

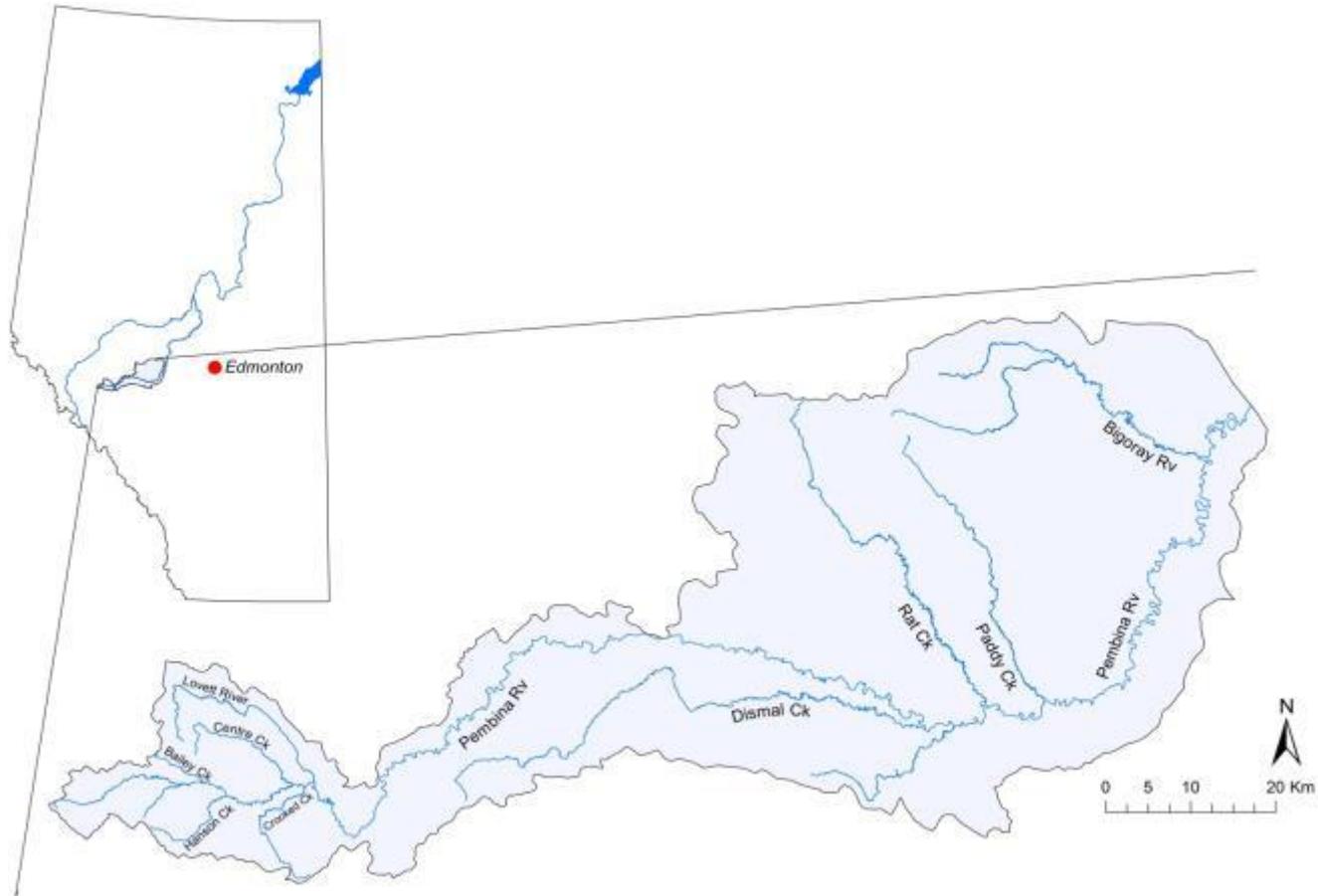
Pembina River Grayling Project 2013 Year – 3



Study Area



Study Area



Historic Grayling Streams – Upper Pembina River Watershed

- ▶ Historically, 10 or more Arctic Grayling streams in the UPR (upstream from Lodgepole), plus the main Pembina River
- ▶ They ranged in size from small tributaries used seasonally (spawning, summer feeding), to larger streams holding fish all year
- ▶ Beginning in the 50's populations started to decline
- ▶ By the 70's some had disappeared; trend continued in the 80's and 90's, to the present day
- ▶ To the best of our knowledge, only two (maybe three tributary populations remain), plus the Pembina River
- ▶ And these populations are at risk of being extirpated!

Historic Grayling Streams – Upper Pembina River Watershed (cont'd)

- ▶ The decline of grayling in the Pembina River watershed due to many factors:
- ▶ **Overfishing** (a significant factor when the area was opened to development); catch and release today
- ▶ **Agriculture** (in the fringe watersheds)
- ▶ **Oil & Gas Development** (access roads/sediment, land clearing, water removal); commencing in the 50's, continuing)
- ▶ **Timber Harvesting** (access roads/sediment, land clearing)
- ▶ **Habitat Fragmentation** (beaver dams, water temperature)
- ▶ **Climate Change** (decreasing stream flows, increasing water temperatures)

Progress in 2013

- ▶ 2013, the third year of a 5-year project, was very successful thanks to the many dedicated volunteers from NLFT/TU Edmonton!!!



Who Provided Funding?

- ▶ NLFT/TU Edmonton provided \$2,750 for the purchase of PIT tag readers and injectors.
- ▶ The ACA provided \$14,130 for vehicle fuel, fish trap expenses, field kits, and signage.
- ▶ NLFT/TU, Golder and ESRD (F&W) provided in-kind support.



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Conserving Alberta's Wild Side



Northern Lights Fly Tyers
Trout Unlimited Edmonton



Major Activities in 2013

- ▶ Volunteer angling effort (third year) in tributaries to the Upper Pembina River (upstream of Lodgepole)
- ▶ Installation and removal of temperature data loggers in current and former grayling streams in the project area (third year)
- ▶ Underwater surveys of suspected grayling overwintering pools in the main Pembina River in October, using dry suits and snorkeling gears (second year)

Major Activities in 2013 (Cont'd)

- ▶ Installation of a fish trap on Dismal Creek at the Wolf Lake Road Crossing during May to capture upstream migrating grayling, on route to spawning areas
- ▶ Installation of Arctic Grayling Conservation Signage at major stream crossings and access points in the project area (first year)
- ▶ Surveying for young-of-the-year and juvenile grayling using back pack electrofishing to locate rearing areas (first year)

Conservation Signage

Arctic Grayling Conservation Project

Many streams in the Upper Pembina River watershed once supported healthy populations of grayling. However, due to various land-use activities and overfishing, populations have experienced major declines and some have disappeared.



NLFT/TU volunteers are collecting information on this species to assist the provincial government in developing a recovery plan for grayling. You can help conserve remaining stocks by following regulations (harvest limit zero) and reporting violations. Handle and release fish with care, and please respect these waters.

For more information, visit www.nlft.org or email (grayling@nlft.org)



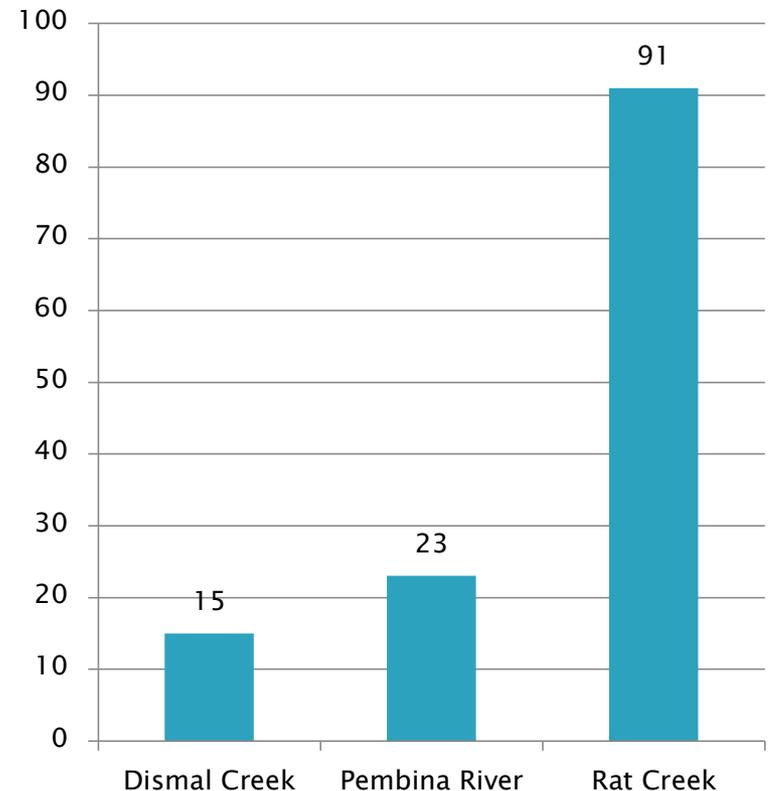
Angling Survey



Angling Effort and Catch

- ▶ Thirteen anglers spent 34 angler days, and 100 hours of on-stream fishing effort, in the study area. Some anglers made several trips
- ▶ All of the angling occurred on Dismal Creek, Rat Creek, Pembina River
- ▶ 129 grayling were caught this year, a catch rate of a little over 1 fish/h
- ▶ But the catch rates between sites was highly variable

Catch by Waterbody



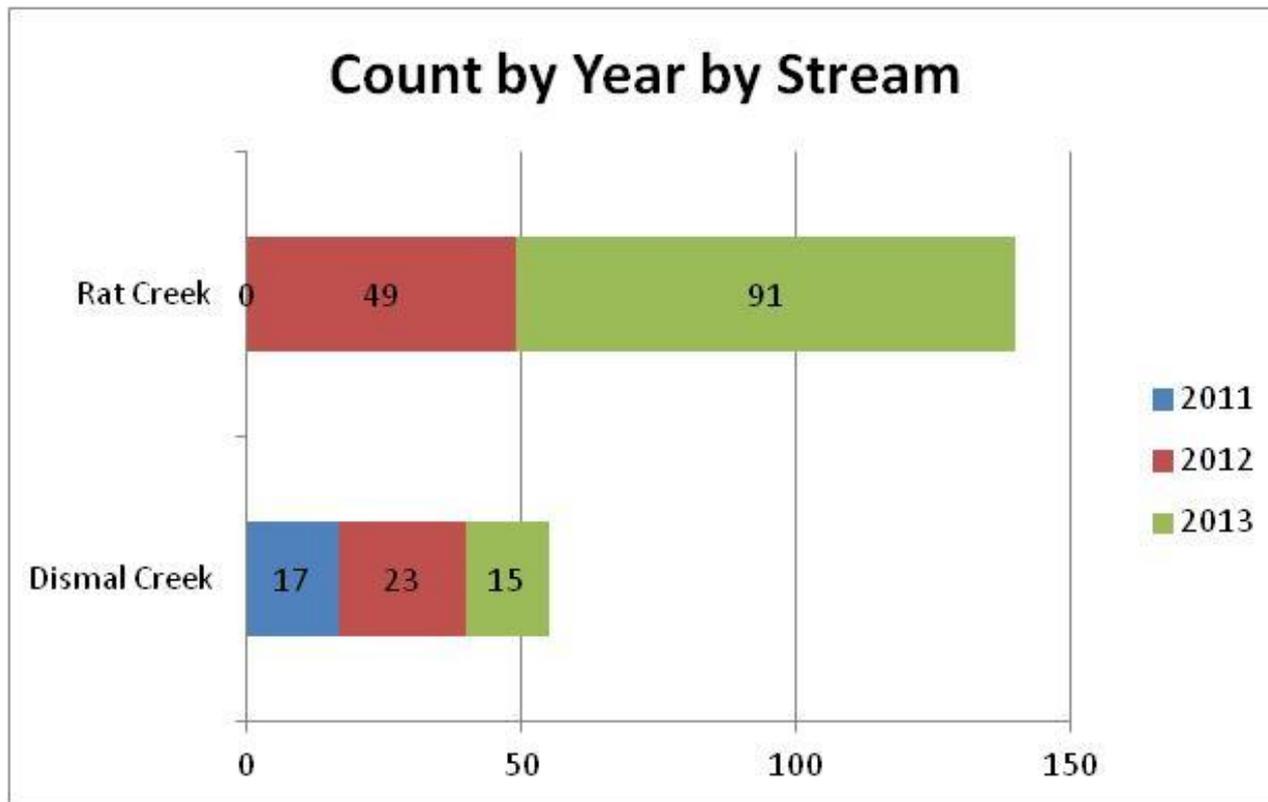
Distribution of Catch

- ▶ Angling effort over 2011 – 2013 has been widespread due to the size of the project area we have not covered all areas equally
- ▶ But we are reasonably confident that the grayling population in the UPR is largely restricted to the larger systems: Dismal Creek, Rat Creek and the main Pembina River
- ▶ Unfortunately, these systems currently support scattered, remnant populations that are at considerable risk of extirpation
- ▶ A major unknown is the extent to which grayling in Dismal, Rat and the Pembina share critical habitats (spawning, overwintering); we need to determine this to conserve them

Distribution of Catch (Cont'd)

- ▶ All of the Rat Creek fish (91), and all of the Pembina fish (23) came out of individual or closely spaced holding areas
- ▶ The concentration of fish in areas with high accessibility may be an added risk to the populations: susceptible to illegal fishing, incidental angling mortality and adverse environmental influences (ATV's, water removal, sediment releases, etc.)
- ▶ The catch from Dismal Creek was more spread out, but most were caught in the upper reaches, which are less accessible

Annual Results



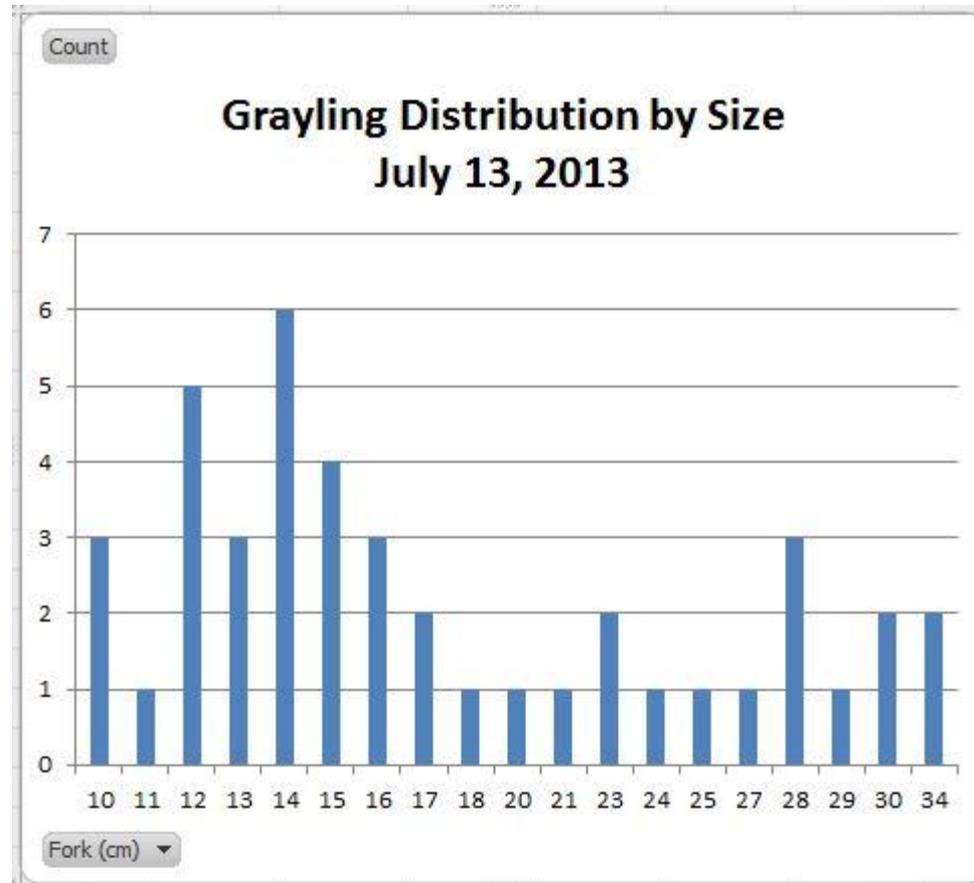
Size & Age Distribution

- ▶ The 15 grayling caught in **Dismal Creek** ranged in fork length from 15 cm (6”) to 36 cm (14”); average of 26.5 cm (10”)
- ▶ Of the catch 30 % were 30 cm (12”) or larger
- ▶ Fish of this size generally range from Age-2 to Age-7.
- ▶ The 91 grayling caught in **Rat Creek** ranged in length from 10 cm (4”) to 34 cm (13.5”), with an average of 19 cm (7.5”);
- ▶ Fish of this size generally range in age from Age-0 (young-of-the-year) to Age-5. Only 7 % of the catch was 30 cm (12”) or larger, indicating the lower section of Rat Creek provides valuable rearing habitat

Size & Age Distribution

- ▶ The 23 grayling caught from a holding pool in the Pembina River in the fall ranged in length from 13 cm (5”) to 38 cm (15”), with an average of 27.8 cm (11”)
- ▶ Fish of this size generally range in age from Age-1 to Age-7+. Of the catch 57 % were 300 mm (12”) or larger; suggesting that adults were staging in this area for overwintering
- ▶ The conservation value of fall staging/overwintering sites such as this cannot be overemphasized
- ▶ Our volunteers carried out angling, preliminary PIT-tagging and snorkeling surveys at this site in fall 2013

Size Distribution - Productive Day on Rat Creek



Backpack Electrofishing



Backpack Electrofishing



Backpack Electrofishing



Backpack Electrofishing



Backpack Electrofishing



Electrofishing Results

- ❑ Only captured two grayling in upper Dismal Creek, but they were significant
- ❑ One was a one year old and was hatched in 2012, and one was a young-of-the-year, and hatched probably in late may 2013
- ❑ We have some spawning going on upstream...good news!

Stream	Site	ARGR	MNWH	LNSC	BUBT	SPSC	LKCH	TRPR	LNDC	Total
Dismal Cr	DC14/14a	2	2	1	2	4	0	0	0	11
Rat Cr	RAC2	0	2	9	0	0	302	16	13	342

Water Temperature Monitoring

- ▶ *NLFT/TU and ESRD/Edson have monitored water temperature from June to October on 10 streams and the main Pembina River west of Lodgepole since 2011*
- ▶ Large differences in the maximum and average temperatures reached between, and within, individual streams
- ▶ These differences are sufficient to influence the present distribution of grayling and the future opportunities to restore populations
- ▶ Overfishing and intensive land use likely caused the demise of grayling in the watershed, but increasing water temperatures may limit opportunities to restore streams

Water Temperature Monitoring



Water Temperature Monitoring

- ▶ *The water temperature data collected by NLFT/TU in 2013 confirms the results obtained in 2011 and 2012*
- ▶ Summer water temperatures no longer suitable for grayling in some streams (Bigoray River, Paddy Creek, and Zeta Creek)
- ▶ Temperatures well above the 17 °C preferred temperature
- ▶ Maximum daily temperatures between 24 °C and 26 °C
- ▶ Average daily water temperatures during the summer exceeded 17 °C between 38 days (49 % of the time) and 46 days (59 % of the time) on these streams
- ▶ Although somewhat cooler temperatures may occur in the upper reaches, these streams will only get less favourable with Climate Change
- ▶ These streams all produced grayling in the 60's and 70's

Water Temperature Monitoring

- ▶ **Rat Creek** continues to support a fragmented grayling population, despite the fact that water temperatures in much of the stream and over most of the summer are outside the preferred range
- ▶ In lower Rat Creek a maximum daily temperature of 25.5 °C was recorded, and the average temperature exceeded 17 °C on 39 days during the summer (50 % of the time)
- ▶ Temperatures were more moderate in upper Rat Creek the summer: maximum daily of 22 °C, and average water temperature exceeded 17 °C on 19 days during summer (24 % of the time)
- ▶ Clearly, we don't understand the habitat dynamics and biology of grayling in Rat Creek. Rat Creek was reputed to be a producer of large grayling in the 60's, and the population has persisted

Data Logger Retrieval



Water Temperature Monitoring

- ▶ **Dismal Creek** is unique in the UPR, maintaining cool water over the entire summer
- ▶ The maximum daily temperatures recorded at the lower, middle and upper sites were 21.5 °C, 17.4 °C, and 15 °C; 5 to 10 ° lower than other sites
- ▶ Average daily water temperatures in lower DC exceeded 17 °C on 19 days during summer (24 % of the time)
- ▶ At the middle site on DC (Wolf Lake Road), and at the upper site temperatures “never exceeded” 17 °C during the summer
- ▶ Our data indicate that summer water temperature conditions in DC are optimum for grayling; however, the landscape is under considerable pressure from O&G and logging
- ▶ Dismal Creek maintained an abundant grayling population into the early 80’s, but it has been reduced to a small, remnant population

Fish Trap on Dismal Creek



Fish Trap on Dismal Creek



Fish Trap on Dismal Creek



Fish Trap on Dismal Creek





Fish Trap Installation Dismal Creek

- ▶ No grayling captured in the trap, despite major efforts. No other fish species commonly migrating in the spring captured (suckers, mountain whitefish, etc.)
- ▶ How do we explain this?: 1) the trap was not operating efficiently, 2) the fish moved upstream before we arrived on site, 3) the fish arrived after we left the site or 4) there was no upstream spawning run in 2013.
- ▶ Based on previous experience and the data available we concluded that a grayling spawning run did not occur in 2013. But we will be taking steps in 2014 to confirm this
- ▶ If the migratory run from the Pembina into upper Dismal Creek no longer exists (as it did in the 80's) this means a loss of fish production in the system

Log Jam – Dismal Creek

- ▶ It came to our attention that there was a major log jam (and possible fish blockage) 6 km downstream of the trap
- ▶ Volunteers visited the site, and angled to determine if there were grayling congregated downstream of the log jam – no fish caught
- ▶ The observers noted the log jam was extensive, and photographs were taken
- ▶ Ordered digital air photos from 1980 to 2003 to determine when the log jam was formed, and whether it was stable
- ▶ The log jam was not in place in 1981 when grayling were recorded moving upstream to spawn above the Wolf Lake Road
- ▶ The log jam was formed by a major flood in July 1986 which resulted in major channel changes and washed out the WL Bridge. It appears to have been in place, and stable since 1986



Log Jam



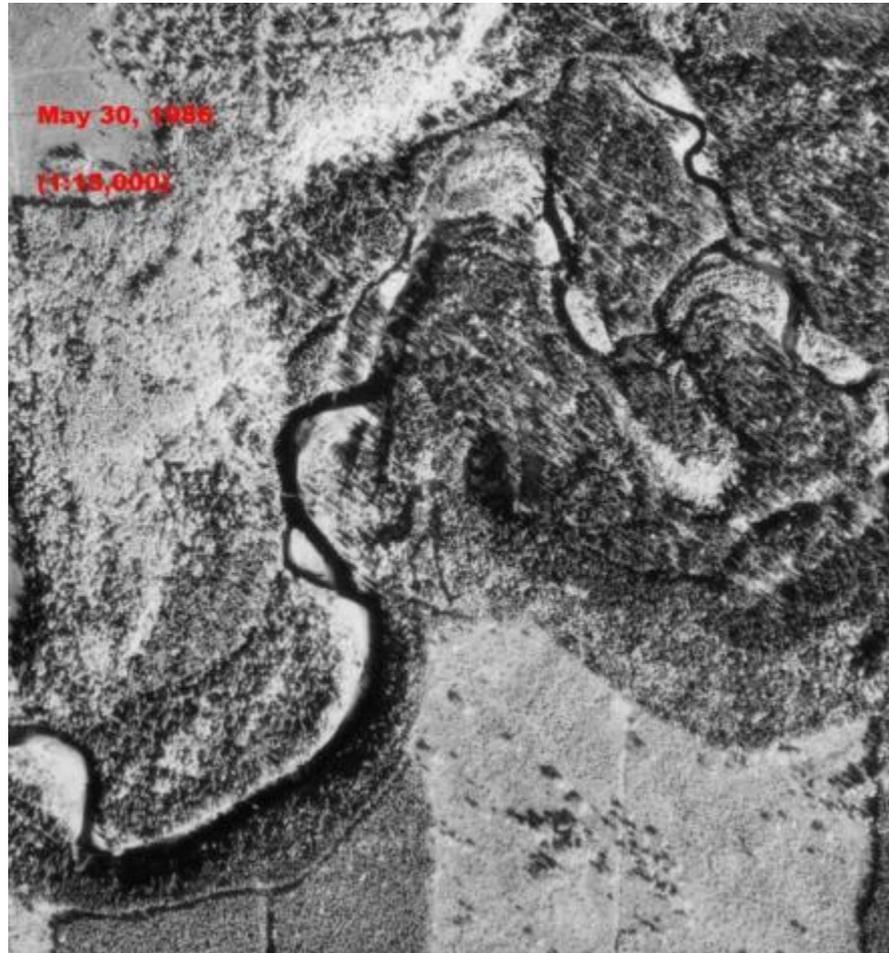
Log Jam – Dismal Creek (cont'd)

- ▶ It is common for log jams to block or impede fish migrations, although there are examples in the published literature
- ▶ We believe the partial removal or opening up of the log jam should be considered in order to possibly re-establish an upstream grayling spawning migration into upper Dismal Creek
- ▶ Prior to proceeding, we will need to provide evidence that a blockage exists, and determine if it is feasible to physically remove or open up the log jam (without de-stabilizing the site)
- ▶ During 2014, we will carry out volunteer angling, PIT-tagging and recapture sampling below and above the log jam, and (possibly) retain a channel morphology/hydrology specialist for a preliminary assessment

Post – Log Jam



Pre - Log jam



Underwater Survey –Pembina River

- ▶ October 11, 2013
- ▶ Three snorkelers
- ▶ 10 Grayling PIT tagged

▶ [Link to Video](#)



Underwater Survey Pool



Underwater Survey Pool



Year 4 – 2014 Project

- ▶ Carry on with previous work. 2014 will be year four of the program.
- ▶ ESRD working relationship
- ▶ Expect ACA announcement first week of April

2014 Objectives

- ▶ Assess water temperature regime
 - 25 data loggers
- ▶ Assess the current distribution, abundance and seasonal movements
 - Angling and PIT Tagging
- ▶ Assess culvert and bridge stream crossings in the Dismal Creek and Rat Creek watersheds
 - Turbidity Measurement

2014 Objectives

- ▶ To install Arctic Grayling Conservation Signage
- ▶ To assess the fish passage characteristics of a major log jam on Dismal Creek
- ▶ To develop a log of water abstraction



Thank You 2013 Volunteers!

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