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Nechako River
Habitat Complex Removal
(RM 86.375 RDC)

Post Construction Monitoring Report

January 8th, 2007

Prepared for:

Nechako Fisheries Conservation Program.
Technical Committee
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1 Introduction

This report has been prepared to document the removal of a rail debris catcher (RDC) installed in the Nechako River as part of the Nechako Fisheries Conservation Program (NFCP). The site is located approximately 5 km southeast of the Village of Fort Fraser, at the UTM coordinate 10U 401879E 5987633N (Figure 1).

This report:

- presents a summary of pre-construction activities and conditions of approval;
- documents the progress of removal activities;
- presents a review and assessment of the success of the project; and
- presents recommendations regarding future projects of this nature.

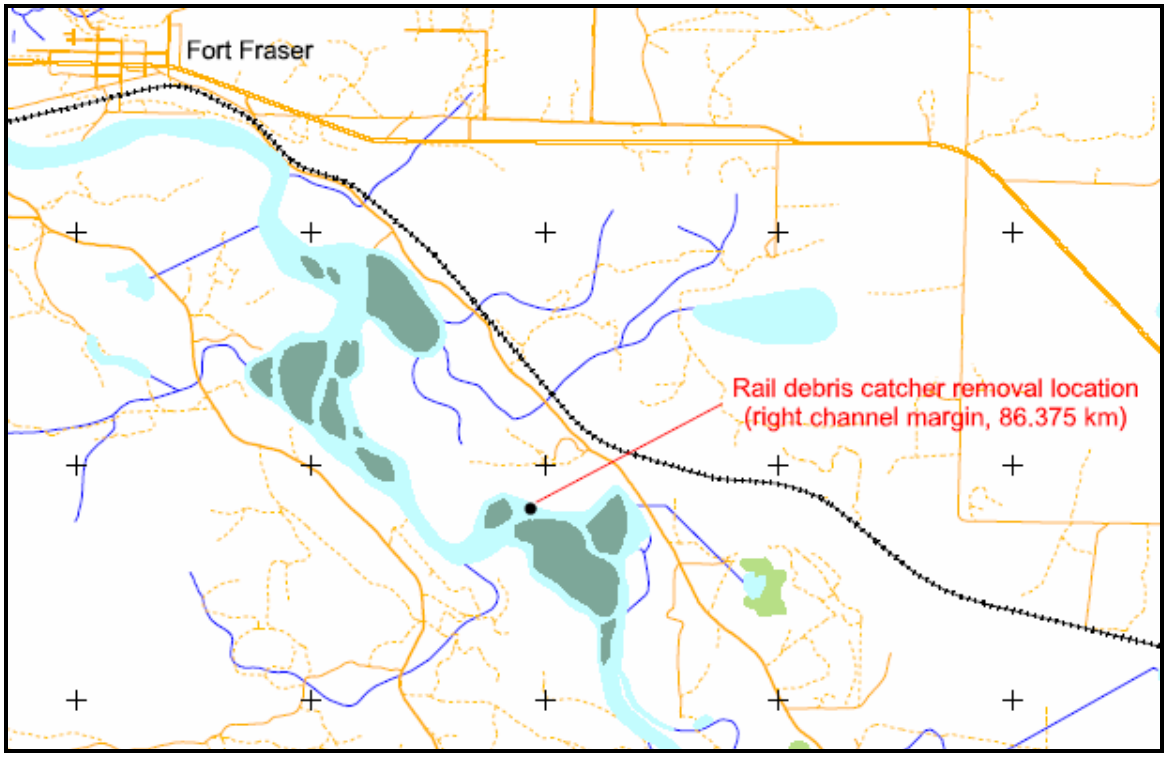

Figure 1. Location map of the RDC at RM86.375.

2 Background

Artificial habitat complexes were installed in the Nechako River from 1989 through 1991, as part of the work of the NFCP. These structures were constructed to test the feasibility of increasing the complexity of habitat in the Nechako River and to offset any potential habitat losses resulting from the change to long-term flows associated with the Kemano Completion Project.

In the fall of 2006, it was determined that the debris catcher at Km 86.375 was no longer functioning as intended (Plate #1). Continued destabilization of the structure may create a potential navigation hazard. As such, the Technical Committee of the NFCP agreed that the rails associated with the habitat structure should be removed from the river.

3 Planning Phase

3.1 Design Objectives

The objective of the project was to remove the rail debris catcher located along the right margin of the Nechako River at KM 86.375. This effort would be undertaken during low flows in early winter. Woody debris associated with the structure was to be disturbed as little as possible, and was to be left in place.

3.2 Design Considerations and Constraints

Heavy machinery (such as a hydraulic excavator) was required to complete the work, and needed to be positioned in close proximity to the structure in order to get sufficient leverage to extract the rails. As the excavator had to be walked down the banks of the river in order to access the rails, riparian vegetation would likely be trampled. Based on these considerations, it was recommended that completing the works during winter conditions would provide the least risk to the environment for the following reasons:

- During the winter months, riparian vegetation is dormant. Shrubs could be hand cut to ground level to allow access for the excavator, and still be expected to start new shoots and re-grow during the upcoming growing season.
- Vegetative mats and the underlying topsoil would be protected from the machine tracks by a layer of snow and ice.
- Frozen soils on the bank of the river should experience less disturbance from the excavator tracks, compared to summer conditions when soils could be displaced.
- Any debris carried onto the ice during the rail removal could be cleared upon completion of the work.

The removal of the rails imbedded in the riverbed would generate a small amount of turbidity; however, isolating the site from flows was not recommended for the following reasons:

- There was a significant amount of ice that would need to be removed in order to install an isolation structure (*e.g.* filter fabric fence lined with poly). The removal of ice could cause more of a disturbance that the removal of the two rails.
- The proper installation of an isolation fence would require numerous pieces of rebar or other material to be pounded into the channel substrate to support the fence. LWD would have to be moved to ensure the fence sealed to the channel bottom. The installation and removal of such a fence would likely result in more of a disturbance than simply pulling out the rails.
- To be effective, the fence would have to be extended around the RDC. The outer rail is in approximately 1.5 m of water – too deep to install a fence by wading. Additionally the outer edge of the fence would have to be installed in flowing water, reducing its effectiveness and increasing the potential that the isolation fence would fail.

3.3 Agency Review and Project Approval

Triton prepared an environmental prescription detailing the proposed methods to remove the rails (Triton 2006). The prescription was submitted to the regulatory agencies for their approval. The removal of the rails was proposed to occur outside of the traditional instream work window for spring and fall spawners (July 15 through to August 15). As no harmful alteration, disturbance or destruction (HADD) of fish habitat was anticipated, the Department of Fisheries and Oceans deferred authorization of this project to the Ministry of the Environment (MoE) under section 9 of the Water Act. A variance was granted to work outside of the approved window by the MoE (2006), based on the measures within the prescriptions to minimize instream disturbances.

4 Removal Phase

4.1 Removal Activities, Techniques and Methods

Following official approval, Nahanni Construction Ltd. was retained to provide an excavator equipped with biodegradable hydraulic fluid to be used for removing the rails. Dave Merz, the owner of the field that needed to be crossed in order to access the RDC was contacted, and permission to walk the excavator across the field was granted. The removal of the rail ties at KM 86.375 RDC was completed on December 21, 2006. The activities associated with this project were as follows:

1. Pre-work assessment;
    - Landowner permission.

2. Mobilization to work site;
    - Assessment of primary crossing location.
    - Assessment of secondary crossing location.
    - Bank protection.

3. Rail removal;

- Rail assessment.
- Instream rail removal.

4. Site cleanup and demobilization;
    - Debris removal from site.
    - Departure of excavator from floodplain.

The following subsections provide a summary of the removal techniques and methods associated with activities identified above.

4.1.1 Pre-work assessment.

While awaiting the approvals from the regulatory agencies, Dave Merz was contacted to obtain permission to cross his field to access the RDC. During a previous effort to remove a similar structure immediately upstream (Triton 2005) Mr. Merz had requested that machine crossings over his field occur in the early morning when the soil was still frozen. During the 2006 effort, a substantial amount of snow was present (50-75 cm) on the field, and this created a protective layer that allowed for unlimited travel across the field.

4.1.2 Mobilization to work site

The excavator was offloaded at the Merz farm, and was inspected by the environmental monitor. The machine was found to be clean and free of any leaks or evidence of potential contaminant sources. The presence of the spill kit was confirmed, and additional gear was loaded on to the excavator. The environmental monitor proceeded to the work area in advance of the excavator to determine the best route to use to access the riverbank. The RDC was located on the margin of a mid channel island that was separated from the remainder of the floodplain by a side channel (Figure 1). The most direct path to the RDC was selected, and the excavator was marched through the floodplain to the margin of the river.

A natural clearing was present within the riparian zone at the edge of the side channel, which greatly reduced the disturbance on the plant community associated with the movement of the machine. The excavator approached the edge of the bank, and the operator disembarked to assess the situation. Following this assessment and subsequent testing of ice (15-20 cm) and water depth (>1 m), it was determined that the site could not be accessed via this location (Plate # 2). The bank height and slope were too great for the machine when combined with the depth of the water. The operator was concerned that the machine would not be able to return to the top of the bank without creating a significant disturbance to the bank and the river bed.

It was determined that a second crossing point may be available downstream. The machine backtracked to the field, and moved to a new point approximately 250 meters downstream. This site also contained a relatively clear riparian zone, and featured reduced bank heights. It was determined that small woody debris should be placed at the foot of the bank. This debris would provide traction onto the ice, as well as creating a protective layer against the bank. The small woody debris was harvested from outside of

the riparian area, and consisted primarily of over-mature willows. Once a suitable amount of debris was in place, the tracks of the machine were cleaned (Plate # 3), the machine was inspected, and the crossing initiated (Plate # 4). The woody debris supported the weight of the excavator, reducing the impact upon the bank and shoreline area. Eventually the machine broke through the ice, and crossed over to the far side. The crossing was completed in one fluid motion, and the excavator was not stationary within the wetted channel at any point.

The machine navigated along the edge of the island and followed a path that avoided significant clusters of shrubs. The deep snow pack protected the buried vegetation, and at no point was the ground layer and associated root networks disturbed.

4.1.3 Rail removal

Both of the rails were encased in ice (Plate # 5), and the upstream rail still had a wooden housing attached. The presence of a significant amount of ice over the Nechako River significantly extended the wetted margins. Upon accessing the site of the RDC, it became apparent that the removal process could not be completed from the dry shoreline. The shore ice at the site was not able to support the excavator, so a path through the ice and instream works would be required.

The environmental monitor determined that completing the removal of the feature was the most appropriate course of action. Mobilizing an excavator at a later date may have resulted in increased damage to vegetation and root networks, as the protective layer of snow may not be available. Future low water conditions may or may not allow for completing the work in the dry, as natural river migration may be contributing to increased water levels at the RDC site. The required works could be completed quickly, and it was anticipated that any disturbance associated with instream works would not be considered as being harmful to downstream fish habitats.

The machine was oriented for a direct approach to the structure, and the ice was breached. The excavator was positioned such that the rails could be accessed and deposited on the banks without additional movement. This allowed for a quick operation that did not require repositioning of the machine.

The shore side rail was approached fist. This rail snapped at the water / ice horizon. The top part was placed on shore, and the operator proceeded to remove the second rail (Plate # 6). This rail was pulled clear without incident. A minimal amount of turbid water and mud was displaced to the surface of the ice as the rail was pulled free. When the second rail was pulled free, a piece of woody debris that was chained between the two rails was also removed. Following this, the excavator operator found the remaining portion of the shore side rail, and was able to pull it free of the river bed. Once this was completed, the excavator was removed from the wetted width of the Nechako River (Plate # 7)

4.1.4 Site cleanup and demobilization

Following the removal of the rail ties, the excavator was walked back to the crossing point. In order to minimize vegetation disturbance, the excavator traveled outside of the

tracks created during the trip in. This provided a fresh layer of protective snow, and greatly reduced the potential for impacting the ground layer. The small woody debris provided an suitable ramp that enabled the machine to ascend the bank in one fluid motion (Plate # 8).

Upon ascending to the top of the bank, the excavator operator began to redistribute the small woody debris to the area it was harvested from. The environmental monitor halted this operation and explained that the material could be left in place to provide temporary instream habitat. The wood housing over the second rail tie and the LWD chained between the two rail ties was removed and left to decompose in the bushes outside of the riparian zone. The rail ties were transported out of the area, and the excavator crossed the field without incident. The rail ties were given to Mr. Merz for use on his farm, and the excavator was loaded onto the flatbed and transported away.

4.2 Incident Summary

There were no significant incidents or environmental disturbance associated with the completion of this project. The deep snow layer protected the vegetation along the transportation corridors, and the impact on riparian vegetation was minimized to the greatest extent possible. There was no disturbance to riparian root networks associated with this project. While a minor amount of substrate material was displaced to the ice surface, the potential impact associated with this material was felt to be inconsequential. Some instream scouring may have occurred around the leading edge of the excavator tracks; however, the short amount of time that the machine was within the wetted margin would have reduced this potential impact.

5 Post-Project Review and Recommendations

5.1 Evaluation of Mitigation Techniques

In general, mitigation techniques used at the site were effective. The timing of the works during winter provided a number of natural protective measures for the local environment. The cutting of shrubs used for the brush ramp should encourage natural re-vegetation during the upcoming growing season. The use of the brush ramp greatly reduced the impact of the machine tracks on the river bank at the crossing point, and proved to be a successful technique.

Any turbidity generated by the removal of the rails would have been minor, and short in duration (though difficult to assess through the thick ice covering). It is assumed that a momentary local increase in turbidity was experienced during this operation; however, the duration and magnitude of this are though to have been minimal. The installation of an isolation structure around the project area may very well have produced similar (if not greater) levels of disturbance.

Replanting or seeding of the site was not required as there was minimal disturbance to vegetation, and natural re-vegetation will occur. Riparian shrubs along the side of the

island were protected by the deep snow layer. Those shrubs that were damaged should be able to generate new shoots in the spring, as the root network remained undisturbed. The shrub community where the brush ramp materials were harvest from was located over 15 meters from the wetted edge, and appeared to be robust and successful. The preserved root networks should regenerate the vegetative layer quickly.

The dispersal of a non-competitive grass seed mix was not deemed to be necessary, as there was almost zero soil disturbance associated with the project. Some ground was broken outside of the riparian zone during the creation of the willow ramp; however the overall area was insignificant in size and local root networks should naturally regenerate the small disturbed area.

5.2 Assessment and Measures of Project Success

The rails associated with the RDC located at KM 86.375 were removed without incident. Any potential navigational hazards and associated liability associated with this anthropogenic structure have been removed. Any biological debris that had accumulated near the structure may be naturally displaced downstream during subsequent freshet events.

5.3 Recommendations

Should the removal of additional habitat structures be required in the future, the following recommendations should be considered:

1) Works should be scheduled to be completed before mid-February, to avoid unusually warm winter weather trends, and to ensure that river ice and snow depth in the riparian zone are at their maximum.
2) When using an excavator to remove the rail structures, avoid exerting horizontal pressure on the rail, as breakage can occur. Removal energies should be exerted along the vertical length of the rail.
3) If possible, initial attempts should be made to lift the rail out by pinching the tops with the excavator bucket and thumb. This process eliminates the need to have a worker positioned on the ice to connect a chain, and reduces the potential for worker injury.

6 Closure

This report has been reviewed internally by Mr. Ryan Liebe, R.P.Bio., and has been found to meet Tritons quality assurance requirements. This report features a selection of the photographs taken during the project. Additional photographs may be made available upon request.

Should you require any further information, or have any questions or comments, please do not hesitate to call, fax or email me (dtisseur@triton-env.com).

Yours truly,
TRITON ENVIRONMENTAL CONSULTANTS LTD.

Dan Tisseur, B.Sc., R.P.Bio.
Project Biologist

7 References

MoE, Ministry of Environment. 2006. Email communication from Leslie McKinley dated December 15, 2006. Subject: RE: Habitat complex removals on the Nechako River.

Triton Environmental Consultants Ltd. 2005. Environmental prescription: Nechako River – habitat complex removal (RM 86.35 RDC). Ref. # P-1192. 8 pp + App.

Triton Environmental Consultants Ltd. 2006. Environmental prescription: Nechako River – habitat complex removal (RM 86.375 RDC). Ref. # P-1563. 9 pp + App.

APPENDIX 1

Photograph Plates

Plate # 1. Date: October 31, 2006. **Comments:** Showing the condition of the structure during the fall of 2006. Note the angle of the leading rail, and a lack of captured debris.

Plate # 2. Date: December 21, 2006. **Comments:** Showing the clear riparian area, steep bank and significant water depth below ice at the initial crossing point to access the RDC.

Plate # 3. Date: December 21, 2006. **Comments:** Showing the small woody debris installed along the bank edge, and the operator clearing the tracks prior to crossing.

Plate # 4. Date: December 21, 2006. **Comments:** Showing the excavator perched on top of the woody debris, crossing out onto the ice.

Plate # 5. Date: December 21, 2006. **Comments:** Showing the condition of the site prior to the initiation of rail removal efforts.

Plate # 6. Date: December 21, 2006. **Comments:** Showing the removal of the second rail. Note the deep water, and the minimal amount of material coming off the rail.

Plate # 7. Date: December 21, 2006. **Comments:** Showing the condition of the site following the completion of the rail removal effort.

Plate # 8. Date: December 21, 2006. **Comments:** Showing the return of the excavator to the top of the river bank. Note the lack of disturbance to the bank under the machine tracks.