

ECOSYSTEM RESTORATION OPPORTUNITIES IN THE SOUTH PEACE



Prepared by LM Forest Resource Solutions Ltd.
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INTRODUCTION

Background And Genesis Of The Plan

The B.C. Ministry of Forests, Lands, and Natural Resource Operations (FLNRO) is responsible for stewardship of Provincial Crown land and natural resources, and protection of B.C.'s archaeological and heritage resources. FLNRO has an Ecosystem Restoration (ER)¹ program which resides within Range Branch. The ER Program is responsible for developing regional ecological restoration plans, coordinating and monitoring restoration treatments, and providing advice on ecological restoration to FLNRO staff and clients: <https://www.for.gov.bc.ca/hra/restoration/>. There are several regional ER implementation teams that are operating under this umbrella.

In the fall of 2015, Stewardship staff within the Peace District approached the Provincial ER Coordinator about the possibility of developing an ER program for the District. Seed funding was provided to engage a consultant with experience in other ecosystem restoration programs to lead the planning process and develop the initial plan. The first step was to identify potential stakeholders to solicit input on the need for such a program, and its possible scope. This work was conducted in the fall of 2015 and winter of 2016 in a series of meetings and phone interviews, culminating in a stakeholder workshop on March 1st, 2016.

This plan represents the results of the stakeholder engagement process and ecosystem restoration experience in other parts of the Province, most notably, the Omineca Region. Detailed GIS and other types of data analyses will also be required to geographically identify potential restoration sites but these activities are envisioned at the tactical and operational planning stages.

Purpose And Benefits Of The Plan

The plan was initiated as a pilot to explore the need for ecosystem restoration, the types of ecosystems and activities that might merit attention, and the level of interest and support amongst stakeholders. It provides a framework for integrating ecosystem restoration into other land management activities and sets broad direction for a program over the next two to five years. It is expected that the plan will provide stakeholders with the information they need to initiate an effective restoration program but it is not meant to replace detailed planning.

Perceived benefits of ecosystem restoration management and planning include:

- Added value to existing programs such as cumulative effects mitigation, mitigation of mid-term timber supply shortfalls, establishment of treatment of areas falling under a Government Actions Regulation, wildfire management, and habitat enhancement.
- Leveraged funding through the establishment of partnerships with other stakeholders with similar land management objectives.
- Shared data and better informed management decisions.
- Improved ecosystem function and climate mitigation.
- Improved public profile and better relations with other organizations including First Nations.
- Safer communities (at risk because of wildfire).

¹ Ecosystem restoration has been internationally defined as the process of assisting with the recovery of an ecosystem that has been degraded, damaged or destroyed by re-establishing its structural characteristics, species composition, and ecological processes. This concept is fleshed in further detail in subsequent sections.

Area Of Interest

The geographic area of interest in this plan is the Peace Forest District (figure 1) although target ecosystems, desired future conditions, and the proposed management structure, may also be appropriate in other parts of the Peace Region. The District boundary does not necessarily coincide with boundaries of ecological function but is administratively important and so the geographic scope was set on this basis.

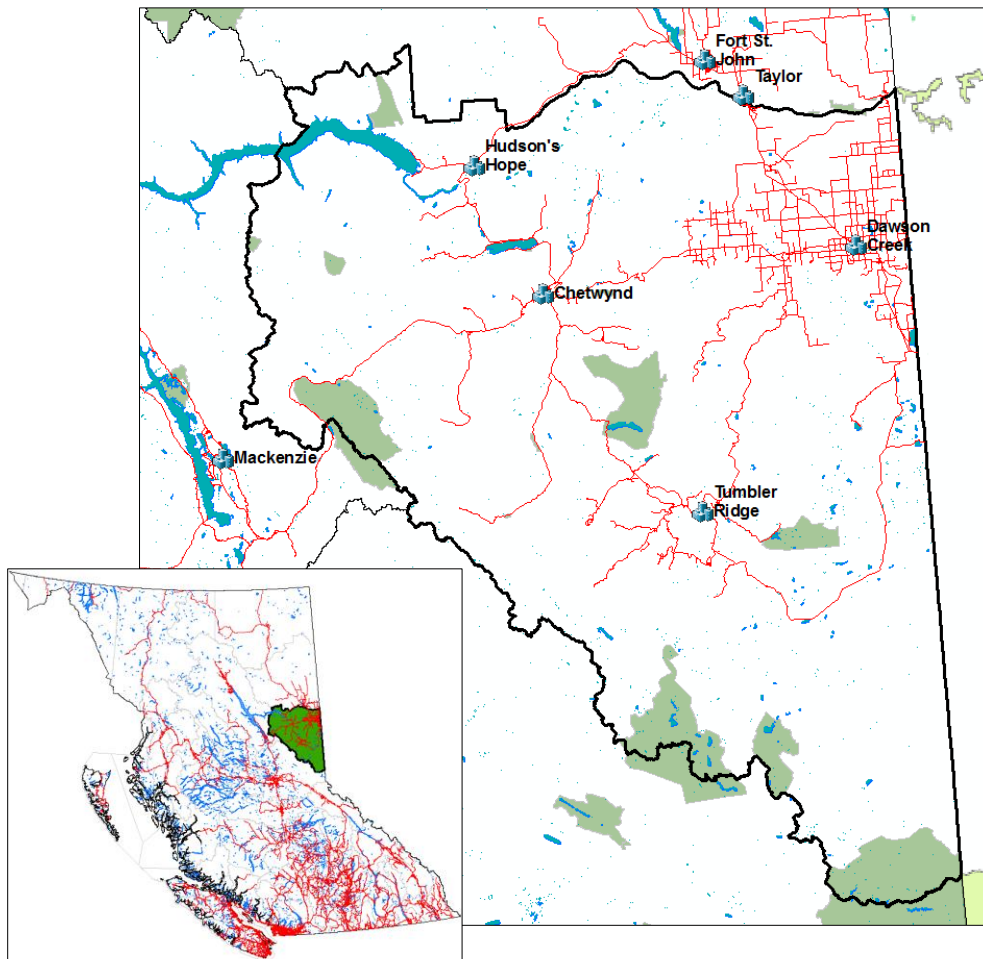


Figure 1. The South Peace District (Inset: the location of the District within British Columbia).

PLAN CONTEXT

The plan has been organized in four parts:

- Context – including biophysical characteristics, historical land uses, and existing programming and guidance.
- Potential Ecosystem Restoration Opportunities and Activities – including what is meant by ecosystem restoration, target ecosystems and activities, and ways to measure success.
- Governance – mission, operating principles, management structure, and funding.
- Next Steps.

Bio-Physical Characteristics Of The South Peace

The area of interest encompasses approximately 3 million ha and includes three main types of ecosystem: the boreal plains in the east, the Rocky Mountain foothills, and the Hart Ranges within the Rocky Mountains in the west. The major river systems and associated valleys that bisect the mountains and plains also have their own unique characteristics.

VEGETATION

There are four dominant types of vegetation in the planning area (see figure 2), described in the Ministry of Forests, Lands, and Natural Resource Operations biogeoclimatic classification system as:

- the Boreal White and Black Spruce Zone (BWBS) – large areas of boreal plain with white spruce, black spruce, aspen, frequent wetlands, and high-capability agricultural land.
- the Sub-Boreal Spruce Zone (SBS) – the foothills and associated valley bottoms adjacent to the mountains, with spruce, sub-alpine fir, and fire-origin lodgepole pine as the dominant tree species.
- the Englemann Spruce Sub-alpine Fir Zone (ESSF) – higher elevation, mountainous portions of the District characterized by Englemann spruce and sub-alpine fir as dominant tree species.
- Alpine Tundra (AT) – highest sections of the tallest of the rounded mountains in the western section of the District, where there are few trees, except in krummholz form, and thin, rocky soils.

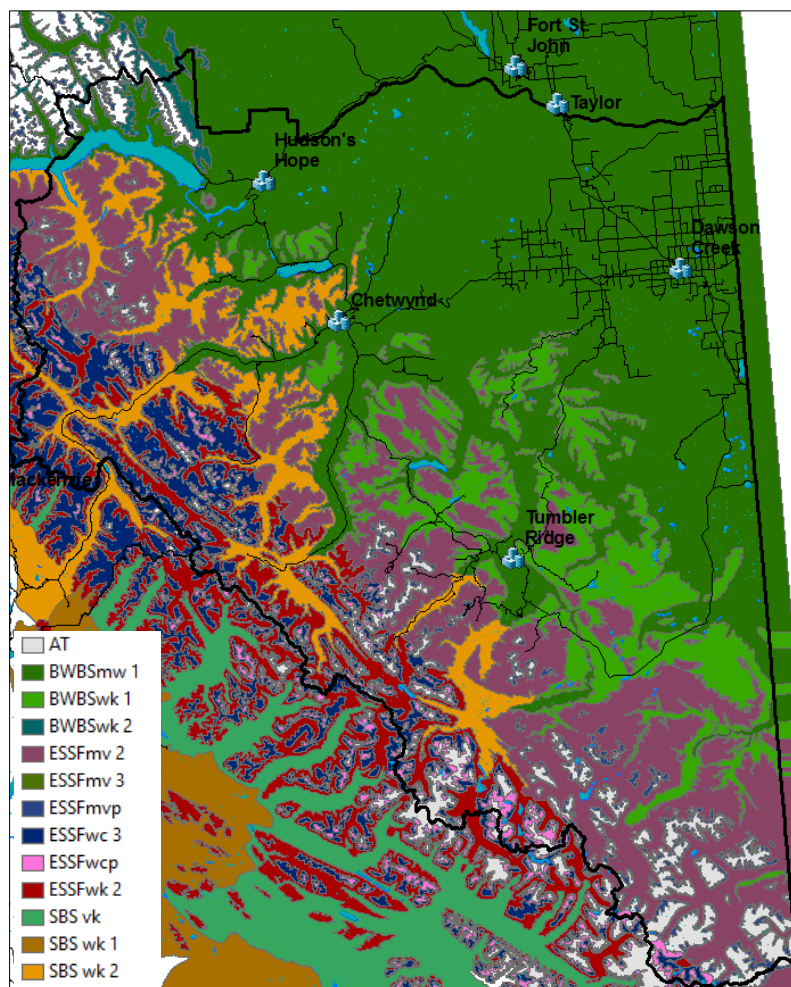


Figure 2. Biogeoclimatic units of the South Peace District.

With respect to ecosystem restoration opportunities, two vegetation features in the area of interest that are especially notable:

- the remnant native prairie grass cover that occurs on south facing river banks and some open areas (e.g. slender wheatgrass, porcupine grass, prairie june grass, old man's whiskers, Hooker's oatgrass), and
- frequent wetlands on the boreal plains and, to a lesser extent, in the foothills.

A GIS analysis of the BC Grassland Conservation Council database indicates that there are nearly 500 separate grassland areas totalling 7,400 ha. There are many more wetlands (nearly 14,000), totalling over 66,000 ha. Both types are sensitive to heavy grazing, climate change, and the influence of fire.

PHYSIOGRAPHY, GEOLOGY, AND SOILS

There are 3 main physiographic regions within the South Peace, including the Hart Ranges, the Foothills, and the Alberta Plateau. Over a period of 100s of millions of years there has been periodic inundation and retreat of ocean waters over the Peace region with the consequent formation of the Western Canadian Sedimentary Basin shale and sandstone layers, formed from a mix of mineral elements and sea organisms that died and settled out on the sea bed. It is these formations that are the basis for the oil and gas reserves of the region. About 85 million years ago, during a period of inundation, a north-south oceanic connection was formed between the Gulf of Mexico and the Arctic Ocean splitting the continent in two. This shallow sea extended in an east-west direction from central BC to Lake Superior.

The earth's crust has also risen, sunk, folded, and fractured in response to the movement of tectonic plates resulting in the formation of the Rocky Mountains between 55 and 80 million years ago. The formation of the Rocky Mountains, and subsequent erosion, has exposed many of the layers in the earth's crust. As the Rockies rose, an inland sea was formed and extensive peat deposits occurred in swampy areas along the lake margins which later became the metallurgical coal seams of the area when continental subduction buried these layers. About two million years ago several periods of glaciation and retreat began, significantly altering the geology of the area, leaving fluvial gravels, glaciolacustrine sediments, and tills overlying previous deposits and rock formations. About 10,000-15,000 years ago, after a period of extensive glaciation, the continental ice sheets began melting and formed an impounded (by ice) post glacial lake (Glacial Lake Peace) that covered middle portions of the District.

Meltwaters from the retreat of the glaciers, draining of the glacial lake, and erosion have caused complex surficial geology. The plateau area is a flat to gently rolling till plain interspersed with glacio-lacustrine deposits and pockets of organic soils. Thin veneers associated with deltaic deposits from the glacial lake are common in middle sections of the District as well as glacial meltwater sediments that vary in texture from coarse gravels to fine clays. The eastern section of the District is dominated by lacustrine clays. Soil types in the foothills and mountains are predominantly glacial tills, with colluvial soils in more rugged areas, fluvial materials along rivers, and occasional wetlands pockets. The area is also deeply dissected by the large rivers (up to 200m deep) with associated benches, terraces, fluvial floors, and unstable banks. Mountainous sections within the District are not as rugged or high as other sections of the Rockies (summits are rounded, often timbered) because softer bedrock types (shale, sandstone, limestone) have been more heavily eroded.

No account of the area's geological diversity would be complete without mentioning bedrock geology and palaeontology of the south-western sections of the District, which ranges in era from Pre-Cambrian (more than 500 million years ago) to the Cretaceous (75 million years ago). According to Charles Helm, author of Exploring Tumbler Ridge (2008) and past President of the Tumbler Ridge UNESCO Global Geopark, there is abundant evidence of the area's geologic history evident in the exposed rocks. Dr. Helm states that palaeontological features are common, varying from Mississippian invertebrates and Triassic fish and marine reptiles, to Cretaceous dinosaur trackways and bones. Some of these features are of international

significance and, for this reason (amongst others), UNESCO approved an area of 7700 km² around Tumbler Ridge as a Global Geopark, one of only two in North America and the first one in Western North America. UNESCO Global Geoparks are sites that promote geo-diversity through community-led initiatives to enhance regional sustainable development.

WATER AND WETLAND RESOURCES

Major river systems in the South Peace include the Peace, Pine, Moberly, Sukunka, Murray, and Kiskatinaw Rivers, with the Redwillow, Wapiti, and Narraway rivers originating in the planning area but joining the Peace River in Alberta. All these rivers drain into the MacKenzie River Basin and eventually, the Arctic Ocean. The river systems have been major movement corridors (and sometimes barriers to movement) over the millennia for both humans and other species.

Equally important are the area's lakes. GIS analysis of the GeoBC Provincial Lakes layer indicates that there are 8167 waterbodies in the District, covering an area of 54,157 ha. Williston Lake, the second largest manmade lake in Canada, covers an area of about 173,000 ha, however, although only a part of the Peace Arm is in the planning area (35,612 ha). Other significant lakes include Moberly (2910 ha), Swan (578 ha), Gwillim (1092 ha), Wapiti (394 ha), Hook (310 ha), and Monkman (286 ha).

FLNRO vegetation resources inventory data indicates that there are 13,876 separate wetlands in the South Peace, covering an area of 66,175 ha. Wetlands provide a number of important services that contribute to their value as ecosystem components. Wetland ecosystems serve to reduce peak flows by providing flow detention areas and by promoting groundwater recharge throughout the year. The high aquatic biological activity of wetlands is known to reduce pollutant concentrations like agricultural runoff and can serve to attenuate hydrocarbon and sediment inputs from road running surfaces. Wetlands also enhance biological diversity because of the wide variety of habitats they create at the aquatic/terrestrial interface and the unique flora and fauna they support. They provide cover for many species of birds that rely on open water, thick vegetation, marshy ground conditions, or wildlife trees for escape cover, and many wetlands have unique value as rearing and refuge habitats for fish - an environment that is often a limiting factor in fisheries productive capacity. Finally, wetlands are an important sink for carbon storage and drying and disturbance of wetlands can result in large releases of carbon.

Climate Change Expectations

Climate in the District is best described as continental with long, cold winters and short, dry summers. According to Climate BC (ver. 5.2), in the vicinity of Dawson creek, mean annual temperature, based on historic records (1961 to 1990) has been about 1.3° C, with average summer (June, July, August) temperatures of 14.0° C, average winter (December, January, February) temperatures of -13.0° C, and a

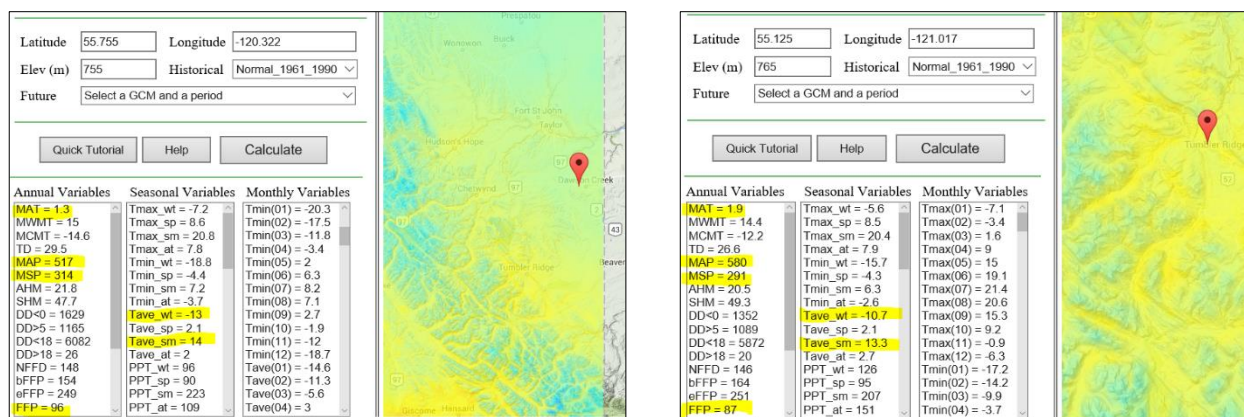


Figure 3. Historic climate variables for the Dawson Creek area (left) and Tumbler Ridge area (right).

frost free period of 96 days. Mean annual precipitation during this period was 517 mm with summer (May to Sept) precipitation of 314 mm (figure 3). In the foothills around Tumbler Ridge, climate variables are similar although there are fewer frost free days, and more snow in the winter.

Relative to other areas east of the Rockies, much of the South Peace is a little more favourable for agriculture because of the influence of the Rocky Mountains. In general, when weather fronts move in from the west, orographic lift causes a loss of moisture, but as the air descends across the eastern flanks of the mountains, it becomes warmer and drier (sometimes causing chinooks). The mountains can also trap cold, stable arctic air that comes in from the north. Because the Rocky Mountains are lower in the plan area than elsewhere, their impact on weather is lower since Pacific air masses can cross over with less loss of moisture.

Climate change modelling for the area is indicating substantial changes for some climate variables in the near term. Using CanESM2_rcp45_2085, a moderately conservative dataset, Climate BC predicts an increase in mean annual temperature of about 4° C in the next 70 years (figure 4). This is a 300% increase in a short period of time. Mean annual precipitation however, only increases by about 20% meaning that the moisture stress in the summer will likely increase.

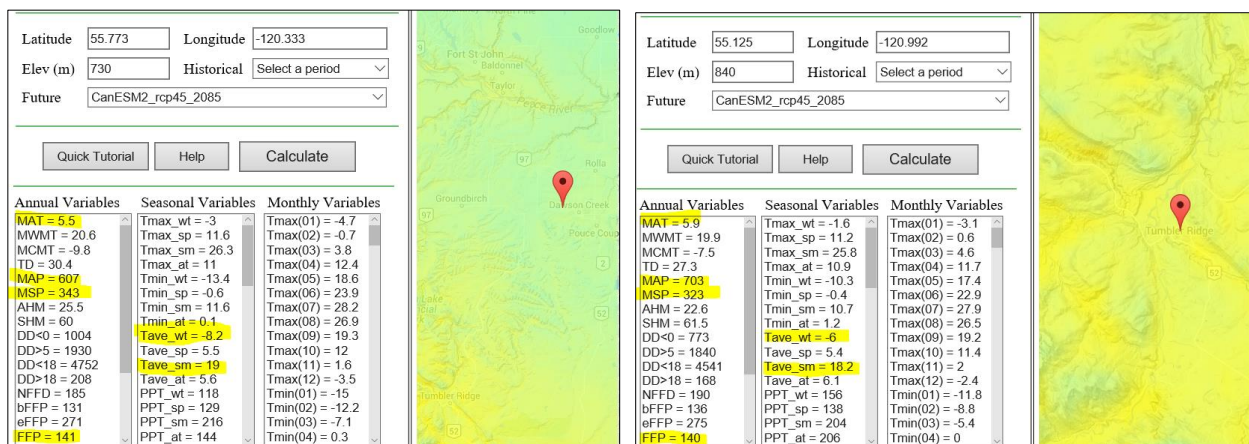


Figure 4. Climate variables for the Dawson Creek area (left) and Tumbler Ridge area (right) in 2085.

This type of climate shift is expected to have considerable impact on ecosystem structure and function including, for example, increased frequency of extreme fire, insect outbreaks (e.g. the mountain pine beetle epidemic), disease, wind events, changes in stream flow (increasing in winter with higher peak flows and decreasing in summer), summer time soil moisture deficits, changes in wetland and riparian vegetation, shifts in upland vegetation species and cover, possible increased tree growth at high elevation and decreased growth at low elevation, and migration and extirpation of forest fauna. Of course, some changes will occur more rapidly than others. Vegetation shifts will take time and future structure and function will not necessarily conform to current patterns. The FLNRO Extension Note *Adapting Natural Resource Management to Climate Change in the Northeast Region*: provides an excellent summary of climate change projections, impacts, and mitigation/adaptation measures (available at - <https://www.for.gov.bc.ca/het/climate/knowledge/knowledge.htm>).

Whether climate change impacts are positive or negative depends on one's frame of reference. What is more apparent, is that we cannot expect that the future will be like the past. Two important principles can be derived from this insight:

1. Land managers should consider historic ecosystem function and structure to help understand how ecosystems might reorganize in the face of external drivers like climate, but they should **not** use the historic range of variation as a benchmark for future conditions. For example, how much

prescribed burning should be done to restore grasslands in the District should not depend on the historic extent of grasslands 100 years earlier, but should instead be a function of existing grassland extent and condition, future temperature and moisture regime forecasts, changes in land use patterns, stakeholder needs, and available treatment options.

2. Land managers need to become more skilled at adapting to future conditions by purposefully experimenting today with the development of different functional and structural attributes at the landscape and stand level (e.g. different disturbance patterns, greater hydrological intervention, new tree species mixes, developing more multi-cohort stands, protecting refugia that are most resilient, etc). They will need to fully embrace adaptive management and create a variety of forest structure outcomes to hedge against an uncertain future.

Land Uses And Economic Development

POPULATION

The population for the South Peace area is estimated to be about 61,000. The six main communities in the plan area are: Dawson Creek, Chetwynd, Tumbler Ridge, Taylor, Hudson's Hope and Pouce Coupe. Dawson Creek is the largest with a population of about 12,257 (2011 BC Stats). Five First Nations have traditional territories that overlap the South Peace District including the Saulteau, West Moberly, Halfway River, McLeod Lake, and Lheidli T'enneh First Nations. Only the West Moberly First Nations and Saulteau First Nations have reserves within the District. With the exception of the Lheidli T'enneh Band, all of the First Nations with aboriginal interests in the District are signatories to Treaty 8.

FOREST SECTOR DEVELOPMENT

In the past, the main economic drivers of the area included mining, forestry, oil and gas, tourism, and agriculture. In the 2014 Dawson Timber Supply Analysis (see Current TSR Documents at <https://www.for.gov.bc.ca/hts/tsa/tsa41/#documents>) *the Dawson Creek TSA covers about 2.3 million hectares in north-eastern BC of which the Crown forest land base is 1.6 million hectares, with 758,300 hectares available for timber harvesting. Approximately 462,500 hectares are stands of predominantly coniferous species and 295,800 hectares are stands of predominantly deciduous species. The forests of the Dawson Creek TSA provide a wide range of natural resources, including forest products, forage, minerals, recreation and tourism amenities, oil and gas reserves, and fish and wildlife habitats. Parks, recreation sites and trails, and roaded and non-roaded areas provide opportunities for numerous outdoor activities including mountain-biking, all-terrain-vehicle use, horseback riding, hiking, spelunking, hunting, camping, boating, cross-country skiing and snowmobiling. Parks within the TSA include Monkman, Gwillim and Kakwa provincial parks and recreation areas include Kinuseo Falls, Moberly Lake, Stewart Lake, Wapiti-Onion Lake, One Island Lake and Williston Lake. The TSA provides important habitat for grizzly bear, elk, mule deer, moose, caribou, bighorn sheep, mountain goat, trumpeter swan, northern goshawk, fisher, and bull trout. In addition to habitat for fish and wildlife, the forested areas of the Dawson Creek TSA provide a wide range of natural resources, including timber, medicinal plants, berries, forage for domestic animals, minerals, oil and gas reserves, and recreation and tourism amenities. The area also has a diverse history, ranging from 90 million year old dinosaur tracks to the Alaska Highway built in the World War II era.*

Timber processing facilities located within the plan area include the Louisiana-Pacific Canada Ltd. oriented strand-board (OSB) mill in Dawson Creek, the Canadian Forest Products Ltd. sawmill in Chetwynd, and the Chetwynd Forest Industries sawmill in Chetwynd (a Division of West Fraser Mills Ltd.). In addition, West Fraser recently built a biomass heat recovery power plant. In March 2014, the Paper Excellence Group acquired Tembec Inc.'s Chetwynd pulp mill re-opening it for a short period before shutting it down again in October 2015. The average timber volume harvested since 2003 has been about

1.3 million m³ per year or about 76 percent of the 1.7 million m³ per year apportioned to replaceable and non-replaceable forest licences and BC Timber Sales.

THE ENERGY SECTOR

The oil and gas sector (including oil, gas, pentanes, LPG, and sulphur) continues to be a large economic driver in the Peace Region (\$1.3 billion in direct government revenue in fiscal 2011/12) although less important in the last year as low demand and low prices, controversy over pipelines and fracking (hydraulic fracturing), and other environmental concerns have slowed development proponent investment and production, and government processing and approvals. In the recent past, British Columbia produced about one trillion cubic feet (Tcf) of marketable natural gas per year. Production growth in the province over the past 10 years is largely from the development of shale and tight gas (unconventional gas) in northeast British Columbia. It is anticipated, that world economic recovery will drive demand higher in the future and that new, as yet unproven, reserves will mean the availability of many trillions of cubic feet in the future, and that this will potentially have significant impact in forested settings. The South Peace Economic Development Commission reports that, in the past few years there have been approximately 10 major multinational oil, gas, and energy companies investing in the region. In 2009, for example, there were 99 oil and gas companies operating in the South Peace with over 254 oil and gas wells approved that year.

There have been other recent developments in the energy sector as well. The first wind farm to be established in BC was in the South Peace and today three separate projects are licensed to provide BC hydro with 380 megawatts of power. Finavera Wind Energy (now Solar Alliance Inc) are also developing another four wind projects in the Peace Region that will provide up to 301 megawatts of electricity. Finally, with respect to the energy sector, it is anticipated that, with the approval of the first phase of construction on the Site C hydro-electric dam in July 2015, there will be a period of significant economic development, in addition to significant environmental impact. The project is expected to create approximately 10,000 person-years of direct employment during construction, and about 33,000 person-years of total employment through all stages of development and construction. During operations, the project is expected to provide 25 direct jobs per year, with 135 additional jobs per year in environmental monitoring and supplier industries. Site C will generate 1,100 megawatts of power, representing an eight per cent increase in Hydro's energy supply, and enough electricity to power about 450,000 homes per year.

MINING

With respect to mining, the primary development activity in the South Peace has been coal mining. The South Peace Economic Development Commission states that there are over one billion tonnes of mostly medium-volatile bituminous coal in the Peace River coal fields, found to the west and south of Tumbler Ridge. This type of coal is particularly valuable in the production of steel. At one time there were 10 coal mining projects in the South Peace region that were either in operation or proposed. In the past, coal extraction and processing explained as much as one third of the regions GDP. Today, however, there are no operating mines although HD Mining International Ltd. was issued an environmental assessment certificate for the Murray River Coal project on Oct 1st, 2015. The proposed project will involve the development of an underground mine with an estimated average annual production of ~ five million metric tonnes of metallurgical coal per year over an expected 25-year operating life, creating 780 jobs during operations.

AGRICULTURE

Finally, there are over 585 farms reporting in the region with about 870,000 ha being farmed. The regions agricultural history dates back over 100 years. The relatively rich soils in the South Peace area are well suited to growing crops such as wheat, canola, and grass seeds. Almost 90% of British Columbia's grain

and 95% of Canola have been produced in the Peace Region. The Peace is also home to some of the largest bison herds in the province, and supports excellent range for raising other livestock such as cattle and sheep.

Overview Of Related Initiatives And Programming

In addition to biophysical characteristics of the plan area, and patterns of land use, it is important to understand the management context for an Ecosystem Restoration Program. There are a number of agencies and organizations that are already undertaking related programming and initiatives (the acknowledgement section lists many of these). Some of the most important activities with respect to ecosystem restoration are described in this section.

FORESTS, LANDS, AND NATURAL RESOURCE OPERATIONS

FLNRO is a very broad organization with many functions that pertain to ecosystem restoration. Much of their programming is about resource development permitting and regulation, and while resource development can certainly affect ecosystem function, these operational programs are not within the scope of this report. There are, however, a few programs that do directly affect an ER program including, the Provincial ER program within Range Branch, three of the February 2016 North Area region priority initiatives (Environmental Stewardship, Boreal and Peace Northern Caribou, and the Site C program), and a few others described below.

The Provincial ER Program

Program Goals

The Ministry of Forests and Range, now FLNRO, created a provincial Ecosystem Restoration (ER) Program in the fall of 2006 and, in 2009, produced a strategic plan with goals, strategic priorities, and methods to help guide the program. Initial efforts were focused in the Rocky Mountain Trench area of the province with emphasis on:

- maintaining open forest and grassland ecosystems to increase natural forage for wildlife and livestock, and to improve ecosystem resiliency.
- reducing excessive fuel loading to reduce the risk of catastrophic wildfires and the risk of infrastructure loss.
- improving long-term timber values and providing a fibre source for biofuels in the short term by thinning over-dense, stagnated stands.

Funding to date for the Provincial ER Program has come from the Land Based Investment Fund. The mandate of the agency includes helping develop regional ecological restoration plans, helping coordinate and monitor restoration treatments, and providing advice on restoration activities. It is likely that some funding from this source might be available for a South Peace program.

Data Management Tools

Over the last couple of years the Provincial Program has also been developing a system for tracking restoration activities that link with the Provincial Government database. The system includes two software applications – *Estate Model* and *ER Pro*, as well as a third application, for the iPad tablet, known as *ER Pad* that allows a field surveyor to collect plot data. Such a system is necessary because ecosystem restoration activities such as surveying and monitoring, burning, manipulating stand structure, or undertaking habitat interventions, do not get captured in RESULTS or other types of provincial database. *ER Pro* is used to manage and summarize field data, including data validation. *Estate Model* imports data from *ER Pro* and is used in creating management units, plot compilation, reporting, and uploading information to RESULTS. Data is archived in the provincial government's central database. It is intended to be the main tool for tracking ecosystem changes over time and determining the effectiveness

of treatments. The system shows a lot of promise, not just the ER program, but for any agency involved in data collection, monitoring, or treatment of a broad array of forest conditions.

The Omineca ER Program

The Omineca Ecosystem Restoration Program (www.sernbc.ca) falls under the Provincial ER program and is directly relevant to the South Peace because their area of interest is adjacent to it, and many of the ecosystems and treatments are similar. In the Omineca, stakeholders formed a society with funds administered through a Board of Directors. Projects are delivered through contractors, some of which are administered through Price Waterhouse Coopers, or in-kind services of partners (e.g. BC Wildfire Services). Funding is provided through the Provincial ER Program and any other organizations with common interests (e.g. the Habitat Conservation Trust Foundation, BCHydro, BC Cattlemen, Environment Canada, Industry, and others). This type of sound societal governance structure provides funders and partners with confidence. Priority ecosystems in the Omineca include: open forests (Douglas-fir ecosystems, open range, beetle affected areas, and whitebark pine), ecosystems supporting species at risk, aquatic ecosystems and wetlands, berry producing ecosystems, and forests expected to be most vulnerable to climate change (forest adaptation). There are likely lessons to be learned from the Omineca Program, that will be transferable to the South Peace, and an effort will need to be made to formalize inter-regional collaboration and information sharing. One example is a treatment monitoring protocol that will likely be directly transferable to the South Peace.

Cumulative Effects

Cumulative Effects (CE) are defined as "changes to environmental, social, and economic values caused by the combined effect of past, present, and proposed activities and events on the land base." There are a number of initiatives related to CE assessments; the provincial CE framework, the Northeast CE program, the Oil and Gas Area Based Analysis, and the Environmental Stewardship Initiative's Regional Strategic Environmental Assessment (see: <http://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/cumulative-effects-framework>). The NE CE Program is responsible for working towards consistent and coordinated multi-sector CE decision making in the Northeast. The management framework for this initiative includes:

- A Northeast Inter-agency Assessment Team who oversee the process and develops operational guidance or policy recommendations as required.
- A Northeast Inter-Agency Manager's Committee, and CE Sub-Committee, who review and endorse drafts and final CE Assessments and associated management responses developed by the Assessment Team.
- A Northeast Strategy Committee (NESC), comprised of Assistant Deputy Ministers for natural resource agencies, who provide overall strategic direction.
- A Northeast Strategic Advisory Group (NE SAG), who are the primary conduit for First Nations and stakeholder engagement and collaboration.

The management team has been working on a Preliminary Cumulative Effects Assessment for Northeast B.C. Values of concern presently include: old forest; riparian habitat; high priority habitat (WHA, UWR, and Grizzly Bear). Objectives, indicators, and thresholds for incursion levels that trigger a management response will be set for specific values. Management responses are still under development. In 2016, the focus will be on studying CE implementation potential with a primary focus on internal communications on CE.

With respect to an ER Program adding value to this initiative, there may be a role in assisting with CE assessments, effectiveness monitoring, or implementation monitoring (whether guidance results in changes to proponent behaviour). A more obvious link might be assisting with restoration (for example, restoring conditions to below management targets through intensive management to mitigate/offset impacts or potential impacts) where an assessment has been completed and objectives have been exceeded.

Peace Northern Caribou Recovery

The FLNRO Ecosystems Section, within Northeast Resource Management and Major Projects, will have an important role in advising on ecosystem restoration activities given staff skills and the mandate of the program. The group is involved in ongoing work on caribou recovery, moose recovery², cumulative effects, maintenance of elk and mule deer habitat, and management of riparian resources, amongst other things. Currently, significant effort is going towards Peace northern caribou recovery and there is a recognition that similar work is required in the South Peace. Ecosystems section has produced an environmental mitigation policy regarding caribou that outlines steps such as:

- avoiding incursion,
- minimizing industrial activity in key habitats,
- restoring affected habitat, and
- offsetting damaged areas with work in other areas.

The caribou recovery project is largely about restoring industrial impacts such as linear features (seismic lines) and caribou ranges. They have completed a substantial inventory of linear features in the North Peace and have developed a restoration framework for measuring current condition in industrial areas that will eventually be turned into a database and used as a tracking tool. Restoration measures include preventing human access, banding trees on seismic lines to reduce ungulate visibility and discourage access, and reestablishing conifers such as black spruce (winter planting) along seismic lines. They have also established ~80 wildlife cameras within the Parker range to monitor wolf movement and impacts.

Finally, the section has also developed a boreal caribou habitat restoration tool kit (on the ground guidance on how to restore a cutline - see <http://www.bcogris.ca/search/node/caribou%20habitat%20tool%20kit>), authored a Government Action Regulation (GAR) order and a general wildlife measure regarding elk and mule deer on open, south facing slopes, and have developed a five year prescribed burn plan for habitat restoration.

An ER program might add value to this kind of initiative by assisting with monitoring and data management, assisting with technology transfer, and coordinating or implementing activities such as burning through its partners.

The Range Program

According to the FLNRO website (<https://www.for.gov.bc.ca/hra/>), the Range Program (including ecosystem restoration, range ecology, and invasive plants) allocates and administers hay cutting and grazing agreements and grazing leases on Crown range across the Province. Program activities focus on ensuring healthy and sustainably managed rangelands. Sustainable management is achieved through monitoring ecological conditions, controlling the establishment and spread of invasive plant species, advocating sustainable range management practices, developing legislation, policy, and extension services, and assisting in the restoration of degraded rangeland.

There are over 200 range tenures managed out of the Dawson Creek office. The overall objectives for range management in the District are:

- maintenance of healthy functioning riparian and upland systems.
- restoration and maintenance of desired plant communities.
- no net loss of native species.
- appropriate levels of use.

Open range treatments can include prescribed burning (typically 10 or 12 range burns per year, mostly north of the Peace River), cutting, fertilization, rangeland seeding, treatment of noxious plants, livestock

² On Mar. 8th, 2016 FLNRO announced funding for a new moose enhancement strategy that will build on the Provinces Provincial Framework for Moose Management (<https://news.gov.bc.ca/releases/2016FLNR0026-000343>).

control with fencing, salt licks, cattle guards, and exclosures, streambank stabilization, development of watering holes and water access points, scarification and tilling, and wildlife control, amongst others.

In other parts of the province, and in the Peace as well, there are occasions where there are conflicts between range use and other resource uses. Examples include damage to riparian vegetation and water quality resulting from over grazing and trampling, wildlife conflicts, the spread of noxious weeds, aspen harvesting (deciduous harvesting reduces forage opportunity for about 30 years because dense resprouting prevents access by cattle), and open range burning that results in timber supply losses. The Range Program has produced some excellent extension materials on treatments including brochures for making decisions about when to remediate, and a remediation toolkit.

There is a clear overlap in range objectives and ER objectives (hence the establishment of the Provincial ER program under Range Branch). An obvious way for an ER program to add value to the range initiative is in the coordination of treatments that will achieve both range objectives and other resource use objectives (e.g. habitat enhancement through prescribed burning). If sufficient separate funding could be obtained, an ER program could even help fund treatments in vulnerable or degraded ecosystems. Monitoring vegetation response to treatments and associated data management is another area of potential collaboration, particularly on native grasslands, shrublands important for wildlife, and sensitive wetlands. An ER Program could also assist with research related to range response and assist with the development and distribution of extension materials. A recent review of the scope of the Range Program in the Peace will likely help in deciding on how to integrate the two initiatives.

MINISTRY OF ABORIGINAL RELATIONS AND RECONCILIATION – LNG ENVIRONMENTAL STEWARDSHIP

The Ministry of Aboriginal Relations and Reconciliation launched the Liquefied Natural Gas Environmental Stewardship Initiative (LNG ESI) in 2014. It is billed as a new form of collaboration among the Province, First Nations and the LNG sector. According to the Ministry's website (<http://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/consulting-with-first-nations/liquefied-natural-gas-environmental-stewardship-initiative>) the goals of the LNG ESI are to *develop a new, collaborative approach to establishing environmental legacies related to LNG development and to generate high quality, accessible, and trusted environmental information*. In April, 2015 the Province announced that it was allocating up to \$30 million over three years to co-design environmental stewardship projects with First Nations and Industry. There are four key programming areas: ecosystem assessment and monitoring, ecosystem restoration and enhancement, ecosystem research and knowledge exchange, and stewardship education and training.

LNG ESI projects are meant to achieve broader environmental objectives and will, therefore, mostly be additional to regulatory and permit requirements. Interim Technical Working Groups have been proposed from each region to design an appropriate governance model and to scope out regional project options. In the next year or two it is likely that the ITWG for the Peace will develop a pilot project for a Regional Environmental Assessment similar in some ways to cumulative effects but with different, collaboratively chosen values and analytical techniques.

There is significant overlap between the LNG Environmental Stewardship Initiative and the proposed Ecosystem Restoration Program including the focus on environmental function, technical outreach, and a governance structure that is multi-stakeholder. Additionally, the LNG ESI is directly focused on First Nations needs and opportunities, something that the ER program has not yet accomplished. Any ER Program in the South Peace will need to directly tie in with the LNG ESI and, it should be a priority for an ER Program to position itself as a delivery agency that can assist with, and implement, actions required as a result of their analysis.

THE MINISTRY OF ENVIRONMENT

The Provincial Government's website indicates that the key functions of the Ministry of Environment (MoE) include:

- leading action on climate change.
- managing discharges to the environment.
- responding to environmental risks.
- protecting biodiversity including ecosystems, habitats, and native species.
- managing the province's parks and protected areas.
- monitoring and enforcing compliance with environmental laws and regulations.

In other areas of the province, BC Parks has been a key partner in delivery of the ER program. Biologists within the Ministry have also helped guide ER programming as Board members or through project ideas and their management. There is certainly the potential for the same type of collaboration in an ER Program in the South Peace.

MoE initiatives of immediate interest for an ER program include:

- the provincial data set for the Peace Region for fisheries, wildlife, and ecosystems.
- Predictive Ecosystem Mapping (PEM) and Terrestrial Ecosystem Mapping (TEM) and derived products like the broad provincial habitat mapping for key wildlife species.
- Detailed habitat mapping for a grizzly bear WHA in the Moberly area.
- Development of data access applications including:
 - EcoCat (Ecological Catalogue): contains fisheries reports, data and maps.
 - FIDQ (Fish Inventory Data Query): search by waterbody name or ID for bathymetric maps, fish presence, chemical studies, obstacles, etc.
 - SIWE (Species Inventory Web Explorer): search for wildlife inventory, telemetry, plants and invertebrate reports and data.
 - The HabitatWizard (HabWiz) spatial database tool (<http://www.env.gov.bc.ca/habwiz/>).

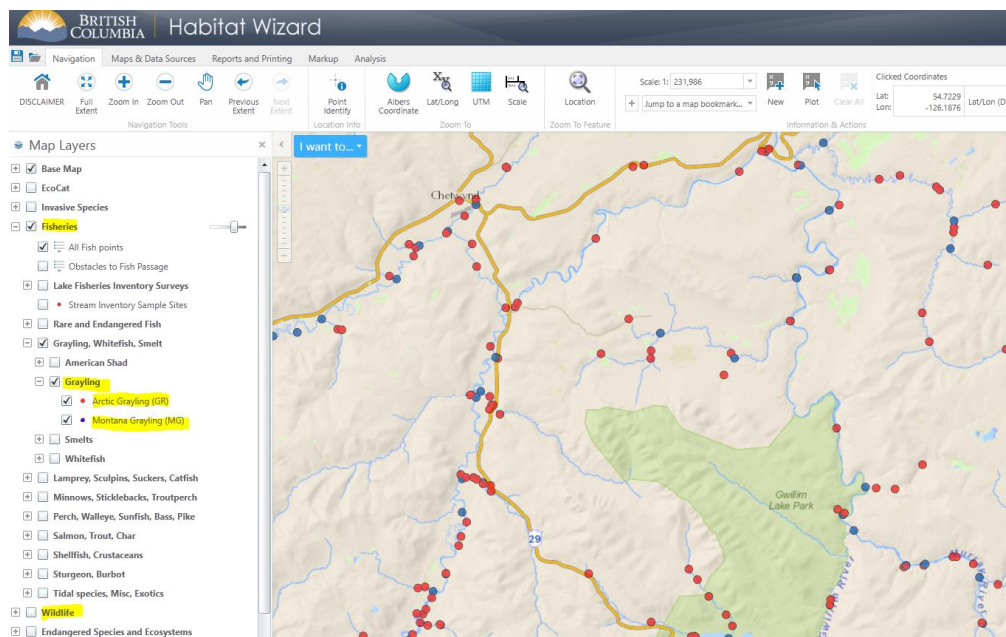


Figure 5. Known locations of grayling south of Chetwynd depicted in Habitat Wizard.

The last product, HabitatWizard, is a map-based tool that spatially represents all the above mentioned MoE data sources, allowing users to view fish, wildlife and ecosystem information over the internet. This type of information is critical to decisions regarding ecosystem restoration interventions, and at some point, it may be useful to link Estate Model and ER Pro databases mentioned under the Provincial ER Program, to this system. In the Omineca Region, a need has been identified to develop a Stewardship Atlas that provides an ecologically based map and database tool, that will help decision makers determine the relative importance of any habitat or ecosystem restoration initiative based on the projects relative location with respect to existing habitat suitability and capability, plant and wildlife population levels, enduring features (terrestrial or aquatic features that will endure in the face of climate change, and possibly act as refugia), known migration corridors, industrial development etc. It is probably that this type of Atlas will be useful in the Peace as well, and HabWiz may be an appropriate mechanism for developing it.

THE OIL AND GAS COMMISSION

The BC Oil and Gas Commission (OGC) is an independent regulatory agency, funded through the application of industrial fees and levies on a cost recovery basis, with a legislated mandate to oversee oil and gas operations in British Columbia, including exploration, development, pipeline transportation, and reclamation. These responsibilities extend from the exploration and development phases, through to facilities operation, and ultimately decommissioning. Core roles include:

- reviewing and assessing applications for industry activity,
- consulting with First Nations,
- ensuring industry complies with provincial legislation.
- protecting the public interest by ensuring public safety, protecting the environment, conserving petroleum resources, and ensuring equitable participation in production.

Initiatives within the OGC that pertain directly to an ER program include:

- An initiative called the Area Based Analysis (ABA) in which oil and gas sector impacts on defined values are being assessed. The values are defined spatially by the OGC, in collaboration with the Ministry of Environment and other agencies, based on stakeholder and First Nations input, and generally align with the Cumulative Effects Assessment and Management Framework (old growth, riparian, UWRs, WHAs, and priority species like grizzly bear and caribou). ABA is primarily a mapping exercise in which the footprint of the industry is being tracked. FLNRO uses this information in the cumulative effects analysis as well as in the Northern Caribou recovery program.
- BC OGRIS (the Oil and Gas Research and Innovation Society – see <http://www.bcogris.ca/>) is funded through a portion of the application fee for wells and a portion of the levy on oil and gas production in British Columbia. Research priorities are defined from knowledge gaps identified in conjunction with stakeholders. OGRIS supports applied research to inform environmental matters related to oil and gas exploration and development. Agencies or other organizations or groups can apply for funding to do the necessary research. There are six funding envelopes: Health and Safety, Environmental Impacts, Community Environmental Knowledge, Cumulative Impacts Management, Collaboration and Communication, and Boreal Caribou.
- Under the professional reliance model of the Oil and Gas Activities Act (OGAA), oil and gas activity applicants, in consultation with their qualified professionals, are presenting restoration measures as a part of their mitigation planning (forms part of their application) where identified environmental values (i.e., riparian, wildlife etc.) are potentially impacted. Industry representatives need to be involved in any ER program as they are the ones implementing restoration activities on the ground.
- The OGC is a key stakeholder in the Environmental Stewardship Initiative described above under the Ministry Of Aboriginal Relations And Reconciliation. This initiative has a lot of potential to

move restoration projects forward because of the dedicated funding that is proposed, and objectives appear to be well aligned with ER program objectives.

The most obvious way an ER Program in the South Peace could add value to OGC initiatives is by undertaking or coordinating ecosystem research. This could be funded through OGRIS or completed in collaboration with the Environmental Stewardship Initiative. ABA data produced by OGC is also an important consideration in developing any restoration plans and may be something that should be incorporated into a Stewardship Atlas.

BC HYDRO

The proposed Site C dam in northern B.C. will flood approximately 5,500 hectares of land along the Peace River. The Project received environmental certification and approval to proceed to construction in December 2014. This decision followed an independent [environmental assessment](#) by the federal and provincial governments, which included a Joint Review Panel process.

B.C. Hydro's environmental certificates, and provincial and federal permits, require mitigation and compensation to offset Project impacts. Key areas for mitigation involving ecosystems include mitigation for wetlands, rare plants, migratory bird habitat and non-wetland migratory bird habitat. In terms of wetland mitigation the objective is to replace wetlands lost in terms of function and area. Mitigation could occur through protection of existing wetlands, changes in land management in and around wetlands, restoring degraded wetlands, and wetland creation.

Where BC Hydro-owned lands have been retained for mitigation and for land purchased for the purposes of mitigation, BC Hydro has prepared comprehensive property-specific management plans. Each plan outlines how environmental certificate requirements will be met, as well as how the land will be managed to maintain agricultural production.

Sections of the south facing slopes adjacent to and above the reservoir on lands owned by BC Hydro have been identified by the Province as ungulate winter range. Prescribed burning has been identified as a way to maintain these areas of winter range.

Hydro has also completed a rare plant inventory and collected information on plant and animal species of cultural importance. Examples of some of the treatments B.C. Hydro is considering within their Site C mitigation strategy are in appendix I.

There are a number of ways an ER Program could assist B.C. Hydro in achieving their goals regarding ecosystem function. Some examples include:

1. Identifying existing or proposed programs to protect rare plant occurrences.
2. Identifying locations for rare plant translocations.
3. Identifying wetland mitigation opportunities.
4. Planning and implementing prescribed burning or other treatments in ungulate winter ranges or open range to reduce or prevent aspen or conifer encroachment.
5. Monitoring.

OTHER STAKEHOLDERS

Ducks Unlimited

Duck Unlimited conserves, restores, and manages wetlands and grasslands to benefit waterfowl, wildlife and people. Their goal is to ensure abundant wetlands and waterfowl, and improve human well-being. There are four DU offices in B.C., and one of them is located at Tom's Lake, just south of Dawson Creek. Ducks Unlimited Boreal Wetland Initiative (out of Edmonton) developed a strategic wetland mapping and planning tool called the Enhanced Wetland Classification (deals with vegetation, soils, and hydrology)

which includes all the Peace (see <http://www.ducks.ca/resources/>). This work has been used in a variety of ways including research, waterfowl population monitoring, habitat analysis for caribou, moose, and furbearers, and has been useful in First Nations negotiations. It is relevant to both landscape level planning and ecosystem restoration site planning. This organization would be a good strategic partner for any ER program.

BC Wildlife Federation

The BC Wildlife Federation is a province-wide voluntary conservation organization representing British Columbians whose aims are to protect, enhance and promote the wise use of the environment for the benefit of present and future generations. Their goal is to ensure the sound, long-term management of British Columbia's fish, wildlife, park and outdoor recreation resources. They are also active in outdoor recreation education. The governing body of many of the other ER programs around the province, includes a representative from the BC Wildlife Federation.

The Guide Outfitters Association of BC

The Guide Outfitters Association of British Columbia (GOABC) was established in 1966 to create a voice with the provincial government for the guide outfitting industry and to advocate for science-based wildlife management. They are another group that commonly participates in ER programming around the province and come to the planning table with substantial practical experience respecting wildlife. GOABC recently established the Wildlife Stewardship Partner Program providing annual funding of \$50,000 per year for community-based wildlife stewardship initiatives.

The Yukon to Yellowstone Initiative (Y2Y)

According to their website (<https://y2y.net/vision/about-us#sthash.VHkrEVA0.dpuf>), the Yellowstone to Yukon Conservation Initiative is a joint Canada-U.S. not-for-profit organization that connects and protects habitat from Yellowstone to Yukon so people and nature can thrive. They take a scientific and collaborative approach to conservation and have worked with more than 300 partners, including scientists, conservation groups, landowners, businesses, government agencies, and First Nations. Their vision is to create an interconnected system of wild lands and waters stretching from Yellowstone to Yukon. Per Tim Burkhart, the Peace Coordinator for the Y2Y initiative, the South Peace is the narrowest part of the Y2Y corridor and most developed and impacted. Y2Y is involved in a number of initiatives in the South Peace including a First Nations CE framework for the Murray River, community workshops on cumulative effects, grizzly bear habitat analysis in the Moberly population unit, and a wildlife vehicle collision and connectivity study through the Pine Pass (Highway 97). Y2Y has a great deal of experience in landscape analysis (for example enduring features analysis) and are mandated to stay connected with development initiatives in the area and are, therefore, a potential partner for an ER program in terms of collaborative information sharing.

The Tumbler Ridge Global Geopark

A Geopark is an area recognized by the Global Geoparks Network, supported by UNESCO, with a geological heritage of international significance. The geology in a Geopark is linked to sites with interesting archaeology, wildlife, history, folklore and culture. Geoparks also help inform the management and sustainable use of natural resources, while at the same time promoting respect for the environment and the integrity of the landscape. Geoparks are typically a community-driven initiative as opposed to national or provincial parks which are generally government-initiated projects. At 7700 square kilometers, the Tumbler Ridge Global Geopark (TRGG) covers an area equivalent to 25% of the entire South Peace District, and given their focus on understanding natural history and current environmental conditions, as well as promotion of outdoor recreation experiences, they are another group that an ER organization should consider as a potential partner in terms of information sharing and possible ecosystem restoration projects.

Encana

Encana Corporation produces, transports and markets natural gas, oil, and natural gas liquids (NGLs) and is Canada's largest natural gas producer. Encana is one of the most active drillers in the South Peace, having drilled 531 wells in the area since 2004. Operations in south peace are in the foothills near the Cutbank Ridge area southwest of Dawson Creek and in other parts of the Montney formation. In the last few years the industry has experienced some slow-downs and in 2016 it is expected that operations will be at minimum levels.

The most important feature of the oil and gas sector in terms of ecosystem function, is the impact of geophysical exploration activities like the cutting and clearing of seismic lines, and other cutline-linear features, such as roads, trails, and pipeline rights-of-way. These linear features create forest fragmentation and improve predator access, negatively impacting species such as the ungulates.

Government is well aware of the impacts of oil and gas sector activities and are considering them in the context of cumulative impacts resulting from other forest resource uses. As a result, reasonably clear guidance and recommended practices have been developed that industry follows to mitigate environmental impacts. Some of this is relatively recent and so, from an ER perspective, it may be that legacy sites are more problematic. There is opportunity for an ER program to work collaboratively with Encana and other oil and gas companies in terms of developing site specific remedial action, particularly on legacy sites. With Encana this type of work could be coordinated through Mark Phinney, a biologist and forester working for Encana on environmental mitigation.

Tech Mining

Teck Resources Limited is a metals and mining company and Canada's largest diversified resources company. In the past they have been criticized regarding environmental standards but more recently have made "best in class" environmental and social performance a priority. Their operations in the South Peace include the Quintette coal mine (currently not operating owing to low coal prices) and the Bull Moose mine (decommissioned), however, because metallurgical coal is essential for steel development, it is anticipated that prices will rebound at some point.

Quintette is required, under their mining permit, to restore/reclaim retired mining sites and they have been undertaking a broad range of restoration activities including caribou monitoring, planning, and mitigation in conjunction with First Nations, caribou maternal penning and offsetting, reclamation of high elevation caribou refugia, water quality mitigation, linear corridor rehabilitation (earthen berms, pulling slash into right of ways, high density replanting for visual blocking), and are involved in a number of restoration and cumulative effects planning committees. In the past, they also did a lot of work on rehabilitation focussing primarily on grizzly bear and elk. In the future, they are considering restoration of linear features associated with the Mesa/Wolverine site (2017 implementation) and mitigation of agronomic species such as timothy, fescue, some legumes (which crowd out native grasses and forbs) that were established at some high elevation sites in the early days of coal development.

The company has not focussed on monitoring nor acquired too much data on pre-existing conditions. They are interested in developing ways to coordinate and manage data and share and distribute resources between and across industries and agencies and this may be an area that an ER program could help with.

First Nations

Although First Nations are involved in nearly every related initiative in the South Peace, and have much to offer in terms of insights into ecosystem restoration needs, there has, as of yet, been no engagement with respect to the proposed South Peace ecosystem restoration program. This will be a critical step that must be completed to ensure a well-targeted and successful ER Program.

POTENTIAL ECOSYSTEM RESTORATION OPPORTUNITIES

Defining Ecosystem Restoration

Given the high potential for a climate-induced state shift and associated changes to external stressors like summer drought, higher temperatures, more frequent fires, changes in peak flow, increased stream temperatures, more frequent/severe forest health issues, etc., it is unlikely that it will be appropriate for land managers to restore ecosystems to some historic state. A more effective scenario may be one in which managers base land management practices on expected future conditions and fundamental ecological principles, to create new conditions that provide reasonable assurance of resource availability, and ecosystem function, now and in the future. Some of the basic ecological concepts underlying this approach are discussed below.

ECOSYSTEM STABILITY AND RESILIENCE

Disturbances such as fire, wind, drought, flooding, epidemic insects and disease outbreaks, avalanches, and pollution can be thought of as external (to the ecosystem of interest) ecological processes that drive change. **Resistance** is an ecosystem's ability to maintain its structural and functional attributes in the face of such stresses/disturbances. Examples of resistant ecosystems might include those with low fuel loads, diverse species mixes, and/or multiple ecological processes. An ecosystem that is **stable** retains its functional and structural characteristics and successional trajectory in spite of stress/disturbance. Stable ecosystems are often in a state of dynamic equilibrium rather than a steady state. Disturbances of sufficient magnitude and duration may force an ecosystem to reach a threshold beyond which a different regime of processes and structures predominates (a different system state).

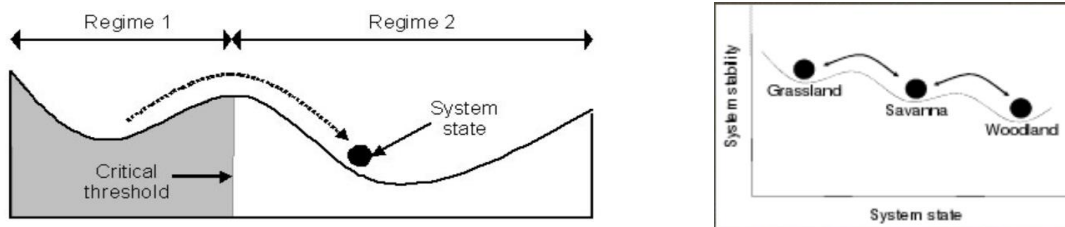


Figure 6. Examples in which a disturbance has changed an ecosystem to such an extent that it has shifted it to a new state with different structure and processes (adapted from Beisner et al, 2003).

There is much discussion in the climate adaptation literature about creating resilient ecosystems. There are many definitions of **resilience** but most are about the capacity of an ecosystem to regain structural and functional attributes that have changed because of a disturbance. In the **provincial** program, **ecological restoration**, is defined as the process of assisting with the recovery of an ecosystem that has been degraded, damaged or destroyed by re-establishing its structural characteristics and ecological processes. This definition might be thought of as *human-assisted resilience*. However, as noted in preceding sections, restoring an ecosystem to an earlier state may not be the right solution in the face of climate change. **Vulnerability**, the counterpart of resilience, is the lack of capacity to cope with, resist, and recover from a disturbance. It is recommended that a South Peace ER Program focus on vulnerable ecosystems rather than ecosystem resilience. As a starting point, it is recommended that ecosystem restoration be defined as:

“managing the structure and function of vulnerable ecosystems to achieve a desired future condition that will sustain ecological services and human socio-economic needs”.

DESIRED FUTURE CONDITION

The term **desired future condition** is anthropocentric, and in the context of an ecosystem restoration program means the *target set of structural attributes necessary to maintain ecosystem function and provide the ecological services and forest products considered to be important by stakeholders*. A desired future condition for a particular ecosystem should reflect the best available information on ecological systems, climate change, and forest management systems, and be established with a specific time scale in mind. Determining a desired future condition for a vulnerable ecosystem requires expert knowledge but, because of the complexity of ecosystems, and uncertainties about driving forces in the future, it will also involve experimentation, adaptation, and revision.

ECOSYSTEM DEGRADATION

Most definitions of degradation include the concept that an ecosystem is degraded when structural elements or functional processes are lost or impeded. In the South Peace then, **an ecosystem would be considered to be degraded or vulnerable when it is missing structural elements and ecological processes that are important for achieving a future condition that will sustain ecological function and human socio-economic needs**. Examples of vulnerable ecosystems include those with:

- excessively uniform species distribution (a lack of diversity).
- introduced species whose growth and spread is not constrained by ecological processes characteristic of the ecosystem.
- a low number of individuals that cannot sustain the population.
- isolated populations which are not integrated into a larger ecological matrix (no opportunity for migration and biotic and abiotic flow).
- unnatural levels of one or more structural elements because of past human activity (e.g. high slash loads because of fire suppression).
- epidemic levels of a forest pest.
- lack of a critical structural element for a given stage of development (e.g. coarse woody debris, berry producing shrubs, large organic debris in a stream, riparian vegetation, old large trees, an important browse species, vegetative cover on erodible soils, etc).
- impeded ecological function (e.g. impeded or excessive above ground or sub-surface water flow, insufficient photosynthesis, impeded carbon fixation, lack of connectivity, disrupted mating or calving, disconnected functional link, etc).
- impaired hydrological regimes that result in loss of function or productivity.

This definition will, of course, evolve as ecosystem knowledge and experience are obtained.

Potential Target Ecosystems/Activities/Species

ER programming in the South Peace is relatively new and stakeholder perceptions on highest priority ecosystems are still emerging. During a stakeholder workshop held as part of the ER planning process, feedback on highest priority ecosystems was solicited. Participants were provided with a summary of candidate activities obtained from interviews with a broad range of stakeholders in the South Peace (see appendix II) and after discussing and refining the initial list, were instructed to consider relative priorities in the context of:

- what is already being adequately managed
- the degree of degradation or vulnerability of the candidate ecosystem, species, or activity
- the potential for success
- cost of implementation

Result of this exercise are presented graphically in figure 7.



Figure 7. Ecosystem Restoration Needs Identified By South Peace Stakeholders

Each participant received a number of chits they could use to “vote” on highest priority candidates. Ideas were subsequently grouped by theme, indicated with colour in figure 7, and votes were summarized for each theme (indicated by white numbers). For example, the various species/ecosystems/activities related to the management of wild ungulates received 14 votes in total. This “voting” process should be thought

of as preliminary thinking on what is important and must be considered in the context of work described in the section on Related Initiatives. For example, the relative emphasis on ungulates is lower than what one might expect because there is a great deal of programming already directed towards ungulates, with less for an ER program to do as a result, but that does not mean ungulate issues are not important. Titles for each of the polygons in the diagram are broad but more detail on what they could encompass is contained in appendix II. One has only to glance at the diagram to realize that the various topics are highly inter-related. For example, monitoring and data management is a cross cutting theme that applies to all other categories.

Priority Ecosystems And Activities For The South Peace ER Program

Strategic priorities and practices in the South Peace District are necessarily different than for other areas in the province because of differences in ecological conditions, tenure, land use planning, stakeholder values, and anticipated changes in climate. The top six activities/ecosystems that stakeholders have identified for the South Peace are:

- 1) ecosystem restoration monitoring and data acquisition and management (20%)³
- 2) native grassland and range ecosystems (13%)
- 3) old forest attributes and tree species with high functional importance (old aspen, whitebark pine, species like Douglas-fir that might be better adapted to future climate) (12%)
- 4) water quality, fish habitat, and riparian ecosystems (10%)
- 5) wild ungulate habitat and ecosystems (8%)
- 6) landscape connectivity (8%)

While these categories are somewhat general they do provide a broad indication of relative priorities. Choosing amongst the many detailed restoration suggestions that stakeholders have provided in Appendix II, to develop an ecosystem restoration program, however, requires a more rigorous set of questions than *what are the broad priorities*. For example, at the strategic level:

- What data is necessary to support decisions about investments in ER?
- What information is required to justify treatment expenditures?
- Who might use information generated from ER programming?
- How would a data management system add value to, and be integrated with, existing systems?
- Who is legally responsible for land management and who else holds an interest?
- Does the existing policy and regulatory framework support the work?
- Is the work supported by all stakeholders?
- Who or what will benefit from the restoration and what is the magnitude and longevity of the benefit?
- Are there others who are already mandated to address the restoration need, and who have both the technical capacity and financing?
- To what extent does the project leverage previous funding, new funding, or partnerships?
- What are the consequences if no action is taken?
- Are there legitimate threats or barriers to implementation of the work?

At the operational level, there are also questions, and while these will vary depending on the type of treatments envisioned, some types of questions will be germane to most projects. For example:

- Is the area, ecosystem, or species of interest vulnerable or degraded and will that change with time?
- What are the stand characteristics and ecosystem functions in the area of interest?

³ The percentage refers to total points allocated to the topic in the stakeholder meeting voting exercise. Categories other than the six listed bring the total to 100%.

- Is the project technologically feasible?
- How much will the project cost, including any possible re-entries?
- How accessible is the area of interest?
- Is there reasonable assurance that the investment will not be compromised by natural catastrophe, land re-zoning, or industrial development?
- What level of uncertainty is there regarding treatment efficacy?
- What are the adverse or unintended consequences of a treatment?
- How will climate change affect treatment results?
- What is the magnitude of benefit associated with the project?

Based on the most likely answers to these questions, the relative emphasis on the various options for ecosystem restoration provided by stakeholders, potential strategic alliances, and the need to develop a governing body (see Governance below) a list of projects with the highest priority and greatest chance of success over the next two to three years has been provided below.

Activity:	<i>Develop a Not-For-Profit Society</i>	Timeline:	May-June, 2016
Potential Partners:	FLNRO Dawson Stewardship, FLNRO Ecosystems, FLNRO Dawson Range, FLNRO Major Projects, FLNRO FN Liaison, FN Reps, OGC FSJ, MoE FSJ, BC Hydro, Encana Dawson, Quintette Coal, BC Wildlife Federation, Ducks Unlimited, Canfor Chetwynd, Y2Y Dawson, TRGG, GOABC Dawson, a LNG Environmental Stewardship Initiative representative		
Description			
•Not for profit as opposed to charitable •Attract seed funding •Decide on a name •Register with the BC Registrar •Develop a constitution and bylaws •Identify a Board of Directors •Setup a bank account and financial controls •Member recruitment •Develop inaugural policies •Engage a coordinator (FLNRO or other agency half time FTE or hired professional) •Outreach to develop awareness through social media, a website, and meetings with stakeholders			

Activity:	<i>Develop An Integrated Data Management System</i>	Timeline:	2016 and 2017
Potential Partners:	FLNRO Prov ER Program, FLNRO Dawson Stewardship, FLNRO Major Projects, MoE FSJ, OGC FSJ, BC Hydro, Encana Dawson, Quintette Coal, Ducks Unlimited Dawson, Y2Y Dawson		
Description			
•Solicit input on an Integrated Data Management System with from key stakeholders •Build on the Provincial ER Program Estate Model and ER Pro (or other model) to service the data needs of each of the partner organizations •Integrate the database with the MoE HabWiz spatial mapping service or iMap •Ensure the system integrates with the BC Gov'ts provincial database (e.g. RESULTS) •Consider building on this model in the future to service Regional research needs (similar to the Bulkley Valley Research Centre) •Consider building on this system to create a Regional Stewardship Atlas.			

Activity:	<i>Develop a Monitoring Protocol For ER Treatments</i>	Timeline:	2016
Potential Partners:	FLNRO Prov ER Program, FLNRO Dawson Stewardship, FLNRO Ecosystems, FLNRO Major Projects, MoE FSJ, OGC FSJ, the LNG ESI Initiative, BC Hydro, Encana Dawson, Quintette Coal		
Description			
<p>•Although there are a number of protocols that have been used through the years (e.g. the Forest and Range Evaluation Program (FREP), Procedures for Environmental Monitoring in Range and Wildlife Habitat Management (1996), the National Forest Inventory Plots, etc), there are none that are directly targeting ER treatments and integrated with a Data Management System the way it is foreseen for the ER Program except what was developed for the Omineca Region. •This project is about adapting the Omineca Monitoring Protocol for use in the Peace by expanding the range of indicators to be examined to meet the needs of potential partners. •Link monitoring type and level with the objectives and outcomes expected, the values and indicators to be measured, and the budget available. •Ensure the data is integrated with ER Pro, Estate Model, and HabWiz •Evaluate how the protocol can be integrated with UAV technology (which can produce plant species maps with an image pixel size of less than one centimeter, produce biomass estimates, and produce 3D terrain and watershed models).</p>			

Activity:	Prescribed Fire	Timeline:	2016 to 2018
Potential Partners:	FLNRO Dawson Stewardship, FLNRO Ecosystems, FLNRO Range, BC Hydro, BC Wildfire Service, BC Peace South Stockmen's Association		
Description			
• This project builds on the Peace-Liard Burn Program, Five Year Burn Plan 2012-2017 (Goddard, 2011 – see figure 8) to restore native grasslands, ungulate winter range, and identified open range •Develop an agreement (MoU) with BC Wildfire Services to implement treatments •Develop burn plans for selected areas •Develop a smoke management protocol and communication strategy •Undertake pre-treatment surveys •Implement burning.			

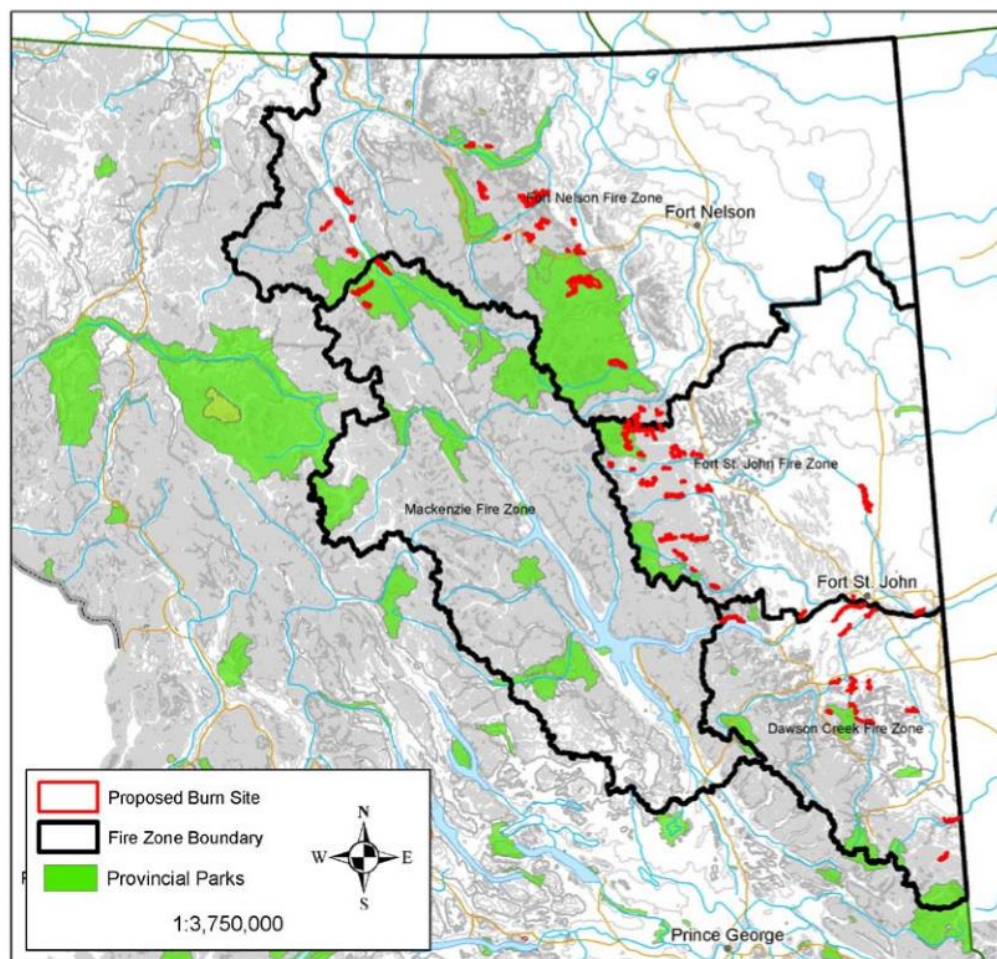


Figure 8. General locations of sites proposed for burning in the 5-year Peace burn plan. Utilization of prescribed fire for wildlife habitat in the Dawson Creek area has been minimal for a number of years because of overlapping values on the landbase, risk of escape, smoke concerns, and infrastructure/values. Many sites are overgrown with aspen and do not provide the forage or the wildlife

Activity:	<i>Rare Plant Inventory and Nursery</i>	Timeline:	2016 and 2017
Potential Partners:	FLNRO Ecosystems, MoE FSJ, BC Hydro		
Description			
•BC Hydro's environmental certificate requires that they develop measures to mitigate environmental effects on species at-risk and sensitive ecological communities and rare plants and that any measures taken must be monitored to evaluate the effectiveness of mitigation measures and to verify the accuracy of the predictions made. A first step in this process is undertake an inventory of rare and sensitive plant communities. •A joint program might involve completing the inventory in areas affected by Hydro's operations as well as related areas			

identified in the ER program (e.g. native grassland sites). •A third step would be working collaboratively with existing nurseries, or developing an independent nursery to grow rare and sensitive native plants for re-establishment on degraded native grasslands, gravel pits, and decommissioned mining sites. •The ultimate goal would be site preparation and seeding/planting of high priority sites.

Activity:	<i>Fish Passage</i>	Timeline:	2017 and 2018
Potential Partners:	FLNRO Stewardship Dawson, FLNRO Ecosystems, Canfor Chetwynd, Encana Dawson, the Provincial Fish Passage technical Working Group		
Description			
•A District wide assessment of barriers to fish passage (for all life stages of fish) along high priority road systems within the District • Barriers could include poorly installed or maintained culverts, beaver activity, low water levels, or debris accumulations. •The analysis would be restricted to orphaned sites, in known fish bearing watersheds, on well defined, low gradient, first and second order streams. •The objective is to identify potential remedial measures to restore identified sites.			

Activity:	<i>Mapping Old Aspen, Douglas-fir, and Whitebark Pine</i>	Timeline:	2017 and 2018
Potential Partners:	FLNRO Stewardship Dawson, FLNRO Ecosystems, MoE FSJ		
Description			
<p>•This project is about identifying and mapping the location of stands of tree species of special concern including whitebark pine, Douglas-fir, and old aspen. •The project is primarily a GIS and imagery interpretation exercise with some ground sampling and aerial reconnaissance with fixed wing and/or helicopter. •This work is premised on the idea that Vegetation Resources Inventory data is not current enough, or of sufficient resolution to identify these species and attributes.</p> <p>•Whitebark pine is a keystone tree species in sub-alpine forests that is declining throughout its range because of white pine blister rust, mountain pine beetle, and increased competition from shade tolerant trees caused by fire suppression. • Whitebark pine grows at treeline and it shades the snowpack, prolonging snowmelt which helps in regulating stream flow, it stabilizes exposed soil in areas where other species don't survive, and its exceptionally large seeds are an important food source for at least 13 species of birds and 8 species of mammals including the Clarke's nutcracker, grizzly bears, and squirrels. It also provides shelter and nest sites for many other wildlife species, including deer, elk, grouse, neotropical migrants, snowshoe hares, and birds of prey •There is currently little information on the specific location or health status of whitebark pine stands although there is some evidence that there are stands in the Wapiti, Monkman Park, and perhaps Pine Pass. Having a viable seed source that is potentially rust resistant is becoming more urgent and will be fundamental to this species survival in the future.</p> <p>•Douglas-fir occurs in some of the western most reaches of the District and, like whitebark pine, does not show up in the Provincial VRI database. It is a species that is expected to be well adapted to wildfire and may be an important species in terms of mitigating climate change. Identifying a viable seed sources for future use in forest plantations as a climate mitigation measure is an objective in mapping this species.</p> <p>•A number of sensitive wildlife species make extensive use of older aspen including many warbler species (the Connecticut warbler being the most well known), and fisher. Additionally, cattle make use of older aspen stands with low slash levels, a sparse shrub layer, and lush herb and grass layer. •In past 20 years, there has been little use of fire on the landscape (which can result in less dense aspen groves, and aspen harvesting has been creating dense stands of impenetrable aspen thicket. •Both the ranching industry and habitat specialists would be interested in knowing the locations of old aspen groves in some sections of the District.</p>			

While the ecosystems described above have been selected as initial candidates for potential restoration, because they are perceived by stakeholders to be relatively high priority and have a high chance of success, it does not preclude including other ecosystems or activities, or changing relative priorities in the future as more is learned about degradation, treatment options, and stakeholders values. The process is iterative and as the program evolves, and early successes generate credibility, other options will need to be considered. The fundamental program driver in the first two years, is to ensure a credible, functional organization is established.

Measuring Success

Part of strategic planning is ensuring that program success is defined. Success can be measured at many levels and, at the most fundamental level, in the South Peace, it is measured by the establishment and persistence of an ER organization, and the willingness of stakeholders to participate. Assuming that this occurs, the next level may be to define when activities or treatments are successful. In general, ecosystem restoration interventions are considered to be successful when:

- further degradation is halted.
- the rate of recovery increases.
- key components are present (e.g. characteristic assemblage of species, key structural elements, necessary ecosystem processes, critical habitat types).
- the ecosystem is capable of sustaining reproducing populations of the species necessary for its continued stability or development along a desired trajectory.
- the ecosystem is integrated into a larger ecological matrix or landscape and there is abiotic and biotic flow and exchange.
- potential threats to the health and integrity of the restored ecosystem, and to human values, from the surrounding landscape have been eliminated or reduced as much as possible.
- there is improved engagement by stakeholders.
- planning amongst stakeholders and agencies is integrated and accounts for cumulative impacts.
- land managers learn and adapt to improve future interventions.

DESIRED FUTURE CONDITION

In most ER programming, the objective of an ecosystem intervention is to create a desired future condition - a target set of structural attributes and ecological processes necessary to maintain ecosystem function and provide the ecological services and forest products considered to be important by stakeholders. This definition is anthropocentric in the sense it is about what people think is important in an ecosystem and what they want in terms of ecosystem products or services (for example, productive range land, good furbearer habitat, good ungulate habitat, productive, functional hydrospheric ecosystems, berry habitat, ecosystems that will continue to provide ecological services into the future even with different disturbance regimes including climate impacts, safe communities). Management interventions typically attempt to change one or more structural elements in a stand or landscape.

Some examples of structural elements and ecological processes that could be used in describing a desired future condition have been provided in the tables below for four different ecosystems (figure 9). These tables simply provide information that helps structure thinking about treatment objectives. It is useful to think about which ecological processes are affected as well. Coloured cells in the tables indicate that an element or process is of particular importance for that ecosystem.

An example of how the tables could be used to describe a desired future condition for ungulate winter range for deer and elk, that includes thinking about structural elements, might look like the following:

- > 50% of the unit is in conifer patches that are primarily mature and old forest.
- More than 30% of patches are greater than 5 ha in size.
- More than 75% of the area in conifer patches has a crown closure that exceeds 50%.
- Aspen cover is less than 5%.
- Fuel loading (coarse woody debris) is less than 10 m³/ha and occurs in dispersed patches.
- Fuel loading within 500 m of infrastructure is less than 5 m³/ha.
- Bark beetles affect less than 5% of conifer stems.
- Browse cover exceeds 30% and is comprised primarily of saskatoon, Douglas maple, willows, red osier dogwood, soopolallie, snowberry, or other favored browse species, and herb cover in canopy gaps exceeds 60%.

Examples of Structural Elements	Fd Sites	Grass lands	Wet lands	Berries	Examples of Ecological Process ¹	Fd Sites	Grass lands	Wet lands	Berries
Patch Size Distribut					Hydrologic Regime ²				
Connectivity					Thermal Regime ³				
Seral Stage Distribut					Soil Erosion/Stability				
Species Diversity					Nutrient Cycling ⁴				
Area In Old Forest					Eutrophication				
Road Density					Anoxia				
Tree Species					Photosynthesis				
Crown Closure/Gaps					Evapotranspiration				
Coarse Woody Debris					Pollination				
Snags and Decay Cl					Carbon Sequestratn				
Shrub Species/Cover					Species Migration				
Grass/Herb Cover					Wildlife Interactions ⁵				
Berry Species Cover					Colonization/Success				
Alien Species Cover					Cell Division/Growth				
Proportion Open H ₂ O					Plant Mortality				
Proportion Rock					Tree Recruitment				
Lichen Cover									
Pest Incidence									
Infrastructure Proxim									

1. Normally assessed indirectly because data collection and required research often exceed the capabilities and budgets of most restoration projects.
2. Refers to water levels, peak flow, ground water recharge/storage, runoff, percolation, salination, eutrophication, connectivity, etc.
3. Soil, water, air heating.
4. Soil organic matter accumulation and decomposition, nitrogen fixation, etc.
5. Breeding, foraging/predation, hiding, escape, etc. behaviors.

Figure 9. Structural elements and processes that could be included in a description of a desired future condition – source: Vanderhoof ER Strategic Plan

Incorporating targets and indicators into a desired future condition, will add strength to a treatment prescription. These terms can mean different things to different people but, in B.C., they are commonly defined as follows:

- Resource value - a characteristic or feature of an ecosystem that is considered to be important by stakeholders. Stakeholders may have one or more objectives for a resource value.
- Objectives - broad statements describing a desired future state or condition for a particular geographic location.
- Indicators - variables used to measure or describe the state or condition - they should be relevant, measureable, feasible, understandable, and acceptable to stakeholders.
- Targets - a specific statement describing a desired future state or condition for an indicator. They should be time-limited and quantifiable if possible.

Program objectives, indicators, and targets can be set at the landscape level and at the site level. Site level objectives are subordinate to landscape level objectives and should be consistent with them. Following is an example of how objectives, indicators, and targets can be built into a desired future condition for grasslands at the site level.

Value: Grassland Forage

Existing Condition: Grasslands (including palatable forbs) occur in small pockets or strips within a complex of aspen copses, shrub pockets, and scattered conifers, and represent less than 50% of the unit. They are predominated by introduced species such as timothy, brome, and Kentucky blue grass.

Treatment Objective: Improved grass abundance and composition.

Indicator 1: Kg forage/ha and stock capacity

Target 1: 600 kg forage/ha/year with a stocking rate of 2.4 ha/AUM.

Indicator 2: Proportion of grasses that are native species.

Target 2: 25% of grass cover is comprised of native species within five years of treatment.

Data supporting specific indicators must be collected before and after treatment during program monitoring. Obtaining this type of information is part of the adaptive management process and allows treatment success to be evaluated and results to be communicated. The overall intent is to ensure that management strategies are meeting stakeholder expectations for ecosystem restoration.

INCORPORATING DESIRED FUTURE CONDITION INTO TREATMENT PRESCRIPTIONS

Once desired future conditions for a particular ecosystem have been described, a treatment prescription must be developed to achieve the desired condition. Some principles that should be considered in designing treatment prescriptions for ecosystem restoration in the South Peace District include:

- Ensure treatments reflect driving forces and future conditions.
- Promote techniques that create biologically diverse and functionally complex ecosystems.
- Avoid setting treatment targets that are based on historical conditions unless historical drivers of ecosystem function will be the same in the future.
- Ensure that treatments result in ecosystems that function well under existing conditions (precipitation, temperature, hours of sunlight, edaphic and physiographic conditions, disturbance regimes, etc.) and under expected future conditions.
- Avoid treatments that require repeated interventions unless there is some assurance that these future interventions can be supported.
- Ensure that a framework for learning through monitoring is incorporated in treatment planning.

The table below provides a more complete example of how a prescription can be built, in this case, for a grassland ecosystem. The table describes general treatment methods, expected outcomes, and rationale for the ecosystem, but does not provide operational details on things like location, equipment, treatment area, costs, and protection concerns for specific units. These types of concerns would also normally be incorporate into an operational plan.

Grassland Ecosystems	
Prescribed Burning	
Treatment Description	<ul style="list-style-type: none"> - prepare a treatment prescription and burning plan 1 to 2 years in advance of burning - engage stakeholder involvement (particularly cattlemen and local residents) prior to treatment implementation - delineate treatment boundaries based on natural fire breaks, location of infrastructure, and access - develop fire guards as necessary near infrastructure, reserves (including areas with high potential for red listed species), or areas with thin duff and rocky outcrops - burn in the spring when the fire is more easily controlled, when dead grass stalks and herbaceous vegetation are dry and flammable, and when soils are still frozen or moist (to avoid loss of humus horizons) - burn intensity should be light so that the seed bank and rhizomes are not destroyed and humus horizons are conserved (note that burn intensity is not well correlated with aspen mortality and that slender wheatgrass - <i>Elymus trachycaulus</i> is sensitive to spring burning) - manually cut and spread brush as required before burning treatments to improve fuel continuity - consider cutting and hinging (on stems up to 15cm at the root collar) aspen taller than 3 m prior to burning (to increase mortality and reduce suckering) - consider repeating burning 2 years after the initial treatment to kill aspen suckers (this approach could reduce soil productivity and will not eliminate aspen – i.e. it will not shift the ecosystem to a new regime state unless it is frequently repeated - but will provide a window of opportunity for better grass, forb, and shrub production until aspen and conifers reestablish). - consider manual cutting of aspen and undesirable shrubs each year for 2 to 3 years after treatment to extend the period of good grass and herb production - consider undertaking controlled grazing in August, in the year of burning (to kill aspen or make any sprouting shoots more susceptible to winter kill).

	<ul style="list-style-type: none"> - consider leaving sections with high indigenous species diversity untreated (since introduced species such as Timothy, Kentucky bluegrass, and Brome resist fire well and may tend to occupy a site more effectively) - in high use areas, consider mechanized thinning (or harvesting) of conifer forests to open the stand and improve light conditions for forbs and grasses - on areas that are primarily used by domestic livestock and are not targeted for restoration to a natural state, consider grass seeding of roadsides and landings using a range mix that includes slender wheatgrass (this treatment could also be considered in thinned conifer forests if there is enough mineral soil exposure) - avoid burning in areas where livestock grazing already provides sufficient disturbance to stimulate robust shrub and herb cover (the combination of burning and grazing can reduce site productivity to a point where recovery is prolonged)
Associated Vulnerability/Degradation	<ul style="list-style-type: none"> - grassland areas occur in small, dispersed pockets - aspen and conifer encroachment - the prevalence of introduced species such as dandelion and agronomic grasses - the prevalence of undesirable shrub species such as snow berry or birch leaved spirea - low species diversity (less than a dozen or so grass and herb species for example) - low grass and herb production - compacted or eroded soils - soil organic horizons that are thin and do not adequately hold soil moisture, provide soil nitrogen, protect seed banks, and prevent erosion - extirpation of wildlife resulting from overuse by domestic animals or human activities
Desired Future Condition	<ul style="list-style-type: none"> - rare or endangered species are protected - grassland patches exceed 2 ha and are well connected - aspen and conifer cover is less than 5% within defined units - shrub cover is less than 50% and 75% of shrub species are browse and/or berry species - grass cover, outside of shrub and aspen sections, exceeds 80% and is 25% native species - on rangeland areas that are not considered to be natural grasslands, grass production exceeds 400kg/ha.
Treatment Rationale	<p>Treating grassland ecosystems may be necessary because they are rare and provide important forage opportunities for a different array of species than is found in most forest ecosystems. For example, grasslands are very important for a variety of bird species and host a variety of small mammals like the chipmunk, the jumping mouse, packrats and other mice and voles, garter snakes, and species of prey like the red-tailed hawk, fox, and even cougar. Most of the natural grassland sites in the District provide important spring range and, in high-snow years could be critical to the survival of wild ungulates following a harsh winter. Such sites may also be beneficial in diverting wild ungulates away from the hay and grain crops available on ranches and farms. In other areas where the focus is on rangeland for cattle, burning can also be beneficial in terms of creating pasture land and improving carrying capacity and could have a direct economic benefit for the cattle industry now that it is beginning to improve. Site specific objectives for undertaking this treatment could include: improving grass nutrient quality, enhancing flowering and seed production, removing unpalatable dead plant matter, creating suitable seedbeds, reducing fuel build-up, and top killing aspen and shrubs.</p>

GOVERNANCE

Considerable experience with developing and implementing an ER program in B.C. has been garnered over the last decade. This section of the document leverages this experience and provides a model for governance (operating principles, organizational structure, and funding sources) that will allow stakeholders to develop an effective organization in the South Peace District.

Operating Principles

There are some important general principles in building any effective organizational structure:

- Ensuring that the program has a clear mission and mandate.
- Building constructive partnerships with those that have an interest in ecosystem restoration and that can bring skills, human or financial capital, and/or influential connections to the initiative.
- Cultivating a culture of inquiry, mutual respect, constructive debate, and transparency.
- Ensuring that the board or steering committee maintains its independence.

- Building sustainability into the governance structure (both economic and social).
- Ensuring that operations are results oriented and that opportunities for learning and adaptation are incorporated into the management framework.
- Ensuring that there is a process for renewal (in particular, of organization policy, membership, Board members, and management practices).

Additionally, there are some principles that an ER organization within the South Peace will need to adopt that are more specific to ecosystem restoration. Ideally these would be incorporated into the organization's policies by elected officials. Some recommendations include:

- Projects and activities should be **incremental** to operational activities that are required under a current license or permit obligation or which are being effectively addressed by other programming. Where another organization wishes to partner in the delivery of ER programming, involvement could be considered based on consistency with the organizations mission and project evaluation protocols. An objective of the organization should be to **add value** to current initiatives.
- Building **partnerships** amongst stakeholders (government, First Nations, NGOs, academia and private or individual development proponents) is key in developing an effective, balanced approach to ecosystem restoration.
- **Land ownership** should not be a barrier to undertaking ecosystem restoration projects provided that there is some assurance that investments will persist long enough to be effective. Covenants could be used on private land, for example, to help ensure the longevity of restoration efforts.
- Program **priorities should be stakeholder driven and ecosystem-based** rather than based on the priorities of external funding sources. In circumstances where an external funding source has explicit end uses for funding, the decision to accept it, should be based on alignment with program mission, program objectives, and project evaluation protocols, including maintaining a functioning organization.
- The program should be forward looking and **scalable** so that it can be expanded as capacity grows to include for example, all of the Peace region.
- The role of the organization in **advocating** for political change should be minimal. Membership of the organization, and on the board of directors, should include individuals that are also involved in provincial level associations (Cattleman, Guide Outfitters, Trappers, Wildlife Federation, etc.), where an advocacy role is better suited. The organization should, however, strive to provide information to government and NGOs to foster an improved understanding of ecosystem dynamics and vulnerabilities across the region.
- The organization will have no direct **authority for land management** and can only undertake restoration activities by virtue of stakeholder agreement, and legal authority granted by government agencies or land owners. For this reason, it is essential that government agencies are directly involved in the affairs of the organization.
- There are often **competing interests** in land management decisions. The organization will need to **balance ecological, social and economic values** when considering involvement in restoration activities. Members of the organization should have a broad range of backgrounds allowing the organization to serve as an effective place for collaborative discussion regarding multiple values.

Mission Statement

A mission statement describes an organization's purpose and helps ensure that current and future initiatives are appropriate. It should be informative and inspire members and funders alike. It is like a lighthouse that keeps one on course. A formal mission statement has not yet been developed for the South Peace program but the Omineca statement seems well suited to the Peace:

To manage the structure and function of vulnerable ecosystems in the South Peace to achieve a desired future condition that will sustain ecological services and human economic and social needs.

This statement will need to be revisited and refined in the future to accurately capture what stakeholders believe to be the purpose of the organization.

Governance Structure

To be effective, the governance structure of the South Peace ER program will need to be founded on partnerships. This thinking aligns well with the Province's approach to similar recent initiatives like the Forest Enhancement Program (formed as a society with government support), and the Liquefied Natural Gas Environmental Stewardship Initiative, both of which are multi-party organizations. The chart in figure 10 is a representation of an organizational structure based on partnership and is similar to that used by other ER programs in the province.

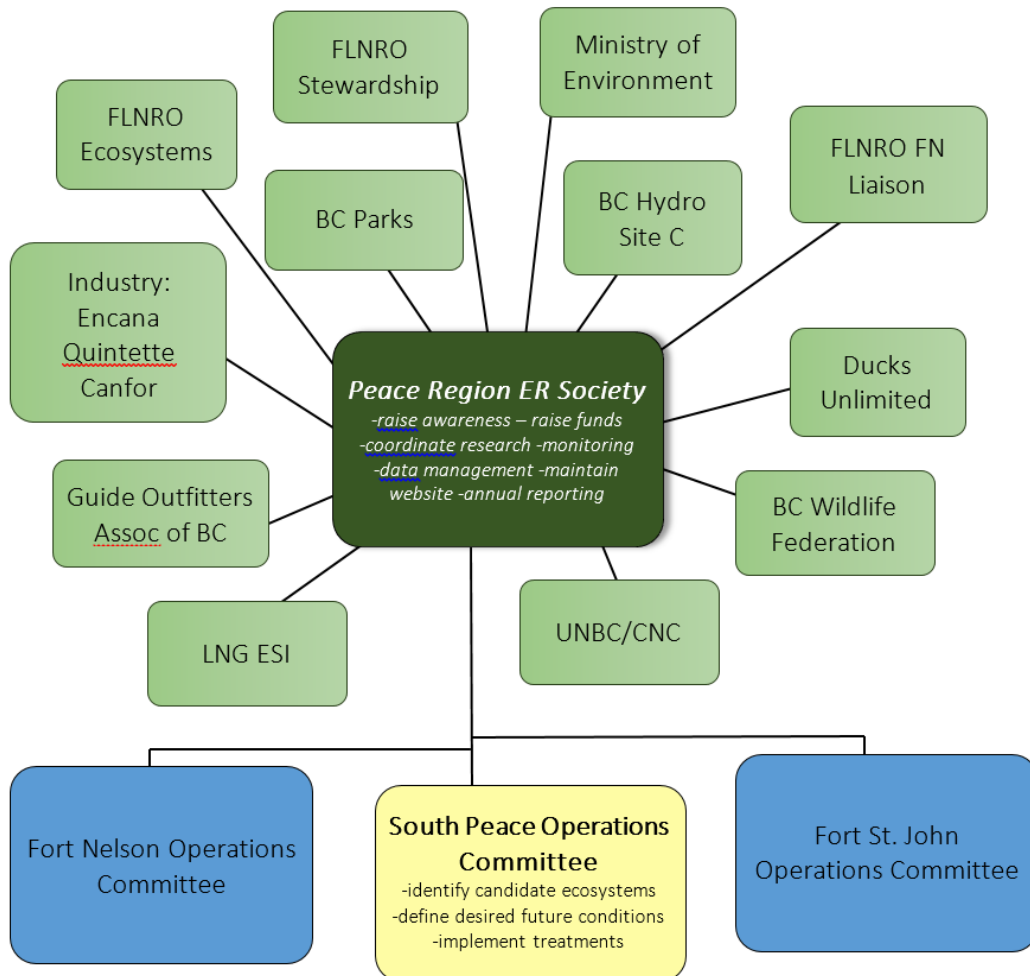


Figure 10. Hypothetical organizational structure for an ER program in the Peace Region.

Implicit in the model in figure 10 is that the ER program should be regional in scope with a regional Board of Directors comprised of key stakeholders who raise awareness and funding for the program, identify

strategic allocation of funds based on proposals from Districts, coordinate research and monitoring, and report out to stakeholders, funders, and agencies building profile for the program in collaboration with the Provincial ER program. At the District level, an implementation or operations committee would be formed and participants would identify vulnerable ecosystems, determine desired future conditions, rank treatment priorities, identify and implement treatments, and report out on accomplishments. Stakeholder committees at the District level might include different people from each organizations than at the Regional level although it is likely, for the South Peace District at least, that they would be the same person. Given that the ER program is currently only proposed for the South Peace, the District implementation committee and Regional ER Board will likely be the same individuals until such time as the program expands.

FORMATION OF A SOCIETY

It is also implicit in the discussion and diagram above that there will be a governing body and a legal vehicle that provides structure for decision making and financial accounting. If sufficient seed funding can be attracted, it is recommended that a society be formed (perhaps the Society for Ecosystem Restoration In The Peace Region) and that this be, at least in name, a society with regional interests. The cost to file through the Provincial Corporate Registry and any associated legal fees will be less than \$1000 although someone will need to shepherd the process through and this will be an expense that must also be factored in. It is also recommended that the Society be incorporated with non-charitable status. More information on this process is contained in appendix IV.

THE GOVERNING BODY

The governing body for an ER Program will need to include at a minimum, a Board with appointed or elected officers, and a Program Coordinator. In the simplest case, the program coordinator could also be a board member but it is anticipated that this position would need to be a half FTE (half a full time equivalent). It would also be extremely helpful if one of the Board members, either the financial officer or the President, worked for the BC Government since it is anticipated that a substantial portion of funding, at least initially, could come from government sources. Someone from within government will have a much easier time managing funding if they are already working within the system. Currently, the Province engages Price Waterhouse Coopers to manage much of the day to day contract administration within their land based investment program (the source of Provincial ER funding) and it would be useful to take advantage of this process.

Role of the Board

The Board will need to initially focus on identifying the mission of the group and roles and responsibilities of the governing body. Typically, their role will include:

- Crafting a mission statement and providing information on the purpose of the organization.
- Deciding amongst alternatives for strategic direction for the program including potential projects and relative program priorities.
- Approving policies that guide program operations.
- Contributing resources to the project.
- Ensuring that projects meet legal requirements, agency policy, and stakeholder expectations.
- Approving plans and budgets.
- Evaluating program outcomes against goals and objectives.
- Fulfilling an outreach role with stakeholders.
- Reporting out to funders and stakeholders.
- Regularly attending committee meetings.

Role of the Program Coordinator

The typical role of a program coordinator is to:

- Carry out the strategic plans and policies established by the board of directors.
- Manage the day-to-day affairs and activities of the organization in a safe and cost effective manner.
- Provide decision support by supplying the Board with information on its activities and policies.
- Developing business plans and operational plans and budgets.
- Managing any staff or contractors that must be hired to deliver programming.
- Motivate and mentor staff, members, and volunteers.
- Periodically report on accomplishments and issues.
- Attend Board meetings.
- Organize an annual general meeting of the society.

Other roles that a coordinator might have, that are particular to an ER Program include:

- Planning and implementing fund raising for the program. This may include providing consulting services for a fee as well as identifying and directly soliciting funding from donors/stakeholders.
- Liaising with stakeholders and community outreach.
- Potentially acting more directly to facilitate the Board's decision making by chairing meetings or designing and facilitating planning sessions or mission review sessions for example.

Role of the Members

For the ecosystem restoration program to be successful, it will take more than simply setting up a governance structure. On-the-ground activities need to take place and early success must be demonstrated in order to build the profile of the initiative and attract the attention of funders. While the program coordinator will have a direct role in coordinating and implementing treatments, it will be imperative that **individual stakeholders and members of the society be directly engaged in implementing treatments**. For example, it is foreseen that prescribed burning in most areas will be led by FLNRO because of their extensive experience with burn control and their protection mandate. Or, Ducks Unlimited may engage a contractor to restore a wetland complex that at one time hosted a healthy beaver population that was subsequently extirpated because of road maintenance issues. For the program to be sustainable, stakeholders will need to take a direct role in the implementation of restoration treatments through in-kind donations or funding to employ contractors.

POLICY DEVELOPMENT

Written policies that are ratified by a legitimate authority serve to guide actions of an organization and reduce conflict by providing a reference that clarifies intent. Bylaws, agreed to by the Board, are different in that they deal directly with the governance structure including such things as duties of the Board, Board composition and appointment, Board operating procedures and authority, etc. Policies provide more detail about how an organization operates and can be developed at any level of the organization although typically they are produced by the executive director (or coordinator) or by the Board. Policies must be approved by the Board. Policies are developed as a need for consistent action arises and are revisited and revised periodically as the operations of an organization change. However, most organizations start with a small number of essential policies. With respect to the Peace ER program, policies that would be useful early in the program are summarized in the text box below.

<u>Board & Board Members</u>	<u>Ethics and Accountability</u>	<u>Membership & Funding</u>	<u>Communications</u>	<u>Decision Making</u>
Board Selection Process (may be part of the bylaws)	Code of conduct	Member Eligibility and Fees	Internal Communication Protocol	Meeting Function (may be part of the bylaws)

Responsibilities of the Implement. Committee	Conflict of Interest	Steering Committee Stipends	External Communication Protocol	Decision Making Process (e.g. consensus)
Responsibilities of the Coordinator		Fund Raising		Principles Used for Financial Decisions

There are many examples of existing policy that are available on-line. An excellent resource that contains sample policies, codes, committee charters, job descriptions, and other statements that will help a Board develop effective policies the US publication, *The Non-Profit Policy Sampler*, 2006. The publication includes 241 policy samples on a CD addressing 48 different issues under 8 broad topic areas.

Funding

An ER program can only exist by virtue of the services it provides, and the profile it brings to its member organizations. It appears that there is significant opportunity for such a body to supply a suite of services (identified in this document) to a number of stakeholders, in particular FLNRO, BC Hydro, the LNG ESI Initiative, Encana, Tech Resources, and the Forest Enhancement Program, in exchange for core funding. Core funding will provide immediate impetus for the formation of an effective agency and will jump start delivery of on-the-ground action. The following core funding levels are recommended for the first five years of operation:

Year One (2016)	- \$100,000
Year Two	- \$180,000
Year Three	- \$250,000
Year Four	- \$250,000
Year Five	- \$250,000

These amounts are not based on a detailed analysis but are representative of other ER programming in the province with a similar list of potential ecosystem restoration functions.

In addition to these amounts, the South Peace ER Program will need to attract other sources of funding. Having a diversity of funding sources will be provide resiliency and demonstrate broader acceptance of the program, something that is important to many agencies. Opportunities for revenue generation within a project (e.g. removal of merchantable timber through a thinning treatment) will need to be used where possible to offset project specific costs.

Some examples of possible funding sources include:

- The Provincial Ecosystem Restoration Program (Ministry of Forests, Lands, and Natural Resources) - <http://www.for.gov.bc.ca/hra/Restoration/index.htm>
- The Habitat Conservation Trust Foundation - <http://www.hctf.ca/>
- The Forest Enhancement Society - <https://news.gov.bc.ca/releases/2016FLNR0018-000284>
- The Liquefied Natural Gas Environmental Stewardship Initiative - <http://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/consulting-with-first-nations/liquefied-natural-gas-environmental-stewardship-initiative>
- The Moose Recovery Program - <https://news.gov.bc.ca/releases/2016FLNR0026-000343>
- BC Oil and Gas Innovation Society (OGRIS) - <http://www.bcogris.ca/>
- The Union of BC Municipalities Strategic Wildfire Prevention Initiative – <http://ubcm.ca/EN/main/funding.html>
- Fisheries habitat compensation projects (FHCPs) coming from the Fisheries Act HADDs (Harmful alteration, disruption or destruction of fish habitat) determined by Federal and Provincial

Environmental Impact Assessments - <http://www.pac.dfo-mpo.gc.ca/habitat/steps/authorization/additional-auth-eng.htm>

- Ducks Unlimited - <http://www.ducks.ca/province/bc/index.html>
- The BC Gaming Commission - <http://www.pssg.gov.bc.ca/gaming/grants/community-gaming.htm>
- Beef Cattle Industry Development Fund - <http://www.cattlefund.net/bcidf.htm>
- The Wilburforce Foundation - http://www.wilburforce.org/funding_areas/priority_regions.cfm?region=bccentral
- TIDES Canada - <http://www.tidescanada.org>
- Corporate contributions (e.g. oil and gas, forest, and mining sectors)
- Other private donations
- Project management fees (fees paid by agencies that engage the Society to undertake ecosystem restoration work).
- Provision of consulting services (like habitat evaluation for government, research work, or community outreach)

Although Board members may have been appointed because of their contribution to operating capital or because they have important connections or contacts and are, therefore, in a good position to undertake some fund raising, it is often left to the Program Coordinator (or executive director) to take on the important task of fund raising. In the absence of an identified Coordinator, it is expected that in the early stages of developing an effective ER program, a champion for the program will need to emerge and build a strong investment case. This work would be the basis for attracting core funding from potential funders and ensure the economic sustainability of the program.

NEXT STEPS

The most critical next step for the South Peace ER Program is to establish a formal presence and governance structure that will provide funders and agencies with confidence that the program can act effectively as a delivery body. It needs to be comprised, not just of government agencies, but of a spectrum of stakeholders to provide balanced representation and avoid perceptions of unilateral interests and the baggage of established politics. As noted above, the Program will need to be scalable so that it can become competent across a broader region, building on the experience and successes achieved at a more local scale.

Other critical next steps include:

- FLNRO, Stewardship, Peace District will need to develop the following draft documents using this report as a basis for them: a mission statement and purpose, an outline of the governance structure, a business case for developing an ER program.
- A meeting of key stakeholders, led by FLNRO, to secure commitment to the concept (best if this is facilitated by a third party).
- A meeting with each individual potential funder to explore the possibility of investing in the ER Program.
- A meeting with key stakeholders to identify potential Board members (best if this is facilitated by a third party).
- Election of officers and formation of the society (completed by a Board member or contractor) including development of the constitution and bylaws and key policies.
- A concerted effort to secure initial program funding.
- Outreach to stakeholders to build awareness and solicit commitment to undertaking activities.
- Better engagement of key stakeholders, especially First Nations, regarding the program through individual meetings and presentations, and potentially, building an on-line presence.

- Engaging a program coordinator if funding permits.
- Beginning implementation of the projects identified in this document that have the greatest chance of success.

Individuals, agencies, and organizations with an interest in restoring function in vulnerable or degraded ecosystems, must find representatives to lead the way forward and galvanize commitment. In the case of the South Peace ER Program, this type of leadership will likely serve as a model for other areas in the Peace Region, and may provide an opportunity for synergies with other organizations (such as the Union of BC Municipalities) with overlapping objectives.

APPENDICES

I - Glossary

Abiotic: Pertaining to the non-living parts of an ecosystem, such as soil particles bedrock, air, and water.

Adaptive Management: managing forests and incorporating into decisions the experience gained from the results of previous actions. Adaptive management rigorously combines management, research, monitoring, and means of changing practices so that credible information is gained and management activities are modified by experience.

Allowable Annual Cut (AAC): The allowable rate of timber harvest from a specified area of land. The Chief Forester sets specific AACs for Timber Supply Areas and Tree Farm Licences in accordance with Section 8 of the *Forest Act*.

Articles of Incorporation: The Articles of Incorporation are a legal document filed with a provincial or territorial government, or the federal government, which sets out a corporation's purpose and regulations.

Best Management Practice (BMP): A forestry practice or combination of practices determined to be the most practicable means of protecting and conserving forest resources and forest land productivity, now and into the future. BMP are often developed for Forest Roads, Stream Crossings, Riparian Management Zones, handling fuels, lubricants and trash, and other practices.

Biogeoclimatic Ecosystem Classification (BEC): A hierarchical system of ecosystems that integrates regional, local and chronological factors and combines climatic, vegetation and site factors. Subzones further refine the zones and are based on precipitation and temperature. Examples include: mc – moist, cold; mv – moist, very cold; dk – dry, cool; dw – dry, warm; xv – very dry, very cold.

Each subzone can be further refined by variants. A variant reflects further difference in regional climate. Also see Site Series.

Biological Richness (species richness): Species presence, distribution, and abundance in a given area.

Carbon Cycle: The storage and cyclic movement of organic and inorganic forms of carbon between the biosphere, lithosphere, hydrosphere, and atmosphere.

Bylaws: Refers to the internal rules of a company or organization. Bylaws vary widely but generally cover topics such as how directors are elected, how meetings of directors are conducted, what officers the organization will have, and a description of their duties.

Carbon Sink: Forests and other ecosystems that absorb carbon, thereby removing it from the atmosphere and offsetting CO₂ emissions.

Coarse Woody Debris (CWD): Downed woody material of a minimum diameter or greater, either resting on the forest floor or at an angle to the ground of 45 degrees or less. Coarse woody debris consists of sound and rotting logs and branches, and may include stumps when specified. Generally a log is considered as being a minimum of 2 m in length and 7.5 cm in diameter at one end. CWD provides habitat for plants, animals and insects, and a source of nutrients for soil development.

Conserve: Keep from harm or damage.

Cultural Feature: Unique or significant places and features of social, cultural or spiritual importance, such as an archaeological site, recreational site or trail, cultural heritage site or trail, historic site, or protected area.

Desired Future Condition: In the context of the Ecosystem Restoration program, means the target set of structural attributes necessary to maintain ecosystem function and provide the ecological services and forest products considered to be important by stakeholders.

Ecosystem: A dynamic complex of plants, animals and micro-organisms and their non-living environment interacting as a functioning unit. Ecosystems can be defined at any scale.

Ecosystem Degradation: In the ER program, which is focussed on managing vulnerable ecosystems, an ecosystem is considered to be degraded or vulnerable when it is missing structural elements and ecological processes that are important for achieving a future condition that will sustain ecological function and human socio-economic needs.

Ecosystem Resistance: is an ecosystem's ability to maintain its structural and functional attributes in the face of such stresses/disturbances. Examples of resistant ecosystems might include those with low fuel loads, diverse species mixes, and/or multiple ecological processes.

Ecosystem Resilience: There are many definitions of resilience but most are about the capacity of an ecosystem to regain structural and functional attributes that have changed because of a disturbance.

Ecosystem Restoration: A commonly used definition is *the process of assisting with the recovery of an ecosystem that has been degraded, damaged or destroyed by re-establishing its structural characteristics and ecological processes*. In the proposed South Peace ER Program, ecosystem restoration is defined as managing the structure and function of vulnerable ecosystems to achieve a desired future condition that will sustain ecological services and human socio-economic needs.

Ecosystem Stability: An ecosystem that is stable retains its functional and structural characteristics and successional trajectory in spite of stress/disturbance. Stable ecosystems are often in a state of dynamic equilibrium rather than a steady state. Disturbances of sufficient magnitude and duration may force an ecosystem to reach a threshold beyond which a different regime of processes and structures predominates (a different system state).

Ecosystem Vulnerability, the counterpart of resilience, vulnerability is the lack of capacity to cope with, resist, and recover from a disturbance. The ER Program focuses on vulnerable ecosystems.

Edge Habitat: Habitat conditions, such as degree of humidity and exposure to light or wind, created at or near the boundary dividing ecosystems, for example, between open areas and adjacent forest.

Environmentally Sensitive Area (ESA): An area requiring special management attention to protect important scenic values, fish and wildlife resources, historical and cultural values, or other natural systems or processes. ESAs for forestry include potentially fragile, unstable soils that may deteriorate unacceptably after forest harvesting, and areas of high value to non-timber resources such as fisheries, wildlife, water, and recreation.

Forage: Grasses, herbs, and small shrubs that can be used as feed for livestock or wildlife.

Forest: A complex community of plants and animals in which trees are the most conspicuous members and where the tree crown density—the amount of compactness of foliage in the tree tops—is greater than 10 percent.”

Forest Health Factors: Biotic and abiotic influences on a forest that have an adverse effect on the health of trees and other plants.” “Biotic influences include fungi, insects, plants, animals, bacteria, and nematodes. Abiotic influences include frost, snow, fire, wind, sun, drought, nutrients, and human-caused injury.

Global Ecological Cycles: The complex of self-regulating processes responsible for recycling the Earth's limited supplies of water, carbon, nitrogen, and other life-sustaining elements.

Inoperable: Lands that are unsuited for timber production now and in the foreseeable future because of a range of factors including: elevation; topography; inaccessible location; low value of timber; small size of timber stands; and steep or unstable soils that cannot be harvested without serious and irreversible damage to the soil or water resources. Inoperable lands may also be designated as parks, wilderness areas, or other uses incompatible with timber production.

Interior Forest: Forest that is far enough away from a natural or harvested edge that the edge does not influence its environmental conditions, such as light intensity, temperature, wind, relative humidity, and snow accumulation and melt.

Managed Forest Land: Forest land that is managed under a forest management plan, utilizing the science of forestry.

Merchantable Timber: a tree or stand that has attained sufficient size, quality and/or volume to make it suitable for harvesting.

Natural Disturbance: Events such fire, insect or disease infestations, wind, landslides, and other natural events not caused by humans that damage or destroy stands of trees.

Natural Disturbance Unit (NDU): Large geographic areas that have similar topography, climate, disturbance dynamics (e.g., fire cycle, patch size), stand development and successional patterns.

Nitrogen Cycle: The movement of nitrogen in its many forms between the hydrosphere, lithosphere, atmosphere and biosphere.

Patch: A particular unit with identifiable boundaries and different vegetation from its surroundings.

Permanent Access: A structure, including a road, bridge, landing, gravel pit or other similar structure that provides access for timber harvesting and is shown on a forest development plan, access management plan, logging plan, road permit or silviculture prescription / site plan as remaining operational after timber harvesting activities on the area are complete.

Predictive Ecosystem Mapping (PEM): A computer-GIS, and knowledge-based method that divides landscapes into ecologically oriented map units for management purposes. PEM is a new and evolving inventory approach designed to use available spatial data and knowledge of ecological-landscape relationships to automate the computer generation of ecosystem maps.

Productive Capability: The current and future ability of forest ecosystems to produce biomass.

Productivity: The natural ability of a forest ecosystem to capture energy, support life forms, and produce goods and services.

Provincial Forest: Forest land designated under Section 5 of the [Forest] Act as provincial forest.

Designation as “provincial forest” restricts land use activities and alienation for other purposes, which can occur more easily on vacant Crown land. This ensures that activities on, or any removal of land from, the provincial forest undergoes due process and consideration.

Public: The people as a whole within a defined area (i.e. community, forest district). At its broadest sense public means everyone anyone in the world and to narrowest sense public might be considered as the people living on your street.

Riparian: An area of land adjacent to a stream, river, lake or wetland that contains vegetation that, due to the presence of water, is distinctly different from the vegetation of adjacent upland areas.

Riparian Habitat: Vegetation growing close to a watercourse, lake, swamp, or spring that is generally critical for wildlife cover, fish food organisms, stream nutrients and large organic debris, and for streambank stability.

Resolutions: A decision made by the directors of an organization and recorded in the organizations meeting minutes.

Stakeholder: A person with an interest or concern with resource management within a defined area (i.e. community, forest district, defined forest area).

Seral Stage: Any stage of development of an ecosystem, from a disturbed, non-vegetated state (early seral) to a mature plant community (late seral).

Site Index: The height of a tree at 50 years of age (age is measured at 1.3m above the ground) In managed forest stands site index may be predicted using either (1) the biogeoclimatic ecosystem classification for the site or (2) the Site Index Curve which uses the height and age of sample trees over 30 years old.

Site Plan: A site level plan that supports the strategic (and legal) results and strategies contained within a proponents Forest Stewardship Plan (FSP). The site plan identifies the appropriate standards for specific cutblocks, including: stand-level biodiversity, permanent access, soil disturbance limits, stocking requirements, regeneration date, and free-growing date at the standards unit level.

Site Series: A landscape position consisting of a unique combination of soil edaphic features, primarily soil nutrient and moisture regimes within a biogeoclimatic subzone or variant. Soil nutrient and moisture regimes define a site series, which can produce various plant associations (see definition of "plant association"). In the BEC system, site series is identified as a number (e.g., 01, 02, 03,).

Soil Disturbance: Disturbance caused by a forest practice on an area. This includes areas occupied by excavated or bladed trails of a temporary nature, areas occupied by corduroyed trails, compacted areas, and areas of dispersed disturbance.

Stocking Standard: The required range of healthy, well-spaced, acceptable trees growing on an area to achieve a free-growing stand.

Stream Class: A stream is a watercourse, having an alluvial sediment bed, formed when water flows on a perennial or intermittent basis between continual definable streambanks. There are six riparian stream classes designated S1 to S6 that are based on presence of fish, occurrence in a community watershed and average channel width. S1 to S4 streams are fish streams or streams in a community watershed. S5 and S6 streams are not fish streams and are not within a community watershed.

Snag: A standing dead tree, or part of a dead tree, found in various stages of decay—from recently dead to very decomposed.

Species at Risk: A list of wildlife species at risk maintained by the Government of Canada. Addition of species is done annually by the Minister of the Environment, based on a report from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), an independent committee of wildlife experts and scientists. The list contains five categories for species: special concern, threatened, endangered, extirpated, and extinct. The goal of the Species At Risk Act is to protect endangered or threatened organisms and their habitats.

Timber Harvesting Land Base (THLB): The portion of the total area of the Defined Forest Area considered to contribute to, and to be available for, long-term timber supply. The harvesting land base is defined by reducing the total land base according to specified management assumptions and tends to change slightly over time.

Visual Landscape Inventory: the identification, classification, and recording of the location and quality of visual resources and values.

Unmerchantable: of a tree or stand that has not attained sufficient size, quality and/or volume to make it suitable for harvesting.

Unsalvaged Losses: the volume of timber destroyed by natural causes such as fire, insect, disease or blowdown and not harvested, including the timber actually killed plus any residual volume rendered nonmerchantable.

Utilization Standards: the dimensions (stump height, top diameter, base diameter, and length) and quality of trees that must be cut and removed from Crown land during harvesting operations. For detailed standards see the Provincial Logging Residue and Waste Measurement Procedures Manual.

Waste: the volume of timber left on the harvested area that should have been removed in accordance with the minimum utilization standards in the cutting authority. It forms part of the allowable annual cut for control purposes. For detailed standards see the Provincial Logging Residue and Waste Measurement Procedures Manual.

Water Cycle (also known as the hydrologic cycle): The journey water takes as it circulates from the land to the sky and back again.

Wetland Ecosystems:

- Organic sedge fen - sedge dominated fen, organic soils
- Marsh - semi-permanently to seasonally flooded mineral wetland dominated by emergent vegetation
- Wet meadow - herbaceous meadow
- Organic open bog - shrub dominated organic bog (tree canopy cover less than 10%)
- Organic treed fen - treed fen on organic soils (tree canopy cover greater than 10%)
- Organic shrub fen - shrub dominated fen on organic soils
- Organic treed bog - treed dominated organic bog (tree canopy cover less than 10%)
- Lowbench shrub floodplain - shrub dominated floodplain
- Lowbench sedge/herb - floodplain herb dominated floodplain
- Shrub swamp - shrub dominated mineral swamp
- Treed swamp - treed mineral swamp

II - List Of Ecosystem Restoration Needs Identified By South Peace Stakeholders

1. Monitoring/Data Management

- a. There are many initiatives to track habitat, cumulative effects, and vegetation inventory, and a number of monitoring protocols, but there does not seem to be a coordinated effort in this regard. This may be desirable given overlapping objectives.
- b. SERNbc has developed a monitoring protocol for restoration activities.
- c. The Ministry of Environment, Fort St John, Ecosystem Information Section (Kristen Peck) manages the provincial data set for the Peace Region for Fisheries, Wildlife, and Ecosystems (created and submitted by broad range of stakeholders). Monitoring is important and generally their work is following BC Forests, Lands, and Natural Resource Operations (FLNRO) Resources Inventory Committee standards.
- d. Re data management, Kristen Peck's group has produced a number of useful tools:
 - EcoCat (Ecological Catalogue): contains fisheries reports, data and maps, and ecosystem mapping reports, data, and maps
 - FIDQ (Fish Inventory Data Query): search by waterbody name or ID for bathy maps, fish presence, chemical studies, obstacles, etc.
 - SIWE (Species Inventory Web Explorer): search for wildlife inventory, telemetry, plants and invertebrate reports and data
 - the Terrestrial Ecosystems Information website where you can download ecosystem mapping data from specific projects, explore all projects. In the Peace, mostly PEM but finding this data only OK for landscape level analyses like TSR and not so good for stand level work. Companies are not required to provide mapping that they have done.
 - HabWiz (Habitat Wizard), a webapp that allows you to query the various databases described above (looks like iMap).

• EcoCat: http://www.env.gov.bc.ca/ecocat/
• FIDQ: http://www.env.gov.bc.ca/fish/fidq/
• SIWE: http://www.env.gov.bc.ca/wildlife/wsi/siwe.htm
• Incidental Observations: http://www.env.gov.bc.ca/wildlife/wsi/incidental_obs.htm
• Terrestrial Ecosystem Information website: http://www.env.gov.bc.ca/ecology/index.html
Spatial Resources:
• HabWiz: http://www.env.gov.bc.ca/habwiz/
• iMap: http://www.data.gov.bc.ca/dbc/geographic/view_and_analyze/imapbc/index.page

- e. The NE SAG (strategic advisory group), FLNRO, is concerned with tracking Ecosystem Restoration (ER) for the Cumulative Effect (CE) initiative values [Old Forest; Riparian Habitat; High-Priority Wildlife (grizzly bear, northern caribou, sheep, goats, elk, mule deer, and moose); and Priority Habitat (Northern and Boreal Caribou, Elk, Mule Deer Moose, Bighorn Sheep, Stone's Sheep, and Mountain Goats, Fisher, Connecticut Warbler, and Black-throated Green Warbler)].
- f. Haven't really started anything to do with restoration for the values identified. Have a contract now to look at monitoring and this is due in March.
- g. Hydro is mandated in their environmental certificate to monitor and evaluate the effectiveness of mitigation or compensation measures implemented and verify the accuracy of predictions made for natural wetlands, created wetlands, and artificial wetland features, as well as other habitat types.

- h. The Oil and Gas Commission is undertaking ABA (area based analysis) to get a better idea of footprint (been doing this for 6 or 7 years) and are working with FLNRO on how to integrate this information in the CE analysis.
- i. Ducks Unlimited Boreal Wetland Initiative (out of Edmonton) developed a strategic wetland mapping and planning tool (soils, hydrology, and wetlands) including all the Peace. See the paper on their website. Very relevant to landscape planning. Used in waterfowl population monitoring, different researchers have been using it, has been really useful for caribou, moose, furbearers work as well, and has been useful in FN negotiations. Cost millions of dollars over about 10 years and is an ongoing process.
- j. Nick Hamilton, FLNRO Range Ecologist, has some monitoring data for grasslands.
- k. There may also be a FLNRO initiative to develop a strategic regional monitoring program including a catalogue of all current monitoring activities, including FN work.
- l. FLNRO, NE Resource Management Section have developed a restoration framework database on current condition in industrial proponent areas. This will eventually be turned into a tracking tool.

2. Grassland and Range Maintenance (domestic and wild ungulates):

- a. There is a five year burn program – guide outfitters assisting with this in some cases.
- b. There is a belief amongst ecosystems biologists that native grasslands are in need of attention in the Peace Region. While there are natural grasslands on the slopes of many of the larger watercourse (eg. the Peace, Beaton, Doig, Halfway, etc.), soils are very fragile and vegetation composition is unique. Many of the listed species in the region (and regionally important species such as sharp-tailed grouse) are dependent on these ecosystems.
- c. The warm aspects along the major rivers are very unique in being home to prairie grassland species, despite being in the boreal forest, and include western wheatgrass, northern wheatgrass, and green needlegrass, among others. Likely because of the warm microclimate of the Peace River valley. Also due to the warm aspects, these sites could be very important for wildlife because they are the first growth in the spring. With the loss of other sites through development, the remaining areas will be subject to more browsing and grazing pressure. There is some literature supporting the idea that species like snowberry and Saskatoon will eventually take over. Landslides along the rivers are a natural disturbance event, the "natural" rate for which seems to be very frequent, and could also be affecting grassland communities. BC Hydro have mapped ~2000 slides. Need to build some range exclosures to monitor changes in vegetation pattern. More long term monitoring and research needed.
- d. Others believe that native grasslands/prairie grasslands are functionally extinct in the south Peace with remnants left on private land and somewhat larger pockets on south facing banks along the Peace, Moberly, Pine, and Murray Rivers. These may not have been mapped. Biggest threat to these areas is succession in the absence of fire. Turns to shrub land and then aspen. Guidelines needed. Inventory needed. Problems with people being too close though with respect to burning. Although there is a burning plan for south peace nobody is actually implementing it.
- e. Some guide outfitters with substantial experience in the area believe that the elk populations today are largely a result of past burning, although, depending on fire intensity, there may have been some risk of degradation of soil productivity. Large brush fields can only be changed by pretty intense fires that people aren't comfortable with. John Eliot did some stand conversion burns for a few years in the mid 80s but not much has occurred since then. In the last 10 years very little burning in the parks either. Some believe there is a need in some areas to reintroduce fire on the land. Smoke management a public perception thing and a concern. Venting indices are pretty good on the east slopes though. Likely getting more wind these days. Climate a factor but not sure how it will affect it. Hard to get a fire going in the trench 20 years ago but now can't get them out.
- f. BC Hydros Site C mitigation strategy includes a number of provisions that pertain to native grasslands including:

- Monitoring migratory bird abundance, distribution and use of **non**-wetland habitat.
 - Undertaking measures to mitigate environmental effects on species at-risk and sensitive ecological communities (e.g. fuzzy-spiked wildrye-wolf willow) and rare plants.
 - Maintaining old field-grassland habitat with vegetation heights of 0.3 to 2.1 meters by mowing every 4 years with the objective of providing breeding habitat for Short-eared Owl, Northern Harrier, Sharp-tailed Grouse and Common Nighthawk.
 - Identifying and maintaining suitable BC Hydro-owned lands for ungulate winter range to the satisfaction of FLNR and for the length of time determined by FLNR.
 - Conducting, as required, prescribed burns of grassland habitats (steep south facing slopes) to rejuvenate native grassland and early seral habitats and maintain and enhance their value as ungulate winter range, although, per Siobhan Jackson indicated that they haven't proposed management strategies for such areas because it is already functional winter range.
 - Planting a mix of live staked Balsam Poplar (60%), willow (30%) and Red-osier Dogwood (10%) at densities of 4,500 stems/ha in a 15 m wide strip in the riparian area along the reservoir shoreline adjacent to BC Hydro-owned farmland to provide riparian habitat and bank stabilization.
 - Establishing large trees along the edge of fields and within current forested areas.
 - Maintaining and enhancing forage production in selected fields through cultivation, weed treatment, fertilizing, and seeding.
 - Noxious weed control.
 - Monitoring and surveys.
- g. Range-forestry conflict does exist. There may be, however, an opportunity to achieve both range objectives and fuel abatement objectives in places.
- h. Out of Dawson, there are over 200 tenures for forage.
- i. Historically some land owners have brought in burn plans.
- j. There is a potential conflict with ranchers and timber harvesting because deciduous logging reduces forage opportunity for 30 or so years (100% occupation of the site by dense cover of At).
- k. Burning the the timber harvesting landbase (and possibly reducing timber supply for At) may be a consideration. Might have 10 or 12 range burns per year on grazing leases, almost all of which are in the North Peace.
- l. Enclosures to exclude cattle.
- m. Dugouts with or without troughs in fields adjacent to water to encourage cattle to stay away from the wetland.
- n. Burning in parks like the MK. According to one guide outfitter, who was around back in the 60s and 70s, burning resulted in a big increase in elk populations. Before that, according to some old guiders he knew, there were no elk but after the burning in the 60s and early 70s there was a sudden rise in populations. This must be considered in the context of competing values. For example, this could be a problem for caribou and/or moose with wolf populations. In the 80s, in response to an increase in wolf populations, following the burning of the 70s, there was a wolf culling program near/in the MK. Wolf population was very high and the guide had many experiences finding wolf killed moose. The wolf cull went on for 2 or 3 years after which there was a notable increase in ungulate populations.
- o. Treatment of invasive species like Canada thistle (*Cirsium arvense*), perennial sow thistle (*Sonchus arvensis*) and yellow hawkweed (*Hieracium pratense*). Some believe that invasive species like thistle and hawks weed are everywhere.

3. Wetlands:

- a. Wetlands at the wildland urban interface are a serious concern with the normal course of agriculture. Few left that are in a natural state. On crown areas though they are generally in decent shape.
- b. BC Hydro and Ducks unlimited are doing a great deal of work around wetlands including compensation measures to address the unavoidable loss of wetland areas and functions supporting migratory birds, species at risk, and the current use of lands and resources by Aboriginal people in support of the objective of full replacement of wetlands in terms of area and function.
- c. Hydro, under their environmental certification, must develop a Wetland Mitigation and Compensation Plan including an assessment of wetland function lost as a result of Site C that is important to migratory birds and species at risk (wildlife and plants). The plan must include ways to: maintain or improve hydrology where avoidance is not feasible; replace wetlands which will be lost, in terms of both function and area, and improve the function of existing wetland habitats. There are also provisions governing Hydro wrt monitoring and evaluating the effectiveness of mitigation or compensation measures implemented and verifying the accuracy of predictions made for natural wetlands, created wetlands, and artificial wetland features.
- d. Some range management/wetlands ideas that Hydro is implementing or considering include:
 - Exclosures to exclude cattle
 - Extracting water from wetlands to provide cattle with water in dry years.
 - Dugouts with or without troughs in fields adjacent to water to encourage cattle to stay away from the wetland.
 - Using different regimes for grazing and cultivation in the context of broader habitat objectives.
 - Treatment of invasive species like Canada thistle (*Cirsium arvense*), perennial sow thistle (*Sonchus arvensis*) and yellow hawkweed (*Hieracium pratense*).
 - Creating fish-free areas to manage the effects of fish predation on invertebrate and amphibian eggs and larvae and young birds.
 - Establishing nest boxes for cavity-nesting waterfowl.
 - Managing habitat (breeding, feeding and migration) for certain species/key indicator species such as invertebrates, a number of bird species, western toad, bats, and fisher.
- e. Beaver are changing the function of the upper reaches of many streams and creeks, particularly wrt changing patterns of fish migration. Trapping pressure and natural predation by wolves has been diminished thus increasing beaver populations. There are whole watersheds where there are no more trout or grayling getting up the stream. In some cases fish haven't been there fish for 40 or 50 years. Examples are the Tate, Tupper, and Brassy Creek. Per John DeGagne, in the Omineca, however, beaver management is more about "shallow water wetlands" enhancement for waterfowl, hydrological and peak flow amelioration, water temperature reduction, and sediment control. I.e., there are also some advantages to healthy beaver populations.

4. Aspen Management:

- a. Harvesting of aspen stands, and associated loss or deterioration of forest habitat has been widely blamed for declines in breeding populations of many warbler species. In past 20 years, fire on the landscape has been disappearing in the parklands, whereas before low intensity spring burns were common in ranching areas creating a sparse understory of trees but lush herb and grass area as well as two layer At stands. Fisher make extensive use of large, old At with fire scars for denning trees and so does the Connecticut warbler. The Connecticut Warbler reaches the northwestern extreme of its breeding range in northeastern British Columbia where it occurs mainly in the Peace Lowland and Kiskatinaw Plateau ecosections of the Boreal Plains Ecoprovince (Campbell et al. 2001). Although recent clearcuts are not used, breeding territories have been

documented in forests from pole stage to old forest (>80 years old). The Connecticut Warbler is on the provincial Red List in British Columbia. The primary threat to the Connecticut Warbler in British Columbia is the harvesting of aspen stands in northeastern British Columbia.

- b. Wrt range, deciduous harvesting reduces forage opportunity for 30 or so years (100% occupation of the site by dense cover of At) and 70% of the area being harvesting is under a range tenure. After an area is declared FG, there is little incentive to do anything further. Thinning may be a desirable treatment to encourage faster achievement of larger piece size. An example is the bear mountain community pasture.

5. Douglas-fir Ecosystems

- a. There are natural Douglas fir in the Peace. Richard Kabzems found several locations with large (80 cm diameter, 30 m tall) veteran Douglas fir in one river valley. At least one of those locations had some with younger (60 years old) Douglas fir naturals. The naturals were all in the SBSwk2, which occurs at lower elevations on the east side of the Rockies.
- b. Richard helped Barry Jaquish establish a Douglas fir provenance trial in the Peace, 3 locations, 110 seedlots, about 6,000 trees at each location. In 2015, the year 6 assessments were done on those. As expected, the northern seedlots are doing better. In co-operation with BCTS they planted 5 northern seedlots at another 3 locations in the Peace this July. The idea is to test 'exposed' (five tree heights from mature forest edge) versus 'sheltered' (two tree heights or less) planting locations. Based on observations from Barry's trial that survival and growth were better where the seedlings had been planted near the mature forest, a 'shelterbelt' effect.
- c. So, there may be some opportunities to establish Douglas fir for future climates in the Peace.

6. Old Growth:

- a. Speeding attainment of old growth attributes through silviculture treatments.
- b. Lots of talk about offsetting which works with Caribou but taking a large number of values and trying to apply offsetting is a problem. Need a tactical response such as spatial OGMA's.

7. MPB/Fire Affected Ecosystems

- a. The Forest Enhancement fund is specifically targeting wildlife habitat restoration in stands severely impacted by wildfires and mountain pine beetle in the Interior.
- b. The 60,000 ha fire near Mt McCallister in the PMT might be a good candidate.

8. Exposed Soils/Gravel Pit/Pile Restoration:

- a. Huge example near Hudson's Hope that was for the WCB dam.
- b. According to some there are erosion problems on a lot of old oil and gas sector seismic lines. Mostly legacy.

9. Invasive Plants:

- a. Denise MacLean (Ecosystems and Invasive Plant Committee) and Kari Bondaroff from the Peace Regional District in Dawson are the contacts for local invasive plant issues. They deal with treatment of invasive species like Canada thistle (*Cirsium arvense*), perennial sow thistle (*Sonchus arvensis*) and yellow hawkweed (*Hieracium pratense*).
- b. They have an interesting project on getting livestock to eat thistle.
- c. Some report that invasive species like thistle and hawkweed are everywhere.

10. Mine Site Rehabilitation

- a. There are some rehab plans for mine sites (e.g. North Komie frack sand project). Some of this is being done by FN.
- b. Restoration of the coal mine sites is required but they are absent and near bankruptcy. Y2Y is sponsoring a nursery in Moberly with FN plants that could be used in restoration.
- c. Tsinkunka coal may be an area that requires mitigation work and/or re-creating properly functioning wetland in appropriate areas.
- d. Alpine pollution around Tumbler Ridge (from batteries in particular needs to be cleaned up – not necessarily a mining issue).

11. Peace Caribou:

- a. Some guide outfitter don't think that the caribou habitat conflict existed in earlier times. Before the late 60s there were many caribou in FSJ and Ft Nelson area but then populations dropped by 90% possibly because of harsh winters and/or habitat loss. Now there is a lot of elk in the area and conflict because of predator prey relationships.
- b. Lisa Brock (FLNRO) manages the Peace Northern Caribou Implementation Plan (PNCIP) initiative which is a response to West Moberly court decision relating to 7 herds in the Peace.
- c. Boreal caribou and peace northern caribou have dedicated funding and programs but little happening in the south Peace so far. There is interest in getting things going in the south Peace. Funding mostly comes from levies on OGC work. The OGRIS (oil and gas resource and innovation society) accepts proposals (and do a call for proposals) for research related to caribou. Accept proposals from gov't and NGOs. Lisa Helmer, Senior Environment Specialist and RP Bio works for the OGC and is instrumental in managing this program.
- d. Inventory legacy linear features (landscape level restoration project near Ft Nelson, in the Parker range (72,000 ha) that Golder and Assoc is leading for them)
- e. Restore linear features by banding trees together to restrict predator movement + passive restoration in other areas.
- f. Re-establishing black spruce by mounding and winter planting in some areas.
- g. FLNRO, Northeast Resource Management and Major Projects is installing 80 wildlife cameras within the Parker range to monitor wolf movement and impacts. Scott McNay, put in a proposal to HCTF to pilot a small restoration project somewhere in the south peace (Moberly). One person reported that the Moberly population is down to about 40 animals. He believes that caribou habitat and herds near Quintette and the herd around Monkman are in reasonable shape.
- h. FLNRO, Northeast Resource Management and Major Projects has also developed a restoration framework (tracking tool) for measuring current condition in industrial proponent areas.
- i. There is also the boreal caribou habitat restoration tool kit (like SPs for seismic line debris with on the ground guidance for those wondering how to restore a line) at www.BCOGRIS.ca
- j. This work ties into Cumulative Effects. Government and Treaty 8 both have separate initiatives respecting cumulative effects (CE). The Treaty 8 process is being assisted to some extent by the Y2Y initiative. BC Hydro also did their own cumulative effects analysis. On the government side, CE is largely about mitigation policy and procedures and this is being informed, at least in part, by an incursion analysis that was recently completed. Emphasis is on:
 - avoiding incursion
 - minimizing impact
 - restoring affected habitat
 - offsetting damaged areas with work in other areas.
- a. Maternal penning of the Caribou (\$100,000 per individual) may be an option as well.
- b. May need to close or reduce access to caribou herds.

12. Moose Recovery:

- a. FLNRO, Northeast Resource Management and Major Projects is doing a study with UNBC looking at the relationship between moose, caribou, and wolves (based on 38 collars) – see the OGRIS website.
- b. Developing moose habitat is not appropriate where trying to encourage caribou recovery.
- c. One guide outfitter believes that reduced moose populations is wide spread and he is not sure it is primarily due to predators – there could also be a climate component.

13. Elk and Mule Deer Range:

- a. Some years ago a GAR order and a general wildlife measure were issued regarding elk and mule deer and open range south facing slopes and the possibility of prescribed burning. In the long term, to maintain these winter ranges, need to do this, but the pine river valley residents don't want it because of smoke. Most of these burns, 25 to 30 years ago, aimed to convert forest to open slopes. No new areas recently.
- b. Have done very little burning in the south peace (2 locations – Moberly and Wapiti) in the last 15 years.
- c. FLNRO, Northeast Resource Management and Major Projects have done some monitoring (veg plots), all post-treatment, within 1 to 2 months of burning and they have a five year burn plan.
- d. There were also two huge wildfires in this last summer both in Caribou Range. Home range is running out.

14. Grizzly Bears

- a. The Ministry of Environment, Ecosystem Information Section manages the provincial data set for the Peace Region for fisheries, wildlife, and ecosystems.
- b. TEM mapping in the Moberly population unit of Grizzly bears is being done by FLNRO to establish WHAs. Trying to identify high quality intact habitat and where restoration is needed. Part of Selwyn Creek watershed might be an area for good candidate for ER for Griz. FLNRO is leading this. Also mapping wetlands in the area. Won't be finished this year. Have to do some field work this summer. They are also hoping to get financial/other support for road decommissioning/restoration work etc.
- c. Scott McNay, Wildlife Infometrics, might be working with FN on this project as well.

15. Fish Passage:

- a. Historically quite a bit of work. No inventory work for 7 or 8 years. Recent emphasis has been around major projects.
- b. No fish passage working group.
- c. In the TFL in the Peace South, Canfor did some fish passage work and there is still more to do.
- d. MoTI needs more funding and might be a collaborative partner.
- e. There are probably legacy sites from the oil and gas sector. Lot of crossings are now are temporary, in the winter with snow fills, and not so much impact.
- f. As noted under wetlands, beaver dams are also preventing fish passage in certain watersheds.

16. Other Aquatic/Riparian

- a. The Murray river is a pristine river with no barriers going all the way to the Artic. Needs to be protected.
- b. Moberly and Gwillim Lake have lake trout restoration plans and have been working with FN - this is headed by Joelle's group and the Parks people. They might have other ideas as well about grayling and bull trout.
- c. Also consider fisheries sensitive watersheds.
- d. Water quality in south peace in the Kitiskan watershed with agriculture and range impacts may be an issue - it is the drinking water. There is a watershed stewardship committee in Dawson.

- e. Swan lake and Tupper creek (no longer fish bearing) but largely agricultural and range impacts. Have data from FREP survey about water quality and riparian for both.
- f. The NE CE process identified water quantity, water quality, air quality as topics to be incorporated into the next iteration of a Northeast CE assessment. The vision is to track a small number of broad resource values, which is consistent with an ecosystem approach to sustainable resource management.

17. Eagle Populations

- a. The eagle population in the Peace is concentrated in Peace Rv Valley. Not common east of the Rockies except along the Peace in big old cottonwood trees. No way to mitigate this. Eagles not fond of the artificial platforms that are built.

18. Other

- a. Where are the gains going to made in the future? Not protected areas because we already have them but more likely in the matrix between. Someone needs to provide a template or vision document (best management practices) on what sustainability looks like on an industry by industry basis. Sets up a series of practical actions. BMPs don't address the landscape level thinking though.
- b. Berry picking offset areas or in cutblocks may be an example of mitigative action for site C or other industrial proponents.

III - Examples of Site C Restoration/Mitigation Treatments Employed by BC Hydro

Interventions that pertain to native grasslands include:

- Monitoring migratory bird abundance, distribution and use of non-wetland habitat.
- Undertaking measures to mitigate environmental effects on species at-risk and sensitive ecological communities (e.g. fuzzy-spiked wildrye-wolf willow) and rare plants.
- Maintaining old field-grassland habitat with vegetation heights of 0.3 to 2.1 meters by mowing every 4 years with the objective of providing breeding habitat for Short-eared Owl, Northern Harrier, Sharp-tailed Grouse and Common Nighthawk.
- Identifying and maintaining suitable BC Hydro-owned lands for ungulate winter range to the satisfaction of FLNR and for the length of time determined by FLNR.
- Conducting, as required, prescribed burns of grassland habitats (steep south facing slopes) to rejuvenate native grassland and early seral habitats and maintain and enhance their value as ungulate winter range, although, per Siobhan Jackson indicated that they haven't proposed management strategies for such areas because it is already functional winter range.
- Planting a mix of live staked Balsam Poplar (60%), willow (30%) and Red-osier Dogwood (10%) at densities of 4,500 stems/ha in a 15 m wide strip in the riparian area along the reservoir shoreline adjacent to BC Hydro-owned farmland to provide riparian habitat and bank stabilization.
- Establishing large trees along the edge of fields and within current forested areas.
- Maintaining and enhancing forage production in selected fields through cultivation, weed treatment, fertilizing, and seeding.
- Noxious weed control.
- Monitoring and surveys.

Some examples of range and wetland management include:

- Exclosures to exclude cattle
- Extracting water from wetlands to provide cattle with water in dry years.
- Dugouts with or without troughs in fields adjacent to water to encourage cattle to stay away from the wetland.
- Using different regimes for grazing and cultivation in the context of broader habitat objectives.
- Treatment of invasive species like Canada thistle (*Cirsium arvense*), perennial sow thistle (*Sonchus arvensis*) and yellow hawkweed (*Hieracium pratense*).
- Creating fish-free areas to manage the effects of fish predation on invertebrate and amphibian eggs and larvae and young birds.
- Establishing nest boxes for cavity-nesting waterfowl.
- Managing habitat (breeding, feeding and migration) for certain species/key indicator species such as invertebrates, a number of bird species, western toad, bats, and fisher.

IV – Forming A Non-Profit Society

Definition:

A society is a nonprofit organization. Nonprofit organizations are defined as those institutions that assist the government by providing services to its citizens.

Key Features:

- May be incorporated or not. Need to incorporate if you have a large budget, want to issue official tax receipts for donations, or have to account for expenditure of public revenues. Can incorporate under the Society act in BC or the Federal Society act.
- It is a requirement that all not-for-profits in British Columbia be registered in good standing as societies with the BC Ministry of Finance in order to be eligible for financial assistance from the province.
- May be charitable or not. Obtaining registered charitable status can be a costly process that can take anywhere from six months to several years. Registration refers specifically to registration with Revenue Canada for income tax exemption. If you have no need for tax-exempt status, or will not be accepting gifts and issuing official receipts for income tax purposes, then you do not need to register.
- A *registered charity* is authorized to issue tax receipts for charitable donations, permitting donors to deduct all, or a portion of, contributions from personal or corporate income tax. Can be a *charitable organization* with a primary function to carry on activities in pursuit of a particular charitable purpose; or a *charitable foundation* with a primary function to fundraise for an organization (foundations can be private or public). If the organization becomes registered as a charitable organization with the Canadian Customs and Revenue Agency (CCRA), it will be permitted to issue charitable tax receipts and will not pay tax on income. Granted only to organizations that pursue the defined charitable causes of “relief of poverty, advancing education, advancing religion, and activities beneficial to the community as a whole”. Revoked if an organization begins earning profits and spends less than 80% of this on advancing the objectives of the organization.

Steps:

- Read the Societies Act
- Agree to a name and register it provincially under the Societies Act or Companies Act through the provincial Corporate Registry or at a Gov't Agent office. Name approval request forms can be found at <http://www.bcregistryservices.gov.bc.ca/> - the filing fee is \$30.00
- Create a constitution and bylaws within 56 days of registering the name.
- Incorporate - To incorporate under the Society Act in B.C. you must submit a:
 - constitution and by-laws of your organization
 - notice of Address of Society (a post office box is not acceptable)
 - list of first board of directors with occupations and home addresses
 - a fee of \$100.00 made payable to the Minister of Finance (no HST)
- ± Apply to register as a charity under the Federal Income Tax Act – register as a charitable organization at <http://www.cra-arc.gc.ca/E/pbg/tf/t2050/>
- ± Register for a GST/HST number - submit the Request for a Business Number (BN), Form RC1, to a Tax Services Office. Charities meeting any one of the following conditions do not have to register for GST/HST: the organization is in its first fiscal year; the organization's gross revenue is \$250,000 or less in either of its two previous years; the organization's gross revenue is more than \$250,000 but its sales of taxable goods and services are not greater than \$50,000 in the current fiscal quarter or over the four previous quarters.
- Set up banking and financial controls including a book keeper.
- File an annual report and financial statement with either the provincial or the federal government, depending on whether you have charitable status and how you incorporated.

Financial Function:

- Accept funding donations from gov't, corporations, foundations, individuals, etc.
- Include an admin fee if funders tie the funding to certain outcomes to help pay for staff.
- Offer consulting services and charge a fee for them.

Resources:

Registration Steps: http://hurwitassociates.com/l_p_initial_bc.php

The BC Centre for Non-Profit Development at <http://www.ufv.ca/bccnpd/> , 1-877-388-8716

Starting a Not-for-Profit Organization in BC: <http://www.fin.gov.bc.ca/registries/corppg/forms/reg20.pdf>

Ministry of Finance (BC): PO Box 9417 Station Provincial Government, Victoria, BC V8W 9V1 T: 250 387-3751 www.fin.gov.bc.ca

Charity Division of Canada Revenue Agency (Operating a Registered Charity): P: 1 800 267-2384 | <http://www.cra-arc.gc.ca/tx/chrts/prtng/menu-eng.html>

Society Act on-line version is available at this link: www.qp.gov.bc.ca/statreg/stat/S/96433_01.html

The [Voluntary Sector Knowledge Network](#) provides comprehensive advice and materials.

[Charity Village](#) offers some useful information, resources and questions to consider.

[Imagine Canada](#) has an online resources related to planning, strategy and organizational development.

[This article](#) from the Stanford Social Innovation Review might also be of use.