



## 5.4 Beaver dam management

### What

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For adult Chinook salmon, this entails removing or breaching beaver dams in productive streams to allow access to upstream spawning areas. For juvenile Chinook, it requires capturing fry downstream then releasing them upstream of beaver dams to restore and maintain migration to upstream rearing and over wintering habitats. The action may be associated with beaver management plans (e.g., trapping or disturbing beavers) in select streams to reduce the probability of beaver dams being established in the first place.

Industrial trapping did not begin in the Yukon until after the collapse of the global beaver market in 1843. Beaver are considered fur-bearing animals in the Yukon and therefore can only be taken by the holder of a registered trap line. Beaver pelt prices have been depressed for decades and so little harvest takes place. Beaver populations probably exceed pre-contact levels, in part as First Nation use of beaver has been constrained by the registered trap line system.

There has been considerable debate regarding the risk that beaver pose to salmonids (e.g., Malison et al. 2014; Mitchell and Cunjak 2007). Most general North American attitudes are based on situations that have occurred, and studies that have been conducted, in environments distant from the Upper Yukon River. The focus here is on the Yukon River Basin in Canada, and the effects of beaver dams on upstream migrating Chinook salmon.

### Where

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Beavers are most common in glaciated terrain, stream/lake complexes, and the dry belt of the Yukon. There is currently no program or process in place to identify streams at risk of obstruction, although some streams have a known history of obstruction due to beaver dams. Beaver dam management for salmon has been conducted in:

- Fox Creek, McIntyre Creek, Wolf Creek and Michie Creek in the Upper Yukon River Watershed;
- Deadman Creek, Strawberry Creek and others in the Teslin River Watershed;
- Klusha Creek, Nordenskiold River and Tatchun River in the Yukon River Mid-mainstem Watershed;
- Mica Creek, Needle Rock Creek, Willow Creek and Caribou Creek in the Pelly River Watershed;
- Janet Creek and restoration channels in the Mayo River in the Stewart River Watershed;
- Tributaries and back channels of the Kluane River in the White River Watershed; and
- Ground water channels along the Klondike River in the Yukon River North Mainstem Watershed.

Other important spawning streams within the Canadian portion of the Yukon River are likely sensitive to beaver dam effects, particularly during drought conditions.



## When

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- In the Yukon, beaver dam breaching or removal requires a Permit under the Wildlife Act. The permit process has been efficient in the past, and a permit could be granted almost immediately if a dam was found to be obstructing upstream migration.
- Important, vulnerable and accessible spawning streams are known to local First Nations and communities, making the development of a Beaver Management Plan fairly straightforward. Permits can be acquired, a monitoring schedule developed and dams breached as they are identified.
- Beaver management is an ongoing process and requires periodic assessment because beaver modification of habitat is a dynamic process.
- Stream levels have been high for the last 5 years and beaver dam management has therefore been less of an issue than in years of low flow. However, 2015 saw a general reduction in stream flows in parts of the upper Yukon River Basin, for example, a dam was noted in August in Tatchun Creek.
- See Appendix E for a backgrounder on beaver and salmon in the Canadian portion of the Yukon River and a discussion of the identification and management of obstructions on small, productive and vulnerable Yukon River Chinook salmon spawning streams.

## Why

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Beavers construct dams on streams and smaller rivers in the upper Yukon River Basin, particularly under drought conditions. These dams, and the ponds that form behind them, may have a number of effects on salmon and their habitats that are similar to those of a small man-made dam.

Adult Chinook salmon migration into spawning streams and subsequent spawning is limited to a narrow window in late summer and follows a long migration from the ocean. Flows in spawning streams and some rivers may be very low during this period and rivers may also be dammed by beaver. Beaver dams can take on various forms. Some dams are total obstructions to all adult Chinook salmon. Others may stop some adults while individuals with sufficient remaining strength and energy can swim over the dam. Multiple attempts may be required to cross each dam and can result in delay and congestion below the dam. Bears often focus their foraging efforts in the area immediately downstream of dams to take advantage of the concentration of adult salmon in these areas. Energy reserves required for the ultimate act of spawning are almost certainly depleted in avoiding predators and finding a pathway to swim over the dam.

Upstream migrating juvenile Chinook salmon can be affected by beaver dams as they attempt to access upstream to summer rearing and overwintering sites. Dams, and dam complexes (one colony may build more than 10 dams in Yukon River non-natal rearing streams) are infinitely variable in size and form. These complexes change constantly as beavers add more material to the dam while the dam settles or water erodes parts of it away. Water flow paths over dams reflect the constantly changing shape of the dam and are seldom constant in any one location. Some juvenile Chinook salmon are able to find pathways to swim over or around most beaver dams.





Observed concentrations of juvenile Chinook downstream of dams imply obstruction or delay of an undetermined portion of the total number of juvenile Chinook salmon at each dam. Juvenile Chinook salmon are limited to between ~100 and 150 days to grow and accumulate fat reserves to last them through the winter. Restoring juveniles to areas upstream of beaver dams may allow access to areas where there is less competition for food, space and cover during the remainder of the rearing period, overwintering, and the early spring feeding period prior to out migration.

## Pros and Cons

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### Pros

- Breaching dams is a low technology activity and is within the capacity of local communities to conduct and a good source of local employment.
- First Nation and non-aboriginal trappers have generally granted social license to the activity, subject to harvested beaver being dealt with respectfully.
- Capture of juvenile salmon and restoration above beaver dams in non-natal streams is a relatively safe activity and does not require expensive certification of staff.
- Breaching dams is a potentially low cost activity.

### Cons

- Resistance to beaver management may be expected from the general public given the high societal value generally attributed to the beaver in Canada.
- Only the monitoring phase of a beaver dam management program can be planned for, as the presence of the dam, and appropriate response, will not be known until the monitoring commences.
- Able-bodied persons with suitable training and certification to carry out dam breaching may be difficult to retain on short notice. Necessary certification may include chain saw operation, swift water rescue, First Aid and other Occupation Health and Safety requirements
- The present Yukon River Panel R&E fund application process is the same for a small, local beaver dam management project as for a major, agency led project. The personnel costs of applying for funds for a beaver management project may exceed the cost of the project itself. This discourages First Nation and other local applicants.

## Critical Uncertainties

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The degree to which beaver dams limit spawning and rearing success is in part determined by what portion of available rearing and spawning habitat for a given population is obstructed. However, the extent to which upstream adult migration and juvenile migration are altered / impeded by beaver dams is dynamic and not well known because of the cost of ongoing monitoring. As a result, the extent to which spawning and rearing success is limited in any given stream during any year is uncertain.



- Beaver management projects for juvenile Chinook salmon have only been evaluated for a single atypical stream in the Canadian portion of the Yukon River. Although these projects have shown positive results (Clinton Creek; von Finster 2012), the generality of these findings is uncertain.
- Uncertainty in those factors outside of freshwater habitats in the Yukon River that may be limiting Chinook survival means that the success of this action is also uncertain.

## Supporting Actions

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- Knowledge of spawning and rearing habitat within a watershed is necessary to assess the risk a given dam poses to Chinook and the corresponding benefit of breaching.
- Breaching dams is a potentially low-cost activity, but realizing savings will require modification of current Yukon River Panel R&E funding processes to reduce the cost to proponents of preparing comprehensive applications for a small project.
- As noted above, addressing the high cost of applying for funds and the lack of support to conduct this type of project is the primary supporting action required.