

Fish of the Dempster Country



2013: Results Report



Prepared for: Yukon Parks

&

Yukon Fish and Wildlife Enhancement Trust

Prepared by:

Matthew McHugh

~WILD COUNTRY FISHERIES LTD~

**Fish of the Dempster Country Project
Final Report: 2013-14-14-C1
Funding Contributions and Support by:**

**Yukon Fish and Wildlife Enhancement Trust
&
Yukon Parks
&
Friends of the Dempster Country**



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We would also like to thank all who assisted in making this year's project a success; the field assistants, equipment loans, in-kind contributions and support from many Yukon people all contributed to the project and are much appreciated.

For copies of the 2013 and/or previous 2011/2012 reports or for questions, email: wild-country_fish@gmail.com or by snail mail: Box 1646 Dawson YT YOB 1G0



Fisheries and Oceans
Canada

Pêches et Océans
Canada





The following is a list of people who helped make Fish of the Dempster Country Project a success:

Kyla Boivin	Project field assistant/camp cook/report editing
Marty Samis	Project field assistant/photography/graphics
Aaron Mendelson	Yukon Park's Summer student/project assistant
Ryan Peterson	TH: Fish and Wildlife Steward/Dempster expert
Roberta Joesph	TH: Fish and Wildlife Manager/project ideas
Alice McCully	Yukon Parks/project support and ideas- IMR program
Cameron Eckert	Yukon Parks/project support-IMR program
Nathan Miller	YG: Fisheries Branch/project support and ideas
Oliver Baker	YG: Fisheries Branch/project support and ideas
Sylvia Frisch	Project concept and ideas/expert into Dempster Country
Matthew McHugh	Project coordinator/field tech/report writing & editing

Introduction:

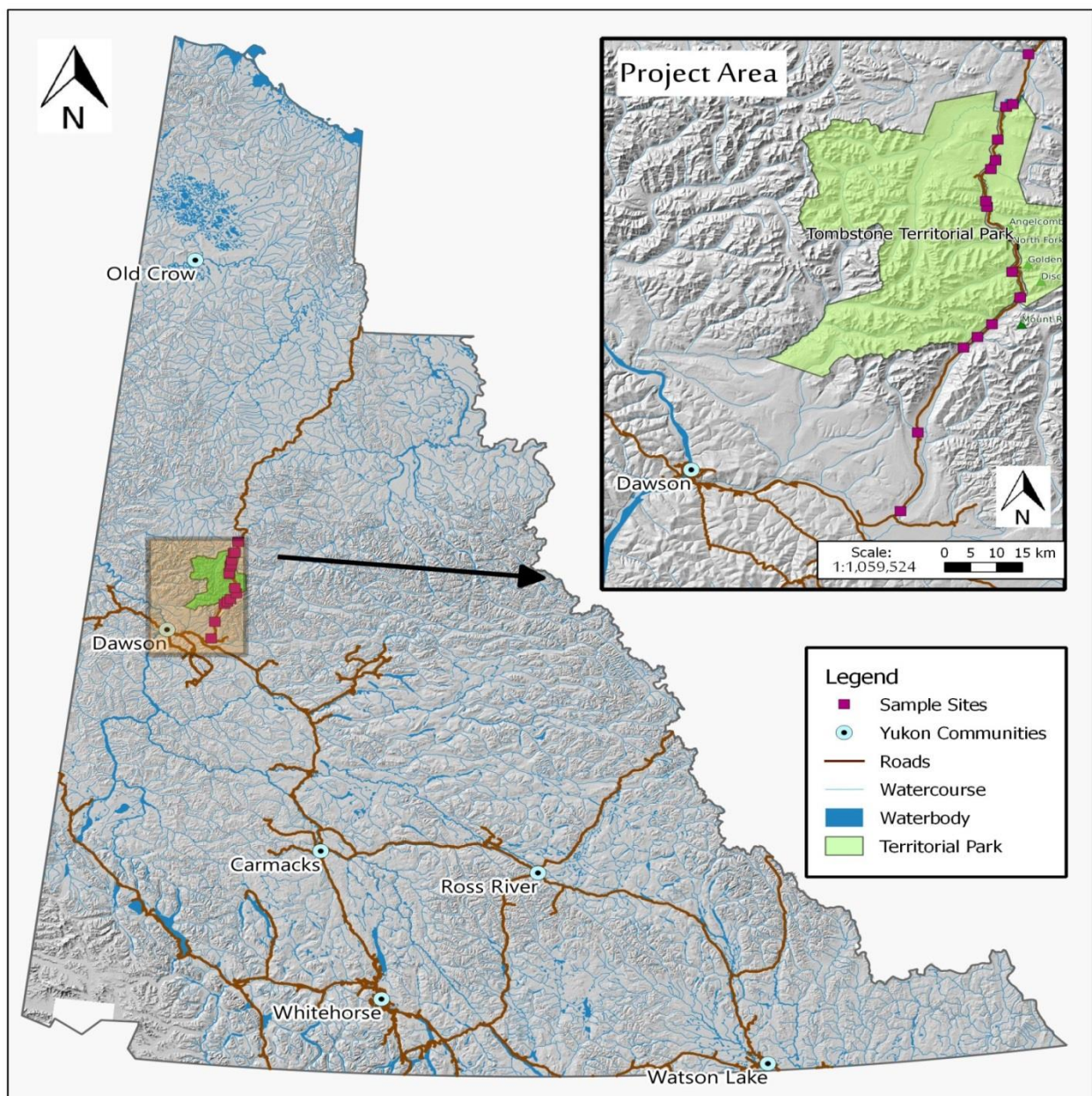
The Northern Yukon Territory is a unique area of Canada and the circumpolar world where little human disturbance has altered the natural environment ecosystems. The remoteness of this landscape is one of many contributing factors which allow the region to remain, in large part, pristine. The Dempster Highway, a corridor through sub-arctic and arctic Yukon taiga, provides access to the proposed project area, thus enabling the project to proceed relatively efficiently and inexpensively.

The Dempster Corridor also provides access to two of the major drainages within northern Canada, the Yukon and Mackenzie-Peel River systems; this access provided comparison possibilities for species present in Dempster Country. Results from this report may assist managers for future applications in the area, such as fisheries management, land-use planning, environmental assessment, and conservation efforts. The baseline data records established over the past three field seasons and a continuation of these efforts will provide a guideline of fish species and their respective habitats.

Summary:

The Fish of the Dempster Country Project completed its third consecutive year of monitoring, sampling and recording fish species distribution in 2013. The project area included 14 sites from Kilometer 09 through kilometer 130 of the Dempster Highway with a focus on establishing baseline data for an area rarely studied. This year the project involved a three step approach to monitoring fish distribution at sites, in order to establish relationships between fish and fish habitat suitability. This included a spring (June x 2 days), fall assessment (Nov x 1 day) and a mid-summer assessment (August). The latter included sampling and recording catch over a 6 day period and also addressed fish passage issues (at known and unknown sites) associated with culvert and/or road crossings through the Dempster Highway. Also each site location was properly assessed for habitat suitability in being able to support fish populations or to not.





Data Collection & Report by Wild Country Fisheries Ltd. | Maps produced by Aaron Woroniuk

Fish of the Dempster Country Project 2013

Locator Map Figure 1

50 0 50 100 150 200 250 km

Scale: 1:5,000,000

NAD83 || YT Albers || EPSG: 3578

Generated February 2014

Data Sources:
CanVec Topo
GeoBase
Yukon Geomatics

The maps and map data are provided "as-is" and are not legal surveys or legal descriptions. Wild Country Fisheries Ltd. and Aaron Woroniuk explicitly disclaims any representations and warranties as to the accuracy, timeliness, or completeness of maps and data. These maps and data should not be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction.

Figure 1: Fish of the Dempster Country 2013 Project Area and Tombstone Park Boundary

The main objectives of the 2013 project were as follows:

- Establish a baseline inventory of fish species and their habitats occurring throughout the Dempster Highway Corridor, including sites within Tombstone Territorial Park boundaries.
- ID and records of culverts and/or road crossings, affecting fish passage, at sampling locations
- ID key fish habitat: including rearing, spawning, and over-wintering at the sampling sites
- Gather Traditional and/or Local Knowledge of Dempster Country, in project area
- Generate GIS mapping of the area, highlighting fish distribution and abundance, summer rearing, spawning and over-wintering habitat
- Involve TH First Nation (Youth - Elders), the local community and interested parties to gain an appreciation and understanding of fish and their habitats within Dempster Country.

Methodology:

All methods used in the 2013 Fish of the Dempster Country Project include proper sampling protocols, as outlined in the Scientific Collectors License; set forth by the Department of Fisheries and Oceans Canada and Yukon Environment-Fish and Wildlife Branch. Fish were captured, sampled and released unharmed and with minimal stress. Any mortality's were collected and preserved for Scientific and/or Educational purposes.

The following is a list of equipment used to collect and record the sample data:

- Gee-Minnow traps: to capture juvenile fish, when appropriate and/or conditions allowed
- Minnow Seine: used for taking "grab samples" if fish were observed while on site
- Electro-Fisher: capture juvenile-adult species present at the sampling location (max 1000 sec)
- Rod and Reel Techniques: to capture adults, where other methods are difficult
- Dry Suit: snorkel-swim count used as a low impact method to document/ID fish species
- Stream Walk: an effective way to do an assessment of a creek: available habitat/fish present/types
- Visual Observations: juvenile-adult ID or environmental factors noted affecting the specific site

Baseline Data was collected and recorded on fish ID (species), numbers (captured/observed), weight (g) and length (mm), recorded as fork or total length. Any notable comments observed at each sample site location were documented under the comments sections in the Habitat Assessment.

A habitat assessment was completed at each site during sampling. A standardized "habitat assessment" form was created for the project based on water and habitat qualities and parameters.

This includes:

- Water Quality: (YSI 556) air/water temperature, dissolved oxygen, total dissolved solids, conductivity, and ph.
- Water Quantity: depth (meter stick) and width (50 m tape)
- Site Characteristics: bed materials/water form/water stage/water colour/veg over-story & riparian/in-stream veg/islands/turbidity/over-flow
- GPS: lat/long coordinate and elevation
- Date/Time : includes weather conditions at time of sampling or assessment

- Culvert/Bridge: noted if present at sample site and if affecting fish passage
- Notes/comments: any notable features, environmental change and/or points of interest

Traditional and Local Knowledge:

The 2013 Fish of the Dempster Country Project utilized Traditional Knowledge to help develop an understanding of how this environment had been used in the past by First Nations who frequented the area. Local Knowledge was utilized to assist with an overview of specific sample locations; over the past two years interviews were completed via telephone conversations and also in person interview sessions.

G.I.S mapping & Photo Geo-referencing:

The 2013 Fish of the Dempster Country Project utilized modern day computer software applications to produce maps in order to describe the project area, sites locations and recognized summer/winter rearing habitats at the sampling locations.

Photos taken in the 2013 project (at each sampling location) were geo-referenced to Google Earth. Several photos' describing each site's features, culverts, species captured and notable site natural features have been uploaded to Google Earth. A file is attached with this report which links the reader to site specific photos.

Field Work: Sampling and Recording:

Site locations along the Dempster Highway Corridor examined in the FOD 2011/2012 projects were sampled 4 times throughout the summer and early fall; the goal was to monitor and record differences and trends in fish distribution, migration and behaviour over different seasons. This would have been the preferred methods for the 2013 project as well but due to the logistics involved in coordinating and organizing, along with maintaining quality sampling data (large # of sites over a short periods of time) it was determined to reduce the site visits to spring and fall assessments plus one sampling period over a week during mid-summer. Several sites which were closely related regarding habitat and/or complexity were eliminated in order to allow new sites of interest and relevance, selected for better representative samples over the large project area.

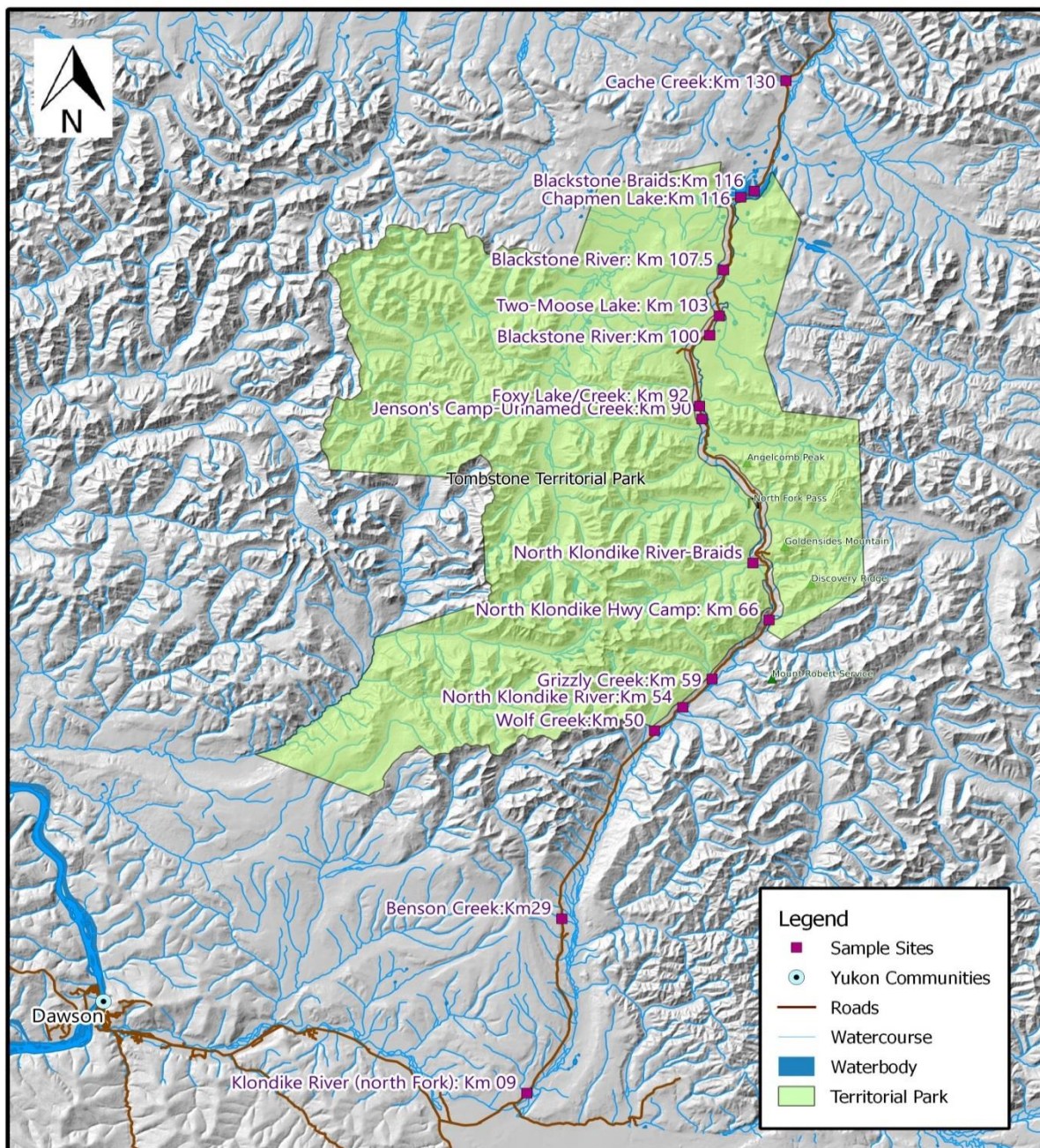
A ***June Assessment*** in spring was completed over a 2 day visit to each project site location. This assessment was originally planned for May, which is known to be when the thaw and ice-out periods occur in the Dempster area, but because of a late winter (extending into May) there was not even a thaw period until end of May. June was the next available date to reach the sites. No live sampling occurred during this assessment period, fish were observed and noted at several site locations. Angling (R/R) was conducted at several sites with limited results.

The ***August Assessment*** during mid-summer was completed over a 6 day period (+ 2xdays for mobilization/demobilization). All of the fish sampling occurred over this period. Sampling efforts identified species distribution, summer rearing areas for each species and provided insight into available habitat and rearing areas during the summer season. Sampling equipment most appropriate to each site was utilized during this period to best represent fish distribution of that particular site location.

The **November Assessment** in fall involved a 1 day exercise completed on each site. The objectives were to identify locations and document any evidence of spawning and/or over-wintering habitat in this region. No live sampling occurred.

The following is a list of sites, selected for study in the 2013 “Fish of the Dempster Country Project”:

- North Fork-North Klondike River-Km 09
- Benson Creek-Km 29
- Wolf Creek-Km 50
- Grizzly Creek-Km 59
- North Klondike River: YG Highways Camp-Km 66
- North Klondike Braids: accessed via Tombstone Campground
- Jenson’s Camp – Unnamed Creek - Km 90
- Foxy Lake/Creek-Km 92
- Blackstone River-Km 100
- Two-Moose Lake- Km 103
- Blackstone River: Rest Area-Km107.5
- Chapmen Lake-Km 116
- Blackstone Braids-Km 116
- Cache Creek-Km 130



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Fish of the Dempster Country Project 2013

Project Area Map

Figure 2

5 0 5 10 15 20 25 km

Scale: 1:500,000

NAD83 || YT Albers || EPSG: 3578



Data Sources:
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Figure 2: Site locations along Dempster Hwy

Results:

The 2013 Fish of the Dempster Country Project involved habitat assessments and sampling at 14 sites along the Dempster Highway Corridor. Sites were selected based on previous studies and/or recognitions, data collected and recorded in the past and current interests regarding site location and/or speculation on species distribution and abundance. Sites recognized as having a “barrier to fish passage” were also examined in order to monitor the current status issue to fish passage. The project area extends over two major watersheds; the Yukon River and Mackenzie-Peel River drainages. Within the 14 selected sites 6 of those are part of the North Klondike River Drainage with Slimy Sculpin and Arctic Grayling species documented (including FOD 2011/2012); 8 sites were found within the Blackstone River. Slimy Sculpin, Arctic Grayling, Northern Dolly Varden, Burbot and Long-nose Sucker were all documented in the Blackstone drainage, including FOD 2011 and 2012 projects.

A proposed early spring assessment was planned for May in order to observe and document potential over wintering areas, spawning activity (specific to spring spawners) and/or rearing areas (fry-adult). A visit was made on a separate outing to the area in early May and after a quick glance to the sites there were no signs of thawing activity; most sites remained ice-over. Temperatures remained consistently below zero and averaging -30 to -35 degrees below zero at night. From this it was decided to postpone the site visits until the first available dates, being June, 7th and 9th 2013. During the last week in May temperatures rose significantly and major freshet events caused an extremely quick thaw period for the area. By the time the June/spring assessment was completed we had missed our window for early spring observation trends. The assessment was completed regardless in order to gain any new insight at the study sites and observe spring fish behaviour for the region. The results were very comparable to the FOD 2011/2012 June results, after freshet had occurred.

A mid-summer assessment was also completed at each site. This took place over a 6 day sample period; on August 05th 2013 and August 18th-21st 2013. During this period the objective was to use different captured methods appropriate to each site and record the data for species (fish) abundance and distribution (and/or occurrence).

Water quality and quantity were also recorded during this period. A habitat assessment form was filled out upon arrival to each site. These records assist in establishing a base-line data set for each site location and to define if the site is well suited to fish species or not.

A fall assessment was completed over a 1 day visit to each site on November 8th 2013. The objectives of the fall assessment were to observe and document spawning activity, over-wintering and rearing habitat. To better understand spawning activity in the area an assessment would have to be completed in late September to mid-October when freeze up occurs. First week of November was late for this northern region and most sites had already frozen over, and spawning activities complete. However several sites locations had characteristics which showed signs which would support over-wintering habitats.

***For a complete list of data- please see attached- FOD Sample Data 2013/Habitat Data 2013
Spreadsheets :Microsoft: Excel**

North Klondike River-Old Damn Site: Km 09

The North Klondike River is long been known to support an abundance of several species of fish during spring, summer and fall and potentially during winter. The study site, located around the old damn at North-fork, has a long history of Chinook salmon (fry to adult) using the area for summer rearing (fry) and spawning (adults) in the fall. This has been recognized in the past from First Nations, Researchers/Scientists and locals. The location supports an abundance of available habitat for fish residing in the area with a large eddy at the base of the damn structure and riffles and glides in the main channel of the River. Also the old damn structure, large driftwood piles and vegetation cover make this location excellent fish habitat. This area has always been regarded as a great fishing spot for Arctic Grayling in the spring after ice-out. In recent years, Dawsonites would fish this site while Chinook salmon were migrating up river to spawn in mid-summer but closed recreational fisheries and declining numbers have forced people to stop fishing Chinook here.

The Frisch family whom lived in a nearby cabin at North-fork for many years recall seeing an abundance of juvenile salmon during summer in the large eddy next to the old-damn structure and were thought to be Chinook fry. Julia Frisch noted adult Chinook numbers were much greater twenty years ago versus what is observed today. Also a past fisheries technician who performed drift netting at this site over twenty years ago, in order to collect male/female Chinook for an incubation/restocking program, noted declining numbers of these salmon, especially males, during mid-summer spawning periods.



Above: North Klondike River: North-fork: Km09 / Below: Slimy Sculpin captured by electro-fishing pools-Aug 2013

photo: M.McHugh



NKR-June 7th 2013 Site Assessment: AIR: 10.1C WATER: 5.8C --over-cast/rain @ 1750h

- River open, ice out- ice remains on shoreline
- Water levels and flows high as freshet continues to flush melt water
- Old damn structure falling into river after heavy melting and fast water in previous few wks.
- River bank has substantial erosion due to high and fast melt water during freshet
- Rod and reel =15 minutes: no fish caught or observed while on site

NKR-August 5th 2013 Assessment: AIR: 9.7C WATER 6.5C --partly cloudy @ 1030h

- 4x g-trap set for 16hr-pulled Aug 6th 2013=no fish caught
- Electro-fisher used in small pools and Lg eddy by old damn: 787 sec= 3x Slimy Sculpin caught
- R/R used for 15 minutes=no fish caught. Also no other fish observed in area during sampling
- Great fish habitat in area: lots of lg woody debris, pools, riffles and glides and veg cover
- There are no culvert/bridge/obstructions to fish passage at this site
- Significant erosion to the Old-damn and river shoreline from heavy ice and melt water at break-up-remains stable since June Assessment

NKR-November 8th 2013 Assessment: AIR: -8.5C WATER: N/A --partly cloudy/windy @ 0900h

- River frozen over at site, including lg eddy at old damn
- There were several open leads in main channel- nothing significant
- Adult's may utilize deeper pools/eddy in area for over-wintering

Benson Creek: Km 29

Benson Creek is a high velocity tributary stream to the North Klondike River which originates from the Tombstone- Ogilvie Mountain range. Although the site location near the Dempster Highway is very fast flowing, only one kilometer downstream it enters the North Klondike, which is Salmon bearing. There is no evidence or documentation to date, of salmon using Benson creek for rearing and/or spawning but it should be considered as a possibility, especially near the mouth where the creek enters the North Klondike. After a conversation with retired DFO fisheries biologist Al Von Finster I learned that Adult Chinook Salmon had been observed and documented spawning near the mouth of Benson Creek when an aerial flight survey was done in years past. Gerard Couchon, a Benson Creek B&B owner who lives near the mouth of the creek, has never noticed salmon in Benson but has observed Arctic Grayling in the creek annually during summer months. The plunge pool beneath the down-stream culvert could also support adult Arctic Grayling during summer rearing but nothing was observed or captured in FOD: 2011-2013. A fisheries assessment report from the 1978 study *Dempster Lateral Pipeline Fisheries Assessment*, completed by Beak Consultants, indicates Slimy Sculpin (x30) were captured at Benson Creek during the early spring suggesting that these fish may over-winter at the creek site. The report also indicates Arctic Grayling (1x juvenile 3x adult) were captured by way of electro-fishing during the assessment over three visits throughout the field season (May-Sept).



Benson Ck: Km 29 –Left: 2x perched culverts/Right: down-stream view of creek

photo: M.McHugh

Benson Ck-June 7th 2013 Assessment: AIR: 12.3C WATER: 3.8C –overcast @ 1950h

- High velocity, fast flowing water-not likely to support juvenile or even adults fish at this time
- No samples taken or fish observed during assessment

Benson Ck-August 21st 2013 Assessment: AIR: 16.5C WATER: 5.2C –partly cloudy @ 1700h

- No traps set due to high and fast flowing water—after heavy rain
- Electro-fisher used for max allowed 1000 sec = 2x Slimy Sculpin: captured down-stream
- No other fish observed during sampling—adult Arctic Grayling may use down-stream plunge pools created by culverts
- Kick-net results= caddis-fly larvae and unidentified invertebrates-in process of ID
- Site could support other fish species—adequate habitat in areas further down-stream
- 2x culverts are perched (+6”) and have slight plunge = barrier to fish passage

Benson Ck-November 8th 2013 Assessment: AIR: -8C WATER: N/A –partly cloudy/windy @ 930h

- Creek completely iced over
- No signs of ground water sources
- Unlikely fish could over-winter at this location

Wolf Creek: Km 50

Wolf Creek is a high velocity stream originating in the Tombstone- Ogilvie Mountains; it enters the North Klondike River less than a kilometer away. Near the highway Wolf creek has limited available habitat for juvenile fish, due to fast moving water and little shelter. However further from the Highway the creek offers an area of adequate shelter and woody debris along with light-current eddies, which could support juveniles. No fish were recorded at Wolf Creek during the past three field seasons (FOD: 2011-2013). However a study completed by Beak Consultants in 1978 *Dempster Lateral Pipeline Fisheries Assessment*, reported capturing 6x Arctic Grayling adults with an electro-fisher upstream of where the highway is today. Salmon have not been documented in Wolf Creek to date but may enter the creek at the mouth via the North Klondike River during spawning migrations. Further monitoring would have to be completed to verify.

A phone interview conducted in March 2014 with Victor Henry, son of Annie and Joe Henry who lived in the cabin at Wolf Creek next to the Dempster Highway for many years, had no knowledge of fish in Wolf Creek by the cabin; they utilized the richer stocks found in the Blackstone Drainage. However, because of the available habitat in the creek and in nearby North Klondike River it is possible that adults may utilize this area during summer rearing to a limited degree.



Wolf Creek: Km 50—Left: electro-fishing pools/Right: 2x culverts (+over-flow culvert) perched

photo: M.Samis

Wolf Ck-June 7th 2013 Assessment: AIR: 12.4C WATER:3.1C –partly cloudy @ 2100h

- High water levels and flows in area due to recent melting
- Unlikely to have fish occurring in area at present-due to high water level and velocity
- No fish observed during assessment

Wolf Ck-August 19th 2013 Assessment: AIR: 20.5C WATER: 7.1C –partly cloudy @ 1430h

- No traps set due to high and fast flowing water
- Electro-fishing 650 secs= no fish captured
- No fish observed during sampling period
- Adequate habitat further down-stream from highway=riffles, glides and good veg cover
- 2x culverts at site-both perched (2-6")
- left culvert receives majority of water flow- substantial plunge= barrier to fish passage

Wolf Ck-November 8th 2013 Assessment: AIR: -8.2C WATER: N/A – partly cloudy @ 1005h

- Creek completely iced over during fall assessment
- No ground water or open water sources observed
- Unlikely fish could over-wintering at this site, with the exception of Slimy Sculpin

Grizzly Creek: Km 59

Grizzly Creek is also a high velocity mountain stream and tributary to the North Klondike River originating in the Tombstone- Ogilvie Mountains; it is smaller in size (width/depth) in comparison to Benson or Wolf Creeks. There are pools (below culvert) and riffles with moderate vegetation cover that could provide habitat for adults. No records of fish captured in past studies are documented but Slimy Sculpin most likely use this area during summer. The creek enters the North Klondike River less than half a kilometer from the Dempster Highway crossing; fish utilizing the main river may enter during summer rearing or fall spawning periods further towards the mouth. The headwaters of this creek at Grizzly Lake have been known to support small populations of Slimy Sculpin as is documented by 2003 YG study, *Fisheries Investigations-Tombstone Park*, that used g-trap sets and gill net sets over short periods. No other fish were caught but recommendations suggest further study over longer periods to provide more information. Continued monitoring and interviews with Park staff and hikers who utilize the Grizzly Creek trail may also provide additional information.



Grizzly Ck: Km59-down-stream site Shot: Aug 2013

photo: M.Samis



Grizzly CK Km 59—Left: 2x perched culverts/Right: down-stream view of Grizzly Creek

photo: M.Samis

Grizzly Ck-June 7th 2013 Assessment: AIR: 12.2C WATER: 2.9C –partly cloudy @ 2130h

- High water and flows at site due to recent melt
- R/R-15 minutes= no fish caught
- No other fish observed during assessment
- Unlikely to have fish present due to higher faster water at site-at this time

Grizzly Ck-August 19th 2013 Assessment: AIR: 22C WATER: 8.5C –partly cloudy @ 1800h

- No traps set due to high and fast water in area
- Electro-fishing 877 sec =no fish caught
- No other fish observed during site assessment
- Limited habitat available-fish may enter creek via N Klondike for rearing/spawning
- 2x culverts at site- both perched (4-6”) Left culvert receives majority of flow and has substantial plunge=potential barrier to fish passage

Grizzly Ck-November 8th 2013 Assessment: AIR: -8.5C WATER: N/A –partly cloudy @ 1040h

- Creek site completely iced over
- No ground or open water sources observed
- Unlikely that fish over-winter here- due to lack of available habitat-iced over

North Klondike River-Hwy Camp: Km 66

Kilometer 66 North Klondike River is located behind the Yukon Government's Highway Maintenance Camp. There are plenty of available adult habitats at this location with glides, riffles and an eddy. This location is known by local fisherman as a great Arctic Grayling fishing. After speaking with the YG foreman on site he stated "Local fisherman used to always fish for Grayling here but things have slowed down in recent years, because fishing is not as good".

This site is utilized by various fish species rearing in summer and mostly over-wintering in areas with deeper pools throughout.

Due to not giving advanced notice access to this site was not possible during the spring and fall assessments.



North Klondike River-YG Hwy Camp: Km 66

photo: M.McHugh

NKR-HWY Camp-August 21st 2013 Assessment: AIR: 15.3C WATER: 7.8C –partly cloudy @ 1545h

- R/R for 15 minutes= no fish caught
- No other fish observed during assessment
- High potential for adult Arctic Grayling habitat-pools, riffles, glides with good veg cover
- No culvert/bridge or obstructions to fish passage at this site
- River banks very stable due to YG camp retaining wall

North Klondike River-Braids:

Accessed via the Tombstone Territorial Campground kilometer 72 this site is located in the braided flats near the headwaters of the North Klondike River. An interruptive 2km hiking trail is the only access that reaches this location, other than river itself. This is a unique area of the North Klondike watershed and is quite productive, considering the available habitat. Shallow pools, riffles and glides all provide habitat for invertebrates and several fish species which seem to thrive in areas like this in Dempster Country. After speaking with several Dawson locals and Tombstone Park staff, who frequent this area in summer, it was learned that fish such as slimy Sculpin and juvenile Arctic Grayling are present to date. These fish can often be observed while walking on the shoreline next to the clear water. Further down-stream in deeper water adult Arctic Grayling are often fished by local anglers.

A telephone interview with Victor Henry, who was raised in the area, told a story of an old timer working on the Dempster Highway in the 1950's and remembers seeing the braids coloured red (with salmon) in late summer. FOD also investigated the North Klondike River Km 64 where it crosses the Dempster Highway and noted that there was no barrier to fish passage observed; a large culvert was in place for the mass runoffs experienced in spring. The only concerns reported to this habitat are contaminates that entered the river at the YG Highways camp in the past. Since then the camp has made drastic changes to fuel storage and potential spills. More studies on the quality of water in the North Klondike down-stream of the YG Highway's camp would have to be completed to draw any further conclusions.

Due to limited access this site was only assessed during the mid-summer sampling period in August/13

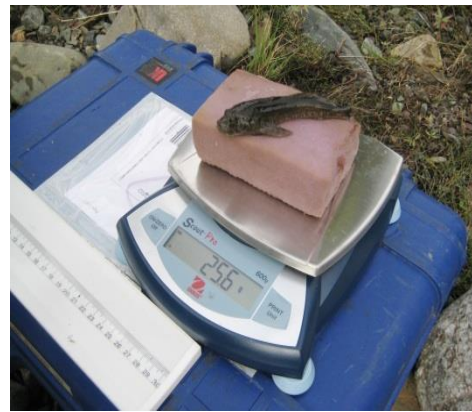


North Klondike Braids-site location

photo: M.Samis



Algae found in water column



Slimy Sculpin on weight scale during Aug sampling



BS Braids -Visitors and Tombstone Park Staff look on as Matt McHugh explains techniques for setting g-traps photo: M.Samis

NKR Braids-August 19th 2013 Assessment: AIR: 15C WATER: 8.9C –overcast @ 1100h

- 4x g-trap set Aug 18th @ 2135h
- G-trap pulled Aug 19th @ 1100h= 3x Slimy Sculpin captured
- Observed other Slimy Sculpin and juvenile fish (AG) while walking in Braids
- Kick-net results produced various invertebrates
- No culvert/bridge or passage obstruction found at this site

Jenson's Camp-Unnamed Ck: Km 90

The Jenson's Camp-Unnamed Creek site originates in the Cloudy Mountain Range in the Ogilvie Mountains. It is a tributary of the Blackstone River which first joins with the Yakamaw River before

draining into the river less than 200 meters from the Dempster Highway. This site has proven to be highly productive for juvenile to adult various species of fish in the past three years of sampling (FOD) and other studies completed on this site confirm the same. Such species as Slimy Sculpin, Arctic Grayling, Burbot and Northern Dolly Varden in all life stages have been found while sampling during May-September.

Pete Jenson, who lived next to the creek since the 70's, noted that the down-stream pools were well-known Arctic Grayling fishing locations. He stated concern about the marked increase of anglers at this location over the past several years (sometimes 3-5 at one time). Mr. Jenson also mentioned that he believed it to be an over-wintering area for Grayling and Dolly Varden because of the open water that remained at the site from November to March. He had also observed Dolly Varden in the up-stream open water hole while hauling water for personal use.



Jenson's Camp: Km90—downstream view, looking into braided channel

photo: M.Samis

The Jenson's Camp Km90 site offers extensive fish habitat and is considered an important summer rearing channel for the Blackstone River. The study completed by Beak Consultants in 1978 called *Dempster Lateral Pipeline Fisheries Assessment*, reported Jenson's Camp site to be utilized as summer rearing and spawning habitat by Arctic Grayling and Dolly Varden. This creek also has potential to provide over-wintering habitat or in the nearby Blackstone River where water is deeper and ground water sources are present. *Filamentous Green Algae* is found throughout the braided shallow channels of this creek indicating possible ground water source.



Jenson's Camp: Km90—Left: electro-fishing pools down-stream/Right: up=stream walk-adult GR/DV observed photo: M.Samis

Jenson Camp-June 9th 2013 Assessment: AIR: 10C WATER: 4.5C –overcast/rain @ 945h

- Water level and flow moderate
- Ice still present in braided channels-but flowing underneath
- R/R for 15 minutes= no fish caught
- No fish observed during assessment period

Jenson Camp-August 20th 2013 Assessment: AIR: 12C WATER: 4.2C –overcast/cool @ 1000h

- Moderate water level and flow
- No g-traps set
- R/R for 25 minutes= 3x Arctic Grayling (adults) caught, sampled, recorded
- Electro-fishing for max 1000 sec= 5x Slimy Sculpin 11x Dolly Varden (fry-adult)
- Snorkel Swim for 20 minutes= 20+ Arctic Grayling/Dolly Varden adults in down-stream pool
- Stream walk: Blackstone revealed many schools of Dolly Varden fry in braided channels
- Stream walk: downstream-100m 5x unidentified adults in main current/culvert
- 1x lg culvert at this site= no passage issues observed-adults observed swimming up/down



Above: Adult Northern Dolly Varden Captured August 20 2013/ Below: Dolly Varden fry captured in braided channel at Jenson's Camp



Photo's: M. Samis

Jenson Camp-November 8th 2013 Assessment: AIR: -10.3C WATER: 0.0C --partly cloudy @ 1745h

- Main creek channel iced over-with some open areas
- Braided/side channels have open water: possible ground water --Dolly Varden fry observed
- Good Potential over-winter at site
- fish observed Nov/Mar by Pete Jenson (previous camp owner) at upstream water hole



Nov 2013 Assessment: open side channel- Dolly Varden fry observed

photo: M.McHugh

Foxy Lake/Ck: Km92

This was the first season Fish of the Dempster Country completed an assessment at this site. Foxy lake is a small thermokarst Lake formation located just off the Dempster to the west. The creek inlet which forms at the Dempster is very narrow (1.3m) yet relatively deep (38.5cm-ave.) which drains into the Blackstone approximately one kilometer away. Arctic Grayling adults were observed during FOD-2013 migrating back and forth between the creek inlet and through the culvert, presumably heading out to the main-stem Blackstone. These observations remain consistent every time the location

is visited. Also during a snorkel swim small juvenile fish, likely to be Arctic Grayling (based on observation ID), were observed in the lakes shallow shoreline which consists mostly of fine clay, mud and aquatic grasses. The snorkel swim also revealed that Foxy Lake is at least 6 meters in depth at the centre. It is possible fish of all life-stages could over-winter at this site. Thick vegetation over-hang along the creek offer excellent cover for fish and cobble gravel substrate add to the available habitat. Past studies on the area indicate species such as Arctic Grayling and Dolly Varden utilize this habitat for summer rearing, spawning and over-wintering (in Lake).

Local anglers recognize this location as an excellent fishing destination. A phone conversation with Victor Henry, of the Trondek First Nation in Dawson City, revealed this site to be great Arctic Char fishing, which is commonly known as Northern Dolly Varden in present day fisheries biology.



Left: Foxy Lake

Right: Foxy Creek-downstream of culvert photo: M.Samis

Foxy Lake/Ck-June 9th 2013 Assessment: AIR: 12C WATER: N/A –overcast/rain @ 1040h

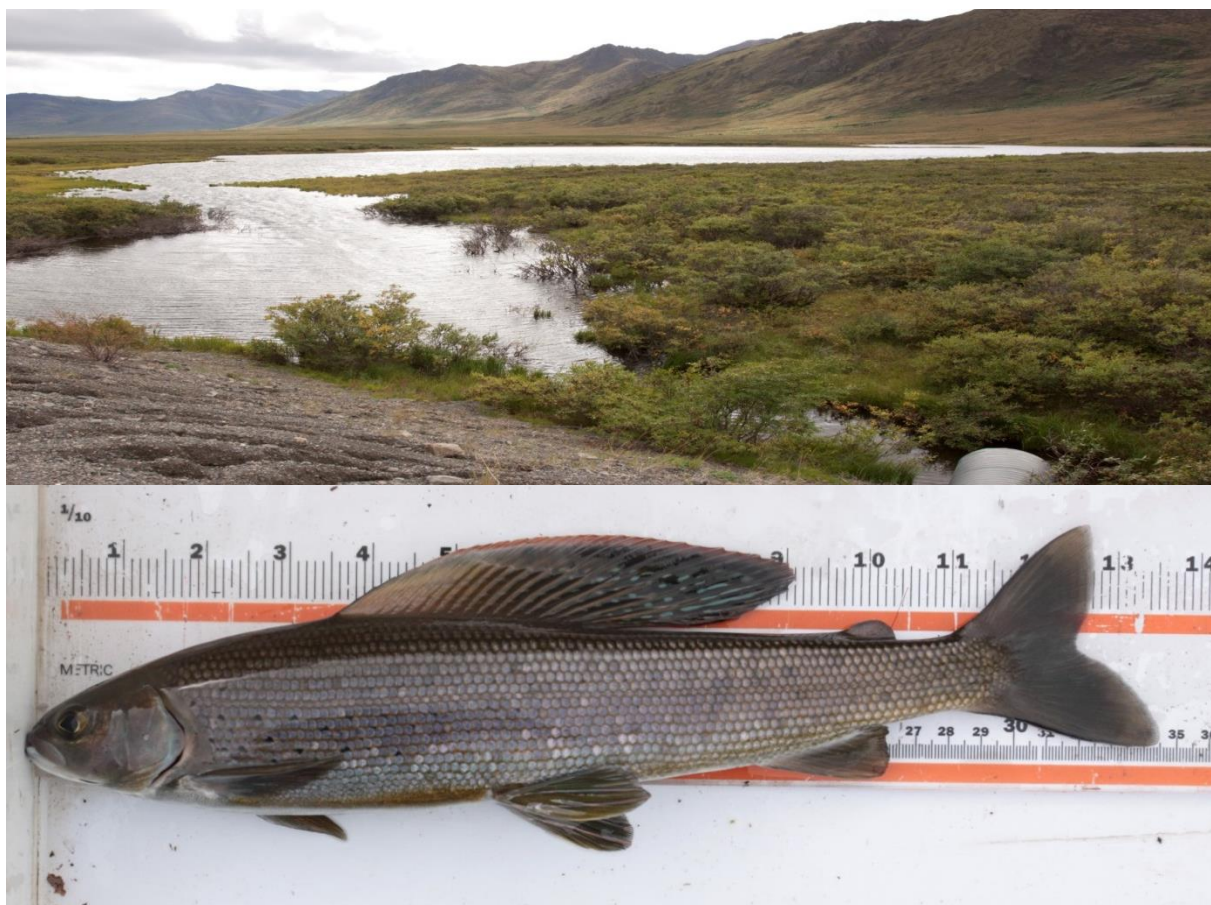
- moderate water level and flow in lake/ck
- adult fish (30-40cm) observed in creek inlet to lake and passing through culvert
- LK may be utilized for fall and spring spawners

Foxy Lake/Ck-August 20th 2013 Assessment: AIR: 15C WATER: 11.1C –overcast @ 1530h

- 4x g-trap set 2@1630h (in Lake)-pulled Aug 21 @ 1230h=no fish caught
- Seine net pull in creek below down-stream culvert= 2x adult Arctic Grayling captured
- Snorkel Swim for 25 minutes= juvenile Arctic Grayling and Slimy Sculpin near shoreline of Lake
- 3 x loons feeding in middle of Lake- possibly feeding on juveniles or smaller fish?
- Fresh water shell fish found—no organism present
- 5x Arctic Grayling observed travelling back and forth through culvert
- 1x culvert with no barrier to fish passage observed

Foxy Lake/Ck-November 8th 2013 Assessment: AIR: -10C WATER: N/A –partly cloudy @ 1815h

- Lake and creek completely iced over
- No obvious ground water sources
- Potential over-wintering habitat-Lake is at least 6 meters in depth=so it would not freeze solid



Above: Foxy Lake @ creek inlet and culvert /Below: Adult Arctic Grayling captured below down-stream culvert

photo: M.Samis

Blackstone River: Km 100

Located approximately 300 meters off the main highway this site has long been known as a great fishing spot. In fact, locals refer to it as “the secret spot” even though it hasn’t remained a secret. It was a selected sample site based on this information from Tombstone Park Staff. An abundance of cobble, riffles, pools/eddies and good vegetation cover offer ideal habitat for fish juvenile to adult, as was documented in FOD: 2012-2013. This area is used by various species of the Blackstone for summer rearing and there is a good possibility that the site is also utilized for spawning and over-wintering as well. After speaking with several local anglers they mentioned this was an excellent area for catching Dolly Varden; Arctic Grayling are also known to be caught at this location.

A significant ice and freshet event has caused the banks and vegetation to erode and have become unstable, along the cut-bank at this site. This may affect certain characteristics of the available habitat at this site or in the area.



BS: Km 100

photo: M.Samis

BS:km 100-June 9th 2013 Assessment: AIR: 10C WATER: 4.6C –overcast/rain @ 1120h

- Moderate water level and flows
- R/R for 15 minutes=no fish caught
- Bank has eroded significantly due to high freshet levels (estimate. @ 1.5-2.5 m)

BS:km 100-August 21st 2013 Assessment: AIR 11C WATER: 4.1C –partly cloudy @ 1000h

- No traps set due to very high water-seems very high for time of year?
- No Electro-fishing due to high water-not safe
- R/R for 20 minutes= no fish caught
- No other fish observed during assessment
- No culvert/bridge or obstruction to fish passage observed: bank-no change since June



Left: erosion to bank and vegetation during freshet: June 2013 / Right: YSI meter taking water quality at site Aug 2013

photo: M.McHugh

BS: km100-November 8th Assessment: AIR: -10C WATER:N/A –partly cloudy @ 1550h

- Creek iced over, with several smaller open leads in main river channel
- No observed ground water sources-a closer survey would have to be completed on BS
- Potential for over-wintering in deeper pools located in area

Two-Moose Lake: Km 103

Two-Moose is a small Thermokarst Lake, located on the west side of the Dempster Highway. It is a shallow lake (2m-average) and is rich with aquatic vegetation. This is also why we often see two moose feeding in the Lake. Although an information sign at the Lake site and local bird-watchers have said there are Arctic Grayling in Two-Moose Lake, there is yet to be any evidence of such, based on the findings from the past 2011-2013 sample seasons in the FOD project. Various sample methods were applied to capture and document fish residing in the Lake including angling (r/r), g-traps and a snorkel swim observation; all attempts to locate fish were unsuccessful. Electro-fishing was not utilized at the request of the First Nation, who was concerned about the consistent presence of Moose at the site. However, this does not conclude species presence in the lake. Certain species which may reside in Two Moose, such as Juvenile Arctic Grayling are prone to avoidance of G-trap sets. Continued study and different sample methods may inform us otherwise.

Until 2013 no culverts were thought to be present at Two-Moose Lake. A 1x culvert was documented in the 2013 study further from the original sampling location at the pull-off and information area. The culvert crosses the Dempster as a small inlet and connects to a lake on the east side of the Dempster. It is not known if this other lake connects to any other tributaries or the Blackstone River. Fish may enter and exit Two-Moose Lake during summer rearing periods via the culvert inlet.



Two-Moose Lake: Km103-Aug 2013

photo: M.McHugh

Two-Moose Lake: June 7th 2013 Assessment: AIR: 13.2C WATER: 12.8C –partly cloudy @ 1400h

- Ice out and moderate water levels in Lake
- No fish observed during assessment

Two-Moose Lake: August 20th 2013 Assessment: AIR: 15.3C WATER: 12.2C –overcast @ 1700h

- Moderate water level and flow through culvert
- 3x g-trap set Aug 20 @ 1700h-pulled Aug 21 @ 1205h= no fish caught: except lg water beetle
- Snorkel Swim for 25 minutes= no fish observed- however a complete survey of the lake revealed max depths to be approx. 2 meters
- Also aquatic vegetation is thick throughout entire lake
- Shoreline comprised mostly of “loon shit”, mud and clay materials
- 1x culvert at site with no observed barrier to fish (other than lower water levels in fall?)

Two-Moose Lake: November 8th 2013 Assessment: AIR: -11C WATER: N/A –partly cloudy @ 1630h

- Completely iced over with no sign of ground water/open water sources
- No fish observed during assessment
- Unlikely to support over-wintering habitat due to shallow depths observed



Right: 1xculvert which drains into Lake on east side of the Dempster /Left: lg water beetles were caught in g-traps

photo: M.Samis

Blackstone River: Km 107.5

The site is located at a pull-off (with YG outhouses) where the Blackstone River parallels the Dempster for several kilometers; at the site a small unnamed creek drains into the Blackstone. Although the culverts would prevent passage, due to barriers such as its high perch and plunge, there is good potential for spawning and rearing habitats (weedy, gravel & cobble, veg) upstream west of the

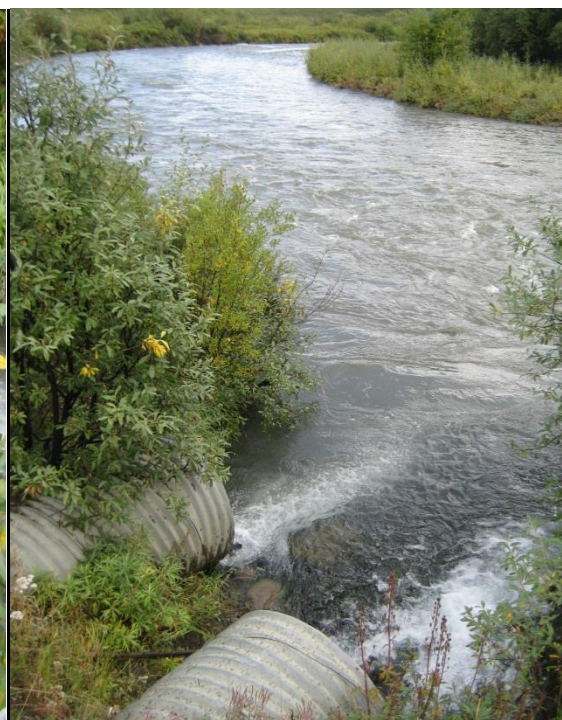
highway. This site has long been regarded as prime fish habitat for the region. A large eddie, riffles and areas with vegetation for cover contribute to the known presence of adult fish at this site.

2013 was the first time this site was included in the FOD project. After speaking with anglers, conservation officers and researchers from the Dawson area about this site, it was included to better represent the Blackstone region. Locals noted this site to have Arctic Grayling and Dolly Varden present.

The site was also recognized in the 2007: Environment Yukon “Dempster Fisheries Assessment” as having a passage issue with the 2x culverts that connect a small inlet tributary to the main Blackstone. The 2007 study also reported Dolly Varden, Burbot and Slimy Sculpin captured and documented in past studies at Km 107.5. Local Dawson fisherman Tyson Bourgard frequents this location often. He mentioned while fly-fishing he has caught Dolly Varden and Arctic Grayling at this location. Conservation Officer, Tori Hunter of Dawson City, indicated that this location is known as Dolly Varden over-wintering habitat.



BS: Km107.5-Left: 2x perched culverts



Right: Site shot

photo: M.McHugh

BS: Km 107.5- June 7th 2013 Assessment: AIR 12.9C WATER: 4.4C –partly cloudy @ 1445h

- Moderate water level and flow
- R/R 15 minutes= no fish caught
- No fish observed during assessment

BS: Km 107.5-August 21st 2013 Assessment: AIR: 11C WATER: 4.1C –partly cloudy @ 1100h

- High water and fast flows-possibly due to recent heavy rain fall
- Water very turbid and silty
- No g-traps set due to high water or suitable trapping locations
- R/R for 15 minutes= no fish caught
- 2x culverts at site from small tributary ck, which drains into Blackstone at this location
- 2x culverts are both perched and have a slight plunge on the Blackstone side= barrier to fish passage

BS: Km 107.5- November 8th 2013 Assessment: AIR: -10C WATER: 0.5C –partly cloudy @ 1615

- Main river channel remains open
- Open areas in large eddy bordering Hwy-possible ground water source found here?
- No fish observed during the assessment
- Over-wintering is likely for Arctic Grayling/Dolly Varden and other species of Blackstone Rv



BS: km 107.5-remains open in area: Nov 8th 2013

photo: M.McHugh

Chapmen Lake: Km 116

Chapmen Lake is a medium sized thermokarst lake formation with the muddy and fine substrate and aquatic vegetation that is present in the study locations. Based on FOD project results from the 2011-2013 studies and surveys such as *Peel Fisheries Report*, completed by EDI in 2006, Chapmen is an important habitat for all life stages of fish in the Blackstone Uplands, including over-wintering habitat. Such species as Arctic Grayling, Long-nose Sucker, Burbot and Slimy Sculpin have been documented at this site and Lake White-fish documented in other projects (*Peel Fisheries Report-EDI*). During FOD investigations depths of up to 2 meters were observed in the areas studied off the highway, down from the pull-out. Other reports such the *Dempster Lateral Pipeline Fisheries Assessment* completed by Beak

Consultants in 1978 reported a trench along the western portion of the lake to be 12 meters in depth. It is likely to support spawning and over-wintering habitat for species such as Arctic Grayling.



Chapmen Lake: Km 116

photo: M.Samis

Chapmen Lake: June 9th 2013 Assessment: AIR: 15C WATER: 11.5C –partly cloudy @ 1315h

- Moderate water level
- R/R for 10 minutes= no fish caught
- Sm Fish observed in lake along shoreline

Chapmen Lake: August 20th 2013 Assessment: AIR: 14C WATER: 12.8C –overcast @ 1800h

- Moderate water levels
- 3x g-trap set Aug 20th @ 1800h-pulled Aug 21st @ 920h=no fish caught
- Snorkel Swim for 20 minutes= no fish observed/grassy weeds and max depth 2 meters in area
- No culvert/bridge or barrier to fish passage observed

Chapmen Lake: November 8th 2013 Assessment: AIR -14C WATER: N/A –partly cloudy/windy @ 1545h

- Lake iced over-no open areas or ground water sources observed from highway side
- Likely over-wintering habitat for Arctic Grayling-deeper areas in western portion of Lake @ 12m



Left: g-trap set in Chapmen- Aug 2013



Right: Chapmen Nov 2013

photo: M.McHugh

Blackstone River Braids: Km116

At this location the Blackstone braids into many smaller channels before connecting into one main-stem channel further down-stream. The braided area seems to represent important summer rearing areas for several species of fish including Slimy Sculpin, Arctic Grayling, Burbot and Dolly Varden. These species have all been documented at this site. This was the first year the site was investigated during the FOD project.

While working in the area in 2012 & 2013 large schools of Arctic Grayling fry were observed rearing in the shallow braided areas of this site. Speaking with Al Von Finster, who has been monitoring this site for several years, mentioned an abundance of Arctic Grayling fry are usually found in the shallow braids throughout the summer.



BS-Braids: Km 116- Aug 2013

photo: M.Samis



BS Braids: Km 116-June 2013

photo: M.McHugh



Habitat in BS-Braids supports Arctic Grayling fry for summer rearing, such as this specimen captured by electro-fishing photo: M.Samis

BS Braids-June 9th 2013 Assessment: AIR: 10.5C WATER: 4.9C –overcast/rain @ 1430h

- Moderate water levels and flows-main channels ice free-smaller iced over but flowing
- 1x Slimy Sculpin observed in shallows

BS Braids-August 20th 2013 Assessment: AIR: 13.5C WATER: 8.2C- overcast @ 1830h

- Moderate water levels and flows
- No g-traps set
- Electro-fishing over 540 sec= 2x Arctic Grayling (juv-4.5cm) 1x Slimy Sculpin 1x Burbot (juv-11cm)
- Stream walk: completed over a 200m distance-upstream= observed 100+ Juvenile Arctic Grayling in shallow water
- *Filamentous Green Algae* noted in Braids- indication of ground water source in area
- No culvert/bridge or barrier to fish in area observed

BS Braids-November 8th 2013 Assessment: AIR: -15C WATER: N/A –partly cloudy/windy @ 1500h

- Main channels iced over-there were open area, no safe to check closer
- Over-wintering potential in deeper pools or in nearby main Blackstone

Cache CK: Km 130

Originating in the Ogilvie mountains Cache creek is a medium-flow stream which drains easterly into the Blackstone River about two kilometers downstream of the Dempster Highway. This is an important area for the region and for the Blackstone drainage. Many species in all life stages are found highly utilizing this location as summer rearing habitat. Species such as Slimy Sculpin, Burbot, Arctic Grayling and Northern Dolly Varden were captured during sampling in the FOD: 2011-2013 projects. A report completed in 2006 by EDI -*Peel Fisheries Report*, defines this site used for spawning by Arctic Grayling and Northern Dolly Varden. Pools and riffles with a gravel, cobble mixed substrate along with moderate vegetation cover and quick access to the Blackstone make this site quite inviting for fish. Adult fish were often observed during assessment in FOD: 2011-2013 in the up-stream channels and eddy located near the culverts.



Cache Ck: Km 130-Aug 2013

photo: M. Samis



Left: 2x culverts-down-stream



Right: upstream culverts with slight plunge

Cache Ck- June 9th 2013 Assessment: AIR: 9C WATER: 6.8C –overcast/rain @ 1330h

- Water level and flows moderate
- R/R for 30 minutes= 1 x Arctic Grayling (adult-approx. 30cm) caught down-stream pool
- No other fish observed during assessment
- Bald eagle present in tree looking on
- Dead Arctic Grayling adult found inland-washed out during freshet?

Cache Ck- August 20th 2013 Assessment: AIR: 11C WATER: 5.5 – overcast/rain @ 1930h

- Water levels and flows moderate
- No g-traps set due to timing constraints
- Electro-fisher used for max 1000 sec. down-stream= Slimy Sculpin x3/Dolly Varden x1 (fry)
- R/R for 15 minutes= no fish caught
- Stream walk upstream= observed Dolly Varden (x 10@30cm-approx) in main current of creek
- 2x culverts present at site: left upstream culvert has heavy debris loads/right has slight plunge –should be monitored-potential barrier to fish passage, during high water
- However: Fry-adult Dolly Varden have been captured upstream of culvert

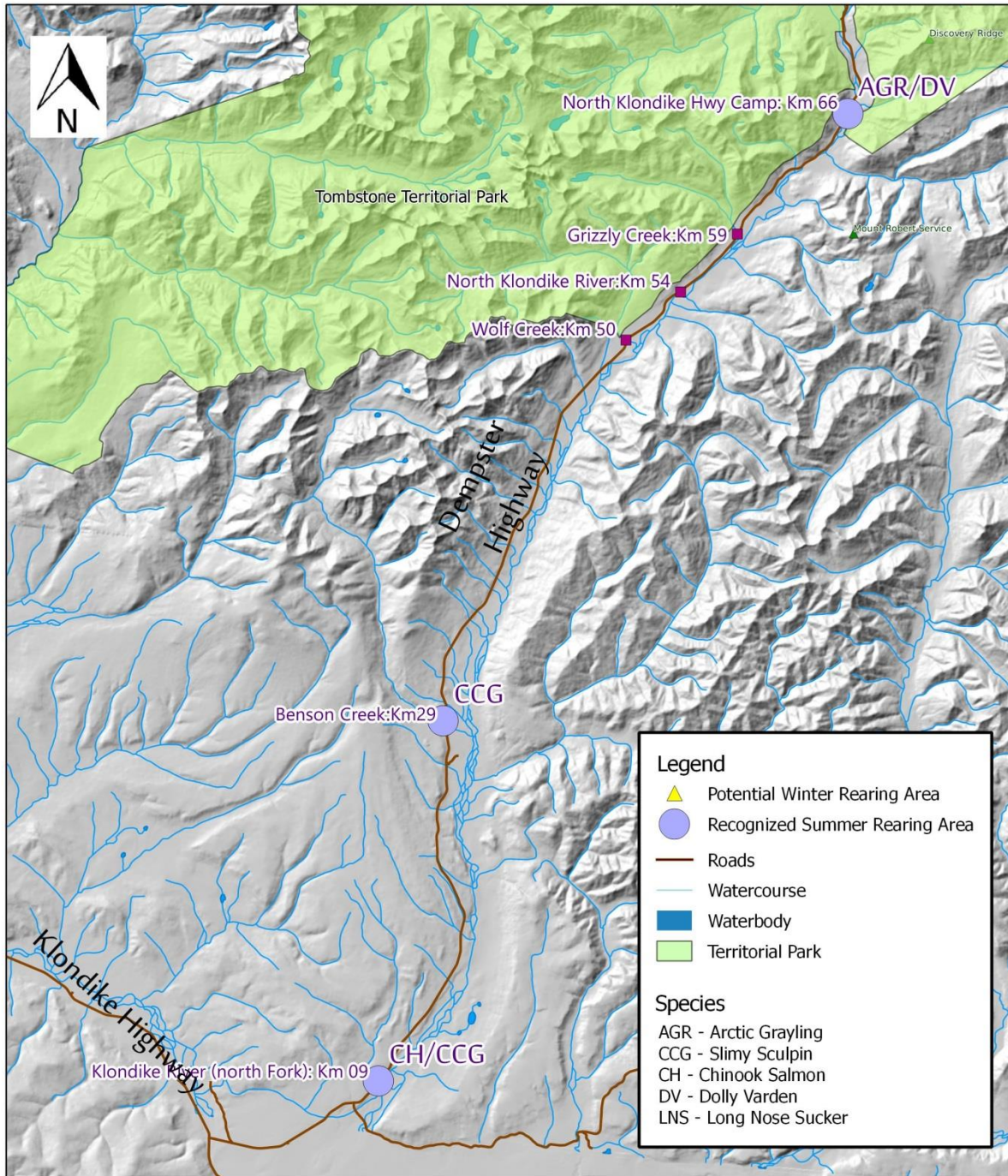
Cache Ck-November 8th 2013 Assessment: AIR: -6C WATER: 0C –partly cloudy @ 1300h

- Creek iced over-some open leads
- No obvious ground water sources-further monitoring required
- No fish observed during assessment
- Potential for over-wintering in deeper pools/eddies found in area



Cache Ck: Km 130-Juvenile Northern Dolly Varden captured at this location, by g-trap

photo: M. McHugh



Data Collection & Report by Wild Country Fisheries Ltd. | Maps produced by Aaron Woroniuk

Fish of the Dempster Country Project 2013

Rearing Areas South Map

Figure 3

Generated February 2014

2 0 2 4 6 8 10 km

Scale: 1:250,000

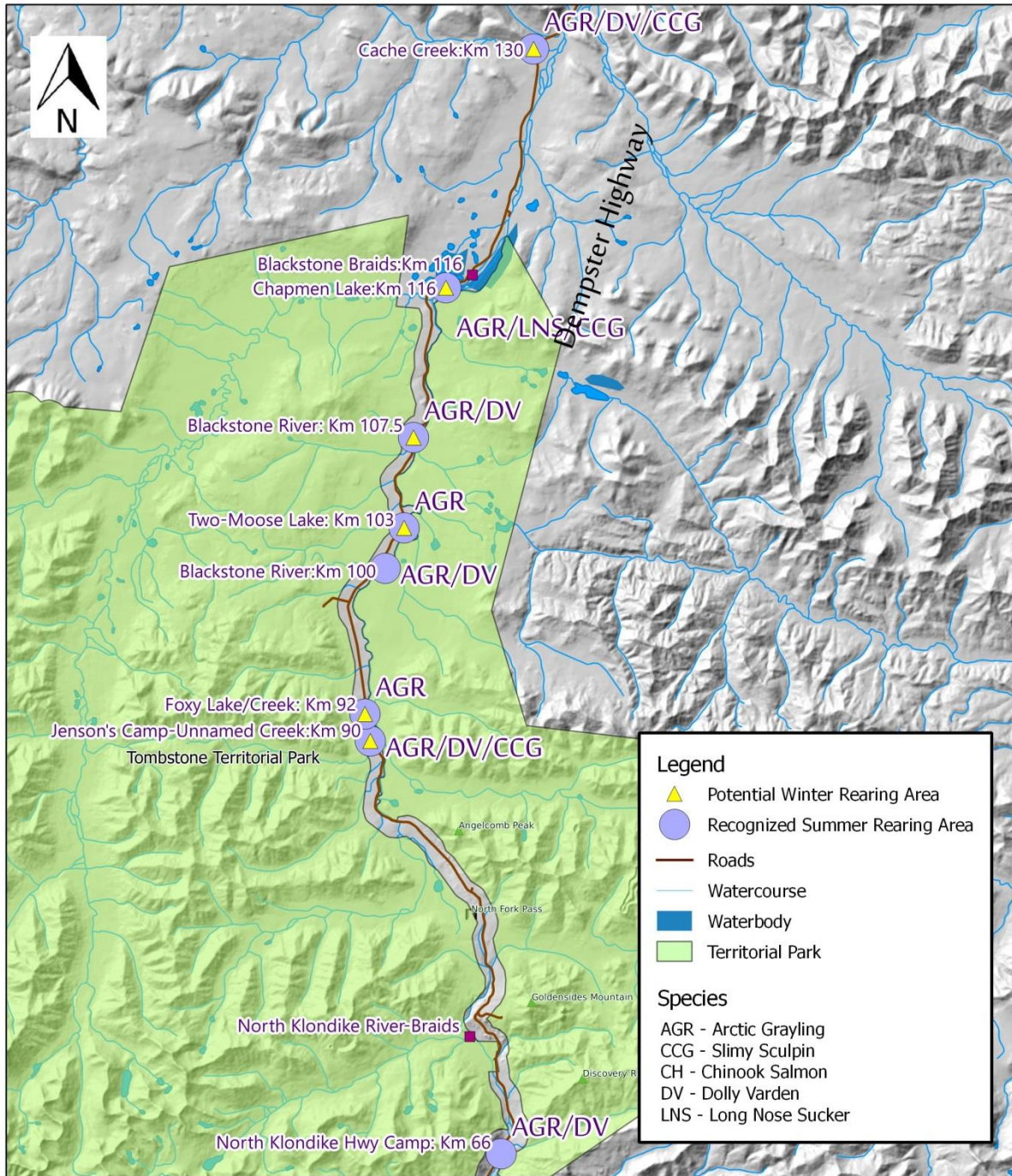
NAD83 || YT Albers || EPSG: 3578



Data Sources:

CanVec Topo
GeoBase
Yukon Geomatics

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Data Collection & Report by Wild Country Fisheries Ltd. | Maps produced by Aaron Woroniuk

Fish of the Dempster Country Project 2013

Rearing Areas North Map

Figure 4

Generated February 2014

2 0 2 4 6 8 10 km

Scale: 1:250,000

NAD83 || YT Albers || EPSG: 3578



Data Sources:

CanVec Topo
GeoBase
Yukon Geomatics

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Species Occurrence Summary: Project Area

While not all species in the list below were captured and/or recorded during the FOD: 2011-2013 other reports and studies completed on this region have documented these listed fish species in the North Klondike and Blackstone drainages. The following is a list of species from the two-drainages, found within the *Fish of the Dempster Country Project* area.

Common and scientific names of fish species which are known and expected to be present in the North Klondike Drainage:

Documented

round whitefish	<i>Prosopium cylindraceum</i>
Arctic grayling	<i>Thymallus arcticus</i>
chinook salmon	<i>Oncorhynchus tshawytscha</i>
burbot	<i>Lota lota</i>
slimy sculpin	<i>Cottus cognatus</i>

Possible

Arctic lamprey	<i>Lampetra japonica</i>
inconnu	<i>Stenodus leucichthys</i>
humpback (lake) whitefish	<i>Coregonus clupeaformis</i>
broad whitefish	<i>C. nasus</i>
chum salmon	<i>Oncorhynchus keta</i>
northern pike	<i>Esox lucius</i>
lake chub	<i>Couesius plumbeus</i>
longnose sucker	<i>Catostomus catostomus</i>

Common and scientific names of fish species which are known to be present in the Blackstone River basin:

Northern Dolly Varden	<i>Salvelinus malma</i>
Arctic grayling	<i>Thymallus arcticus</i>
round whitefish	<i>Prosopium cylindraceum</i>
burbot	<i>Lota lota</i>
longnosed sucker	<i>Catostomus catostomus</i>
slimy sculpin	<i>Cottus cognatus</i>
lake chub	<i>Couesius plumbeus</i>

Discussion:

The Dempster Country is unique and relatively pristine with very little development or human footprints. At first glance this environment appears to be an unproductive and vast landscape with little activity but upon close observation thriving, functioning ecosystems are apparent, almost as if it never grows cold and freezes. The clear creeks that cross or travel near the Dempster Highway are filled with life and change and diversity.

The results presented in the 2013 Fish of the Dempster Country Project: Results Report and those found in the previous FOD: 2011 and 2012 reports provide a guideline to an area where little is known about fisheries. The Dempster Highway Corridor provides access to an area otherwise only accessible by air or remote travel. Together these assist in the recognition of fish species distribution and abundance at sites selected along the Dempster Highway, providing a fundamental baseline for the remote and isolated region.

Over 20 different sample locations along the Dempster Highway were examined as part of the last three years of study (FOD: 2011-2013) 14 of those sites from 2013. Within the project area two major Drainages occur, the Yukon and Mackenzie Rivers but the project focused specifically within the North Klondike and Blackstone Rivers, their tributaries and the lakes of these major watersheds.

The results gathered by The Fish of The Dempster Highway Project over the past three field seasons contribute to the knowledge of fish and their respective habitats in this region. These results may serve as a guideline for management officials who are making future management decisions on this area in the fields of land-use planning, environmental assessments, fisheries management and conservation efforts.

Also The Fish of the Dempster Country Project enabled several positive outcomes for the community:

- Youth involvement with hands-on experience and education assisting with the project
- Elder participation in contributing Traditional Knowledge for the region
- Local community members contributing input towards a local natural resources
- Working relationships with stake-holder parties such as First Nations, Federal and Territorial Governments and a local non-profit organization

The knowledge we gather today we may pass on to our children tomorrow.

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Unpublished paper

Traditional Knowledge:

Percy Henry Interview, in person by Matthew McHugh. Feb 2012.

Peggy Kormandy Interview, in person by Matthew McHugh. Dec 2012.

Robert Alexie Interview, over the phone by Matthew McHugh. Jan 2013.

Victor Henry Interview, over the phone by Matthew McHugh. Feb 2014

Local Knowledge:

Pete Jenson, knowledge of fish and fish habitat around Jenson's Camp Km90

Telephone interview March 2014.

Tyson Bourgard, knowledge of fishing locations along Dempster and past results at specific sites.

In person interview Oct 2013.

Personal Communication:

VON FINSTER, knowledge of "filamentous green algae".

Aug 2012.

Von FINSTER, knowledge and insight into Chinook salmon spawning in the North Klondike River

July 2012.