lower in the Nilkitkwa and Shelagyote systems, with the exception of the upper, clearwater portion of the Nilkitkwa.

Total population estimates for each system were derived from the fish sampling and habitat data. The best overall estimates of population sizes are contained in Table 4. While the reliability of the estimates was described by the author as “fairly low”, the differences between the various systems are large enough to discuss relative importance with confidence.

The Babine mainstem was found to be the most productive system in the watershed, producing almost 70% of the total steelhead fry in the Babine. The Nichyeskwa is the most important tributary by far, producing 23% of the fry. As would be expected, the glacially dominated tributaries are much less productive, each producing less than 5% of the total. Many of the other clear water tributaries (Bocher Creek, Secrete Creek, etc) are also productive, but small. The key to the high productivity of Nichyeskwa Creek is its large size and clear, non-glacial, water. Sebastian (1988) noted in his conclusions that 95% of the steelhead fry production occurred in non-glacial streams.

Table 4. Estimates of juvenile steelhead population numbers in the Babine Watershed. Data from Sebastian (1988). The data indicates that Nichyeskwa Creek is the most important nursery stream tributary to the Babine for steelhead fry production.

Stream	Estimated Fry Production (Fry*1000)	% of Total	Theoretical Fry to Smolt Survival (%)	Estimated Smolt Production (Smolts *1000)	% of Total
Babine River Mainstem	1,120.0	68.6%	9.2%	88.8	79.6%
Nichyeskwa	379.5	23.2%	4.2%	16.45	14.7%
Niklitkwa	68.7	4.2%	3.9%	2.68	2.4%
Shelagyote	15.0	0.9%	4.2%	0.63	0.6%
Boucher	50.1	3.1%	6.0%	3.0	2.7%

Though the purpose of the study was fry production, Sebastian (1988) also modelled fry-to-smolt survival and smolt yield for the systems he studied. The models used water quality data, primarily temperature, alkalinity, and total dissolved solids, and average fish size. The results, shown in Table 4, indicate that again the Babine mainstem is the most productive water, followed by the Nichyeskwa. Other tributaries make minor contributions to the total Babine productivity in comparison.

Though the methods employed in this study were not designed to measure parr habitat, it was noted that rearing habitat for steelhead parr appeared to be limited in the Nichyeskwa. This is due largely to the lack of deeper water, as is typical of smaller to medium sized steelhead nursery streams. It was estimated that approximately 30% of the older parr (age 2+) would migrate out of the Nichyeskwa due to competition for habitat. These fish would take advantage of habitat in the Babine mainstem.

While Sebastian (1988) focused on the rearing habitat in the larger river and creek systems, it is important not to discount the contribution of small (2-3 m channel width) stream habitat. Juvenile steelhead may remain in Nichyeskwa for up to 3 years, during which they are vulnerable to the larger piscivors that rear in larger systems. By rearing in small channels, juvenile steelhead can avoid this predation risk.

The fish inventory information for the Bulkley Forest District portion of the Nichyeskwa compiled by Triton (2002a) shows rainbow trout to be widespread throughout the Nichyeskwa in channels down to 2-3 m wide. These fish were identified as resident rainbow trout by Triton, but a good portion may be juvenile steelhead, given what we know about steelhead spawner distribution (Beere 1994 and unpublished data) and what we know about juvenile steelhead behaviour (Beere pers. comm.). While the relative contribution of the smaller tributary rearing habitat compared with the mainstem Nichyeskwa is unknown, it is likely significant.

3.0 Coho Salmon

3.1 Population Characteristics

The Department of Fisheries and Oceans maintains the Salmon Escapement Database System (SEDS) which contains spawner return records for major waterbodies in the province (DFO 2002). The SEDS database contains count data for Nichyeskwa Creek for 17 years dating from 1953 to 1985 (DFO 2002). These counts range from 150-1,000 spawners. However, aerial surveys of coho spawners are well known to underestimate total numbers for a watershed, due largely to the lack of visibility on small tributaries and side channels heavily used by coho. The Skeena coho stock assessment officer for DFO estimates that Nichyeskwa Creek receives roughly 15,000-20,000 spawners a year and produces 200,000 smolts (Barry Finnegan, pers. comm.). Migration into Nichyeskwa Creek begins in early September and spawning occurs through late October.

3.2 Spawning Habitat

DFO stock assessment staff used to perform aerial surveys of Nichyeskwa Creek annually. In recent years, aerial counts have been more sporadic. The staff conducting these surveys report that coho spawning occurs far into the headwaters of Nichyeskwa Creek, wherever suitable habitat is accessible (B. Finnigan, pers. comm.). Coho will spawn in very small systems (~2 m channel width) and it is possible that many of the small, accessible tributaries to Nichyeskwa Creek are used for coho spawning.

3.3 Rearing Habitat

Juvenile coho rear in streams, but the most productive fry and parr habitat is found in standing water associated with streams: ponds, sloughs, off and side channels. This habitat is absent in the lower reaches of Nichyeskwa Creek, but is abundant upstream. Sebasian (1988) noted that upper Nichyeskwa (above 15 km) was one of the most important areas for coho production. This area has also been identified as important by the DFO coho stock assessment biologist (B. Finnegan, pers. comm.). This low gradient section of Nichyeskwa Creek is heavily impacted by beaver dams, creating the abundant, productive coho habitat.

Due to conservation concerns for upper-Skeena coho, DFO has been conducting synoptic surveys of coho rearing habitat throughout the Skeena since 1994 (Taylor, various dates). Three sites have been sampled in Nichyeskwa Creek over the length of the surveys. The sites are all located in the low gradient section noted above. These surveys involved isolating a section of creek habitat with fine mesh nets, and conducting multiple pass removal using seine nets or electrofishing, to generate a population estimate. Species captured at the Nichyeskwa Creek sites include coho, rainbow trout, cutthroat trout and Dolly Varden. Spatial estimates for coho numbers in 2000 range from 4.1 to 12.1 fish per 10 m^2. By way of comparison, the clear water portion of the Nilkitkwa ranged from 19.1-25.9, Nine Mile Creek 6.2-7.2, Lamprey Creek 4.5, and Boucher Creek 2.0-9.6 fish per 10 m^2. Taking into account the amount of habitat available and the coho densities in the habitat, DFO Coho Stock Assessment Biologist Barry Finnegan has characterized the Nichyeskwa as a “significant, mid-range coho producer” in the Babine.

4.0 Chinook Salmon

4.1 Population Characteristics

A small population of chinook salmon use Nichyeskwa Creek for spawning. Department of Fisheries and Oceans SEDS data (DFO 2002) contains 17 records for chinook counts from 1953 to 1994. Run size estimates range from 50 (in 1962, 1966, 1967 and 1994) to 800 (in 1959) fish with an average of 260. No fish were observed during a stream inspection in 1970 and 1972.

4.2 Spawning Habitat

Chinook use larger substrates for spawning than trout, steelhead or coho, relying mostly on cobbles (7-15 cm diameter) rather than gravels (0.5-5 cm diameter). Habitat of this type is available in the lower portion of Nichyeskwa Creek. DFO records note that chinook spawning is dispersed throughout the lower 16 km of Nichyeskwa Creek (Mike Jacabouski, pers. comm.).

4.3 Rearing Habitat

Chinook rear in freshwater for one year before migrating to the ocean. There are no records of juvenile chinook being captured in Nichyeskwa Creek. Rearing habitat tends to be the mainstems of relatively large rivers and creeks. While fish sampling effort in the lower portion of the river has been relatively light, it can be assumed that most juvenile chinook migrate out of Nichyeskwa Creek to rear in the Babine and Skeena rivers.

5.0 Sockeye Salmon

There are four records of sockeye escapement to Nichyeskwa Creek in DFO's SEDS database (DFO 2002). The average escapement is 730 with a range of 10 to 1600. Interviews with DFO stock assessment personnel, suggest that there may not, in fact, be a distinct Nichyeskwa stock. These numbers may represent overflow from the huge Babine stock, some of which will move a distance into a tributary stream to spawn without establishing a distinct stock.

Sockeye would migrate into Nichyeskwa Creek beginning in July and spawn through late September. Juvenile sockeye will school after emergence the following spring and migrate downstream into the Babine River and upstream into Nilkitkwa Lake and Babine Lake to rear.

6.0 Pink Salmon

Nichyeskwa Creek supports small numbers of pink salmon spawners. DFO SEDS data contains records for pink spawner numbers ranging from 60-2,000 dating from 1967 to 1995. It is unclear if pink spawning in Nichyeskwa Creek represents a distinct stock, or if it is a portion of the larger Babine run (T.Turnbull, B. Finnegan, pers. comm.).

Our knowledge of pink spawning location is limited, based largely the memory of technicians who conducted overflight assessments in the 1980's. Pink spawners appear to use mostly the lower portion of Nichyeskwa Creek and some of its tributaries (Terry Turnbull, pers. comm).

Juvenile pink migrate downstream to the estuary almost immediately after emergence in early spring, and therefore do not make use of freshwater rearing habitat.

7.0 Rainbow Trout

7.1 Population Characteristics

Fish inventories and synaptic surveys of fish populations in Nichyeskwa Creek regularly capture juvenile rainbow trout. Steelhead motivated surveys have called these fish juvenile steelhead (Sebastian 1988), while stream classification motivated inventories have called these same fish stream resident trout (Triton 1998, 2002a). The life history of these fish is ultimately not known. Four possible life histories exist for juvenile rainbow trout in Nichyeskwa Creek:

1. Anadromous – The steelhead life history. These fish rear as juvenile rainbow trout for 2-7 years in freshwater before migrating downstream to the ocean.
2. Lacustine – Babine Lake contains large (~4-6 kg) piscivorous rainbow trout that support a popular recreational, boat based lake fishery (Bustard 1987). These fish move into Babine Lake tributaries to spawn. The juveniles in the streams for several years before moving to the lake. Use of Nichyeskwa Creek by Babine lacustrine rainbow trout has not been investigated.
3. Fluvial – These fish rear to mature size in larger rivers such as the Babine, and migrate into smaller streams to spawn. As with lacustrine fish, the juveniles rear in the nursery streams for a year or two before moving downstream. Very little is known about the existence or habits of fluvial rainbow trout in the Babine River.
4. Stream resident – These fish remain in the smaller streams for their entire life cycle, maturing and spawning at a young age (2-4 years) and relatively small ize (150-200 mm fork length). It is possible to differentiate fish with this life history by dissection. These fish will show signs of sexual maturity in gonadal development at small size (110-140 mm), while the other fish will show no gonadal development at the same size.

The information gathered by Beere (1994, 1997, and unpublished data), indicates that steelhead spawn far into the headwaters of Nichyeskwa Creek. Given this, plus the high degree of mobility of juvenile steelhead fry and parr, is possible that many of the juvenile rainbow captured in Nichyeskwa have an anadromous life history (steelhead). Dissection of rainbow trout >100 mm fork length by field survey crews could identify stream resident fish but this is rarely done by inventory crews in the interest of saving time and reducing impacts on the fish populations.

7.2 Spawning and Rearing Habitat

The location of steelhead spawning and rearing habitat is discussed in sections 2.2 and 2.3. Large lacustrine and fluvial trout may likely use the same habitat. Small resident trout, if present, would use suitable spawning gravels in smaller streams. Rearing habitat is abundant in channels of sufficient size throughout the Nichyeskwa watershed. The results of fish inventories show that rainbow are wide spread throughout the watershed (Triton 2002a).

8.0 Dolly Varden

In Nichyeskwa Creek, as elsewhere in the region, Dolly Varden is a common headwater resident fish. This species was captured throughout the watershed, and was often the only species in the accessible upper reaches of many of the small creeks (Triton 2002a). Dolly Varden was captured in small numbers in the larger channels, but most of the catch here is comprised of juvenile rainbow and coho where the habitat is suitable. Throughout the watershed, Dolly Varden is likely the most numerous fish species after rainbow trout and coho.

Stream resident Dolly Varden will spawn and rear in the smaller channels in the Nichyeskwa watershed. These fish will reach sexual maturity and spawn as young as two to three years. The intense physiological demands of spawning greatly reduce overwintering success, and resident fish older than four or five are rare.

Dolly Varden is Blue Listed (ie: vulnerable) by the BC Conservation Data Centre. This designation has been applied to the anadromous life history of this species, which is vulnerable to by-catch by the commercial fishery due to its migrations through the estuary. While the stream resident form is not generally considered vulnerable, it is dependent on smaller creeks in systems like the Nichyeskwa. Small creek habitat is heavily dependent on its watershed. Poor forestry practices within a small watershed can severely impact the fish population there.

9.0 Cutthroat Trout

Only one record exists for cutthroat trout in Nichyeskwa Creek. Taylor (1998) reports capturing 17 cutthroat trout at two sites in upper Nichyeskwa Creek. No rainbow trout, a much more common species in Nichyeskwa Creek were reported captured at either of these two sites during this survey. Juvenile cutthroat and rainbow can be difficult to separate and it is possible that the fish were mis-identified at these sites. At this point in time, it is assumed that cutthroat trout do not heavily use Nichyeskwa Creek.

10.0 Bull Trout

Only one fish identified as a bull trout (Salvelinus confluences) has been captured in Nichyeskwa Creek. The fish was collected in the largest Nichyeskwa tributary (unnamed creek, Watershed Code 480-370100-29400) during a fish inventory of the area (Triton 1998). The identification was regarded as suspect, and subsequent inventory work in the same area found no further bull trout (Triton 2002a). The 1998 fish was not taken as a voucher specimen and the identification cannot be confirmed. This fish is now considered to have been a mis-identified Dolly Varden.

In many watersheds, a lack of records for bull trout is due to this fish's relatively recent recognition as a species (Hass and McPhail 1991), and the difficulty in separating juvenile bull trout from Dolly Varden in the field. In the case of Nichyeskwa Creek, the lack of bull trout appears to fit a pattern noted in other Babine tributary systems.

Juvenile bull trout and rainbow trout (or steelhead) compete for habitat (Haas 2001). Bull trout have a competitive advantage in colder water and rainbow trout in warmer water systems. In the Shelagyote River system, Triton (2002b) conducted an inventory focusing on identifying bull trout habitat and found that bull trout and rainbow trout were strongly segregated by watershed type. Cold, glacial systems contained bull trout and no rainbow, the opposite was true of clear, warmer water systems. The Nichyeskwa is a relatively warm, clear water system. Juvenile bull trout would be out-competed and excluded by the numerous juvenile steelhead.

11.0 Other Sport Fish

Mountain whitefish (*Prosopium williamsoni*) is common in large river systems throughout the Skeena, and is likely present in low numbers in the Nichyeskwa Creek mainstem and perhaps some of the larger tributaries. There is a record for mountain whitefish in Nichyeskwa Creek approximately 10 km upstream of the mouth.

Burbot (*Lota lota*) are present in the Babine watershed and may make use of the Nichyeskwa sporadically. This fish is primarily limited to lakes, though does move into rivers and streams from time to time. No records were found of burbot in Nichyeskwa Creek.

12.0 Non-Sport Fish

Triton (1998) reports the capture of an unidentified chub species in Nichyeskwa Creek. There are no reports of suckers (*Catostomus* sp.), northern pike minnow (*Ptychocheilus oregonensis*), sculpin (*Cottus* sp.) or other non-sport fish species in Nichyeskwa Creek, though these species are known to occur in Babine Lake.

13.0 Key Habitats

While all water bodies in the Nichyeskwa Creek drainage have some fisheries values as migration corridors, source of clean water, etc., some areas contain key spawning and rearing habitat that is primarily responsible for the fish production capacity of Nichyeskwa Creek. These areas are listed below.

1. <u>Upper Nichyeskwa</u>. The upstream, low gradient portion of Nichyeskwa Creek (reach 3 in Figure 1), contains habitat that is key to the high coho productivity of this system. Steelhead also use this area heavily for spawning and rearing, though steelhead habitat appears to be more broadly distributed throughout the watershed.
2. <u>Small Creeks</u>. Steelhead and coho can spawn and rear in very small creeks. Rainbow trout that are likely juvenile steelhead are widespread through the small creeks of the Nichyeskwa watershed. While the relative contribution of small systems compared to mainstem systems is unknown in the Nichyeskwa, it is likely significant. Due to these systems dependence on the small land areas they drain, they can be heavily impacted by poor forest development practices.
3. <u>Lower Nichyeskwa</u>. This reach serves as a migration corridor to the important upper sections of Nichyeskwa Creek. It also contains the only chinook spawning habitat in the watershed, and provides rearing habitat for juvenile steelhead.

14.0 Conclusions

Nichyeskwa Creek has high fish values, used heavily by both steelhead and coho for spawning and rearing. It is one of the most productive Babine tributaries for steelhead, receiving 11.9% of the Babine spawners. Habitat models estimate that it accounts for 23.2% of the fry and 14.2% of the steelhead smolts produced in the Babine. While the accuracy of these estimates is acknowledged as poor, other Babine tributaries have productivity estimates of less than 5%. Nichyeskwa Creek is unquestionably a key system for Babine steelhead.

Nichyeskwa Creek is a significant coho producer in the Babine, with highly productive habitat in the headwaters. A small run of chinook salmon spawns in the lower reaches of this system, and it receives some spawning use by pink and sockeye. It appears unlikely, however, that the pink and sockeye in Nichyeskwa Creek comprise a stock distinct from the Babine run. Rainbow trout are common throughout the watershed, though the life history of these fish is unknown and it is suspected that many are steelhead. Dolly Varden are widespread as resident fish, and some whitefish are present in the mainstem. There are records for both bull trout and cutthroat trout in the watershed, but these appear to be in error.

The upper portion of the mainstem contains the highest quality fish habitat. The lower gradients and gravel substrates in this reach are well suited to steelhead and coho spawning, and the abundant wetlands and beaver development creates productive coho rearing habitat. This section is key to the fisheries productivity of Nichyeskwa Creek.

Coho and steelhead rely heavily on fresh water rearing habitat, and both of these species can use small creeks for spawning and rearing. The many small tributaries that flow into the Nichyeskwa mainstem are known to contain rainbow (steelhead) and may contain coho. Small creeks are the most vulnerable to poor logging practices.

Lower Nichyeskwa Creek contains the only chinook spawning habitat in the watershed. This section of the creek is also important to steelhead and coho as a migration corridor to access the upstream habitat.

The fisheries values of Nichyeskwa Creek are not well known outside government agency fisheries biologists. This system has been identified as potentially sensitive to sediment inputs (Sebastian 1988). Special consideration is warranted by forest licensees as development proceeds in this watershed.

15.0 References

Beere, M.C. 1991. Radio telemetry investigations of Babine River steelhead, spring 1990. British Columbia Ministry of Environment, Lands, and Parks; Recreational Fisheries Branch, Skeena Region. Skeena Fisheries Report #71.

Beere, M.C. 1996. Movement of summer run steelhead trout tagged with radio transmitters in the Babine River during spring, 1994. British Columbia Ministry of Environment, Lands, and Parks; Fisheries Branch, Skeena Region. Skeena Fisheries Report #94.

Beere, M.C. 1997. Movement of summer run steelhead trout tagged with radio transmitters in the Babine River during the fall, 1994. British Columbia Ministry of Environment, Lands, and Parks; Fisheries Branch, Skeena Region. Skeena Fisheries Report #96.

Bjorn, T.C. and W.R. Meehan. Habitat requirements of salmonids in streams. American Fishereis Society Special Publication 19:83-138.

British Columbia Ministry of Environment. 1976. Biophysical stream survey of several stream in the Babine Nilkitkwa Area. Fisheries & Marine Service Data Report. Series PAC/D-76-3. Government Report.

Bustard, D. 1987. Babine Lake Creel Survey. 1985-1986. Unpublished consultants report prepared for Ministry of Environment, Smithers, BC by David Bustard and Associates.

Department of Fisheries and Oceans. 2002. Salmon Escapement Database System (SEDS). Area 4 Escapement. Fisheries and Oceans Canada, Prince Rupert.

Haas, G.R. 2001. The mediated associations and preferences of native bull trout with rainbow trout with respect to maximum water temperatures, its measurement standards, and habitat. Bull Trout II Conference Proceedings 99-99.

Haas, G.R. and J.D. McPhail. 1991. Systematics and distributions of Dolly Varden (*Salvelinus malma*) and bull trout (*Salvelinus confluentus*) in North America. Can. J. Fish Aquatic Sci. 48:2191-2221.

Koski, W.R. 1995. Distribution, timing, and number of coho salmon ad steelhead returning to the Skeena watershed in 1994. LGL Limited Environmental Research Associates. Consultants report prepared for Fisheries Branch, BC Ministry of Environment, Lands and Parks.

Sebastian, D. 1988. Steelhead production characteristics of the Babine River and Tributaries, 1987. Fisheries Project Report No. FAIU-09. Fisheries Assessment and Improvement Unit, Recreational Fisheries Branch. Victoria, BC.

Taylor, J.A. 1998. Synoptic surveys of juvenile coho population in lakes and stream within the Skeena River watershed, British Columbia, 1998. Unpublished consultants report prepared for Fisheries and Oceans Canada.

Taylor, J.A. 2000. The 2000 synoptic survey of juvenile coho population in selected lakes and stream within the Skeena River watershed, British Columbia. Unpublished consultants report prepared for Fisheries and Oceans Canada.

Taylor, J.A. 2001. A synoptic survey of juvenile coho population in lakes and stream within the Skeena River watershed, British Columbia, 2001. Unpublished consultants report prepared for Fisheries and Oceans Canada.

Triton Environmental Consultants Ltd . 1998. Reconnaissance Level fish and fish habitat inventory in the Bulkley TSA. (Working Unit #3 – Nichyeskwa). Unpublished consultants report prepared for Pacific Inland Resources Ltd.

Triton Environmental Consultants Ltd . 2002a. Reconnaissance (1:20,000) fish and fish habitat inventory in the Nichyeskwa Watershed. WSC 480-310670 – WSC 480-370100-62500-76400. Unpublished consultants report prepared for Pacific Inland Resources Ltd., Smithers, BC

Triton Environmental Consultants Ltd . 2002b. Reconnaissance (1:20,000) Fish and Fish Habitat Inventory of the Shelagyote River (Shelagyote River Planning Area) WSC 480-069500 to WSC 480-195700. Unpublished consultants report prepared for NWBC Timber and Pulp Ltd., Terrace, BC.