CAWG Woody Material Management Strategy 2024

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Introduction

In Prince Edward Island, one of the primary mandates of many community-based watershed groups is the improvement of salmonid habitat in local rivers. Armstrong et al., 2003; Committee on the Status of Endangered Wildlife in Canada., 2011; Mollenhauer et al., 2013; NASCO, 2010; and Raleigh et al., 1984, all explain that salmonids make use of a variety of different habitat types depending on age, species, and season. They further describe salmonid habitat requirements, which include riffles with a gravel or cobble substrate for breeding habitat, cool, clear water of moderate velocity and depth, deep and lower-velocity pools for resting and refuge, in-stream cover for protection from sun and predators, organic materials to support fish foraging opportunities, and well-connected streams that allow access to a wide variety of these habitat types for foraging and cover.

In healthy salmonid rivers, these requirements are maintained and controlled by a forested riparian zone which, among other functions, **provides an input of woody material into the stream**. Functions of large wood in streams includes:

- Improved sediment deposition and storage (Marttila et al., 2018; Wohl & Scott, 2017),
- Increased volume in pools (Wohl & Scott, 2017), and
- Improved biotic production and increase to fish foraging habitat (Hafs et al., 2014; Thompson et al., 2018).

Wood in streams also increases the amount of in-stream cover available to fish and is commonly used in conservation efforts to rebuild or protect riverbanks.

Within the North River and Hyde Creek watersheds, which is the management area of the Cornwall and Area Watershed Group (CAWG), habitat degradation is widespread and primarily

related to surrounding land use practices which allow a large volume of sediment run-off into the streams. These same practices further compound the issue by reducing canopy cover, interfering with the natural meander of the stream, reducing connectivity to the floodplain, homogenizing vertical profile of the stream, and increasing nutrient and pesticide loading.

It should be noted that many of the most commonly studied functions of in-stream woody material relate to sediment storage and transport. Because of the ongoing problems with siltation in CAWG rivers, and because the presence of woody material has a substantial influence on sediment movement within the stream, management of in-stream woody material in the CAWG management area is a delicate balance between encouraging sediment storage and encouraging sediment transport. A strong understanding of stream hydrology, in-stream sediment movement, salmonid habitat requirements, and the relationship between these factors and stream order is needed to successfully walk this line.

In an event that should prove beneficial for the river systems under CAWG management, extensive windthrow caused hurricane Fiona when it struck PEI in 2022 resulted in a massive influx to in-stream woody material in river systems throughout the province. Although this may appear at first glance to constitute a challenge to fish passage, this natural increase to large wood in local river systems has the potential to help speed habitat rehabilitation. The management strategy described below is designed in the context of the recent hurricane disturbance and aims to maximize the potential of existing in-stream woody material. It is recommended that this strategy be reviewed and updated in future years as conditions fluctuate.

Management strategy

Management of in-stream woody materials for the purpose of reducing siltation of salmonid spawning beds requires a two-pronged approach. Sediment transport should be

encouraged over spawning beds specifically, and sediment storage should be encouraged along banks and point bars. If this is done well, improvements can be expected to fish habitat, natural stream meander, and sediment storage along banks and floodplains.

In the fields of river conservation and hydrology, river reaches are classified by order. First order streams are the uppermost tributaries and headwaters. The order number increases downstream at each point where two tributaries of the *same order* meet. With increasing order we can expect to see differences in habitat, scale, and surrounding land use. Fish will inhabit different sections of the river at different times depending on their seasonal habitat requirements. It has also been observed within the CAWG management area that treed buffer zones tend to be better retained along second and third order reaches, as opposed to headwaters and estuaries. For these reasons, this woody material management assigns goals and specific strategies based on stream order. Using the following classifications as a guide, the recommended strategies should be applied at the discretion of management personnel based on stream order and the specific conditions found within individual reaches.

First order streams and headwaters

First order streams and headwaters are often refuges for trout during hot weather because they contain cool, spring-fed water. In the CAWG management area, most of the land surrounding headwaters tends to be heavily farmed, with reduced buffer zones that lack trees and shrubs. This means that these headwaters have little protection from the sun, receive little natural large wood input, and typically experience high levels of sediment input, all of which has resulted in severe degradation. These reaches will therefore benefit greatly to the recent increase of in-stream woody material. Although many headwaters are degraded, most tributaries in the North River system do have one or more first order streams with a healthy tree buffer. Fish

passage can be made most available to these healthier reaches via appropriate woody material management.

Goals:

- Improve storage of sediment and prevent sediment from being transported further downstream.
- Improve in-stream shade and cover.
- Increase habitat variability.
- Ensure fish access to cool, high-quality habitat.

Strategies:

- Leave all in-stream wood at headwaters.
- Leave all in-stream large wood in first order streams that are lacking a treed buffer.
- Optionally, add large wood to first order streams and headwaters where it is lacking, especially where the absence of a treed buffer has left the stream exposed and/or caused degradation.
- Remove barriers to fish passage in selected first order streams that are already surrounded by an intact treed buffer. Remove only as much wood as is necessary to ensure passage and leave all wood that does not constitute a barrier.

Second and third order streams

A significant amount of salmonid spawning and feeding habitat in the North River system is found within the second and third order streams. These reaches are most likely to have appropriate salmonid spawning habitat. Siltation of spawning beds is the greatest issue in these reaches. Although much of the silt in these reaches is transported from the headwaters, there is

also a significant amount of direct sediment input to second order streams in areas with upland commercial farm fields and/or areas where the treed buffer is inadequate. Management of these reaches can be complex, because while it is important to prevent and remediate the siltation of spawning beds, it is also important encourage sediment storage and prevent silt from being transported further downstream. Some of these reaches may also require relief from bank erosion, or support to the natural meander of the stream.

Goals:

- Decrease siltation of spawning beds.
- Reduce sediment transport to downstream reaches.
- Increase habitat variability.

Strategies:

- Remove barriers to fish passage in the thalweg.
- Leave all woody material outside of the thalweg, except where it may be causing over-widening of the stream or erosion of the bank.
- Install brushmats on degraded point bars.
- Where bank erosion is extreme, deflector logs may be placed strategically to protect the bank.

Fourth order streams

Most rivers in Prince Edward Island are third order at the mouth. North River is one of the exceptions, reaching fourth order at “the Forks,” where Watts Creek joins North River. The section of North river just below this point (from “the Forks” downstream to Milton Bridge) is degraded from heavy siltation, over-straightening, and lack of fish cover. Nonetheless, salmonid redds are routinely found in the upper section.

Goals:

- Decrease siltation of spawning beds.
- Improve the natural meander of the river.
- Increase fish cover.
- Increase habitat variability.

Strategies:

- Leave all in-stream wood, except where it may constitute a barrier to fish passage.
- Where necessary, move or add large wood just above spawning beds to create slight pinch points and encourage sediment transport over the spawning beds.
- Where necessary, move or add large wood just below spawning beds to encourage pool formation.
- Following the meander of the thalweg as a guide, add large wood as deflectors at various points along the wetted edges of the river to improve the natural meander of the stream and increase habitat variability.

Further Considerations

In applying this strategy, it is important above all to take advantage of the large wood already present in the streams, and to make changes conservatively. Many of the problems present in the rivers managed by CAWG have been exacerbated in the past by removal of wood from the channel and riparian zones to extents far beyond the abilities of CAWG to replace. Concerns regarding barriers to fish passage or channel morphology should not take precedence over the retention of in-stream large wood, because the presence of this wood has the ability to re-ignite and maintain the ecological and geomorphic processes that naturally prevent or correct such problems.

It is recommended to begin at the mouths of tributaries and work in an upstream direction, both for the ease of the crew and so that increases to downstream velocity are slow and incremental. There may occasionally be re-establishment of log jams downstream as wood is mobilized, and these should be addressed using the same principles that were used in the first pass. Routine monitoring of reaches following the application of woody material management will be necessary, and observed changes should be recorded to aid in future decision-making.

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