

**Using beavers as a watershed management tool: articulating
Alberta's regulatory context**

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ABSTRACT

In many jurisdictions throughout North America, people from private citizens to land management agencies are investing in alternative management techniques regarding water and beavers. These techniques include purposeful reintroductions of beavers as a ‘watershed management tool’ to improve the health of wetland and riparian ecosystems, as well as the installation of water flow devices to reduce human-beaver conflicts. Beavers are an impressive ecosystem engineer that increases water availability, improves ecological connectivity, and promotes biodiversity. Therefore, they hold potential as a tool for wetland reclamation. Beaver reintroductions have occurred in parts of the United States and western Canada with the goal of reclamation in mind. However, there is a lack of clarity regarding the regulations that speak to this process. Installation of pond-levelling devices has also occurred in parts of Alberta without clear regulatory guidelines. Individuals and organizations promoting both of these approaches are unsure whether their actions align with current policy or legislation. Therefore, there is a need to clarify Alberta’s policy and legislative framework as it relates to these alternative management techniques. Our study assesses how these initiatives fit within Alberta’s current policies and laws. Through an extensive literature review and meta-analysis we examined initiatives in other parts of North America, including Oregon, Washington, New Mexico, California, and Utah. Through this research, we identified regulatory tools in Alberta that support new management strategies and provide recommendations for any additional changes that may be required to clarify these management activities.

INTRODUCTION

The ecological benefits of beavers are well known within the natural sciences; numerous studies have examined positive impacts this species brings to vegetation^{1,2}, other wildlife^{3,4}, the physical landscape^{5, 6, 7}, and ecosystem health and hydrology^{3,8,9}. An ECONorthwest study in Utah, *The Economic Value of Beaver Ecosystem Services*¹⁰ also recognized economic benefits coming from beavers. The ability for beavers to act as an ecosystem engineer has sparked an idea to use this species as a management tool for restoring wetland habitats. There are numerous case studies emerging from the United States of America (USA) and a few within Canada where individuals and organizations have reintroduced beavers into an area for the purposes of building or enhancing habitat. Case studies in the United States include New Mexico¹¹, California¹², Wyoming¹³, Washington¹⁴, and Oregon¹⁵. In Canada, there are only a few instances where these projects have been conducted, with informal reports coming out of Alberta^{16, 17}.

Where beavers exist near humans, there is often conflict. However, there are management techniques available that promote coexistence. One of these techniques is the use of water control devices, which limit flooding associated with beaver damming and lead to cost savings compared to conventional methods of beaver management¹⁸. Similar to the process of relocation, there are multiple case studies in the USA that speak to the use of water control devices^{18,19,20,21,22}.

In Canada, this technology is making a slow start, with records of installations occurring only in Ontario²² and Alberta²³.

Because there is such a dearth of case studies in Canada, little attention has been brought to the issue of beaver management and the potential for using these animals as a management tool for wetland creation and enhancement. In addition, there is a severe lack of clarity regarding the regulatory framework as it applies to water control devices and beaver relocation. Due to increasing interest within the province of Alberta, both by individuals and management agencies, to begin making use of these management techniques, this lack of clarity must be addressed. This study seeks to articulate the regulatory framework within Alberta. It addresses the following questions:

1. What is the current regulatory environment as it relates to beaver management in Alberta, specifically the use of water control devices and the process of relocation?
2. How does this regulatory context affect the implementation of the initiative to use beavers as a tool for wetland creation and enhancement?
3. What frameworks exist in other jurisdictions, and how can these frameworks inform Alberta's growing interest in beaver management?
4. What changes must be made to Alberta's current framework in order to ensure the success of developing beavers as a management tool?

METHODS

The results of this study were applied within the province of Alberta, Canada. However, literature was sourced from across North America to inform the context of beaver management in the province. The study was broken into a literature review, a policy/legislative review, and a final meta-analysis. For the literature review, I gathered studies and reports on the impacts of beaver on wetland ecosystems, as well as case studies from across North America where beaver reintroduction had taken place or where water control devices have been installed. The policy review was broken into two parts. The first part consisted of reviewing existing regulatory frameworks within the USA to identify aspects that could be used to inform the Albertan context. The second part consisted of examining Canadian and Albertan legislation that currently addresses beaver management, and identifying applicable policies, regulations, and guidelines. This review included permits, prohibitions, and allowances for activities related to relocation projects and the installation of water control devices. Data for the literature review and policy review were mainly qualitative. All literature and policy outputs were compiled and organized within a digital library. I then compared jurisdictions in table format within Microsoft Excel. Once the data were collected, I conducted a meta-analysis to summarize how beaver management in Alberta might move forward in the future. I identified structures and guidelines from the US that might inform future policy development in Alberta, and highlighted opportunities to creatively address wetland restoration through the use of beavers in Alberta. Finally, I noted gaps within Alberta's and Canada's policy, and put forward recommendations to address these gaps.

RESULTS

Beaver Management in the United States

Many States within the USA have policies and legislation applying to beaver management. Table 1 outlines how each State's regulation applies to the process of beaver relocation and the installation of water control devices.

In order to determine suitable habitats for reintroduction, Oregon and Washington have published guidelines on requirements for release sites. Table 2 shows the guidelines that were outlined in three different publications across two different states.

Beaver Management within Canada and Alberta

Wildlife Act (2000): The beaver is defined as a 'Fur-bearing animal' under Schedule 4 of Alberta's *Wildlife Act*²⁴. Section 55 prohibits any person from being in possession of wildlife unless he/she are authorized to do so by a permit. Written permission from the Minister is also required under section 61(1) to release wildlife from captivity. Wildlife Regulation outlines various permits that apply to the possession of wildlife. Table 3 summarizes these permits and licences.

Table 1. The regulatory context of various states in the US, as they apply to beaver management.

Regulation Associated with Beaver Management			
	<i>Legal Classification</i>	<i>Relocation</i>	<i>Water Control Devices</i>
California	Furbearer	-No explicit regulation; California Fish and Wildlife is gaining interest	-No explicit regulation
Colorado	Furbearer	-Outlined in the City of Westminster's <i>Beaver Management Plan</i> ²⁵ -Relocations carried out by state licenced contractor and controlled by Department of Wildlife (CDOW)	-Outlined as management action in <i>Beaver Management Plan</i>
Massachusetts	Furbearer	-Relocation is prohibited	-Conflict prevention technique in the Bay Circuit Alliance's <i>Guidance for Beaver Dam Problems</i> ²⁶ and the Division of Fisheries & Wildlife's <i>Beavers in Massachusetts</i> ²⁷ -Installation may require permits under <i>Wetlands Protection Act</i> ²⁸
New Mexico	Protected Furbearer/ Species of Greatest Conservation Need	-Department of Fish and Game (NMDFG) runs program and conducts relocation site evaluations -Memorial has requested creation of Statewide Beaver Management Plan	-Outlined in <i>Living with Beavers: A Guide for solving Beaver-Human Conflicts</i> ²⁹ as nonlethal management solution
Ohio	Furbearer/Nuisance	-Relocation is prohibited	-Mentioned as damage control method in <i>Nuisance Wild Animal Control Certification Manual</i> ³⁰
Oregon	Protected Furbearer (<i>Public Land</i>) Predatory Animal (<i>Private Land</i>)	-Relocation program administered by Department of Fish and Wildlife (ODFW) (permit required) - <i>Guidelines for Relocation of Beaver in Oregon</i> ³¹ is available to the public	-ODFW promotes technique as nonlethal management strategy ³² -Installation may require approved Fish Passage Plan

Utah	Protected Wildlife	-Division of Wildlife Resources (UDWR) is responsible for beaver management -Watershed restoration is an objective in the <i>Utah Beaver Management Plan</i> ³³	- Technique promoted within <i>Utah Beaver Management Plan</i> under beaver conflict management
Washington	Furbearer	-House Bill ³⁴ permits the release of wild beaver for restoration purposes -Promoted as restoration technique in <i>Stream Habitat Restoration Guidelines</i> ³⁵ - <i>Beaver Re-Introduction</i> guide ³⁶ available from Department of Fish and Wildlife (WDFW)	-Mentioned as management technique in <i>Living with Wildlife: American Beaver</i> ³⁷ -Removal or modification of beaver dams requires a Hydraulic Project Approval, issued by WDFW
Wyoming	Furbearer	-Relocation program is run through Wyoming Wetlands Society with support and oversight from Game & Fish Department (WGFD) -Relocation guidelines mentioned in <i>The Role of Beaver in Riparian Habitat Management</i> ³⁸	-No explicit regulation

Table 2. Guidelines for appropriate release sites within the process of beaver relocation.

Habitat Suitability Guidelines for Relocation			
	<i>Oregon Department of Fish and Wildlife Guidelines for Relocation of Beaver</i>	<i>City of Portland (Oregon) Guidance: Living with American beaver</i>	<i>Washington Department of Fish and Wildlife Beaver Re-Introduction Guidelines</i>
Stream Type	small, perennial	small, perennial	perennial or ephemeral with sufficient water supply
Channel Width	4-8m (~13-26ft)	13-20 ft	n/a
Valley Width	>2x active channel width	>2x active channel width	≥ 60 feet (150 ft optimal)
Gradient	≥ 5%	≥ 6%	≥ 3%
Food Source	≥ 550 trees/ha small deciduous within 30m (~100ft) of stream	≥ 220 trees/acre (~90/ha) small deciduous adjacent to stream	≥18 acres willow or ≥ 6 acres <i>Populus</i> species within 100 ft of stream
Elevation	n/a	n/a	≤ 6,000 ft
Relocation Period	August 1 - October 15/31	n/a	August - October
Landowner Cooperation	Cooperation of landowners 5-6 miles upstream and downstream of site	n/a	Cooperation of neighbours is encouraged
Previous Beaver Activity	Site lacks evidence of current occupation	n/a	Site has evidence of previous beaver occupancy

Adjacent Infrastructure and Property	Away from roads and unprotected culverts	n/a	Will not interfere with other management prescriptions or cause damage to property
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Section 97(1) of the Wildlife Regulation states if beavers are causing damage on privately owned lands in such a way that is affecting other landowners, the landowner may be directed by the Minister to remove the beaver and/or the dam or lodge. Under Section 107.1, wildlife traps must be certified under the Agreement on International Humane Trapping Standards (AIHTS). Traps that are not killing devices must be examined every 48 hours, according to Section 110. Anyone transporting wildlife, according to Section 138(e), must have a completed wildlife manifest form in their possession. The open seasons for beaver on public lands vary according to Fur Management Zones, and are outlined in Schedule 15 of the Regulation. Beaver seasons range between October 1-May 15, October 1-May 31, and October 15-April 30.

Canada National Parks Act³⁹ (2000): Section 25(1) of the Act prohibits the transport of any wild animal that has been taken in or from a park without a permit. The Act’s associated Wildlife Regulation, according to Section 4(1), states that it is prohibited to be in possession of, hunt, or remove from the park any wildlife in a park, unless permitted. Section 4(4) states that in order to possess wildlife in a park, a person must hold an export permit or a trapping licence/permit. Section 15 of the Regulation states that the superintendent of a park may authorize the removal of wildlife for scientific or park management purposes, or authorize the introduction of wildlife into the park that is/was indigenous to the area; these authorizations do not need permits.

Table 3. Authorizations in Alberta’s Wildlife Regulation that relate to the process of beaver relocation.

Authorizations Associated with Beaver Relocation in Alberta	
<i>Authorization</i>	<i>Purpose</i>
Hunting/Trapping Licence	Hunting or trapping beaver on public lands
Import Permit	Moving wildlife out of the province
Export Permit	Moving wildlife into the province
Research Permit	Possessing wildlife for research and/or education purposes; applies if attaching transmitters on animal
Collection Licence	Capturing wildlife for purposes of a study; eligible only with associated research permit
Temporary Shelter Permit	Holding wildlife in captivity for a short period of time
Wildlife Rehabilitation Permit	Operating a wildlife rehabilitation facility

Wildlife Manifest Form	Maintains a record of wildlife being transported within a vehicle
Wildlife Property Transfer	Form that transferring 'ownership' of wildlife from the Crown to an individual/group

Provincial Parks Act⁴⁰ (2000): According to Section 9.2 of the Act, it is prohibited to remove any animal life from a park, or introduce any animal that has the potential to alter the ecological integrity of a park without permission from the Minister.

Municipal Government Act⁴¹ (2000): According to Section 60(1) of the Act, municipalities have direction, control and management of natural water bodies within their borders. Under Section 632(1) of the Act, municipalities with a population of 3500 or more must adopt a municipal development plan, which may address environmental matters within the municipality. Section 664(1) states that a subdivision authority may require a portion of land scheduled for development to be set aside for the purposes of an environmental reserve. Section 664(2) also allows for the creation of conservation easements for the purposes of protecting and enhancing the environment.

Public Lands Act⁴² (2000): Section 7(c) of the Act states that the Lieutenant Governor in Council may set aside public land for use as a provincial park, natural area, ecological reserve, wilderness area, wildlife sanctuary, or habitat conservation area. Section 11.1 of the Act says the Minister may establish and support initiatives for the purpose of conservation and resource management. This support includes programs that assist in resource protection and enhancement, and that help resolve multiple-use concerns. Water control devices do not require authorization, as they do not affect the beds or shores of water bodies. Within Section 43 of the associated regulation, persons may not enter onto the beds and shores of a water body for purposes other than recreation unless they have been provided with consent through a permit or disposition.

Species at Risk Act⁴³ (SARA) (2002): Section 11 of SARA states that a conservation agreement may be entered into between the federal government and any other Canadian government, organization, or person for the benefit of a species at risk. This agreement may include conservation measures for protecting the species' habitat. Section 12 states that similar agreements may also occur for wildlife species that are not at risk.

Water Act⁴⁴ (2000): Within Section 8 of the Act, the Minister must establish a protection strategy for the aquatic environment. This strategy includes guidelines for establishing conservation objectives, matters relating to protection of biodiversity, and mechanisms for implementation. Section 95 of the Act allows for the removal of a beaver dam if it is obstructing the flow of water in such a way that interferes with the rights of a user. According to Section 159(1), the Minister may purchase or expropriate any land for the purposes of water conservation or management. Under the associated regulation, the installation of a flow device would not

require an approval, as it does not lead to significant alteration of the bed or shore. According to Section 11 of the regulation, licences may be issued for purposes associated with management of wildlife, implementing a conservation objective, habitat enhancement, or water management.

Alberta Land Stewardship Act⁴⁵ (ALSA) (2009): Under ALSA, Regional Plans will be developed according to the six planning regions of the Land-use Framework. According to Section 10 of the Act, a regional plan may authorize preparation of issue-specific plans, which become part of the overall plan that authorized it. Section 29 allows for the creation of conservation easements, and Section 37 allows for the designation of areas of land that are subject to a conservation directive. The use of conservation off-set programs is outlined in Section 47 of the Act, where reclaiming an area can be used to counterbalance certain activities. Regulations can establish stewardship tools that are appropriate for the purposes of conservation off-sets, and associated guidelines can be established for these stewardship tools.

Minimum Standards for Wildlife Rehabilitation⁴⁶ (2009): *note: These are not official guidelines. They were published through the Alberta Wildlife Rehabilitators' Association.* Wildlife Rehabilitation Centres must keep a record of each patient that comes through their care. The standards also include cage requirements for semi-aquatic mammals, including beaver. Only wildlife rehabilitation centres with adequate facilities to care for beaver are able to take them in. Rehab centres have the ability to transport and release wildlife under their wildlife rehabilitation permit. However, there are no special release procedures for beavers outlined in these standards, and no published guidelines for appropriate release locations are available for the centres.

DISCUSSION

Regulatory Summary

Overall, Alberta is grossly lacking in policy, regulation, or legislation that effectively addresses beaver management as it relates to relocation and the use of water control devices. In regards to relocation, there are permits in place addressing the movement of wildlife – which includes beavers - throughout the province, as outlined within Alberta's *Wildlife Act*²⁴. However, there are restrictions on the movement of wildlife within national and provincial parks^{39,40}. In regards to the process of trapping and handling beavers, there are regulations regarding the process of trapping beaver within the *Wildlife Act*, and guidelines for rehab centres that care for beavers in captivity⁴⁶. However, no guidelines exist regarding more specific processes of trapping and relocating beavers, including guidelines for how many beavers should be trapped for effective relocation, what the holding requirements are, what suitable release habitat should look like, maximum and/or minimum release distances from the source population, or what monitoring and follow-up processes should be carried out to promote success. Even wildlife rehabilitation centres do not have guidelines regarding the release of beavers. There are guidelines within USA publications that can inform the development of future management in the province. There are also relevant publications in Ontario⁴⁷ and British Columbia⁴⁸. However, there is a lack of clarity, even within the USA, addressing the appropriate distances from source populations for effective relocation of beavers. This deficiency may reflect a lack of research

regarding dispersal patterns and distances of juvenile beavers. Also, some relocation guidelines in the USA recommend trapping and relocating entire families of beavers; however, there is not much written about the recommended number and age of beavers.

Policy or management guidelines surrounding water control devices and beaver dams in Alberta are basically nonexistent. There are restrictions on the destruction of beaver dams and lodges on public lands in the *Wildlife Act* and allowances for the removal of lodges and dams in the *Water Act*⁴⁴. As it stands, the installation of water control devices falls under the *Public Lands Act*⁴², which requires authorization or permission to be given to persons entering onto public lands and carrying out activities on and around the beds and shores of water bodies other than for recreation. As of right now, the installation of water control devices does not require an approval under the Public Lands Act; neither does it under the *Water Act*⁴⁴.

Recommendations

There are a number of governments, organizations, and individuals seeking to use beavers as a management tool within Alberta. Beaver relocation is legal within Alberta, as long as those persons involved have the appropriate permits for moving wildlife and for carrying out research. The installation of water control devices is also legal (at least, not illegal), and does not require any permits. However, the current informal process of relocation and water control device installation carries many uncertainties and holds potential for improper management and poor implementation. These processes are also currently lacking in monitoring and follow-up procedures. Therefore, some form of regulatory framework should be implemented.

Working within the Current Model: Individuals/groups seeking to relocate beavers can accomplish it through different avenues. Beavers can be trapped on private lands throughout the year without any license, and with a licence during open seasons on public lands. Live trapping is allowed without a permit on private lands as long as they are being released on the same property; moving off of private land requires a permit. One way to legally possess live wildlife is to complete a wildlife property transfer form, as outlined in the Wildlife Act. If beavers are being held in captivity for a period of time before being released, a temporary shelter permit could be obtained. Individuals transporting beavers must have a wildlife manifest form with them, as well as an import/export permit if moving the animals into or out of the province. One way to carry out an entire relocation project with the least amount of permitting is via a research permit. Research permits also allow the obtainment of a collection licence, which allows trapping beyond the open season. In regards to installing water control devices, all that is really necessary is to obtain permission to access a waterbody, either on public lands or private lands. Permitting for the activity of installation is not required as it does not affect the beds and shores of a waterbody.

Creation of Beaver Management Plans: I recommend that management plans and best practice guidelines be developed within the province of Alberta to guide initiatives that are already taking place on an informal level. These management plans may be developed through a variety of mediums. The *Alberta Land Stewardship Act* is a great opportunity for the

development of beaver management plans, especially since the development of Regional Plans and the implementation of the Land-Use Framework, developed under this Act, is relatively new to the province. A beaver management plan would fall under the category of issue-specific plans, and would address beaver management within a general watershed-based framework. Implementing beaver management plans under ALSA would also be effective, since many other Acts must align with the plans outlined in ALSA. Another aspect of beaver management that could be incorporated into ALSA could be the use of beavers as a form of conservation off-sets. Alternately, beaver management could be taken up by municipalities, who could incorporate beaver management into their municipal development plan. Beaver-human conflict is already being addressed within counties by their Ag Service Boards, but a more comprehensive local plan would be beneficial.

Municipal Government Initiatives: It appears to be the case in Canada that, in recent years, there has been a downloading of responsibilities onto municipal governments. While this situation can strain the capacity of local governments, it also provides opportunities for municipalities to become leaders in sustainable development. Beaver management is one avenue for municipalities to pursue sustainability. Intermunicipal agreements, as outlined in the *Municipal Government Act*⁴¹, can assist with relocations across municipal borders. In addition, integrating beaver management at a local scale is beneficial in that there is a high level of familiarity with the landscape and a greater capacity to engage local landowners.

Conservation Strategies: One creative solution for using beavers as a management tool could be through conservation strategies developed on behalf of other species or habitats. SARA allows for the creation of conservation agreements for species at risk. Beavers are known to create aquatic habitat for wetland species. Therefore, they could be integrated into these conservation strategies – say, for the northern leopard frog, which is threatened in Alberta⁴⁹. Another avenue for using beavers to protect species at risk is via the provincial Endangered Species Conservation Committee, who can also develop recovery plans. Beavers may also be outlined as a tool within the strategy for the protection of aquatic environments, as outlined in the *Water Act*⁴⁴.

Source Populations and Receiving Areas: To have an effective program for beaver relocation, one must have sources from which beavers may be taken, and receiving areas that can accept them. Since instances of human-beaver conflict are quite common in Alberta – especially in agricultural zones – sources for beaver populations should be relatively easy to locate. Live-trapping and relocation of beavers may become a method for dealing with ‘problem’ animals. The concern for effective relocation is the availability of receiving areas, where released beavers will be free to carry out wetland habitat enhancement without fear of future development or conflict. One source of receiving areas will come from interested landowners who are seeking the ecological benefits of beaver activity. National or Provincial Parks may also act as receiving areas if permission is given by the superintendent or park director^{39,40}. Natural areas, ecological reserves, wilderness areas, wildlife sanctuaries, or habitat conservation areas created under the Public Lands Act may also be receiving areas. The creation of conservation reserves and

conservation easements through the Municipal Government Act may act as receiving areas for beaver relocation, as well as conservation easements created under ALSA. Property owned by environmental organizations such as Ducks Unlimited, Alberta Conservation Association, or the Nature Conservancy of Canada could also act as receiving areas if their activities align with beaver management initiatives.

Additional Recommendations

- The Minimum Standards for Wildlife Rehabilitation within Alberta should be updated to include a ‘Special Release Procedure’ section for beavers.
- Further research should be carried out surrounding beaver dispersal patterns and distances, concerns over disease transfer, and the likelihood for conflict between introduced beavers and existing populations, in order to inform relocation guidelines.

Overall, there are many ways the regulatory framework around beaver management in Alberta could be clarified. As it stands, individuals and organizations carrying out beaver relocations and water control device installations are doing so in a regulatory void. However, there is a large volume of literature that speaks to the potential for beavers to bring valuable services – both ecological and economic – to ecological communities. Therefore, efforts must be made to use this existing literature to provide sound, scientifically-informed guidelines to beaver management initiatives and promote best practices. By promoting best management practices, we may maximize benefits coming from these ecosystem engineers.

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