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Beaver-Related Restoration in Owyhee County, Idaho: Opportunities and Challenges

Jesse Abrams, Michael Johnduff, and Susan Charnley



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Authors

Jesse Abrams is an assistant professor, Warnell School of Forestry and Natural Resources and Savannah River Ecology Laboratory, 180 E Green Street, Athens, GA 30602-2152 (formerly a research associate, Institute for a Sustainable Environment, 130 Hendricks Hall, University of Oregon, Eugene, OR 97403); **Michael Johnduff** was a research assistant a research assistant, Institute for a Sustainable Environment, 130 Hendricks Hall, University of Oregon, Eugene, OR 97403; **Susan Charnley** is a research social scientist, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 620 SW Main Street, Portland, OR 97205.

Abstract

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Owyhee County, Idaho, covers much of the Owyhee Uplands, an arid landscape characterized by sagebrush habitat where cattle grazing is a dominant land use. Because this landscape is home to many sensitive sagebrush-obligate species as well as species that require high-quality riparian and aquatic habitat, it has garnered attention from state and federal wildlife agencies and various nongovernmental organizations (NGOs) interested in restoring and conserving habitat on working landscapes. The installation of beaver dam-like structures such as beaver dam analogues, and the reintroduction of beaver (*Castor canadensis*) through translocation or natural recolonization, have been examined as possible tools to accomplish these objectives. The purpose of this exploratory study is to understand the opportunities and challenges associated with beaver-related restoration in Owyhee County rangeland systems. The findings presented here, based on interviews with 19 Owyhee County landowners, ranchers, and key stakeholders, suggest that there are opportunities for increasing restoration activities that incorporate beaver dam analogues and other beaver-related restoration techniques. Specifically, an overall positive perception of beavers on the part of interviewed producers (as long as the beavers stay away from irrigation infrastructure); the potential overlap between conservation goals and livestock production benefits of watershed restoration; the goodwill created by previous cooperative projects involving federal, state, NGO, and private entities; and the grant and cost-share funding opportunities available for beaver-related projects all point toward opportunities to reconcile restoration and cattle production interests. However, many challenges were also identified, such as concerns regarding regulations and liability—including the liability arising from the creation of threatened or endangered species habitat—and potential conflict regarding the degree and kind of grazing management changes that would be needed to set the stage for long-term riparian habitat improvement.

Keywords: Beaver, Columbia spotted frog, perceptions, ranching, rangeland, watershed restoration.

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Introduction

Recent years have seen increased interest in watershed restoration in the Western United States, including in arid rangeland ecosystems. The translocation of beaver (*Castor canadensis*) and installation of structures that simulate beaver dams have been used with the goals of restoring incised streams, improving aquatic habitat for fish, reestablishing floodplain connectivity, promoting riparian vegetation, and creating wetland habitat (Bouwes et al. 2016, Pilliod et al. 2018). In Owyhee County, located in the arid southwestern corner of Idaho (fig. 1), beaver-related restoration has been championed by a number of nongovernmental organizations (NGOs) and government agencies working in habitat restoration and watershed management because of its potential to meet diverse wildlife habitat and conservation objectives (IDFG 2016, USDI FWS 2017).

The Idaho State Wildlife Action Plan identifies conservation benefits associated with beaver and directs the Idaho Department of Fish and Game (IDFG) to maximize beaver dam densities in appropriate areas in the Owyhee Uplands to support habitat and wildlife conservation (IDFG 2016). Benefits of beaver and beaver dams identified in the plan include supporting aquatic and riparian habitat for “species of greatest conservation need”—species in need of certain specified degrees of support to prevent an Endangered Species Act listing—such as the Columbia spotted frog (*Rana luteiventris*), western toad (*Anaxyrus boreas*), and various bird and bat species. The Owyhee Uplands also constitute a priority conservation area of the U.S. Fish and Wildlife Service because of the presence of diverse habitats that support sagebrush-obligate species (USDI FWS 2017). Additionally, the Natural Resources Conservation Service (NRCS) has developed a regional conservation partnership program to increase ranching resilience to drought that includes parts of Owyhee County as well as neighboring areas of Oregon and Nevada.

To date, only limited beaver-related restoration activity has occurred in Owyhee County. This activity has focused on Stoneman Creek in the western part of the county, where a beaver dam on Bureau of Land Management (BLM) land was reconstructed and beaver were reintroduced in 2001 (Lingo 2013), in addition to individual cases of landowners reconstructing dams on their own properties. Other off-stream wetland construction projects have been implemented to benefit Columbia spotted frog populations, and beaver have naturally recolonized many areas on their own. The purpose of this study is to identify opportunities and challenges related to beaver-related restoration in Owyhee County and to improve understanding of what is needed to facilitate implementation of these restoration approaches from a social and regulatory standpoint. The focus of this report is on landowners’

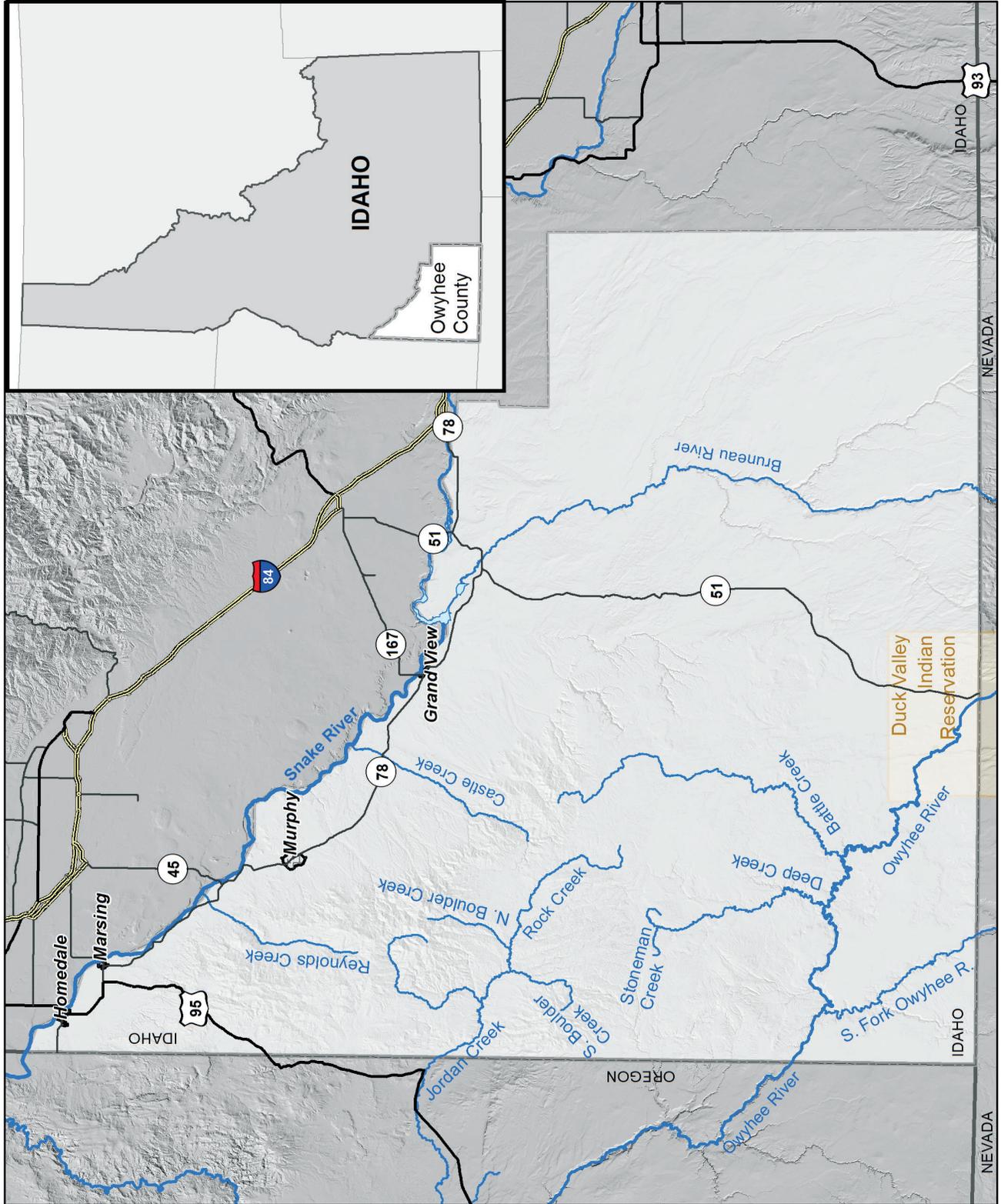


Figure 1—Owyhee County, Idaho.

and ranchers' perspectives on the challenges and opportunities associated with beaver-related restoration, which will likely occur either on private ranches or on public lands where ranchers have grazing allotments.

Methods

This study was developed as part of a larger, interdisciplinary research project to assess the social, hydrological, and ecological effects associated with beaver-related watershed restoration of incised streams in rangelands of the Western United States. We chose Owyhee County as a study site because of the strong local interest among agencies and NGOs in implementing this approach. Our analysis is based upon a review of relevant literature and 16 interviews with 19 Owyhee County key informants (13 ranchers/landowners and six state, federal, or NGO representatives who work with ranchers/landowners). Interviewees were chosen purposively based on their actual or potential experience with beaver or riparian restoration. We attempted to gather a wide range of perspectives on the opportunities and challenges related to beavers and watershed restoration; however, their perspectives should not be considered representative because they were not selected as a random or representative sample of defined populations. Following a research protocol approval by the Institutional Review Board of Oregon State University, researchers developed a list of potential interviewees based on suggestions from state and federal wildlife agency contacts as well as from prior research experience in Owyhee County (Abrams et al. 2017). Interviews were conducted during two separate field visits to Owyhee County (in April and August of 2017) and, in some cases, via telephone. Some interviews also included site tours of ranches and riparian areas. We used a semistructured interview protocol, consisting of a series of guiding questions with the possibility for followup questions as the need arose. Interviews were audio recorded with the consent of the interviewees; detailed notes were taken in cases where an individual preferred not to be recorded. Interview audio files were transcribed verbatim and reviewed to generate the broad findings reported here.

Owyhee County

Owyhee County occupies 4.9 million ac (1 982 959 ha) of land (fig. 1). The vast majority (85 percent) of Owyhee County's land base is public, primarily managed by the BLM; approximately 78 percent of the county is under federal ownership, and nearly 7 percent is state owned. Only about 12 percent of the county is under private ownership. The 2016 population estimate of Owyhee County was 11,389, representing a 36 percent increase from 1990. Its major towns are Homedale,

Marsing, Murphy, Grand View, and Bruneau, the largest of which is Homedale, with a population of a little more than 2,500. However, the county lies relatively close to Idaho's largest population center, the "Treasure Valley" of Boise/Meridian/Caldwell/Nampa, and as such, sees a substantial amount of recreational use, particularly by motorized recreationists.

Water management is integral to land stewardship in this semiarid territory, particularly given the importance of irrigation for the production of row crops, hay, and irrigated pasture. Average annual precipitation ranges from 6 in (2.5 cm) in Bruneau to 30 in (76 cm) in the Owyhee Mountains at Afterthought Mine (Owyhee County 2015). More than 303 identified waterways run through the county, making up approximately 107,651 linear mi of river (173 247 km) (IASCD/ISCC 2004).

Owyhee County's large expanses of sagebrush steppe habitat (fig. 2), together with a growing mining industry, led to livestock ranching becoming the predominant activity during the Euro-American settlement period of the late 19th and early 20th centuries. Settlers generally selected land near waterways for their private ranch properties, with large expanses of arid uplands being retained under federal



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Figure 2—Sagebrush steppe habitat covers much of Owyhee County. Photo taken near upper Reynolds Creek.

ownership. The Owyhee country was used extensively by sheep outfits in the late 19th and early 20th centuries; beef cattle became more prevalent by the mid-20th century in response to changing markets for food and wool (Idaho State Historical Society 1973). Grazing of beef cattle is currently the predominant land use throughout most of Owyhee County's arid rangelands; irrigated row-crop production occurs on the county's northern edge near the Snake River, and dairy production is also important economically. Lewin et al. (2014) estimated that there are 45,660 beef cattle in Owyhee County, with a total economic output in the ranching and feedlot sector of \$129.9 million. They calculated the base contribution of this sector as 13.7 percent of total employment, 22.5 percent of total cash receipts, and 16 percent of county gross product (Lewin et al. 2014: 15).

Ranching practices directly depend upon, and can have an impact on, rangeland waterways and riparian areas. Water for irrigation is a key resource for livestock operators who must grow (or purchase) hay to feed their herds over the winter. Water for cattle is crucial on the expansive, largely arid landscapes on which livestock graze. A persistent challenge on these landscapes is the maintenance of riparian vegetation, given that lush streamside vegetation is prone to being heavily grazed, resulting in streambank instability, downcutting, and erosion (IASCD/ISCC 2004).

Erosion may also be exacerbated by the absence of beavers on the landscape. The Snake River area was an epicenter of fur trapping as early as 1816, when the Hudson's Bay Company sent brigades throughout the Snake River drainage. Their goal was to create a "fur desert" to block competing fur companies from gaining a foothold in the Interior West. This activity largely came to an end by 1840, but the ecological impacts of beaver extirpation continued to be felt for decades. Idaho Department of Environmental Quality reports show that loss of beaver dams in the 19th century directly increased stream channelization and led to decreased wetland area in many watersheds across Owyhee County (Shock et al. 2011). Given the historical presence of beaver in Owyhee County and their potential to reduce stream incision and help restore riparian vegetation, there is growing interest in using beaver and beaver dam-like structures in local restoration efforts. Much of this interest is related to the high quality of wildlife habitat in this remote and relatively undeveloped area, despite some evidence of habitat degradation over time (IDFG 2016, USDI FWS 2017). Beaver-related restoration may also have the potential to promote ranching resilience to drought by increasing forage production in riparian pastures and improving streamflows (Davee et al. 2017).

Opportunities for Beaver-Related Restoration in Owyhee County

Interviews with Owyhee County ranchers, landowners, land managers, and project partners revealed potential opportunities for integrating beavers and beaver-related structures into rangeland watershed restoration. These stakeholder-identified opportunities include recognition of the benefits of beavers, positive experiences with past restoration partnerships, and the availability of technical and financial assistance to support beaver-related restoration and grazing management more broadly. Here we summarize the most relevant findings from stakeholder interviews on these topics.

Benefits Associated With Beavers

Opinions of beavers among interviewed landowners and ranchers were typically neutral to favorable. Interviewees often responded that they had positive associations with beaver and few felt that grazing operations would be negatively affected by the presence of beaver or their structures. Benefits observed by ranchers and landowners included the creation of wet meadows, the retention of water in streams later in the summer season, the reduction of stream velocity and consequently of erosive potential, and the creation of wildlife habitat for sensitive species. One rancher described the outcome of an effort to rehabilitate abandoned beaver dams on his property:

It worked well for everything because, one, it provided water, year-round water all the time, which is a godsend for wildlife, for my cattle, everything. Two, it enhanced the wet meadows that were there, so you had better forage production for cattle, wildlife, everything else. Three, it helped with spotted frogs...that was one of the species that I was building for just so that I wouldn't have those problems, regulatory problems in the future that if you build habitat they'll come. That's the same way with the beaver (interview 2).

Indeed, many ranchers and landowners credited past wetland construction projects with increasing Columbia spotted frog populations and thereby avoiding an Endangered Species Act listing. These past projects were generally not beaver-related restoration projects specifically; rather, they tended to be offstream pond installation projects encouraged by state or federal wildlife agencies. In some cases, landowners chose to install these wetlands without specific financial support from public entities. They also typically viewed beaver and their dams as creating habitat benefits for sensitive species.

Some landowners and ranchers saw the potential of beaver as ecosystem engineers:

Well, we were thrilled to see the beaver come in because we felt that while, I don't know, growing up on a ranch, we kinda knew what they could do... My brother was like, "Oh, no, they're gonna clog up all the irrigation." We just worked with it. We just worked with it, and they did. They did clog things up here and there. You know, I hate to lose trees. [But] it was strictly about improving our waterways and our wetlands, yeah, and in a physical manner (interview 4).

One ranching couple described their positive associations with the beaver that currently inhabit their BLM grazing allotment:

Male: ...even if I could, I wouldn't remove them from where they're at, just because I think it's a—to back that water up and keep the—I think it's a good thing in most places.

Female: You see elk or deer or antelope, or all the wildlife, including—and the cows all drinking from that big pond. They'd rather drink from that freshwater pond than mud (interview 13).

Many interviewees observed that beaver are relatively abundant within the broader landscape and often recolonize on their own, given appropriate habitat conditions. For example, interviewees near the site of the Stoneman Creek reconstructed beaver dam and beaver translocation said that "beaver were starting to make their comeback big time" even before the project, and that "populations have really exploded" since then (interview 14). Other interviewees described beaver recolonizing naturally after artificial ponds had been installed on their properties. In other cases, landowners expressed interest in installing artificial structures as a means of creating more attractive conditions for natural beaver recolonization:

When you turn a beaver loose in a wild situation and there's no dams, they can wander a long time before they find a spot that they feel comfortable with. We hope that what we can do is find spots that they're comfortable with and have something there for them to go to that they'll immediately finish the project and become permanent...They help slow the velocity of the stream down. That just in itself helps recharge the aquifer. Hopefully [installation of artificial structures will] give the attraction for the beaver to come in and settle (interview 9).

Positive Experiences With Partnerships

Although some landowners undertake beaver-related restoration projects on their own (e.g., Davee et al. 2017), implementing these projects often involves partnerships between agencies, NGOs, and other stakeholders (including landowners when it occurs on private lands). Interviewed landowners expressed some reservations about conducting work in partnership with state or federal agencies or NGOs, but many had positive prior experiences partnering on restoration efforts. One landowner praised the way that the U.S. Fish and Wildlife Service was willing to undertake agreements that were not overly bureaucratic: “They did a page-and-a-half or two-page agreement. It wasn’t a 90-some page, that most governments [do]... This was simple, plain and to the point. Even on the wetlands, it was just a page-and-a-half, two pages” (interview 5). Another rancher opined, “There’s a lot of mistrust of the government, period. The actions of the people, at least in the Boise [office of the U.S.] Fish and Wildlife Service, has been remarkable. Very trustworthy... They’ve been very straightforward and their actions speak for themselves” (interview 7).

Availability of Technical and Financial Assistance

External funding was often seen as critical for implementing restoration activities on private lands: “as far as any funding coming about for that because it’s not something we’d endeavor on our own because there’s just no economic way to justify it.” (Interview 4). “Money’s always tight on a ranch. We always wanna do—ranchers always wanna do the right thing and do the right thing for habitat, everything else for wildlife, but all of that costs money. It comes out of your pocket, even on cost-share projects, things like that, NRCS [Natural Resources Conservation Service] type things” (interview 2). Technical assistance with implementing restoration approaches for which landowners might not have expertise is also important. Several nonregulatory entities provide financial support or technical advice regarding water and watershed management, which can help landowners implement beaver-related restoration and adjust grazing practices so that they are complementary to restoration goals. These entities include the following:

- The Idaho Office of Species Conservation was created to coordinate private and governmental interests to protect sensitive species and to provide resources for planning within subbasins and watersheds.
- The NRCS provides financial and technical assistance for various conservation programs on private production lands.
- A variety of NGOs, including Trout Unlimited, the Owyhee Watershed Council, Ducks Unlimited, and The Nature Conservancy, are active in supporting restoration and habitat improvement efforts on ranches and public lands.

Interviewees enumerated several possible sources of grant and cost-share funding for beaver-related restoration projects. Funding associated with the Sage Grouse Initiative was mentioned in several interviews as a potential source of financial support. This is because wet meadow restoration (resulting from the addition of beaver dams or beaver dam analogues¹) can provide benefits to greater sage grouse (*Centrocercus urophasianus*) populations. Sage Grouse Initiative funds have already been used to support the removal of juniper, a practice that has been found to increase streamflow and thereby improve conditions for watershed restoration. The NRCS recently authorized funding for “post line-wicker weave” structures as well as Zeedyk (rock) structures as part of its farm conservation programs in Idaho (the Environmental Quality Incentives Program and Conservation Stewardship Program). Both the post line-wicker weave and Zeedyk structures represent low-cost instream structures that perform functions similar to beaver dams. At the time of our interviews, however, neither of these techniques had yet been funded by the NRCS in Owyhee County.

In addition, the U.S. Fish and Wildlife Service is beginning to pilot beaver-related restoration projects through its Partners for Fish and Wildlife Program, in which the agency provides funding and technical assistance to achieve habitat restoration and conservation on private and tribal lands. Permitting is currently underway for a demonstration project using beaver dam analogues in Owyhee County on one landowner’s ranch. Other projects underway, supported by various federal and nonprofit entities, entail the construction of offsite watering sources for livestock to prevent them from lingering in the riparian zone as well as cross-fencing projects that will allow ranchers to more easily control the amount of time their herds spend in particular areas.

Challenges for Beaver-Related Restoration in Owyhee County

Although interviewees described opportunities for beaver-related restoration, they also identified challenges to implementing it. These include the potential complications beavers pose to irrigation systems and livestock operations, undesirable landscape alterations made by beaver, potential liability for restoring habitat for sensitive and threatened species on private lands, environmental conditions unsuitable to beaver, and regulatory and permitting issues.

¹ A beaver dam analogue is a low-profile structure within a waterway constructed from organic material, and which may be supplemented by material from the stream bed and banks, in a manner designed to mimic the hydrological, geomorphological, and ecological functions of natural beaver dams.

Threats to Irrigation

Livestock operators in Owyhee County rely on irrigation for growing hay and for watering irrigated pasture. Most of the complaints regarding beavers had to do with their impacts on irrigation infrastructure. “That’s the biggest point of my complaint with them. The creek’s way down late in the summer. You still got a little bit of water coming. They’ll get in there and dam off your head gate. Shut your water off. You go out there, open it up. They’re back in there that night” (interview 7). Many landowners and ranchers made a distinction between the effects of beavers in upland, non-irrigated areas (which were seen as largely positive) and their impacts in irrigated areas or near irrigation infrastructure (which were overwhelmingly negative).

Another worry was simply that an influx of beavers could choose to dam certain areas inconvenient for landowners: “Where they’re situated on the creek, say if they dammed it here, it would not be good. I mean, you’d have water backing up into places you don’t want it. Where they are [currently], it’s not an issue at all” (interview 4). Another rancher related, “once in a while, they’ll be in a bad place where they’ll just flood a field and drown out your crops. They have to be removed then. Other than that, they—I kinda like ‘em to keep the creek checked up” (interview 13).

Challenges to Livestock Operations

Interviewees listed some concerns related to the impacts of beaver translocation or installation of beaver dam-mimicking structures on their livestock operations. The wet meadows that are created with the installation of artificial beaver dams or beaver dam analogues can lead to problems with livestock becoming stuck in deep mud. The flooding associated with dams can also complicate the movement of vehicles and horses across the landscape and can result in some loss of pasture. Perhaps more importantly, some ranchers expressed concerns regarding mandatory changes to their grazing practices that might be required as a condition for obtaining funding for restoration projects on private lands—changes such as building riparian exclosures to keep cattle out of riparian areas and revisions to grazing management plans.

At the same time, some representatives of public agencies felt that the introduction of beavers or beaver-related structures would likely be insufficient for promoting restoration if not accompanied by changes to grazing practices. One representative said this can be a formidable challenge:

Implementing any sort of infrastructure in the streams to prevent or reduce the incision that’s occurring really needs to be coupled with a change in

management so that we're protecting that area... It's often pulling teeth to get those other things accomplished, or it's typically the last thing that gets done and requires a lot of follow-up (interview 15).

In some cases, ranchers were already managing in ways that they felt would be compatible with beaver-related restoration: "We operate our ranch, which could help this program, on what we call a rest rotation for our cattle. There's areas that we won't graze for quite a while, then we rotate the animals on a rest rotation. I don't see that the cow would interfere a lot with any beaver dam or population" (interview 9).

Undesirable Landscape Alterations

Some respondents felt that beavers had little discretion in their use of materials for dam building, and that their activities can cause substantial alterations to the watershed and landscape. "They'll take every tree," as one landowner said, citing one instance where he witnessed a beaver cross a road 200 ft (70 m) from the water to work on a tree. "The trees all help hold the banks and help hold some material behind. In that situation, they're actually counterproductive to everything the conservation people say that they'll do" (interview 10). Another rancher felt that hardwood trees were relatively uncommon in the arid landscape of Owyhee County and lamented that beaver would kill and fell them. In other cases, respondents expressed concern that beaver dams can and will wash out during heavy water years, potentially causing problems downstream. According to one rancher, "Our experience with beavers are they're pretty good as long as they stay where they belong—but they will eat all of their habitat, themselves out, and then if you get a catastrophic event of water, it just washes them dams out and causes more trouble than what it was to start with" (interview 14).

The one Owyhee County example of dam installation and beaver introduction, the Stoneman Creek dam reconstruction and beaver translocation effort, also suffered from some undesirable outcomes owing to a lack of maintenance, according to interviewees in the vicinity:

The majority of [the installed structures], the water went right around the end of them and just washed a deeper hole than what it started with...[the BLM] took and cut juniper trees, and they physically made dams...They worked good as long as they maintained them. They held the silt, but as soon as they quit maintaining them, they just washed out. It would have taken very little maintenance to keep them up (interview 14).

Liability for Habitats Restored

One reason beaver-related restoration is growing in popularity among state and federal agencies is that it could benefit sensitive species such as the Columbia spotted frog and western toad, among others (IDFG 2016) and help to prevent them from being listed as threatened or endangered under the Endangered Species Act. Although none of the species that could benefit from beaver-related restoration in Owyhee County are currently listed as threatened or endangered, fear of the repercussions of having one or more of them listed was a theme throughout many interviews with ranchers and landowners. An Endangered Species Act listing, as well as the designation of critical habitat for listed species, could potentially result in land use restrictions that could complicate livestock grazing and related activities on both public and private lands. It should be noted that there are also tools, such as the Safe Harbor Program, that protect landowners from liability if they create or improve habitat for listed species. In addition, candidate conservation agreements with assurances can be used to protect landowners from additional obligations should a candidate species become listed. Nevertheless, the prospect of liability associated with attracting or encouraging sensitive species concerned several interviewed ranchers.

Many landowners saw beaver restoration as related to sensitive species preservation, and viewed many of their activities through that lens. Thus, a prevalent concern was about what could happen once restoration projects are completed. “I think it has to start somewhere. I mean, we’re not about getting rid of endangered species,” one rancher explained. But “sometimes you have kind of like a little touchy feeling about, well, do we even want to promote an endangered species because then what?” (interview 4). As one empathizing expert said, “Somebody is telling you all of a sudden you’ve got to limit what you’re doing so you can preserve the species that you’ve created...the habitat for” (interview 3).

Some interviewees described past riparian conservation projects that entailed riparian fencing; this was generally assessed as being too successful in eliminating grazing and thus resulting in the accumulation of dead vegetation. With respect to Columbia spotted frog protection, which was seen as a related effort by many ranchers, some interviewees felt that maintenance of the habitat alone would be difficult. For example, one rancher expressed concern about a hypothetical plan to fence constructed wetlands benefiting Columbia spotted frogs:

...At that altitude, there’s no way you can maintain a fence around each one of these ponds, because of the snow [they] would collapse and I’d spend all my time building a fence around those. The cattle have to have access

to them... [There's] always been access to the beaver ponds and the other natural ponds up there anyway (interview 7).

This particular concern may have been triggered by research findings that cattle exclusion from ponds and riparian areas benefit Columbia spotted frog populations (Pilliod and Scherer 2015).

In addition to the regulatory implications of sensitive species protection, several interviewees expressed concern that financial assistance programs may come with “strings attached”—additional requirements or restrictions that impinge on land-owner autonomy. For this reason, some interviewees described installing offstream wetlands on their properties using their own equipment and funding, rather than accepting financial support that they felt might ultimately result in reduced decisionmaking discretion. For example, an interviewed ranching couple described their process of installing offstream ponds for spotted frog benefit:

Male: Well, you know, [the ponds are] small, but we try to make them deep and in the right places. Then, that was the one [the U.S. Fish and Wildlife Service] offered us a contract. They offered to pay for it, but it—

Female: So many strings [attached].

Male: We told [the U.S. Fish and Wildlife Service representative], “You can come and look and study if you want, but we don’t want to sign anything. We’ll just do it” (interview 13).

Unfavorable Conditions for Beaver

Where artificial structures mimicking beaver dams are used as a restoration tool, a common goal is to encourage beaver to eventually move in on their own and take over the structures, or build their own dams. However, not all watersheds are necessarily well suited to benefit from this kind of intervention. The lack of year-round water in some drainages was perceived to be a major impediment to the establishment and maintenance of beaver populations. Many streams in Owyhee County are ephemeral and water is scarce. “They need a lot of water,” one rancher said, describing an attempt to attract beavers to establish on his private ranch property. “We had all of the food source, all of that. They [beavers] just didn’t have enough water” (interview 2). Stream incision and a lack of woody riparian vegetation in many areas also make for poor beaver habitat (fig. 3). In some areas, riparian vegetation has been hit hard by grazing; in others, by recent wildfires (fig. 4). This suggests that some areas may need changes in grazing management, installation of artificial structures, or active restoration to establish the needed riparian vegetation



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Figure 3—Castle Creek in northern Owyhee County, showing an absence of abundant woody riparian vegetation.



Figure 4—Much of the Owyhee County landscape was affected by the 2015 Soda Fire, which consumed riparian vegetation in some areas.

for the eventual reappearance of beaver. In some cases, beaver reintroduction was thought to be of questionable benefit owing to the pressure on beaver populations placed by trapping (particularly on public lands) and predation by large predators such as mountain lions.

Some interviewees identified the need to conduct remedial restoration on streams before they would be ready for installation of artificial beaver dam-like structures and the eventual return of beavers themselves. This was echoed by one partner representative:

I think that BDAs [beaver dam analogues] are a great tool when you have a stream which isn't heavily incised or with major issues... I think there are definitely places out there that absolutely could benefit from it but then I also think that heavier restorations should be done on the larger streams (interview 12).

These restoration activities were described as including the installation of rock, large wood, and “heavy vegetation planting.”

Regulatory and Permitting Issues

Interviewees regularly touched on concerns related to the regulatory context for watershed restoration. Regulatory and permitting issues related to beaver-related

restoration are linked to Idaho and federal water and wetland law and policy that affect the construction of beaver dam-like structures as well as beaver translocation. We provide an overview of these laws, policies, and the regulatory agencies below.

Roles of key entities—

Administration of the rights and obligations associated with management of Idaho waterways is divided among several federal and state authorities:

- The U.S. Fish and Wildlife Service is responsible for regulating the “taking” of any terrestrial or resident aquatic species listed under the federal Endangered Species Act as well as for the recovery of listed species and conservation and improvement of wildlife habitat generally.
- The U.S. Army Corps of Engineers regulates activities that remove or add material to waterways designated as “navigable,” or those that are connected to such waterways.
- The Idaho Department of Water Resources has statutory responsibility for the appropriation and protection of surface and groundwater resources.
- The Idaho Water Resource Board is an entity formed to implement the state water plan within the Department of Water Resources, and suggests rules governing stream channel alteration.
- The Idaho Department of Environmental Quality regulates water in accordance with the Clean Water Act by establishing clean water standards and total maximum daily loads.
- The Idaho Department of Fish and Game (IDFG) regulates the taking of wildlife species (fishing, hunting, and trapping) and works to conserve non-game wildlife to preclude Endangered Species Act listings.
- The Idaho Department of Lands regulates and provides assistance on a number of issues related to forestry, fire, and land management and regulates state trust land, including the beds of navigable rivers and the bed and banks of navigable lakes.

The IDFG regulates the trapping of beavers; beaver trapping is prohibited on private lands without landowner permission and in certain designated places across the state. In the 2015–2016 season, 57 beavers were taken by licensed trappers in Owyhee County out of a total of 2,155 trapped statewide (Crea et al. 2017). Idaho Code requires the IDFG to investigate filed complaints about beaver dams. In such a case, the IDFG receives a determination from the Idaho Department of Water Resources regarding whether the dam activity is injuring water rights, and requires the recommendation of a watermaster about how to address the problem.

If the analysis shows that water is being lost as a result of beaver activity in an amount that exceeds that lost prior to the construction of the dams, and that valid existing rights are deprived of water, the IDFG will take action to protect these rights. Removal of beaver structures is governed by a process set out by the Stream Channel Protection Act.

For activities that may alter stream conditions, the Stream Channel Protection Act requires that a joint application permit to alter a stream in Idaho be issued by the Idaho Department of Water Resources, the Idaho Department of Lands, and the U.S. Army Corps of Engineers. This applies to any alterations within the beds and banks of continuously flowing natural streams in the state. A permit is not required, however, to perform tasks associated with the maintenance of irrigation infrastructure, including the removal of beaver dams.

Interviewees related that permitting and regulatory concerns were generally not considered to be barriers to projects conducted offstream or in seasonal drainages (as was the case with many of the constructed ponds designed for Columbia spotted frog habitat). However, permitting issues, specifically state and federal permitting under the Clean Water Act, loomed large for instream work conducted in perennial stream systems where beavers are most likely to be found or to recolonize, as well as on federal lands where environmental analysis requirements are greater. To date, these permitting issues have led to an emphasis on offstream work on private lands. “I think it’s easiest for...government agencies to get stuff done on private land because you don’t have to go through all the regulatory NEPA [National Environmental Policy Act] and whatever else they do” (interview 4). One partner representative related frustration with trying to implement projects on federal land:

...[W]e have a lot of really coordinated boots on the ground but it’s a regulatory part of that that really hurts us being able to do [work on federal land].

To do a project we have to go through a legal process and all of that. I can tell you right now, every single one of those landowners would love nothing more than to be able to put some restoration work in on their BLM allotments...

It’s just regulatory [issues] makes it almost impossible (interview 12).

To date, there have been relatively few attempted instream or federal lands watershed restoration projects in Owyhee County. Many interviewees felt that the BLM (which controls the majority of Owyhee County rangeland and public grazing allotments) was under such scrutiny by litigious organizations that it had relatively little flexibility to change grazing practices, even if those changes implied a net benefit for riparian conditions and associated wildlife.

In general, interviewees appeared to be most interested in private land restoration projects owing to a combination of available funding and technical support, and what was perceived as a less demanding regulatory process when compared to federal lands. However, even on private lands, the time investment required to complete permitting requirements can complicate project implementation. According to a partner representative, it can be detrimental to a project:

I can tell you that waiting on permits is a real big issue for all the farmers. We'll fund them a grant and if they have to wait a really long time to get a permit on something—I've got friends actually who had grants. The permitting process took so long, the landowner actually just nixed everything (interview 12).

It is not known from these interviews how common this particular scenario is, but it may be worth future research to clarify.

Conclusions

Interviews with ranchers, landowners, and agency representatives revealed substantial opportunities for beaver-related restoration on Owyhee County rangelands as well as some important challenges. Landowners said they perceived benefits to both wildlife and their own operations from wetland restoration generally and the activities of beavers (or beaver-related structures) specifically. Their past experiences with restoration projects were largely described as positive, both in terms of project outcomes and in terms of their interactions with state and federal agencies. Aside from challenges related to maintaining irrigation infrastructure, the landowners and ranchers we interviewed largely described beavers themselves as a neutral or even beneficial presence on the landscape, and some individuals said they were highly motivated to introduce beavers or beaver-related structures onto their ranches. However, some interviewees expressed concern regarding the potential liability that could arise from creating habitat for sensitive species should they become listed as threatened or endangered; and they identified challenges related to the permitting component of instream work on perennial streams. They also described riparian vegetation as insufficient in many areas to support beaver populations, even as beaver were readily recolonizing other parts of the landscape on their own. Relatedly, there was some difference in the perspectives expressed by ranchers and some agency interviewees regarding the necessity of changes to grazing management to support riparian restoration. Where ranchers generally felt that cattle exclusion from riparian and wetland areas resulted in habitat degradation, at least some of the agency representatives interviewed said that the promises of watershed restoration

in these rangeland ecosystems would not be met without substantial changes to grazing management.

There may be specific opportunities to test the viability of artificial beaver-related structures through the NRCS' recent decision to fund post line-wicker weave and Zeedyk structures through farm support programs. The challenge with the use of these structures, as with any restoration project on productive landscapes, will be to meet wildlife habitat and conservation objectives while simultaneously providing benefits to private landowners, ranchers, and farmers in the county. Another challenge is to develop feasible approaches to conducting beaver-related restoration on federal lands, which currently many interviewees said is a difficult regulatory environment in which to work. The presence of multiple federal, state, and nongovernmental entities with interests in Owyhee County watershed restoration, combined with the goodwill created by past projects and interactions, suggests opportunities for continued collaborative learning regarding the practices and outcomes of beaver-related restoration.

From the expressed perspective of landowners and ranchers, the most important concerns were ensuring that the dams and instream structures were in the right place and ensuring that producers and landowners would not lose land management and income options because of the presence of beavers or species that benefit from wetlands. The other partners we interviewed generally expressed agreement on the need to align watershed restoration objectives with landowner and rancher interests, though some said that substantial changes to grazing operations would often be necessary to realize restoration benefits over the long term. Several prior habitat improvement projects, including pond installation for spotted frog habitat and juniper removal for sage grouse benefit, have demonstrated tangible benefits and have built trust and goodwill between landowners and state and federal agencies. In addition, the presence of multiple initiatives in Owyhee County and on rangelands generally point to substantial opportunities for technical advice, cooperative funding, and partnership building for future projects.

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