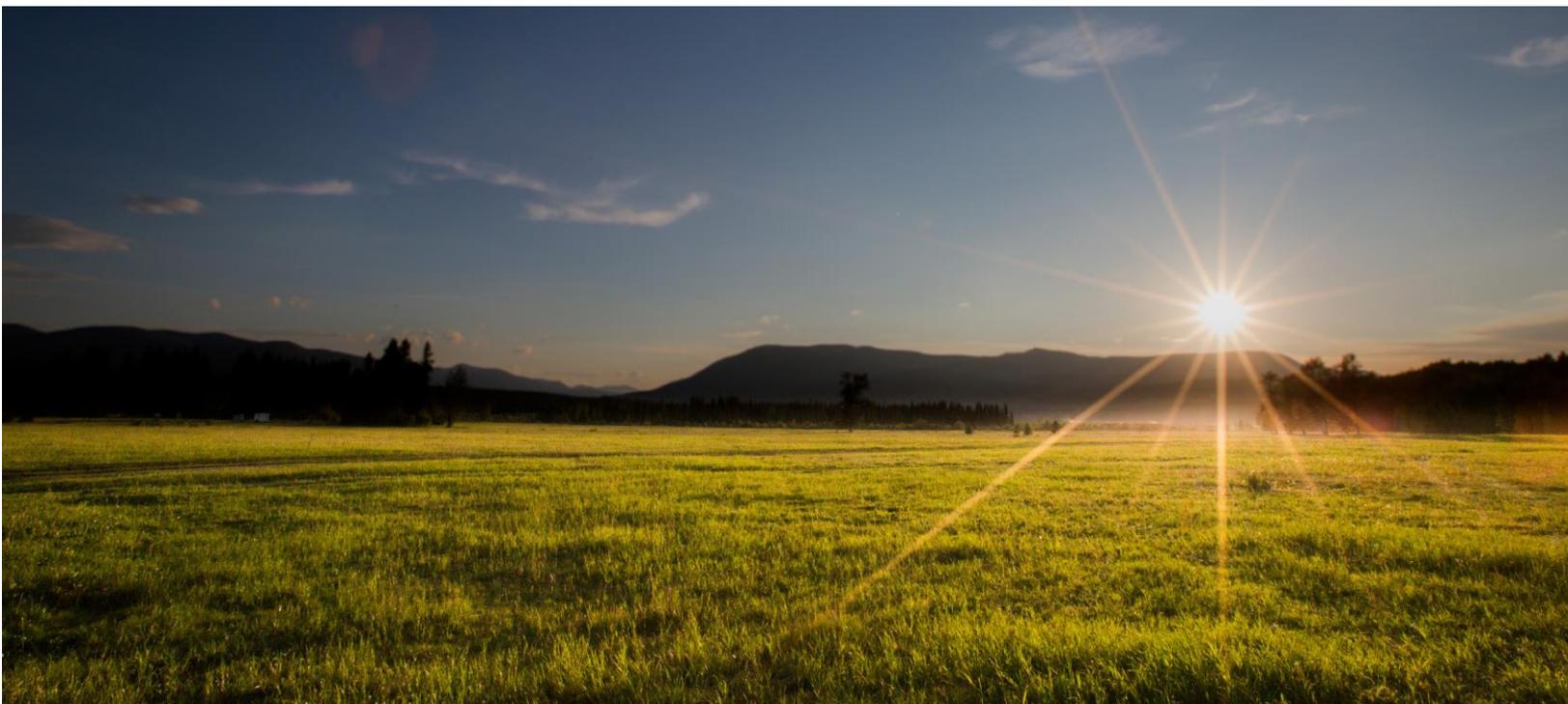


FRAMEWORK FOR COMMUNITY-BASED LANDSCAPE RESTORATION

SCALING UP RESTORATION EFFORTS IN BLUEBERRY RIVER FIRST NATIONS TERRITORY



MAY 2021

**FRAMEWORK FOR COMMUNITY-BASED LANDSCAPE RESTORATION:
Scaling Up Restoration Efforts in Blueberry River First Nations Territory**

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1. BACKGROUND

The Blueberry River First Nations (BRFN) people have lived in their territory in north-eastern British Columbia since time immemorial, relying on Indigenous practices and rights to develop a vibrant culture and economy tied to the lands and waters. The degradation of watersheds, forests, and wildlife populations in BRFN territory has sundered this way of life, which was assured to BRFN members by the Crown under Treaty 8. The goal of this report is to examine approaches for BRFN to restore impacted lands and waters in their territory in support of the inherent rights and interests of its members.

1.1 IMPACTS TO THE LAND

The degradation of ecosystems poses a threat to the natural environment and all living things within it, including BRFN way of life.

Impacts to the lands, waters and wildlife in BRFN territory have been extensive. Forestry, agriculture, mining, oil and gas development, and other industrial land uses have left a large footprint on the landscape. A territory-wide assessment in 2016 indicated that 73% of the area inside BRFN territory was within 250 meters of an industrial disturbance and less than 14% of the forest landscape was considered intact (E. Macdonald 2016). The intense and pervasive scale of development is further confirmed by analysis undertaken at the joint provincial and First Nation governments Regional Strategic Environmental Assessment (RSEA) pilot project (documents in preparation).

With environmental degradation and loss of habitat, BRFN members have reported substantial declines in the abundance and health of wildlife, fish, and plants. Species, such as caribou, are disappearing from the landscape (Susan Leech and Bates 2016) and sites that were once used for hunting, camping, and teaching have been lost (Blueberry River First Nations et al. 2018). The cumulative effects of these impacts have displaced BRFN members, preventing them from meaningfully carrying on traditional practices protected under Treaty 8.

Loss of access to traditional foods has direct impacts to the food security, health, and overall well-being of BRFN members. In addressing these impacts, a first measure must be cessation or limitation of further landscape destruction, along with establishment of protected areas. Restoration is not a panacea for unchecked development, but it is an important tool in the recovery of ecological and cultural values in impacted areas. Restoration efforts need to prioritize activities that promote the health of the ecosystem, human wellbeing and livelihoods, and Indigenous communities alike (Gann & Lambs 2006). By restoring the relationships between people and ecosystems, culturally-appropriate ecological restoration benefits both social and ecological systems.

1.2 RECIPROCAL RESTORATION

The health of the environment is tightly linked to the spiritual, physical, and overall cultural well-being of Indigenous people (Morishige et al. 2018). Reciprocal restoration focuses on restoring these relationships.

There is an urgent need to cease destruction and to improve the health and quality of lands and waters in BRFN territory. Active habitat restoration has become increasingly important for the recovery of threatened species and ecosystems in Canada, as habitat loss, degradation, and fragmentation are the most prevalent threats to biodiversity (Venter et al. 2006).

While ecological restoration aims to repair damage to ecological communities, it is often unclear if or how restoration projects incorporate the revitalization of traditional practices and life patterns for Indigenous communities (Wehi and Lord 2017). The relationships between people and place are crucial to repairing impacted Indigenous rights and interests and are a vital component of functional and healthy ecosystems. Restoring these relationships promotes cultural revitalization and ecosystem resiliency by strengthening connections between people and the environment (Morishige et al. 2018).

For the purposes of this report, we will focus on reciprocal restoration: the enhancement, creation, or re-creation of habitats that aims to restore the environment as well as Indigenous human relationships with the land. End-goals for reciprocal restoration place emphasis on the revitalization of ecosystems and cultural practices; in other words, returning relationships between the environment and people to what they were prior to disturbance.

Defining “Restoration”

Activities intended to improve the condition of injured ecosystems may be referred to using a variety of terms, including “restoration”, “rehabilitation”, “remediation”, or “reclamation”, among others. These words are often used interchangeably but their definitions may vary in practice. End-goals, for example, can range from erosion control, or the restoration of a single species, to historical fidelity of the ecosystem – returning a degraded site to the exact condition it was in prior to disturbance (Gann, et al., 2019).

In this report, we focus on the implementation of reciprocal restoration, which aims to restore dynamic ecosystems and human cultures together as interconnected processes (Kimmerer, 2011). Also referred to as “ecocultural” or “biocultural” restoration, end-goals for this approach emphasize the importance of environmentally and culturally effective restoration that revitalizes healthy relationships among the land, water, wildlife, and people.

1.3 INDIGENOUS STEWARDSHIP

Indigenous approaches to caring for the land are reciprocal in nature and promote ecosystem diversity, productivity, and resilience (Turner 2014).

Implicit in the historical practices and governance structures of BRFN is the maintenance of ecosystem health for the benefit of animals, plants, and people alike. BRFN has Indigenous management practices that include stewardship and restoration of the water and lands in their territory. These practices, which include activities such as leaving areas to 'rest', burning, planting, and weeding, are informed by ancestral knowledge and have supported healthy socio-ecological communities since time immemorial.

Protected under Treaty 8, these stewardship practices are not confined to the boundaries of reserves or parcels of negotiated treaty land but cover the entire BRFN territory. With an intimate knowledge of the land, a vested interest in restoring the health of injured ecosystems, and Indigenous protocols for stewardship, BRFN are well positioned to support the restoration and safeguarding of ecosystems in their territory.

2. FRAMEWORK OVERVIEW, SCOPE AND PURPOSE

This framework is intended to support the development of large-scale restoration planning in BRFN territory.

The goal of this work was to identify a framework for restoration in BRFN territory that promotes consistency across projects and reflects BRFN priorities for the recovery of ecological and cultural values. This report includes discussion on the importance of scaling up restoration in BRFN territory, steps for developing a landscape-scale restoration plan, and guidance for implementing restoration efforts at the site-scale.

In this report, we build on BRFN's experience leading site-scale restoration projects and desire to see these programs expanded across the territory. The development of this framework was informed by a review of key resources for restoration planning.¹ BRFN community engagement was conducted from November through December 2019 and included an open house, Lands staff workshop, and discussions with key BRFN staff members in other departments.

This report includes information on:

- The importance of scaling up restoration in BRFN territory;
- A framework for landscape-scale restoration planning;
- Guidance for restoration efforts at the site-scale; and
- Recommendations for promoting Indigenous content in restoration projects.

¹ Please refer to Appendix 1 for an annotated bibliography of key documents on restoration frameworks reviewed for this report.

2.1 TRADITIONAL ECOLOGICAL KNOWLEDGE AND RESTORATION PRACTICE

Traditional Ecological Knowledge describes the cumulative body of knowledge, practice, and understanding handed down over generations, building on past experience and adapting to changes.

Traditional Ecological Knowledge (TEK) provides a baseline for ecosystem and cultural recovery rooted in a multi-generational history of experience on the land. With long-term insight into ecological relationships and environmental trends, this information must be considered on equal footing with modern scientific research.

TEK is critical for effective restoration, including especially the prioritization of sites to restore, the development of restoration end-goals, and the selection of appropriate treatments. By combining TEK with scientific understanding, restoration can be a powerful vehicle for revitalizing or sustaining cultural practices, connection to the land, and knowledge transmission to younger generations (Senos et al. 2006).

2.2 BLUEBERRY RIVER FIRST NATIONS CASE STUDIES

BRFN have taken a leadership role in the restoration of degraded lands to support the revitalization of ecosystems, culture, and community health. Still, protection of areas from further development is needed. Although restoration alone cannot address ecosystem degradation, BRFN restoration programs are featured throughout this report as case studies, including a pilot project for the restoration of caribou habitat, watershed monitoring, and an orphaned wells program. This report builds on key cross-cutting themes, challenges, and successes drawn from BRFN case studies to inform the development of a framework for large-scale restoration planning, and key considerations for promoting Indigenous participation in its implementation.

3. SCALING UP RESTORATION

With a diversity of industrial impacts, target values, and stakeholder groups, a mosaic of restoration activities are being implemented across BRFN territory. It is important to note the significant time and space lag between destruction and restoration, and further between restoration actions and the return of ecological integrity and associated opportunities to exercise treaty rights. To promote meaningful and positive change on the landscape, there is an increasing need to coordinate restoration efforts across the territory.

3.1 THE IMPORTANCE OF DEVELOPING A TERRITORY RESTORATION PLAN

The scope of the industrial disturbance footprint within BRFN territory is immense. There are almost no areas that have not seen some form of industrial activity, and in much of the territory the intensity of the footprint is some of the highest in the region and in the province. The joint provincial and First Nation governments RSEA Project has identified that many ecological and cultural thresholds have been exceeded already – resulting in a need to both cease development in some areas (protection zones) and to implement a coordinated restoration plan to recover ecological function at the landscape scale.

Local restoration sites are linked to the larger landscape context in which they occur, with the quality, quantity, and configuration of habitat at the landscape level being critical to ecological integrity and BRFN land use. While the physical work of restoration tends to be focused at the scale of the individual feature or site being restored, restoration outcomes and benefits, such as species recovery, are ultimately evaluated at the landscape level. Effective restoration therefore requires explicit linkages between local restoration efforts and corresponding landscape restoration goals (Ray 2014).

From a species' recovery perspective, a single site or feature cannot be deemed restored in isolation, and the surrounding landscape context will strongly influence whether or not a site is occupied (Arkle et al. 2014). Similarly, BRFN harvesting and land use practices are heavily influenced by the abundance and distribution of resources, including the health and condition of areas surrounding a given site (Susan Leech, Bates, and Blueberry River First Nations 2016; S Leech et al. 2017).

For many species and BRFN practices, successful restoration requires the revitalization of large areas, supporting connectivity at the landscape scale. Maintaining this connectivity requires a configuration of restored habitat that satisfies the life history requirements of species and provides sufficient access to resources needed to sustain the practice of BRFN rights and interests. With limited funds and resources available for the implementation of restoration work, a landscape-scale plan is crucial to meeting these multi-pronged goals.

Current restoration in BRFN territory is dominated by local-scale efforts aimed at restoring features, such as well pads, cutblocks, linear features, or stream crossings. With recent changes to legislation and increasing requirements for companies to restore impacted features, it is anticipated that such restoration activities in BRFN territory will increase in the coming years.

However, legislative and policy changes to date have not ensured that restoration will occur at a sufficient time or spatial scale to promote ecosystem health or recovery.

Rather than implement restoration efforts independently with respect to individual features and sites, BRFN wishes to develop a coordinated strategy for building suitable habitat and restoring relationships to the land. This will require a framework for landscape-scale restoration, complete with specific targets, objectives, and guiding principles for the prioritization of restoration sites and the allocation of resources. Areas identified for future protection as part of the RSEA Project, for example, may provide strong candidate locations for future coordinated restoration activities. Work is currently underway through the RSEA Methods Pilot to understand the scale of restoration funding required to make a meaningful addition to ecological integrity at the landscape scale.

Case Study 1: BRFN orphan and dormant wells program

With the introduction of new legislation in spring 2019, oil and gas companies are required to decommission, assess, and restore dormant sites that have not produced for five or more years. Currently, almost 5,000 dormant well sites exist in the BRFN consultation area. Timelines for decommissioning, assessing, and restoring sites are staggered, with targets for the percentage of sites that must reach each stage over the coming 16 years. All sites dormant before December 31, 2018, must be restored by the year 2036.

BRFN is currently working with the BC Oil and Gas Commission on a pilot restoration program for eight orphan sites, totalling 13.5 hectares within the BRFN consultation boundary. Moving forward, BRFN wishes to expand this work to include the restoration of all dormant well sites in BRFN critical areas through the development of joint workplans with permit holders.

As part of this program, BRFN wishes to develop higher standards for the restoration of orphan well sites. Until recently, oil and gas companies were only given basic requirements for revegetation — implementation was often permit holders spreading a forestry grass and clover seed mix. Despite recent guideline revisions, the current regulatory standards remain inadequate. From BRFN’s perspective, these practices are not sufficient to restore healthy and vibrant ecosystems or the cultural practices that rely upon them. With new guidelines for the use of ecologically relevant species in site reclamation,² BRFN seeks to promote the use of culturally important plants that revitalize relationships among the land, wildlife, and people.

3.2 COORDINATING EFFORTS ACROSS SPATIAL SCALES

BRFN members rely on a rich diversity of resources including plants, birds, fish, and animals distributed across the landscape. These resources are not limited by administrative boundaries,

² BC Oil and Gas Commission. January 7, 2020. Commission Clarifies Use of Ecologically Suitable Species. Industry Bulletin 2020-02. Retrieved from: <https://www.bcogc.ca/node/15786/download>

and regardless of the spatial scale selected, they are likely to overlap with a variety of management units and jurisdictions. As a result, ecosystems, plants, animals, fish, and other culturally important resources are managed by a diverse set of agencies at different spatial scales and often with a focus on single species. Examples of common spatial scales used in resource management and restoration planning are summarized in Appendix 2.

Coordinating restoration efforts at this broader scale requires holistic, overarching goals and targets that promote interagency collaboration. The development of a BRFN-led approach to restoration will promote the inclusion of TEK and values, with improved representation in the activities and outcomes of restoration initiatives at various spatial scales across the territory.

The development of a restoration framework will provide BRFN with a set of restoration goals and targets for communication and collaboration with government agencies, industry representatives, and other stakeholder groups living and working in the territory. This will promote the development of partnerships for the implementation of collaborative restoration projects.

4. FRAMEWORK FOR RESTORATION PLANNING AT THE LANDSCAPE-SCALE

STEP 1: EVALUATE IMPACTS TO THE LANDSCAPE AND BRFN RESOURCE SUFFICIENCY

Assessing the current impacts across the territory is a critical first step in the development of a landscape-scale restoration plan. The RSEA Project has developed a Disturbance Layer dataset which compiles disturbance data from multiple sources into a single useable format. The RSEA team is currently in the process of calculating the total length of linear features across the broader landscape, as well as for sub-areas identified by BRFN. This work provides important insight into the extent of the issue – for example, there are approximately 210,000km of seismic lines within the Fort St John TSA (an area that overlaps substantially with BRFN territory). These seismic lines have been classified in relation to their probability of natural recovery, based on width and location. A substantial proportion of the seismic lines have been identified likely permanent and are unlikely to recover without active restoration treatment. Similarly, data are being compiled on the length of roads, pipelines, and well sites in differing states of recovery. These data are being considered cumulatively by the RSEA table to understand the scope of restoration funding required to improve overall ecological integrity.

Reviewing and documenting existing impacts to BRFN rights and interests with additional member input will also be crucial to prioritize resources and relationships that require restorative action. Impacts to BRFN ways of life should be assessed in terms of access to sufficient lands and resources for hunting, fishing, trapping, and gathering for sustenance and livelihood, as well as cultural and spiritual practices, among other purposes (Candler 2012).

Case Study 2: BRFN tributary study

Based on TEK, BRFN began a three-phased study in 2017 to catalogue watershed condition, establish priority areas for restoration, assess stream health, and develop recommendations for restoration. The study combined standardized western science water quality testing with a TEK framework for assessing watershed health.

BRFN participants in this study received certification in the CABIN protocol for wadeable streams, as well as training in stream crossing and fish passage assessments. Restoration prescriptions developed for each of the sites have been used to inform conversations with tenure holders and private landowners.

The approach and methods developed in this study can be applied across BRFN territory to inform a living catalogue of stream health and restoration priorities. BRFN intends to continue growing capacity in this area, scaling up site-assessments and restoration work in other watersheds across the territory.

STEP 2: ESTABLISH LANDSCAPE-SCALE TARGETS FOR RESTORATION

Targets for landscape-scale restoration rooted in ecological and cultural thresholds for BRFN resource sufficiency requirements will form the foundation for the framework. In this context, “sufficient” resources refers to both the quantity and quality necessary in order for BRFN members to fully exercise rights to hunt, gather, fish, and harvest for subsistence and cultural purposes (A. Macdonald and Candler 2014).

This approach aims to set evidence-based thresholds regarding the amount and condition of plants, fish, birds, mammals and other resources needed to support the well-being and cultural continuity for BRFN members. Targets should be established based on a combination of TEK, best practices, and western science recommendations. Where feasible, targets should aim to align with relevant regional, provincial and/or federal goals, such as attaining a minimum of 65% undisturbed habitat for caribou.

At the RSEA table, analysis of multiple indicators shows the extent to which disturbance on the landscape has surpassed the natural ecological range for many key values, such as old forest, functional old forest, and moose habitat condition. These indicators can be used to reset the ecological direction of the landscape back towards a natural pattern that better reflects a landscape able to respond to cultural sufficiency questions.

In combination, cultural sufficiency and ecological condition thresholds can be applied to develop restoration targets (e.g., area or proportion of undisturbed habitat) that support sufficient conservation and recovery of culturally important resources in BRFN territory.

STEP 3: DEVELOP CRITERIA AND INDICATORS OF SUCCESS

Restoration in BRFN territory should aim to revitalize ecosystems and cultural practices; achieving a sufficient quantity and quality of plants, animals, fish, and water to return socio-ecological relationships to their pre-disturbance condition. Developing indicators of resource sufficiency can help establish measurable end-goals for restoration that promote consistency across site-scale projects and allow the ecological and cultural effectiveness of restoration activities to be tracked over time.

Indicators should be specific, measurable, attainable, relevant, and timely elements that capture information about the state of a given characteristic or value. Indicators for resource sufficiency must also be culturally relevant and informed by an Indigenous perspective and worldview. Similarly, understanding what constitutes a state of “good condition” versus “poor condition” for an indicator must reflect the community’s relationship to and use of the resource (Gratani, Royee, and Butler 2016).

While most of the actual restoration work will be conducted at a site scale, evaluation of ultimate success mostly occurs at the landscape scale. Indicators for resource sufficiency should therefore be developed across spatial scales, first at the landscape level (e.g., total population estimates for caribou in BRFN territory) and later for the site or feature scale (e.g., evidence of caribou using the site for calving, wintering, rutting, foraging etc.) (Ray 2014). Development of indicators at the RSEA Methods Pilot provides a good starting point for this work and can be used as the foundation of a more detailed Restoration Framework.

STEP 4: IDENTIFY PRIORITY AREAS FOR RESTORATION

From BRFN’s perspective, the most appropriate lens for coordinating restoration efforts is the long-term revitalization and protection of priority community areas. A preliminary zoning approach has been established through BRFN community engagement, including input from Chief and Council, as well as engagement with BRFN family groups. This initial work has identified a broad zoning approach for the identification of protection areas and a hierarchy of conservation zones. Preliminary zoning is being applied in the RSEA Project’s modelling work and provides a broad basis for the development of this restoration framework.

Additional community engagement and verification will be required as this work progresses to finalize zones and priority restoration areas over time. Consistent with BRFN’s approach to restoration planning in community-based pilot programs, the following factors should be considered when further prioritizing these areas for restoration:

- Zoning / Protection status of the area
- Habitat capability and connectivity;
- Degree and types of disturbances; and
- Land tenure or ownership status.

STEP 5: CONDUCT A NEEDS ASSESSMENT

This step should include summary of required restoration in BRFN priority areas and an assessment of BRFN's capacity to undertake or participate in site-scale projects that would contribute to meeting landscape-scale targets. This assessment may include an evaluation of components such as the following (Stephen and Triraganon 2009):

- **Situation analysis:** what must be achieved, and what barriers are currently preventing BRFN from undertaking this work? Summarize restoration goals and objectives, identify current challenges, and key stakeholders that need to be involved.
- **Action analysis:** What are the critical actions that must be implemented and by whom? Identify critical actions and tasks that must be implemented to meet landscape-scale restoration targets and who has jurisdiction or is responsible for these actions.
- **Capacity assessment:** Who has the capacity to implement these actions, and where are the gaps? Assess the current capacity of BRFN departments, staff, contractors, Joint Ventures, and other resources to implement the critical actions. Identify where capacity gaps exist.
- **Capacity-strengthening interventions:** What skills, training, funding, or other interventions are required to bridge the defined gaps and capacity needs? Identify the interventions needed to bridge capacity gaps in order to perform the critical actions.
- **Capacity building action plan:** What resources are required, for what activities and when? Document required actions, training, resources, responsibilities and timelines for capacity building.
- **Capacity building strategy:** How are the outcomes communicated, implemented, and evaluated? Document the objectives, process, outcomes, monitoring and evaluation of capacity building actions. Include a process for reporting back to the community.

This needs assessment should be reviewed as implementation of the restoration activities progresses to reflect on the outcomes, including what has worked well, what has changed or needs improving, and what has been learned.

STEP 6: UNDERTAKE STRATEGIC COORDINATION OF RESTORATION PROJECTS

Rather than implement restoration efforts independently, a coordinated approach should aim to implement site-scale restoration projects that contribute to meeting landscape-scale targets. Coordinated efforts should aim to build large tracts of suitable habitat in priority areas. This would require organized efforts of multiple agencies and actors to collectively coordinate and track restoration efforts in BRFN territory.

Communication with local tenure holders, neighbouring First Nations, provincial and federal government agencies, and regional land use planning tables will be key to supporting the implementation of coordinated efforts across the landscape. Key provincial and federal

government agencies with a responsibility to maintain sustainable resource use in BRFN territory include: the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development; the Department of Fisheries and Ocean Canada; and Environment and Climate Change Canada (particularly for Species at Risk).

STEP 7: TRACK IMPLEMENTATION AND MONITOR RESULTS

The implementation of site-scale restoration projects in BRFN territory should be monitored to help coordinate efforts and track progress towards landscape-scale targets. Project-specific monitoring results should be reviewed to confirm the effectiveness of restoration treatments and adaptively manage sites where additional intervention (e.g., maintenance) is deemed necessary.

Although restoration work itself is focused at the site scale, success will ultimately be evaluated at the landscape level. Landscape-scale indicators, such as the total area of functional old forest, moose habitat quality, or the population size of a culturally important species, should be monitored to track the combined effectiveness of restoration efforts across BRFN territory.

5. RESTORATION EFFORTS AT THE SITE-SCALE

Coordinating site-scale restoration projects to meet landscape targets will benefit from a community-based approach to planning and implementing these activities. Below is a high-level summary of recommended phases for restoration projects at the site scale, developed in BRFN's pilot programs:

PHASE 1: PROJECT PLANNING

- **Set project goals and criteria:** Conduct a preliminary review of relevant literature, spatial data, and BRFN landscape targets. Develop project objectives that are consistent with BRFN's end-goals for restoration and will directly contribute to meeting landscape targets.
- **Prioritize sites for restoration:** Work with BRFN knowledge holders and community members to prioritize specific sites for restoration within priority areas identified by the landscape plan. Site selection should be informed by a combination of desktop review, community engagement sessions, and ground-truthing site visits.
- **Engage with the community, government agencies, and stakeholder groups:** Consult with BRFN community, staff, and leadership, as well as government agencies. Notify local tenure holders, private land owners, and other stakeholder groups, as appropriate, and work with these groups to address concerns.
- **Identify permitting requirements:** Identify anticipated permits and associated timelines required for implementation of restoration treatments at priority sites.

Case Study 3: BRFN boreal caribou habitat restoration project

BRFN is working on the development and implementation of a boreal caribou habitat restoration pilot program for the Black Creek area. The overall purpose of this project is to begin the critical and long-term process of restoring degraded boreal caribou habitat in BRFN territory.

This work builds on the results of a traditional knowledge and use study in 2015, which summarized BRFN understanding of caribou ecology and habitat use, impacts to caribou health and abundance, and changes over time for the Chinchaga and Pink Mountain herds. In 2017, BRFN conducted additional workshops and site visits with knowledge holders to identify principles for boreal caribou habitat restoration and develop a framework for the selection of site-specific prescriptions.

BRFN has since undertaken site characterization surveys for ten locations in the Black Creek area, focusing on the restoration of legacy seismic lines. This project includes opportunities for training and hands-on experience for community participants.

Implementation of restoration prescriptions will be dependent upon funding in subsequent years.

While this pilot program is not currently nested within a broader range-planning context, BRFN seeks to undertake coordinated efforts for the protection and restoration of caribou habitat. A landscape-scale plan for caribou habitat restoration will be crucial to informing the expansion of this work.

PHASE 2: PRESCRIPTION

- **Establish indicators and select site characterization methods:** Work with BRFN knowledge holders and land users to identify ecological and cultural indicators for assessing the health and condition of priority sites. Identify relevant standardized methods for site characterization³ that can be combined with the collection of TEK.
- **Conduct site characterization surveys:** Work with BRFN field technicians and knowledge holders to collect information on the condition of ecological and cultural indicators for each site, providing training opportunities in standardized site characterization methods where necessary.
- **Develop site-specific prescriptions:** Identify detailed recommendations for improving the condition of each site. Prescriptions should be heavily informed by TEK and must be consistent with attaining project end-goals and criteria for success.
- **Assess costs and feasibility:** Assess material, equipment, and labour requirements for implementing restoration prescriptions. Work with the BRFN economic development officer to develop requests for proposals, obtain quotes, source materials, secure contractors, and follow BRFN steps for joint ventures.

PHASE 3: IMPLEMENTATION

- **Secure permits, equipment, materials and contractors:** Prior to commencing, confirm that all necessary permits, equipment, materials and contractors have been secured.
- **Implement restoration treatments:** Work with BRFN staff, field technicians, contractors, and joint ventures to implement the restoration prescriptions developed in Phase 2. Observe appropriate protocols for working on the land.

³ Please refer to Appendix 3 for a summary of example methods for site characterization.

Case Study 4: BRFN native seed collection and storage

Plants and seeds sourced and grown in local environments are best suited for restoration projects.⁴ Seed collection, propagation, and storage can be used to cultivate seedlings and propagules, trained in nurseries or agricultural fields to meet the conditions of an altered environment.

It is BRFN's goal to start a community-driven seed collection and storage program that includes supplemental nursery propagation and continued care in an outdoor restoration garden. Modelled from similar nursery projects in the region, BRFN is working towards the development of a pilot native plant program that can support restoration work in BRFN territory.

PHASE 4: MONITORING

- **Monitor restored sites:** Continued monitoring is critical for evaluating the effectiveness of restoration treatments. Work with trained BRFN field technicians to monitor sites using a combination of ecological and cultural indicators.
- **Report back:** Information management and regular reporting will be crucial to informing adaptive management and tracking progress towards achieving landscape-scale targets for restoration. Report back to funders and BRFN.
- **Manage adaptively:** Where restoration treatments have not achieved end-goals and criteria for success, manage sites adaptively to implement additional treatment where necessary and appropriate.

⁴ Predictive provenancing, that is, using genotypes adapted to changing climatic variables, will enhance later iterations of the project (Gann, et al., 2019).

6. INDIGENOUS PARTICIPATION

In instances where another organization or agency is leading or co-leading the restoration project, BRFN participation will be a critical component of implementing successful restoration activities that address resource sufficiency and BRFN landscape-scale targets. The following key considerations should be addressed concurrently with the development of a restoration framework, to promote Indigenous content and community participation in this work.

6.1 PROPOSAL CRITERIA

For all proposed restoration projects occurring in BRFN territory, Indigenous participation and content should be considered a crucial component of the project's proposal. Regardless of who is leading the restoration project, at a minimum the following components should be evaluated:

- How BRFN TEK will be incorporated in the project, including how BRFN direction will be sought and included in the planning phase and a description of opportunities for BRFN involvement in implementation and monitoring.
- How the project will address BRFN priorities and territory targets for restoration.
- Opportunities for BRFN members to participate in the project, including capacity building and training.
- Anticipated economic opportunities for BRFN contractors and joint ventures.

Developing specific criteria for BRFN review and Indigenous content in project proposals, and working with funders to make this a requirement, will promote BRFN participation and support the strategic coordination of activities that contribute to meeting landscape-scale targets for restoration.

6.2 ECONOMIC DEVELOPMENT AND PARTNERSHIPS

Restoration represents a substantial economic development opportunity that aligns well with Indigenous stewardship principles and the revitalization of Indigenous rights and interests. Restoration often involves a wide variety of skillsets, materials, and equipment used to assess, re-shape, replant, or otherwise treat large areas of land or aquatic habitat. Employing local Indigenous planners, project managers, contractors, joint ventures, labourers, and approved service providers not only benefits the community's economic sector but can increase community support for the project.

External contractors or agencies administering restoration projects in BRFN territory should rely on partnerships with BRFN lands staff, contractors, joint ventures, and approved service providers when sourcing this work. These partnerships, or the processes by which they will be established, should be clearly outlined in project proposals and considered by funders in their evaluation process. BRFN-generated requests for proposals will prioritize existing partnerships

and transparency regarding the procurement of contractors, joint ventures, and approved service providers with restoration skillsets.

BRFN contractors, joint ventures, and approved service providers with restoration skillsets include, but are not limited to, businesses operating in the following fields:

- air transportation
- accommodation
- catering
- communications
- chainsaw operators
- decommissioning
- equipment rentals
- environmental assessment
- erosion control
- fencing
- heavy equipment operations
- hydrology
- general labour
- oil field contracting and clean-up
- remediation and reclamation
- road construction
- safety
- security
- spill response
- traffic control
- trucking

A complete list is maintained by the BRFN Economic Development Officer.

6.3 TRAINING AND CAPACITY BUILDING

Restoration projects often require technical field skills for site characterization, the development and implementation of prescriptions, and continued monitoring of treated sites. BRFN is building a strong foundation of members who are trained in aquatic and terrestrial site assessment methods, and has a desire to grow this capacity in the future.

Restoration projects in BRFN territory should be designed to maximize opportunities for community field technicians to participate in data collection, implementation, and monitoring. Where BRFN field technicians do not already possess the necessary skills, projects should include training components to build capacity within the community first. This training is critical to increasing BRFN's ability to engage in future restoration work.

BRFN field technicians have training in the following areas:

- Canadian aquatic biomonitoring network (CABIN) wadeable stream protocol – certification at the field technician or field assistant levels;
- Protocol for Fish Passage Determination of Closed Bottomed Structures;
- Protocol for Evaluating the Potential Impact of Forestry and Range Use on Water Quality: Water Quality Effectiveness Evaluation;
- Caribou Habitat Restoration Monitoring Framework; and
- Land Reclamation.

CITATIONS

- Arkle, Robert S, David S Pilliod, Steven E Hanser, Mathew L Brooks, Jeanne C Chambers, James B Grace, Kevin C Knuston, David A Pyke, Justin L Welty, and Troy A Wirth. 2014. "Quantifying Restoration Effectiveness Using Multi-Scale Habitat Models : Implications for Sage-Grouse in the Great Basin." *Ecosphere* 5 (March): 1–32.
- Blueberry River First Nations, Susan Leech, Boyd Barrett, and Firelight Research Inc. 2018. "Blueberry River First Nations Tributary Indigenous Knowledge Study Phase 2: Detailed Characterization of Aitken / North Aitken Watersheds."
- Candler, Craig. 2012. "Integrated Knowledge and Land Use Report and Assessment for Shell Canada's Proposed Jackpine Mine Expansion and Pierre River Mine." Victoria, BC.
- Gratani, Monica, Frank Royee, and James R A Butler. 2016. "A Research Process and Criteria – Indicators Framework for Developing Indigenous Freshwater Ecosystem Health Monitoring." *Cogent Environmental Science* 255 (1): 1–14. <https://doi.org/10.1080/23311843.2016.1214228>.
- Leech, S, C Ames, Firelight Research Inc., and Blueberry River First Nations. 2017. "Blueberry River First Nations Tributary Traditional Knowledge Study (Phase 1)."
- Leech, Susan, and Peter Bates. 2016. "BRFN Indigenous Knowledge Study of Chinchaga Muskeg Caribou and Pink Mountain Caribou," 74.
- Leech, Susan, Peter Bates, and Blueberry River First Nations. 2016. "BRFN Indigenous Knowledge Study of Chinchaga Muskeg Caribou and Pink Mountain Caribou."
- Macdonald, Alistair, and Craig Candler. 2014. "The Proposed North Montney Mainline Pipeline Project : Initial Consideration of Impacts on Blueberry River First Nations ' Use of Lands , Resources and Treaty 8 Rights."
- Macdonald, Eliana. 2016. "Atlas of Cumulative Landscape Disturbance in the Traditional Territory of Blueberry River First Nations." In , 86. Ecotrust Canada and the David Suzuki Foundation.
- Morishige, K, Pelika Andrade, P Pascua, K Steward, E Cadiz, L Kapono, and U Chong. 2018. "N a Kilo a Aina : Visions of Biocultural Restoration through Indigenous Relationships between People and Place," 1–20. <https://doi.org/10.3390/su10103368>.
- Ray, Justine. 2014. "Defining Habitat Restoration for Boreal Caribou in the Context of National Recovery : A Discussion Paper." Toronton, ON.
- Senos, R, FK Lake, N Turner, and D Martinez. 2006. "Traditional Ecological Knowldge and Restoration Practice." In *Restoring the Pacific Northwest*, edited by Dean Apostol and Iarcia Sinclair, 393–426.

- Stephen, P, and R. Triraganon. 2009. "Strengthening Voices for Better Choices: A Capacity Needs Assessment Process." Gland, Switzerland: IUCN.
- Venter, Oscar, Nathalie N Brodeur, Leah Nemiroff, Brenna Belland, Ivan J Dolinsek, and James WA Grant. 2006. "Threats to Endangered Species in Canada." *BioScience* 56 (11): 903–10.
- Wehi, Priscilla M, and Janice M Lord. 2017. "Importance of Including Cultural Practices in Ecological Restoration." *Conservation Biology* 31 (5). <https://doi.org/10.1111/cobi.12915>.

APPENDIX 1: ANNOTATED BIBLIOGRAPHY OF RESTORATION FRAMEWORK REVIEW

Douglas, T. 2002. Ecological restoration guidelines for British Columbia. Biodiversity Branch of the BC Ministry of Water, Land and Air Protection. Victoria, BC. 84 pp.

Description: These broad guidelines are intended to inform groups undertaking restoration projects, regardless of funding source or type of project. This framework focuses on components common to all restoration projects, and provides general recommendations for funding, resourcing, and developing project-specific plans.

Framework Components:

1. Define Goals and Objectives
2. Project Planning
3. Implement Plan
4. Maintenance
5. Effectiveness monitoring

National Parks Directorate. 2008. Principles and Guidelines for Ecological Restoration in Canada's Protected Natural Areas. Retrieved from:

<https://www.pc.gc.ca/en/nature/science/conservation/ie-ei/re-er/pag-pel>

Description: This document provides federal guidance for ecological restoration practices, particularly within Canada's Protected Natural Areas. Principles and guidelines described in this report were developed collaboratively by managers from Canada's federal, provincial and territorial parks and protected areas, as well as experts from Canadian universities and relevant international agencies, including the Society for Ecological Restoration International (SER), and SER's Indigenous Peoples Restoration Network Working Group.

Framework Components:

1. Identify Natural and Cultural Heritage Values
2. Define the Problem
3. Develop Restoration Goals
4. Develop Objectives
5. Develop Detailed Restoration Plan
6. Implement Detailed Restoration Plan
7. Monitor and Report

BC Oil & Gas Commission. 2019. Site Remediation and Reclamation Manual. Retrieved from: <https://www.bcogc.ca/industry-zone/documentation/Remediation%2C-Reclamation%2C-and-Restoration>

Description: This manual provides a reference document for oil and gas permit holders detailing the requirements and expectations for Certificate of Restoration applications made to the Commission. For permit holders, the manual includes an overview of their obligations under the Oil and Gas Activities Act, the Environmental Management Act, and the Contaminated Sites Regulation.

Framework Components:

1. Site Certification Regulatory Framework -standards and options for reclamation
2. Site Screening
3. Site Investigation and Assessment
4. Site Remediation
5. Certificate of Restoration Applications and Dormant Site Assessment Reporting
6. Site Reclamation and Certificate of Restoration Part 2 Application
7. Restoration Verification Audit Program

Invasive Species Council of British Columbia. 2018. Indigenous Community Toolkit for Managing Invasive Species. Retrieved from:
<https://bcinvasives.ca/resources/publications/indigenous-community-toolkit-for-managing-invasive-species>

Description: This toolkit provides a resource for Indigenous communities and staff in British Columbia interested in invasive species management. From defining the issue and developing a plan, to setting goals and strategies for promoting long-term success, this toolkit provides valuable resources for restoration projects that address or interact with invasive species in BC.

Framework Components:

1. Identify and Map the Management Area
2. Conduct an Invasive Species Inventory
3. Set Management Goals and Objectives
4. Set Priorities for Invasive Species Management
5. Select Management Strategies
6. Develop an Integrated Pest Management Plan
7. Develop a Monitoring Plan

Society for Ecological Restoration International. 2004. Primer on Ecological Restoration. Retrieved from: www.ser.org

Description: Internationally recognized, this introductory reference document on ecological restoration defines the conceptual building blocks for designing an ecological restoration project. Guiding principles discussed in this guide are inclusive to impacted cultures and the benefits of including cultural beliefs and practices.

Framework Components:

1. Rationale - why restoration is needed;
2. Ecological characterization of the site to be restored;
3. Goals and objectives for restoration;
4. Designation and description of reference site or ecosystem;
5. Project integration with the landscape and movement of organisms;
6. Project plans, schedules, and budgets for site treatment;
7. Performance standards and monitoring protocols for project evaluation;
8. Strategies for long-term protection and maintenance of restored ecosystem.

CBD Secretariat and Society for Ecological Restoration. 2019. A companion to the Short-Term Action Plan on Ecosystem Restoration - Resources, cases studies, and

biodiversity considerations in the context of restoration science and practice. Montreal, Canada. Retrieved from:
https://cdn.ymaws.com/www.ser.org/resource/resmgr/custompages/publications/ser_publications/staper_companion.pdf

Description: The Short-Term Action Plan on Ecosystem Restoration provides step-by-step guidance to support governments in the development and implementation of national restoration strategies. Recognizing the opportunity that ecosystem restoration creates for addressing ecological, economic, and social issues, the United Nations Convention on Biological diversity adopted this plan at its 13th annual Conference of the Parties in 2016.

Framework Components:

1. Assessment of opportunities for ecosystem restoration;
2. Improving the institutional enabling environment for restoration;
3. Planning and implementation of restoration activities; and
4. Monitoring, evaluating, feedback, and disseminating results.

APPENDIX 2: SPATIAL SCALE EXAMPLES FOR RESOURCE MANAGEMENT AND RESTORATION PLANNING

Unit	Description	Advantages	Key Challenges
Species-scale Area	Area occupied by a given species. May be as specific as a niche habitat feature or as broad as a herd range. This scale is particularly useful for the restoration of habitat for species-at risk.	Some federal and provincial funding for restoration is available by species, particularly for species-at-risk. At this scale, restoration efforts can be highly focused on maximizing benefits to the species of concern.	Species distribution will often cross multiple administrative or jurisdictional boundaries. Planning for a single species may not maximize benefits to other species or cultural values.
Wildlife Management Unit (WMU)	B.C. is divided into nine administrative natural resource regions, having a total of 225 WMUs for the purpose of game management. Population surveys and management decisions, such as hunting regulations, are primarily implemented at the level of WMUs. This scale is particularly relevant for game species, including ungulates and furbearers.	Planning at the WMU level promotes access to provincial management levers for wildlife in B.C. Furthermore, this can align project monitoring with existing wildlife population datasets and promote collaboration with provincial wildlife managers.	WMU boundaries may not reflect Indigenous land use, or the true distribution, movement, and interactions of fish and wildlife populations. Planning and implementing restoration by WMU only can contribute to inconsistencies across the broader territory-scale. Broader ecosystem processes may be overlooked.
Land Use Plan Regions	Strategic land use plans have been completed at a regional or sub-regional scale for most of the province. These land-use plans provide resource management direction for Provincial public land in B.C. This scale can address multiple species and ecosystems across the landscape.	Promotes restoration work that is consistent with regional land use plans and priorities. May increase access to regional regulatory tools and levers for restoration and protection.	Administrative boundaries may not reflect Indigenous land use or the true distribution, movement, and interactions of fish and wildlife populations. Planning at this scale often requires substantial stakeholder engagement.
Watershed	Landscape-level feature, includes the entirety of a drainage basin that contributes to a specific waterbody or primary stream. This scale is particularly relevant for the restoration of fish habitat, riparian ecosystems, and	Within a watershed, the land, streams, and rivers are connected through the hydrologic cycle. Restoration planning and implementation at the watershed scale helps to capture downstream and upstream considerations	There can be a great diversity in ecosystems, ecosystem processes, and impacts across a watershed. Watersheds are nested in larger watersheds and basins, all of which are connected

	improving water quality or quantity.	in the same watershed. This scale is often meaningful and intuitive to communities and land users.	and influenced by one-another.
First Nation Territory	Encompasses the ancestral and contemporary connections of Indigenous peoples to a geographical area. This scale is particularly meaningful for the revitalization of cultural practices and relationship with the land and waters.	Restoration planning at the territory-scale promotes the recovery of culturally important species and resources, in consideration of historical and contemporary relationships with the land and water. This approach facilitates reciprocal restoration.	Indigenous territories may not encompass the full range or distribution of target species, populations or resources. Indigenous territories often overlap with multiple administrative boundaries, including WMUs and regional land use plans.

APPENDIX 3: EXAMPLE METHODS FOR SITE CHARACTERIZATION

Canadian Aquatic Biomonitoring Network (CABIN) Wadeable Streams Protocol: The CABIN wadeable streams protocol is a nationally standardized method for assessing the ecological condition of Canada's freshwater systems. This biomonitoring approach uses the presence and health of organisms living at a site as an indication of ecosystem condition. While it does not necessarily identify causes of impairment, this monitoring program provides an assessment of longer-term ecosystem health. CABIN studies benefit from a large online database of biological and habitat data.

Forest and Range Evaluation Program (FREP): FREP is a nationally accredited program designed to help resource managers evaluate resource value status, trends, and causal factors. This program provides background information and data collection instructions for evaluating eleven resource values identified under the Forest and Range Practices Act: biodiversity, cultural heritage, fish/riparian, forage & associated plant communities, recreation, resource features, soils, timber, visual quality, water quality, wildlife.

Boreal Caribou Habitat Restoration Operational Toolkit for British Columbia: This operational handbook is intended to guide the implementation of reclamation techniques that will contribute to the restoration of caribou habitat. It provides guidance on regulatory considerations; reclamation of new disturbances and historical linear footprint; access control treatments and specifications; and monitoring of treatment applications to determine success.

Protocol for Fish Passage Determination of Closed Bottom Structures: Developed by the BC Ministry of Environment, this field assessment procedure is designed to quickly and effectively answer the question: "Does this stream crossing likely provide safe fish passage?". When assessing stream health and ecosystem function, fish passage is a primary concern, specifically in relation to important salmon bearing streams. The information collected using this protocol can be used to develop site-specific management recommendations and improves decision-making regarding priorities for restoration.

Resources Information Standards (RIS): The Resources Information Standards Committee is responsible for establishing standards for natural and cultural resources inventories in British Columbia. RIS documents include a large number of inventory methods for a variety of resources, including aquatic ecosystems, plants, furbearers, ungulates, and birds, among others. Supporting manuals and data forms provide instructions for the consistent collection, storage, analysis, interpretation, and reporting of inventory data.

Water Quality Effectiveness Evaluation (WQEE): The WQEE procedure is designed to quantify the effects of disturbances on water quality, as well as identify mitigation measures. This procedure was designed to meet environmental objectives for improving water quality under the Forest and Range Practices Act. The WQEE is a simple and quick method that can be applied by non-specialists to determine sediment generation potential for a site. Sites where estimated sediment generation exceeds a certain threshold are prioritized for further site assessment, management actions and/or restoration prescriptions.

