



Implementing Stewardship Practices that Benefit Species at Risk: Perspectives from the Land



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The Stewardship Centre for BC

The Stewardship Centre for BC (SCBC) was created to assist governments, businesses, conservation and environmental organizations, and citizens carry out stewardship activities in the most efficient, effective, and rewarding ways. A leader in promoting stewardship values as the foundation for sustainability, the SCBC wants to help make "shared stewardship" – the voluntary adoption of environmentally sustainable practices by all sectors of society – a reality in British Columbia.

We are committed to champion science-based best stewardship so that British Columbians understand, enjoy, and sustain healthy ecosystems through stewardship. As good stewardship relies on good decision- making, we work closely with our partners to develop innovative technical, educational, and capacity building resources. For more information about the Stewardship Centre, go to www.stewardshipcentrebc.ca.

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Acronyms

Acronym	Full name
ARDCorp	Agricultural Research & Development Corporation
B.C.	British Columbia
NGOs	Non-Governmental Organizations
SARA	Species at Risk Act
SAR	Species at Risk
SCBC	Stewardship Centre for British Columbia
SP	Stewardship practice
SPP	Stewardship Practices Project
UBC	University of British Columbia

Table 1: A list of the stewardship practices used by participants 28

Table 2: List of species at risk 29

Executive Summary

Introduction

By employing stewardship practices, such as riparian habitat protection or enhancement, land-managers across B.C. can play a critical role in protecting species at risk. To promote the further adoption of stewardship practices that benefit species at risk, the Stewardship Centre for BC profiled 20 land-managers across B.C. engaged in these practices.

The 20 case studies, completed from 2014-2017, included data on participants' stated motivations for stewardship, challenges to stewardship, and outcomes of stewardship. We also collected data regarding the employed stewardship practices and presence of species at risk. An analysis of these case studies demonstrates a better understanding of how: (a) money, (b) relationships, and (c) stewardship can help increase stewardship practice adoption.

Motivations

Only 25% of the participants stated they were motivated to complete stewardship practices extrinsically or by 'expected achievement of separable outcomes' such as financial benefits. When participants did discuss financial benefits as a motivation or an outcome they

often employed the logic of 'win-wins' suggesting that stewardship practices can benefit agricultural operations and nature in the long-term.

However, the initial costs and maintenance costs associated with stewardship practices such as riparian fencing or invasive species control was challenging for some participants. Financial incentive programs that offset costs associated with stewardship practices could help land-managers further adopt practices.

"At the end of the day if you haven't got healthy pasture lands and healthy water on your ranches, you are not going to be profitable"
-Project Participant

Some participants were motivated by their relationships with their families and communities to participate in stewardship, while many benefited from the relationships they formed while conducting stewardship activities. However, starting and maintaining relationships can be challenging. Some participants also stated that they were unaware of the support many organizations provide for stewardship practice adoption.

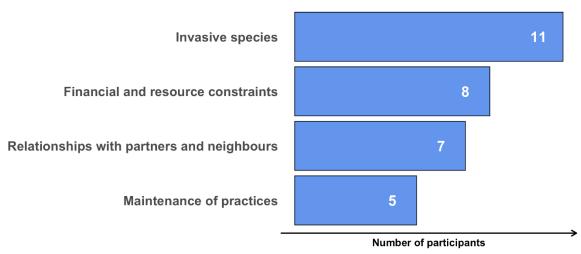
While conducting these 20 case studies, we also found that focusing on stewardship practices – easy and concrete to identify – was better for initial relationship building with potential participants than focusing on species at risk as participants were not always familiar with species at risk and/or wary of their association with the Species at Risk Act.

Participants were broadly motivated by a desire to be steward of their land. Increasing the adoption of stewardship practices requires an understanding of how land-managers view and interact with nature. This may be particularly relevant to 'early-adopters' of stewardship practices such as the participants in the Stewardship Practices Project who were

broadly motivated by stewardship as expressed by their desire to work with nature and to protect and enhance the environment.

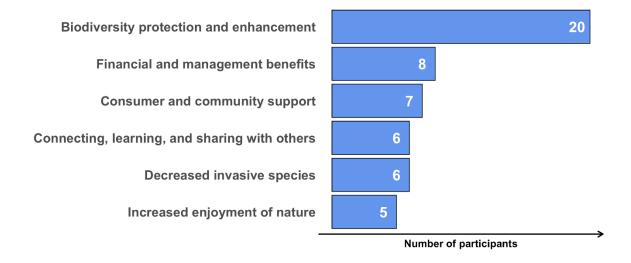
Perceived Challenges to Stewardship

More than half of participants mentioned challenges with invasive species when implementing stewardship practices. Participants noted that they were challenged by invasive species because of (1) the ongoing and incremental nature of the work and (2) a lack of effective non-chemical controls for larger impacted areas.



Stewardship Outcomes

Seven common outcomes were identified from the interview data. These outcomes were both social and ecological. All participants (20) saw increases in natural habitat and/or biodiversity because of the stewardship practices. Participants also observed many different types of wildlife benefiting or using the habitat they had protected or restored. Some participants observed species at risk using restored habitat.



Conclusion and Recommendations

Based on our results from a literature review and analysis of case studies, a stewardship practices model that accounts for the financial costs and benefits of stewardship, focuses on practices rather than species at risk, and focuses on supporting a stewardship ethic in land-managers demonstrates promise. As such, the stewardship practices model employed by the Stewardship Centre for BC in its work with land-managers, which utilizes easy-to-access information (guidance) on specific stewardship practices and showcases "early adopters" of these practices, could help increase adoption of practices by land managers.

Finally, following are recommendations for further work on stewardship practices that benefit species at risk:

(1) Create resource tool and further resources for land-managers Update the Stewardship Practices Project webpage to include more resources for land-managers such as links to organizations and resources that can assist with implementation of stewardship practices. This will provide a "one stop shop" resource currently missing in British Columbia. This is a response to some of the challenges land-managers face in navigating the many organizations attempting to increase the adoption of stewardship practices. As well, with their partners, SCBC can develop new resources that address concerns noted by land-managers, like invasive species. The SCBC could become a hub where land-managers are inspired by their peers, and then have some concrete resources to get started on their own projects.

(2) Complete more 'intensive' outreach and collaboration

With the completion of updated guides about stewardship practices and species at risk, a tool to search for species at risk (speciesatriskbc.ca) and 20 case studies, the Stewardship Centre is well positioned to increase outreach about SAR and stewardship practices with land-managers. The creation of a resource tool for land-managers noted above would complement these resources. Outreach that is more 'intensive' such as in-person presentations should be prioritized.

(3) Expand collaborative partnerships

Team up with organizations already working with land-managers to deliver more on the ground work. Increased collaboration between government, industry and the non-profit sector will increase the effectiveness of different approaches to stewardship. A 'Stewardship Practices Model' that supports and interacts with existing incentive programs such as BC's Environmental Farm Plan or account for regulations such as SARA will have a greater positive impact.

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Background

What is Stewardship?

The Stewardship Centre for British Columbia defines stewardship as follows: "stewardship is about taking responsibility to promote, monitor, conserve and restore ecosystems for current and future generations of all species." Bennett et al. (2018) proposes a similar definition: "local environmental stewardship is the actions taken by individuals, groups or networks of actors, with various motivations and levels of capacity, to protect, care for or responsibly use the environment in pursuit of environmental and/or social outcomes in diverse social-ecological contexts."

Both definitions emphasize responsibility for and care of ecosystems/environment. Bennett et al.'s (2018) definition is useful as it articulates the possible differences between stewards (e.g., in capacity and motivations) and explicitly includes individuals who are 'responsibly [using] the environment' such as farmers or ranchers.

What are Stewardship Practices?

Riparian areas, or transition zones between land and water, provide habitat for many species at risk, as well as, proportionally high numbers of other plant and animal species. These areas also provide a host of other benefits to plants, animals, and people (Lands Near Water, 2018). Land-managers can take steps to ensure that these benefits are maximized and threats to the environment are mitigated; we call these steps stewardship practices.

In this case, stewardship practices include protecting, establishing or restoring riparian buffers, controlling invasive species, maintaining unmown riparian strips, stabilizing banks with bioengineering techniques, restoring aquatic habitats, and properly managing manure (Figure 1). Stewardship practices are commonly referred to as 'best management practices', 'beneficial management' practices, and 'conservation practices'. Regardless of the terminology, increasing the adoption of these practices has positive benefits for people and wildlife.









Figure 1: Stewardship practices. (a) unmown riparian strips, (b) bioengineering bank stabilization, (c) manure stored far from tree-lined riparian area, and (d) protected riparian and aquatic habitat.

Understanding Stewardship Practice Adoption

Multiple theoretical frameworks exist for understanding stewardship practice adoption and how it might be increased. In this report, we draw from two recently proposed frameworks that provide contemporary overviews of the literature on stewardship and agricultural practice adoption.

Bennett et al. (2018), proposes an 'analytical framework' for understanding and supporting environmental stewardship. Stewards, influenced by their motivations, are constrained or enabled by their 'capacity' or their 'broader social and ecological' context, complete stewardship practices, which result in 'social and ecological outcomes'.

Mills et al. (2017) developed a framework to better understand the "factors influencing farmer environmental decision-making" as it relates to stewardship practices. The framework emphasizes that farmer decisions might be best understood by their 'willingness to adopt' practices, 'ability to adopt' practices, the level of 'farmer engagement', and how these three factors interact.

Applying these two frameworks to stewardship practice adoption in B.C., we focus on 'stewards' or land-managers who have completed stewardship practices. These land-managers are therefore '[willing] to adopt' at least some practices. We attempt to better understand their 'willingness to adopt' by focusing on land-manager's 'motivations'. Next, we focus on the challenges land-managers face in implementing stewardship practices. These challenges provide us with insight on land-manager's 'capacity' or 'ability to adopt' practices. We also discuss the 'social and ecological outcomes' of stewardship with land-managers. By better understanding adopters stated motivations for stewardship, challenges to stewardship, and outcomes of stewardship, we can better understand how stewardship practice adoption might be increased (e.g., Greiner, & Gregg, 2011).

Increasing Stewardship Practice Adoption

The two frameworks for understanding stewardship practice adoption also provide insights into how adoption might be increased. Mills et al. (2017) broadly describes three major approaches to increasing stewardship practice adoption: incentives, regulation, and volunteerism. All three approaches can occur simultaneously. In B.C., land-managers must comply with regulations such as the Species at Risk Act (SARA), which prevents managers from knowingly destroying species at risk habitat. Land-managers can apply to incentive programs, such as BC's Beneficial Management Practices program, which provide financial and technical resources to help land-managers adopt specific practices that can benefit species at risk. Finally, land-managers can adopt stewardship practices voluntarily without the influence of regulations or incentives.

Bennett et al. (2018) is more specific in terms of the possible 'leverage points' to increase environmental stewardship: "1) introduce new actors, 2) provide incentives, 3) augment local capacity or institutions, 4) promote or support the implementation of specific actions, or 5) monitor and evaluate the outcomes of stewardship to facilitate adaptive management".

Non-governmental organizations (NGOs), unencumbered by regulatory duties associated with government, can play a role in supporting and fostering potential stewardship practice adopters. Next, we discuss how the three approaches described by Mills et al. (2017) and five leverage points proposed by Bennett et al. (2018) relate to the Stewardship Centre for B.C.'s Stewardship Practices Project.

The Stewardship Practices for Species at Risk Project

The Stewardship Centre for BC (SCBC), an environmental non-governmental organization, initiated the Stewardship Practices for SAR Project (SPP) to increase the voluntary adoption of riparian stewardship practices that benefit species at risk (Figure 2). The focus is on increasing adoption via volunteerism rather than incentives or regulations. The SPP builds upon past work and projects which include the <u>Species at Risk Primer</u> and the <u>Stewardship Practices Guides for Species at Risk</u>

The SPP has four aims that relate to Bennett et al.'s (2018) leverage points as follows:

- (1) Foster partnerships between local government, agricultural producers, and ENGOs who have a long-term stake in stewarding the local land base to 'augment local capacity or institutions' and 'introduce new actors'.
- (2) Develop stewardship community champions to 'promote or support the implementation' of stewardship practices.
- (3) Address scientific gaps related to the effectiveness of the different riparian area and agricultural waterways stewardship practices by '[monitoring] and [evaluating] the outcomes of stewardship to facilitate adaptive management.'
- (4) Encourage voluntary stewardship actions to safeguard the natural areas of species at risk need to live thereby '[promoting] or [supporting] the implementation' of stewardship practices.

Stewardship Practices for Species at Risk







Figure 2: Screen-shot of Stewardship Practices Project web-page. The project showcases land-managers adopting stewardship practices that benefit species at risk. Additionally, a 'resources' page provides land-managers with resources to help them adopt more stewardship practices

Purpose of Report

We analyze the work completed for the Stewardship Practices Project (SPP) from 2014 to 2017 (Figure 2). The results include farm characteristics, a summary of documented stewardship practices, a list of documented species at risk, and a qualitative report on land-managers perceived motivations, challenges, and outcomes associated with stewardship activities.

The data is used to discuss stewardship practice adoption and how it might be increased. We also discuss whether a 'Stewardship Practices Model' approach focused on practices rather than habitat/species is an effective way to protect species at risk and conclude with recommendations for future work on the Stewardship Practices Project.

Methods

The Stewardship Centre for B.C. completed a total of 21 interviews with land-managers from across British Columbia (Figure 3). One case study focused on a land-manager still in the planning phase of their riparian projects and so was not included in this analysis. All 21 participants participated in riparian projects, in many cases with the assistance of agricultural or non-profit stewardship organizations. These organizations played a bridging role in identifying and providing contact details and introductions for potential participants.

Interview Process

After selecting and contacting landowners, a one-hour semi-structured interview and tour was completed for each site. The semi-structured interview was based on a data collection form created by Bernardo Ranieri and an interview protocol designed by Dr. Mollie Chapman (Chapman, 2017). The data collection form allowed for the gathering of systematic information regarding implemented stewardship practices and species at risk. The interview was designed to capture why landowners adopted stewardship practices (motivations), what problems they had with implementation (challenges), and what were the impacts of the adopted practices (outcomes). We also asked some land-managers to provide advice to other land-managers. Pictures and field notes were also taken to document the implemented stewardship practices.



Figure 3: Profiled participant standing in front of his restored and protected riparian area

Data Analysis

The data collation and analysis was completed by Adrian Semmelink. The data collection forms were compiled and the number of implemented stewardship practices were calculated. A list of all reported species at risk was also generated. Data detailing farm demographics was also collated. Ten of the interviews were fully transcribed. For the other ten only the parts deemed relevant to the motivations, challenges, outcomes, and recommendations were transcribed.

We used a grounded theoretical approach to analyze the transcribed qualitative data collected in the 20 interviews (Marshall & Rossman, 2014). This theoretical approach requires finding common themes present across multiple interviews. A qualitative analysis software program, NVivo, was used to find these common themes. Quotes are used to support these findings and are edited for length, clarity, and redaction of identifying information.

Limitations

Importantly, the results below should not be used out of context. The interviews were conducted with an unusual demographic: early adopters of stewardship practices who were willing to be publicized. The results should not be extrapolated to the broader BC agricultural community, but do provide an in-depth view of some important considerations for organizations pursuing stewardship goals on agricultural lands. Future research could provide further evidence for whether the findings are indicative of the broader community.

Characteristics of Stewardship Participants

To better understand operational differences between land-managers, we asked participants to provide information on the following: property size, production type, total employees, and land tenure length. Figure 4 showcases two important characteristics: property size and production type.

Cumulatively, the 20 participants managed nearly 150,000 acres. The size of properties ranged from 1 acre to 92,000 acres, while the median property size was 88 acres. In Figure 3, property size is aggregated as small (1-10 acres), medium (11-100 acres), large (101-1000 acres), and very large (1000 or more acres). Applying these categories, 5 participants are small, 8 are medium, 3 are large, and 4 are very large. The large and very large operations were often livestock operations who leased crownland.

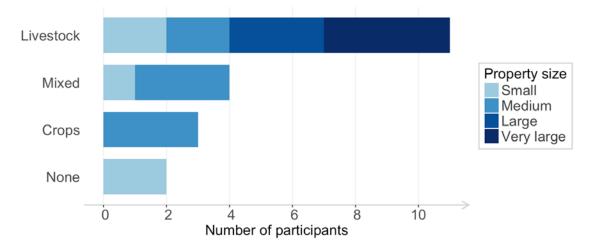


Figure 4: Summary of production type and property size

Figure 4 also shows the major groups of land-managers by agricultural production type: livestock, crops, both crops and livestock (categorized as 'Mixed'), or neither crops or livestock (categorized as 'None').

Most of the participants managed livestock, six of which managed cattle. Other participants who worked with livestock managed dairy cows, horses, chickens, ducks, sheep and pigs. Including the mixed operations, 7 participants produced crops. These crops included a variety of fruits, vegetables, and grains.

The number of people working on the land ranged from 0 to 30, with a median of three people employed per site. The participants who reported higher numbers, often relied on volunteers who were involved occasionally.

Participants and their family owned or managed their properties from 3 to 100 years. The median participant owned/managed their land for 31 years. The longer time periods were reported by participants whose family had owned or managed the land over multiple generations.

Motivations for Stewardship

The qualitative analysis of the motivations or goals for participating in stewardship programs and practices revealed nine common themes (i.e., more than one participant identified theme). Widely held motivations (i.e., more than 25% of participants) included: environmental protection and enhancement (18), desire to work with nature (11), enjoyment of nature (10), upbringing/family (7), and financial incentives (5) (Figure 5). Other motivations for participation included contributing to their community (4), management assistance (4), education (4), and a passion for stewardship work (2). These motivations provide insight into why these land-managers are '[willing] to adopt' stewardship practices on a voluntary basis (Mills et al., 2017). Applying Bennett et al.'s (2018) framework, motivations can be divided by whether they are intrinsic or extrinsic. Intrinsic motivations are 'associated with actions that are expected to bring personal pleasure or satisfaction'

such as the 'environmental protection and enhancement', 'desire to work with nature', enjoyment of nature, and 'upbringing and family'. Extrinsic motivations 'are associated with the expected achievement of separable outcomes' such as 'financial incentives'.

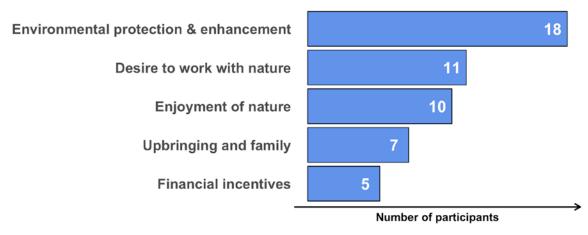


Figure 5: Widely held motivation

Environmental Protection & Enhancement

A large majority of participants (18) were motivated by a desire to protect and enhance the natural environment (Figure 6). This often took the form of a vision or a broad aim of the land-manager/s. For example, a participant suggests that clearing a channel of invasive species would allow them to enact their broader vision of environmental protection:

We could do something that would prevent [the channel] from getting choked and stick with [our] vision to support natural ecosystems and build a diversity of wildlife [M1, Mixed, Medium].

Legend

Motivations (M1 – M20) Livestock, Crops, Mixed (both livestock and crops), and None (neither livestock or crops) Small (1-10 acres), Medium (11-100 acres), Large (101-1000 acres), Very large (1001 or more acres)	Interview #	Production type	Property size
		livestock and crops), and None	100 acres), Large (101-1000 acres),

For one participant, these environmental motivations were more important than financial goals and influenced their decision to fence off a large area of their property and protect wetland habitat. However, the participant did not rely on farming as a primary source of income.

For me, maintaining biodiversity is extremely important. If I was coming from a financial standpoint, maybe not so much because we cut off a lot of our grazing. But our priority is to maintain biodiversity. [M2, Livestock, Medium]

Other participants expressed a desire to see improvements on their land related to increasing the 'natural activities' taking place on their property. The long-term goal of environmental stewardship was often tied to their feelings around family.

We've improved a lot of the natural activities that are occurring here. We look to pass it on in a better condition, a self-sufficient condition, than when we took it over from our family. [M3, Livestock, Large]

Figure 6: A participant with his cattle and protected riparian area

Desire to Work with Nature

Many land-managers (11) mentioned that completing the stewardship practices were part of their attempt to work with nature. One participant viewed their role as working with nature to make the production of food more 'fluid' or productive.

We call it holistic, natural, farming system, everything should fit together and there's no one part of the farm that's more important than the other. Our assistance as humans is to make the pieces fit together in a more fluid fashion, a more workable fashion as we understand the natural processes that are undergoing in the soil, in the water, or in the forest. [M4, Livestock, Large]

Others expressed this desire to work with nature as an attempt to better connect nature's pathways (e.g. nutrient flows) and their agricultural activities:

Our aim is to deepen the connection between natural pathways and agricultural production. [M5, Crops, Medium]

In some cases, their desire to work with nature was related to their goal of protecting or enhancing their natural environment. One participant describes that farming with nature was 'the right thing to do':

We saw potential for that to work with what we thought was the right thing, how we wanted to farm with the ecology. [M6, Livestock, Very Large]

Enjoyment of Nature

Many participants (10) were motivated to complete stewardship practices by their enjoyment of nature. For example, one participant described their enjoyment of nature.

As long as you leave wildlife alone they leave you alone. We like trees, vegetation water. [M7, Livestock, Large]

Another participant mentioned their love for nature. The participant suggested that they prefer not to leave their home because of their stewardship activities.

I wanted it to be a natural oasis.... When we come home here we don't want to leave. I love gardening, I love nature, I love wildlife. Bringing it to where you live makes it special. [M8, None, Small]

Upbringing and Family

A third of the participants (7) discussed the importance of family and their upbringing (Figure 7). One participant describes how their upbringing shaped their views on agriculture and the role it should play in protecting the environment.

I was born and raised in a small agricultural community. I spent a lot of time on farms, most of which had set aside non-productive land for habitat. I would often go fishing and hiking and I was lucky to spend all this time in nature. I think this is part of why I think agriculture is so important in sustaining wildlife habitat. [M9, Mixed, Medium]"

For some the stewardship practices allowed them to show the next generation what they were doing in terms of stewardship.

Family, strong family ties, we've got grand-children, you want them to see what you are doing, I take that personally, so it is a personal thing. [M10, Livestock, Small]



Figure 7: Participant and family

Financial Incentives

One in four participants (5) mentioned some financial benefits associated with stewardship practices and stewardship of the land in general. One participant said that for a rancher to make a profit they had to have 'healthy' pastures and water.

At the end of the day if you haven't got healthy pasture lands and healthy water on your ranches, you are not going to be profitable/[M11, Livestock, Very large]

Other land-managers mentioned the consumer support they receive because of the stewardship practices they implement. In one case the land manager linked the value of having his farm next to a water body that provided habitat for a species at risk (Salish Sucker) and how that would impact consumer support.

I like to showcase what we have; we need the consumer support for all this to work.... A high producing dairy farm right next to a creek with Salish Sucker [species at risk]. I mean how good is that. You can't buy that kind of advertising. [M12, Livestock, Large]

Other Motivations

A sense of community and a desire to contribute to their local community also motivated some land-managers to employ stewardship practices. For example, one land-manager relays that their goal is to support their family and broader community while also balancing the needs of their 'land':

Our goal is to promote strong and healthy families and to provide our community with a choice of nutritious quality farm products, while cultivating the holistic balance between land, animals and people [M13, Livestock, Very large]

Some land-managers expressed goals regarding educating others. These land-managers tended not to be family farms focused on agricultural production, but rather organizations dedicated to sustainable food production of smaller land-managers. However, in other cases, land-managers made it clear that this was explicitly not part of their motivations

We're not in the business of telling people what to do. We're in the business of running a ranch to the best of our ability to the most benefit to us and the total environment.... We're trying to develop a strategy that will work, and if it works and it becomes the norm, then so be it. [M14, Livestock, Very Large]

Other land-managers discussed how some stewardship practices can also assist in their management of their land. For example, one participant describes how creating a riparian buffer and limiting livestock access to a water body also served to prevent livestock from entering the channel and getting stuck:

Livestock will start eating here and then there's grass down there and soon they are in the ditch and can't get out. [M15, Livestock, Small]

Finally, two participants mentioned their passion for stewardship work as a motivation for completing stewardship practices. In one case, a participant mentioned how discovering that an organism was a species at risk increased her motivation to protect their habitat:

Finding out [that the frogs] are a species at risk stirred some passion in me to advocate for them and make sure their home is as protected as mine is. [M16, None, Small]

Challenges to Stewardship

We identified seven challenges that were themes across more than one interview (Figure 8). Widely discussed challenges (more than 5) included invasive species (11), financial and resource constraints (8), relationships with partners and neighbours (7), and maintenance of practices (5). Other less widely perceived challenges to stewardship included wildlife damage (4), uncertainty over long-term management of land (3), and potential negative outside influences (2). Some of these themes do overlap. Many of these challenges uncover where land-managers lack the 'capacity' or ability to adopt' practices (Bennett et al., 2018; Mills et al., 2018).

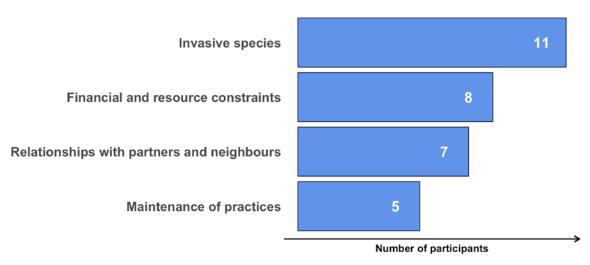


Figure 8: Widely perceived challenges

Invasive Species

More than half of participants (11) mentioned challenges with invasive species when implementing stewardship practices. Apart from invasive species, few other technical challenges were discussed by participants. Most invasive species discussed were plants including Himalayan Blackberry, Reed Canary Grass, Scotch Broom, Japanese Knotweed, Yellow Flag Iris, and Burdock. Although some participants did mention American Bull Frogs and Grey Squirrels.

Participants were challenged by invasive species because of (1) the ongoing and incremental nature of the work and (2) a lack of effective non-chemical controls for larger impacted areas.

Many participants described that removing invasive species was challenging because of the follow-up and maintenance required to control invasive species. One participant describes how removing invasive species is not a once off task, but rather an ongoing commitment: It does require effort and energy and ongoing commitment, especially if there are black-berries involved because they are persistent. It's not a let's do this and it will be fixed kind of thing. [C1, Mixed, Medium]

Interview #	Production type	Property size
Challenges (C1 – C20)	livestock and crops), and None	Small (1-10 acres), Medium (11-100 acres), Large (101-1000 acres), Very large (1001 or more acres)

The challenge of maintaining stewardship practices is discussed further below.

Other participants noted that non-chemical weed control options either have not worked or are impractical for larger areas. Some land-managers expressed a desire to use chemical controls but noted that it was not legal to do so in riparian habitat. One land manager describes how alternative controls such as burning or smothering with plastic/cardboard often don't work in wet environments or are infeasible over large areas (Figure 9):

Burning didn't work, it's so thick that the native plants can't grow through We don't want to use anything toxic. People don't know what to do. Putting down cardboard and plastic is infeasible for large areas. [C2, Livestock, Large]



Figure 9: Reed canary grass resisted burning and is proving challenging to remove

Financial and resource constraints

Many participants (8) discussed the difficulty of completing some of the stewardship practices due to financial and resource constraints. Land-managers discussed two major financial/resource constraints: (1) few direct financial benefits, and in some cases, costs, and (2) limited time and resources to implement stewardship practices and programs.

Some participants also perceived negative financial impacts or costs to implementing stewardship practices prevented them from completing stewardship practices. One participant highlighted how maintaining some of these practices can be at odds with a farmer's financial needs. Specifically, he discussed how cutting down trees, which provide wildlife habitat, could allow one to make a bank payment if you can sell the lumber. If you are busy trying to figure out how to make a bank payment you are not going to try to do stewardship just to make yourself feel better. Instead, you will be possibly cutting trees to pay the bills. [C3, Livestock, Large]

Some land-managers expressed that although they would like to implement more stewardship practices they are limited by available funds and labour. For example, one participant mentioned the expenses associated with building riparian cattle exclusion fences.

At the end of the day, its money, and available labour. Labour costs money too, and this is not easy country to build fence in, its expensive area to fence in. [C4, Livestock, Very large]

Another land-manager discussed how even though limited time did prevent them from undertaking all the stewardship practices they would like to complete they do not resent the time that they do allocate to stewardship practices:

I certainly don't begrudge the time and I think it's time very well spent. [C5, Crop, Medium]

Relationships with Stewardship Partners and Neighbours

Some participants (7) suggested that the many different players in agricultural stewardship made it time consuming, confusing, and at least one missed an opportunity to receive help with implementing some of the stewardship practices.

If you are involved in these programs they become time consuming, I would love to see a way where programs all fit together so that the time the farmer has to spend is minimized. I don't have to do five separate inspections... They can all be minimized to reduce my time. That's one thing that really [would] make it easier for a lot of farmers that are trying to start up. You go to a farm and say, 'Okay you going to spend 3 days a year for this and 5 days a year for that' they're going to say no. [C6, Livestock, Large]

One participant mentioned that they did not know about a program that could have helped him/her implement the stewardship practice.

The EFP, the South Similkameen Conservation Program they are all there they even provide labour, which I didn't know at the time....I would have gone through them knowing now. [C7, Livestock, Large]

Other participants mentioned that the many different partners involved made it difficult to maintain communication and therefore, make the 'best decisions' for 'land stewardship'.

Communication can be challenging within the watershed. There is a need to maintain open and clear communication so we can continue to learn from each other and make the best decisions for land stewardship. [C8, Mixed, Medium]

Maintenance of Practices

Another continuity issue is fence maintenance as in the words of one participant: "a fence is only as good as the fence is maintained." Maintenance can be very costly and many funding programs only provide funding for the installation of these projects.

The maintenance on these riparian projects is a huge problem down the road. A lot of these developments are new and they have already started to become that [a huge problem]. We

have been talking about how do we maintain all this stuff. We have approximately 30 kilometers of fence and riparian zones, that doesn't work for our operation. If you had one here and there you could maintain it. But you only have so much time, there is only so much to go around. [C9, Livestock, Very large]

Other Challenges

Three other challenges were discussed by more than 1 and fewer than 5 participants: wild-life damage, uncertainty over long-term management of land, potential negative outside influences. Four participants discussed challenges with wildlife damage. Some participants discussed how wildlife damaged their operation:

There are maybe some costs in the fact that the [bighorn] sheep generally eat our third cut of hay so that's a cost that we take, because whether we have a deer fence or not we still irrigate it and fertilize to try and get that hay. So that's a cost but we kind of like seeing the sheep too. [C10, Livestock, Very large]

Other participants challenged by wildlife, discussed how deer or beaver could set back their efforts at stewardship by browsing on seedlings (deer) or bringing down planted trees (beavers).

Some land-managers were nearing retirement and did not know who would take over managing the land once they did and were therefore concerned over the long-term management of the land.

This farm is most probably going to go out of production when my brothers and I get so old we can't do it and nobody has bought it. [C11, Livestock, Large]

The same participant worried about what could happen if they were to sell to a farmer who did not use similar stewardship practices.

It only takes one farmer to come along and start spraying chemicals and fertilizers and running off into creek and ditches again. [C12, Livestock, Large]

Finally, a few participants were worried about the impact negative outside influences might have on the completion of stewardship activities. For example, one participant describes the anxiety of someone upstream releasing their swimming pool water into the stream as it would damage the stewardship work they had undertaken:

If somebody upstream dumps something in the stream, and that it hasn't happened, but you just think what if they empty their swimming pool or something, so you can get a little anxious. [C13, None, Small]

Outcomes of Stewardship

We identified 7 common outcomes from the interview data (Figure 10). These outcomes were both social and ecological (Bennett et al., 2018). By common, we mean more than 1 participant mentioned the outcome. The 6 outcomes that were widely discussed (more than 5 participants) are biodiversity protection and enhancement (20), financial and management benefits (8), consumer and community support (7), connecting, learning, and sharing with others (6), and decreased invasive species (6), and increased enjoyment of nature (5). Finally, a few participants also mentioned increased water quality as an outcome (2). The social outcomes include financial and management benefits; consumer and community support; connecting, learning, and sharing with others; and increased enjoyment of nature. The biophysical outcomes include biodiversity protection and enhancement and decreased invasive species.

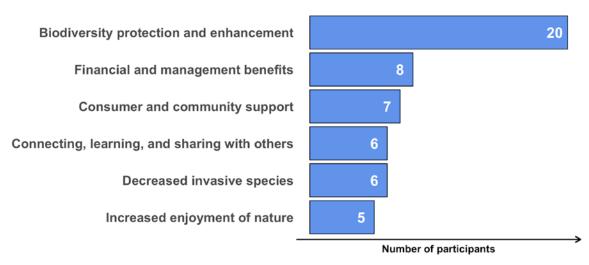


Figure 10: Widely perceived outcomes

Increase in Habitat and Biodiversity

All participants (20) saw increases in natural habitat and/or biodiversity because of the stewardship practices (Figure 11). Participants also observed many different types of wild-life benefiting or using the habitat they had protected or restored. Some participants observed species at risk using restored habitat.

One participant described how a stewardship group working on their land had helped increase the available wildlife habitat on the farm by planting trees:

I'm happy with what they've done in terms of providing a little bit of habitat. They've planted lots of trees on my property. [O1, Mixed, Small]

Interview #	Production type	Property size
Outcomes (O1 – O20)	livestock and crops), and None	Small (1-10 acres), Medium (11-100 acres), Large (101-1000 acres), Very large (1001 or more acres)

Another participant was particularly proud of the number and variety of species that used their restored riparian area:

We are proud of what came down the mountain due to this work. [We] run into everything: white tail deer, moose, woodpeckers, bald eagles, porcupines, and more. All these animals were always here but they were up in the hillside. They didn't come down because there was no protection. [O2, Livestock, Large]



Figure 11: Western Painted Turtle. Picture provided by Dave Zehnder

Another participant discussed how because of their restoration work frogs returned to the area. The participant, who had grown up on the property, had not heard frogs in this area since childhood:

As a kid growing up here was a lot more water and then over the years it went. Now we hear frogs again, you know that buzzing at the slough, and that's been in the last 5 or 6 years. [O3, Livestock, Large]

In a few cases, participants observed species at risk benefiting directly from their work. One participant describes observing a Lewis Woodpecker, a SARA listed species, in a riparian area that they fenced off from their cattle (Figure 12):

And there [the Lewis Woodpecker] was. In the area that we'd fenced off. It was a beautiful thing. It was the icing on the cake. Here's this endangered species showing up. It was powerful for me, encouraging to me that it could happen. [04, Livestock, Very large]

Financial and Management Benefits

Four in ten participants discussed financial or management benefits associated with adopting stewardship practices.

One participant suggested that by farming in a 'natural fashion' they have been able to benefit financially.

By learning to farm in this manner, we have improved our bottom financial line, by reducing costs phenomenally, and increasing our returns, so for us there is a financial benefit, but it took years and years to achieve that. [05, Livestock, Large]

Some participants used win-win logic to describe how employing these practices benefited both habitat and their own operation. For example, one rancher explains how completing riparian projects, allowed for better herd management thereby increasing cattle weight.

For us it's nice to see the improvements of the grasslands and how projects work, and the benefits that we think we are doing, by doing all these different projects, and how the cattle are maybe getting heavier or getting better. It's like a win-win and that part of it is kind of nice to see. [O6, Livestock, Very large]

Consumer and Community Support

Seven participants discussed receiving increased consumer and community support because of their involvement in stewardship activities. One participant discussed how the stewardship practices they adopted gave them a 'social license', and provided them with support of their claim to their consumers that they were environmental stewards:

This is the type of thing that helps give you social license and build your brand from a hard and fast business perspective. It provides legitimacy to your claim of being an environmentally friendly operation. [07, Livestock, Very large]

Another participant discussed how as because of stewardship work they increased their public profile with the community. They fenced a lake to prevent cattle from accessing the lake. Many people lived on the other side of the lake and the preventative steps made the public feel better about his cattle operation.

Public perspective is probably the most important thing. Everybody thinks we are a hero over there, because we fenced the lake. [08, Livestock, Very large]

Connecting, Learning, and Sharing with Others

Three in ten participants discussed how by participating in stewardship activities they connected, learned and shared with others. For example, one participant discusses how the stewardship group he was working connected them with the Invasive Species Council after spotting an invasive species on his property.

They noticed the [invasive] Japanese knotweed in the area, just one small patch right smack in the middle of our farm. And they connected us with somebody from the Invasive Species Council. [09, Crops, Medium]

Others mentioned learning opportunities on their own land either for themselves or others. In one case, protected wetlands were used as a science fair project giving the entire family a learning opportunity.

My son used one of the wetlands as a reference for his science fair project and he made it all the way to the nationals in Montreal this year. It's provided learning for us all. [O10, Livestock, Large]

A few participants discussed how other land-managers had adopted similar stewardship practices after observing their own. One participant discussed how their neighbours saw what he was doing and emulated his fencing project to decrease erosion and protect riparian habitat.

They saw what we were doing with the fence going along the stream where the horses are. They've fenced that big area to prevent more soil erosion [along their streambank]. [O11, Livestock, Small]

Decreased Invasive Species

Six participants noticed a decrease in invasive species because of their stewardship work. Many of those who did notice decreases were smaller operations. One participant described how the removal of Himalayan blackberry, replanting of native riparian plants, and cattle exclusion fence has created healthier habitat for these native species.

I haven't done any studies, but overall there is clearly more growth, fewer blackberries, we can look at that, so there's been that process. [O12, Livestock, Small]

Increased Enjoyment of Nature

One quarter of the participants mentioned increased enjoyment of nature as a result of stewardship. For example, one participant describes how the work a stewardship group completed on their land increased the aesthetics of the property.

I think aesthetically it looks nice, the habitat is nice, the extra trees are nice. [O13, Mixed, Small]

Figure 12: Participant observing protected riparian and aquatic habitat

Increased Water Quality

A few participants discussed how these stewardship practices increased their water quality. For example, one participant explained how a wetland was created to serve as a natural waste water treatment project, where plants purified water moving through the wetland.

[There is] so much bird life, cattail, wetland plants that are cleaning the water. It is a wetland, a dynamic and vibrant ecosystem. [O14, Mixed, Small]

Advice from Land-managers for Land-managers

Five land-managers also offered advice to other land-managers considering stewardship projects. Most of these participants suggested engaging with programs that help land-managers adopt stewardship practices. They suggested BC wide programs such as the Environmental Farm Plan or BC Wetlands Program while also recommending regional and local partnerships as helpful.

One participant recommended starting with the Environmental Farm Plan program. Completion of the program also allows land-managers to access funding to help complete stewardship projects.

One of the best things to do to get started is to do an Environmental Farm Plan. Sometimes just having a look at what you're doing will make you see places to improve. Often if people recognize it, people will do it. [A1, Livestock, Very large]

Interview #	Production type	Property size
Advice	Livestock, Crops, Mixed (both	Small (1-10 acres), Medium (11-
(A1 – A20)	* / '	100 acres), Large (101-1000 acres), Very large (1001 or more acres)

Another participant cautioned that without a good business plan you will not be able to complete much stewardship.

If your business plan is poor you're just going to be a [bad] environmental steward because you're just always scrambling to make a buck. [A2, Crops, Medium]

Reported Stewardship Practices

Table 1 contains a list of the stewardship practices that were documented throughout the 20 case studies. An important caveat is that we relied on the land-managers to self-report many of these practices. Although we did our best to observe as many practices as possible, some practices such as 'avoiding over application of manure' are impossible to monitor in one visit. Notably most land-managers avoided clearing riparian vegetation, the use of pesticides in riparian areas, controlled invasive species, and avoided the over application of manure. Fewer participants created pits and mounds, used plant whips to stabilize banks, composted, or were involved in data collection.

Many of the practices that were documented the highest percentage of times were steward-ship practices that avoided harm (e.g., 'avoid clearing of riparian vegetation) or practices and controlling invasive species. One exception was 'planting native vegetation' which 85% of participants completed and requires an action from the land-manager. Other practices that required more specialized knowledge and are costlier such as 'create pits and mounds' were completed less often. Data collection was reported by 45% of farms but was often carried out by stewardship organizations. Finally, 55% of participants reported the presence of species at risk.

Table 1: A list of the stewardship practices used by participants

Relevant Guide	Stewardship Practices	Recommended Techniques	Times Documented (%)
Lands Near Water:	Protect existing riparian areas	Avoid clearing of riparian vegetation	20 (100%)
Riparian Restoration & Enhancement		Pesticide/herbicide use in riparian areas only to control invasive species	20 (100%)
2		Avoid dumping organic waste in riparian areas	16 (80%)
	Establish new or restore de-	Plant native vegetation	17 (85%)
	graded riparian buffers	Protect plantings from wildlife and livestock	16 (80%)
		Install large woody debris	10 (50%)
		Create pits and mounds	6 (30%)
		Create riparian wetlands	9 (45%)
	Control invasive species	Varies by species	20 (100%)
	Augment riparian areas with	Maintaining unmown or seldom mown strips	11 (55%)
	agroforestry or leave strips	Maintain or plant agroforestry crops	8 (40%)
Drainage Maintenance in	Use sensitive methods to	Manual work used to clear ditches	9 (45%)
Agricultural Waterways	work in waterways	Worked during in-stream work window if necessary	12 (60%)
·	Stabilize banks using bioen-	Plant whips (cut branches or saplings)	5 (25%)
	gineering methods	Construct structures (wattle fences, live palisade and live brush areas)	7 (35%)
	Restore aquatic habitats	Habitat complexing	10 (50%)
		Constructed wetlands & stream channels	9 (45%)
	Avoid over application or	Avoid over application	19 (95%)
poor storage of manure		Composting program or digester	9 (45%)
		Proper storage	14 (70%)
Monitor and Evaluate	Monitoring	Data collection	9 (45%)
Projects	Protect species at risk	Presence of species at risk	11 (55%)

Reported Species at Risk

A small majority of participants reported species at risk on their property (55%). However, discussing species at risk with participants was more challenging compared to discussing stewardship practices. Participants could easily identify the practices they were or were not using, whereas species at risk (SAR) requires specialized knowledge and interest. Two major challenges emerged when discussing species at risk:

- (1) Knowledge gap: many participants did not know whether specific species were 'species at risk'. In some cases, participants mentioned stewardship groups identifying the species at risk on their property.
- (2) Hesitancy regarding species at risk: some participants were hesitant when discussing species at risk and the Species at Risk Act (SARA). In a few cases, this association with SARA resulted in potential participants refusing to participate hindering our recruitment effort.

Despite these challenges, 76 different species at risk were reported by participants. Most of these species were reported on two properties. Table 2 provides a list of these species at risk and their SARA designation as reported by land-managers and their partner organizations. A number next to each species indicates the number of sites at which a SAR was reported at different case study sites. Species of amphibians and fish (6), birds (26), invertebrates (11), mammals (12), reptiles (8), and plants (13) were reported (Table 2).

Table 2: List of species at risk reported by land-managers and their partner associations

Common Name (Scientific Name)	Status		
Common Name (Scientific Name)	BC List	COSEWIC	SARA
Amphibians and Fish [6]			
Blotched Tiger Salamander (Ambystoma mavortium)	Red	E (2012)	1 (2003)
Great Basin Spadefoot (Spea intermontana) [3]	Blue	T (2007)	1-T (2003)
Northern Red-legged Frog (Rana aurora) [4]	Blue	SC (2015)	1-SC (2005)
Oregon Spotted Frog (Rana pretiosa)	Red	E (2011)	1-E (2003)
Salish Sucker (Catostomus sp. 4) [3]	Red	T (2012)	1-E (2005)
Western Toad (Anaxyrus boreas) [3]	Blue	SC (2012)	1-SC (2005)

Common Name (Scientific Name)	Status		
Common rame (Secentific France)	BC List	COSEWIC	SARA
Birds [26]		_	
Barn Owl (Tyto alba) [2]	Red	T (2010)	1-SC (2003)
Barn Swallow (Hirundo rustica)	Blue	T (2011)	
Bobolink (Dolichonyx oryzivorus)	Blue	T (2010)	
Brewer's Sparrow, breweri subspecies (Spizella breweri breweri)	Red		
Burrowing Owl (Athene cunicularia)	Red	E (2006)	1-E (2003)
Canyon Wren (Catherpes mexicanus) [2]	Blue	NAR (1992)	
Common Nighthawk (Chordeiles minor) [2]	Yellow	T (2007)	1-T (2010)
Flammulated Owl (Psiloscops flammeolus) [3]	Blue	SC (2010)	1-SC (2003)
Grasshopper Sparrow (Ammodramus savannarum)	Red		
Gray Flycatcher (Empidonax wrightii)	Blue	NAR (1992)	
Great Blue Heron, herodias subspecies (Ardea herodias herodias)	Blue		
Lark Sparrow (Chondestes grammacus) [2]	Blue		
Lewis Woodpecker (Melanerpes lewis) [3]	Blue	T (2010)	1-T (2012)
Long-billed Curlew (Numenius americanus) [2]	Blue	SC (2011)	1-SC (2005)
Olive-sided Flycatcher (Contopus cooperi)	Blue	T (2007)	1-T (2010)
Peregrine Falcon, anatum subspecies (Falco peregrinus anatum) [2]	Red	SC (2007)	1-SC (2012)
Prairie Falcon (Falco mexicanus)	Red	NAR (1996)	
Sage Thrasher (Oreoscoptes montanus)	Red	E (2010)	1-E (2003)
Sandhill Crane (Antigone canadensis)	Yellow	NAR (1979)	
Short-eared Owl (Asio flammeus) [2]	Blue	SC (2008)	1-SC (2012)
Swainson's Hawk (Buteo swainsoni)	Red		
Western Screech Owl, macfarlanei subspecies (Megascops kennicottii macfarlanei) [3]	Red	T (2012)	1-E (2005)
White-headed Woodpecker (Picoides albolarvatus) [2]	Red	E (2010)	1-E (2003)
White-throated Swift (Aeronautes saxatalis)	Blue		
Williamson's Sapsucker (Sphyrapicus thyroideus) [2]	Blue	E (2005)	1-E (2006)
Yellow-breasted Chat (Icteria virens) [2]	Red	E (2011)	1-E (2003)

Common Name (Scientific Name)		Status	
	BC List	COSEWIC	SARA
Invertebrates [11]			
Behr's Hairstreak (Satyrium behrii)	Red	E (2012)	1-T (2003)
California Hairstreak (Satyrium californica)	Blue		
Common Sootywing (Pholisora catullus)	Blue		
Half-moon Hairstreak (Satyrium semiluna)	Red	E (2006)	1-E (2007)
Immaculate Green Hairstreak (Callophrys affinis) [2]	Blue		
Lance-tipped Darner (Aeshna constricta)	Blue		
Monarch (Danaus plexippus)	Blue	SC (2010)	1-SC (2003)
Okanagan Robber Fly (Efferia okanagana)	Red	E (2011)	
Oregon Forest Snail (Allogona townsendiana)	Red	E (2013)	1-E (2005)
Twelve-spotted Skimmer (Libellula pulchella)	Blue		
Vivid Dancer (Argia vivida)	Blue	SC (2015)	
Mammals [12]			
American Badger (Taxidea taxus) [2]	Red	E (2012)	1-E (2003)
Bighorn Sheep (Ovis Canadensis)	Blue		
Fringed Myotis (Myotis thysanodes) [2]	Blue	DD (2004)	3 (2005)
Great Basin Pocket Mouse (Perognathus parvus)	Blue		
Mountain Goat (Oreamnos americanus)	Blue		
Nuttall's Cottontail (Sylvilagus nuttallii) [2]	Blue	SC (2006)	1-SC (2007)
Pacific Water Shrew (Sorex bendirii)	Red	E (2016)	1-E (2003)
Pallid Bat (Antrozous pallidus) [2]	Red	T (2010)	1-T (2003)
Spotted Bat (Euderma maculatum) [2]	Blue	SC (2014)	1-SC (2005)
Townsend's Big-eared Bat (Corynorhinus townsendii)	Blue		
Western Harvest Mouse (Reithrodontomys megalotis)	Blue	SC (2007)	1-SC (2009)
Western Small-footed Myotis (Myotis cilliolabrum)	Blue		
Reptiles [8]			
Desert Nightsnake (Hypsiglena chlorophaea) [2]	Red	E (2011)	1-E (2003)
Gopher Snake, deserticola subspecies (Pituophis catenifer deserticola) [2]	Blue	T (2013)	1-T (2005)
Northern Rubber Boa (Charina bottae) [2]	Yellow	SC (2016)	1-SC (2005)
Pygmy Short-horned Lizard (Phrynosoma douglasii)	Red	XT (2007)	1-XX (2003)
North American Racer (Coluber constrictor) [2]	Blue	T (2015)	1-SC (2006)
Western Painted Turtle (Chrysemys picta pop. 2) [4]	Blue	SC (2006)	1-SC (2007)
Western Rattlesnake (Crotalus oreganus)	Blue	T (2015)	1-T (2005)
Western Skink (Plestiodon skiltonianus)	Blue	SC (2014)	1-SC (2005)

Common Name (Scientific Name)	Status		
Common Name (Scientific Name)	BC List	COSEWIC	SARA
Plants [13]	,		
Alkaline Wing-nerved Moss (Pterygoneurum kozlovii)	Blue	T (2004)	1-T (2006)
Annual Paintbrush (Castilleja minor var. exilis) [2]	Red		
Cut-leaved Water-Parsnip (Berula erecta) [2]	Blue		
Flat-topped Broomrape (Orobanche corymbosa ssp. Mutabilis)	Blue		
Lemmon's Holly Fern (Polystichum lemmonii)	Red	T (2003)	1-T (2005)
Many-headed Sedge (Carex sychnocephala)	Yellow		
Moss no common name (Pteryganeurum lamellatum)	Red		
Narrow-leaved Brickellia (Brickellia oblongifolia var. oblongifolia)	Blue		
Nettle-leaved Giant-hyssop (Agastache urticifolia)	Blue		
Rusty Cord-moss (Entosthodon rubiginosus)	Blue	E (2004)	1-E (2006)
Showy Phlox (Phlox speciosa ssp. occidentalis)	Red	T (2004)	1-T (2006)
Western Centaury (Zeltnera exaltata)	Red		
Whitebark Pine (Pinus albicaulis)	Blue	E (2010)	1-E (2012)

Discussion

We discuss why money, relationships and stewardship matter to the adoption of stewardship practices for the 20 land managers included in this study. We end with a discussion regarding the effectiveness of a 'Stewardship Practices Model' in protecting and enhancing habitat for species at risk by private land-managers.

Why Money Matters

Only 25% of participants stated they were motivated to complete stewardship practices extrinsically or by 'expected achievement of separable outcomes' such as 'financial incentives' or 'positive management outcomes.' (Bennett, 2018). However, some participants were motivated by finances (e.g. M11, M12), while others saw finances as a challenge to implementing stewardship practices (e.g. C3-C5), and eight participants discussed financial and management as outcomes of stewardship practices (e.g., O5 & O6). In a few cases, participants expressed that they were both motivated and challenged financially when adopting stewardship practices. This counterintuitive result could be due to the direct, concrete, short-term costs associated with implementing stewardship practices and the indirect, difficult to quantify, long-term benefits of completing stewardship practices.

The long-term benefits associated with completing stewardship practices were often described using the logic of win-wins, that is: 'what is good for the environment is good for the land-manager'. Although only one participant used the term 'win-wins (O6)', many land-managers embraced the term when describing the motivations and outcomes for and of stewardship practices. These win-wins are generally indirect or difficult to quantify such as 'increased consumer support'. Based on our results, some land-managers using these practices observe positive financial outcomes, and the logic of win-wins may be a useful way to frame stewardship practice adoption. However, care should be taken when using this framing. The prior beliefs of land-managers regarding specific practices are an important factor to the success of employing the logic of win-wins. If a land-manager believes that a stewardship practice will not benefit them, suggesting that it does can be counterproductive (e.g., Andrews et al., 2013).

Participants also face financial and resource constraints to implementing stewardship practices (e.g., C3-C5). Many of these stewardship practices require significant upfront costs even if the land-manager believes that the practices have financial and operational benefits in the future. Although some land-managers are willing to give up profits for stewardship (e.g., Chouinard et al., 2008), cost-sharing or incentive programs can play an important role in increasing the adoption of stewardship practices by alleviating the cost of participation. For example, BC's Environmental Farm Plan Program (EFP) is a voluntary agri-environmental incentive program that provides farmers/ranchers access to financial and technical assistance to complete beneficial management or stewardship practices. This can be a valuable tool for land-managers to diffuse some of the upfront costs of engaging in stewardship practices.

As some participants noted, stewardship practices can have on-going maintenance costs (e.g. C9). Programs that can help offset some of these costs could also be a useful approach to increasing stewardship practice adoption. Ongoing support for some practices such as invasive plant removal and fencing maintenance could be especially useful. Some pro-

grams already provide ongoing support such as the Farmland Advantage Program (previously known as the Ecological Services Initiative) who are piloting ongoing support programs for agricultural land-managers using some of these practices. These and other programs could be expanded to fully support stewardship practice maintenance.

Importantly, incentive programs can be designed in such a way that supports and reinforce land-manager's pre-existing values (Chan et al., 2016). For example, the EFP program benefits from approaching it as a cost-sharing exercise. This signals to land-managers that they are partners rather than paid service providers, thereby engaging their own internal motivations for completing stewardship, rather than relying only on their need for financial support.

Why Relationships Matters

Participants discussed the relationships as motivations, challenges, and outcomes. These relationships are with people or organizations, but they also discussed their relationships with nature (see next section).

Many participants were motivated by their family and community to engage in stewardship (e.g., M9, M10, M13). Framing stewardship in terms of family and community could resonate with many land-managers. Other relationships were conversely seen as a challenge. Some participants were challenged in starting and maintaining relationships with their neighbours and stewardship partner organizations. In a few cases, starting relationships with potential stewardship partner organizations was not a challenge due to a lack of time but rather a lack of awareness of the existence of the program or organization. This is not a deficit in information regarding how the practice works and its possible benefits, but rather a deficit in information regarding programs/organizations that can help land-managers adopt stewardship practices.

Some participants discussed how by engaging in stewardship they increased their opportunities to connect, learn and share with others (e.g., O9-O11). While others discussed the benefits to their relationships with their consumers and community by participating in stewardship (e.g., O7, O8).

As a stewardship organization interacting with land-managers, lessons can also be drawn from our experience conducting 20 cases studies. One insight from the relationships we formed while completing the Stewardship Practices Project was related to access. Successful case studies were often the result of connecting with land-managers through organizations already operating on the ground. In other cases, land-managers who had pre-existing relationships with the Stewardship Centre for BC also proved easier to access. In some cases, attempts were made to reach land-managers unconnected to the SCBC or its partner organizations; these generally proved unsuccessful. This suggests that leveraging prior relationships may be a better use of an organization's resources. The need for coordination between stewardship organizations was also raised as some participants expressed frustration and confusion with the number of different people taking up their time. Conversely, some participants expressed their gratitude for all the people working in this field.

Another insight from our experience working with land-managers involved species at risk and the Species at Risk Act (SARA). The Stewardship Practices Project was focused on increasing the adoption of stewardship practices that increased habitat for species at risk. In some cases, emphasizing stewardship practices rather than species at risk resonated more

with participants given that the term 'species at risk' was not necessarily well-understood and its association with SARA. Our four years of field experience working with land-managers suggests that focusing on stewardship practices rather than species at risk might increase access to some land-managers.

What we haven't discussed regarding relationships, is a land-managers' relationship with their land. Next, we discuss how this relationship relates to the concept of stewardship and why it matters.

Why Stewardship Matters

Nearly all participants stated that they were motivated by 'intrinsic' motivations which are 'associated with actions that are expected to bring personal pleasure or satisfaction'. Many of these intrinsic motivations related to stewardship such as 'environmental protection and enhancement' (e.g., M1-M3) or a 'desire to work with nature'. In our analysis, we separated these motivations into different categories as land-managers expressed them in different ways. Arguably, these different categories could be thought of as different types of discourses with the same underlying motivation: stewardship.

Given that the focus of the Stewardship Practices Project is developing 'Stewardship Champions' it may be unsurprising that most participants were motivated by protecting and enhancing the environment and all participants observed increases in habitat and biodiversity because of stewardship practices (e.g., O1-O4).

However, some participants also noted the challenges of working with nature. Four participants discussed how wildlife had either damaged their operations (e.g. deer grazing crops) or stemmed their acts of stewardship (e.g. beavers destroying planted saplings). All these participants acknowledged this as a challenge but were also willing to overcome it, in an effort to be stewards of their land.

Motivating stewardship therefore requires an understanding of how land-managers view and interact with nature. Eleven of twenty participants discussed their desire to work with nature (M4-M6) as a motive for adopting stewardship practices. The concept of 'working with nature' compares to the more common refrain associated with land-managers, or farmers, is 'working the land'. The latter emphasizes a relationship of mastery or domination of the land, while the former suggests a more harmonious relationship between land-manager and their land. Regardless, our results suggest that a land-manager's relationship with their land is an important factor in stewardship practice adoption.

A Stewardship Practices Model?

The Stewardship Centre for BC (SCBC) requested that we reflect on the potential of a 'Stewardship Practices Model' to increase stewardship practices adoption. This model could be considered 'volunteerism' (Mills et al., 2017). Specifically, this project has focused on the promotion of stewardship practices by developing 20 'stewardship champions'. Through parallel projects, the SCBC has also sought to 'augment local capacity' and 'address scientific gaps' through the creation of expert advisory groups who are developing technical guides for land-managers and organizations seeking to adopt more stewardship practices. We'll discuss how the literature and our data support these approaches to stewardship. But first we'll discuss the difficulty of measuring the effectiveness of such approaches.

Quantifying the effectiveness of programs that aim to increase the adoption of stewardship practices is difficult. Even measuring the adoption of practices (e.g. Mackay, 2010) does not provide an accurate measure of the benefits to the environment. Of the 20 land-managers who participated in the Stewardship Practices for SAR project (SPP) 45% were aware of some type of monitoring of habitat or biodiversity on their land (Table 1). In many cases stewardship partner groups were responsible for the monitoring. In other cases, monitoring was limited and included a list of what plants and animals had been observed on the property. At a more abstract level, all our participants observed benefits to habitat and biodiversity.

Other research has advocated for the use of 'flagship' owners to ensure wider adoption of 'conservation' or stewardship practices (e.g., Wilcove & Lee, 2004). Our results indicate that land-managers who adopt stewardship practices sometimes 'spread' these practices even though education of others is often explicitly not part of their motivation for implementing stewardship practices. This result suggests that 'leading by example' or developing and supporting 'Stewardship Champions' is an effective strategy for increasing stewardship practice adoption.

The 'information deficit model' or concept that individuals will change their behaviour simply by being given the 'right' information is often considered ineffective at instigating large-scale pro-environmental behaviour change (Kollmuss & Agyeman, 2002). However, in the literature completed on stewardship practices in agriculture, evidence suggests that 'access and quality of information' (Baumgart-Getz et al., 2012) is a driver of stewardship practice adoption. Lemke et al. (2010) adds to this widely supported claim with survey data from the U.S. showing that outreach is most effective when it is intensive: 'one-on-one landowner visits, localized workshops, and tours'. This type of outreach emphasizes the importance of relationship building. Our results suggest that information about how to find support for stewardship practice adoption is important. The participants in the SPP are already involved in stewardship activities and might see knowledge about practices as less of a barrier compared to information about where to find support.

Finally, we return to what motivated our participants. We discussed how only some participants were motivated extrinsically (e.g., financial or management benefits), most of our participants were intrinsically motivated through goals such as their 'enjoyment of nature', and their 'upbringing and family'. As Bennett et al. (2018) and Chan et al. (2016) argue, these intrinsic motivations could be more 'durable' compared to extrinsic motivations for adopting stewardship practices. This concept also supports Mills et al. (2017) assertion that approaches that increase volunteerism are a more long-term solution compared to incentives and regulations that rely on continued support from government.

Based on our results, a stewardship practices model that accounts for the financial costs and benefits of stewardship, focuses on practices rather than species at risk, and focuses on supporting a stewardship ethic in land-managers demonstrates promise. As such, the stewardship practices model employed by the SCBC in their work with land-managers which utilizes easy-to-access information regarding support and guidance on specific stewardship practices and showcases "early adopters" of these practices can help increase adoption of practices by land managers and is consistent with previous research.

Future Recommendations

Three major recommendations emerged for moving the Stewardship Practices Project forward:

(1) Create resource tool and resources for land-managers

Update the Stewardship Practices Project (SPP) webpage to include more resources for land-managers such as links to organizations and resources that can assist with implementation of stewardship practices. This will provide a "one stop shop" resource currently missing in British Columbia. This is a response to some of the challenges land-managers face in navigating the many organizations attempting to increase the adoption of stewardship practices. As well, with their partners, SCBC can develop new resources that address concerns noted by land-managers, like invasive species. The SCBC could become a hub where land-managers are inspired by their peers, and then have some concrete resources to get started on their own projects.

(2) Complete more 'intensive' outreach and collaboration

With the completion of new guides about stewardship practices and species at risk (SAR), a tool to search for SAR, and 20 case studies, the Stewardship Centre is well positioned to increase outreach about SAR and stewardship practices with land-managers. The creation of a resource tool for land-managers noted above would complement these resources. Outreach that is more 'intensive' such as in-person presentations should be prioritized.

(3) Expand collaborative partnerships

Team up with organizations already working with land-managers to deliver more on the ground work. Increased collaboration between government, industry and the non-profit sector will increase the effectiveness of different approaches to stewardship. A 'Stewardship Practices Model' that supports and interacts with existing incentive programs such as BC's Environmental Farm Plan or account for regulations such as SARA will have a greater positive impact.

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