

Fisheries Biologist Report

Swan Creek Fish assessment and potential effects of OHV use within the stream

Tchir, J. Senior Fisheries Biologist

Fisheries Management Branch
Environment and Sustainable Resource
Development

August 13, 2013



Environment and Sustainable
Resource Development

Location of the offence

Swan Creek is located within the North Saskatchewan River drainage and is a major tributary to Prairie Creek. Swan Creek flows into Swan Lake and forms the outlet for Swan Lake in SW 25-36-9-W5 where the offence occurred. It is a free stone stream, where dominant substrates are non-embedded small and large gravel and cobble. This portion of Swan Creek has high quality spawning, rearing and over-wintering habitat protected by a Class A designation, defined under the Code of Practice for watercourse crossings (Alberta Environment 2001) as “highest sensitivity; habitat areas are sensitive enough to be damaged by any type of activity within the water body; known habitats in water body critical to the continued viability of a population of fish species in the area”. The Class A portion of Swan Creek extends 2 km downstream from the Lake (figure 1). From review of the YouTube video entitled “June 2012 Mud Run Outlander 1000, Renegade XXC 1000, XMR 800, RZR” I confirmed that the incident occurred within the Class A section of the stream and was within the area where Fisheries Management conducted a fish assessment (on July 17, 2013). Figures 2 and 3 show quad trails intersecting the stream, where the Off Highway Vehicles (OHVs) in question entered and exited the stream.

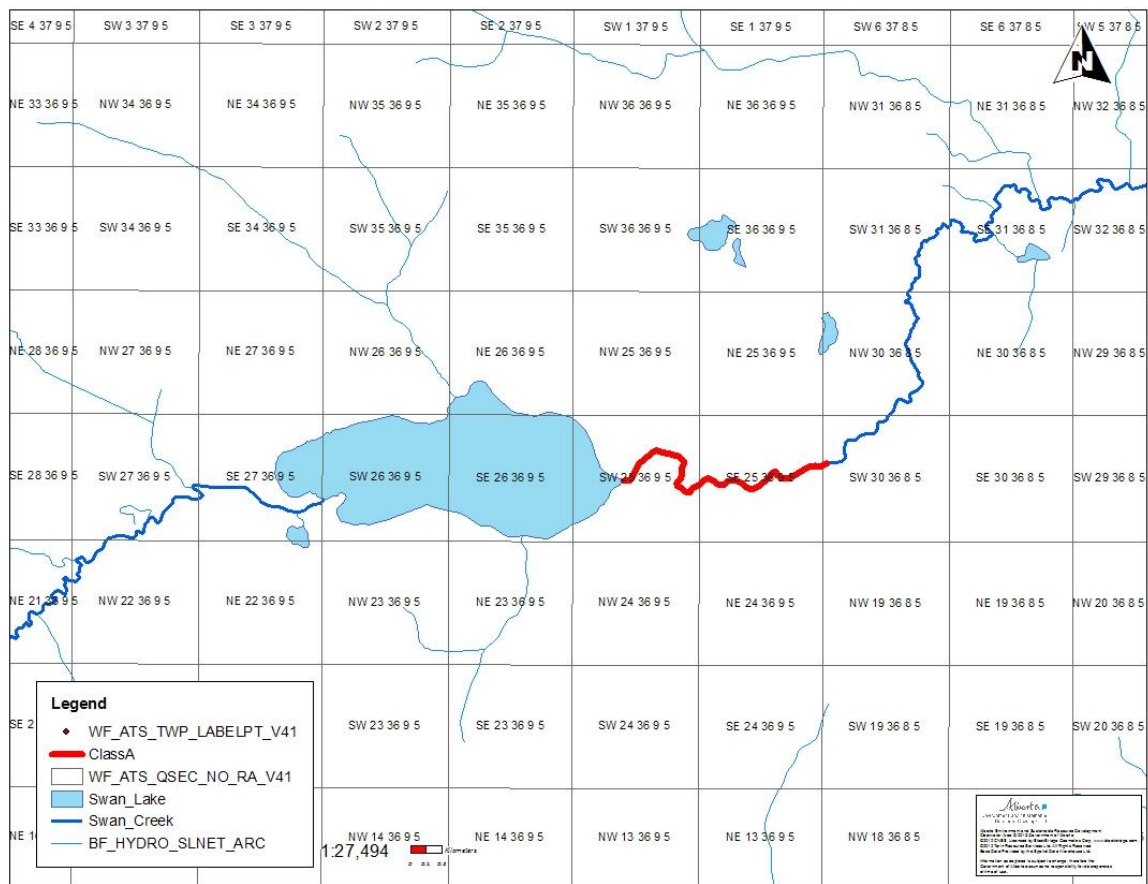


Figure 1. Map showing location of Class A designated section of Swan Creek.



Figure 2. Photo showing trail where OHVs exited the stream, note gabion basket on left, also shown in the YouTube video “June 2012 Mud Run Outlander 1000, Renegade XXC 1000, XMR 800, RZR”.

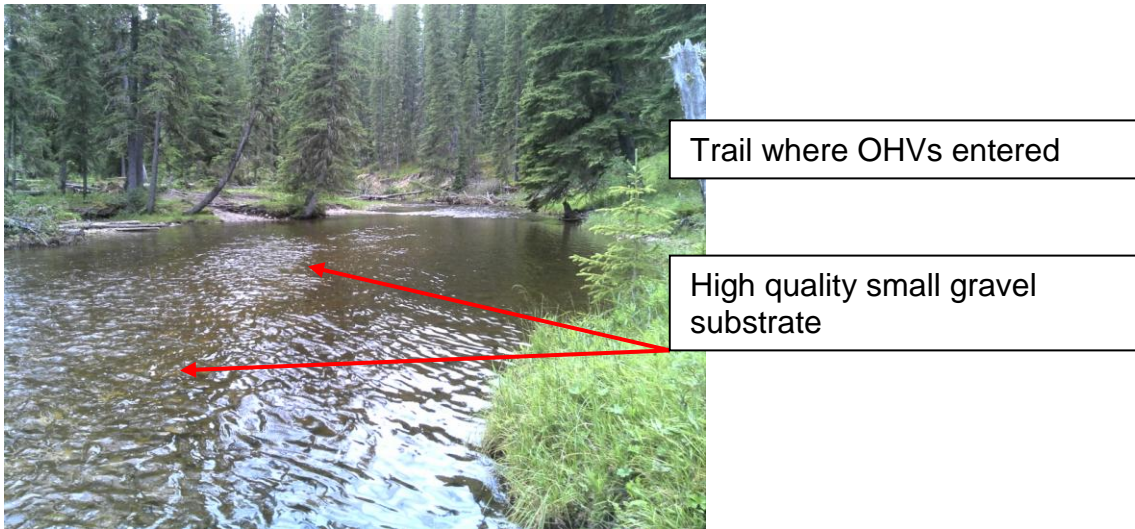


Figure 3. Photo showing downstream trail where OHVs entered the stream shown in the YouTube video “June 2012 Mud Run Outlander 1000, Renegade XXC 1000, XMR 800, RZR”.

Fisheries Management

Swan Creek contains eight documented species of fish including: Lake Trout (Steve Herman pers. Comm.), Northern Pike, Burbot, Brown Trout, Brook Trout, Longnose Sucker, White Sucker, and Longnose Dace (Fish and Wildlife Management Information System 2013).

Lake Trout are a cold water species and have a limited distribution in Alberta. Lake Trout generally spawn in the fall - during mid-September to early October on rocky shoals and typically reside in deep oligotrophic (cold and deep) lakes. In west-central Alberta, Lake Trout live in the North Saskatchewan River upstream of

the Bighorn Dam as well as in Abraham Lake. The Swan Lake population of Lake Trout is unique in that the lake habitat would be considered marginal for Lake Trout survival with very little cold water refugia in summer months. These trout tend to spawn over gravel in the outlet stream and over a small area of Chara (calcium based vegetation) in the lake. These fish have adapted to an environment that would not typically support a self-sustaining Lake Trout population and must be carefully managed. A large number of anglers travel to Swan Lake to catch Lake Trout, which are a high priority sport fish.

Northern Pike are a cool water species, and have a very broad distribution throughout Alberta. These fish spawn in the spring over vegetation in April and early May. This species prefers lakes with weedy shorelines and they also inhabit slow moving streams (Nelson and Paetz 1992). Northern Pike spawn and rear in Swan Lake and likely in portions of Swan Creek.

Burbot are a cool water sport fish preferring the cooler water of benthic (lake bottom) habitats. They have a broad distribution throughout Alberta and inhabit both streams and Lakes. Burbot generally spawn in late winter, under ice and broadcast spawn over a variety of substrates (Nelson and Paetz 1992).

Brown Trout are an introduced sport fish species in Alberta. Brown Trout spawn in late fall and early winter depending on water temperatures. Brown Trout dig redds (nests) in areas of small, clean, gravel and their eggs over-winter in these redds until the spring when the fish emerge.

Brook Trout are an introduced fish species that are self-sustaining in several drainages in the western portion of the province. Brook Trout spawning occurs between September and November where redds are built in gravel beds in streams or in lakes where conditions are adequate for egg survival.

Historically, Lake Trout and Brown Trout have been documented to spawn within the Class A portion of the stream, coincident with the location of the offence. More recently evidence that Northern Pike are likely spawning in the stream was found by the occurrence of a young-of-year fish in the survey completed on July 17, 2013. Summarized results of the survey are below.

The sportfishing regulations in effect on Swan Creek are designed to provide protection for sport fish populations to ensure their sustainability over the long term. These regulations were excerpted from the "*Alberta Guide to Sportfishing Regulations 2013*".

Swan Creek and tributaries

- Downstream for 2 km below Swan Lake
 - Apr. 1 to August. 31 - Trout limit 2; Mountain Whitefish limit 5 over 30 cm; Bait Ban.
 - Sept. 1 – Mar. 31 – Closed
- The remainder including tributaries to Swan Lake

- Apr. 1 – Aug. 31- Trout Limit 2; Mountain Whitefish 5 over 30 cm; Bait Ban.

Fish Survey Results

An assessment of fish community, relative abundance and size structure was completed on July 17, 2013. Senior Fisheries Technicians Steve Herman, Rocklyn Konynenbelt and Senior Fisheries Biologist John Tchir used a back pack electrofisher to capture fish in a 225 meter reach within close proximity to where the offence occurred (figure 4). Stream temperature was 16.5 degrees Celsius, pH 8.41, and temperature corrected conductivity was 291 μ S. These parameters are consistent with cold water free stone stream habitats in the East Slopes of Alberta. A total of 1,311 seconds of electrofishing effort resulted in 89 individual fish being captured and measured. Of the fish captured, Brook Trout (figure 5) (n=71) were most abundant, followed by Brown Trout (figure 6) (n=15) and Longnose Dace (figure 7) (n=2). A single young-of-year Northern Pike (figure 8) was captured and is a good indication that Northern Pike are spawning in Swan Creek. Brook Trout ranged in size from 76 mm to 257 mm total length (TL) with a mean total length of 163.4 mm. Brown Trout ranged in size from 131 mm to 180 mm with a mean total length of 153.3 mm TL. The size range of Brook Trout indicates that all life stages of this fish are using this portion of the stream, whereas the size range of Brown Trout indicates that these fish were likely juveniles and adults may be residing either further downstream or in Swan Lake. The absence of young-of-year Brown Trout and Lake Trout was noted in the electrofishing survey, reasons they were not detected are not well understood. However, given the sensitive nature of these fish to disturbance, it is not unlikely that some numbers were destroyed by OHV operation in the spawning beds of the stream outlet. Upon review of the YouTube video "*June 2012 Mud Run Outlander 1000, Renegade XXC 1000, XMR 800, RZR*" it is possible that young of year fish were ground into the substrate, covered with silt, and / or displaced during this occurrence.

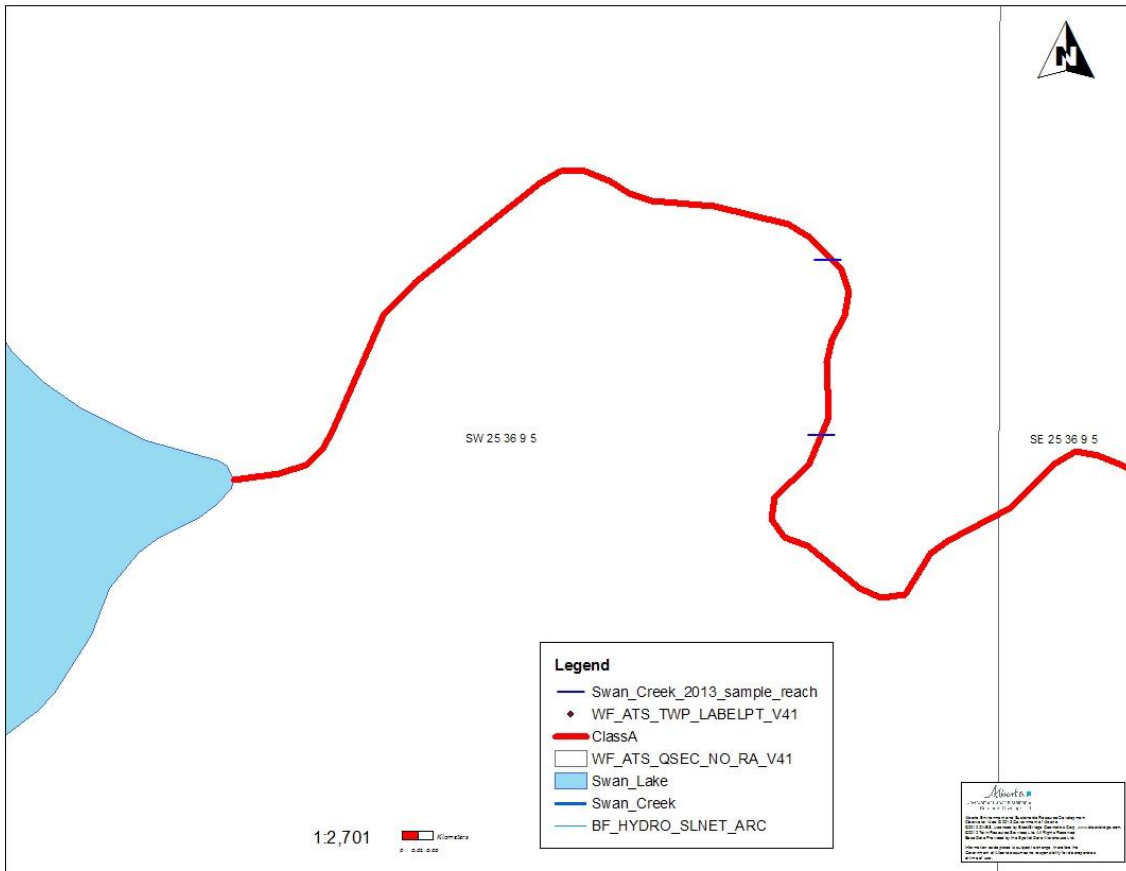


Figure 4. Location of fish survey, start and end locations depicted by horizontal slash symbols.



Figure 5. Photo of Brook Trout captured in Swan Creek on July 17, 2013.



Figure 6. Photo of Brown Trout captured in Swan Creek on July 17, 2013.



Figure 7. Photo of Longnose Dace captured in Swan Creek on July 17, 2013.



Figure 8. Photo of Northern Pike captured on Swan Creek July 17, 2013.

Habitat Impacts

For the purpose of this report I have described impacts from the point of entry into the creek to the OHV exiting the creek as well as impacts that linger after the vehicle has left the stream bed and shore area. These impacts can be considered both acute and chronic. Acute effects result during the activity whereas chronic effects persist after the activity and tend to be cumulative.

- When an OHV enters a stream from the bank there is almost always mechanical removal of soils from the bank that are immediately transported into the stream.
- Once in the stream, OHVs have the potential to drive over redds (spawning nests built in the substrate by trout) crushing and disrupting incubating eggs and increasing sediment transport in the water. Depending on the severity of sediment loading fish eggs can be covered and suffocated or mortality may increase as a result of a combination of factors (e.g., increased chance of fungal growth). The increased cloudiness of the water reduces the ability of fish to feed on invertebrates and may also reduce invertebrate and aquatic plant production.
- Washing vehicles in streams can result in spills of oil and antifreeze, sedimentation and a risk of transferring invasive aquatic plants from one water body to another.
- Upon exiting the stream wheels tend to spin into the bank causing erosion and further increases in sediment loading.

At this particular location on Swan Creek multiple points of entry were noted and the trail on the opposite bank was nearly 100 meters downstream of the entry point which crossed the highest quality spawning habitat observed in the survey section. When cross referenced with the YouTube video “June 2012 Mud Run Outlander 1000, Renegade XXC 1000, XMR800, RZR”, this section of spawning gravel would have been driven over by the OHVs. This act likely resulted in the killing of young-of-year Brown Trout, Lake Trout, and Brook Trout in the gravels and displacing juvenile fish that were rearing. The suspension and addition of sediment in the stream was evidenced by the silt plume created by the OHVs in the aforementioned YouTube video.

Additive, excessive suspended sediment can have devastating effects on aquatic communities (Novotny and Gordon, 1981). Increased turbidity (cloudiness) reduces local primary production (productivity of aquatic plants) and impacts all trophic levels (Newcombe 2003). The Department of Fisheries and Oceans (<http://www.dfo-mpo.gc.ca/regions/central/pub/factsheets-feuilletsinfos-on/t1-eng.htm>) provides some of the specific effects of excessive suspended and deposited sediments. These effects may include: abrasion of gills and obstruction of gill function of fish and aquatic organisms, changes in fish movement and migration, increased risk of disease, impairment of visual feeding fishes, poor egg and fry development, direct mortality of aquatic invertebrates, embedding substrates, preventing interstitial water flow, reducing oxygen and increasing trapping of wastes that reduce egg survival. Of particular note, the deposit of a deleterious substance (including sediment) is prohibited under the Federal *Fisheries Act* under Section 36(3).

OHV use in and around streams has lasting effects. Each time it rains after or during operation of OHVs at trail-stream intersections the bared soils are eroded and transported into the stream, as the stream flows downstream sediment in the water column accumulates at every OHV and stream crossing. Some sediments are comprised of larger particles (sand and small rocks), these tend to settle out once flows decrease. The finer sediments (silt) can be transported in the stream for many kilometers and end up degrading fish habitat downstream. The actions of upstream OHVs not only impact fish habitat in the localized area but these impacts accumulate as sediment moves downstream into Prairie Creek, the Clearwater River and later into the North Saskatchewan River.

Summary

- The operation of Off-highway vehicles in Swan Creek jeopardizes the viability of fish populations residing in the stream and could negatively impact Lake Trout and Brown Trout populations residing in Swan Lake, by increasing mortality of eggs and larval fish incubating in the gravels.
- Based on the fish survey conducted July 17, 2013 and historical file data several important sport fish species were found in Swan Creek, it is an

important section for spawning and rearing Lake Trout, Brook Trout, Brown Trout and likely Northern Pike.

- Swan Creek has the highest level of habitat protection possible under the Code of Practice for Watercourse crossings. The reason for this level of protection is that this area has very sensitive fish habitat that is critical for maintaining both native and introduced sport fish populations in Swan Lake and Swan Creek.
- Siltation of streams reduces their productive capacity and ultimately results in a reduction of fish allocable to Albertans. Considering reduced production potential of these waters fisheries managers have to implement more restrictive fishing regulations to ensure sustainability. This is a short term measure to address an issue that continues to shrink Alberta's stream fisheries resources.
- As Alberta's numbers of OHVs grow the severity and duration of silt loading events will continue to increase resulting in the long term impairment and in some cases loss of free stone stream fisheries.

References

Alberta Guide to Sportfishing Regulations 2013. ISBN 978-1-927698-00-6.

Department of Fisheries and Oceans Fact sheets. 2013. (<http://www.dfo-mpo.gc.ca/regions/central/pub/factsheets-feuilletsinfos-on/t1-eng.htm>)

Fish and Wildlife Management Information System. Measured Fish query, Swan Creek. 2013.

Nelson, J. S. and M. J. Paetz. 1992. The fishes of Alberta. The University of Alberta Press, Edmonton; The University of Calgary Press, Calgary. 437 pp

Newcombe, C.P. (2003) Impact Assessment for Clear Water Fishes Exposed to Excessively Cloudy Water. Journal of the American Water Resources Association, 39 (3), pp. 529-544.

Novotony, V. and Chesters, G. (1981) Handbook of Nonpoint Pollution Sources and Management. New York, NY: Van Nostrand Reinhold Company.