Streamline
B.C.'s Watershed Restoration Technical Bulletin
Vol. 2 No. 4

Akolkolex River: Addressing Fish and Wildlife Habitat Values

Cory S. Legebokow

Introduction

The Akolkolex River watershed was one of the first valleys to be harvested within the Revelstoke TSA and had 29 cutblocks harvested prior to 1987. Harvesting occurred primarily along the mainstem valley bottom and lower reaches of the main tributaries. During the winter of 1996 there was an avalanche, apparently induced by a lack of vegetative cover from forest harvesting activities. This resulted in the destruction of riparian and off-channel rearing habitats adjacent to the Akolkolex River mainstem.

The Akolkolex watershed contains westslope cutthroat trout (*Oncorhynchus clarki lewisi*) and slimy sculpins (*Cottus cognatus*). The population of westslope cutthroat trout is of particular interest because it has not experienced any degree of introgressive hybridization with introduced rainbow trout as has occurred in many other watersheds (DeDominicis and Boag 1996). The combination of previous forest harvesting practices and historical angling pressure is thought to have caused a decline of this provincially significant, endemic population of westslope trout.

Mitigation was chosen over restoration at this site, because of the inherent risks of further avalanches and potential flooding from the mainstem. Restoration is a possibility at some time in the future, depending on results from monitoring.

Project Objectives

- To provide both winter rearing and spring high flow refuge habitat for juvenile westslope cutthroat trout.
- To mitigate damage to riparian and wildlife habitat attributes resulting from a nearby cutblock induced avalanche.
- To provide a variety of habitat types, both terrestrial and aquatic, in order to benefit as many species as possible.

Location

The Akolkolex River is located within the Columbia Forest District, approximately 25 km southeast of Revelstoke, B.C. It flows southwest for approximately 31 km from its glacial headwaters in the Duncan Ranges of the Selkirk Mountains to its confluence with the Columbia River (Figure 1). This watershed is within the Northern Columbia Mountains eco-region, Interior Cedar-Hemlock biogeoclimatic zone.

The watershed restoration project is situated at approximately km 23.5 on the Akolkolex River Mainline FSR, at which point it is clearly visible from the road. Foot access to the groundwater channel portion of the project is gained from approximately km 23.8 (Standfast Creek) by a short walk of approximately 200 m.

Assessment and Prescription

The results of fish habitat assessments in the project vicinity demonstrated the presence of cutthroat trout juveniles within small isolated pools throughout the

This Quarter

Winter 1997

BC Environment
British Columbia
Forest Service British Columbia
Forest Renewal BC

Feature

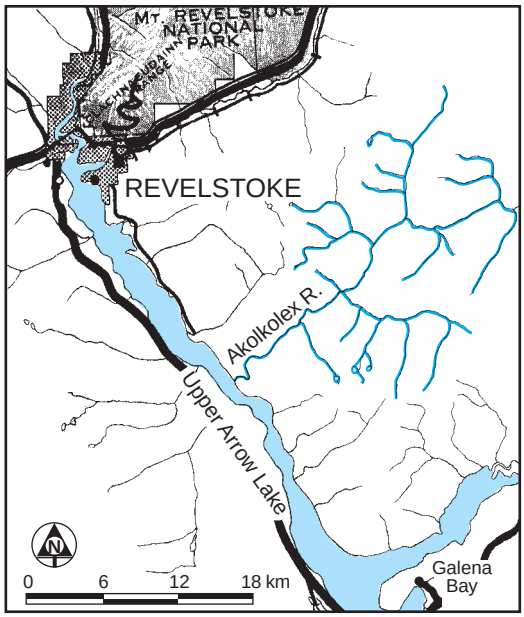


Figure 1. Map showing the Akolkolex River watershed

damaged riparian area. These pools are inundated annually during freshet thus providing access of fish, followed by isolation of pools when freshet ends. Juveniles were also found within a nearby undisturbed off-channel site. Although off-channel habitat use by cutthroat trout has not been well documented in the literature, the above evidence suggests that a groundwater-fed side channel would provide habitat for refuge purposes.

The proposed site also provides habitat for amphibians and other wildlife. Existing wildlife trees within the area are primarily decadent cottonwood trees, which, although providing wildlife habitat, have a very limited life span. Concerns raised during the planning process led to measures that would ensure that any efforts to provide fish habitat did not sacrifice amphibian values or destroy existing wildlife trees.

Final design and plans for the project were developed by a Fisheries Habitat Engineer, the Habitat Protection Officer, Regional Hydraulic Specialist and the Forest Ecosystem Specialist. The Alkolkolex River project involved creating a groundwater-fed side channel within the nearby undisturbed riparian area in order to mitigate the loss of fish habitat. In addition, the side channel supplies water to a pond that has shallower depths suitable for amphibians as well as deeper areas of up to 2.7 m (Figure 2). A stable surface water source was diverted into the pond to supplement water flows. The outlet of the pond connects directly to the mainstem of the Akolkolex River. The design used existing natural features and incorporated a wide diversity of aquatic habitat types (Figure 3). Considerations for amphibians, wildlife trees, and waterfowl (Figure 2) were addressed in planning the terrestrial areas.

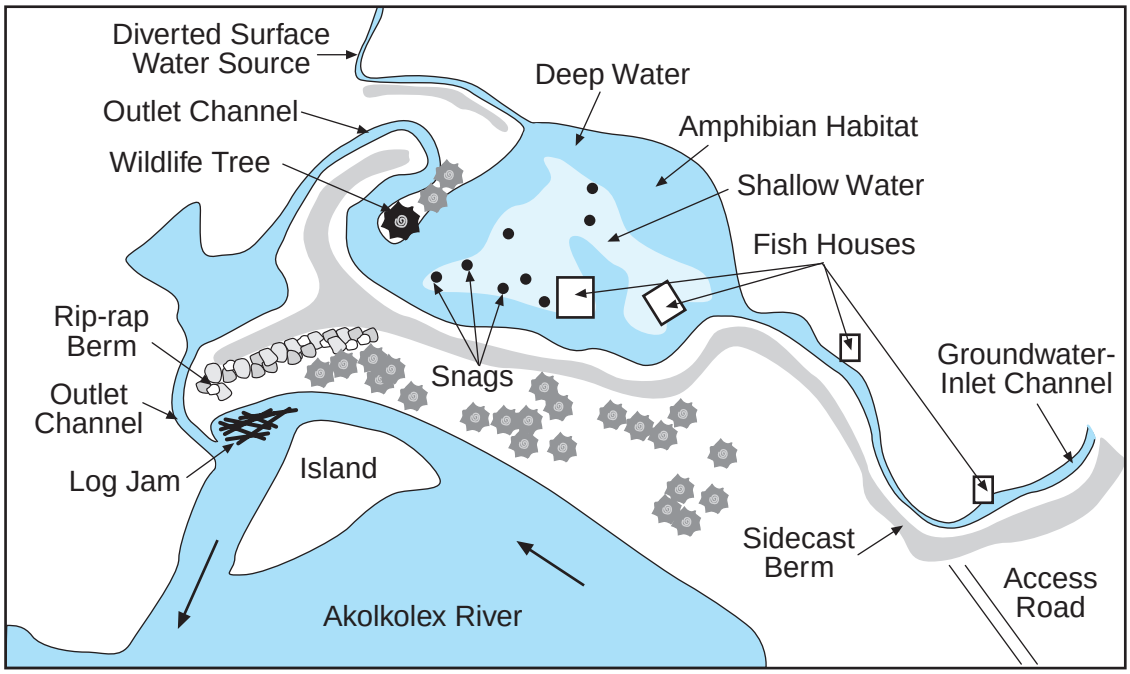


Figure 2. Site plan provides for off-channel fish habitat.

Figure 3. Project design at this site uses existing natural features to enhance habitat for fish, amphibians, waterfowl, and other wildlife.

Feature

Rehabilitation Works

Works were initiated in September, 1997 and took approximately three weeks to complete. The construction involved the following sequence of activities:

1. A series of four test pits were excavated to determine the depth to ground water. The depths and amount of groundwater present suggested that suitable flows could be maintained within a new groundwater channel provided the pond into which it flowed was maintained;
2. A berm was constructed along the alignment of an existing beaver dam (after the dam was removed) using material from the pond side of the berm. Excavation of the berm material provided a deep channel (up to 2.7 m deep) along the inside perimeter of the berm which encloses the main pond (Figure 4);
3. A small, stable, surface-water source was diverted into the pond. This method of diversion allows for overflow into the original channel should high freshet flows occur. It is possible that adult fish may use this diverted stream for spawning, as the gradient and substrate approximate natural spawning habitat (Figure 5);
4. The elevation of the pond outlet was set such that areas previously used by amphibians would be maintained at their pre-project depth. The pond outlet was also heavily filled with wood to deter beaver activity (Figure 4);
5. A large cedar tree salvaged from the avalanche run-out zone was placed and secured in a standing position within the ponded area to provide wildlife habitat. Further attempts to position additional trees were unsuccessful due to a lack of suitable wood (Figure 4);
6. Several "fish houses" were constructed within the ponded area by excavating a finger shaped trench. Logs and branches were then placed over the trench as cover for fish. The resultant fill was placed on top of the branches. Access by fish was maintained by connecting one end to the deep portion of the pond. The mounds created by the fill remain above pond level, and may provide nesting sites for harlequin ducks and/or other waterfowl;
7. A 130 m long groundwater-fed side channel was constructed above the ponded area. The channel followed a natural depression in the topography. The channel was constructed to provide both pool and riffle habitat (Figure 6). Two "fish houses" were also constructed within the channel;
8. The excavated material from the side channel was sidecast towards the river side of the channel to create a protection berm. Approximately 30 m of riparian vegetation was maintained between the berm and the mainstem to provide roughness should high flows encroach the area;
9. The outlet channel of the project connected with the Akolkolex River on an outside bend. The materials here are highly susceptible to erosion. There was concern that natural erosion would result in encroachment of the river into the site. As a result, a deflection berm was built to protect its outlet. The berm was built using excavated material as a base with geotextile and rip-rap as a protective outer layer (Figure 6);
10. The outlet was constructed by excavating a channel from the pond outlet around the bottom of the protection berm and connecting it with an existing pool along the outside bend of the Akolkolex River. An existing log jam within this pool was expanded to provide additional protection to the outlet channel (Figure 7);
11. Small trees that were displaced during construction were salvaged and replanted along the berm by displaced forest workers.
12. Willow whips were used to make fascines, which function to stabilize slopes (Babakaiff, et al.,1997). In addition, the entire site was seeded with a mix developed for the biogeoclimatic zone;
13. Displaced forest workers constructed upstream V-weirs within the groundwater channel, the diverted surface water source, and the outlet channel. Boulders clusters were also installed within these areas (Figure 4);
14. Whole logs and root wads were placed within the pool sections of the groundwater channel and within the ponded area to provide cover;
15. Stand pipes were installed within the test pit sites to allow for subsequent monitoring of groundwater levels.

Feature

Figure 4. Excavated berm material encloses the main pond. The pond outlet is filled with wood to deter beavers. The large, salvaged cedar tree provides wildlife habitat.

Most of the work was accomplished by a size 300 excavator with a clean-out bucket. Dump trucks hauled rip rap to the site, and a front-end loader moved the rip rap to the berm.

Project Proponent

Ministry of Environment, Lands and Parks implemented this project on behalf of Downie Street Sawmills Ltd. of Revelstoke, B.C.

Cost Summary

Pre-construction Engineering	$13,484
On-site Engineering	$24,358
Labour (Displaced Forest Workers)	$2600
Equipment	$19,976
Materials	$13,393
TOTAL	**$73,811**

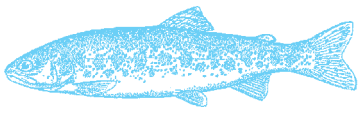
Production Estimates

Watershed Restoration Technical Circular No. 9 (Slaney and Zaldokas 1997), provides very little information on biostandards for cutthroat trout. Using the information available, which is for mainstem habitat complexing, up to 546 fish may result from the ponded area. A more likely scenario is that the ponded area would yield less fish than increasing complexity in the mainstem. The total area of the groundwater channel, the surface water diversion stream, and the outlet channel is approximately 315 m^2 which would yield about 44 fish. In addition, the surface water diversion stream and other riffle areas may provide 30 m^2 of spawning habitat.

Quarterly monitoring of the utilization. of the watershed habitat by cutthroat trout will commence in January, 1998. This data may be used to further develop the biostandards presented in Technical Circular No. 9, which are limited to mainstem habitat. The monitoring will include fish presence/absence studies and basic water chemistry, such as dissolved oxygen, alkalinity, and nutrient sampling. Temperature data loggers will be in place during the next year to monitor seasonal temperature fluctuations. Both tributary and total flow measurements, will also be assessed.

Figure 5. Diverted stream is used as overflow channel.

Figure 6. Channel construction provides both pool and riffle habitat.



Feature

References

Babakaiff, S., D. Hay and C. Fromuth in Slaney, P.A. and D. Zaldokas 1997. Fish habitat rehabilitation procedures, Province of B.C., Ministry of Environment, Lands and Parks and Ministry of Forests. Watershed Restoration Technical Circular No. 9: p.6-6 - 6-12. Vancouver B.C.

DeDominicis, S., and T.D. Boag. 1996. Level II fish population and riverine habitat assessment of the Akolkolex River, Greely, Twin, Liberty and Fissure Creeks watersheds in B.C. AGRA Earth and Environmental Ltd., Revelstoke B.C.

Slaney, P.A., and D.O. Zaldokas 1997. Fish habitat rehabilitation procedures, Province of B.C., Ministry of Environment, Lands and Parks and Ministry of Forests. Watershed Restoration Technical Circular No. 9: 341p., Vancouver B.C.

Mr. Cory S. Legebokow
Habitat Protection Officer, Columbia Forest District
Box 9158 - RPO #3 Revelstoke, B.C. V0E 2S0
Tel: (250) 837-7637
E-mail: CSLEGEBO@Nelson.env.gov.bc.ca

Repair of the Kitseguecla* Forest Service Road: A Blend of Conventional and Bioengineering Methods

Editor's Note: Kitseguecla has a number of alternative spellings including Kitsegukla and Gitsegukla. The latter is the current spelling used by the Band Council and the Gitskan First Nation.

Alan Harrison

Introduction

The Kitseguecla Forest Service Road (FSR) is located in the Kispiox Forest District, approximately 107 km west of Smithers (Figure 1). It provides access to the Kitseguecla Valley and the Chart Areas held by Hobenshield Logging and Skeena Cellulose Carnaby Division. Road use for log hauling is high and based on current forecasts, logging access to the area will be required for at least the next 25 years.

In 1995, surficial slides of both cut and fill slopes occurred at km 9.5 on the FSR, an area with a history of stability problems. At this location, the road alignment is on steep terrain with 50 % sideslopes. The soils are glacio-fluvial outwash material composed of layers of coarse gravel and thin layers of silt and clay, underlain by glacial till. The sand and gravel are relatively permeable while the layers of silt, clay and till are not. Water percolates down to the impermeable layers, flows downhill and exits on cut slopes as seepage.

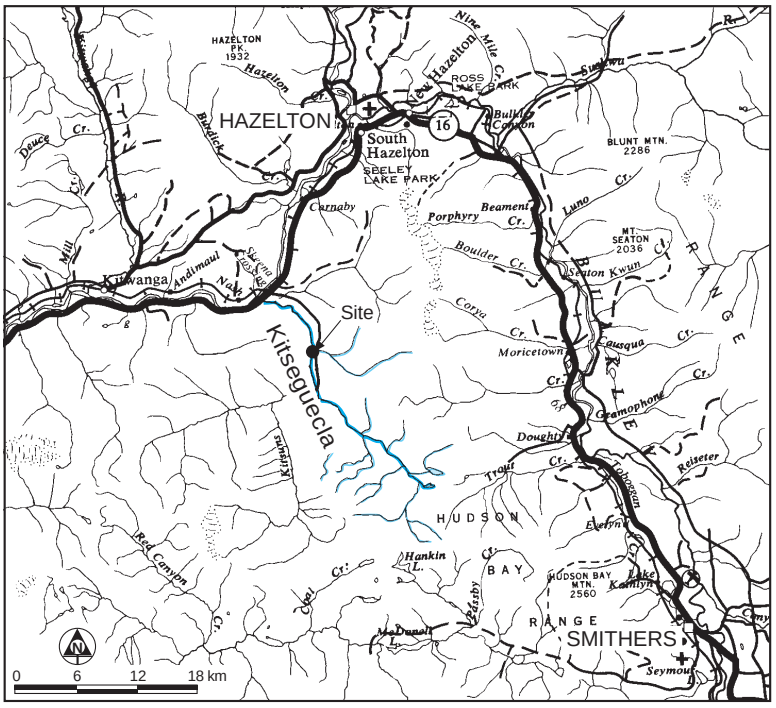


Figure 1. The location of the Kitseguecla River Watershed Restoration Project.