

Beaver Restoration across Boundaries

March 2015

Prepared by: Rachelle Haddock



MIISTAKIS
INSTITUTE



Supported by: The Adaptive Management Initiative

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Miistakis Institute
Rm U271, Mount Royal University
4825 Mount Royal Gate SW
Calgary, Alberta
T3E 6K6
Phone: (403) 440-8444
Email: institute@rockies.ca
Web: www.rockies.ca

EXECUTIVE SUMMARY

Beavers keep water on the landscape, leading to landscape stability and resiliency which benefits ecosystems, land owners and land managers. As a result, beavers are gaining recognition as a climate change adaptation tool. In parts of the United States beavers are becoming increasingly valued for their role in watershed health including, but not limited to, improved water storage, stream temperature moderation, reduced stream velocities and habitat creation¹. Beavers have been, and continue to be, translocated and/or reintroduced in the Mountain States and the Pacific Northwest for riparian area and wetland restoration. In some places such as Montana, these efforts date back to the 1940s. There is a growing interest about beaver restoration in Alberta and the Crown of the Continent to realize provision of ecosystem services and as a “no regrets” climate change adaptation strategy.

This report is the culmination of work funded by the Adaptive Management Initiative to share the experiences and lessons learned regarding the use of beaver for restoration and climate change adaptation in a selection of American states: California, New Mexico, Oregon, Utah, Washington and Wyoming.

Table 1. Summary of beaver management approach by state.

State	Beaver Management Approach
California	Regulations for recreational hunting of beaver and management of beaver as a nuisance species
New Mexico	State beaver bill
Oregon	Regulations for management of beaver as a furbearer, predatory and nuisance species, State Beaver Working Group, beaver restoration guidelines
Utah	State beaver management plan
Washington State	State beaver bill
Wyoming	Regulations for management of beaver as a furbearer

This information will be relevant to land owners and land managers within the Crown of the Continent and beyond who are interested in opportunities to restore riparian areas and wetlands and/or to use a “no regrets” strategy to adapt to climate change. More specifically, this information will help guide the next stage of efforts in Alberta to realize the use of beavers for watershed stewardship and climate change adaptation. Considering potential stakeholder engagement and policy approaches used in other geographic contexts will provide a solid foundation for a made-in-Alberta approach.

The key recommendations or themes arising from the interviews include:

- The creation of beaver management-specific legislation isn’t necessary to realize improvements in how beaver are managed in Alberta.
- In thinking about potential changes to beaver management for Alberta, don’t reinvent the wheel. Alberta has the enviable opportunity to consider lessons learned and best practices from other jurisdictions and the ability to incorporate what will work best for an Albertan context.
- Focus on how beavers can solve problems (e.g., providing ecosystem services) and/or how you can help solve people’s beaver problems (i.e., enabling co-existence or translocation).
- It is critical to bring all stakeholders into consultation regarding beaver management so that each stakeholder feels that they have a voice in determining beaver management.

¹ <http://cowsandfish.org/publications/documents/APondofGold.pdf>

- Consider the role that beavers play as a keystone species in species at risk management in Alberta and how existing legislation or policy influences the role that beavers can play in recovery efforts.
- The desire for beaver restoration is often tied to the desire for wetland restoration and restoring species that depend on wetland habitat. Conversely, wetland restoration can also enable beavers to relocate to new habitat under their own power.
- Push for a better understanding of beaver population dynamics and occupied and potential beaver habitat in Alberta. It is critical to consider habitat suitability and quality when considering beaver translocations as beavers will not provide their desirable effects if they are occupying marginal habitat.
- Outreach and education efforts are a key component in realizing beaver co-existence as it is best to leave beavers in habitat they have selected. Use simple stories in engaging people to think about beavers and focus outreach on land managers with shoreline and riparian habitat.

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INTRODUCTION

Beavers keep water on the landscape, leading to landscape stability and resiliency which benefits ecosystems, land owners and land managers. As a result, beavers are gaining recognition as a climate change adaptation tool. Research demonstrates that beaver have a dramatic influence on the creation and maintenance of wetlands even during extreme drought. In their study of beaver presence in a boreal region of east-central Alberta, Hood and Bailey (2008)² documented that during wet and dry years, the presence of beaver was associated with a nine-fold increase in open water area when compared to a period when beaver were absent from those same sites.

In parts of the United States beavers are becoming increasingly valued for their role in watershed health including, but not limited to, improved water storage, stream temperature moderation, reduced stream velocities and habitat creation³. Beavers have been, and continue to be, translocated and/or reintroduced in the Mountain States and the Pacific Northwest for riparian area and wetland restoration. In some places such as Montana, these efforts date back to the 1940s. Recognition of the role that beavers play has been established legislatively in both Washington State and New Mexico where their State Senates have passed state memorials encouraging the use of beavers for watershed stewardship. In Washington State, their “beaver bill”⁴ has the intent of promoting the use of beavers to build green infrastructure for water storage instead of building grey infrastructure (i.e., dams). In New Mexico, their beaver bill was focused on the utility of beaver as a means to address both climate change impacts to watersheds and endangered species issues.

Beaver Relocation in Western Canada

Aside from a landowner reintroducing beaver to his property in the Chilcotin region of British Columbia in the 1930s⁵, there is a dearth of documented cases where beavers have been used as a tool for watershed restoration in Western Canada. However, in 2012 the [Ann & Sandy Cross Conservation Area](#) (ASCCA) reintroduced two families of beavers to this 4,800 acre conservation area. Beavers had been extirpated from the ASCCA and there was a desire to bring them back for watershed stewardship and biodiversity purposes. The Leave It To Beavers collaborative project formed to support these efforts (<http://www.rockies.ca/beavers/>). This collaboration involved the ASCCA, the Miistakis Institute, Cows and Fish and the Calgary Science School (now known as Connect). It was established to collect information about the effects of beaver relocation through both a formal monitoring program and a citizen science program involving junior high school students over a three-year timeframe.

Media coverage of this project catalyzed over twenty inquiries by land owners/managers about how to coexist with beavers. Given this response, project partners began to engage interested land owners and land managers in workshops and other extension activities focused on coexisting with beavers to inspire on-the-ground action for watershed stewardship and resilient landscapes. The project also brought to the

² Hood, G.,A., Bayley, S.E., 2008. Beaver (*Castor canadensis*) mitigate the effects of climate on the area of open water in boreal wetlands in western Canada. *Biological Conservation* 141 (2008) 556–567.

³ <http://cowsandfish.org/publications/documents/APondofGold.pdf>

⁴ http://landscouncil.org/documents/Beaver_Project/HB2349_factsheet%201.12.12.pdf

⁵ <https://ericcollier.wordpress.com/conservation/how-beavers-made-the-wilderness-bloom/>

fore a number of policy⁶ questions that must be addressed if beavers are to be used on a broader scale in Alberta. These questions include:

- What government agencies in Alberta have jurisdiction over beaver management?
- What government policies would or could guide beaver coexistence and relocation efforts in Alberta?
- What precedents exist for beaver coexistence and relocation efforts in Alberta?

This paper will provide a foundation for pursuing further research on these questions and for crafting an approach to realizing beaver restoration efforts in Alberta.

Beavers, Climate Change & the Crown of the Continent

Based upon existing research, authors of the “Climate-Impacts Assessment of the Crown of the Continent” report⁷ state that the Crown is: getting hotter; experiencing extremely hot days more often; becoming drier; recording reduced snowpack; and experiencing declines in stream flow. The report also states that “continuing hydrological changes are expected to lead to pronounced water shortages,” and discusses how these changes are already having negative effects on the agricultural economy, communities and residents of the region.

However, beavers can be used as an on-the-ground tool to capture spring run-off and store flows as groundwater for release during the drier summer months. The release of groundwater also serves to moderate stream temperatures amongst other valuable ecosystem services⁸. The “Climate-Impacts Assessment of the Crown of the Continent” report lists accommodating beavers in more sites to facilitate water capture, storage and aquifer recharge as a climate change adaptation strategy. Further, there has been a surge of interest on the part of land owners, biologists, non-profit organizations and agency personnel on the use of beavers as a tool to improve watershed resilience and ecosystem function in the face of climate change in both Alberta and Montana.

Ensuring landscape health and integrity in the Crown of the Continent relies heavily on land managers’ and land owners’ management choices. Recovering beaver populations will help increase and stabilize water storage capacity at a watershed scale, offering greater resilience and adaptability to climate change. Additional benefits include improved water quality and biodiversity and flood amelioration. Accommodating beavers in more sites is something that can be done on private, public and tribal lands. It is an on-the-ground climate change adaptation strategy that can be implemented locally by municipal, state/provincial, and federal agencies, land trusts and other land owners.

⁶ We have used the Max Bell Institute’s definition of public policy for this paper: “Public policy refers to official decisions that guide the activities of organizations operating in the public interest. Such organizations include governments and non-profit organizations at the local, municipal, regional, provincial, and national levels. For example, public policy decisions can be expressed as legislation, resolutions, regulations, by-laws, appropriations, court decisions, etc. Public policy refers not only to decisions, but also the programs and administrative practices undertaken by organizations operating in the public interest.” <http://www.maxbell.org/what-we-do>

⁷ Bay, L., Broberg, L., Carlson, A., Cross, M., Deuel, K., Hann, D. Climate-Impacts Assessment of the Crown of the Continent. http://cpaws-southernalberta.org/upload/Crown_Impacts_Assess_FINAL.pdf

⁸ <http://cowsandfish.org/publications/documents/APondofGold.pdf>

Given the nascent stages of using beavers for watershed stewardship in Alberta and the role that beaver could play as a climate change adaptation tool in the Crown of the Continent, the Miistakis Institute, Cows and Fish and the Clark Fork Coalition applied for, and secured, funds from the Adaptive Management Initiative to:

1. Build a new transboundary partnership dedicated to knowledge sharing and mutual learning on beaver relocation as an on-the-ground adaptive management tool for a sustainable and resilient future for the Crown of the Continent;
2. Tailor our existing beaver workshop template to the geographic area and context of the Crown of the Continent Ecosystem with a climate change adaptation lens; and
3. Research and report on the barriers to, and opportunities for, beaver relocation that exist on both sides of the 49th parallel.

This report is the culmination of the work funded by the Adaptive Management Initiative. The purpose of this report is to share the experiences and lessons learned regarding the use of beaver for restoration and climate change adaptation in a selection of American states. This information will be relevant to land owners and land managers within the Crown of the Continent and beyond who are interested in opportunities to restore riparian areas and wetlands and/or to use a “no regrets” strategy to adapt to climate change. More specifically, this information will help guide the next stage of efforts in Alberta to realize the use of beavers for watershed stewardship and climate change adaptation.

METHODS

The research for this report was carried out in two stages. The initial stage was an internet search using Google for beaver coexistence, translocation or relocation cases in Western North America. Based on the findings of the internet search, six different cases were selected to represent a diversity of policy approaches to beaver, spanning from simply using long-standing trapping regulations to the promotion and creation of a state beaver bill.

The six states selected were: California, Oregon, Wyoming, Utah, New Mexico and Washington State. After the cases were selected, emails were sent to relevant individuals requesting a one-hour phone interview. An interview guide (see Appendix 1) was provided to each individual in advance of the call. A draft of the interview results was shared with each interviewee to ensure accuracy and clarity. With the exception of Dr. Wheaton, all individuals reviewed and approved their interview summaries. The individuals who generously shared their time and expertise include:

Table 2. Details on interviewees.

State	Contact	Organization	URL
California	Kate Lundquist	Occidental Arts & Ecology Center, WATER Institute, Bring Back the Beaver Campaign	http://oaec.org/beaver
New Mexico	Bryan Bird	WildEarth Guardians	http://www.wildearthguardians.org/site/PageServer?pagename=priorities_wild_places_jemez_mountains_beaivers#.VHehGskR8ml
Oregon	Dr. Joe Wheaton ⁹	Utah State University	http://beaver.joewheaton.org
Oregon	Dr. DeWaine ¹⁰ Jackson	Oregon Department of Fish and Wildlife	http://www.dfw.state.or.us/wildlife/living_with/beaver.asp
Utah	Mary O'Brien	Grand Canyon Trust	http://www.grandcanyontrust.org/utah/forests_actions_beaiver.php
Washington State	Joe Cannon	The Lands Council, The Beaver Solution	http://www.landscouncil.org/beaversolution/
Wyoming	Bill Long	Wyoming Wetlands Society	http://wyomingwetlandssociety.org/beaver_problem.php

⁹ Dr. Wheaton is involved in beaver research projects in several states. He was selected to speak about Oregon given his research efforts in Oregon.

¹⁰ Dr. Jackson was not interviewed for this paper. However, the author attended a presentation that Dr. Jackson gave on beaver management in Oregon. Dr. Jackson and Thomas Stahl provided clarification on the text summary that is included in this report.

RESULTS

The information shared below is gleaned directly from the interviewees, and represents their professional knowledge, insights and opinions.

California – Kate Lundquist, Occidental Arts & Ecology Center WATER Institute

CONTEXT

Beaver were nearly extirpated in California by the beginning of the 1900s, and a law was passed in 1911 to protect beaver. The population started to recover slowly but they were still being depredated owing to conflicts with the agricultural industry. The agricultural community succeeded in getting laws relaxed for property owners so that they could still depredate beaver and this law remains on the books today.

In the mid-1920s the California Department of Fish and Wildlife did recognize the benefits of beaver and started a relocation program. From 1923 until 1950, 1221 beaver were relocated into different parts of the state (more than many other western states). Today, many of the current populations stem from those relocations although not all were successful.

In 1942, Donald Tappe wrote a [report](#) on the status of beavers in California. He drew a historic beaver distribution based on his assessment. He believed beaver were only native to certain parts of California not including the coast south of the Klamath River, the San Francisco Bay Area, the Sierra Nevada and southern California given the rocky topography, aridity and lack of forage. While these findings are questionable based on the author's limited access to the kind of information we have today, this report has affected how beaver are currently managed, as people still believe that they are not native to much of the state.

The WATER Institute, and its partners have published three papers in the peer-reviewed California Fish and Game Journal and an in-depth [report](#) that discuss evidence (i.e., physical evidence, historic accounts, ethnographic evidence) demonstrating beavers were native in the Sierra Nevada and most of the coast, all the way down to San Diego. This work has helped people to consider that beaver might be native and therefore that they be managed differently. However, it appears that there is still some ignorance that beaver are native to significantly more parts of the state than once believed.

At this point, the only regulations for beavers in California are for trapping and the management of beavers as a nuisance (depredating them or trying other means to manage them). The management of beavers is under the jurisdiction of the California Department of Fish and Wildlife. No one else can legally possess or move beavers as they have been designated as a "detrimental species". Of the 58 counties in the state, trapping beaver is currently permitted in 42 of the counties. There is a trapping season for beaver and there is no bag limit. Trappers require a trapping permit to take beaver. If people sell beaver for their fur, they require a fur dealer's license and the State asks them to report fur sales. California law states that any property owner or tenant can apply for a permit to depredate a beaver that is threatening or actually causing damage to property. According to Kate Lundquist of the Occidental Arts & Ecology Center WATER Institute, this law leaves a lot of room for interpretation.

According to Kate, it is not clear if there is a consistent protocol or process for issuing depredation permits. California Department of Fish and Wildlife wardens can issue these permits, as can regional wildlife biologists. One of the regional biologists reports that he/she ensures the utilization of non-lethal strategies before he/she issues a depredation permit. However it is unclear if this approach is required

and, if it is, how well articulated or enforced it is across the Department. It is also unclear as to what extent the Department is informed about the potential benefits of having beaver on the landscape and is committed to managing them for those benefits.

COEXISTING WITH BEAVER

The California Department of Fish and Wildlife does have [content on their website about coexisting with wildlife](#). There currently is no content on coexisting with beaver; however they have received approval to develop content for coexisting with beaver.

TRACKING POPULATION NUMBERS

There are no up-to-date records of how beaver populations are faring in California. Although most fur sales are reported, it is difficult to assess how many beaver are being killed in California annually as it is difficult to obtain depredation records and there is no bag limit and no reporting requirement for those not selling the fur. It is unclear how the Department can set bag limits without knowing total population numbers. Compounding this uncertainty regarding population numbers is the beaver depredation actions of the United States Department of Agriculture's Animal and Plant Health Inspection Service (APHIS)¹¹. APHIS has an arm responsible for managing wildlife pests. The agency's trapping services are in some cases paid for by counties allowing landowners to receive their services at no cost. APHIS has a separate reporting mechanism outside of the reporting mechanism for the California Department of Fish and Wildlife, making it even more difficult to discern how many beaver are killed each year in the state. Through Riverbend Sciences' "[beaver mapper](#)", the WATER Institute and other interested citizens are attempting to track beaver presence in the state.

BEAVER TRANSLOCATION

The Department of Fish and Wildlife has now formed an internal group charged with creating a white paper clarifying their position on beaver. It is unclear if this paper will affect any change to how beavers are managed. It is predicted that the white paper will not recommend beaver translocation given the Department's liability concerns. While the potential for benefit has been clearly demonstrated elsewhere, the Department does not appear to be interested in beaver translocation and lacks the funding and staffing support to develop such a program.

In terms of potential beaver translocation projects, the WATER Institute is trying to determine the nexus of where there are large holdings of land with minimal potential for human-beaver conflict and where the management of land is not at odds with what beaver do to modify the environment. This type of site could fall on private or public lands. In California, there is a lot of logging on public lands and there is a concern that beavers will cause harm to timber. There are also lots of grazing leases on public lands and the WATER Institute is now talking and working with the rangeland managers/cattle grazing stakeholders to learn their opinions regarding beavers. Kate indicated that it may be easier to get traction with private individuals who have large enough holdings because there is less bureaucracy to tangle with and fewer interests to navigate.

According to Kate, beaver translocation is not appropriate in all situations, especially where there is no habitat to support the establishment of a colony; however the WATER Institute would like to see the Department not "throw the baby out with the bath water". The WATER Institute would like to try a pilot relocation as they have cultivated relationships with landowners who: have large tracts of land, would likely support beaver transplants and would have low potential for other landowner conflict. However, right now there are no means to translocate beavers as no one but The Department can legally possess or

¹¹ <http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/wildlifedamage>

move beavers. The WATER Institute has been working with other NGOs and agency staff to draft recommendations for Department of Fish and Wildlife on how to manage beaver for their benefits and take advantage of their water managing capacity for water quantity and quality and in particular for climate change adaptation, carbon sequestration, and listed species recovery.

BEAVER & CLIMATE CHANGE ADAPTATION

The Global Warming Solutions Act (AB 32) and The Water Bond (Proposition 1) have allocated money to fund climate change adaptation and ecosystem restoration. Mountain meadow restoration has been identified as a means to engage in adaptation. The WATER Institute would like to see those seeking funding to restore mountain meadows to consider the role beaver might play in that and, where appropriate, include them in their restoration plans. It is possible to restore meadows by restoring beaver populations and allowing them to take care of the upkeep and maintenance of meadows while sequestering carbon. Kate attended a comprehensive meadow restoration conference in February and she was the only one proposing beaver as a means to restore meadows. There is growing interest in being more explicit about working with beaver as a meadow restoration agent in that community.

BEAVER & ENDANGERED SPECIES

The WATER Institute did an exhaustive report re-evaluating the historic range of beaver on the North Coast where endangered Coho salmon occur with the intent to realize greater protection of current beaver populations as a valid tool in the Coho recovery toolbox. The WATER Institute is focused on beaver because of their potential benefit for assisting recovery efforts for endangered species, such as Coho.

According to Kate, the beauty of the *Endangered Species Act* is that it requires recovery plans be thoroughly researched, published and implemented. Recovery plans have suggested actions and because the plans for Coho salmon in California were still being drafted in the last three years, the WATER Institute worked closely with the fisheries community on these efforts. They were initially “laughed out of the room” as there were a lot of misperceptions around beavers and fish including concerns that beaver can prevent fish passage. However, there is a large body of literature that points to beavers benefitting Coho.

As a result of these efforts, good language on working with beavers is included in the recovery plans for the two evolutionarily significant units for Coho in California and now there is a diversity of mechanisms that can be set into motion. For example, access to funding for working with beaver as a restoration tool could become available through the Fisheries Recovery Grant Program. This program will only fund restoration activities if they are listed as an action in recovery plans. Being included in the recovery plans helps to legitimize the use of beavers for restoration.

There is so much focus on recovering endangered species and there is a lot of money going toward their recovery. Further, restoration efforts are costly and so burdened with bureaucracy, and these issues are compounded by shrinking agency budgets. Beaver can be used as a tool to realize restoration for a very low cost and yet many people are ignoring this option. There is nothing quite like the beaver as a keystone species and what beaver do for other aquatic and terrestrial species.

The other concern the WATER Institute has with beaver management is the potential for “incidental take” of Federal or State listed species. It is not clear by what process the Department determines whether or not a permit is needed to remove a beaver dam. Furthermore it is unclear whether or not a site assessment is conducted to determine if any listed species might be harmed by the removal of beaver (depredation or trapping) or their dams. In Region 3 for example, no permits are required for removing a beaver dam by hand. As long as there are no machines in the creek, you don’t need a permit. Meanwhile there could be

endangered Coho behind a beaver dam that die as a result of the dam being pulled out when there is little water in the stream.

WATER INSTITUTE'S PUBLIC OUTREACH EFFORTS

With regards to public outreach about beavers and their benefits, the WATER Institute does public talks and conference presentations. They have a list of resources on ways to manage beavers non-lethally. They engage different communities such as fisheries restoration, rangeland conservation, wildlife conservation and mountain meadow restoration. People can contact the Institute for assistance if they have a conflict with a beaver and want help to manage the beaver and mitigate its impacts. The WATER Institute has also offered itself up as a resource to their California Department of Fish and Wildlife regional biologist. The Institute worked with Swift Water Design to install a culvert protection device locally and the land owner has allowed workshops and tours on their land. They partner with other non-profit organizations doing environmental education and riparian restoration work to get the word out about beavers. Finally, the WATER Institute is currently creating an educational booklet tailored to California, with examples of people who have had success managing beaver and mitigating potential impacts. The WATER Institute recently launched a new website (www.oaec.org/water) and have made stickers and hats to promote the Bring Back the Beaver Campaign.

WATER INSTITUTE'S NEXT STEPS

The WATER Institute is calling for the California Department of Fish and Wildlife to update the 1942 status of beaver report, as a new report assessing current population numbers and distribution would be really helpful to understand what is happening with beaver in California. Having this understanding would enable better management of existing populations (i.e., setting bag limits in different regions or putting a moratorium on trapping where populations are struggling). Secondly, the WATER Institute is encouraging the Department to develop a beaver management plan that recognizes ecosystem services provided by beaver and focuses on figuring out ways to protect the existing beaver population. In particular, it would be beneficial to ease the process for permitting non-lethal device installation to realize more beaver coexistence. Currently there is disparity across California in how these permits are issued. Some individuals report that it is cumbersome and challenging to get devices approved.

The WATER Institute would also like to assess the impacts of trapping and depredation of beaver on endangered species. The *California Endangered Species Act* and the federal *Endangered Species Act* require that endangered species are being accounted for before any permits (trapping or depredation) are offered. It could be beneficial to stop trapping beaver any place where endangered species exist given beaver's role as a keystone species. Further, blanket approval of removing beavers without doing a site visit or even looking at a map (e.g., Is the potential beaver removal site a known Coho tributary or other endangered species habitat?) to see what other species might be impacted in advance of an approval should be stopped.

The WATER Institute would love to see greater coordination for beaver management across state agencies as beavers are a species that affect so many different agency mandates in terms of water quantity and quality, wetlands, and other species. Beaver are managed by the Wildlife Branch of the California Department of Fish and Wildlife while the Fisheries Branch and the newly forming Meadows Branch could be dramatically affected by beaver presence or absence. These branches don't get the same kind of say in beaver management. The State Water Resources Control Board, Department of Water Resources, State Department of Transportation and assorted federal agencies also affect beaver management. It would be helpful for each agency to figure out how to meet their own mandate while protecting beaver and managing them non-lethally. To achieve all of these things, it would be helpful to

garner legislative support that requires a certain portion of budgets are directed toward beaver management. The California Department of Fish and Wildlife is so underfunded that to mandate a change in beaver management without funding to support it will not realize any change.

According to Kate, there are people in the Department who are interested in beaver as a restoration agent and who work with the WATER Institute. The Institute is hoping to influence those in the highest positions that have the most power. The current director is someone who comes from a fisheries recovery background so he knows about the role of beaver and fisheries restoration; however, it is hard to make big changes in a very large agency. The Institute plans to support the current director in making even better decisions when it comes to beaver.

LESSONS LEARNED FOR AN ALBERTA CONTEXT

- Clarify how beaver numbers are tracked within Alberta. Push for a unified tracking system across provincial agencies and for a status report on beaver populations.
- Promote adoption of a protocol that ensures Fish and Wildlife officers explore non-lethal management options in advance of depredate beavers
- When considering beaver translocation, focus on large land holdings with minimal potential for human-beaver conflicts
- Promote the role of beaver in ongoing climate change adaptation initiatives in Alberta
- Explore beaver as a tool for species at risk recovery in Alberta; where fitting, ensure that language on beaver presence is included in recovery plans
- Explore regulatory requirements around both beaver dam removal and device installation: how are these activities controlled or managed via the *Fisheries Act*, *Navigable Waters Act* or other relevant municipal, provincial or federal legislation and/or policy
- Promote greater coordination across federal, provincial and municipal agencies that manage beaver within the province

ADDITIONAL RESOURCES

[Scientific paper: The historical range of beaver \(*Castor canadensis*\) in coastal California: an updated review of the evidence](#)

New Mexico – Bryan Bird, WildEarth Guardians

CONTEXT

Beavers were almost extirpated from New Mexico in the 20th century; however there were several relocation efforts in the late 1970s. Beavers were reintroduced on three of five national forests in New Mexico and beaver trapping was banned on those public lands in an effort to get beaver re-established. That ban still stands on those three national forests. New Mexico, like all states in the US, is required to create a wildlife conservation plan and in that conservation plan beaver would be named a species of greater conservation need because of its keystone function. The only regulatory mechanism for beaver in New Mexico is the trapping regulations. These regulations are outdated and stem from a time when people trapped beaver for fur. Today there is very little commercial beaver trapping in New Mexico, but there remains some recreational trapping.

The State has given authority to the New Mexico Game and Fish Department (the state-level game management entity) to regulate beaver as a fur bearer. The Department is very territorial about beaver management owing to a holdover from the days when beaver trapping was actually a money-maker in New Mexico. Beaver trapping currently brings the State very little income through permits or licenses. The

Game and Fish Department tracks the issuance of permits and licenses (beaver trapping permits and nuisance wildlife assistance permits), however they don't issue many. Trappers are to report numbers that they take, however they often don't report and reporting efforts are not scrutinized.

STATE MEMORIAL ON BEAVERS

Several years ago, WildEarth Guardians began advocating for a paradigm change for beaver management in New Mexico from one that is haphazard and by neglect, to one that is intentional, strategic and takes advantage of the keystone nature of beaver and their ability to affect major ecosystem processes. WildEarth decided to facilitate an assessment of where beaver do and don't exist in New Mexico. They proposed a partnership with the New Mexico Environment Department's Wetlands Program to seek out Environmental Protection Agency (EPA) funds to 1) model suitable or potential beaver habitat and to predict occupied habitat, and 2) consider where (if there was an intentional effort to reintroduce beaver) would beaver relocation improve wetland condition or re-establish wetlands that had disappeared. Given that this proposed work aligned with the Water Quality Bureau's mission to protect and re-establish wetlands, the agency was very interested in the opportunity. WildEarth and the Environment Department secured EPA money and did a comprehensive assessment of beaver habitat in New Mexico.

Upon completion of this assessment, WildEarth Guardians approached the legislative body of New Mexico via a "friendly" senator. They proposed that New Mexico needs a strategic management plan so that all beaver stakeholders know what is taking place, and why, to realize buy-in for beaver management. Beaver management remains an emotional and controversial issue, so WildEarth wanted to make sure all stakeholders were bought into a plan to manage beaver in a different, more intentional way. They held up the Utah beaver state management plan, which was signed by all relevant parties, as a model to emulate. The senator liked the idea owing to the utility of beaver as a very cost-efficient and elegant way to address both climate change impacts to watersheds and endangered species (fish, amphibians and meadow-jumping mice) issues in the State. The senator introduced the [Beaver Management Plan Memorial](#) in early 2014 and it passed.

Unfortunately, a senate memorial doesn't have much force of law. It represents an opinion of the state's legislative body and it often recommends that certain state agencies take action. In this case, State Memorial 4 did not demand action as there were no dedicated funds attached to it. It named the state agencies that would work together to assess whether a beaver management plan was a good idea and then report back to the Senate Conservation Committee.

COEXISTING WITH BEAVERS

The bulk of outreach work on beaver coexistence is carried out by the non-governmental organization sector in New Mexico. However, the Game and Fish Department does have some [resources](#) on coexisting with beavers on their website.

Bryan Bird (with WildEarth Guardians) does not perceive there to be any regulatory burdens associated with installing pond levelers to enable beaver coexistence in New Mexico. This is an issue that was identified in some of the other states discussed in this paper.

BEAVER RELOCATION

There has been strong opposition to beaver from the agricultural sector in New Mexico, especially irrigators and the cattle growers' association (who view beavers as a nuisance species that was close to being eradicated in New Mexico). However, some ranchers are beginning to realize the role that beavers can play in keeping water on their landscapes during drought years. They are now calling on the small

contingent of beaver relocation experts in New Mexico to bring back beavers to their landscapes. However, the Game and Fish Department are very proprietary about their authority to regulate the animal and trapping of the animal.

There is a mechanism for the Game and Fish Department to relocate beavers, as the Department has the ability to issue a nuisance wildlife permit any time there is nuisance wildlife and there is a desire to kill or live trap an animal. However, the Game and Fish Department is hesitant to issue nuisance permits for beavers as they see this species as a problem and they question why they would want to create more problems by moving beavers to more places on the landscape.

Bryan suggests that a next step for WildEarth Guardians is to get a legislative body to appropriate money to do a state-wide beaver management plan. More specifically, they plan to go to a state department (likely the Environment Department) to ask them to put a line item in their budget request to do such a state-wide beaver management plan. This request is founded on the idea that a management plan would realize an intentional approach to beavers, enabling New Mexico to both address nuisance beavers and to benefit from a climate change adaptation and endangered species perspective (as beavers create habitat for a number of endangered species in the State). When possible, the State doesn't want to trigger the *Endangered Species Act* because it "kick starts" all kind of regulatory mechanisms that are viewed as undesirable.

Bryan would like to see a change in the criteria for issuing nuisance permits. Currently, the Game and Fish Department has the authority to put whatever provisions it deems necessary in a permit. At present, those provisions are: must have permission of everyone in a five-mile radius of the relocation site and must have a beaver habitat assessment verified by Game and Fish staff. Realizing the permission of landowners within a five-mile radius is almost impossible, which has led Bryan to focus on federal lands where there is less human infrastructure.

Bryan has been working directly with federal agencies in hopes of realizing beaver relocations on public lands at higher elevations in New Mexico. This is where snow accumulates and the mountains act like a sponge for precipitation, with snowmelt providing water for downstream users. This is where beavers have been trapped out and where they could provide substantial benefits from both a water quantity and quality perspective. Bryan is working to get United States Forest Service (USFS), Bureau of Land Management (BLM), and tribal personnel to intervene with the State and indicate they want beavers on their managed landscapes. If there is a sufficient groundswell of interest, Game and Fish may realize that they can address nuisance beavers by moving them to other landscapes where they are wanted.

To date, WildEarth Guardians has not been able to realize beaver translocations in New Mexico. There is unoccupied beaver habitat in New Mexico and there are many places with nuisance beavers. They have been trying, without success, for two years to get a permit from Game and Fish to relocate a beaver. It is likely that permits will not be issued until there is a significant change in leadership in the Game and Fish Department. The New Mexico State Governor and her administration are also antagonistic toward a more progressive approach to managing beavers.

Bryan highlighted the importance of starting with "friendlies" (individuals/organizations that are pro-beaver), building a broader coalition, getting the coalition to engage movable stakeholders and ignoring the deep, deep naysayers. Another important approach has been hiring local people that understand the issue to engage their community. It pays dividends to have someone they trust talking to them about beavers.

HABITAT RESTORATION & BEAVERS

WildEarth Guardians does a lot of habitat restoration on public lands in New Mexico. Beaver habitat is a limiting factor for beaver relocation as a lot of beaver food sources have been removed by elk and cattle. Following habitat restoration, beaver will sometimes come back on their own without any relocation efforts. This would be Bryan's preferred approach to realizing the benefits of beavers in New Mexico. Learn more [here](#).

CLIMATE CHANGE ADAPTATION

More people are beginning to understand the role that beavers can play in adapting to climate change. WildEarth Guardians created a [report](#) on the ecosystem services provided by beaver and all the policies where beaver could be identified as a climate change tool in the United States. Learn more [here](#).

LESSONS LEARNED FOR AN ALBERTA CONTEXT

- Political and agency leadership can greatly enable or hinder beaver management efforts
- Drawing the link between land management agencies that can benefit from beavers and landowners with nuisance beavers can provide incentive for the government to engage in more progressive beaver management
- Public lands provide a place for beaver relocation with minimal human-wildlife conflict
- Good quality riparian habitat can be a limiting factor for beaver relocation
- Create/restore riparian habitat and beavers will return if they are able

ADDITIONAL RESOURCES

- [Assessing Beaver Habitat on Federal Lands in New Mexico](#)
- [Beaver and Climate Change Adaptation in North America: A Simple, Cost-Effective Strategy](#)

Oregon - Dr. DeWaine Jackson, Oregon Department of Fish & Wildlife (ODFW)

The beaver is Oregon's state animal and it is considered a predatory animal (managed by the Department of Agriculture) and a furbearer (managed by the Department of Fish and Wildlife). There are state regulations related to beaver relocation, science and education, dam removal and fish passage.

BEAVER & FISHERIES RESTORATION

The Oregon Plan for Salmon and Watersheds provides support for beaver restoration to improve fish restoration. The focus of the plan is to restore salmon runs, improve water quality, and achieve healthy watersheds and strong communities throughout the state¹². However, there is no specifically dedicated funding from the Plan tied to the use of beavers for salmon and watershed restoration.

Fisheries biologists within ODFW have understood the importance of beavers for fish recovery, and in 2007 a work group was created within the agency to examine how to encourage beaver restoration within the current regulatory framework for beaver. The work group was formed to discuss seven management issues:

1. Disease presence;
2. Identify sensitive Coho areas for voluntary beaver trapping closures;
3. Evaluate research projects and how to fund them;
4. Contact Oregon Watershed Enhancement Board to discuss funding;

¹² http://www.oregon.gov/owrd/pages/mgmt_opsw.aspx

5. Create Living with Beaver brochure;
6. Obtain beaver harvest data for private damage take from Oregon Department of Agriculture; and
7. Develop restoration guidelines.

The work group felt it would be beneficial to have input from other agencies, groups and individuals, so an external working group was formed that included agency staff and a large group of external stakeholders. The first meeting of the Beaver Working Group (BWG) was held in June 2008 and it focused on what the group could and should do, and how it would function. The BWG mission statement is:

Using existing rules and statutes, identify research and information gaps to help us improve our understanding of beaver ecology and beaver management so we can maximize the ecological benefits that beaver provide (especially for ESA-listed coast Coho) and minimize any negative economic (or other) impacts.

The BWG identified a list of eight priority topics for gaining new information:

1. Literature review;
2. Restoration guidelines on who can relocate beavers, when and where, on private and public lands;
3. Aquatic inventory surveys to examine the intrinsic potential for Coho;
4. Evaluation of relocation efforts within the Cascades;
5. Understanding landowner attitudes and incentives for beaver co-existence;
6. Genetic research;
7. Habitat selection; and
8. Effects of trapping harvest.

The BWG worked together over about six years to produce almost all of their desired products (e.g., beaver brochure, beaver restoration guidelines, literature review in partnership with Oregon State University, landowner incentives report and relocation evaluations). Only genetic research and formally understanding the effects of trapping were not concluded given funding constraints.

The beaver restoration guidelines:

- Establish standards for when, where, and by whom beaver may be relocated on public and private lands in western Oregon;
- Provide a process for monitoring and evaluating the success of beaver relocation efforts;
- Provide direction to ODFW staff when evaluating applications for relocating beaver; and
- Apply to all individuals, agencies or organizations that propose to relocate beavers on public or private land in western Oregon.

Efforts with the Oregon Department of Transportation to create a list of locales with beavers that need to be relocated and places that could receive beavers were started, but shifting staff and the lack of resources to conduct required monitoring have halted these efforts.

The BWG continues to meet and is considering its future work priorities.

Oregon - Dr. Joseph Wheaton, Utah State University

CONTEXT

Dr. Joe Wheaton is a professor at Utah State University who studies the physical aspects of rivers and streams as well as feedbacks with the biota that occupy and alter them (i.e., ecogeomorphology). Joe was selected for an interview owing to his extensive research efforts (especially for his work on endangered steelhead populations in Oregon) and expertise on beaver restoration.

BEAVERS AS A RESTORATION TOOL

Presently in the Pacific Northwest, there is a tremendous amount of interest in using beavers as a restoration tool, moving them from areas where they are a nuisance to areas where they can “do good” owing to their conservation and restoration value. However, this can be challenging in Oregon because of the ODFW beaver regulations. In order to relocate a beaver, you have to notify all landowners within a five-mile radius of the site. If any landowners object, you cannot proceed. Also, there is a very limited window in which you can move beaver (late August through October). It is prohibited to hold beaver in a facility for quarantine or onsite, which makes it difficult for trappers to catch and relocate a whole family unit. According to Dr. Wheaton, moving an entire family unit has been demonstrated to be the most successful way to relocate beavers. An additional element that confounds these rules and guidelines is that depending on the ODFW official engaged, the rules and guidelines may be interpreted and delivered differently (i.e., loosely followed or read to the letter of the law). Finally, there are issues with ODFW leadership not being supportive of managing beavers outside of their traditional approach to the animal as a furbearer or nuisance. These challenges are putting real constraints on using beaver relocation as a means to engage in restoration. To date, Dr. Wheaton has not been involved in any live trapping and relocation efforts in Oregon.

There are four different ranges of actions that people can take to use beavers for restoration:

- 1) Promoting more beaver— this may occur through simple conservation (e.g., entering into a conservation easement or providing protections against trapping in a system) or changing how riparian areas are managed (e.g., changing grazing practices, especially in riparian areas);
- 2) Translocation – moving nuisance beavers to areas where they can do good;
- 3) Staged approach – this occurs when there is a desire to translocate nuisance beaver but the riparian habitat needs to be restored first (e.g., change grazing management, allowing riparian areas to come back to provide foraging materials for beaver);
- 4) Treatments where beavers alone aren’t enough – if beavers are translocated to sites where conditions aren’t optimal, beaver dam analogues or other structural intervention can buy beavers some time or create conditions that are preferable for beavers. For example, installing beaver dam analogues can raise the water table, promoting expansion and recovery of riparian vegetation before translocating beaver to the site.

Beavers and Ecosystem Services

Dr. Wheaton has been working with the US Forest Service and with private landowners in a number of states (Idaho, Utah, Washington and Wyoming) who want beaver back for various reasons. These reasons include: restoring perennial flows in streams that are now intermittent, creating better fish habitat to bring fish back, raising water tables to realize more reliable year-round flows, and sub-irrigating valley bottoms and meadows to create good summer forage for cattle.

Private landowners and agencies have different motivations for bringing beavers back; very few people are interested in beaver for beaver's sake. Beavers are a means to an end, and unlike so many other species that we are concerned about conserving this one is not picky. Beavers are incredibly resilient and can be found in a huge diversity of habitats which makes them easy to work with compared to other "picky critters" (e.g., sage grouse or salmon) that have very specific habitat needs. When you translocate beavers, you have no idea what they will actually do. They may stay, they may move elsewhere or they may engage in activities in a different manner than you had hoped, but if we have the space to let them engineer systems according to their own plan there tends to be knock-on benefits in terms of ecosystem services.

Riparian Health

Dr. Wheaton mentioned a recent presentation by the BLM's Carol Evans. She described very intensive grazing management and experimentation that has taken place on Nevada BLM lands since the late 70s and 80s. These lands experienced a dramatic recovery, with riparian areas responding well to the change in management. Once they started restoring riparian areas and mixing up their management approaches, beaver showed up, became established and played an ongoing role in riparian health¹³.

Native Trout

Dr. Wheaton and his colleagues looked at the interplay between steelhead trout and beaver in Bridge Creek, OR. They pit tagged over 45,000 fish in the system and their research demonstrated that beaver dams did not act as barriers to steelhead as they navigated hundreds of dams in the watershed. Dr. Wheaton and his colleagues have also looked at how other fish species (native cutthroat and introduced brown and brook trout) in Utah navigate beaver dams¹⁴. They have evidence of cutthroat swimming through beaver dams in the interstices of the dam materials and using the overflow side channels as fish ladders. The introduced brown trout got flushed downstream and had a hard time getting upstream and past the beaver dams unless the system was experiencing its biggest, highest flows. The brook trout didn't move as much and typically stayed in the beaver ponds. This research points to a potential competitive advantage for native cutthroats over invasive brown trout in a stream system with lots of beaver dams and suggests that a passive restoration strategy for cutthroat would be to get more beaver in that system.

Sage Grouse

Dr. Wheaton and his colleagues received sage grouse funds to restore riparian areas on private land in Utah and to bring beaver back. The impetus for this work is to create brood rearing habitat for sage grouse because the riparian fringe is very important for life states of the sage grouse.

Incised Stream Channels & Beaver Dam Analogues

Over a century to thousands of years, mountain streams evolve from deep, entrenched ditches that start to widen and erode their banks (providing material to build up flood plains) to systems with intact and connected floodplains. Researchers are studying the role that beavers play in speeding up the evolution from incised stream channels to connected floodplains, which creates habitat for many species including steelhead trout. At Bridge Creek in Oregon, Dr. Pollock (National Oceanic and Atmospheric Administration (NOAA) Fisheries) and his colleagues noted that sites where incised channels were at a later stage of

¹³ http://www.blm.gov/nv/st/en/feature_stories/wetland_aquatic_habitat.html

¹⁴ Lokteff RL, Roper B and Wheaton JM. 2013. Do beaver dams impede the movement of trout? Transactions of American Fisheries Society. DOI: 10.1080/00028487.2013.797497.
https://www.researchgate.net/publication/262829535_Do_Beaver_Dams_Impede_the_Movement_of_Trout

evolution there were a number of productive beaver dams which were maintaining hydrological connectivity with flood plains and the dams lasted longer. When they looked at other sites in Bridge Creek without beaver dams, the stream was at an earlier stage of evolution (i.e., incised channel). Typically, if beavers are able to establish dams on these streams, the dams are often blown out each year owing to flooding events or the number of dams that survive don't remain in the densities required for speeding up stream evolution. Dr. Pollock, Dr. Wheaton and their colleagues aimed to increase the length of time that dams survived by reinforcing existing or abandoned dams with cheap wooden fence posts. They then began building their own dams or beaver dam analogues using fence posts and materials on site, including willows, mud and rocks. When they build these analogues, beavers colonize these structures quite quickly and the researchers observed a shift in the longevity of dams from lasting a year to much longer, hopefully enabling beavers to get a stronghold and establish more stable colonies.

The researchers realized that they can achieve very similar and fairly rapid geomorphic and hydrologic responses with their beaver dam analogues but the analogues are never as good as real beaver dams¹⁵. The researchers have found it difficult to strike a balance between maintaining the analogues and letting the analogues fail, as a lot of the best riparian habitat is around failed beaver dams. To address this challenge, the researchers have created adaptive management plans that outline triggers for maintaining beaver dam analogues. The ideal completion of the researchers' involvement occurs when beaver take over and realize a self-sustaining system with lots of dams at different stages of occupation, abandonment and failure.

PERMITTING FOR ANALOGUES & BEAVER RESTORATION

In the case at Bridge Creek, the researchers were working under the *National Environmental Protection Act* (NEPA) because they were working on Bureau of Land Management (BLM) lands. The project originally received a categorical exemption, but for the second round of treatment (building beaver dam analogues) the BLM is putting the project through a full NEPA review owing to a conservative interpretation of NEPA and a desire for due diligence. Streambed alteration agreements are typically issued by the state where the work will occur or by the Army Corps of Engineers. There is a tremendous amount of variation in deciding if a streambed alteration agreement is necessary for this type of work, however Dr. Wheaton has not heard of anyone requiring a streambed alteration agreement. Dr. Wheaton also highlighted that the Army Corps of Engineers may become more heavily involved in regulating beaver dam analogues as installing analogues creates a lot of permanent, seasonal, or temporary wetlands and wetlands fall under the jurisdiction of the Army Corps. This has not happened to date, but it is possible. This type of work was not anticipated by many regulators and therefore the regulations aren't explicit. ODFW has yet to find a way to implement policy or any legislative action to make it easy to use beavers for restoration.

OUTREACH

Dr. Wheaton and his colleagues have a contract to create design manuals for beaver analogues. They also plan to create "recipe cards" and a supporting website where people can contribute experiences and techniques relating to beaver coexistence. Dr. Wheaton met a landowner in Oregon who discovered a technique to keep beaver from rebuilding a problematic dam. He installed two T posts with a wire between

¹⁵ Pollock, M, Beechie T, Wheaton JM, Jordan C, Bouwes N, Weber N, and Volk C. 2014. Using Beaver Dams to Restore Incised Stream Ecosystems. Bioscience. DOI: 10.1093/biosci/biu036. https://www.researchgate.net/publication/261215514_Using_Beaver_Dams_to_Restore_Incised_Stream_Ecosystems

them and hung an old sheet on the wire. The sheet scares the beavers away and they haven't plugged the dam again. The recipe cards aim to gather anecdotes and "recipes" from diverse land managers so that others can benefit from their knowledge. There will be some similarities and differences between diverse locales but having common knowledge banks to draw upon would be very beneficial.

Private Landowners

Dr. Wheaton stressed the importance of having land managers who understand the role that beavers play in landscape health. There is a need for willing permit holders and/or private landowners and science in order to realize the potential of beavers for restoration. If land managers are able to continue working the land and have better stream habitat, why wouldn't they want beavers on the landscape? Often outreach efforts are focused on a broad audience that is already sympathetic to ecosystem restoration, but the reality is that a small number of people and agencies who own land with riparian habitat truly matter when it comes to engaging in restoration work. Dr. Wheaton suggests it is better to target federal/provincial agencies and private landowners and work with them to realize restoration.

LESSONS LEARNED FOR AN ALBERTA CONTEXT

- Consider the possibility of working with existing legislation and regulations for beaver restoration in Alberta
- Consider the role of beaver in creating and maintaining habitat important to species at risk, including bull trout (currently under consideration for listing), westslope cutthroat trout, and sage grouse
- Focus outreach efforts on land owners and managers whose landscapes contain the most kilometers of streams and riparian habitat
- Restoring riparian health can attract beavers to return to areas without translocation
- Tap into local knowledge about beaver management and share those learnings broadly

ADDITIONAL RESOURCES

- [Working with Beaver to Restore Salmon Habitat](#)

Utah – Mary O'Brien, Grand Canyon Trust

CONTEXT

The State of Utah developed a beaver management plan spanning from 2010-2020. Utah typically creates wildlife management plans for two reasons: 1) to manage big game species or 2) to manage species that might be headed for listing under the *Endangered Species Act*. The beaver management plan was different in that it wasn't created for either of these reasons. There was a landowner, a USFS National Forest supervisor and some local citizens that were vocal about getting beaver back onto Forest Service lands. There was a growing acknowledgement of the importance of beavers on national forests (e.g., for their role in reducing the erosive power of floods, reconnecting streambeds with their floodplain and for maintaining riparian habitat). The impetus for the plan was rooted in concerns that if public land agencies were working to restore beaver populations, there were no mechanisms to ensure that their efforts weren't undermined by beaver trapping. The profile of beavers received a welcome increase as a result of a meeting between Mary O'Brien and the science director at National Public Radio (David Malakof) who was doing a year-long NPR series on climate change. Mary suggested that beaver were an excellent tool at adapting to climate change and David wanted to cover this "positive" climate change story. Mary connected David to private landowners, USFS forest supervisors and Utah Division of Wildlife Resources (UDWR) staff for the story.

Initially the UDWR talked about piloting a beaver management plan in the Southern Region, but instead made the decision to cover the entire state in the beaver management plan. They assembled a Beaver Advisory Committee of diverse stakeholders (including Mary O'Brien) to craft the plan. As planned, the work of the committee ceased once the plan was drafted. Initially there were conversations about piloting a beaver management plan for one region, but a decision was made to cover the entire state in the beaver management plan. The management plan was written in six months. It went through five regional councils and the state Wildlife Board (which determines UDWR policy) and was unanimously approved.

Prior to the creation of the management plan, anyone who got a permit during trapping season could theoretically kill all beavers in state. Technically this is still true, but the plan talks a lot about living with beaver and translocating beaver from inconvenient areas (e.g., irrigation ditches) to public lands sites that would benefit from beaver. The management plan lays out rules for translocation including quarantine time to prevent disease transmission, sets limits to the distance that beaver can be moved (in order to preserve beaver genetics), and allows federal agencies to place a moratorium on trapping in certain watersheds for up to three years (with a potential three-year top-up) if they are trying to restore beaver populations. The management plan names specific creeks that would be ideal to restore beaver populations (if beaver are absent) and provides a blueprint for where beaver could be translocated to provide ecosystem services with low potential for human conflict. The management plan is pioneering because now agency personnel aren't responding to nuisance beaver calls by simply killing the beavers and it has started a broader conversation about beavers in Utah.

The management plan has not realized equal implementation across the State. Utah is divided into five Utah Division of Wildlife Resources regions. Implementation of the beaver management plan in each region is dependent on the region's leadership. Some regions are very proactive in implementing the plan, while it lies dormant in others. Mary held up an example from Northern Utah where a Wal-Mart parking lot was being flooded by a beaver dam. Wal-Mart called UDWR and Dr. Joe Wheaton (fluvial geomorphologist at Utah State University), and they were jointly able to come up with a plan to keep the beavers and address the flooding issue. Anyone can now call the UDWR to get assistance with beavers as a result of the management plan. These types of situations are also catalyzing state agency/researcher relationships, such as the one with Dr. Wheaton. The success of the plan depends on leadership at UDWR, other state and regional agencies, non-governmental organizations, and individual citizens.

The beaver management plan neglects to address private landowners who want beavers. The committee should have addressed that question, but forgot to do so in their haste to create the plan. There needs to be a good policy for landowners who want beavers and who have received an endorsement from their neighbors for the translocation. The beaver management plan is really focused on public lands (73% of the state land base is comprised of federal lands) and currently the UDWR cannot bring beavers onto private lands. Their ability to assist private landowners is limited to installing beaver co-existence devices.

Beaver restoration is appealing in Utah as a climate change mitigation strategy. Utah is the second driest state in the USA, making water management a critical issue. The USFS national forests comprise the main headwaters in the state. Beaver restoration is also important from a biodiversity perspective because when beavers are present, biodiversity increases dramatically. In Utah there is a sensitive species called boreal toad and the State is paying attention to its status. This species does particularly well in beaver ponds. The USFS recognized that the landscapes they managed were missing a critical link by not having beaver present as a keystone species. Further, most issues caused by beaver dams can be addressed

through inexpensive technology such as pond levelers or culvert fences. Beavers are appealing as a “cheap and cheerful” restoration technique for public lands.

The beaver management plan is “locked down” for the decade because those who are pro-beaver in the state wildlife agency don’t want to open it up for debate because the positive attributes of the plan could be eroded. Generally, the management plan hasn’t been controversial and it has been widely accepted and implemented in various ways, however it is more a question of how much different people have taken advantage of it to really encourage beaver on the landscape. The importance of the management plan is that it allows different wildlife regions, and individuals within wildlife agencies, to be proactive and it allows good things to happen. It doesn’t require good things to happen.

One southern Utah county commission (Garfield) fears that beaver are a plot to remove livestock from public lands, and has told UDWR to not translocate beaver to sites listed in the beaver plan. A Garfield county irrigation company killed all 37 beavers in one creek because they want more water running off rapidly in the spring into their reservoirs (and beavers distribute the release of water from headwaters regions throughout the season). The beaver management plan does not prevent this from happening as long as the irrigation company secured a permit to kill the animals. It is a barrier when businesses or individuals see ecological function as a threat to their business.

When asked if she thought a “beaver bill” is needed in Utah, Mary responded that a beaver bill is a non-starter given the Conservative leanings of the state legislature. Additionally, Utah citizens would perceive a beaver bill as more control and federal government intrusions, which are also non-starters. It is Mary’s opinion that in Utah, the beaver management plan suffices, and that people need to discern the most likely institution(s) that will encourage beaver in their state or province. If there is a reluctant wildlife agency but enlightened legislature, then state legislature can correct the agency through something like a beaver bill.

The Grand Canyon Trust focuses on beaver coexistence. The Trust published a pamphlet on how to fence culverts/trees, how to keep beaver ponds from getting too big for adjacent land uses. Their basic message is that if you have a beaver problem, you can solve it. If you don’t want beavers, they can be live trapped and translocated to sites where they are desired. There is a solution for everyone. However, there are limits to beaver education. In Mary’s experience, it is best to focus on how you can engage in problem solving with beavers (how beavers can address problems) and on how to fix problems that people encounter as a result of beavers.

It is invaluable to have researchers (e.g., Glynnis Hood) that can tell the story of the various beneficial roles that beavers play on the landscape. The stories can be simple and at the same time true to the underlying science. For example in her Alberta research, Dr. Hood has found more water in landscapes with beaver in drought years than in a good year without beavers. Research by Joe Wheaton, a fluvial geomorphologist at Utah State University and others, has demonstrated the ability of native fish to navigate up- and down-stream where beaver dams are present.

There is a robust and ever-growing body of research demonstrating myriad benefits of beaver (and approaches to solving beaver-human inconveniences) that can be rapidly surveyed by any collaborative group working out a beaver management plan.

[Mapping the Potential for Beaver Restoration](#)

The Grand Canyon Trust got a grant from Walton Family Foundation to test out an idea of Dr. Wheaton’s to use data nationally available on the web (i.e., perennial streams, riparian woody vegetation, stream flow) for one watershed in Southern Utah to map out where one would expect to find many, few or no beaver.

The project was so successful that UDWR paid to have a map created for the entire State to demonstrate where beaver have existed historically, where they are now and where their dams could be expected to persist for at least two years. The map enables organizations or individuals to ground truth different sites for beaver restoration potential and to approach UDWR to realize beaver translocation. This mapping method can be used anywhere, and in fact Joe Wheaton and colleagues are currently mapping in other regions.

LESSONS LEARNED FOR AN ALBERTA CONTEXT

- Don't start from scratch. Look to other places for what has worked and what has not worked. There is no need to reinvent the wheel.
- Connections with other practitioners and researchers are invaluable for beaver restoration. The community is incredibly open and sharing given their incredible desire to get beavers back on the landscape.
- A beaver bill is not always the appropriate solution
- Focus on how beavers can solve problems and/or how you can help solve people's beaver problems
- Simple stories that convey research are critical to getting buy-in from stakeholders
- Focus on how beavers can address serious issues such as drought-prone areas

ADDITIONAL RESOURCES

- [Utah Beaver Management Plan: 2010-2020](#)
- [Beaver and Climate Change Adaptation in North America: A Simple, Cost-effective Strategy for the National Forest System](#)
- [Beaver Restoration Assessment Tool: BRAT](#)
- [Citizen Science - Beaver Monitoring App](#)
- [The Economic Value of Beaver Ecosystem Services: Escalante River Basin in Utah](#)
- [Beaver: Best Management Practices](#)

Washington – Joe Cannon, The Lands Council

CONTEXT

The Washington Department of Fish and Wildlife (WDFW) is responsible for managing beaver populations. The following is an excerpt from their Living with Wildlife webpage on beavers¹⁶ that details how beavers can be trapped or killed in the State. These management guidelines are shared in detail here as they were realized through the Washington State Beaver Bill (described in the next section):

The beaver is classified as a furbearer ([WAC 232-12-007](#)). A trapping license and open season are required to trap or shoot a beaver.

The owner, the owner's immediate family, an employee, or a tenant of property may shoot or trap a beaver on that property if a threat to crops exists ([RCW 77.36.030](#)). In such cases, no special trapping permit is necessary for the use of live traps. However, a special trapping permit is required for the use of all traps other than live traps ([RCW 77.15.192](#), [77.15.194](#), [WAC 232-12-142](#)). There are no exceptions for emergencies

¹⁶ <http://wdfw.wa.gov/living/beavers.html#preventingconflicts>

and no provisions for verbal approval. All special trapping permit applications must be in writing on a form available from the Department of Fish and Wildlife (WDFW).

It is unlawful to release a beaver anywhere within the state, other than on the property where it was legally trapped, without a permit to do so ([RCW 77.15.250](#); [WAC 232-12-271](#)).

To remove or modify a beaver dam you must have a Hydraulic Project Approval (HPA)—a permit issued by WDFW for work that will use, obstruct, change, or divert the bed or flow of state waters ([RCW 77.55](#)). A permit application can be obtained from the [WDFW Regional Office](#) or from the [Hydraulic Project Approval \(HPA\) web page](#).

In emergency situations (when an immediate threat to property or life exists), verbal approval from WDFW can be obtained for work necessary to solve the problem. A 24-hour hotline (360) 902-2537 is available for emergency calls during nonworking hours. During normal hours, contact the nearest [WDFW Regional Office](#).

BEAVER BILL

The provisions for beaver relocation stipulated in the management guidelines above are a result of Washington State's Beaver Bill. This bill was first introduced to the State Senate in 2007, however it did not pass. This attempted bill was focused on giving more opportunities for private entities outside of WDFW to do beaver relocations primarily for the purposes of water retention in the late summer season for ranchers. It was focused on removing bureaucratic hurdles to beaver relocations. The Bill was killed because there was an existing mechanism to do beaver relocations in Washington via the WDFW, and WDFW had already engaged in beaver relocations in the absence of a Beaver Bill.

The Lands Council received a grant in 2009 to do research on using beavers as a viable water storage solution in light of the Washington State Legislature's House Bill 2860 (Columbia River Basin Water Management Program). The following is an excerpt from The Lands Council report entitled: The Beaver Solution: an innovative solution for water storage and increased late summer flows in the Columbia River Basin¹⁷:

In 2006, the Washington State Legislature directed the Department of Ecology (DOE) to "aggressively pursue development of water supplies to benefit both in-stream and out-of-stream uses" by enacting House Bill 2860, commonly referred to as the Columbia River Basin Water Management Program. The objective of this program is to provide an additional 3 million acre-feet of water storage that would benefit people, farms, and fish during the low flow periods of the year. Beginning in 2007, the DOE undertook an appraisal-level study for the potential development of dams and reservoirs in side channels of the Columbia River. A \$30,000 grant from the DOE partially funded The Lands Council's initial research on using beaver activity as a viable water storage option. The purpose of this study was to (1) understand the potential of using beaver dams to store water and increase late-season flow in the upper Columbia River Basin and (2) to identify suitable habitat for beaver throughout 12 Eastern Washington counties: Pend Oreille, Stevens, Ferry, Okanogan, Chelan, Douglas, Kittitas, Grant, Lincoln, Spokane, Adams, and Whitman.

¹⁷ http://landscouncil.org/documents/Beaver_Project/The_Lands_Council_Beaver_Solution_1mar2010.pdf

The Lands Council continues to refine the findings of this study each year.

Following on the heels of this report, The Lands Council authored an additional [report](#) that looked at habitat suitability and the potential effects of beaver relocation in the Hangman Creek Watershed. According to their findings, 37 stream miles were available for relocation. Assuming at least one beaver colony per mile, the watershed could support 185 beaver resulting in an estimated storage of 3,885 acre-feet of water storage, increased late-season flows, reduced nutrient levels, floodplain restoration and sediment trapping¹⁸.

Recognizing the existing science, beaver relocation precedents and the lack of a useful mechanism for connecting nuisance beavers to places that could use beavers for restoration, The Lands Council returned to the legislator who had first proposed the Beaver Bill in 2007. They also hired a lobbyist to help push the Bill through the State Senate. Their aim was to make beaver relocation something that anyone in the community could do. The Lands Council highlighted that WDFW was struggling to keep good beaver management records as data management within the agency is problematic for a number of reasons (e.g., funding, lack of connectivity between positions that facilitate the process, staff turnover at entry level). Good data management is essential for good natural resource management. The Lands Council made the case that you need to have an understanding of the status of a resource in order to make good management decisions. And, you can't know where you are at if you don't have data on what is happening out there.

There was a dearth of information on beaver population dynamics (i.e., where they are, how much are populations expanding, how much are their resources expanding, how are they affecting other natural resources and human communities, etc.). Ultimately, the impetus for the Beaver Bill stemmed from three things: 1) a desire for legislation that made it feasible for the private sector to be involved in beaver trapping and relocation; 2) a desire for improved monitoring and data management for beaver in Washington; and 3) to ensure that people who are involved in beaver relocation are educated and the process is safe for everyone.

House Bill 2349 (The Beaver Bill) passed on March 6, 2012. According to Joe Cannon from The Lands Council, one of the biggest accomplishments of getting the Bill passed was the acknowledgement of the science highlighting the role that beavers can play in watershed health and riparian ecology. The Bill created a legal precedent and infrastructure for being able to move beavers from where they are a nuisance to places where they can be used as a best management practice and it allows private entities to be able to do the trapping and relocation.

The Bill was not a total success in the eyes of The Lands Council because it did not address a number of key points (including having a mandated state beaver management plan – see below), however it “got the ball rolling” and brought the role of beavers into the public realm. The Bill generated a great deal of media interest and resulted in stories in the Wall Street Journal, the New York Times and other media outlets.

[Monitoring & Research Post-Beaver Bill](#)

Joe was uncertain as to the current status of WDFW with regard to keeping records (e.g., who is permitted to move beaver, how many they are moving, where they are moving them, etc.) following the passing of the Beaver Bill. WDFW have a process but there is uncertainty if they have been able to implement it. Joe has been unable to receive any beaver management reports from WDFW.

¹⁸ <http://landscouncil.org/documents/HangmanBeaverReport.pdf>

The Lands Council has been doing habitat suitability indices (HSI) to make sure they are taking beavers to suitable sites and that the relocated beavers are not going to become nuisance beavers. They have also been submitting reports to WDFW about their relocation activities. Further, Joe has been carrying out post-relocation monitoring funded by the National Forest Foundation (NFF) in collaboration with Colville National Forest. He is doing research-minded monitoring by both tracking the success of beaver relocation and expectations of beaver colonization with different levels of habitat suitability. Monitoring efforts focus on vegetation as an indication of how beaver engineered ecosystems change: the status of it, how it is changing based on plants as indicators (especially wetland plant status), etc. By monitoring wetland habitat complexity, you can get a sense of if what is taking place is a direct or indirect result of beaver habitation. Joe highlighted the importance of continued research and monitoring of beaver populations in Washington especially as the urban-wildland interface continues to grow.

Stakeholders

Joe feels strongly that you need to appeal to all stakeholders and to make sure that all stakeholders have a voice in the discussion and policies on beaver management as they materialize. You need to acknowledge all stakeholders and the value that beaver have to each stakeholder. In order to create political viability and substance to this movement, the mechanisms to realize beaver relocations need to make this something that anyone in the community can do, something that does not threaten anyone. Just about everyone is a stakeholder in this beaver management situation where beavers were a historic component of the landscape and there is a desire to potentially expand their population. The Lands Council has worked with a number of stakeholders including the US Forest Service, big commodity-based entities (timber, cattle, agriculture) that operate on public lands, the Washington State Department of Transportation and city engineers.

Beavers can cause a lot of expensive damage to roads. Roads are built on floodplains, and these floodplains are there because of beavers and this is what beavers are drawn toward (flat places with low-order streams). The Lands Council also attempts to work with the Power Administration as they have jurisdiction over how water is running through our landscape and how funding for managing that happens. This action agency has to engage in mitigation for property that is impacted because of hydro damming and running power lines.

Logistics of Beaver Relocation

Prior to engaging in beaver relocation, you need to ensure you are placing them in suitable habitat. The WDFW paperwork requires a checkmark in two places to indicate you are relocating beaver to suitable habitat. Beaver population dynamics are governed by the extent of their resources and if habitat quality is marginal you will only get so much ecosystem services out of them if beavers are living at the margin. The Lands Council has been working with WDFW to streamline this process and make it feasible for all parties. According to the Beaver Bill, beavers can be moved from west of the Cascades to the east of the Cascades, but not east to west. According to an analysis, the region west of the Cascades is at carrying capacity with regard to beaver and human (i.e., suitability for beaver expansion); if there is any expansion of beaver, they would be living in marginal habitat in that region. There is a lot of habitat east of the Cascades.

The Lands Council is attempting to discern what ideal beaver habitat looks like. Generally, beaver like extensive stands of mature aspen and low-order streams. Subsequent to that would be mixed deciduous, broadleaf riparian forests. Eastern Washington has the limitation that the ideal beaver habitat type doesn't occur here historically to the extent that it occurs in the Rocky Mountains or on the east slope of the Cascades. Joe indicated they are trying to tease out what was long-term suitable habitat for beavers

historically that enabled them to have perpetual multiple decades of habitation without exploiting winter food and moving on.

Permitting Challenges

There is generally good support within the WDFW and they really want to make this process work, but there are multiple places where it gets hung up. With regard to a live trapping permit, from the time Joe submits a report and application to WDFW to get a trapping permit and research permit it can take two months for the permits to be processed. If the trapping permit is to solve a nuisance problem (e.g., whole basement flooded, road collapsed), a two-month turnaround is likely unacceptable to the people being impacted by the beaver. When someone calls the WDFW with an urgent nuisance beaver problem, WDFW claims to provide a couple of options: visit the living with wildlife webpage to explore non-lethal solutions (e.g., fencing trees, flood control devices (those devices also take a lot of complicated permitting)) or hire someone to shoot or trap the beaver. The bottom line is that there isn't viable infrastructure for non-lethal timely solutions for nuisance beaver activity.

Of greater concern is the lack of connectivity or buy-in within WDFW concerning agency mandates for wildlife management; therefore, permits and enforcement are applied inconsistently, subjectively and possibly with preference/favoritism. Joe has gone back to live trapping a lot more because he can't get through the permitting for flood control structures in time or other more appropriate non-lethal solutions. He feels it is preferable to install a flow device and leave beavers where they have chosen to establish themselves instead of move them to a new location, with all of the risks that come with that.

Desired Changes to Beaver Bill

When asked if he would make any changes to the Beaver Bill, Joe suggested that he would get an itemized management plan that is binding, based on the best available science and that caters to diverse stakeholders. Also there is a need for more research that is specific to Washington State and the regions of Washington State. It would be nice to mandate the need for more outreach and education (both within state agencies and within the private sector) to let people know what is at stake in managing beavers. Finally, timely permitting would be a welcome change.

LESSONS LEARNED FOR AN ALBERTA CONTEXT

- Time to process permits is critical to the usefulness of regulatory mechanisms to enable coexistence tools and beaver relocation
- A beaver bill doesn't bring salvation – the devil is in the details
- Importance of record keeping for beaver relocation efforts – good data management is essential to make good natural resource decisions
- Importance of looking at habitat suitability index data to avoid relocating beavers to marginal habitat
- Appeal to all stakeholders and make sure that all stakeholders have a voice in the discussion and policies on beaver management as they materialize: just about everyone is a stakeholder in beaver management

ADDITIONAL RESOURCES

- [House Bill 2349: The Beaver Bill](#)
- [An Innovative Solution for Water Storage and Increased Late Summer Flows in the Columbia River Basin](#)

Wyoming – William Long, Wyoming Wetlands Society

CONTEXT

The following is a direct excerpt from the WWS website¹⁹:

Beaver (Castor canadensis) are the world's best wetland engineers and are an integral part of the Wyoming Wetlands Society's (WWS) mission to protect and enhance wetlands for future generations. Although wetlands comprise less than 2 percent of the western U.S. landscape and are being rapidly lost to development, they provide numerous ecological services and habitat for over 80 percent of the region's wildlife. Almost half of endangered and threatened species in North America rely upon wetlands.

In the early 1900s the state of Wyoming, along with the rest of the nation, decided that no matter the value of beaver to trappers or as fur hats, they would always be more valuable to the citizens of Wyoming as curators of our wetlands. Beaver were given protection by the state and were reintroduced to many watersheds. By the 1950s the program was considered a resounding success and restrictions on trapping were lifted. Beaver trapping soon reached levels comparable to those found during the height of the fur trade and local populations have been diminished. Current North American populations are estimated to be between 6 and 12 million. Without healthy populations of beaver, wetland complexes and associated ecological services have once again deteriorated throughout the region.

As beaver attempt to reclaim their ancestral lands, the same behaviors that make beaver a keystone species essential to the creation and maintenance of wetlands result in conflicts with humans. Although WWS recognizes the importance of beaver as a keystone species, we also realize that they can cause real problems in inhabited areas. Since 2004, WWS has been assisting private landowners by live trapping problem beaver at no cost to the landowner. Many of the beaver we live trap are those that are damaging expensive landscaping, obstructing irrigation head gates, or flooding yards and roads. Sometimes it is all of the above. The beavers trapped in this program are relocated to suitable but unoccupied areas of the Gros Ventre River Drainage and adjacent drainages to restore and enhance wetland habitat.

WWS increased its efforts in the beaver relocation program in 2007 with cooperation from Wyoming Game and Fish Department (WGFD) and Bridger-Teton National Forest (BTNF). Funded by private donations, grants from the Wyoming Wildlife and Natural Resource Trust (WWNRT) and the WGFD, WWS was able to relocate thirty-three beaver in 2009 alone. Many of these beaver have established territories and are creating or enhancing wetland habitat in the BTNF. WWS has plans to continue the beaver relocation program through at least 2016 with the hope of re-establishing beaver throughout the BTNF and other areas in northwest Wyoming.

Current Trapping Regulations

All of Wyoming is open to trapping of beaver; some areas are limited quota limiting the number of beaver that can be trapped in that area. Most areas are open to unlimited trapping and some restoration areas have limited quota trapping permitted in those areas. Limited quota trapping areas are the exception versus the norm.

BEAVER RESTORATION

The State of Wyoming issues a Chapter 10 permit to enable simple possession of beavers. WWS holds a Chapter 10 permit, in addition to a Chapter 33 permit (scientific permit). The State issues Chapter 33 permits on a case-by-case basis. They do not endorse research for research's sake but are looking to

¹⁹ <http://wyomingwetlandssociety.org/beaver.php>

approve research that provides benefit to the State. WWS's Chapter 10 permit is a blanket permit, tied to a geographic area where restoration work can occur.

The success of beaver restoration is highly dependent on trapping and predation post-relocation. Generally, where beaver are newly planted and there are no established colonies, the success rate is 0-30% in a predator-rich environment and 50-60% where there are fewer predators.

Trumpeter Swan Restoration

A big impetus for beaver restoration efforts by WWS is trumpeter swan restoration (a sensitive species in Wyoming), as the lack of wetlands in the state is confining expansion of trumpeter swan nesting habitat and hindering waterfowl produced on Montane wetlands. Bill cited an example where beaver re-occupied an abandoned beaver colony, resulting in new dams and a pair of swans found the wetland. The pair has since nested at the site and successfully fledged young. Beaver restoration is part of a broader suite of tools, including a captive breeding program, being used to pre-empt the listing of swans under the *Endangered Species Act*.

Fisheries

There has been a lot of interest in fisheries throughout the years and how beaver ponds provide recreation opportunities and over-wintering habitat for trout. Additionally, beavers were used in headwaters regions to maintain stream flows year-round. Beginning in the 1980s, Game and Fish trapped beaver where there was an abundance and then moved them into drainages where they could benefit trout fisheries. Pole Mountain is a shining star of the results of beaver restoration for fisheries. The awareness is there that beaver are important from a keystone species perspective. Beaver are a very good tool and cheap tool for creating wetlands. Even if the beaver get killed out, the dams they built continue to trap silt, maintain stream flows and temperature regimes that benefit fish species.

Big Game

Post-beaver relocation, the State has seen results of riparian shrub communities coming back where there was none or they had been degraded. Aspen communities and willow communities on big game ranges have benefited from the return of beavers owing to the creation of beaver ponds.

Private Landowners

Many people in Wyoming are concerned about getting water back on the land. When you talk to landowners, they recognize that raising the water table is important for riparian shrub communities. Beaver are being returned to some drainages over time as private landowners see value in having beaver in the system.

BEAVER COEXISTENCE

WWS does work on a case-by-case basis with landowners who want beaver and those who want to get rid of beaver (typically agriculturalists or people living in urban environments with high-priced houses and trees). WWS does outreach by talking to home owners about: installing beaver deceivers, fencing trees, and installing overflow pipes to realize coexistence with beavers. WWS' efforts are split between 30% outreach and 70% removing problem beaver.

BARRIERS

Bill believes that there are no barriers to beaver restoration in Wyoming.

LESSONS LEARNED FOR AN ALBERTA CONTEXT

- Even if the beaver get killed out, the dams they built continue to trap silt, maintain stream flows and temperature regimes that benefit fish species

- Lack of a beaver bill or state beaver management plan does not negate beaver restoration activities
- Wetland restoration (and recovering or pre-empting listing of species who depend on wetlands) can provide a real impetus for beaver restoration
- Hunting and fishing advocates can act as champions for beaver relocation given the benefits to wildlife and fish populations as a result of this ecosystem engineer

Montana

Although Montana was not selected as a case for this paper, there is a growing interest in beavers in the Treasure State. The following is an excerpt from a report prepared by Will McDowell (Clark Fork Coalition) on the Crown of the Continent Beaver workshop held on October 2014.

Vanna Boccadori, the Butte area wildlife biologist for Montana Fish Wildlife and Parks (FWP), gave a presentation on actual and historical beaver management in the State, emphasizing that the State of Montana was relocating live beaver as long ago as the 1940s to promote their broader repopulation of the State. She also was able to clarify the role of trapping in beaver population management, the incentives driving trappers, and locations where trapping is concentrated (near roads). Vanna gave examples of how Montana FWP had collaborated with the US Forest Service and other entities to manage beaver in certain watersheds in the past. There were many questions for Vanna on FWP policy.

The next presentation was Jeff Burrell from Wildlife Conservation Society (WCS), who had an interesting presentation focused on the Madison River Valley, where WCS has done extensive beaver habitat mapping and field surveys. He is finding beaver are quite common in the river corridor and often rare or absent in upper watersheds, even where habitat is good. Participants noted this same pattern exists in other parts of western Montana. The working hypothesis is that the habitat in "travel corridors," -- riparian areas in mid-valley-- is often poor and beaver do not successfully migrate through the zones of poor habitat to locate the better habitat further upstream. Jeff is working on building beaver dam analogues to raise water tables, capture sediment, and promote natural habitat recovery in some mid-valley degraded streams, with the hopes that both good habitat and beaver will naturally recover, re-establishing corridors between rivers and headwaters.

The last presentation, by Dan Tyers of US Forest Service was an inspiring success story of a 25-year long beaver relocation effort in the Absaroka Wilderness just north of Yellowstone National Park. Dan initiated this project as a USFS ranger, in collaboration with Montana FWP, to capture nuisance beaver near Bozeman, MT, and carry them, by pack horses, many miles into the headwaters of Hellroaring and Slough Creeks, deep in the wilderness. After transporting/relocating 140 beaver over many years, monitoring has confirmed that this area, where beaver were completely absent in 1985, now has established beaver populations which have continued to spread on their own, including downstream migration into and recolonization of the northeastern part of Yellowstone National Park. This experience reinforced the impression that in some cases, beaver do not naturally recolonize isolated areas of good habitat, especially headwaters, if corridors they need for dispersal exhibit poor habitat (it is well-known that Yellowstone National Park lost much its streamside willow cover due to over-browsing by a bloated elk herd during the middle part of 20th century--now recovering due to effects of wolf and beaver).

There was a panel of the speakers at lunch, facilitated by Lorne Fitch, which came off very well, with a number of ideas not covered by presentations being brought out in discussion.

The field trip led by Amy Chadwick included a visit to several parts of the Blacktail Creek watershed and several beaver deceivers in Butte. The field trip then continued upstream in the Blacktail Creek watershed to visit a city park experiencing beaver damming near public roads, and then to a headwaters area where Amy is using beaver dam analogues and deer fencing to improve headwaters beaver habitat.

DISCUSSION & CONCLUSION

The purpose of this report is to share the experiences and lessons learned regarding the use of beaver for restoration and climate change adaptation in a selection of American states. This information will be relevant to land owners and land managers within the Crown of the Continent and beyond who are interested in opportunities to restore riparian areas and wetlands and/or to use a “no regrets” strategy to adapt to climate change. More specifically, this information will help guide the next stage of efforts in Alberta to realize the use of beavers for watershed stewardship and climate change adaptation. Each of the beaver management approaches outlined above is unique, however a number of key themes are evident. The main themes arising from this report are as follows:

- 1) The creation of beaver management-specific legislation isn’t necessary to realize improvements in how beaver are managed in Alberta. Both Bryan Bird and Joe Cannon spoke about the profile that the state memorials in New Mexico and Washington gave to beaver management and some of the other positive changes that have resulted, however the legislation wasn’t a “silver bullet” for beaver management. The state memorial in New Mexico didn’t allocate a budget to realize changes in beaver management and the state memorial in Washington didn’t mandate a state-wide beaver management plan. Meanwhile, Wyoming has nothing more than state fur trapping regulations and seemingly has no barriers to translocating beavers. The Utah statewide beaver management plan is often held up as one to be emulated and it was not realized through a beaver bill.

It will be important to discern the most likely municipal, provincial or federal government institution that will encourage beaver in Alberta. In New Mexico, WildEarth Guardians developed a partnership with the Department of Environment instead of the Department of Fish and Game to do research to lay the groundwork for beaver relocation. WildEarth Guardians also focused its efforts on working with federal land agencies that were amenable to bringing back beaver populations. It is critical to consider how improved beaver management in Alberta aligns with, and challenges, the regulatory efforts of relevant government departments. Many of the issues faced by government agencies described in this report also plague Alberta government agencies: lack of funding, lack of communication between agencies with different mandates, and a lack of support from political masters or agency leaders.

- 2) In thinking about potential changes to beaver management for Alberta, don’t reinvent the wheel. Clearly, a number of jurisdictions outside of Alberta have been engaged in beaver restoration for a number of decades. Alberta has the enviable opportunity to consider lessons learned and best practices from other jurisdictions and the ability to incorporate what will work best in an Alberta context. Mary O’Brien stressed the importance of learning from others’ mistakes and not starting from scratch. She stressed that the beaver management community is very generous in sharing its learnings and that we have one of the most knowledgeable academics about beaver management right here in Alberta (Dr. Glynnis Hood).

- 3) Focus on how beavers can solve problems and/or how you can help solve people's beaver problems. This was a key learning shared by Mary O'Brien. As noted by Joe Cannon, very few people want beaver on the landscape for the sake of having beaver on the landscape. Alberta has the opportunity to utilize beavers for the provision of a number of ecosystem services including: improved water quality, ground water recharge, provision of riparian and wetland habitat, and reduced flow velocities. Alberta also has the opportunity to assist people who have nuisance beavers co-exist with the animals by using management tools such as fencing trees or installing flow control devices.

Two key policy questions for beaver coexistence include: 1) Is it necessary to get any permitting (federal, provincial or municipal) to install a flow control device? 2) If beaver coexistence isn't a viable option, how can Alberta best enable beaver translocation efforts? One of the planned components of the next stage of the beaver collaborative project is the creation of a "beaver match-making service" that would connect landowners with nuisance beavers with those who want to reintroduce beaver to their lands.

- 4) It is critical to bring all stakeholders into consultation regarding beaver management so that each stakeholder feels that they have a voice in determining beaver management. This was stressed by a number of the interviewees and was reinforced when Joe Cannon stated: "Just about everyone is a stakeholder in this beaver management situation where beavers were a historic component of the landscape and there is a desire to potentially expand their population." In Alberta, an initial list of important stakeholders includes (but is not limited to): First Nations, irrigators, ranchers and farmers, property owners, Alberta Trappers' Association, Alberta Environment and Sustainable Resource Development, Alberta Transportation, Alberta Agriculture and Rural Development, Department of Fisheries and Oceans, Parks Canada, Agriculture Canada, Alberta Urban Municipalities Association, Alberta Association of Ag Fieldmen, Alberta Association of Municipal Districts and Counties, environmental non-governmental organizations (especially watershed- and climate change-focused organizations), wildlife rehabilitation organizations, TransAlta, Canadian Association of Petroleum Producers, pipeline companies and pest management companies.

In a number of jurisdictions, hunting and fishing communities have become allies for beaver restoration owing to the benefits of beaver for fish and wildlife populations. This raises the question: why are these communities not currently proponents for beaver restoration in Alberta? Is it that Alberta's habitat hasn't declined to the same extent as some of the states profiled in this report? Is it that these communities are unaware of the role of beaver as a keystone species on our landscapes? It would be beneficial to engage in conversations with representatives of these communities as they could be strong allies for beaver restoration.

- 5) Consider the role that beavers play as a keystone species in species at risk recovery in Alberta. In the case of California, New Mexico, Oregon, Wyoming and Utah, beaver restoration is being used as a tool, or promoted as a tool, that can assist with species recovery or to pre-empt listing under the *Endangered Species Act*. Beaver can create wetland and riparian habitat critical to threatened or at risk species. Alberta lacks legislation comparable to the *Endangered Species Act* however it is critical to consider how beavers are tied to species at risk recovery in Alberta. What, if any, role can the federal *Species At Risk Act*, *Fisheries Act*, *Environmental Assessment Act* or other species at risk policies play in beaver restoration efforts?

- 6) The desire for beaver restoration is often tied to the desire for wetland restoration and restoring species that depend on wetland habitat. Restoring wetlands and riparian areas may bring beavers back to a region without translocation efforts (i.e., through in-migration). Wetland and riparian restoration is an approach that will benefit Albertan watersheds, improving water quality, quantity and wildlife habitat. It will be important to understand how beaver restoration ties into Alberta's Wetland Policy, especially from a wetland replacement perspective.
- 7) Push for a better understanding of beaver population dynamics and occupied and potential beaver habitat in Alberta. There are a number of tools (e.g., BRAT and Google Beaver Mapper) and approaches (e.g., Joe Cannon's research-focused monitoring) that have been created in other jurisdictions and that can be applied, or modified and applied, here. It is critical to consider habitat suitability and quality when considering beaver translocations as beavers will not provide their desirable effects if they are occupying marginal habitat.
- 8) Outreach and education efforts are a key component in realizing beaver co-existence. Mary O'Brien noted that it is best to use simple stories in engaging people to think about beavers. Joe Wheaton stressed that outreach efforts should be focused on land owners and land managers who have the greatest amount of riparian and/or wetland habitat on their properties. These stakeholders are critical to keeping beavers on landscapes. Often, co-existence is the preferred approach to realizing the benefits of beavers as it is best to leave beavers in habitat they have selected.

The increased level of interest in the role of beavers as an ecosystem engineer, the declining social license for simply destroying nuisance beavers and the prospect of using beavers as a "no regrets" climate adaptation strategy in Alberta, provides a ripe opportunity to make concerted efforts to improve beaver management. Clearly, there is a great deal to be learned from ongoing beaver restoration initiatives in other jurisdictions and there is a willingness on the part of beaver restoration experts to share their knowledge. This report provides a brief overview of insights shared by six beaver restoration experts and highlights a number of key research and policy questions that remain for consideration in crafting a "made in Alberta" approach to improved beaver management.

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APPENDICES

Appendix 1 - Beaver Policy Research Question Guide

Introduction

The Miistakis Institute (www.rockies.ca) is a non-profit, charitable research institute based at Mount Royal University in Calgary, Alberta, Canada. We study the landscape so that we can help people conserve it, and we work to make innovative research accessible to communities and decision-makers. The Miistakis Institute and a number of partners have been involved in a [beaver relocation project](#) in Alberta for the last three years. To our knowledge, it is the first of its kind in our province as beavers are now gaining recognition here for the role they play in watershed health in water-limited regions like Southern Alberta. Through our involvement in this project, we have learned of substantial policy and regulatory barriers to beaver relocation in Alberta.

In an effort to learn from people like you who have been involved/are involved in beaver relocation, we are carrying out research on opportunities and challenges to beaver relocation on both sides of the 49th parallel. We have received funding from the [Adaptive Management Initiative](#) to pursue this work. We learned about your beaver relocation work through an online search and/or word-of-mouth.

Question Guide

- The interview will take thirty minutes to an hour of your time and the following questions will guide our discussion. Some of the questions may be less relevant than others depending on the evolution of beaver relocation efforts in your state.
- The interviews will be transcribed for our records and used to inform our report and recommendations stemming from this research. The report and recommendations will help guide our work to realize public and political support for beaver relocation in Alberta.
- With your consent, we will record our interview to ensure that we accurately capture our conversation. The recording will only be used to ensure proper transcription of our conversation.
- We will be certain to share a draft version of the report with you and to solicit your comments and suggestions. If we wish to use any direct quotes from you, we will vet those quotes with you first.
- We may decide to pursue publication of a journal article from our research; if this is the case, we will keep you informed of our progress and we may contact you to seek out additional information from you.
- Do you have any questions before we begin?

WHAT?

1.0 Please describe the current context for beaver management in your state. For instance, does your state have a beaver bill, beaver management plan or other regulations related to beaver relocation? Have these tools made a difference (i.e., could you pursue your work if these tools weren't in place)?

If you don't have any of these tools, would it be helpful to have them in place?

2.0 Tell me a bit about the history of beaver management in your state. How did you end up where you are today? Did stakeholders work together to realize the current management regime? How did you realize political support for beaver relocation? Were there any specific acts, regulations or plans that supported beaver relocation? Were there any specific acts, regulations or plans that needed to be amended to support beaver relocation?

SO WHAT?

3.0 Have beaver relocation efforts resulted in the desired result(s)? If so, what were those results?

4.0 Do you have programming focusing on beaver coexistence as well?

5.0 What barriers to beaver relocation continue to exist in your state?

6.0 What opportunities for beaver relocation exist in your state at the present?

NOW WHAT?

7.0 Do you or any of your partners have plans to address any of the barriers or opportunities that you mentioned?

8.0 Based on your experience, what would you recommend to an organization who wishes to pursue beaver relocation?

9.0 Do you have anything else about beaver relocation that you would like to share?