3695/WP-1429

Nechako River Habitat Complex Removal (LM 21.4 RDC) Post Construction Monitoring Report

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 (Plate 1) as part of the Nechako Fisheries Conservation Program (NFCP). The site is located at the UTM coordinate 10U 379867E 5951471N, which is approximately 3.5 km northeast of the Irvine homestead or approximately 1 km upstream of the Cutoff Creek Forest Recreation Site boat launch (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.

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 intended to test the feasibility of increasing habitat complexity 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.

During chinook spawner enumeration flights in the fall of 2005, it was observed that one of the structures (LM21.4) appeared to have failed. A subsequent ground assessment in December of 2005 confirmed that two of the three rails had bent to the point where the tips were just slightly above water level. 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 navigational hazard posed by the bent rails by extracting them from the riverbed. Since the third rail would not function to retain wood independent of the other two and it may eventually become a navigational hazard, it was also planned for removal. Wood associated with the structure was to remain at the site.

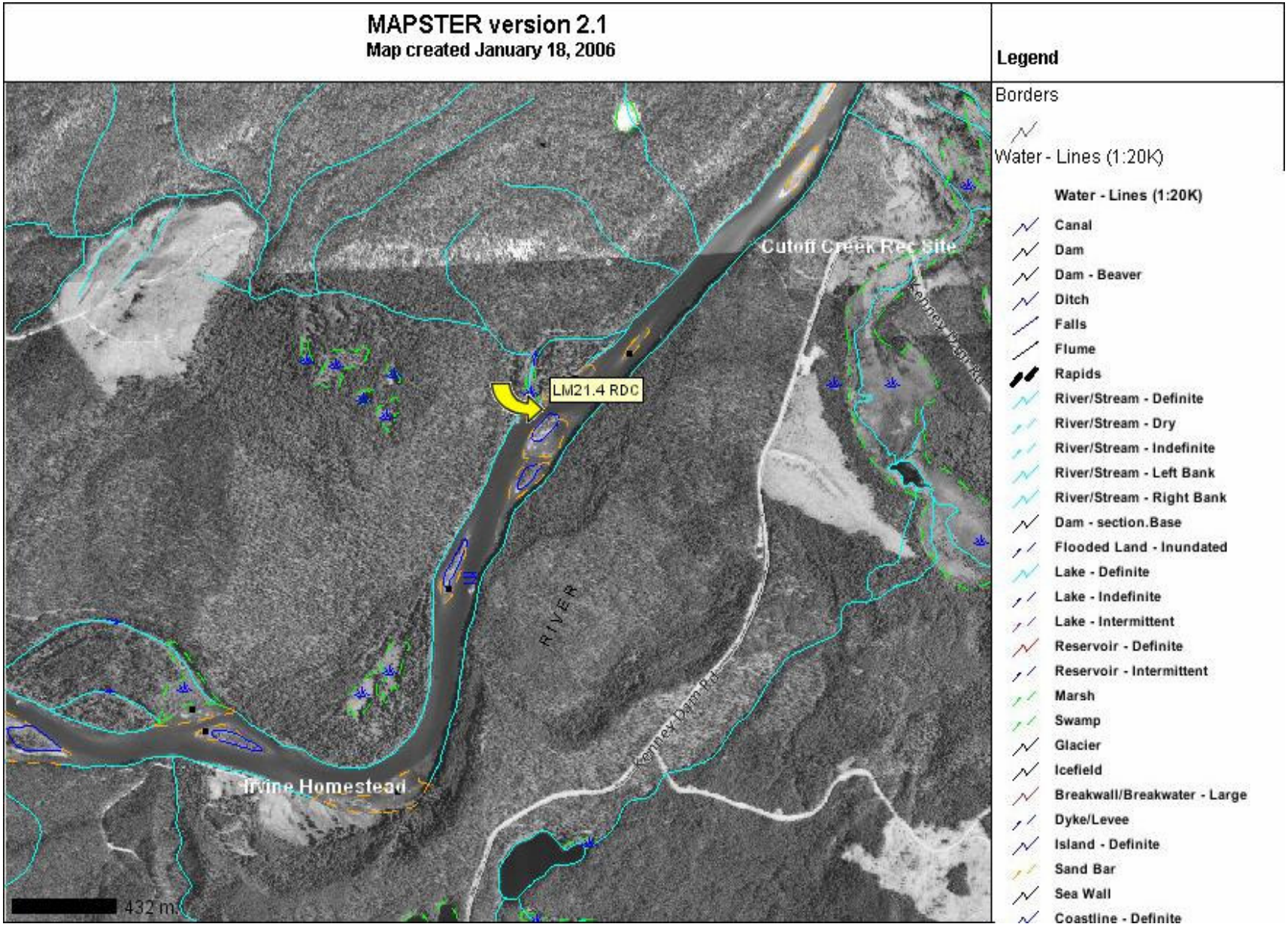


Figure 1. Location of LM21.4 rail debris catcher.

Design Considerations and Constraints

Heavy machinery was required to complete the work and needed to be positioned in close proximity to the rails in order to get sufficient leverage for extraction. The access option involving the smallest environmental footprint required the excavator to be walked across the Nechako River from the boat launch at the Cutoff Creek Forest Recreation Site, and then up the left bank of the river. It was anticipated that a small, brief sediment plume would be generated immediately behind the excavator as it crossed the river, and that some riparian vegetation would be trampled along the bank. 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;
- Snow and ice would protect vegetative mats and the underlying topsoil from the machine tracks;
- Frozen soils on the river bank would be less prone to disturbance by the excavator tracks, compared to the summer when soils could be easily disturbed;
- The possible presence of shore ice could allow the excavator to position itself over the wetted margin without disturbing channel substrates; and
- The winter flows were anticipated to be low enough to facilitate an excavator crossing of the channel.

It was anticipated that removing the rails embedded in the riverbed would generate a small amount of turbidity, but isolating the site from flows was not recommended for the following reasons:

- There may be 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 polyethylene material). The removal of ice could cause more of a disturbance that the removal of the 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 may have to be moved to ensure the fence sits on 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 fast flowing water, reducing its effectiveness and increasing the potential that the isolation fence would fail.

3.3 Agency Review and Project Approval

An environmental prescription describing the proposed methods for removing the rails was submitted to the Department of Fisheries and Ocean (DFO) and the BC Ministry of Environment (MOE) for approval (Triton 2006). Since the proposed works were planned to occur outside of the traditional instream work window for spring and fall spawners (*i.e.* July 15 through to August 15), a variance was approved by MOE (2006). Approval from the DFO was granted with the following conditions and comments (DFO 2006):

1. The mitigative measures identified in the EMP must comply with the habitat protection provisions of the Fisheries Act;
2. The Cutoff Creek Forest Recreation Site access is acceptable to the DFO;
3. Only one machine crossing is permitted (there and back);
4. The excavator must be pressure washed and free of any leaks prior to crossing the Nechako River;
5. The excavator must use biodegradable hydraulic fuel (ensure a copy of the MSDS for the hydraulic fuel is sent to DFO);
6. As this reach of the Nechako River contains active redds, a qualified environmental monitor must be utilized to ensure the machine does not cross over or directly upstream of known redds;
7. Ensure environmental conditions are conducive to having a machine walk along the bank/margin of the Nechako River to ensure minimal environmental degradation (*i.e.* frozen soil conditions, no precipitation, *etc.*);
8. Ensure all cable is removed from the structure and disposed of properly off-site; and
9. Notify the DFO (Len Seefried) prior to the work being performed.

The MSDS for the hydraulic fuel was sent to the DFO prior to completing the work, and all of the other conditions outlined by the DFO were adhered to as described in the following sections.

4 Removal Phase

4.1 Removal Activities, Techniques and Methods

Nahanni Construction Ltd. was retained to provide a 315L excavator equipped with biodegradable hydraulic fluid (Petro-Canada Environ MV32) for removing the rails. The project was completed on February 22, 2005, and the associated construction activities included:

1. Walking the excavator into position by crossing the Nechako River and moving up the left (west) bank to the job site;
2. Removing the three rails;
3. Walking the excavator back along the left bank of the Nechako River, and crossing the river back to the boat launch at the Cutoff Creek Forest Recreation Site; and
4. Cleaning up the site and demobilizing.

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

4.1.1 Mobilization to the work site

Prior to leaving Prince George the excavator was pressure washed to remove any soil and dirt from the machine (Plate 2). The excavator was walked to the right river bank at the

Cutoff Creek Forest Recreation Site boat launch, and then the environmental monitor and excavator operator used an inflatable boat to scout out water depths and look for redds prior to crossing. Since the location that was selected to start the crossing was ten meters downstream of the boat launch, the machine was walked into position down the right bank and turned on the bank prior to entering the water (Plate 3 and 4). No redds were observed at or immediately downstream of the selected crossing location.

The first 20 to 30 m on the right side of the river was the deepest part of the crossing, with water depths rising to up to the cab of the machine (Plate 5). Moving across the majority of the channel, however, the water was typically only half the depth of the excavator's tracks. Once the left bank was reached the machine exited the water and the tracks were turned upstream. Although shore ice was limited, there was room along the bank between the wetted perimeter and the mature shrubby vegetation for the machine to move upstream for approximately 1 km to the job site (Plate 6).

The inflatable boat was used to transport additional gear that might be needed to the work area. Some of this equipment and materials included: a cutting torch (if eyelets were not be present in the rails, or should there be large woody debris cabled to the rails), a spill kit, water quality sampling gear, and a satellite phone.

4.1.2 Rail removal

While the water level had decreased by approximately 40 cm since the previous site visit in December of 2005, this was not sufficient to completely dewater the shallow gravel bar just downstream of the scour pool created by the RDC structure. For that reason the machine needed to enter the water in order to get proper leverage for removing the rails. The downstream rail with the wooden casing on top was removed first, followed by the leaning rail that was furthest from the left bank, and then the upright rail with the bird box attached (Plates 7, 8, and 9). In all cases the excavator was able to easily extract the rails using the bucket with thumb attachment (Plate 10).

4.1.3 Site cleanup and demobilization

While there was very little LWD remaining in the RDC prior to its removal, a few seed logs did remain. Any chains and cables that were attached to this wood were removed using the cutting torch, and the LWD was placed back into the river. The three rails and other waste material were removed from the site, and the excavator was walked back down the left bank to the crossing location. Similar to the first crossing, the return trip across the river proceeded without incident. Since no visible bank damage had occurred it was not necessary to apply any sediment and erosion control measures.

4.2 Incident Summary

There were no significant incidents or environmental disturbances associated with the completion of this project. An almost imperceptible amount of sediment was mobilized behind the excavator during the river crossing, and a minor amount of sediment was

mobilized during the rail removal. A background value of 1.59 NTU was measured with a turbidity meter prior to any disturbance at the work site. A water sample that was taken from the main current directly downstream of the RDC at the peak of the disturbance indicated that turbidity had slightly increased to 4.27 NTU, while a value of 8.08 NTU was measured in the stagnant water where the machine had entered and exited the river. These data indicate compliance within the turbidity criteria outlined in the BC Water Quality Guidelines (WLAP, 1998), which limits maximum induced turbidity to 8 NTU in 24 hours when the background is less than or equal to 8 NTU. The visible sediment plume in the main current dispersed almost immediately, while the suspended material in the stagnant water along the channel margin required approximately 15 minutes to settle out.

5 Post-Project Review and Recommendations

5.1 Evaluation of Mitigation Techniques

The mitigation techniques used during this project were highly effective, and the winter timing provided a number of natural protective measures for the local environment. The ambient air temperature on the day of construction was just below freezing (-2°C), and the banks were still frozen and snow covered. This prevented any visible disturbance to the surface soil, and protected the root structure of riparian vegetation.

During the Nechako River crossing the increased turbidity behind the excavator was almost imperceptible. Ensuring that the excavator was very clean prior to entering the water minimized the introduction of sediment, while several factors contributed to minimizing sediment mobilization from the river bed. Taking the most direct route across the river and not turning the machine in the water were effective mitigative techniques, coupled with the fact that the channel consisted almost entirely of gravel substrate at the crossing location.

Replanting the site was not required since there was minimal disturbance to the young vegetation, which was generally less than one meter tall. Since the small diameter of the shrubby stems minimized breakage when they were run over, it is anticipated that trampled vegetation will recover vigorously.

5.2 Assessment and Measures of Project Success

The rails associated with the RDC located at KM 21.4 were removed without incident. The small amount of large woody debris associated with the structure was left in place, but will likely be mobilized during summer high flows. Mobilized woody debris from the structure may be captured by another RDC located approximately 1 km downstream near the Cutoff Creek Forest Recreation Site boat launch, or may become part of some natural downstream habitat feature.

5.3 Recommendations

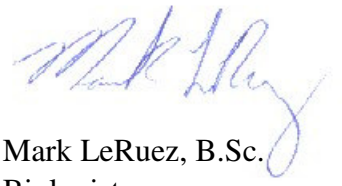
Should the removal of additional habitat structures be required in the future, the following recommendations should be considered:

1) Works should be scheduled to be completed before mid-February, to avoid unusually warm winter weather (as occurred in 2005 during the RM 86.35 RDC removal), and to ensure that river ice and snow depth in the riparian zone are at their maximum.
2) If a river crossing is required, ensure that the excavator contains biodegradable hydraulic fluids, is leak free, and has been pressure washed to remove any mud and dirt. Cross the river in the most direct route possible and avoid turning the machine while in the water to minimize sediment mobilization.

6 Closure

This report has been reviewed internally by Mr. Ryan Liebe (R.P.Bio.), and has been found to meet Triton's quality assurance requirements. Should you require any further information, or have any questions or comments, please do not hesitate to call (562-9155), fax (562-9135) or email me (mleruez@triton-env.com).

Yours truly,
TRITON ENVIRONMENTAL CONSULTANTS LTD.



Mark LeRuez, B.Sc.
Biologist

7 References

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Ministry of Environment (MOE). 2006. E-mail communication from Leslie McKinley dated February 20, 2006. Subject: Recent notifications to MOE.

Ministry of Water, Land and Air Protection (WLAP). 1998. British Columbia Approved Water Quality Guidelines (Criteria), 1998 Edition. Updated August 24, 2001.

Triton Environmental Consultants Ltd. 2006. Environmental prescription: Nechako River – habitat complex removal (LM 21.4 RDC). Ref. # P-1399.

APPENDIX 1

Photograph Plates

Plate 1. Upstream view of the condition of the rail debris catcher on February 22, 2005 prior to being removed. Note the angle of the outer rail and the downstream rail (with wood casing).

Plate 2. View of the very clean excavator tracks prior to crossing the Nechako River.

Plate 3. View of the undisturbed right bank just downstream of the Cutoff Creek Forest Recreation Site boat launch.

Plate 4. View of the undisturbed right bank after the excavator had crossed.

Plate 5. View of the excavator crossing the Nechako River at the deepest location.

Plate 6. View of the excavator walking up the right bank of the Nechako River toward the LM 21.4 RDC.

Plate 7. View of the failing downstream rail with the wooden top casing being removed.

Plate 8. View of the failing rail that was furthest from shore being removed.

Plate 9. View of the last rail with the bird box attached being removed.

Plate 10. View of the project area after the instream works had been completed.