Biological and Habitat Data for Bull Trout (*Salvelinus confluentus*) and Associated Species from Stream Surveys Conducted in the Southern and Central Mackenzie River Valley, Northwest Territories, 2000 to 2001

N.J. Mochnacz[1], J.D. Reist[1], P. Cott[2], G. Low[3], and R. Wastle[1]

Central and Arctic Region
Fisheries and Oceans Canada
[1]Winnipeg, MB R3T 2N6
[2]Inuvik, NT X0E 0T0
[3]Hay River X0E 0R9

2004

Canadian Data Report of Fisheries and Aquatic Sciences 1131

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Fisheries and Aquatic Sciences

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Canadian Data Report of
Fisheries and Aquatic Sciences 1131

2004

BIOLOGICAL AND HABITAT DATA FOR BULL TROUT (*Salvelinus confluentus*) AND ASSOCIATED SPECIES FROM STREAM SURVEYS CONDUCTED IN THE SOUTHERN AND CENTRAL MACKENZIE RIVER VALLEY, NORTHWEST TERRITORIES, 2000 to 2001

by

N. J. Mochnacz[1], J. D. Reist[1], P. Cott[2], G. Low[3], and R. Wastle[1]

Central and Arctic Region
Fisheries and Oceans Canada
[1]Winnipeg, Manitoba R3T 2N6
[2]Inuvik, Northwest Territories X0E 0T0
[3]Hay River, Northwest Territories X0E 0R9

Cat. No. Fs 97-13/1131E ISSN 0706-6465

Correct citation for this publication:

Mochnacz, N. J., J. D. Reist, P. Cott, G. Low, and R. Wastle. 2004. Biological and habitat data for bull trout (*Salvelinus confluentus*) and associated species from stream surveys conducted in the southern and central Mackenzie River Valley, Northwest Territories, 2000 to 2001. Can. Data Rep. Fish. Aquat. Sci. 1131: iv + 38p.

ABSTRACT

Mochnacz, N. J., J. D. Reist, P. Cott, G. Low, and R. Wastle. 2004. Biological and habitat data for bull trout (*Salvelinus confluentus*) and associated species from stream surveys conducted in the southern and central Mackenzie River Valley, Northwest Territories, 2000 to 2001. Can. Data Rep. Fish. Aquat. Sci. 1131: iv + 38p.

In the summer and fall of 2000 and 2001 stream surveys were conducted in 18 different tributaries from three major river systems in the southern and central Northwest Territories. Biological data for all species sampled during the two-year study are presented, with emphasis on bull trout. Habitat surveys were completed in six tributaries from the study area. General physical stream features were documented in these six streams, and physical attributes of habitat were also described in Funeral Creek at specific positions where bull trout were captured. The data presented in this report confirm the presence of bull trout in nine tributaries throughout drainages in the southern and central Mackenzie Valley. Results suggest that bull trout populations are small but wide ranging, using a variety of habitat types over a large geographical area. Much of the habitat that bull trout occupy in this region is similar to habitat occupied in the southern part of their distribution. Complete data are provided for both biological sampling and habitat measurements taken during the study.

Key Words: Northwest Territories; NWT; Keele River ; Arctic; oil and gas exploration; Nahanni National Park; habitat preference; bull trout; Arctic grayling; Drum Lake; Liard River; Funeral Creek

RÉSUMÉ

Mochnacz, N. J., J. D. Reist, P. Cott, G. Low, et R. Wastle. 2004. Biological and habitat data for bull trout (*Salvelinus confluentus*) and associated species from stream surveys conducted in the southern and central Mackenzie River Valley, Northwest Territories, 2000-2001. *Can. Data Rep. Fish. Aquat. Sci.* 1131: iv + 38p.

Pendant les saisons d'été et d'automne de 2000 et de 2001, des relevés ont été effectués dans 18 tributaires de trois importants réseaux hydrographiques du sud et du centre des Territoires du Nord-Ouest. Les données biologiques recueillies pendant l'étude de deux ans sur toutes les espèces échantillonnées, plus particulièrement sur l'omble à tête plate, sont présentées ici. Des relevés complets des habitats ont été réalisés pour six tributaires de la zone d'étude. Les caractéristiques physiques générales de ces six cours d'eau ont été documentées, et celles des habitats du ruisseau Funeral ont également été décrites pour les endroits précis où l'omble à tête plate a été capturé. Les données présentées dans ce rapport confirment la présence de l'omble à tête plate dans neuf tributaires sur l'ensemble des bassins hydrographiques dans le sud et le centre de la vallée du Mackenzie. Les résultats semblent indiquer que les populations d'ombles à tête plate sont petites mais largement réparties, et qu'elles fréquentent des habitats variés sur un large secteur géographique. Une bonne partie de l'habitat que l'omble occupe dans cette région est semblable à l'habitat occupé dans la partie sud de son aire de distribution géographique. Les données complètes recueillies pendant l'étude sur les mesures biologiques et sur les habitats sont présentées ici.

Mots clés: Territoires du Nord-Ouest; T.N.-O.; rivière Keele; Arctique; exploration pétrolière et gazière; parc national Nahanni; préférence d'habitat; omble à tête plate; ombre arctique; lac Drum; rivière Liard; ruisseau Funeral

INTRODUCTION

The bull trout, *Salvelinus confluentus* (Suckley) is a native char found throughout western North America. West of the continental divide, the species' distribution originally extended from northern California (~ 41° N) and Nevada (McPhail and Baxter 1996), throughout central British Columbia, north into the southern Yukon Territory (Cavender 1978; Haas and McPhail 1991). East of the continental divide the distribution extended from northern Montana and throughout much of western Alberta (Nelson and Paetz 1992; McPhail and Baxter 1996; Fitch 1997). Peripheral populations in the southwestern United States have been extirpated from the McCloud River, California and from three major tributaries in the Willamette system, Oregon (Goetz 1989; McPhail and Baxter 1996). A decline or absence of local populations has also been observed in Alberta (McCart 1997), and there is evidence of drastic declines in several local populations in Nevada, Washington, and British Columbia (Haas and McPhail 1991; McPhail and Baxter 1996).

Such declines have led to formal listings of bull trout as "threatened" within the coterminous United States (U. S. Fish and Wildlife Service 1999) and "sensitive" in Alberta, British Columbia, and the Yukon Territory (Canadian Endangered Species Conservation Council 2001). Bull trout are considered a species that could be at risk of extinction or extirpation in the Northwest Territories (NWT), and are a candidate for a detailed risk assessment (Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development 2000). Impacts contributing to the decline of southern bull trout populations include fragmentation and isolation of populations by man-made structures; over-fishing; habitat disturbance from industrial activities such as seismic, pipeline, forestry and mining work; interaction with exotic species; and, the cumulative effects of these activities (Ford et al. 1995; McCart 1997; Baxter et al. 1999). The present distribution extends from the northwestern United States (~ 42°N) throughout interior drainages of British Columbia, western Alberta, and the southern Yukon Territory, north throughout the south-central Mackenzie River valley, NWT (~ 64°N) (Fig. 1; Haas and McPhail 1991; Reist et al. 2002).

Recent work has confirmed that bull trout populations are more widespread than first thought in the NWT. Captures from locations east and west of the Mackenzie River confirmed the presence of this species approximately 500 km north of the previous northernmost known distribution (Fig. 1; Reist et al. 2002). Repeated capture of bull trout at these locations suggests that these fish are part of self-sustaining populations rather than strays from southern watersheds. However, the actual distribution and biology of bull trout populations occurring in the NWT are poorly understood (Reist et al. 2002). Furthermore, taxonomic confusion between bull trout and Dolly Varden (*Salvelinus malma*) in the past, and lack of clear, easily applied criteria for identification, have resulted in mis-identification of chars throughout the region.

In 2000, the Department of Fisheries and Oceans (DFO), Arctic Fish Ecology Assessment and Research section developed a two-year study designed to acquire distributional and biological information for riverine (fluvial) chars, specifically bull trout in watersheds of the southern and central NWT. The project was implemented during the summer and fall of 2000 and 2001 with assistance from DFO Fish Habitat Management and the Fisheries Management staff in the region. The intent of the work was to provide information to habitat managers that can be utilized when conducting environmental assessments of development proposals. If areas, times of use, and habitats are identified that may be sensitive for particular fish species, projects can be planned so these are avoided thereby minimizing disturbance. The study will also provide fisheries managers with information on the distribution and biology of bull trout populations and associated species in the NWT. The two-year study was completed in the fall of 2001, and this report provides a compilation of habitat and biological data for bull trout and associated species captured.

MATERIALS AND METHODS

Biological Data Collection

Stream surveys were conducted in 18 different tributaries from the Keele, South Nahanni, and Liard river systems (Fig. 2). Fish were captured using a Smith-Root Type VII POW backpack electroshocker, angled using barbless hooks in larger tributaries where depth and flow prevented wading, and fished with multimesh gillnets in deep, low velocity areas. In 2000, streams were sampled in areas which char (i.e., bull trout and/or Dolly Varden) were reported to occur by local people or by consultants and government agencies that have worked in the region. In 2001, streams known to contain bull trout were stratified into lower, middle, and upper reaches and 200 – 500 m stretches were electrofished.

Population estimates of bull trout were completed at four randomly selected reaches (~200 m) in Funeral Creek (61° 36’ N, 124° 48’W) using the Zippin three-removal method (Zippin 1958). Funeral Creek was the only stream where population estimates were conducted, as this watercourse was the only safely wadable site where bull trout were caught consistently during the study. Each reach was blocked at the lower and upper boundary by seine nets to prevent fish movement into and out of the sampling area. Three consecutive electrofishing passes were performed in an upstream manner and the number of bull trout captured during each pass was recorded. Approximately twenty minutes elapsed before each subsequent electrofishing pass was conducted in each reach. The number of bull trout captured during each pass was entered into the “Microfish” program which calculates the maximum-likelihood population size estimates at 95% confidence intervals based on the number of fish captured on each electrofishing pass (Van Deventer and Platts 1989).

To minimize research impacts on populations a combination of live- and dead-sampling was conducted. The data collected for each differed as described below.

Live Sampling

At each sampling location all fish captured were identified to species prior to release. Due to time and resource limitations during the study, biological data were only collected for randomly selected fish of species other than char. All char captured were held in a fish bag, which is a long tubular bag with mesh on the anterior and posterior ends to ensure water circulation. Fish bags were securely anchored in slow moving water to provide a well oxygenated holding facility before and after biological sampling. Biological data, which included fork length (nearest mm), weight (nearest g), sex and maturity state, were documented where possible. Life history type and life stages were assigned to bull trout based on external characteristics, such as size, colour, and presence of parr marks. All bull trout > 200 mm were fitted with an individually numbered Floy-tag inserted at the base of the dorsal fin between the posterior basal pterygiophores. A portion of the adipose fin was removed for genetic analysis and as a secondary marking method. The first fin ray was removed from the left pelvic fin to evaluate the effectiveness of non-lethal ageing using this structure. Once biological data were recorded and structures were taken, bull trout were placed back into the fish holding bag to recover and then released at the same location that they were originally captured.

Dead Sampling

In locations where bull trout were captured, a limited number of fish were sacrificed for confirmation of species' identity and to acquire additional biological information. Char retained from field sampling were frozen whole and shipped to DFO in Winnipeg. These char were compared to positively identified bull trout to confirm species' identify from qualitative morphological criteria described in literature (Cavender 1978; Haas and McPhail 1991; Nelson and Paetz 1992; Reist et al. 2002). A linear discriminant function (LDF) shown to be 100% effective in distinguishing Dolly Varden from bull trout (Haas and McPhail 1991) was used to confirm the identity of all char captured. 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:

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

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.

Mitochondrial DNA (mtDNA) analyses (Baxter et al. 1997) were run on tissue samples from 114 char specimens, which included the 42 samples used in the LDF analyses, by individuals from the fish genetics laboratory at the Freshwater Institute in Winnipeg. Ribosomal DNA (rDNA) analyses (Baxter et al. 1997) were run on ten tissue samples, which were also included in both mtDNA and LDF analyses, by individuals from the genetics laboratory at the University of British Columbia. The identification results of voucher specimens examined in the laboratory were accepted if two or more of the analyses (i.e., morphological, mitochondrial DNA, LDF, ribosomal RNA) were in agreement.

Morphometric and meristic measurements were completed for all dead-sampled specimens. Morphometric measurements were measured to the nearest 0.1 mm and included: preorbital, orbital and postorbital lengths; interorbital width; trunk, dorsal, lumbar, anal and caudal peduncle lengths; head, body and caudal peduncle depths; maxillary length and width; pectoral, pelvic and adipose fin lengths; middle gill raker length, and lower arch length (Reist et al. 1997). Meristic variables that were counted included: dorsal, anal, pectoral, and pelvic principal fin rays; upper and lower gill rakers; and pyloric caecae. Biological variables documented included; standard and fork lengths (nearest mm), weight (nearest g), sex and maturity, gonad weight (nearest 0.1 g), stomach content analysis, and age determination (Reist et al. 1997). Sexual maturity was determined by internal examination of gonads and each fish was assigned a maturity code (Table 1; McGowan 1992). Stomachs were examined and contents were described as fish, aquatic insects, or terrestrial insects.

Fish were aged using whole and sectioned otoliths. The whole otoliths were placed in distilled water and viewed under a microscope with reflected light. Age was estimated by counting opaque and dark bands (annuli), which represented one year of growth; opaque bands correspond to fast growth in the summer, and darker bands are a result of slower winter growth (Secor et al. 1992). Once ages were determined for whole otoliths, one otolith from each fish was embedded in epoxy-resin and left in a fume hood for seven days to harden. Once the resin was hard, embedded otoliths were cut into thin transverse sections through the sulcus on the dorsal-ventral axis with a diamond saw. The sections were viewed under a microscope with reflected light and annuli were counted to determine ages.

Habitat Data Collection

During the summer and fall of 2001 habitat surveys were conducted in six study streams to describe bull trout habitat use in the region. The objective was to describe general stream features where bull trout have been captured and to determine specific habitat use at the habitat-unit level.

Habitat use was quantified at the macrohabitat level for all streams and the microhabitat level for one stream during the study. Macrohabitat represents general physical features (e.g. depth, velocity, substrate, wetted width) of a stream. Microhabitat represents the physical features of the stream at specific positions where fish are captured (Goetz 1997). Macrohabitat was quantified from randomly sampled habitat units (pool, run, riffle) in each study stream regardless of bull trout presence or absence. Microhabitat was quantified only at sites where bull trout were observed or captured in the stream.

Macrohabitat Data Collection

Habitat data were obtained from 81 pools, 55 runs, and 61 riffles that were randomly sampled from 22 reaches in six streams. Habitat surveys were conducted during August and September of 2001 in streams where bull trout had been captured during stream inventory surveys in 2000 and 2001. Reaches that were 200 to 400 m long were selected in the lower, middle, and upper sections of each stream for sampling. Habitat typing followed the technique of Bisson et al. (1988) based on the hydraulic characteristics of each stream; however, habitat was not classified at a scale beyond the pool, run, and riffle level.

To determine physical features of each habitat unit, three equidistant transects were placed parallel as well as perpendicular to water flow within each habitat unit. The transects running parallel with river flow crossed those running perpendicular to flow and resulted in a grid with nine points in each habitat unit. At points where transects crossed, depth, velocity, substrate, and cover were measured giving nine measurements for each variable. Depth was measured with a meter stick, and bottom velocity was measured (~ 5 cm above the bottom) using a Marsh-McBirney flow meter (accurate to 0.01 m/s). Dominant substrate was estimated visually in the surrounding 5 cm for each point using a modified Wentworth scale (Table 2), and cover was estimated visually at each point according to a ranked classification scale (Table 3). The wetted width of the stream was randomly measured at 50 m intervals throughout all sampling reaches in each stream.

The mean depth and velocity were determined for each habitat unit. Mean depth was calculated by dividing the sum of all nine measurements by 12 to account for zero depth (cm) at each bank (Platts et al. 1983). The mode was determined for substrate and cover in each habitat unit.

Microhabitat Data Collection

Microhabitat data were collected in Funeral Creek during September 2001. A two-person crew electrofished two randomly selected reaches (200-300 m). Each time a bull trout was captured a weighted blue or orange marker, representing either juvenile or adult fish, was placed in the habitat unit for later identification. Lengths (nearest mm) and weights (nearest g) were recorded for all bull trout captured in the field, and Floy-tags were attached to all individuals greater than 200 mm that were released live after sampling. All bull trout larger than 200 mm were considered adults, and all less than 200 mm were juveniles based on size-at-age data for sacrificed individuals from the stream. Three transects, parallel as well as perpendicular to flow, were placed in each habitat unit where bull trout were captured, and depth, velocity, dominant substrate and cover were recorded at nine points as described above.

RESULTS

Common and scientific names with corresponding abbreviations for all species captured are presented in Table 4. Table 5 shows location information, number of fish tagged and released, number of fish dead-sampled and the species for all fish captured during the 2000 and 2001 sampling seasons. Ten different species were captured during stream inventories. Arctic grayling (*Thymallus arcticus*) and bull trout were the most widely distributed species captured at most sampling sites. Arctic grayling were most abundant in Bluefish Creek where more than 300 individuals, representing many different age classes, including juveniles, were captured. Since grayling were abundant in this stream, only a sub-sample of the catch was measured for length and weighed. Table 6 summarizes the biological data obtained for all species captured from the NWT in 2000 and 2001.

Bull trout were captured in nine of the 18 streams surveyed (Fig. 2). Biological data for bull trout that were both live- and dead-sampled during the 2000 and 2001 field seasons are presented in Table 7. The majority of bull trout (n = 78) were captured from Funeral Creek. Quantitative and qualitative data from the bull trout sampled during this study, and used to identify char captured in 2000 and 2001, are shown in Table 8. These data include morphometric and meristic data used for the LDF and qualitative data based on external characteristics for bull trout described in literature. Qualitative data from bull trout sampled during the study, which included eye position, upper jaw shape and length, head shape, and head size, were consistent with bull trout described in the literature. Most of the char sampled had eyes positioned close to the top of the head, a long decurved upper jaw, and a large relatively flat, triangular-shaped head. Most char measured had LDF scores that suggested they were bull trout; however, a few had scores that corresponded to those observed for Dolly Varden. Also presented are identities implied by mitochondrial and ribosomal DNA analyses. Mitochondrial DNA analyses show that all char captured were bull trout. Results from ribosomal DNA analyses suggest that seven of the char are bull trout and three could be Dolly Varden/bull trout hybrids (Table 8).

Population estimates for the Funeral Creek bull trout population are presented in Table 9. The data suggest that the adult and juvenile populations are small compared to other more prolific species (e.g. grayling). Habitat data by location are summarized for all study reaches and are presented in Table 10.

DISCUSSION

Based on the genetic and morphometric analyses, all char captured during the study were bull trout. All of the char with LDF scores corresponding to Dolly Varden values were juveniles and in some cases young-of-the-year fish. The LDF has an inherent bias by design, because all meristic counts are highest for bull trout. This implies that if errors in counts are made, which is not uncommon with small fish, they usually result in lower scores and coincide with inaccurate identification of bull trout as either hybrids or Dolly Varden. Since the LDF is very sensitive to branchiostegal ray counts, and most of these counts were difficult to perform accurately for small fish, it is likely that the individuals designated as Dolly Varden are actually bull trout. It is also possible, especially for young-of-the-year (YOY) fish that complete development of these meristic traits had not occurred. The only evidence that suggests Dolly Varden were present in the study area are the rDNA results. However, the sample size of char examined during the trial was extremely low and hybrids were only detected in one of three enzyme markers. In two out of three occurrences of hybrids at enzyme markers the signal was faint making these results suspect. Furthermore, a larger sample (n =114) of mtDNA was run and no samples showed any evidence that any of the char captured were Dolly Varden.

Arctic grayling were the most abundant species found during the study. In Bluefish Creek juvenile grayling were abundant (> 300) suggesting that this tributary is likely a spawning and rearing area. Not as many bull trout were captured as grayling in most sites. This is likely a reflection of the species' biology, as bull trout generally inhabit deep pools making capture difficult and top trophic-level predators are rarely as abundant as lower trophic-level prey species. The only location where bull trout were relatively abundant was in Funeral Creek; however, the higher density observed is likely a result of sampling effort allocated to this site. Since Funeral Creek was identified as a spawning tributary a large proportion of sampling effort was allocated to this area. Despite fishing more than half of the stream on two separate occasions in the late summer and fall, the number of adults captured was low (n = 16) suggesting that this population is relatively small.

The presence of yoy and juvenile bull trout in Funeral Creek suggests that this stream is used for spawning and rearing. Funeral Creek is a high-gradient mountain stream with predominantly cobble to boulder-type substrate. Given that discharging groundwater is common in this area (Chuck Blight, Nahanni National Park Superintendent, pers. comm. 2002) and relatively deep pools (> 1 m) are present in this stream, fish are likely able to overwinter at this location. Further, groundwater upwellings are frequently associated with bull trout redds and increase spawning success as they provide stable water temperatures for incubating eggs (Baxter and McPhail 1999).

Bull trout prefer small, high-gradient mountain streams with cobble to boulder-type substrate. Adults were associated with some type of large cover (e.g. undercut banks, deep pools, boulders) during the day. Juveniles were found most frequently in high velocity habitats at or near the bottom in pocket pools created by large cobble and boulders. Cover use appeared to be dictated by latitude and elevation as the cover-type diversity (e.g. woody debris) tended to decrease in sample sites further north and at higher elevations. In all study streams, a large proportion of suitable spawning and rearing habitat was present. However, in Funeral Creek only a small area appeared to be used by juveniles, which suggests that these fish have specific habitat preferences. Similar site-specific habitat requirements could be prevalent for populations in the north and warrant further investigation.

CONCLUSIONS

This two-year study has laid a foundation for future research on bull trout and associated species for streams in the southern and central NWT. Information obtained during the study indicates that bull trout populations are small, but wide ranging utilizing a variety of habitat types over a large geographical area. Care must be taken to prevent impacts to bull trout habitat by ensuring that industrial development does not occur in or around such tributaries, especially at times critical to fish life history. It is also important to recognize that many of these watercourses likely provide critical spawning and rearing habitat for bull trout and other species. Protecting these areas will be essential for effective management of bull trout and associated species throughout the NWT.

ACKNOWLEDGEMENTS

This project was directly supported in 2001 through funding received from Fisheries and Oceans Canada and the Habitat Stewardship Program for Species at Risk sponsored by the Government of Canada. Funding and/or in-kind support was also provided by Parks Canada Agency, Fisheries and Oceans Canada, the Northern Scientific Training Program, Manitoba Wildlife Federation, Government of the Northwest Territories, Department of Resources, Wildlife and Economic Development, Tulita Renewable Resource Council, Nahanni Butte Renewable Resource Council, and the Natural Resources Institute. Robert Bajno (DFO Winnipeg) and Anna Elz (UBC Vancouver) are thanked for preparing and analyzing the samples for the genetic component of this project. E. Taylor is thanked for providing the resources to analyze the samples at the University of British Columbia. Special thanks to L. Bataille, K. Bourassa, K. Cott, J. Demers, K. Ditz, K. Hickling, M. Low, A. Nande, G. Sibbeston, D. Tate, B. Vital, M. Vital, and S. Weaver for assistance in the field. Dr. R.K. Baydack, Dr. P.J. Blanchfield, P. Hvenegaard, J.D. Johnson, and Dr. K.W. Stewart provided valuable technical assistance and advice that was integral for this project. Comments by K. Cott and S. Stephenson improved the manuscript.

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Table 1. Sexual maturity codes assigned to char captured during the study (McGowan 1992).

Maturity State	**Male – 1**	**Female – 2**
Immature	06 – testes long and thin, tubular and scalloped shape, up to full body length, putty-like firmness	01 – ovaries granular, hard and triangular, up to full length of body cavity, membrane full, eggs distinguishable
Mature	07 – current year spawner, testes large and lobate, white to purplish in cooler, centers may be fluid, milt not expelled by pressure	02 – current year spawner, ovary fills body cavity, eggs near full size but not loose and not expelled by pressure
Ripe	08 – testes full size, white and lobate, milt expelled by slight penetration	03 – ovaries greatly extended and fill body cavity, eggs full size and transparent, expelled by
Spent	09 – spawning complete, testes flaccid with some milt, blood vessels obvious, testes violet-pink in colour	04 – spawning complete, ovaries ruptured and flaccid, developing oocytes, visible, some retained eggs in body cavity
Resting	10 – testes tubular, less lobate, healed from spawning, no fluid in center, usually full length of body, mottled and purpulish in colour	05 – ovary 40 – 50% of body cavity volume, membrane thin and semi-transparent, healed from spawning, developing oocytes apparent with few atretic eggs, some eggs may be retained in body cavity
Unknown (virgin)	0 – cannot be sexed, gonads long or short and thin, transparent or translucent	
Unknown (non-virgin)	11 – resting fish, has spawned but gonads regenerated, or sexing not possible	

Table 2. Categories used to define substrate composition for habitat surveys in this study.

Code	Particle size range (mm)	Substrate definition
6	> 256	Boulder
5	126 - 255	Large Cobble
4	64 - 125	Small Cobble
3	16 - 63	Pebble
2	2 - 15	Gravel
1	0.06 - 1	Sand
0	< 0.059	Silt

Table 3. Cover classification defining types used for habitat surveys in this study.

Code	Type or size range	Cover definition
1	aquatic vegetation	Submerged vegetation
2	riparian vegetation	Overhanging vegetation
3	water column depth	Depth
4	water turbulence	Turbulence
5	65 - 255 mm	Cobble
6	256+ mm	Boulder
7	> 30 cm diameter	Large wood
8	< 30 cm diameter	Small wood
9	stable bank, undercut	Undercut bank
10	none of the above are applicable	No cover

Table 4. Fish species captured during stream surveys in the Northwest Territories, 2000 and 2001.

Common Name	**Scientific Name**	**Abbreviation**
Arctic grayling	*Thymallus arcticus*	ARGR
burbot	*Lota lota*	BURB
bull trout	*Salvelinus confluentus*	BLTR
inconnu	*Stenodus leucichthys*	INCU
lake chub	*Couesius plumbeus*	LKCH
longnose sucker	*Catostomus catostomus*	LNSC
mountain whitefish	*Prosopium williamsoni*	MTWF
northern pike	*Esox lucius*	NRPK
slimy sculpin	*Cottus cognatus*	SLSC
white sucker	*Catostomus commersoni*	WHSC

Table 5. Fishery inventory data for all species from streams and rivers in the Northwest Territories during 2000 and 2001.

Capture location	Date	Latitude (N)	Longitude (W)	Species	N fish captured	N fish released live/tagged	N fish dead sampled
Kotaneelee River system							
Unnamed Creek	Jul-00	60° 36.226'	124° 01.518'	ARGR	15	15	0
	Jul-00	60° 36.226'	124° 01.518'	BLTR	12	10	2
	Aug-01	60° 36.060'	124° 13.900'	WHSC	2	2	0
	Aug-01	60° 36.060'	124° 13.900'	BLTR	6	3	3
Keele River system							
Keele River	Aug-00	64° 14.988'	125° 59.740'	BLTR	13	11	2
	Aug-01	-	-	BLTR	1	0	1
Unnamed Creek	Sep-01	64° 08.000'	126° 09.000'	MTWF	4	4	0
	Sep-01	64° 08.000'	126° 09.000'	SLSC	3	3	0
	Sep-01	64° 08.000'	126° 09.000'	ARGR	45	45	0
Mackenzie River system							
Great Bear River	Aug-00	64°58.967'	124°52.850'	ARGR	21	21	0
	Aug-00	64°58.967'	124°52.850'	NRPK	4	4	0
Saline Creek	Sep-01	64° 18.000'	124° 24.000'	ARGR	30	25	5
	Sep-01	64° 18.000'	124° 24.000'	SLSC	2	2	0
Drum Lake							
Drum Lake outlet	Sep-00	63° 49.977'	126° 11.149'	ARGR	10	10	0
	Sep-00	63° 49.977'	126° 11.149'	BLTR	2	0	2
	Sep-01	63° 49.000'	126° 11.000'	BLTR	23	11	12
	Sep-01	63° 49.000'	126° 11.000'	BURB	10	10	0
	Sep-01	63° 49.000'	126° 11.000'	LKCH	15	15	0

Table 5. (Continued).

Capture location	Date	Latitude (N)	Longitude (W)	Species	N fish captured	N fish released live/tagged	N fish dead sampled
	Sep-01	63° 49.000'	126° 11.000'	LNSC	5	5	0
Unnamed Creek	Sep-01	63° 48.000'	126° 09.000'	BLTR	2	0	2
	Sep-01	63° 48.000'	126° 09.000'	ARGR	75	75	0
	Sep-01	63° 48.000'	126° 09.000'	LKCH	5	5	0
	Sep-01	63° 48.000'	126° 09.000'	SLSC	20	20	0
Bluefish Creek	Sep-01	63° 47.000'	63° 47.000'	ARGR	300	295	5
	Sep-01	63° 47.000'	63° 47.000'	SLSC	20	20	0
	Sep-01	63° 47.000'	63° 47.000'	BURB	20	20	0
South Nahanni River system							
Fast Creek	Aug-01	61° 36.600'	124° 48.600'	SLSC	1	1	0
Funeral Creek	Aug-01	61° 36.000'	124° 48.000'	BLTR	31	23	8
	Sep-01	61° 36.000'	124° 48.000'	BLTR	47	39	8
Irvine Creek	Sep-01	61° 18.000'	124° 25.000'	BLTR	2	0	2
Mouth of Prairie Creek at Funeral Creek	Sep-01	61° 36.488'	124° 49.232'	BLTR	2	2	0
South Nahanni River	Aug-01	61° 14.963'	124° 24.488'	BLTR	3	2	1
	Aug-01	61° 14.963'	124° 24.488'	INCU	1	1	0
	Aug-01	61° 33.530'	124° 47.118'	ARGR	3	3	0
Galena Creek	Aug-01	61° 32.722'	124° 47.053'	BLTR	1	1	0
Prairie Creek	Aug-01	61° 14.958'	124° 24.482'	ARGR	25	25	0
Jorgenson Creek	Aug-01	61° 31.777'	126° 05.733'	BLTR	3	3	0
Marengo Creek	Aug-01	61° 35.535'	125° 48.043'	BLTR	1	1	0
	Aug-01	61° 35.535'	125° 48.043'	ARGR	15	15	0
	Aug-01	61° 35.535'	125° 48.043'	MTWF	1	1	0
	Sep-01	61° 35.535'	125° 48.043'	MTWF	1	1	0
	Sep-01	61° 35.535'	125° 48.043'	ARGR	4	4	0

Table 5. (Continued).

Capture location	Date	Latitude (N)	Longitude (W)	Species	N fish captured	N fish released live/tagged	N fish dead sampled
Virginia Falls (South Nahanni River)	Aug-01	61° 30.671'	126° 05.121'	BLTR	1	1	0
Sheaf Creek	Sep-01	-	-	SLSC	6	6	0
Carcajou River system							
Dodo Creek	Sep-01	64° 50.695'	127° 14.773'	SLSC	10	9	1
Dodo Creek	Sep-01	64° 50.695'	127° 14.773'	ARGR	22	22	0

Table 6. Biological data from both live- and dead-sampled fish species captured in the Northwest Territories during 2000 and 2001.

No.	Fish ID[1]	Location[2]	Date M/D/Y	Latitude (N)	Longitude (W)	Method[3]	Species	FL (mm)	Wt (g)	Life Stage Assigned	Notes[4]
1	-	Unnamed Cr.[A]	07/22/00	60° 36' 13.6"	124° 01' 31.1"	ANG	ARGR	271	190	Adult	15 additional ARGR caught (~200 - 400 mm)
2	MC001	Unnamed Cr.[A]	07/22/00	60° 36' 13.6"	124° 01' 31.1"	ANG	BLTR	350	400	Adult	-
3	MC002	Unnamed Cr.[A]	07/22/00	60° 36' 13.6"	124° 01' 31.1"	ANG	BLTR	380	460	Adult	-
4	MC003	Unnamed Cr.[A]	07/23/00	60° 36' 13.6"	124° 01' 31.1"	ANG	BLTR	228	130	Adult	-
5	MC004	Unnamed Cr.[A]	07/23/00	60° 36' 13.6"	124° 01' 31.1"	ANG	BLTR	286	450	Adult	-
6	MC005	Unnamed Cr.[A]	07/23/00	60° 36' 13.6"	124° 01' 31.1"	ANG	BLTR	300	590	Adult	-
7	MC006	Unnamed Cr.[A]	07/23/00	60° 36' 13.6"	124° 01' 31.1"	ANG	BLTR	240	190	Adult	-
8	MC007	Unnamed Cr.[A]	07/23/00	60° 36' 06.7"	124° 01' 55.4"	ANG	BLTR	234	100	Adult	-
9	MC008	Unnamed Cr.[A]	07/23/00	60° 36' 05.5"	124° 02' 04.3"	ANG	BLTR	265	180	Adult	-
10	MC009	Unnamed Cr.[A]	07/23/00	60° 36' 05.5"	124° 02' 04.3"	ANG	BLTR	344	380	Adult	-
11	MC0010	Unnamed Cr.[A]	07/24/00	60° 36' 06.1"	124° 01' 39.9"	ANG	BLTR	312	290	Adult	-
12	47257	Unnamed Cr.[A]	07/24/00	60° 36' 01.9"	124° 02' 11.0"	ANG	BLTR	289	235	Adult	-
13	47258	Unnamed Cr.[A]	07/24/00	60° 36' 01.9"	124° 02' 11.0"	ANG	BLTR	355	479	Adult	-
14	-	Great Bear R.	08/01/00	64° 58' 58.0"	124° 52' 51.0"	ANG	ARGR	-	-	Adult	21 additional ARGR caught (~230 - 400 mm)
15	-	Great Bear R.	08/02/00	64° 58' 58.0"	124° 52' 51.0"	ANG	NRPK	-	-	Adult	4 additional NRPK caught (~ 400 - 600 mm)
16	MC0011	Keele R.	08/03/00	64° 14' 33.5"	125° 59' 26.5"	ANG	BLTR	636	1220	Adult	-
17	48.835	Keele R.	08/03/00	64° 14' 59.3"	125° 59' 44.4"	ANG	BLTR	604	2000	Adult	-
18	48.814	Keele R.	08/03/00	64° 14' 59.3"	125° 59' 44.4"	ANG	BLTR	577	1790	Adult	-
19	48.872	Keele R.	08/03/00	64° 14' 59.3"	125° 59' 44.4"	ANG	BLTR	583	1410	Adult	-
20	48.695	Keele R.	08/03/00	64° 14' 59.3"	125° 59' 44.4"	ANG	BLTR	522	1230	Adult	-
21	48.854	Keele R.	08/03/00	64° 14' 59.3"	125° 59' 44.4"	ANG	BLTR	535	1300	Adult	-
22	48.774	Keele R.	08/03/00	64° 14' 59.3"	125° 59' 44.4"	ANG	BLTR	485	1000	Adult	-
23	48.754	Keele R.	08/03/00	64° 14' 59.3"	125° 59' 44.4"	ANG	BLTR	474	1000	Adult	-
24	MC0012	Keele R.	08/03/00	64° 14' 59.3"	125° 59' 44.4"	ANG	BLTR	432	730	Adult	-

Table 6. (Continued).

No.	Fish ID[1]	Location[2]	Date M/D/Y	Latitude (N)	Longitude (W)	Method[3]	Species	FL (mm)	Wt (g)	Life Stage Assigned	Notes[4]
25	48.715	Keele R.	08/04/00	64° 14' 28.6"	126° 25' 44.1"	ANG	BLTR	513	1150	Adult	-
26	48.795	Keele R.	08/05/00	64° 14' 28.6"	126° 25' 44.1"	ANG	BLTR	548	1540	Adult	-
27	47259	Keele R.	08/05/00	64° 14' 28.6"	126° 25' 44.1"	GN	BLTR	512	1435	Adult	-
28	47260	Keele R.	08/05/00	64° 14' 28.6"	126° 25' 44.1"	GN	BLTR	533	1341	Adult	-
29	47261	Drum Lake outlet	09/13/00	63° 49' 58.6"	126° 11' 08.9"	ANG	BLTR	561	1806	Adult	Observed 3 other BLTR, 1-2 ARGR lesions
30	47262	Drum Lake outlet	09/13/00	63° 49' 58.6"	126° 11' 08.9"	ANG	BLTR	583	2161	Adult	-
31	-	Drum Lake outlet	09/14/00	63° 49' 58.6"	126° 11' 08.9"	ANG	ARGR	-	-	-	10 additional ARGR caught (`200 - 400 mm)
32	-	Unnamed Cr.[A]	08/10/01	60° 36' 03.6"	124° 13' 54.0"	ANG	ARGR	-	-	-	15 additional ARGR caught (~200 - 450 mm)
33	47326	Unnamed Cr.[A]	08/10/01	60° 36' 03.6"	124° 13' 54.0"	ANG	BLTR	270	200	Adult	Stomach - terrestrial and aquatic insects
34	47327	Unnamed Cr.[A]	08/10/01	60° 36' 03.6"	124° 13' 54.0"	ANG	BLTR	276	253	Adult	Stomach - SLSC
35	47328	Unnamed Cr.[A]	08/10/01	60° 36' 03.6"	124° 13' 54.0"	ANG	BLTR	400	736	Adult	Stomach - terrestrial and aquatic insects
36	-	Unnamed Cr.[A]	08/10/01	60° 36' 03.6"	124° 13' 54.0"	ANG	BLTR	204	130	Juvenile	-
37	MC0018	Unnamed Cr.[A]	08/10/01	60° 36' 03.6"	124° 13' 54.0"	ANG	BLTR	202	200	Juvenile	-
38	MC0019	Unnamed Cr.[A]	08/10/01	60° 36' 03.6"	124° 13' 54.0"	ANG	BLTR	284	240	Adult	-
39	-	Fast Cr.	08/13/01	61° 36' 36.0"	124° 48' 36.0"	EF	SLSC	~50	-	-	-
40	-	Funeral Cr.	08/13/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	180	60	Juvenile	-
41	-	Funeral Cr.	08/13/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	142	30	Juvenile	-
42	-	Funeral Cr.	08/13/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	179	50	Juvenile	-
43	-	Funeral Cr.	08/13/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	155	40	Juvenile	-
44	-	Funeral Cr.	08/13/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	180	70	Juvenile	-
45	-	Funeral Cr.	08/13/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	170	50	Juvenile	-
46	MC0017	Funeral Cr.	08/13/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	208	100	Adult	-
47	MC0026	Funeral Cr.	08/13/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	281	360	Adult	-
48	MC0029	Funeral Cr.	08/13/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	292	280	Adult	-
49	MC0030	Funeral Cr.	08/13/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	329	360	Adult	-

Table 6. (Continued).

No.	Fish ID[1]	Location[2]	Date M/D/Y	Latitude (N)	Longitude (W)	Method[3]	Species	FL (mm)	Wt (g)	Life Stage Assigned	Notes[4]
50	MC0031	Funeral Cr.	08/13/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	302	370	Adult	-
51	47267	Funeral Cr.	08/13/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	168	53	Juvenile	Stomach - Aquatic and terrestrial insects
52	47268	Funeral Cr.	08/13/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	266	204	Adult	Stomach - Aquatic and terrestrial insects
53	47269	Funeral Cr.	08/13/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	354	495	Adult	Eggs retained from previous year
54	47270	Funeral Cr.	08/13/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	185	72	Juvenile	Stomach - Aquatic and terrestrial insects
55	MC0032	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	272	220	Adult	-
56	MC0033	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	307	315	Adult	-
57	MC0034	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	370	500	Adult	-
58	-	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	70	1	Juvenile	-
59	-	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	78	0.9	Juvenile	-
60	-	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	70	0.9	Juvenile	-
61	-	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	70	0.7	Juvenile	-
62	-	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	75	0.5	Juvenile	-
63	-	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	75	0.9	Juvenile	-
64	-	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	80	0.9	Juvenile	-
65	-	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	75	0.8	Juvenile	-
66	-	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	80	1	Juvenile	-
67	47263	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	71	2.8	Juvenile	-
68	47264	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	64	2.3	Juvenile	-
69	47265	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	323	387	Adult	Stomach - Aquatic and terrestrial insects
70	47266	Funeral Cr.	08/14/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	289	281	Adult	Stomach - Aquatic and terrestrial insects
71	MC0035	Galena Cr.	08/14/01	61° 32' 43.3"	124° 47' 03.2"	ANG	BLTR	321	350	Adult	-
72	MC0037	South Nahanni R.	08/15/01	61° 14' 57.8"	124° 24' 29.3"	ANG	BLTR	330	250	Adult	-
73	MC0038	South Nahanni R.	08/15/01	61° 14' 57.8"	124° 24' 29.3"	ANG	BLTR	402	750	Adult	-
74	-	Prairie Cr.	08/15/01	61° 14' 57.5"	124° 24' 28.9"	ANG	ARGR	-	-	-	Caught + 20 - 30 ARGR (~200 - 500 mm)
75	-	South Nahanni R.	08/15/01	61° 14' 57.8"	124° 24' 29.3"	ANG	INCU	-	-	Adult	Captured 1 INCU (~700 mm)

Table 6. (Continued).

No.	Fish ID[1]	Location[2]	Date M/D/Y	Latitude (N)	Longitude (W)	Method[3]	Species	FL (mm)	Wt (g)	Life Stage Assigned	Notes[4]
76	-	South Nahanni R.	08/15/01	61° 33' 31.8"	124° 47' 07.1"	ANG	ARGR	-	-	Adult	Captured additional 3 ARGR (~300 - 400 mm)
77	47325	South Nahanni R.	08/15/01	61° 14' 57.8"	124° 24' 29.3"	ANG	BLTR	281	236	-	Stomach - small larval insects
78	MC0040	Jorgenson Cr.	08/16/01	61° 31' 46.6"	126° 05' 44.0"	ANG	BLTR	245	145	Adult	-
79	MC0041	Jorgenson Cr.	08/16/01	61° 31' 46.6"	126° 05' 44.0"	ANG	BLTR	320	455	Adult	-
80	MC0042	Jorgenson Cr.	08/16/01	61° 31' 46.6"	126° 05' 44.0"	ANG	BLTR	336	355	Adult	-
81	MC0043	South Nahanni R.	08/17/01	61° 30' 40.3"	126° 05' 07.3"	ANG	BLTR	510	1250	Adult	-
82	MC0044	Marengo Cr.	08/17/01	61° 35' 32.1"	125° 48' 02.6"	EF	BLTR	359	475	Adult	-
83	-	Marengo Cr.	08/17/01	61° 35' 32.1"	125° 48' 02.6"	EF	MTWF	~150	-	-	-
84	-	Marengo Cr.	08/17/01	61° 35' 32.1"	125° 48' 02.6"	EF	ARGR	-	-	-	Captured additional 15 ARGR (~200 -350 mm)
85	-	Funeral Cr.	09/11/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	168	50	Juvenile	-
86	MC0031	Funeral Cr.	09/11/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	302	260	Adult	-
87	MC0029	Funeral Cr.	09/11/01	61° 36' 22.9"	124° 48' 28.8"	EF	BLTR	278	240	Adult	-
88	MC0032	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	250	200	Adult	-
89	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	82	6.5	Juvenile	-
90	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	117	18	Juvenile	-
91	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	81	5	Juvenile	-
92	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	80	5	Juvenile	-
93	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	76	4	Juvenile	-
94	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	80	6	Juvenile	-
95	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	78	5.5	Juvenile	-
96	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	64	3	Juvenile	-
97	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	73	4	Juvenile	-
98	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	76	3.9	Juvenile	-
99	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	83	6	Juvenile	-
100	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	74	5	Juvenile	-
101	FT0851	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	258	230	Adult	-

Table 6. (Continued).

No.	Fish ID[1]	Location[2]	Date M/D/Y	Latitude (N)	Longitude (W)	Method[3]	Species	FL (mm)	Wt (g)	Life Stage Assigned	Notes[4]
102	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	70	3.8	Juvenile	-
103	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	77	3.5	Juvenile	-
104	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	79	5	Juvenile	-
105	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	77	4	Juvenile	-
106	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	75	4	Juvenile	-
107	-	Funeral Cr.	09/11/01	61° 36' 37.5"	124° 44' 12.3"	EF	SLSC	-	-	-	Captured additional 30 SLSC (~30 - 100 mm)
108	47330	Funeral Cr.	09/11/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	272	246	Adult	Stomach - small BLTR # 47331
109	47331	Funeral Cr.	09/11/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	101	10	Juvenile	Stomach - small larval insects
110	47332	Funeral Cr.	09/11/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	67	3	Juvenile	-
111	47333	Funeral Cr.	09/11/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	61	2	Juvenile	Stomach - aquatic insects
112	47334	Funeral Cr.	09/11/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	35	1	Juvenile	-
113	47335	Funeral Cr.	09/11/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	38	1	Juvenile	-
114	47336	Funeral Cr.	09/11/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	99	14	Juvenile	Stomach - aquatic insects
115	47337	Funeral Cr.	09/11/01	61° 36' 22.9'	124° 48' 28.8"	EF	BLTR	139	28	Juvenile	Stomach - insects & fish
116	FT0852	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	ANG	BLTR	284	250	Adult	Spawning BLTR (female)
117	FT0853	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	ANG	BLTR	299	180	Adult	-
118	FT0854	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	268	200	Adult	Spawning BLTR (female)
119	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	150	34	Juvenile	-
120	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	84	4	Juvenile	-
121	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	143	27	Juvenile	-
122	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	112	14	Juvenile	-
123	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	148	33	Juvenile	-
124	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	134	28	Juvenile	-
125	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	174	50	Juvenile	-
126	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	154	37	Juvenile	-
127	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	150	31	Juvenile	-

Table 6. (Continued).

No.	Fish ID[1]	Location[2]	Date M/D/Y	Latitude (N)	Longitude (W)	Method[3]	Species	FL (mm)	Wt (g)	Life Stage Assigned	Notes[4]
128	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	149	34	Juvenile	-
129	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	129	24	Juvenile	-
130	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	145	25	Juvenile	-
131	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	147	32.5	Juvenile	-
132	-	Funeral Cr.	09/13/01	61° 36' 37.5"	124° 44' 12.3"	EF	BLTR	65	1	Juvenile	-
133	FT0855	Prairie Cr.	09/13/01	61° 36' 29.3"	124° 49' 13.9"	EF	BLTR	430	245	Adult	-
134	-	Prairie Cr.	09/13/01	61° 36' 29.3"	124° 49' 13.9"	EF	BLTR	175	48	Juvenile	-
135	-	Marengo Cr.	09/14/01	61° 35' 32.1"	125° 48' 02.6"	EF	MTWF	119	13	-	-
136	-	Marengo Cr.	09/14/01	61° 35' 32.1"	125° 48' 02.6"	EF	ARGR	276	190	-	-
137	-	Marengo Cr.	09/14/01	61° 35' 32.1"	125° 48' 02.6"	EF	ARGR	181	54	-	-
138	-	Marengo Cr.	09/14/01	61° 35' 32.1"	125° 48' 02.6"	EF	ARGR	206	83	-	-
139	-	Marengo Cr.	09/14/01	61° 35' 32.1"	125° 48' 02.6"	EF	ARGR	300	255	-	-
140	47596	Irvine Cr.	09/15/01	61° 18' 08.7"	124° 25' 24.1"	EF	BLTR	934	456	Adult	Stomach - small terrestrial insects, lesion LS
141	47338	Irvine Cr.	09/15/01	61° 18' 08.7"	124° 25' 24.1"	ANG	BLTR	626	2870	Adult	Stomach - fish (2) - ARGR?
142	-	Irvine Cr.	09/15/01	61° 18' 08.7"	124° 25' 24.1"	ANG	ARGR	-	-	Adult	Captured + ~ 20 ARGR (~300-500 mm)
143	-	Sheaf Cr.	09/16/01	-	-	EF	SLSC	-	-	-	Captured additional ~ 6 SLSC (~30 - 70 mm)
144	47329	Keele R.	09/20/01	-	-	ANG	BLTR	529	1268	Adult	Fish angled by local resident
145	-	Dodo Cr.	09/22/01	64° 50' 41.7"	127° 14' 46.4"	EF	SLSC	-	-	-	Captured additional ~10 SLSC
146	-	Dodo Cr.	09/22/01	64° 50' 41.7"	127° 14' 46.4"	EF	ARGR	-	-	-	Observed 1 ARGR
147	-	Dodo Cr.	09/22/01	64° 53' 07.4"	127° 13' 30.0"	EF	ARGR	-	-	Adult	Captured 1 ARGR (~ 300 mm)
148	-	Dodo Cr.	09/22/01	64° 52' 59.3"	127° 13' 39.5"	EF	ARGR	-	-	-	Captured additional ~ 20 ARGR in small pool
149	-	Unnamed Cr.[B]	09/23/01	64° 14' 32.6"	125° 59' 19.5"	EF	ARGR	-	-	Juvenile	Captured 2 YOY ARGR
150	-	Unnamed Cr.[B]	09/23/01	64° 13' 34.9'	126° 05' 08.5"	EF	ARGR	-	-	Adult	Captured 1 ARGR (~ 300 mm)
151	-	Unnamed Cr.[B]	09/23/01	64° 13' 34.9'	126° 05' 08.5"	EF	MTWF	-	-	-	Captured 1 MTWF (~120 mm)
152	-	Unnamed Cr.[B]	09/23/01	64° 13' 34.9'	126° 05' 08.5"	EF	SLSC	-	-	-	Captured 2 SLSC
153	-	Unnamed Cr.[B]	09/23/01	64° 10' 56.6"	126° 09' 54.6"	EF	ARGR	-	-	-	Captured additional ~ 40 ARGR

Table 6. (Continued).

No.	Fish ID[1]	Location[2]	Date M/D/Y	Latitude (N)	Longitude (W)	Method[3]	Species	FL (mm)	Wt (g)	Life Stage Assigned	Notes[4]
154	-	Unnamed Cr.[B]	09/23/01	64° 10' 56.6"	126° 09' 54.6"	EF	MTWF	-	-	-	Captured 3 MTWF
155	-	Unnamed Cr.[B]	09/23/01	64° 08' 32.6"	126 09' 06.5"	EF	ARGR	-	-	-	Captured 4 ARGR (~150 - 350 mm)
156	-	Unnamed Cr.[B]	09/23/01	64° 08' 32.6"	126 09' 06.5"	EF	SLSC	-	-	-	Captured 1 SLSC
157	-	Saline Cr.	09/24/01	64° 18' 55.4"	124° 24' 13.6"	EF	ARGR	-	-	-	Captured additional ~ 30 ARGR (~200 - 400 mm)
158	-	Saline Cr.	09/24/01	64° 18' 55.4"	124° 24' 13.6"	EF	SLSC	-	-	-	Captured 2 SLSC
159	FT0856	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	544	1650	Adult	-
160	FT0857	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	504	1600	Adult	-
161	FT0858	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	662	2970	Adult	-
162	FT0859	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	574	2000	Adult	-
163	FT0860	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	671	3250	Adult	-
164	FT0861	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	589	2250	Adult	-
165	FT0862	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	611	2350	Adult	-
166	FT0863	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	586	2250	Adult	-
167	FT0864	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	444	850	Adult	-
168	FT0865	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	636	2620	Adult	-
169	FT0866	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	590	1950	Adult	-
170	47119	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	ANG	BLTR	610	2360	Adult	Female (resting)
171	47339	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	EF	BLTR	711	423	Adult	Stomach - fish (ARGR?), insects, lesion RS
172	47340	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	EF	BLTR	604	1917	Adult	-
173	47341	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	EF	BLTR	568	1823	Adult	Stomach - small larval insects
174	47342	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	EF	BLTR	528	1561	Adult	Stomach - insects, fish (unidentifiable)
175	47343	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	EF	BLTR	639	2771	Adult	Stomach - insects, fish (unidentifiable)
176	47344	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	EF	BLTR	661	3379	Adult	Stomach empty
177	47345	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	EF	BLTR	642	3144	Adult	Stomach - small larval insects

Table 6. (Continued).

No.	Fish ID[1]	Location[2]	Date M/D/Y	Latitude (N)	Longitude (W)	Method[3]	Species	FL (mm)	Wt (g)	Life Stage Assigned	Notes[4]
178	47346	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	EF	BLTR	561	1875	Adult	Stomach - insects, fish (unidentifiable)
179	47347	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	EF	BLTR	550	1735	Adult	Stomach empty
180	47348	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	EF	BLTR	558	1954	Adult	Stomach empty
181	47349	Drum Lake outlet	09/25/01	63° 49' 04.3"	126° 11' 08.4"	EF	BLTR	635	2480	Adult	Stomach - insects, fish (2 LNSC)
182	47350	Unnamed Cr.[C]	09/27/01	63° 48' 01.0"	126° 09' 40.1"	EF	BLTR	49	0.9	Juvenile	-
183	47351	Unnamed Cr.[C]	09/27/01	63° 48' 01.0"	126° 09' 40.1"	EF	BLTR	57	1.8	Juvenile	-
184	-	Unnamed Cr.[C]	09/27/01	63° 48' 01.0"	126° 09' 40.1"	EF	ARGR	-	-	Juvenile	Captured additional ~ 75-100 YOY/Juvenile ARGR
185	-	Unnamed Cr.[C]	09/27/01	63° 48' 01.0"	126° 09' 40.1"	EF	SLSC	-	-	-	Captured additional ~ 20 SLSC
186	-	Unnamed Cr.[C]	09/27/01	63° 48' 01.0"	126° 09' 40.1"	EF	LKCH	-	-	-	Captured additional ~ 5 LKCH
187	-	Drum Lake outlet	09/27/01	63° 49' 04.3"	126° 11' 08.4"	EF	LNSC	-	-	-	-
188	-	Drum Lake outlet	09/27/01	63° 49' 04.3"	126° 11' 08.4"	EF	LKCH	-	-	-	-
189	-	Drum Lake outlet	09/27/01	63° 49' 04.3"	126° 11' 08.4"	EF	BURB	-	-	Adult	-
190	-	Bluefish Cr.	09/27/01	63° 47' 48.0"	126° 09' 12.3"	EF	ARGR	-	-	Juvenile	Captured additional ~300 ARGR including YOY
191	-	Bluefish Cr.	09/27/01	63° 47' 48.0"	126° 09' 12.3"	EF	BURB	-	-	-	Captured additional ~20 BURB
191	-	Bluefish Cr.	09/27/01	63° 47' 48.0"	126° 09' 12.3"	EF	SLSC	-	-	-	Captured additional ~20 SLSC

1. MC### & FT### = Floy-tag codes; five digit codes (e.g. 47257) are ID numbers assigned to dead-sampled fish at the Department of Fisheries and Oceans, Wpg; and 48.### = codes for fish with radio-transmitters.

2. A - Unnamed Creek flowing into Kotaneelee River system, B - Unnamed Creek flowing into Keele River system, C - Unnamed Creek flowing into Drum Lake outlet.

3. ANG = angling, EF = electrofishing, GN = gillnetting.

4. LS = left side, RS = right side, YOY = young-of-the-year.

Table 7. Biological data collected from both live- and dead-sampled bull trout captured in streams and rivers from the Northwest Territories in 2000 and 2001.

Fish ID[1]	Date M/D/Y	No.	Location[2]	FL (mm)	Wt (g)	Sex	Mat.[3]	Gonad Wt (g)	Age	Fish[4] fate	Adipose[5] fin clip (Y/N)	Life[6] history	Life[7] stage	Notes
47267	08/13/01	1	Funeral Cr.	168	53	1	06	-	4	DS	-	SR	J	Stomach contents - Aquatic and terrestrial insects/larvae
47268	08/13/01	2	Funeral Cr.	266	204	2	02	0.7	7	DS	-	SR	A	Stomach contents - Aquatic and terrestrial insects/larvae
47269	08/13/01	3	Funeral Cr.	354	495	2	05	8.0		DS	-	SR	A	Eggs retained from previous year
47270	08/13/01	4	Funeral Cr.	185	72	1	06		5	DS	-	SR	J	Stomach contents - Aquatic and terrestrial insects/larvae
47263	08/14/01	5	Funeral Cr.	71	2.8	-	-	-	1	DS	-	SR	J	-
47264	08/14/01	6	Funeral Cr.	64	2.3	-	-	-	1	DS	-	SR	J	-
47265	08/14/01	7	Funeral Cr.	323	387	1	07	5.2	11	DS	-	SR	J	Stomach contents - Aquatic and terrestrial insects/larvae
47266	08/14/01	8	Funeral Cr.	289	281	1	07	3.8	9	DS	-	SR	J	Stomach - Aquatic and terrestrial insects(grasshopper)/larvae
47257	07/24/00	9	Unnamed Cr.[A]	289	235	2	01	1.0	8	DS	-	SR	A	-
47258	07/24/00	10	Unnamed Cr.[A]	355	479	-	-	-	8	DS	-	SR	A	-
47259	08/05/00	11	Keele R.	512	1435	1	10	1.0	10	DS	-	F	A	-
47260	08/05/00	12	Keele R.	533	1341	1	10	4.3	10	DS	-	F	A	-
47326	08/10/01	13	Unnamed Cr.[A]	270	200	2	05	0.8	8	DS	-	SR	A	Stomach - terrestrial (grasshopper) and larval insects
47327	08/10/01	14	Unnamed Cr.[A]	276	253	1	06	1.5	7	DS	-	SR	A	Stomach contents - sculpin (SLSC)
47328	08/10/01	15	Unnamed Cr.[A]	400	736	1	10	8.9	9	DS	-	SR	A	Stomach - terrestrial (small worms) and aquatic insects
47325	08/15/01	16	South Nahanni R.	281	236	1	10	-	11	DS	-	SR	A	Stomach contents - small larval insects
47330	09/11/01	17	Funeral Cr.	272	246	2	02	1.5	11	DS	-	SR	A	Stomach - Ants, wasp, insect larvae, small BLTR # 47331
47331	09/11/01	18	Funeral Cr.	101	10	-	00	-	2	DS	-	SR	J	Stomach contents - small larval insects
47332	09/11/01	19	Funeral Cr.	67	3	-	00	-	1	DS	-	SR	J	Too small & rotten to sex
47333	09/11/01	20	Funeral Cr.	61	2	2	01	-	1	DS	-	SR	J	Stomach contents - aquatic insects
47334	09/11/01	21	Funeral Cr.	35	1	2	01	-	0	DS	-	SR	YOY	-
47335	09/11/01	22	Funeral Cr.	38	1	-	00	-	0	DS	-	SR	YOY	-
47336	09/11/01	23	Funeral Cr.	99	14	2	01	0.1	2	DS	-	SR	J	Recapture - adipose fin clip from Aug
47337	09/11/01	24	Funeral Cr.	139	28	2	01	1.0	3	DS	-	SR	J	Stomach - aquatic and terrestrial insects, fish (unidentifiable)

Table 7. (Continued).

Fish ID[1]	Date M/D/Y	No.	Location[2]	FL (mm)	Wt (g)	Sex	Mat.[3]	Gonad Wt (g)	Age	Fish[4] fate	Adipose[5] fin clip (Y/N)	Life[6] history	Life[7] stage	Notes
47261	09/13/00	25	Drum L. outlet	561	1806	2	05	9.3	9	DS	-	AF	A	Observed 3 other BLTR and (>10) ARGR
47262	09/13/00	26	Drum L. outlet	583	2161	2	05	9.8	14	DS	-	AF	A	-
47596	09/15/01	27	Irvine Cr.	626	2870	2	05	17.2	12	DS	-	F	A	Stomach contents - fish (2) - ARGR possible?
47338	09/15/01	28	Irvine Cr.	934	456	2	05	4.6	10	DS	-	F	A	Stomach - fish, aquatic and terrestrial insects, lesion RS
47329	09/20/01	29	Keele R.	529	1268	2	05	-	9	DS	-	F	A	Fish angled by local resident
47339	09/25/01	30	Drum L. outlet	423	711	1	10	0.3	9	DS	-	AF	A	Stomach - fish, aquatic and terrestrial insects, lesion
47340	09/25/01	31	Drum L. outlet	604	1917	1	09	3.9	18	DS	-	AF	A	-
47341	09/25/01	32	Drum L. outlet	568	1823	1	10	1.1	10	DS	-	AF	A	Stomach contents - small larval insects
47342	09/25/01	33	Drum L. outlet	528	1561	1	09	3.0	10	DS	-	AF	A	Stomach - aquatic and terrestrial insects, fish (unidentifiable)
47343	09/25/01	34	Drum L. outlet	639	2771	2	05	23.3	-	DS	-	AF	A	Stomach - aquatic and terrestrial insects, fish (unidentifiable)
47344	09/25/01	35	Drum L. outlet	661	3379	2	05	20.2	16	DS	-	AF	A	Stomach contents – empty
47345	09/25/01	36	Drum L. outlet	642	3144	1	09	1.6	11	DS	-	AF	A	Stomach contents - small larval insects
47346	09/25/01	37	Drum L. outlet	561	1875	1	10	1.0	10	DS	-	AF	A	Stomach - aquatic and terrestrial insects, fish (unidentifiable)
47347	09/25/01	38	Drum L. outlet	550	1735	1	10	0.9	13	DS	-	AF	A	Stomach contents – empty
47348	09/25/01	39	Drum L. outlet	558	1954	2	05	8.8	11	DS	-	AF	A	Stomach contents – empty
47349	09/25/01	40	Drum L. outlet	635	2480	2	05	15.3	11	DS	-	AF	A	Stomach - aquatic and terrestrial (ants) insects, fish (LNSC)
47119	09/27/01	41	Drum L. outlet	610	2360	2	05	-	12	DS	-	AF	A	Female (resting)
47350	09/27/01	42	Unnamed Cr.[B]	49	0.9	-	-	-	1	DS	-	AF	J	-
47351	09/27/01	43	Unnamed Cr.[B]	57	1.8	1	06	-	1	DS	-	AF	J	-
-	08/10/01	44	Unnamed Cr.[A]	204	130	-	-	-	-	RNT	N	SR	-	Released same day at capture site
-	08/13/01	45	Funeral Cr.	180	60	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/13/01	46	Funeral Cr.	142	30	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/13/01	47	Funeral Cr.	179	50	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/13/01	48	Funeral Cr.	155	40	-	-	-	-	RNT	Y	SR	J	Released same day at capture site

Table 7. (Continued).

Fish ID[1]	Date M/D/Y	No.	Location[2]	FL (mm)	Wt (g)	Sex	Mat.[3]	Gonad Wt (g)	Age	Fish[4] fate	Adipose[5] fin clip (Y/N)	Life[6] history	Life[7] stage	Notes
-	08/13/01	49	Funeral Cr.	180	70	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/13/01	50	Funeral Cr.	170	50	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/14/01	51	Funeral Cr.	70	1	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/14/01	52	Funeral Cr.	78	0.9	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/14/01	53	Funeral Cr.	70	0.9	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/14/01	54	Funeral Cr.	70	0.7	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/14/01	55	Funeral Cr.	75	0.5	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/14/01	56	Funeral Cr.	75	0.9	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/14/01	57	Funeral Cr.	80	0.9	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/14/01	58	Funeral Cr.	75	0.8	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	08/14/01	59	Funeral Cr.	80	1	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	60	Funeral Cr.	168	50	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	61	Funeral Cr.	82	6.5	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	62	Funeral Cr.	117	18	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	63	Funeral Cr.	81	5	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	64	Funeral Cr.	80	5	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	65	Funeral Cr.	76	4	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	66	Funeral Cr.	80	6	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	67	Funeral Cr.	78	5.5	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	68	Funeral Cr.	64	3	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	69	Funeral Cr.	73	4	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	70	Funeral Cr.	76	3.9	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	71	Funeral Cr.	83	6	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/11/01	72	Funeral Cr.	74	5	-	-	-	-	RNT	Y	SR	J	Released same day at capture site

Table 7. (Continued).

Fish ID[1]	Date M/D/Y	No.	Location[2]	FL (mm)	Wt (g)	Sex	Mat.[3]	Gonad Wt (g)	Age	Fish[4] fate	Adipose[5] fin clip (Y/N)	Life[6] history	Life[7] stage	Notes
-	09/11/01	73	Funeral Cr.	70	3.8	-	-	-	-	RNT	N	SR	J	Released same day at capture site
-	09/11/01	74	Funeral Cr.	77	3.5	-	-	-	-	RNT	N	SR	J	Released same day at capture site
-	09/11/01	75	Funeral Cr.	79	5	-	-	-	-	RNT	N	SR	J	Released same day at capture site
-	09/11/01	76	Funeral Cr.	77	4	-	-	-	-	RNT	N	SR	J	Released same day at capture site
-	09/11/01	77	Funeral Cr.	75	4	-	-	-	-	RNT	N	SR	J	Released same day at capture site
-	09/13/01	78	Funeral Cr.	150	34	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	79	Funeral Cr.	84	4	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	80	Funeral Cr.	143	27	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	81	Funeral Cr.	112	14	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	82	Funeral Cr.	148	33	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	83	Funeral Cr.	134	28	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	84	Funeral Cr.	174	50	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	85	Funeral Cr.	154	37	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	86	Funeral Cr.	150	31	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	87	Funeral Cr.	149	34	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	88	Funeral Cr.	129	24	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	89	Funeral Cr.	145	25	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	90	Funeral Cr.	147	32.5	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	91	Funeral Cr.	65	1	-	-	-	-	RNT	Y	SR	J	Released same day at capture site
-	09/13/01	92	Prairie Cr.	175	48	-	-	-	-	RNT	Y	SR	-	Released same day at capture site
MC0018	08/10/01	93	Unnamed Cr.[A]	202	200	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0019	08/10/01	94	Unnamed Cr.[A]	284	240	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0017	08/13/01	95	Funeral Cr.	208	100	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0026	08/13/01	96	Funeral Cr.	281	360	-	-	-	-	T	Y	SR	A	Released same day at capture site

Table 7. (Continued).

Fish ID[1]	Date M/D/Y	No.	Location[2]	FL (mm)	Wt (g)	Sex	Mat.[3]	Gonad Wt (g)	Age	Fish[4] fate	Adipose[5] fin clip (Y/N)	Life[6] history	Life[7] stage	Notes
MC0029	08/13/01	97	Funeral Cr.	292	280	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0030	08/13/01	98	Funeral Cr.	329	360	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0031	08/13/01	99	Funeral Cr.	302	370	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0032	08/14/01	100	Funeral Cr.	272	220	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0033	08/14/01	101	Funeral Cr.	307	315	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0034	08/14/01	102	Funeral Cr.	370	500	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0035	08/14/01	103	Galena Cr.	321	350	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0037	08/15/01	104	South Nahanni R.	330	250	-	-	-	-	T	Y	-	A	Released same day at capture site
MC0038	08/15/01	105	South Nahanni R.	402	750	-	-	-	-	T	Y	-	A	Released same day at capture site
MC0040	08/16/01	106	Jorgenson Cr.	245	145	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0041	08/16/01	107	Jorgenson Cr.	320	455	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0042	08/16/01	108	Jorgenson Cr.	336	355	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0043	08/17/01	109	South Nahanni R.	510	1250	-	-	-	-	T	Y	F	A	Released same day at capture site
MC0044	08/17/01	110	Marengo Cr.	359	475	-	-	-	-	T	Y	-	A	Released same day at capture site
MC0031	09/11/01	111	Funeral Cr.	302	260	-	-	-	-	T	Y	SR	A	Recapture - fish tagged in Funeral Creek, Aug 2001
MC0029	09/11/01	112	Funeral Cr.	278	240	-	-	-	-	T	Y	SR	A	Recapture - fish tagged in Funeral Creek, Aug 2001
MC0032	09/11/01	113	Funeral Cr.	250	200	-	-	-	-	T	Y	SR	A	Recapture - fish tagged in Funeral Creek, Aug 2001
FT0851	09/11/01	114	Funeral Cr.	258	230	-	-	-	-	T	Y	SR	A	Released same day at capture site
FT0852	09/13/01	115	Funeral Cr.	284	250	-	-	-	-	T	Y	SR	A	Spawning (female) BLTR, Released same day at capture site
FT0853	09/13/01	116	Funeral Cr.	299	180	-	-	-	-	T	Y	SR	A	Juvenile BLTR, Released same day at capture site
FT0854	09/13/01	117	Funeral Cr.	268	200	-	-	-	-	T	Y	SR	A	Spawning (female) BLTR, Released same day at capture site
FT0855	09/13/01	118	Prairie Cr.	245	430	-	-	-	-	T	Y	SR	A	Released same day at capture site
FT0856	09/25/01	119	Drum L. outlet	544	1650	-	-	-	-	T	Y	AF	A	Released same day at capture site
FT0857	09/25/01	120	Drum L. outlet	504	1600	-	-	-	-	T	Y	AF	A	Released same day at capture site

Table 7. (Continued).

Fish ID[1]	Date M/D/Y	No.	Location[2]	FL (mm)	Wt (g)	Sex	Mat.[3]	Gonad Wt (g)	Age	Fish[4] fate	Adipose[5] fin clip (Y/N)	Life[6] history	Life[7] stage	Notes
FT0858	09/25/01	121	Drum L. outlet	662	2970	-	-	-	-	T	Y	AF	A	Released same day at capture site
FT0859	09/25/01	122	Drum L. outlet	574	2000	-	-	-	-	T	Y	AF	A	Released same day at capture site
FT0860	09/25/01	123	Drum L. outlet	671	3250	-	-	-	-	T	Y	AF	A	Released same day at capture site
FT0861	09/25/01	124	Drum L. outlet	589	2250	-	-	-	-	T	Y	AF	A	Released same day at capture site
FT0862	09/25/01	125	Drum L. outlet	611	2350	-	-	-	-	T	Y	AF	A	Released same day at capture site
FT0863	09/25/01	126	Drum L. outlet	586	2250	-	-	-	-	T	Y	AF	A	Released same day at capture site
FT0864	09/25/01	127	Drum L. outlet	444	850	-	-	-	-	T	Y	AF	A	Released same day at capture site
FT0865	09/25/01	128	Drum L. outlet	636	2620	-	-	-	-	T	Y	AF	A	Released same day at capture site
FT0866	09/25/01	129	Drum L. outlet	590	1950	-	-	-	-	T	Y	AF	A	Released same day at capture site
MC001	07/22/00	130	Unnamed Cr.[A]	350	400	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC002	07/22/00	131	Unnamed Cr.[A]	380	460	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC003	07/23/00	132	Unnamed Cr.[A]	228	130	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC004	07/23/00	133	Unnamed Cr.[A]	286	450	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC005	07/23/00	134	Unnamed Cr.[A]	300	590	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC006	07/23/00	135	Unnamed Cr.[A]	240	190	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC007	07/23/00	136	Unnamed Cr.[A]	234	100	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC008	07/23/00	137	Unnamed Cr.[A]	265	180	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC009	07/23/00	138	Unnamed Cr.[A]	344	380	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0010	07/24/00	139	Unnamed Cr.[A]	312	290	-	-	-	-	T	Y	SR	A	Released same day at capture site
MC0011	08/03/00	140	Keele R.	636	1220	-	-	-	-	T	Y	F	A	Released same day at capture site
*48.835	08/03/00	141	Keele R.	604	2000	-	-	-	-	T	Y	F	A	Released same day at capture site
*48.814	08/03/00	142	Keele R.	577	1790	-	-	-	-	T	Y	F	A	Released same day at capture site
*48.872	08/03/00	143	Keele R.	583	1410	-	-	-	-	T	Y	F	A	Released same day at capture site
*48.695	08/03/00	144	Keele R.	522	1230	-	-	-	-	T	Y	F	A	Released same day at capture site

Table 7. (Continued).

Fish ID[1]	Date M/D/Y	No.	Location[2]	FL (mm)	Wt (g)	Sex	Mat.[3]	Gonad Wt (g)	Age	Fish[4] fate	Adipose[5] fin clip (Y/N)	Life[6] history	Life[7] stage	Notes
*48.854	08/03/00	145	Keele R.	535	1300	-	-	-	-	T	Y	F	A	Released same day at capture site
*48.774	08/03/00	146	Keele R.	485	1000	-	-	-	-	T	Y	F	A	Released same day at capture site
*48.754	08/03/00	147	Keele R.	474	1000	-	-	-	-	T	Y	F	A	Released same day at capture site
MC0012	08/03/00	148	Keele R.	432	730	-	-	-	-	T	Y	F	A	Released same day at capture site
*48.715	08/04/00	149	Keele R.	513	1150	-	-	-	-	T	Y	F	A	Released same day at capture site
*48.795	08/05/00	150	Keele R.	548	1540	-	-	-	-	T	Y	F	A	Released same day at capture site

1. MC### & FT### = Floy-tag codes; five digit codes (e.g. 47257) are ID numbers assigned to dead-sampled fish at the Department of Fisheries and Oceans, Wpg; and numbers with (*) are radio transmitter tags.
2. A - Unnamed Creek flowing into Kotaneelee River system, B - Unnamed Creek flowing into Drum Lake outlet.
3. Maturity (see methods for codes).
4. DS = dead-sampled, RNT = released with no tag, T = released with tag.
5. Y = yes, N = no.
6. AF = adfluvial, F = fluvial, SR = stream-resident.
7. A = adult, J = juvenile.

Table 8. Qualitative, quantitative, and genetic identification of bull trout dead-sampled from the Northwest Territories in 2000 and 2001.

Fish ID code	Location	Standard length (mm)	Upper jaw length (mm)	ARC[1]	BRC[2]	LDF[3]	Age (yrs)	Eye[4] position	Upper jaw shape	Upper jaw length	Head shape	Head size	mt DNA[5]	rDNA[6]	ID[7]
47257	Unnamed Cr.	267.0	29.9	10	26	0.5052	8	top	decurved	well past eye	flat, triangular	large	BLTR	BLTR	BLTR
47258	Unnamed Cr.	335.0	38.3	12	26	0.9567	8	top	decurved	well past eye	flat, triangular	large	BLTR	HY	BLTR
47259	Keele R.	461.0	53.1	10	28	1.8911	10	top	decurved	well past eye	flat, triangular	large	BLTR	HY	BLTR
47260	Keele R.	478.0	58.3	10	26	0.8877	10	top	decurved	well past eye	flat, triangular	large	BLTR	BLTR	BLTR
47261	Drum Lake	508.0	54.2	10	28	1.5720	9	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47262	Drum Lake	536.0	62.5	9	28	1.7659	14	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47325	South Nahanni R.	281.0	30.7	9	27	0.8625	11	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47326	Unnamed Cr.	266.0	28.0	10	28	1.5166	8	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47327	Unnamed Cr.	246.0	27.1	9	28	1.5181	7	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47328	Unnamed Cr.	349.0	45.5	10	28	2.4509	9	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47329	Keele R.	465.0	57.9	10	29	2.8635	9	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47330	Funeral Cr.	244.0	30.7	10	26	1.0207	11	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47331	Funeral Cr.	90.0	9.1	8	27	0.3836	2	top	decurved	just past eye	-	-	BLTR	BLTR	BLTR
47332	Funeral Cr.	60.0	6.3	8	26	-0.1107	1	top	decurved	just past eye	-	-	BLTR	-	BLTR
47333	Funeral Cr.	54.0	6.1	7	28	1.2381	1	top	decurved	just past eye	-	-	BLTR	-	BLTR
47334	Funeral Cr.	32.0	3.5	8	26	0.0471	0	top	decurved	just past eye	-	-	BLTR	BLTR	BLTR
47335	Funeral Cr.	36.0	2.9	7	26	-1.2152	0	top	decurved	just past eye	-	-	BLTR	-	BLTR
47336	Funeral Cr.	96.0	10.6	9	29	2.1626	2	top	decurved	just past eye	-	-	BLTR	-	BLTR
47337	Funeral Cr.	120.0	12.5	10	27	0.8495	3	top	decurved	just past eye	-	-	BLTR	-	BLTR
47338	Irvine Cr.	400.0	44.5	10	28	1.7399	10	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47339	Drum Lake	368.0	41.7	9	28	1.6387	9	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47340	Drum Lake	528.0	71.7	10	27	2.0267	18	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47341	Drum Lake	491.0	60.9	9	26	0.7829	10	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47342	Drum Lake	465.0	55.0	9	29	2.4576	10	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR

Table 8. (Continued).

Fish ID code	Location	Standard length (mm)	Upper jaw length (mm)	ARC[1]	BRC[2]	LDF[3]	Age (yrs)	Eye[4] position	Upper jaw shape	Upper jaw length	Head shape	Head size	mt DNA[5]	rDNA[6]	ID[7]
47343	Drum Lake	560.0	64.9	10	27	1.2890	10	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47344	Drum Lake	576.0	68.0	9	29	2.4489	16	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47345	Drum Lake	550.0	68.6	9	28	2.0669	11	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47346	Drum Lake	491.0	50.7	9	27	0.6345	10	top	decurved	well past eye	flat, triangular	large	BLTR	BLTR	BLTR
47347	Drum Lake	478.0	51.5	9	27	0.8071	13	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47348	Drum Lake	492.0	57.8	9	29	2.4239	11	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47349	Drum Lake	559.0	70.6	10	27	1.6725	11	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47350	Drum Lake	44.0	5.7	10	26	1.1928	1	top	decurved	well past eye	-	-	BLTR	-	BLTR
47351	Drum Lake	51.0	6.5	9	26	0.9258	0	top	decurved	just past eye	-	-	BLTR	BLTR	BLTR
47596	Irvine Cr.	560.0	67.4	10	29	2.7122	15	top	decurved	well past eye	flat, triangular	large	BLTR	BLTR	BLTR
47263	Funeral Cr.	72.0	5.8	7	26	-1.1945	1	top	decurved	just past eye	-	-	BLTR	-	BLTR
47264	Funeral Cr.	65.0	5.2	6	26	-1.3702	1	top	decurved	just past eye	-	-	BLTR	HY	BLTR
47265	Funeral Cr.	287.0	37.0	9	28	2.2240	11	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47266	Funeral Cr.	259.0	34.9	9	27	1.8096	9	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47267	Funeral Cr.	150.0	14.9	9	28	1.1201	4	top	decurved	just past eye	flat, triangular	large	BLTR	-	BLTR
47268	Funeral Cr.	233.0	27.0	9	27	1.1117	7	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47269	Funeral Cr.	312.0	38.3	10	28	2.1732	-	top	decurved	well past eye	flat, triangular	large	BLTR	-	BLTR
47270	Funeral Cr.	166.0	17.5	9	28	1.3473	5	top	decurved	just past eye	flat, triangular	large	BLTR	-	BLTR

1. ARC = principal anal ray count.

2. BRC = total branchiostegal ray count.

3. Linear discriminant function (LDF) score as computed following Haas and McPhail (1991): LDF Score = 0.629(total branchiostegal ray count) + 0.178(principal anal ray count) + 37.310(upper jaw length/standard length) – 21.8.

4. Eye position relative to dorsal surface of head.

5. Identification for individual fish is based on mitochondrial DNA (mtDNA) analyses; BLTR = bull trout, DVCH = Dolly Varden, HY = Hybrid, UK = unknown.

6. Identification for individual fish is based on ribosomal DNA (rDNA) analyses.

7. Identification for individual fish is based on the LDF score, genetic results, and morphometric characteristics.

Table 9. Population estimates of bull trout captured from Funeral Creek in 2001.

	All Life Stages		**Juveniles**	
Pass	**N (reach 1)**	**N (reach 2)**	**N (reach 1)**	**N (reach 2)**
1	13	14	12	14
2	3	5	4	6
3	1	2	1	3
Total catch	17	21	17	23
Population estimate	17	21	17	24
Standard error	0.531	1.002	0.686	1.943
upper 95% CI	18.126	23.090	18.454	28.020
lower 95% CI	15.874	18.190	15.546	19.980
Mean wetted width	3.02	3.50	3.05	3.60
Reach length	200	200	100	100
Sampling area	604	700	305	360
number of fish/100m^2	2.81	3.00	5.57	6.67
upper 95% CI	3.00	3.30	6.05	7.78
lower 95% CI	2.63	2.60	5.10	5.55

Table 10. Physical habitat characteristics of study locations where habitat use of bull trout was measured in the Northwest Territories during 2000 and 2001.

Location	Site	Stream order (map scale 1:50, 000)	Average wetted width (m)	Average temp (°C)	Month sampled	Elevation (m) (map scale 1:50 000)	Depth (cm)[1]	Velocity (m/s)[1]	Dominant substrate[2]	Dominant cover[2]
Drum Lake (63° 48' N, 126° 09' W)										
Drum Lake outlet	1	1	4.10	4.0	Sept	800	20.4(4-60)	0.21(0.01-0.81)	3	2
	2	1	4.45	4.0	Sept	800	19.1(3-66)	0.18(0.01-0.70)	3	5
	3	2	16.4	6.4	Sept	800	149(54-282)	0.32(0.12-0.49)	0	3
Funeral Creek (61° 36' N, 124° 44' W)										
Funeral Creek	1	1	3.36	7.8	Aug	1000	28.0(9-89)	0.39(0.0-1.13)	4	6
	2	1	2.56	7.5	Aug	1100	29.5(9-93)	0.26(0.0-0.93)	4	6
	3	1	1.72	4.6	Sept	1100	22.2(9-80)	0.30(0.1-1.33)	4	6
	4	1	1.70	4.1	Sept	1100	29.1(7-90)	0.22(0.01-0.91)	4	6
Jorgenson Creek (61° 31' N, 126° 05' W)										
Jorgenson Creek	1	2	6.26	7.9	Sept	600	53.1(12-140)	0.37(0.01-1.20)	4	6
	2	2	4.86	7.8	Sept	600	31.8(10-72)	0.68(0.01-1.46)	4	6
Marengo Creek (61° 35' N, 125° 48' W)										
Marengo Creek	1	2	4.96	-	-	600	40.9(12-85)	0.41(0.01-1.40)	6	6
	2	2	2.82	-	-	600	31.5(12-88)	0.37(0.01-1.72)	5	6
Keele River (64° 14' N, 125° 59' W)										
Unnamed Creek	1	3	10.7	4.1	Sept	400	38.2(12-114)	0.55(0.01-1.46)	4	6
	2	3	13.8	5.6	Sept	400	46.8(12-122)	0.41(0.0-1.25)	4	6
	3	2	5.17	3.6	Sept	600	35.9(12-66)	0.35(0.01-1.02)	4	6
	4	2	10.1	4.0	Sept	600	45.0(12-130)	0.42(0.0-1.46)	4	6
Kotaneelee River (60° 36' N, 124° 01' W)										
Unnamed Creek	1	2	4.95	12.7	Aug	1500	50.2(15-110)	0.29(0.0-1.00)	1	2
	2	1	6.90	10.3	Aug	2000	55.3(8-135)	0.47(0.0-1.21)	4	7
	3	1	5.80	7.8	Aug	2000	49.1(8-140)	0.51(0.0-1.40)	4	4
	4	1	7.20	8.5	Aug	2000	52.5(18-104)	0.48(0.0-1.55)	5	4

1. Depth and velocities are mean values with ranges in parentheses, 2. Substrate and cover codes are described in methods, and Tables 2 and 3

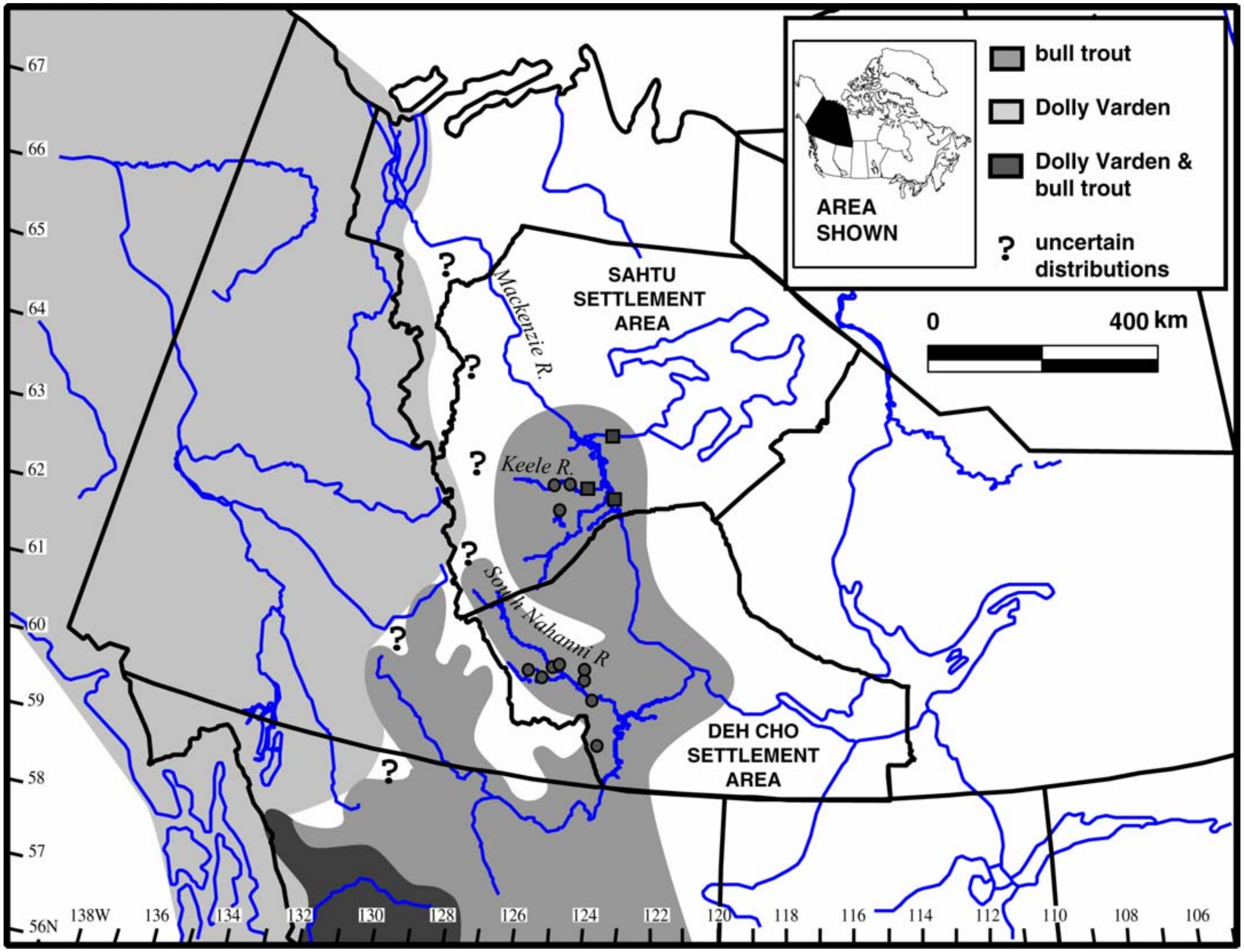

Figure 1. Distribution of bull trout and the related char, Dolly Varden, in Northwestern Canada showing locations of confirmed bull trout captures (● Mochnacz 2002; ■ Reist et al. 2002) in the Northwest Territories.

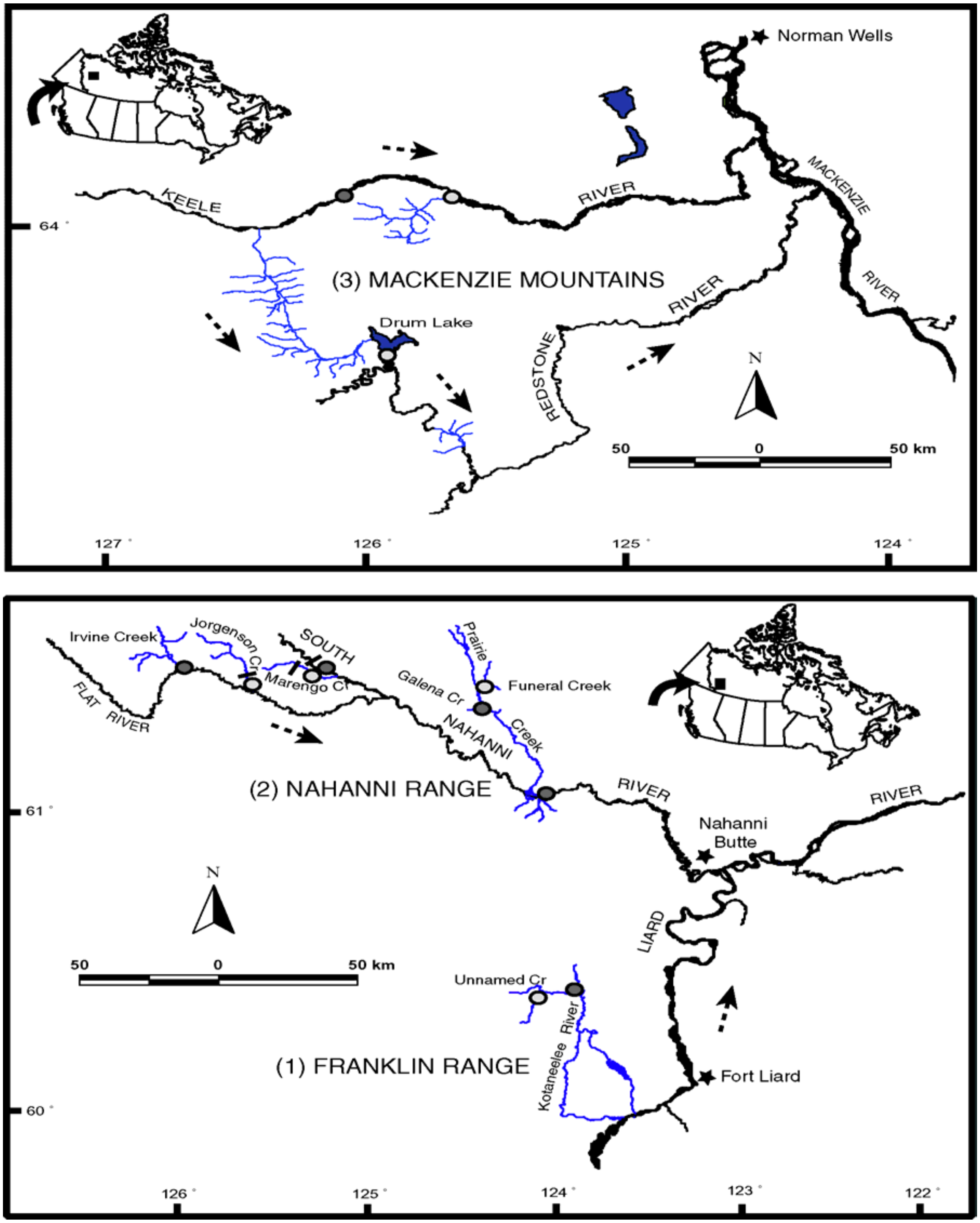

Figure 2. Study sites showing habitat (○) sampling sites and locations where bull trout were captured (○ & ●) in the central (top) and southern (bottom) Northwest Territories. Note that dashed arrows show flow direction, solid bars (▬) represent impassable falls, and only partial drainages are shown for clarity.