A Land Stewardship Framework

Prepared by Dr. R.F.Holt for the Blueberry River First Nation. June 2016.

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Section 1: Introduction

This document was produced at the request of Blueberry River First Nation. It was written by Dr. Rachel Holt – an ecologist with 20 years of expertise developing sustainable approaches to forest and land management across Canada and particularly in British Columbia. Rachel has been involved in land management issues from a variety of perspectives - primarily bringing science and technical expertise to solving a range of sustainability issues, and on behalf of industry, environmental groups, governments and First Nations. These include developing certification standards for forest management, investigating policy approaches to managing single species and ecosystems, undertaking large and small scale climate analyses and developing adaptation strategies to reduce risk. Rachel has been involved in the development and evolution of ecosystem-based management in the Great Bear Rainforest. This multi-stakeholder process involved creating science products (Rachel was a member of the Coast Information Team and wrote the EBM Handbook and Science basis of EBM in 2004), and Rachel was then involved problem-solving a variety of technical and policy challenges as EBM was fully developed and then ratified by a government-to-government process in February of 2016. Rachel was recently a member of the BC Government's Forest Practices Board for 4 years, and vice chair of the FPB for a 2 year period. She runs an independent consulting company – Veridian Ecological Consulting - where more information and copies for a variety of reports are available.

The request from Blueberry River First Nation was for a Land Stewardship Framework that would be relevant to the Blueberry River First Nation's traditional territory. Rachel has developed and been involved with a variety of planning processes and brings expertise to bear on this subject. A first step for producing the document was to understand the context – the current landscape condition of the territory. Current context provides critical guidance for how to approach a Land Stewardship Framework. This report summarizes a number of analyses on the condition of BRFN territory and interprets them in relation to ecological condition and the practice of treaty rights.

To understand how much of the landbase is managed with an emphasis on conservation, the report looks at how much of the BRFN territory is located in Protected Areas, and reviews this in relation to the available science on how much landscape protection is needed to act as an effective core reserve system. In addition to an analysis of Protected Areas, policy mechanisms on the remainder of the landbase are a critical piece relating to maintaining ecological and cultural values. To understand how the landbase is managed under existing policies today, a review of the central tools and policies that are intended to provide stewardship of the land is provided. These supporting documents (Appendix 1 and 2) raise significant questions about the effectiveness of the stewardship policies in BRFN territory which aim to maintain values of importance to the Nation.

As a result of this combined summary of information – the condition of the territory, the levels of protection of ecosystems in the territory, and concerns about the existing policy framework for stewardship, **this document recommends a way forward for a BRFN Land Stewardship Framework. As a result of the combined information on rate and extent of development pressures, combined with very low levels of protection, immediate actions are identified, based on available science, that are critical to maintaining ecological integrity and provide the opportunity to effectively practice Treaty Rights on BRFN territory.**

The condition of the BRFN territory today

This section of the report provides a summary of various analyses that review the condition of the BRFN territory and surrounding area.

A summary of what has been known about development trends over the last 6 decades, and what levels and distribution of development are present in BRFN territory today is provided. This is followed by, a summary of what is known about implications of landscape change to ecological functions and the ability of BRFN to practice their treaty rights.

The analysis then asks what protection is in place today to maintain both ecological integrity and meaningful practice of treaty rights, and how does this measure up to what is known about required levels of protection, and what has occurred elsewhere in BC.

Condition of BRFN territory in the B.C. Context

BRFN territory lies in the southern portion of the 'northeast' of BC, on the eastern side of the Rocky Mountains, and overlaps in large part with the Boreal Plains ecoprovince[1]. In an analysis of all of British Columbia, this ecoprovince stands out as having one of the highest and most diverse industrial human footprints in the province (Holt and Kehm 2014). Note that these data are current only to around 2006 for linear disturbance density –significant additional footprint has occurred since this time in the northeast (see below).

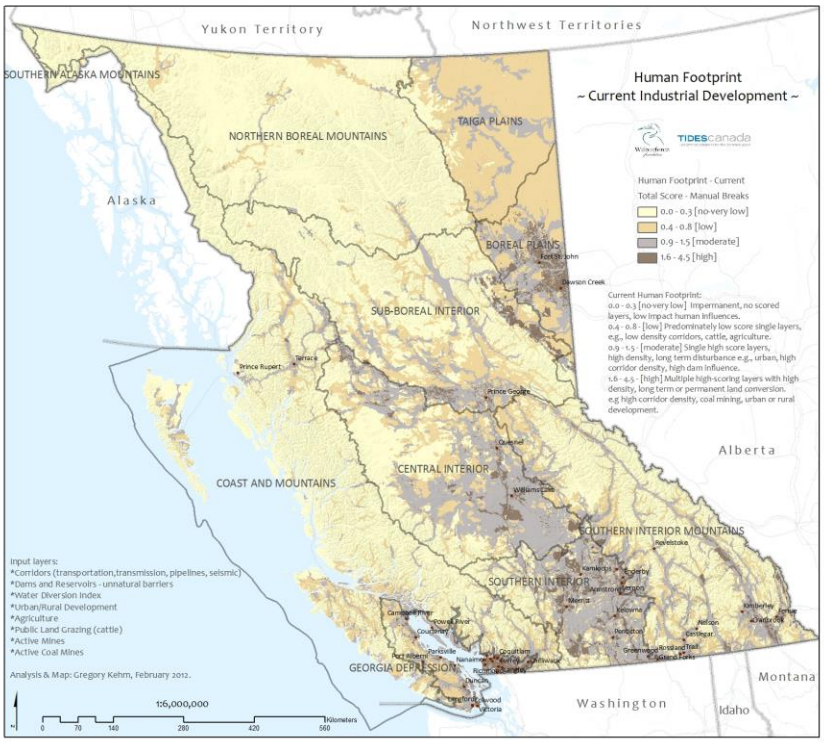


Figure 1. Human Footprint – Industrial Development indicators for British Columbia. Data current to ~ 2006 for roads / linear disturbances. (Holt and Kehm 2014).

[1] Ecoprovinces and ecoregions are part of the hierarchical suite of ecologically based units developed by the province of BC. See: http://www.env.gov.bc.ca/ecology/ecoregions/ for more information.

Land Condition within the BRFN territory

The region in and around BRFN territory was first developed for non-aboriginal settlement and development of an agricultural community, with agricultural clearing throughout the area around the old Montney Reserve (IR 172) north of Fort St. John from the 1920s onwards. In the 1950s development more widely started to occur primarily for both oil and natural gas development.

In 2003, Salmo Consulting undertook a detailed cumulative effects analysis for an area termed the Blueberry Case Study (Salmo 2003 Appendix 3) which was primarily the Blueberry River watershed and adjacent area, and which forms a small central part of BRFN territory.

The Salmo report documents the exponential increase in development for various indicators, for the period 1950s, 1970s and late 1990s for the Blueberry Study Area (Salmo 2003), and augmented in the tables below by recent data for a similar (but not exactly the same area) the Blueberry Watershed.

Table 1. Number and area of well sites for Blueberry Study Area for the 1950s, 1970 and late 1990s (from Salmo 2003), and more recent data for the Blueberry watershed (2015 / 2016).

	1950	1970	Late 1990s	2015*	2016**
# well sites	8	133	208	512	19,974
Area well sites	12	200	880	-	10,482

*in the OGC watershed of Blueberry River (data accessed 2016 from BC Govt's Hectares BC)

** in the whole of BRFN territory for context (data accessed 2016 from BC Govt's Hectares BC).

Agricultural clearing was identified in Salmo (2003) as a significant activity in the region and large areas of 'parkland forest' were noted as having been converted to grazing and forage production.

Table 2. Agricultural land data for the 1950s, 1970s and late 1990s for the Blueberry Study Area (Salmo 2003) and to 2006 for Blueberry watershed.

Year	1950	1970	Late 1990s	2006*
Agricultural clearing	0	5,695	17,783	49,700

*BTM Agricultural Land –accessed from Hectares BC in 2016, but data noted as current to 2006.

Linear features and access development in the Blueberry study area were low in the 1950s, and more than 50% of the area was undisturbed by linear corridors of any kind (Table 3). By the 1970s these numbers had increased significantly, and in the 1970s a seismic program covered around half of the study area. In 2015, no area within the Blueberry watershed is greater than 1.5km from a road (this includes all roads, but not other linear features). Today, 84% of the whole of BRFN territory is within 500m of an industrial disturbance (Ecotrust et al. 2016).

At the time it was written, the Salmo report (2003) noted that in the Blueberry Study Area, the levels of linear development already exceeded thresholds that were estimated to affect ecological functioning. The landscape condition found in the late 1990s was suggested to result in around 73% of the study area having a high aquatic hazard rating (Salmo 2003), and road densities already exceeded thresholds known to impact grizzly bear populations over 65% of the watershed at that time. Today the level of development is considerably higher and this type of pervasive development is found throughout the territory (see Table 3, and more recent analyses below).

Table 3. Linear features data for the 1950s, 1970s and late 1990s for the Blueberry Study Area (Salmo 2003), and to 2015 for Blueberry watershed.

Year	1950	1970	Late 1990s	2015*	2016**
Km/km2					
Roads	0.1	0.26	0.61	1.5	
Truck trails	0.09	0.36	1.0		
Utility corridors	0.01	0.07	0.11		
Cutlines	0.34	1.23	2.54	9.3	
% undisturbed	>50%	>50% of area disturbed by seismic	Note stated	No area is >1.5km from a road today (blueberry watershed)	84% of whole territory is within 500m from an industrial disturbance

*exact age of roads data unknown. (data accessed 2016 from BC Govt's Hectares BC).

** Ecotrust et al. 2016.

In 2012, an Atlas of land use change was created for the broad region overlapping the Blueberry River territory (Lee and Hanneman 2012). The report examined 15 categories of development to understand the cumulative footprint of all activities. In this work, the disturbance layer was buffered[2] to understand the potential implications of potential impacts over and above the direct footprint of each development.

Lee and Hanneman compile results by watershed zones that also overlap the BRFN territory, and conclude that in 2012:

- 90.2% of the Upper Peace-Kiskatinaw is disturbed;
- 66.9% of the entire study area was disturbed when applying a 500m buffer to disturbances;
- 90.8% of the Beatton watershed is disturbed when applying a 500m buffer to disturbances;
- the Upper Peace-Kiskatinaw watershed had the highest numbers of water crossings in the region, with 747 water crossings (of a total of 2296 in the region);
- two of five watersheds (Beatton and Upper Peace Kiskatinaw) have very few remaining intact forest landscapes (<6% each); and
- three of the 10 caribou herd ranges that are all or partly within this study area were more than 50% disturbed by development in 2012.

Since that work was completed in 2012, and based on an updated Atlas of human footprint for the BRFN territory (Ecotrust et al. 2016), the Province of BC has authorised more than 2600 oil and gas wells, 1884km of petroleum access and permanent roads, 740km of petroleum development roads,

[2] Buffering is the process of adding an additional area surrounding a mapped area (in this case a discrete location or linear development physically disturbed by an industrial activity).

1500km of new pipelines and 9400km of seismic lines within the territory boundary. In addition, approximately 290 forestry cutblocks were harvested.

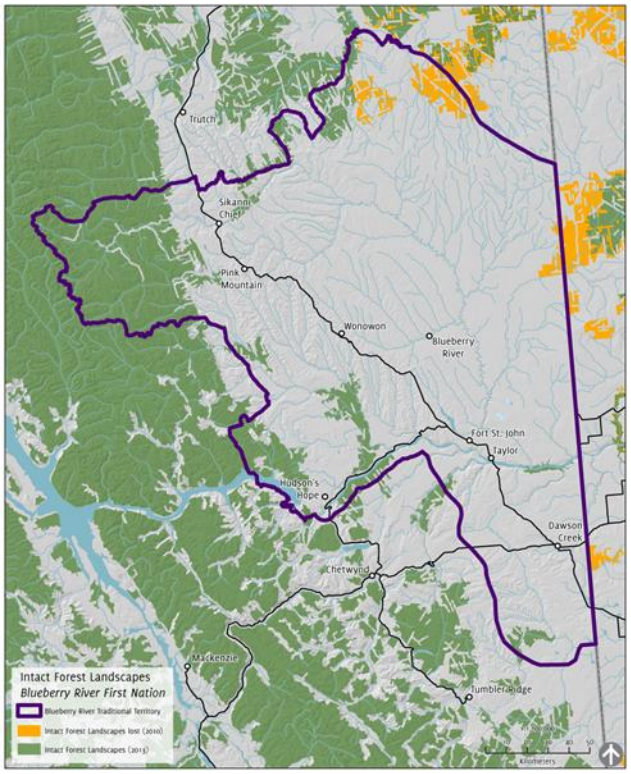
This newly released Atlas (Ecotrust et al. 2016) shows that, based on Government of BC data:

- Approximately 73% of the BRFN traditional territory is within 250m of industrial disturbance, and
- Approximately 84% of the BRFN traditional territory is within 500m of an industrial disturbance.

These numbers demonstrate the pervasive nature of the development that has occurred to date in BRFN territory and the rapid pace of development in recent years.

Intact Areas

Intact forest ecosystems are typically defined in relation to natural processes. For example, 500km^2 (50,000ha) is an often cited figure to define Intact Areas in Canada and worldwide (e.g. FSC Canada, 2016; Heino et al. 2015), if they are free from ,or largely free from(<5%) from human-caused disturbances. 'Intact forests' are similar in concept to the ecological benchmarks[3] which are defined using the concept of minimum dynamic reserves[4] to identify ecologically relevant large landscapes. For this part of the boreal forest the MDR is estimated as 2600km^2 , 1800km^2 and 960km^2 for the three sub-units with the Boreal Plains ecoprovince (K. Lisgo pers. comm. science advisor to the BEACONS project, University of Alberta).



Intact forests are a declining resource worldwide but are known to be critically important to maintaining biodiversity values. Large intact areas are more likely to be fully functioning (i.e. have intact ecological processes), with natural levels of habitat availability and use by species as expected under natural conditions.

While British Columbia as a whole has approximately 60% of its forest classified as 'intact'(defined using the smaller number of 5000ha than identified by others (see above)[5], the BRFN territory has less than 14% intact forest, and only 5.5% intact if one large area – the Muskwa-Kechika Management Area - is removed from the analysis (see Figure

[3] http://www.beaconsproject.ca/conservation.

[4] A minimum dynamic reserve is the minimum reserve area required to incorporate natural disturbance and maintain ecological processes (Leroux et al. 2007).

[5] Global Forest Watch Canada defines intact forest landscape (IFL) as "a contiguous mosaic of natural ecosystems in a forest ecozone, essentially undisturbed by human influence, including both treed and naturally treeless areas. An intact forest landscape should be large enough to contain and support natural biodiversity and ecological processes, and to provide a buffer against human disturbance from surrounding areas." Intact forest landscapes are "areas of at least 5,000 hectares (50 km^2) within boreal forest ecozones and 1,000 (10 km^2) within temperate forest ecozones that contain forest and non-forest ecosystems minimally disturbed by human activity, as detected on Landsat satellite imagery Islands are also included in the analysis, though they might be smaller than 1,000 hectares".

below). Note that these definitions of intactness are smaller than the area identified as likely effective minimum dynamic area from above.

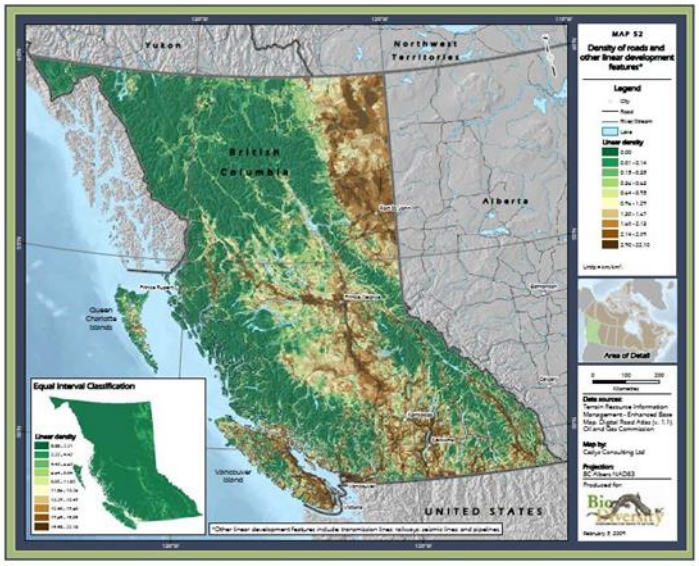
Habitat loss and fragmentation are two of the primary causes of species loss world-wide[6], and overall, the amount of intact forest is a good indicator of the likelihood of keeping all the species in a particular region. For example although grizzly bears will inhabit areas with roads and disturbances, the amount of road-less habitat (or intact areas) is typically considered to be a measure of habitat security for this species (e.g. Proctor et al. 2012; MacHutchon and Proctor 2015). There are not only direct effects of habitat loss, but many other effects that can have profound implications for both ecology and human systems (Chapin et al. 2000). See review of the effects of roads and linear disturbances below for other examples.

For BRFN, these large undisturbed areas are critical to meaningful practice of treaty rights because they have a higher likelihood of conditions resembling traditional harvesting practices, are isolated, have little or no industrial sensory effects (so increasing the faith in the safety of the country food), and have stronger ecological conditions to support more robust species abundance.

Based on these two assessments of landscape condition - the amount of area far from a development, and the amount of intact forests remaining, **today, there are very few options within BRFN territory remaining to find areas that are not already impacted by development. For example, while there remains a small amount of relatively unimpacted area in the far northwest of BRFN territory, areas closer to the BRFN residential reserve are significantly impacted by development with few, if any, intact areas remaining.**

Linear Development

The context of northeast BC and BRFN territory in relation to linear density of disturbance is shown in this figure (below – from Austin et al. 2009). The darker brown areas show increasing density of disturbances.



Specific to BRFN territory, the atlas of industrial development (Ecotrust et al. 2016) shows that when considering roads, transmission lines, seismic lines and pipelines, there are 110,300 km of linear features in 38,327 km^2 of territory – or 2.88 km of linear disturbance per square kilometer. Significant portions of the territory have a linear disturbance density that is much higher (ranging from 6.1 to 12 km per km^2) with other areas spiking over 24 km per km^2.

Of this total linear disturbance, 50,237km are roads, resulting in an average of 1.3km/ km^2 roads averaged over the whole territory. This total linear density reflected in the most recent Atlas for Blueberry territory is in excess of the limits / or thresholds known to be important to sensitive species such as caribou and grizzly bears (E.C. 2012 and Boulanger and Stenhouse 2014)– and, unsurprisingly,

[6] The most important direct drivers of biodiversity loss and ecosystem service changes are habitat change (such as land use changes, physical modification of rivers or water withdrawal from rivers, climate change, invasive alien species, overexploitation, and pollution). Millenium Assessment 2005.

caribou and grizzly bear populations have declined or been locally extirpated throughout large regions of the BRFN territory (Salmo 2003). The extent to which linear disturbances have site and landscape level impacts on different values is dependent on various factors, including the access created by the corridor (for humans and other species), the width of the corridor, and the disruption of natural conditions on the corridor (level of soil erosion, ingrowth, restoration to native species, invasive species movement etc.).

In addition to impacts on known sensitive species such as caribou, roads and linear disturbances are known to have a very large number of different impacts on ecological functions and habitat use by a very wide variety of species. Types of impacts from roads and from other linear developments are numerous and varied (summarised from Findlay and Houlahan 1997; Forman and Alexander 1998; Trombulak and Frissell 2000; Fahrig and Rytwinski 2009) and include:

a) Terrestrial species and habitat impacts such as
   - increased direct and indirect mortality for species,
   - loss of suitable habitat,
   - degradation of habitat (e.g. avoidance of otherwise suitable habitat due to disturbance or edge effects such as micro-climate change),
   - loss of important structures such as wildlife trees – which are critical habitat for a large number of species - due to WorkSafe requirements (this effect can be very extensive in some areas),
   - barriers that prevent movement (due to avoidance of roads or physical barriers), and
   - fragmentation of remaining habitat – resulting in small patch sizes of remaining habitat,

b) Hydrologic impacts such as
   - effects on waterflow,
   - increased sedimentation levels,
   - loss of hydrologic functions due to change or loss of stream pattern, and
   - barriers that prevent movement of species (e.g. for fish passage due to culverts),

c) Noise and pollution effects,

d) Invasive species incursions and movements

e) Dust effects on vegetation,

f) Effects on natural processes such as fire or predator prey dynamics (e.g. changing wolf movement patterns in a landscape and changing natural predation patterns).

Many of these effects have variable 'incursion' effects into the surrounding forest, or 'zone of influence' effects. So, although a single road or disturbance has a direct footprint, the potential implications of a single road expand over a much larger footprint (see reviews below).

In addition, because roads are typically related to other development it is critical to use a cumulative effects approach to understanding landscape condition. For example, Johnson *et al.* (2010) suggest that for every 3.1 acres of well-pad developed (in the Marcellus Shale in the northeastern U.S.):

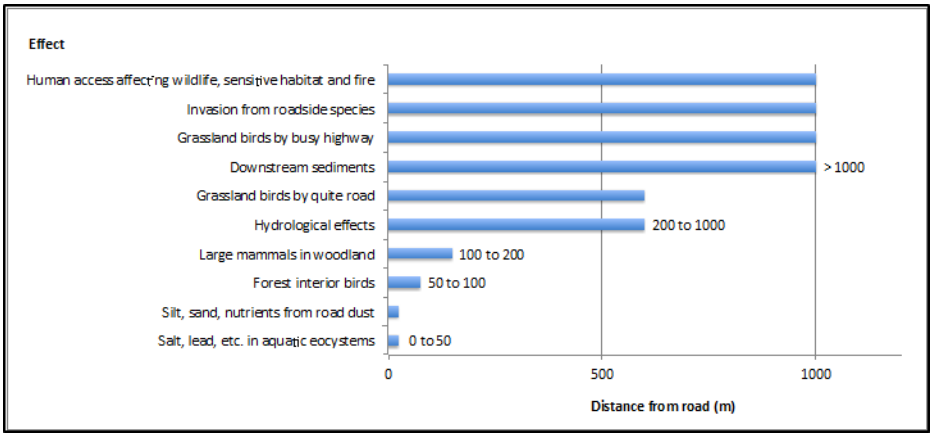
- […] An additional 5.7 acres of forest is cleared for associated infrastructure such as roads, pipelines, and water containment pits;
- […] A total of 8.8 acres of total forest is cleared; and
- […] Indirect forest impacts from the development of new edges are felt in another 21.2 acres of forested landscape (2.41 times the direct disturbance area).

How many roads are needed to affect ecological processes?

Not all species or ecosystem processes are negatively affected by roads – but negative effects of roads on animal abundance outnumber positive effects in the literature by a factor of 5 : 1 (Fahrig and Rytwinski 2009).

In one of the first general reviews on the effects of roads, Forman and Alexander, (1998), suggested that the literature indicates 0.6km/ km2 appears to be a maximum density of roads to maintain a naturally functioning landscape with all the species including large predators. Similarly, a maximum of 0.72km/ km^2 was suggested as necessary to support functional systems including wolves (Committee on the Ecological Impacts of Road Density 2005 – referenced from Madrone 2014).

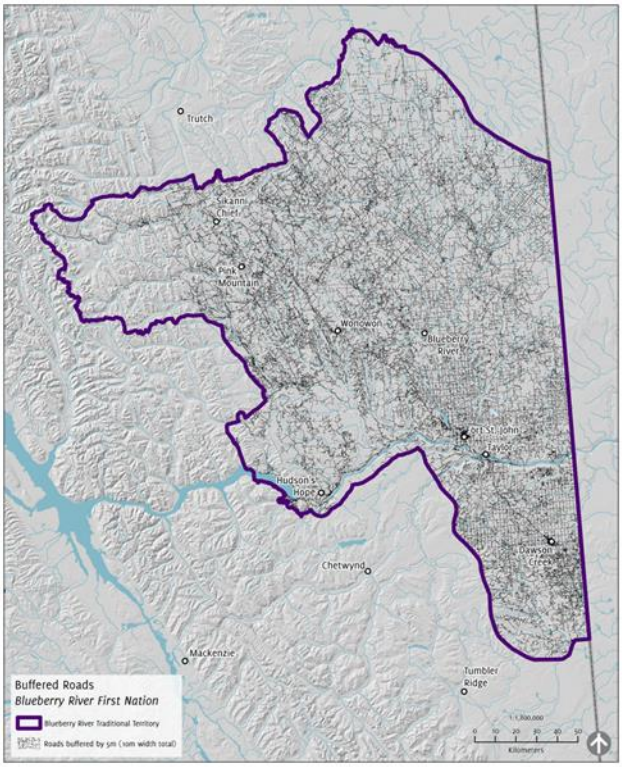
These numbers are also corroborated by more recent data : road densities of greater than 0.75km/ km2 in Alberta were associated with grizzly bear population decline (Boulanger and Stenhouse 2014). Higher road densities were strongly associated with lower female bear survival which was a limiting factor in population growth when road densities surpassed these thresholds. This work is being used to establish road density targets of 0.6km /km2 for 'core conservation areas' in Alberta today where grizzly bears are being managed for recovery, and 0.75km/ km2 where long-term stability is the population goal.



The distance that road effects 'filter' into adjacent areas differs for different values. Some general patterns are provided in the figure (above) for different types of effects (from Daust and Morgan 2014, and compiled from Forman and Alexander 1998).

TROMBULAK AND FRISSELL 2000 SAY: ALTHOUGH NOT ALL SPECIES ARE AFFECTED EQUALLY *"OVERALL, THE PRESENCE OF ROADS IS POSITIVELY CORRELATED WITH CHANGES IN SPECIES COMPOSITION, POPULATION SIZES, AND HYDROLOGIC AND GEOMORPHIC PROCESS THAT SHAPE AQUATIC AND RIPARIAN SYSTEMS. MORE EXPERIMENTAL RESEARCH IS NEEDED TO COMPLEMENT POST-HOC CORRELATIVE STUDIES. OUR REVIEW UNDERSCORES THE IMPORTANCE TO CONSERVATION OF AVOIDING CONSTRUCTION OF NEW ROADS IN ROADLESS OR SPARSELY ROADED AREAS AND OF REMOVAL OR RESTORATION OF EXISTING ROADS TO BENEFIT BOTH TERRESTRIAL AND AQUATIC BIOTA".*

FAHRIG AND RYTWINSKI (2009)– IN THEIR "REVIEW OF THE LITERATURE ON INDIVIDUAL SPECIES AND RESPONSE TO ROADS" CONCLUDE THAT "*THE EVIDENCE FOR POPULATION-LEVEL EFFECTS OF ROADS AND TRAFFIC IS ALREADY STRONG ENOUGH TO MERIT ROUTINE CONSIDERATION OF MITIGATION OF THESE EFFECTS IN ALL ROAD CONSTRUCTION AND MAINTENANCE PROJECTS".*

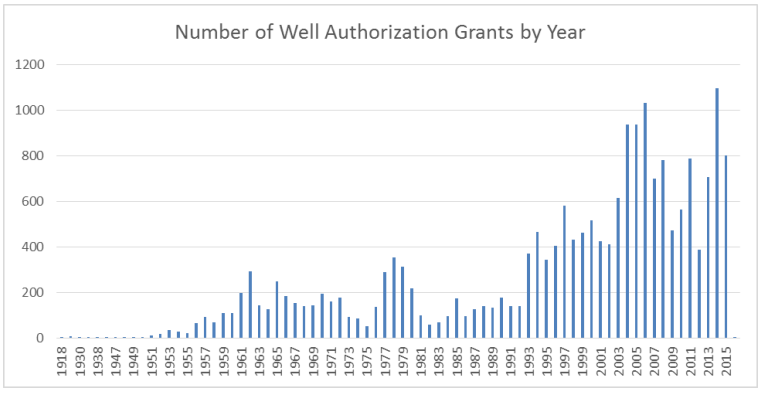


As is shown from the 2016 work (Ecotrust et al. 2016 – see left), the density of roads and other linear disturbances in BRFN territory surpasses the maximum magnitude of densities recommended by a variety of scientific analyses to maintain functional ecosystems. This single indicator (density of linear disturbance) is often considered the most useful metric on landscape condition – but obviously also interacts with the multitude of other developments on the landscape. The different effects of roads and linear disturbances vary widely, but they are well known to exist and to be primarily negative, and are important to understand and factor into management decisions.

Rate of Change

Industrial development of natural ecosystems causes a variety of different types of impacts as outlined above. In addition to the extent and density of changes from natural conditions, the **rate** at which changes occur is also an important metric reflecting how species, ecosystems and humans may respond, adapt and mitigate change to their environment (Millenium Ecosystem Assessment 2005a).

In BRFN territory the rate and scale of development has been and continues to be dramatic. For example, between 2010 and 2013 (dates determined by two available datasets)[Ecotrust et al. 2016], 56,189 hectares of intact forest landscape was lost in– 9.6% of the 2010 intact forest landscape, and 21% of the intact forest outside MKMA. This corresponds to a rate of loss of 3.2% and 10.3% per year respectively. This three year period is indicative of the very high rate of change that has occurred in the BRFN territory since industrial development began, changes which include:



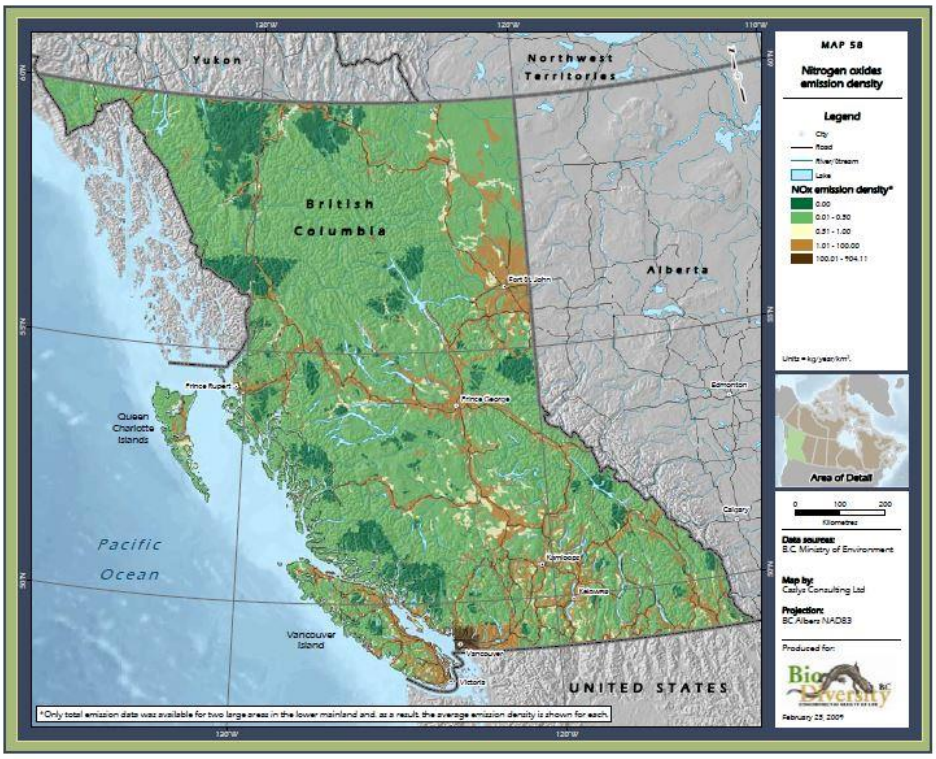
- conversion to agricultural land (13% of BRFN territory is identified as agricultural land cover, and 28% is designated as Agricultural Land Reserve);

- the creation of two major dams within the territory (creating Williston reservoir and Peace Canyon), affecting upstream and downstream flows on the major Peace river system and all the cascading effects that come with changes to the hydrology of a major river system. The current Site C dam is under development on BRFN territory;
- development of the oil and gas industry – today there are 19,974 wells in Blueberry River First Nations traditional territory, 36% of which are active. The increasing rate of development of well sites is shown in the figure at right (Ecotrust et al. 2016);
- along with well sites there is a large number of additional facilities that support the oil and gas industry (see Ecotrust et al. 2016).
- Development of 13,239km of pipelines, covering 26,334ha of tenured area, with several major new pipelines under examination today;
- 69% of the BRFN territory has some kind of oil or gas tenure (this number does not double-count overlapping tenures);
- In addition, there has been a long history of forest management throughout the territory which has a variety of different impacts on natural systemsincluding truncation of the seral stage distribution (resulting in a reduction in the amount of mature and old forest on the landscape and altering the distribution of wildlife habitat), loss of 'wildlife trees' within areas that are harvested, and a total removal of biomass from the site that is different from that caused by natural disturbance events such as wildfires and windstorms.

Atmospheric Impacts

Nitrogen oxides are gases emitted when fossil fuels are burned. High levels of exposure can cause irritation to eyes, ears, throat, lungs, as well as fatigue and gastric problems in humans and other animals. Long-term exposure can cause lung issues, heart disease damage to nervous system and decrease in birth rates. These gases also increase the amount of other gases in the atmosphere such as methane which oxidize to carbon dioxide and contributes significantly to climate change (Austin et al. 2009).

The province-wide density of emissions (kg/ year / km^2) from human sources is shown on the map below (from Austin 2009). The oil and gas sector is one of the significant sources of nitrogen oxides in BC. Northeast BC, around Blueberry River First Nation territory can be seen from the figure below as showing an observable high density of nitrogen oxides in the atmosphere over a large area.



Cumulative Effects Assessment

BC's Forest Practices Board undertook a cumulative effects analysis for one watershed within the territory – the Kiskatinaw. The FPB report (2011) notes that historically, caribou ranged throughout the Kiskatinaw watershed, but today, as a result of the human disturbance in the watershed, only a subset of the watershed is used as winter caribou habitat. The FPB developed indicators that reflect the caribou value namely core habitat, average core habitat patch size, and density of linear corridors. All disturbances on the landscape were buffered, and the potential effects evaluated. The FPB report concludes:

Caribou have likely retreated south in the study area, as habitat quality has deteriorated because of increased human activity. All indicators of winter habitat quality for caribou have deteriorated over time, to the point where they have exceeded the limits of concern derived from published literature. As a result, there is no need to project these indicators to 2017. Any additional industrial development will drive the indicators further from the limits set.

For drinking water, the FPB report concludes:

The CEA found relatively unambiguous indications of changes in the flow regime of the river, over the period of record, that indicate a concern for drinking water quantity. Additional human activity, particularly in the form of drilling for natural gas, has the potential to cause withdrawals from the [Kiskatinaw] river that exceed limits of concern.

Summary of Landscape Condition

The overall messages from these various reports are that BRFN traditional territory:

- **Bears a much higher burden of industrial development compared to the whole of BC;**

- **Is largely covered by, or is in close proximity to industrial development - very little area is unaffected or intact within the territory;**
- **Has experienced a rapid and significant rate and scale of change, with extensive development occurring in very short time periods;**
- **Is now covered, with rare exceptions, by amounts of industrial and agricultural disturbance that exceed well established thresholds of manageable change for known species such as grizzly bears and caribou that act as umbrella and indicator species for ecosystem functions overall.**

How are treaty rights and human well-being being affected?

The Beaver members of Blueberry River First Nation are known as Dane-zaa, or "real people" (Gibson 2014). Aboriginal people have continuously occupied the lands of Treaty 8 for over 11,000 years. Dane-zaa oral history describes events and people being present in the area long before the arrival of white explorers. Archaeological evidence from the Charlie Lake caves shows that people occupied the area from at least 10,500 years ago, hunting bison and other game (Ridington and Ridington 2013). The area was rich in wildlife and thereby attractive to First Nations due to the diversity of habitats available. Bison were abundant on the prairie along the Peace River, the muskeg to the north and east supported caribou, moose, elk, deer, beaver and other fur-bearers, and the mountains to the west provided habitat for sheep, goats and marmots (whistlers). Fish were also abundant in the rivers and lakes (ibid). As a result, habitation of the area has been continuous since this time, as ancestors of the Dane-zaa took advantage of these resources. Dane-zaa ancestors also actively managed the landscape, for example performing controlled burning around the Peace River to maintain the prairie habitat for the bison herds (ibid).

Successful harvesting of wildlife in BRFN territory has traditionally required strong knowledge of intrinsic animal cycles and seasonal migrations (UBCIC 1980) a willingness to take only what the land can give, reliance on a large geographic base with altered harvesting patterns each year so that animal numbers in certain areas could replenish, and other active management strategies:

"In order to operate their system, hunters have to be able to move between different areas, take advantage of habitat variety, and switch their activities from species to species". (UBCIC 1980)

Ethnographic research, traditional use studies and traditional knowledge of elders all indicate that members of the Fort St. John Band, which included the Blueberry River people, by necessity and common practice had an extremely large seasonal round with a radius of several hundred kilometres, much of which was covered in any given year in the hunt for game, including long-term seasonal camps in multiple locations, with members gathering as a larger group at communal sites for a portion of the year and striking out to key harvesting sites for other portions in smaller family units.

With an extensive land base available for seasonal rounds, this traditional land stewardship way of life was sustainable. The relationship between BRFN members and the physical and biophysical environment has always been present, with land use decisions of the people defined by observed environmental conditions.

This concept of balance has been lost in the post-contact period. Dane-zaa ancestors travelled seasonally around the Peace River country from the Rocky Mountains to the Alberta plains. This pattern of land use continued until relatively recently – well into the 20th century for some families – with a variety of factors (e.g., land privatization, agricultural development and fencing, government rules and regulations, the registered trapline system, increased non-Aboriginal populations) involuntarily reducing the geographic and seasonal mobility of BRFN members (Ridington 1980; Ridington and Ridington 2014).

The ability to practice treaty rights is dependent upon a functional ecosystem – to hunt species and gather food requires the right ecosystems, habitats and species to be present.

Changing the seral stage distribution – as occurs in forest management – from an older forest dominated landscape to one dominated by younger age structure that lack natural levels of wildlife trees alters the distribution of bird and mammal species. This changes natural processes, the availability of food sources and has cascading effects on the ecosystem. Changing the location of suitable habitats for species such as moose alters the ability of BRFN to undertake their seasonal rounds, which are predicated on place-based knowledge of habitats preferred for by harvested species. These have been substantially altered due to disturbance effects and habitat loss in general. In addition, the change from a natural 'forested' ecosystem to an agricultural landscape prevents many natural processes (e.g. movement of species, habitat for species, changes hydrologic processes), and largely precludes any traditional use of the land. This is because of the biophysical changes, as well as the reduced accessibility for First Nations harvesters across large portions of their traditional territory, which are now ranches and farmland.

Where food species populations have declined or moved from the landscape the ability to practice treaty rights is impacted. The case of caribou is a clear example: the dire conservation status of this species in BRFN territory has resulted in the extirpation of caribou from some areas and prevents any hunting of this species at all where they do remain.

In addition, the ability to practice treaty rights is more than simply having access to elements of the ecosystem. Seasonal rounds require potential food to be present in the right places and at the right times. But for First Nations, being on the land encompasses components such as quiet enjoyment of being outside, and of knowing that the lands and waters are safe and will continue to provide resources for generations to come. Being close to developments, roads, pipelines, well sites, cutblocks, all reduce the enjoyment, practicability, and success of traditional rights-based activities. These factors require large areas that are free from development, and they require knowledge that species are not being driven from the landscape.

The reality for Blueberry River First Nation is that the condition of today's landscape compared to when the treaty was signed in 1900 is extremely different.

The losses sustained to the land base, waters and other resources relied upon by BRFN have led to not only alienation from land, wildlife and rights, but have led to severe and lasting social, economic and cultural loss and marginalization. For a mobile, land-based culture group to lose much of their functional mobility and connection to the land has many and varied, but invariably negative, effects on the culture holders themselves.

Existing Land Stewardship Mechanisms

Stewardship strategies include both Protected Areas – areas off-limits to development - and policies and regulations that influence how development of the 'matrix' - the remaining landbase outside Protected Areas – is done. Protected Areas are the central strategy to maintaining ecological integrity in a region, and management of the matrix is dependent on the extent and effectiveness of these areas. In this section, the state of Protected Areas in BRFN territory is evaluated against current science.

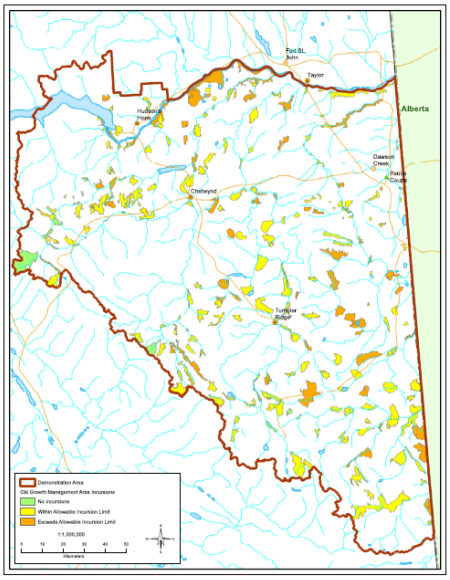
As a secondary analysis, key policies and programs for managing the matrix are evaluated for their potential effectiveness in providing a comprehensive land stewardship framework. This analysis is provided in two supporting documents: Appendix 1 provides a summary of the suite of government programs available; Appendix 2 provides a review of the Oil and Gas Commission's Area-based Analysis which this is the primary tool for managing oil and gas development in B.C., and in BRFN territory.

Level of ecosystem protection in BRFN territory

The BRFN territory has a very low level of land managed strictly for the conservation of natural resources, with less than 1% of the territory area in provincial, federal parks, or ecological reserves (Ecotrust et al. 2016). The average size of protected areas is very small compared to the natural disturbance size in the region. The maximum park size is 8900ha and the median size of parks is less than 200ha. This is tiny from an ecological or traditional use perspective, and prevents these areas from functioning effectively as resilient core protection zones. The size of the protected areas is relevant because only large areas are resilient to processes such as climate change, or are large enough to maintain landscape level natural and cultural processes (e.g. fire or seasonal rounds).

The majority of the territory overlaps with the Boreal Plains ecoprovince, which also has a very low level of ecosystem protection (<1%).

In addition to strictly protected areas, there are a number of other designations that potentially contribute to the protection of some elements of the landscape. The Muskwa-Kechika management area overlaps with a small portion of the BRFN in the more mountainous western portion of the territory. It is not representative of the dominant ecosystems in the majority of the territory.



Development there is managed by Resource Review Areas, which do not set legally enforceable limits on development. There are Wildlife Habitat Areas and Ungulate Winter Ranges in some of the western more mountainous areas of the territory, but they similarly have little demonstrated impact on resource development to date (Ecotrust et al. 2016).

Old Growth Management Areas are identified in some landscapes in the south of the territory only, and have an influence on forest management, but not oil and gas development (Appendix 1 and 2). However, even those OGMAs that are identified have many 'incursions' from oil and gas development, so even these areas set-aside for biodiversity protection are not free of development pressures. The figure (left) is from a BC government analysis of how many OGMAs are not impacted by oil and gas development. Of the OGMAs in the south Peace region only those in green in the adjacent figure have no oil and gas infrastructure within them (Ciruna 2014).

These land use designations may well have a useful role to play in overall stewardship once a set of core protection zones is established. However, without that, piecemeal and often hard to enforce limited protection strategies are not the primary strategy of interest at this time.

Why does this matter?

The role of protected areas - those areas fully off-limits to development- is well documented in the science literature[7] (for example: MacArthur and Wilson 1967; Diamond 1975; Noss and Cooperider 1994; Arcese and Sinclair 1997; Mackey et al. 2008):

- To provide 'core' areas that act as anchors for populations of species;

[7] There are a very large number of papers that discuss the merits of different configurations of protected areas and buffers to those areas. This literature starts with works by John Muir around a 100 years ago and increases from the 1980s onwards with more technical analyses of what combination of land use protects species most effectively. The notion of 'core' areas for protection is embraced by the vast majority of the literature (I do not know of any literature that suggests core protection zones are not needed to effectively maintain species and processes in a large landscape).

- To provide areas where natural processes can continue to operate unaltered;
- To maintain values that are incompatible with industrial disturbance
- To provide areas where climate change is the only stressor – these areas are likely to be increasingly needed in the future as one of the major adaptation possibilities against climate change impacts is to remove any stressor that can be managed
- To provide undisturbed 'benchmarks' – areas that provide areas for monitoring in future[8].

How do we evaluate the level of protection versus level of development?

Canada is committed to a general protection level of 17% in the "Aichi target" - a revised number agreed to internationally to surpass the original 12% protection as agreed to as part of the Convention on Biological Diversity (see Appendix 3 for details). To be effective, protection levels should be representative of all ecosystem types – the 'keeping all the pieces' notion that is foundational in modern conservation biology approaches (Gibbon 1993; CIT 2004b).

However, an analysis of policy or political targets for protection versus evidence based targets for protection, Svancara et al. (2005), found that evidence-based targets for how much protection was 'appropriate' or 'required' were on average three times higher compared to political targets. **In the literature, average values for the level of protection recommended from "conservation assessments" were 30.6% (+/- 4.5%), from "threshold assessments" were 41.6% (+/- 7.7%), and from policy based processes 13.3% protection (+/- 2.7%).**

In B.C., the ecosystem-based management working group (the Coast Information Team) from the Great Bear Rainforest undertook a literature review on species-disturbance responses across a number of different species and ecosystems. Looking at literature in a variety of primarily forest dominated ecosystems, extirpation and rapid population decline were rare when more than 60% of a landscape was retained as habitat, and extirpation and rapid population decline both increased as habitat abundance decreased below 60% (of total habitat). All species reviewed faced extirpation or rapid decline when habitat abundance declined to 10% of total area, and about 1/3rd of the species populations were unaffected when remaining habitat exceeded 30% and about 2/3rds of the species were unaffected when remaining habitat exceeded 50%. This review by the Coast Information Team led to the recommendation and implementation that maintaining habitat at 70% of its natural range [which equates to about 60% of total habitat in coastal ecosystems] would be likely to result in a low risk outcome (high probability of maintaining ecological integrity), whereas moving to 30% of natural levels would result in a high risk (low probability of maintaining ecological integrity)(Price et al. 2003; CIT 2004a, b;).

For the boreal forest, Wells et al. (2014) concluded that managing 50% of the landbase to maintain natural patterns and processes would be required if the millions of songbirds and their populations are to maintained across the boreal forest ecosystem. Similarly, Rompré et al. 2010, reviewed available science and identify that for individual 'sensitive' species (e.g. most species with large home ranges, such as birds), the threshold of habitat needed to avoid drastic declines in populations or species loss is within the 30 – 40% range of natural habitat. In their review paper the authors make a recommendation of using >40% of habitat as a minimum amount of habitat to preserve the integrity of the forest ecosystem.

The Canadian Boreal Forest Agreement (CBFA) – an agreement between the Forestry Products Association of Canada (FPAC), and six leading environmental organizations – was signed in 2010, and

[8] See BEACONS project literature at http://www.beaconsproject.ca/home

sets a global precedent for both boreal forest conservation and forest sector competitiveness. The CBFA Science Committee is an independent committee that supports the signatories to the agreement by identifying the 'best available information' and appropriate experts and by creating science and technical decision-support. The science Committee has an independent Chair, Dr. Fiona Schmiegelow of the University of Alberta[9]. This group is supporting work in all the boreal regions of Canada, and has commissioned various science-based documents to support that work. Kim Lisgo (and others) on behalf of the CBFA Science Committee has reviewed the science of how targets are generated and they conclude that:

Evidence-based targets for protection levels:

- Are quantitative measures that inform the amount of a species' distribution, vegetation type, or other biodiversity features to be protected;
- Emerge from conservation requirements of the conservation feature based on adequate understanding and mapping of the distribution and viability of the features;
- Are biologically grounded.

Conversely, the CBFA concludes that policy-based targets – [those on the order of 12 – 20%]:

- Lack biological foundation
- Do not address representation, redundancy and resiliency
- Fail to account for persistence (i.e. they provide habitat today but don't necessarily provide it for tomorrow)
- Do not account for variability in spatial requirements amongst species and ecological process,
- Do not ensure that ecological processes are functioning adequately,
- Are inadequate to conserve a multitude of features especially in regions significant altered by humans, and
- Are viewed as a minimalist approach to conservation which could result in unanticipated declines in species numbers and an increase in endangered species to name a few.

It is clear that the level of land protection in BRFN territory (<1%) is significantly below both policy-based and far below any evidence-based recommendations. Even Canada's basic commitment to representative ecosystem protection of 17% would result in 651,500ha of protected land compared to the existing 27,300ha.

In addition, science based analyses suggest that even if a policy target of 17% was reached, this is still likely insufficient to maintain functional ecosystems, and therefore also to maintain treaty rights.

Given the level of development in BRFN territory to date, it will be difficult to find fully functional areas to function as core protection zones immediately. However, high value areas that have some development can be identified and recovered over time if development is halted in some locations and those areas allowed to recover.

Protection levels, and managing at multiple scales and risks

The most secure approach to maintaining ecological integrity is to use a 'low risk' management strategy at all scales. However, neither cultural and ecological values nor resource development opportunities are equally distributed across the landbase. It is therefore often most feasible to use a zoned approach to development and protection.

The CBFA states that where policy-targets are used (i.e. where there is insufficient levels of protection to maintain ecological integrity), the shortfalls – i.e. the gap between the target and what is needed to actually maintain ecological processes would need to be met by other processes such as ecosystem-

[9] http://cbfa-efbc.ca/

based management or deferral of development in critical habitat or cultural key areas. This speaks to the concept that was also a key part of the CIT Ecosystem-based Management approach for the Great Bear Rainforest, namely that areas that are off-limits to development (protected areas / conservancies / other 'strong' ecological protection zones) form the core of a strategy to maintain landscape functions – these areas provide a place where ecosystems are at low risk (though typically not at zero risk due to additional factors such as climate change). Outside of core areas, management of the matrix must also maintain key processes and functions for the landscape. The higher the level of 'full protection', the more flexibility there is in the matrix to push specific areas of the landscape into to a high-risk category, without jeopardising the whole (CIT 2004a). Conversely, the lower the level of core protection the lower the footprint must be on the matrix if ecological values are to be maintained over time.

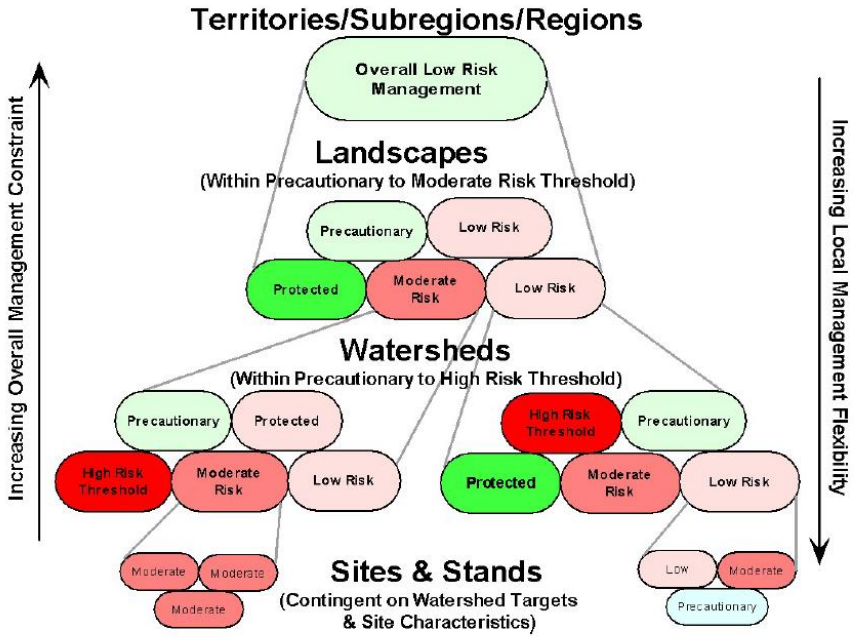


Figure 2. Risk allocation approach across scales – from the CIT EBM Handbook (CIT 2004a - Figure 2.4). Within EBM, higher risk is allowed at some areas and at some scales, but collectively low risk overall is maintained.

For coastal BC, the recent implementation (signed in Feb 2016 by First Nations and BC governments) of an ecosystem-based management strategy resulted in an increase in protection and conservancies from an original 2% at the beginning of the process to 38% in 2016[10]. In addition, to aim for a low risk management outcome, overall minimum targets of 30% of the total forest as old, in high risk zones, and 70% of the natural level of old forest are to be maintained across the rest of the region. This combination of strategies allowed forestry to continue, though at a reduced rate, and increased the probability that ecological integrity would be maintained, as the ecosystem collectively is managed to low risk. In addition, co-management (by First Nations and BC governments) also moved the collective system towards an outcome of maintaining Aboriginal rights for the First Nations on the coast.

[10] These core protection zones were put in place sequentially, with an early moratorium on harvest in key areas raising the number from 2% to around 28%, with the additional areas identified later after further analysis.

In terms of how much total protection is needed for different ecosystems and species, there is no single definitive answer. However, the data are clear that the higher the amount of strong protection, the higher the probability that ecological integrity can be maintained. In addition, the higher strong protection, the less stringent the matrix management needs to be. Protection in BRFN is considerably below either policy or evidence-based targets.

In addition, the contextual and technical issues which raise concerns about the effectiveness of key policy / management tools (Appendix 1 and 2) does not create confidence that management of the matrix is able to recognize issues or limit development in the matrix.

In addition to the pervasive impacts of industrial development within the territory, it is important to remember that today's risks include the issue of climate change – which in BRFN territory likely includes significant drying and increased fire probability, which affects the landbase irrespective of the land designation. Managing the landscape to reduce the other stresses on natural systems (e.g. maintaining natural hydrologic processes), and maintaining landscape connectivity are the most cited adaptation responses to climate change, and this will only increase the need for core protection areas, and appropriate matrix management that allows for connectivity and permeability and natural processes in the remainder of the landbase.

In Summary – for Blueberry River First Nation Territory immediate action is needed because:

a) **The current level of area protected from industrial development is far below both political or evidence-based targets known to be needed to maintain ecological integrity. It is less than 1% of the BRFN territory, and less than 1% for the surrounding ecosystem.**
b) **The level of development is already very high**
c) **The opportunity to find "core landscapes" has become increasingly limited since development started in the 1950s, and permits continue to be authorized, even though levels of protection are insufficient to maintain either ecological integrity or the meaningful practice of Treaty Rights.**
d) **There is no comprehensive process that measures and then manages cumulative effects on the landbase. The key programs in place (e.g. OGC ABA) have a series of technical and process flaws.**

This current status has guided the format and development of the Land Stewardship Framework for BRFN territory.

Section 2: Developing a Land Stewardship Framework

Effective Land Stewardship

In western resource management, land management approaches have been developed in response to a growing dis-satisfaction with the standard single value driven approach. Two of the most well-known are Ecosystem-based management (EBM) and sustainable development. Both are centered on the notion that the use of resource today should not dilute the natural capital of the ecosystem. Both also run parallel to the principles of traditional BRFN lands stewardship.

Ecosystem Based Management is defined as:

an adaptive, systematic approach to managing human activities that seeks to ensure the co-existence of healthy, fully functioning ecosystems and human communities. The intent is to maintain those spatial and temporal characteristics of ecosystems such that component species and ecological processes can be sustained and human well-being supported and improved[11].

Sustainable Use – as defined by the Convention of Biological Diversity[12] means:

the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

The BRFN Land Stewardship Framework is based on the principles of ecosystem-based management, long-term sustainable use and maintaining BRFN treaty rights which provide for the right to maintain livelihood from the lands, waters and resources, by modern means while sustaining their use for future generations[13].

There are no land use planning processes active in northeast BC today, even though protection levels are very low, development rates are high and existing land use plans are out of date.

BRFN are not the only people to identify the need for effective planning of this landscape.

The Forest Practices Board reviewed the status of land use planning in the province in 2008 and noted that most plans were out of date, even at that time, and that no updates had been undertaken even though that was the original intention of the planning process in the 1990s. Existing plans were also focused on forest management and not the extensive oil and gas development that has occurred in this part of the province. In addition, existing plans do not contemplate climate change, a significant stressor for ecological and human services from the landscape. It was noted by the FPB in 2008 that the goal of having strategic comprehensive planning for the whole province had been abandoned, but that planning would be done only when a need could be demonstrated through a 'business case' (FPB 2008).

In a report on cumulative effects management in the Kiskatinaw watershed, in BRFN territory, the FPB (2011) concluded that under current land management approaches in BC there is no requirement to assess the effects of the *"myriad of minor activities that are continually authorized on the land. The result is these remain largely unknown and unmanaged"*. Attempts to solve these problems are largely unsuccessful because there are no "*institutional mechanisms to use the results of the assessments – that is, there is no one to tell"*. In addition, values must be linked to indicators that actually reflect the values. This process must *"include the notion of limits".* The FPB concludes that methods for effective cumulative effects analysis are well documented and researched, but that there remains a need for **"a comprehensive land management framework in which those methods could be used".**

[11] Definition of EBM defined for the Great Bear Rainforest in BC (CIT 2004a).

[12] A program developed under the United Nations Environment Program arising from the Rio Earth Summit in 1992: https://www.cbd.int/intro/default.shtml

[13] R v. Marshall, [1999] 3 SCR 456 at para 78.

Similarly, the BC Auditor General (2015) stated that existing land use plans were outdated and provided insufficient direction to guide management of cumulative effects on the landscape. And in addition, thresholds were not identified to guide decision-making. The AG report states:

"Without up-to-date values, well-defined thresholds for acceptable changes, or a clear understanding of the current condition of values, decision-makers are left to make subjective interpretations about risk when deciding if, and how, development should proceed."

Blueberry River First Nation have made multiple requests for a more effective process for their territory, including requests made directly to the Premier of BC[14], in particular:

"the Province must work with Blueberry to design and implement a CEA process focused on our territory and treaty rights. We must agree on the methodology to ensure our rights, interests, and concerns are seriously and effectively addressed. This CEA process must inform all decisions relating to our territory. Key steps include:

- *collecting appropriate baseline data which assesses the legacy of past and current disturbances on Blueberry's rights and interests;*
- *developing thresholds respecting the maximum allowable levels of change to Blueberry's rights and interests;*
- *establishing rates and spatial patterns of disturbance based on development in Blueberry territory to date, and projecting those rates and patterns forward under different development scenarios to determine potential levels of effects, which can then be used to inform development decisions;*
- *prioritizing areas currently disturbed or at high risk of disturbance which require protection, reclamation and/or the implementation of better management practices; and*
- *establishing a shared governance and decision-making structure to facilitate CEA and management.*

We have reached a critical point in our relationship. Additional development in our territory, including any approvals relating to the Province's LNG plans, would threaten our way of life. Both Blueberry and the Province need to understand the cumulative effects on our treaty rights, and develop strategies to manage them, before any further decisions are made. We want you to be our partner in this work, rather than our opponent. "

BRFN Land Stewardship Goal and Principles

The overarching goal is to:

Sustain Treaty Rights, cultures, communities, and economies within the context of healthy ecosystems.

As Blueberry River First Nations set out in their Notice of Civil Claim[15]:

Upon entering in to Treaty 8 with the Crown, the ancestors of Blueberry River First Nations were promised that "the treaty would not lead to any forced interference with their mode of life" and that they would be "as free to hunt, and fish after the treaty as they would be if they never entered in to it"[16]. The Crown assured the ancestors of Blueberry that under the treaty, they must be able to "carry on

[14] Sent in a briefing note and meeting with Premier Clark in 2014
[15] March 3, 2015, Registry No. S-151727
[16] Report of the Treaty Commissioners for Treaty 8

their traditional and economic activities so as to maintain themselves productively, in good health and wellbeing, and so as not to become dependent on the Crown". However, Crown authorized industrial activities "have damaged the forests, lands, waters, fish and wildlife that are integral to the Nations' mode of life, and upon which the Nations rely. Rather than protecting the Blueberry River First Nations' mode of life, these Crown choices have contributed significantly to an impoverishment of it."

The intention of the Land Stewardship Framework is to ensure that ongoing degradation will be halted, and the condition of the landbase improved so that it can sustain the natural biological richness and ecological services provided by natural ecosystems that support treaty rights, while stimulating the social and economic health of the communities that depend on and are part of those ecosystems.

Two key Principles are to be met to reach the overarching goal:

Maintain ecological integrity —

by sustaining the biological richness and services provided by natural terrestrial processes, including the structure, function, and composition of terrestrial, and freshwater aquatic ecosystems at all scales and through time.

Maintain the integrity of treaty right practices —

The ability to practice these rights has been impacted as development has proceeded without direct recognition of this principle. Practical support means that the rights are not infringed but rather that the landscape is managed to ***maintain or restore respect for treaty rights for hunting, fishing, gathering, and access to the land and water.***

In the recent Great Bear Rainforest agreement, where two key goals were very similar to those outlined above, in addition a number of supporting or enabling principles were also used to guide development of the model. These 'enabling principles' are outlined as:

Apply the precautionary principle —

recognize uncertainty and establish and implement management objectives and targets that err on the side of caution. Use best evidence-based information, and where uncertainties arise, the onus is on the developer to demonstrate how ecological values will be maintained[17].

Undertake Collaborative Planning —

clearly articulate collaborative decision-making procedures; respecting the diverse values, traditions, and aspirations of local communities; and use best information including traditional, local, and scientific knowledge.

Distribute benefits fairly —

ensure equitable distribution of the benefits from resource development on the land.

[17] The idea for the need to alter how the onus for proof is used in conservation biology has arisen over the years. For example, in 1994, Noss wrote about how mis-interpreting a lack of evidence as assuming no impact tends to lead to ecosystem degradation. For example, in medicine in the case of a deadly disease, medical science is less concerned about false positive (saying you have the disease when you do not), rather than a false negative (saying you do not have the disease when in fact you do). In the case of ecosystem or species health we typically have focused on demanding proof that the disease exists, rather than erring on the 'caution' side and saying we'd better act as though the health is in danger. Aligning ecosystem health issues with how we approach medical health issues has been termed the precautionary principle.

Although it may be technically feasible to do planning that meets the broad goals and principles, use of these 'enabling principles' is likely to increase the chances of an effective process that results in the intended outcomes. These principles embody approaches to managing information and people based on ideas of humility and fairness. The precautionary principle is really about acknowledging what is not fully understood, and moving away from a model that puts the burden of being wrong onto the environment or particular segments of society. Collaborative planning is important because it creates a framework where different perspectives, often use similar words in different ways, can come to understanding and resolution, and is clearly relevant in a government to government process. And 'fairness' relating to the outcome is obviously an important factor affecting how and whether people are willing to come to the table, and whether they are likely to be satisfied with the outcome over time. If the objective is to reduce long-term conflict then this is clearly important.

What do the Principles mean in Practice?

Maintain Ecological Integrity

This means to:

- Maintain all species and habitat elements through space and into the future;
- Maintain natural functions and processes at all scales – these include water quality and quantity, natural disturbance rates and distribution; and
- Protect sufficient representative natural ecosystems. Where necessary, restore degraded or impacted ecosystems.

To achieve this the following approaches are well recognized in the land management literature[18].

Coarse Filter Strategy –protects representative samples of all ecosystems at multiple scales, and in size and distribution sufficient to reflect natural disturbance regimes. In practice this requires a system of protection zones that overlap critical cultural and ecological areas and are large enough to withstand and be resilient to broad scale processes such as fire and climate change. The BEACONS[19] project – a partner to the CBFA lead by Dr. F. Schmiegelow at University of Alberta and Dr. S. Cummings, U. of Laval, took a science-based approach to identifying zones for protection in boreal ecosystems. They recommend that the minimum size of core zones should be larger than the mean fire size, to provide climate and fire resilience. This approach was established as this group recognized that the typical conservation approach - small reserves in a hostile matrix – was ineffective. Large-scale planning such as this is needed if reserves are to be resilient to natural processes and climate change. It is also needed to support functional habitat that supports treaty right practices such as seasonal rounds or trap-lines that require healthy animal populations across the landscape and into the future.

Fine Filter Strategy – protects specific fine scale features (e.g. habitat elements and critical areas) not maintained by the coarse filter. This may constitute identifying both smaller 'protection' zones and specific habitat features that need to be maintained during development. Site level protection may also be needed for protecting special elements such as fine-scale areas important for maintaining larger seasonal rounds, fine-scale calving areas or special plant areas. These finer scale features may be difficult to map in advance – so precautionary measures must be in place to ensure they are identified on a local scale as development advances.

[18] A short list of key references for these concepts includes: Noss, R. and Cooperider 1994.; Landres, P.B., P. Morgan, and F.J. Swanson. 1999.; Coast Information Team 2004a; Hannah et al. 2007.; Hunter Jr., M.L. and F.K.A. Schmiegelow 2011; Strittholt, J.R. and S.J. Leroux. 2012..

[19] http://www.beaconsproject.ca/conservation

Spatially Connect these zones – identify and maintain connectivity areas that allow linkage between coarse and fine scale zones. The larger the area of protection the less connectivity matters – but in this already fragmented landscape it is likely a key value to specifically manage for.

Water constitutes an important linkage zone especially in parts of this landscape, and connectivity likely primarily revolves around riparian ecosystems, but should also contemplate movement for key species (e.g. caribou movement between core habitats or ranges). This strategy has enhanced importance in the context of climate change as maintaining connectivity is the primary tool available to us as a climate change adaptation strategy (Heller and Zavaleta 2009).

Collectively – the coarse, fine filter and connectivity strategies should maintain core ecosystems and maintain the integrity of treaty right practices. To be effective across the entire landbase, a protection strategy needs to be supported by a comprehensive management approach.

Maintain or restore the integrity of treaty right practices for hunting, fishing, gathering, and access to the land and water.

As outlined in Section 1, cultural use of the land and waters is based partly on the direct use of ecological values, so maintaining ecological integrity is a positive step towards meeting First Nation needs from the land. However, maintaining treaty rights is also more than the simple sum of individual ecological values. Protection of

- adequate areas within which to conduct all aspects of seasonal rounds in preferred locations;
- spiritual areas;
- gathering sites;
- specific trapping areas; and
- traditional use areas for berry picking and other plant gathering

are all examples of the specific needs that are directly included in the Land Stewardship Framework. Therefore, because of the nature of this boreal landscape – *primarily large areas of relatively low productivity ecosystems where native mammals occur at low densities and where ecosystems are maintained by large scale fire cycles* - large core areas are required to maintain these populations and a sustainable seasonal round. In reality, in this landscape and its condition today, support for treaty rights requires very large areas that function as core areas for species. It also means allowing a connection with nature, and also some lower density development areas closer to home where Treaty Rights can be maintained, if not in pre-contact condition, then enough to adequately allow for the maintenance of livelihoods. This likely requires additional areas with reduced intensity of industrial activity, increased protection from harvesting competition by non-indigenous people, proactive restoration and species revitalization in a tiered way outside the protected core.

Other values are more appropriately maintained across the landscape by inclusion of relevant indicators and limits or best management practices to guide and manage development.

Apply the Precautionary Principle

Getting to grips with what is known, what is not known, and what is important to know are crucial pieces of managing long-term sustainability. Identifying those pieces of information that have the ability to radically alter the outcome is crucial because it turns our attention to key uncertainties and where targets / limits and monitoring must focus.

For each key value, ‘knowledge summaries’ are a useful approach. Knowledge summaries identify the factors that affect values and indicators, and identify the ‘levers’ that affect change. The risks or

pressures from different sources can be understood as a result, and critical information gaps identified (e.g. Daust and Morgan 2014).

BRFN, in coordination with technical experts and the province (and other First Nations who want to engage), will summarize available data and hypothesize the relationships between values and disturbance. This process allows assumptions to be identified and areas of disagreement identified. It is often important to identify and to then reconcile the differences in the estimates of values and risk tolerance between those that make decisions (currently provincial) and those that hold the burden of the risks (the people and animals on the land). Typically these two groups view risk quite differently (FPB 2014).

Undertake Collaborative Planning

While the Nation is outlining its Land Stewardship Framework, BRFN recognizes the need for collaborative planning with the province and others.

However, in the immediate term, there must be a focused process to identify critical areas to be off-limits to development. This immediate action is necessary because the condition of the landbase is already highly impacted by the wide array of industrial footprints, and because development continues to proceed at a very high rate and options are being systematically reduced.

BRFN has put forward a map of critical areas proximate to important areas for various treaty right practices. These critical areas were described by BRFN as requiring immediate protection, starting with a suspension of crown authorizations pending agreement on longer term management (see below). BRFN will work with government to accept, or refine these areas based on the Principles outlined above.

A collaborative table of experts from BRFN and the Province can review proposed areas to be off-limits to development, and also develop thresholds of acceptable change as guiding posts for further development. The developing RSEA process may provide a forum for undertaking more collaborative planning in the future – however, the urgency to identify immediate protection zones in BRFN territory is paramount. The RSEA process has the potential to result in useful outputs, but is not quickly responsive - since it involves many parties – and cannot respond to the high level of concern in BRFN territory under a 'talk while continuing to develop' scenario (see Appendix 1).

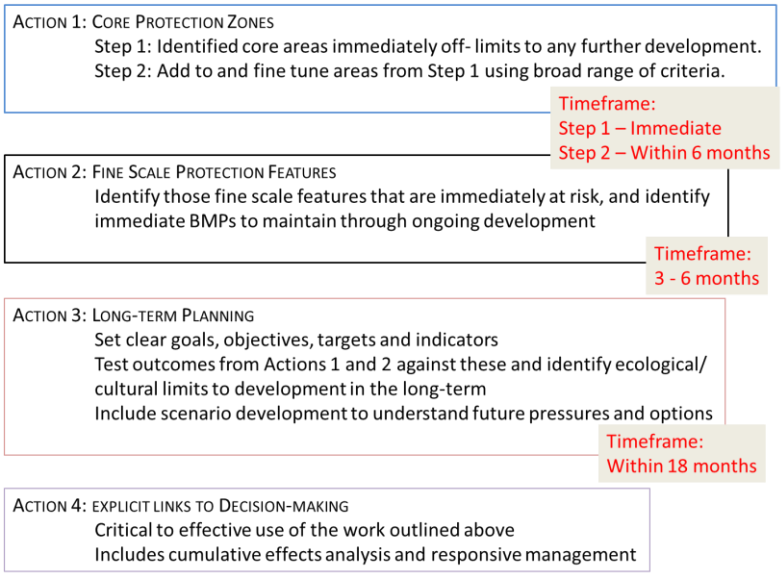
Distribute benefits fairly —

- ensure equitable distribution of the benefits from resource development on the land.

This paper focuses on land management issues, and therefore does not speak to the details of this enabling principle. However this issue has been raised by BRFN to the Province of BC.

Section 3: Implementation of the Land Stewardship Framework

A series of actions, steps and associated timelines are outlined below. Typically, Action #3 would be a first step, but as a result of the current state of the landbase, combined with ongoing development pressures, Actions #1 and #2 are recommended to create 'breathing room' so that core areas of concern can be protected in the interim, allowing opportunity for a more refined stewardship process to be undertaken.



Action #1 Identify core / critical areas for protection

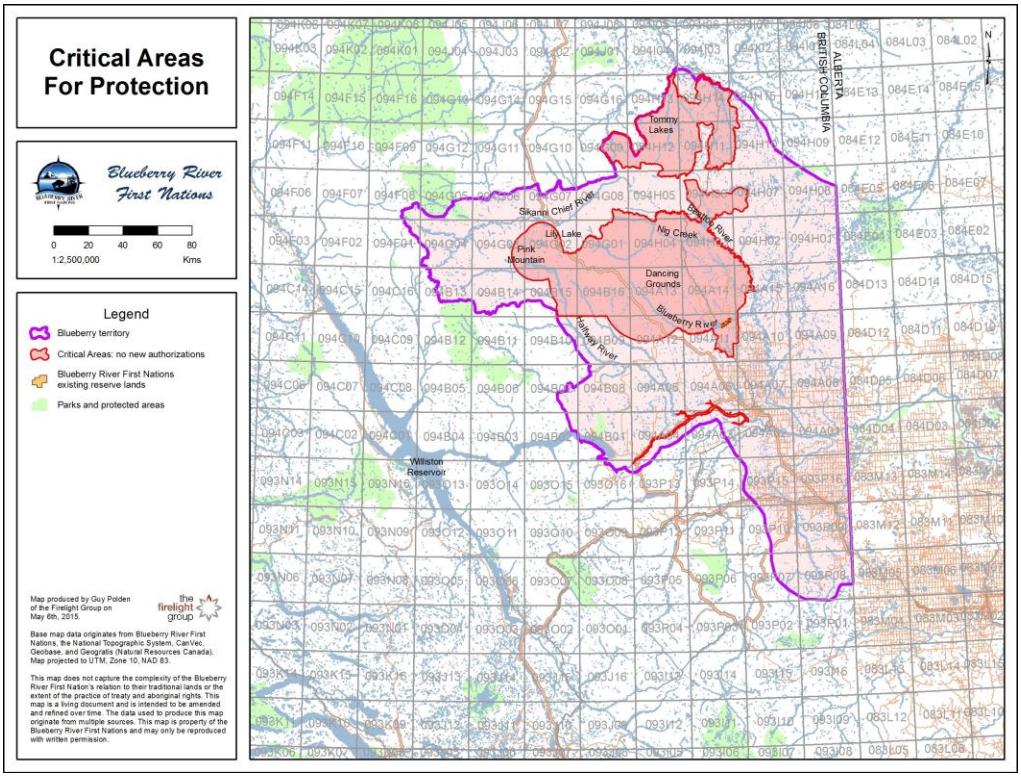
Due to the very high level of disparity between known needs for effective protection levels and current protection in the region, there is an **urgent and immediate need to set aside core areas for protection.** These immediate measures are needed to prevent further loss of opportunity to protect core / critical areas, while development continues.

HOW MUCH? At a minimum, the 17% Canada commitment to the Convention on Biological Diversity (Aichi targets – Appendix 3) would be a starting point for the amount of strict protection areas. As noted previously this is not considered by evidence-based studies to be likely to be sufficient to maintain landscape level biodiversity values. An ultimate level of area managed for protection should be in the range of 40 – 50% of the landbase (see text above). To maintain ecological integrity, the higher the footprint on the landscape, the larger the area managed for conservation needs to be. The intention is to reach 'low risk overall' for the landscape – but the exact distribution of high and lower risk areas and implementation mechanisms need to be determined (in Action #3)[20].

STEP 1: Identify core protection areas that are immediately off-limits to further development or permitting. An initial set of core areas have already been presented by BRFN to the Province. (see Figure below). **No further permits should be granted within these areas as an interim strategy to prevent further degradation of these areas while planning continues.**

STEP 2: Add to and refine areas from Step 1 based on the criteria list outlined below:

[20] In this longer term process, specific objectives and targets for cultural and ecological attributes are needed (Leroux and Strittholt 2014). Details of broader target setting is part of the proposed collaborative planning process outlined under Action #3.



The types of areas to be identified as part of Step 2 include:

- Additional Core cultural areas – identify those core areas with highest density of cultural practices and sensitive cultural features that are incompatible with industrial development.[21] Due to the current landscape condition, they may or may not be developed already; where they are already heavily impacted, alternative actions, which may include more or less protection, would be considered on a case-by-case basis. Much of this work can use existing TLU data, but on-the-ground verification and community verification exercises may both be necessary.
    - Identify appropriate buffers for these areas.
    - Identify potential restoration needs for these areas.
- Core ecological areas – investigate whether any possible 'benchmark' areas exist that may form the core of a large protection zone.[22] Note that it is possible that no areas suitable to classify as 'benchmark' areas remain on this landscape due to the high level of existing disturbance. If this is the case then smaller or lower quality areas could be identified. [23]
- Investigate smaller 'intact' areas or lower density of development areas to form core protection zones.

[21] It is critical not to conflate intensity of use with cultural value in every instance. Some areas may be highly valuable and subject to cultural taboos NOT to use them or only to use them in very special and tradition bound ways – A. MacDonald Pers.Comm. (Firelight).

[22] These are whole watersheds larger than the mean dynamic fire size for the ecosystem. Benchmark areas have been identified through the CBFA BEACONS project using a peer reviewed scientific approach and are intended to be large enough to be resilient to climate change and natural disturbance processes.

[23] The lack of a benchmark would be one indicator of the level of 'lost opportunity' that has occurred as a result of development to date.

- Identify intact areas based on recent analysis (Ecotrust et al. 2016), or Global Forest Watch intact areas mapping, or watershed areas with the highest percent of unroaded development for this landscape.[24]
- Identify larger areas of old growth.
- Identify core areas for the protection of the following species using ecological and TUS data:
    - Caribou
    - Moose
    - Grizzly Bear
    - Other species of concern
    - Wetlands
    - Other ecosystems of concern
- Identify core 'connectivity' areas – e.g. river / wetland systems or other areas that may be important for aboriginal / treaty rights or animal movement.
- Identify areas that may provide resilience to climate change – the large 'benchmark' areas are one approach to managing for resilience, but other finer scale features can also be included. Examples include potential climate refugia (areas expected to remain in similar ecosystems with climate projections), areas that may be important for movement with climate change (low passes in mountain ranges), riparian corridors, areas where movement across gradients of temperature can occur etc.
- And because of the existing level of development, identify areas with development but with the potential to be managed for or restored for high values, and to buffer existing core areas above.

Check efficiency of areas identified:

Test against Representation of fine-scale ecosystems:

- Use the areas identified above to 'tally' ecosystem representation, and identify any 'gaps' in ecosystem protection that need filling.
- Look at representation by ecoprovince (Boreal plains), ecoregions, watersheds and ecosystem units within these. [25]
- Look for overlap of values, and potentially identify high value and lower value watersheds to provide a framework for a zoning approach.

Look for areas of highest overlap of values to create best optimum scenario. (Optimization programs such as Marxan can be used to identify optimal areas - best gain for area included, but likely this more complex analysis would be completed under Action #3).

Action #2: Identify 'finer scale' protection features

As with Action #1 it is also necessary to immediately identify fine-scale features that should be maintained in the short-term to be protected during any ongoing development.

- Identify critical fine scale values that are incompatible with development. These would include both cultural values and ecological values.

[24] The size of potential intact areas can be informed by science guidance of what is a suitable size (e.g. BEACONS mean fire sizes, FSC and GFW definitions), however, in this impacted landscape these naturally large undisturbed areas are rare, if they exist at all. Intact areas as part of the suite of protection areas should be collectively representative of the landscape as a whole. Given current landscape condition, a practical solution of looking for existing intact areas, and then building in additional impacted areas to promote recovery of large areas over time can be used.

[25] Ecoprovinces and ecoregions are part of the hierarchical suite of ecologically based units that can guide representation of protected areas. In addition, watersheds (within ecoregions) and lower level ecosystem units (e.g. BEC site series) should also be used to ensure that overall protection is representation of the whole. I.e. that some of all the pieces are maintained, not just a subset of ecosystems.

    - Examples include smaller cultural sites, mineral licks, old forest, sensitive wetland or other riparian features, high productivity areas etc.
- Identify what information exists about these values today.
- Identify what type of BMPs are required to maintain these fine-scale features
    - Do they require full protection?
    - Can they be maintained by BMPs? (e.g. leave x% intact, or further than x km from a road etc.).
- Where fine-scale features are not mapped, identify how / where to fill the data gap, and how they should be maintained in the field.

Actions 1 and 2 result in a series of PROTECTION AREAS and MEASURES. Known high value areas can be protected from further development and impact immediately, and additional areas to make up the total interim target identified as soon as possible (as soon as possible, and within 6 months). This immediate action is critical to ensure that further degradation of core value areas is prevented while more detailed planning occurs.

Implementation Mechanisms

Before planning is fully complete, areas and features identified under Actions #1 and #2 can be set aside from further development in the short-term using an Interim Measures Agreement.

In the longer term, there are many types of zones and zoning, which vary with respect to the degree of development allowed. The most 'protected' from development are typically Protected Areas, and in the Great Bear Rainforest new designations were identified to restrict specific types of development (in that case the most prevalent was forest management), while specifically allowing for continued First Nation cultural uses of an area. These 'conservancies' are likely most relevant in this situation, but obviously the mechanism must prevent all industrial activity (not just those regulated by certain ministries) in the core reserve zones[26].

Beyond full protection there are a number of other designations that can be given to an area – Wildlife Habitat Areas, Old Growth Management Areas, Ungulate Winter Range, designation under GAR, Resource Review Areas etc. These have been identified in Appendix 1 and 2. These measures have varying relevance to / influence on different agencies – for example old growth management areas are to be maintained by forest management but can be developed for a well site by an oil or gas developer. This is clearly problematic as has been identified by others (e.g. FPB 2011; Auditor General 2015). However, mechanisms do exist to prevent this from happening – for example, OGMAs can be identified under the Oil and Gas Activities Act, and regulations changed so that these areas should not be permitted for development[27]. Similarly, in the north of the BRFN territory, a primary land use designation is under the Boreal Caribou Implementation Plan – which has been shown to have some significant gaps for maintaining caribou habitat. For example, issues such as the lack of the OGC not finding any 'material adverse effects' need to be resolved to ensure effective protection if existing mechanisms are to be embraced by the Land Stewardship Framework. Whichever mechanisms are used, it is important that the values that are intended to be maintained are actually maintained over time. Effectiveness monitoring is an important part of this work in the longer term.

[26] Core reserves are those on known highest value areas, and around which additional protection strategies are built.
[27] Although some small efforts to consolidate regulations have occurred, the effectiveness remains questionable. For example, OGMAs have been identified in the OGAA (in a limited area in the lower Peace), however the spatial OGMAs themselves can still be roaded and developed for activity by oil and gas.

Action #3: Long-term Planning for key values in the matrix

In order to know where the Land and Water Stewardship Framework is aiming to take us, and whether we are on the right path and likely to achieve our goal, it is necessary to articulate as clearly as possible the specifics of where we want to go, how we are going to get there, and how we will know if we've achieved the goals or not. **Setting clear goals, objectives, requirements, targets and indicators is a key part of this process.** This process leads ultimately to a set of management goals that will identify ecological limits beyond which development should not proceed.

In an undeveloped landbase this would be step 1 in a planning process. However, due to current condition and the very high levels of disturbance that have occurred to date, this is part of a longer plan that can be used to test whether the outcomes above are sufficient to maintain values into the future.

Identify Key Indicators

Example indicators for ecological values:

- Area (%) of intact ecosystems (terrestrial/ wetland / riparian)
- Area (%) of intact old forest
- Area (%) of intact core habitat for identified species of concern
- Number of stream crossings by medium sized watershed
- Invasive species levels and spread
- Area (%) of connectivity zones that are intact / permeable (includes natural connectivity areas and areas identified for climate corridors)
- Volume of water withdrawal from individual stream/ lake systems, and for watersheds

Example Indicators relating to Treaty Rights:

Relating to the land directly:

- Area of land suitable for cultural hunting, trapping and fishing
- Number of core patches [>X ha] free of linear disturbance
- Percent of access trails that are free from disturbance (with buffers)
- Quiet space available in key watersheds (e.g. areas >5km from a road or other disturbance).
- Populations / area of food plants in key watersheds
- Amount of Non-native hunting in key watersheds
- Access (allowed and managed)
- Populations of food wildlife in key (preferred) watersheds (moose / fur-bearers/ others?)
- Observed population health of harvested species
- Invasive species levels and spread
- Degree of sensory disturbance from natural background conditions (smell, taste, noise, vibration, textures (on plants, visual aesthetics)

Examples: Effectiveness monitoring type cultural indicators:

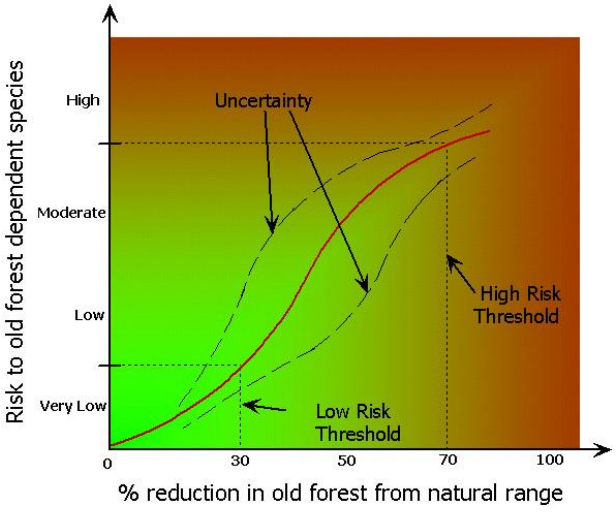
- Catch per unit effort for fish
- Willingness to harvest preferred species (perceived risk of contamination)
- Proportion of protein from country foods
- Return on effort (the level of effort required to harvest foods, compared to a benchmark, and linked to distance and time required to harvest country foods)
- Reported ability to transfer/attain traditional knowledge
- # of areas and # of people attending gatherings

- Willingness to drink water directly from the land
- Reported sense of safety and security on the land
- Knowledge levels of country food types, locations, harvesting techniques and uses
- Visual navigability of landscape (ability to get around based on landmarks)
- Knowledge of place names and stories connected to place names
- Levels of sharing among community members
- Ability to be involved in stewardship decisions and implementation/monitoring

Develop Knowledge Summaries, Risk analyses and Limits for key indicators

For each key indicator, identify the factors that influence the indicator, and summarize known information on what is needed to maintain the value in the landscape.

The goal is to create a series of simple figures like the one that addresses old growth below. These hypotheses can then be tested in the cumulative effects framework piece.



Old Growth is an example that has been used elsewhere: based on literature (CIT 2004a,b), the diagram (left) guided development of goals and targets for different old forest ecosystems. Ecosystems where ecological or Traditional Ecological Knowledge suggested alternative targets were necessary was used to modify the basic risk curve (e.g. red and blue listed ecosystems had higher targets).

In these landscapes, the natural amount of old forest to occur in each ecosystem can be estimatedcreating high and low risk 'targets' based on 30% total and 70% of the natural amount of old forest.

This process is critical because assumptions can be questioned to determine whether these limits are likely to change in these ecosystems, and whether there are other factors that need to be considered. Pressure diagrams help to elucidate these outcomes.

For example, in an exercise to identify how much 'quiet space' is required in key watersheds to maintain treaty rights a starting hypothesis (e.g. the figure below) can be used to understand how areas are viewed by different parties based on their knowledge, values and risks borne.

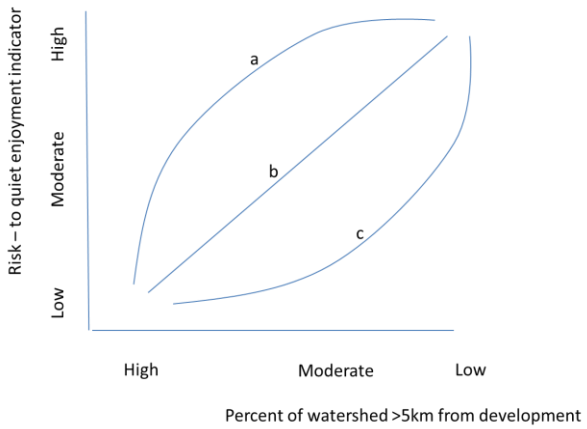


Figure 2. Hypothetical relationship between the amount of 'undisturbed area' in each watershed (or amount of area >5km from an industrial development) to result in a 'peaceful existence' indicator needed to practice Treaty Rights. Testing how the shape of the curve interacts with different distances (e.g. a, b, c) can shed light on the important variables needed on the landscape.

In this process, for each indicator,

- Identify the stressors for that indicator, and the known or hypothesized relationship with disturbance of different types
- Identify the buffers required to maintain ecological and treaty right values for example on roads, on riparian systems / wetlands, mineral licks, particular forest types, particular fine-scale ecosystem complexes (e.g. calving areas).
- Identify precautionary limits beyond which disturbance is not permitted.
- Identify areas where restoration is necessary as a result of exceeding limits today.

Action #4: Explicit links to decision-making.

In order to have an effective science-based decision-making framework, outcomes from the steps above should be directly tied into an explicit decision-making process. Social and economic trade-offs are always part of political decision-makingbut a process that ties the outcomes from Action #3 to an explicit process is an important piece of a transparent process that identifies how goals are met, and how risks and benefits are distributed and shared

Effectiveness Monitoring and Responsive Management Decisions

Monitoring and adaptive management are important in any management framework. The details of what is needed here will be determined by how the framework is implemented, and by knowledge gaps identified. Effectiveness monitoring – based on cumulative effects assessments – should be undertaken for the landscape and key values, and this information should tie back into decision-making that seeks to maintain the main Goal and Principles of this Stewardship Framework. Cumulative effects assessment and management do not monitor policies, but examine outcomes against natural and historic baselines to understand absolute, not relative risks.

Action #3 will provide the framework for understanding where critical areas for monitoring, new data and plan revision are needed.

Section 4: Moving Forward

What differentiates this Land Stewardship Framework from what exists now?

The province of BC claims to be managing sustainably, and striking the right 'balance' with respect to maintaining ecological integrity and treaty rights, with development levels.

A key difference between existing government policy and this Land Stewardship Framework lies in the degree or probability to which ecological integrity and treaty rights are maintained. The Nation aims to manage for the long-term and expects that the landscape available for these future generations will provide **the same level of environmental resources** as it has done historically. This concept is central to maintaining treaty rights as outlined throughout this document, and seems currently to be at odds with the current condition and rapid pace of development seen throughout BRFN territory.

POLITICAL STRATEGIES OF RECOVERY OFTEN ACCEPT THE NOTION OF DECLINE.

THE BOREAL CARIBOU IMPLEMENTATION PLAN (MOE 2011) AND ANALYSIS OF IMPLEMENTATION PLANS (TABLE 1 IN CICHOWSKI ET AL. 2012) FOR EXAMPLE, EXPLICITLY STATES AN EXPECTATION THAT THE BCIP IMPLEMENTATION THROUGH RRAS IS EXPECTED TO RESULT IN A DECLINE FROM ~1500 TO ~500 ANIMALS WITHIN 50 YEARS. UNFORTUNATELY, WE FIND OURSELVES TODAY WITH A CURRENT ESTIMATE OF ~700 ANIMALS SUGGESTING THAT THE DECLINE HAS OCCURRED MUCH MORE RAPIDLY THAN EXPECTED.

Delivery Mechanisms

Currently, there are no land use planning processes active in the northeast of BC. BRFN makes the strong case here that a lack of up to date and relevant planning is exacerbating the effects of rapid and extensive resource development in its territory. A comprehensive land use planning exercise is the ideal solution, and was the original intention of land use planning as initiated in the 1990s.

BRFN has provided a critical areas map. No further permits for development should be granted within these areas. Existing permits should be moved or put on hold to prevent additional degradation of these lands while further planning is taking place. Key areas for restoration will be identified along with specific actions and timeframes for doing so.

As outlined in the Land Stewardship Framework above, once interim protection measures are in place, BRFN envisions a collaborative planning process that uses best available science and traditional ecological knowledge to identify indicators to guide what is needed on the landscape to maintain treaty rights and ecological values into the future.

This work should ultimately tie into an effective joint decision-making process.

Recommendations for additional work:

In order for a cohesive long-term vision of increased human wellbeing to be realized, BRFN (and others) also need long-term economic planning that:

- ensures that economic development does not exceed the ecosystem's capacity for resilience.
- Uses scenarios to plan and test out long-term development and its implications.
- Promotes industries that do not add to global climate change. Global pressure will move in this direction in the short-term and getting ahead of this curve is needed for community well-being.
- Ensures that benefits are equitably shared.
- Uses models of co-management that ensures that values are aligned and that one set of values does not trump another in setting objectives and targets.

- Develops long term sustainable industries to provide jobs for the community, but that do not compromise ecological integrity or promote climate change,.
- Explores alternate approaches to economy – for example, carbon financing to off-set protected areas and alternative conservation financing.
- Examines opportunities for alternative 'internet-based' industries – rather than resource extraction based industries.

Each of these enabling policies should be the subject of additional planning, but which are out of scope of this Land Management Framework.

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Wells, J., D. Childs, F. Reid, K. Smith, M. Darveau, and V. Courtois. 2014. Boreal Birds Need Half: Maintaining North America's Bird Nursery and Why it Matters. Boreal Songbird Initiative, Seattle, Washington, Ducks Unlimited Inc., Memphis, Tennessee, and Ducks Unlimited Canada, Stonewall, Manitoba.

Appendix 1: Status of Environmental Management relevant to NE BC.

Contents

Existing Stewardship & Cumulative Effects Approaches

Blueberry River First Nation territory has seen extensive industrial development, including agricultural land conversion, forestry, oil and gas development, damming of major rivers and spreading of rural populations and ranches (Main Report; Appendix 2; Ecotrust 2016). The Nation has concerns about the programs in place that are intended to manage the impacts of industrial development on the ecology of the Northeast B.C. region and BRFN treaty rights. This document reviews the programs in light of their ability to contribute towards a meaningful stewardship framework for land management decisions in northeast B.C.

Assessing Stewardship

Noble (2015) states:

"Cumulative effects assessment is broadly understood to be the process of systematically assessing impacts resulting from incremental, accumulating, and interacting stressors over space and time (Noble 2010, Squires et al. 2010). It refers to the process of analyzing and assessing cumulative environmental change (Spaling and Smit 1993) – that is, identifying environmental effects, and pathways that lead to those effects, in order to avoid, wherever possible, the potential triggers and stressors that lead to cumulative effects. "

In this light, the goal of environmental assessment is to assess the extent to which the health and functioning of ecological systems is being maintained. Environmental assessment provides information about risks to environmental and associated values such as treaty rights[28], that can then be evaluated in light of analysis for other values (e.g. economic analysis, or community development analysis). Society and governments will make trade-offs between values, but cumulative effects assessment procedures have been developed to provide explicit information about the risks to environmental conditions, so that **informed** trade-offs can be made.

A federal review panel has created the following definitions:[29]:

Cumulative effect is a change in the environment caused by multiple interactions among human activities and natural processes that accumulate across space and time.

Cumulative effects assessment is a systematic process of identifying, analyzing, and evaluating cumulative effects.

Cumulative effects management is the identification and implementation of measures to control, minimize or prevent the adverse consequences of cumulative effects.

The B.C. Approach

Traditionally in B.C., land management and resource development has occurred within ministerial 'silos' focused on individual resource development rather than on a comprehensive framework aimed at maintaining specific values through time. The B.C. government approach has treated individual projects and development procedures as though they act in isolation. This piecemeal approach has been roundly criticised for being ineffective at understanding and appropriately managing the potential adverse impacts associated with development and for failing to be able to effectively inform stewardship decisions (Duinker and Greig 2006; FPB 2011; BC Auditor General 2015).

Addressing cumulative effects is identified as a central element of effective resource decision-making (e.g. AG 2015; MFLNRO[30]), yet only a single statute – the Environmental Assessment Act (EAA) – actually

[28] In order to be assessed directly treaty rights need to be evaluated on their own account.
[29] www.ccme.ca/files/Resources/enviro_assessment/CE%20Definitions%20and%20Principles%201.0%20EN.pdf
[30] http://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/cumulative-effects-framework

requires that cumulative effects are assessed (Auditor General 2015). However, the EAA does not apply to the vast majority of land management decisions in B.C. (see discussion below about the definition of major projects). This leaves most of the land and water in B.C. being managed in a piecemeal fashion by multiple agencies, with multiple industries and to varying standards.

After a number of years where scientific reviews and various agencies have pointed out these problems (FPB 2011; AG 2015), this piecemeal approach remains in place today. And although the B.C. government has been evaluating different approaches to cumulative effects assessment and management, there are still no policies that explicitly require assessment prior to most operational decisions that collectively affect the water, land, and other natural resources in B.C.

A Review of existing Stewardship Programs

This appendix examines provincial programs in relation to their contribution to a land stewardship framework in NE B.C. Key concerns are outlined below.

Major Project Context

The Environmental Assessment Process is complex, and all elements of it are not reviewed here. However, there is a key concern related to the definition of the types of projects that are reviewed under the environmental assessment legislation.

The current practice within the EAO allows 'project splitting' – breaking what is really one large linked project down into smaller parts subject to separate assessment, or subject to no assessment at all. If cumulative effects assessment were done in a manner recommended by practitioners (e.g. Noble 2015) this would not matter because all 'likely foreseeable future projects' would be assessed within the scope of individual EA assessments for individual projects. However, because this is not typically done (or done thoroughly), project splitting results in large complex decisions with huge implications (such as development of LNG in BC) being assessed in a piecemeal fashion. The thresholds for a 'reviewable project' are often arbitrary and there is no assessment of the deeper context or related projects. For areas upstream of LNG development, for example, many small decisions are often not assessed at all – and yet they relate to the whole LNG project development process. Decisions on LNG plants, or pipelines, for example, have the potential for massive ramifications to landscape condition in the upstream, but these effects are not recognized or considered.

To provide a more effective tool, and in the context of the potential massive scale of gas development, environmental assessment must consider projects 'from shale to ship' – i.e. as an integrated 'project' that assesses the many smaller 'projects' that occur in the gas extraction end of the stream. Canada's current federal system limits this type of integrated assessment to upstream greenhouse gas (GHG) calculations; and while important, this is nowhere near adequate to capture the full scope of impacts of the natural gas sector on all ecological values and treaty rights.

FINDINGS: The EAO procedures relating to 'major projects' only deal with a small fraction of land management decisions – the vast majority of small decision are not evaluated, even though they may be linked and may have large cumulative impacts. In addition, many 'major projects' are assessed independently from one another, and many potentially impactful projects (mid-sized) do not pass the arbitrary thresholds and are not evaluated.

BC Stewardship Approaches

Outside the EAO procedures, a number of different programs exist that are part of land management in B.C. Table 1 outlines the variety of government processes that are in place in NE BC, identifying the initiative and lead agency. The number and piecemeal nature of the tools and agencies provides a

complex environment in which to understand whether an effective job is being done. There is no overseeing group or linking strategy amongst programs, ministries and industry making it very difficult to achieve a consistent and transparent assessment tool or management response. This raises an immediate concern as the subject of stewardship decision-making itself is hard to grapple with as it is difficult to even understand which program applies where and under whose mandate or responsibility.

Table 1. Programs and the lead agency relating to Stewardship in NE B.C (provided by BC Govt).

CE Assessment Initiative	**Key Lead**
Provincial CE Framework	Jen Psyllakis, FLNR
LNG Environmental Stewardship Initiative (ESI) (RSEA Project).	Justin Calof, FLNR
Federal Review of Cumulative Effects Assessment & Management	Sara Howard, MOE
CE Management Initiative	**Lead**
OGC Area Based Analysis (ABA)	Sean Curry, OGC
Peace Northern Caribou Plan	Rhonda Cage, FLNR
Boreal Caribou Implementation Plan	Chris Pasztor, FLNR
Northeast Moose Management Plan	James Cuell, FLNR
Old Growth Management Areas (OGMAs) Working Group	Steve Gordon, FLNR
Northeast Water Strategy (NEWS)	Kristy Ciruna, FLNR

Evaluating the Programs

This review examines each of the programs outlined in Table 1 and asks whether it has components that may lead to effective stewardship decisions. The evaluation is based on the types of criteria identified in the general literature on cumulative effects management (e.g. FPB 2011; Daust, Price and Morgan 2013; IFC 2013; Auditor General 2015). The primary active initiative in Blueberry River Territory is the OGC Area-based Analysis (ABA), and a more detailed technical review of the ABA is provided in Appendix 2.

The results are broken down into two broad categories: 1) those elements that relate to the Context of the programs, and 2) issues relating to the Content of the individual programs. These are separated below.

Context Analysis

To be effective, the whole suite of assessment and management programs need to be situated in a management framework which provides the following:

Clear context on landscape values, within which to make decisions.

Core values must be protected across the landscape in advance of individual permitting. Values that are incompatible with development, or required to maintain basic ecological functioning must be unavailable for resource development and must include both ecological and cultural values relating to treaty rights. This is typically a key outcome of land use planning.

FINDINGS: A key conclusion from the B.C. Auditor General report (2015) is the lack of government objectives that reflect up to date landscape level direction for the province. The Auditor General concluded:

"From a selection of land use plans and related material … we concluded that government has not provided decision-makers with information they need to manage cumulative effects. Although values have been established … these values are potentially dated or incomplete."

The Forest Practices Board came to a similar conclusion about the lack of up to date and relevant land use planning information that provides a clear articulation of strategic direction for the land (FPB 2011).

Land use plans for the Northeast of B.C. are 20 years old and were created before the scope and scale of shale gas development or the potential for LNG had been understood, and before the implications of climate change were imagined. Less than 1% of the Boreal Plains ecoprovince is in protected areas. This is significantly lower than any policy or evidence-based thresholds (see main report), and the vast majority of watersheds have no full protection at all.

Clear Lines of Responsibility

In order to be effective and transparent, information must flow to a clear decision-maker (or group of integrated decision-makers) who is responsible for landscape condition, not individual permits. Without this clear line of responsibility the tragedy of the resource development commons may often occur.

FINDINGS: For all the programs listed in Table 2 below, including the ABA, there is no explicit framework that identifies the decision-maker who has ultimate responsibility for maintaining **values** into the future. For example, if a "trigger" is exceeded within the ABA process, the onus is on industry to avoid, minimize, reduce impacts but without clear direction on what constitutes 'too much impact'.

This issue of having 'no-one to tell' is identified by the FPB (2011) and the AG (2015) as a significant flaw in provincial approaches to cumulative effects assessment and management.

Programs such as the Boreal Caribou Implementation Plan are also unclear in terms of management responsibility. Expertise, background material and analysis are available from MoE, but the program is managed under FLNRO. However, in BRFN territory the major impacts to caribou come from a combination of natural gas development managed by the OGC permitting process, forest management, land conversion and general disturbance. The caribou recovery program is intended to meet federal requirements but there is no federal jurisdiction on provincial crown land. Therefore, who has overall responsibility for the recovery of boreal caribou is unclear.

The Auditor General (2015) concluded that BC legislation remains piecemeal, and that no coordinated mandate to manage cumulative impacts across sectors exists. FLNRO has developed a Cumulative Effects Framework, expected to be rolled out by 2016. The OGC uses an Area-based Analysis framework. All agencies continue to talk about the ongoing collaboration between individual groups. However, it remains the case that attempts to develop a 'one land manager' approach have not been successful because the Ministry of Energy and Mines and the Ministry Natural Gas Development (which is responsible for the OGC) were not subsumed into the single agency, and attempts to unify stewardship policy across agencies remains piecemeal.

Clear decision-making framework that is responsive to information on cumulative impacts

Decisions should flow from information.

FINDINGS: There appear to be no policies that direct a clear and transparent decision-making process within the programs listed. The policy to guide how decisions are made should be clear and transparent. ABA material says "Using ABA, a Commission SDM [Statutory Decision-Maker] can assess the impact of proposed oil and gas activities on ecological, cultural and social values[31] in the context of all other development activities". However, there is no transparent or available policy that explains how this is to be done.

This issue is linked to the lack of a responsible individual across the collective ministries, but even within individual ministries there is a lack of a clear decision-making framework even within individual

[31] Though note that only two indicators are currently being assessed, so there are no cultural or social values indicators generating information.

programs. Cumulative effects assessment and management has been called for by many in response to the piecemeal development of regulations and policies relating to different industries on the same landbase, with the concern being that this piecemeal approach does not clearly assess the cumulative risks to the environment. Yet, the MFLNRO cumulative effects framework (CEF) approach recently laid out is explicit that the CEF will "*support existing regulations and policies"*, and will provide only "*general expectations and guidance"* as a result of cumulative effects analysis, and that the analysis will provide '*flexibility through guidance*'.[32] There does not appear to be any direction that requires change in regulations/ policy / actions to prevent significant ecological impacts from being realized.

Content Concerns

In addition to the broader contextual requirements outlined above, technical rigour is needed to result in an effective assessment program. As the FPB concludes – there is sufficient information on how to 'do' cumulative effects analysis, so there should be no technical barriers to effective assessments, yet the details of some B.C. programs raise significant concerns about methodology.

To be effective the programs need:

Indicators that relate to the values and are analyzed at appropriate scales.

A suite of indicators that reflect key or sensitive values are needed. The concept of SMART indicators or those that reflect the Bellagio Principles[33] is well articulated in the literature. Indicators must be implemented at appropriate scales, using appropriate definitions and benchmarks against which they are tested.

FINDINGS: The ABA is the primary assessment procedure currently used in the Northeast of B.C.. Detailed technical review (Appendix 2) raises a number of significant concerns with respect to its use of indicators. Key issues include a) only using 2 of 9 stated indicators are currently being used in the process,so it cannot be comprehensive; b) no indicators reflect Treaty Rights; c) indicators do not measure what they purport to measure (e.g. the riparian indicator), d) the analysis uses triggers / targets at inappropriate scales (e.g. old forest). e) There are no management responses that recognize ecological limits. These issues are outlined in more detail in Appendix 2.

Collectively this list of concerns leads to the conclusion that the existing ABA process is not technically robust. It therefore cannot lead to an adequate representation of the condition of the landbase, nor can management have a meaningful responses. Although some of the other programs listed by the province may develop some good indicators, these programs are not yet part of any stewardship program because they are under development today and they lack a direct link to decision-making and responsibility (see Table 3).

The values being assessed must include Treaty Rights

In order for effects on treaty rights to be evaluated, indicators that reflect these values must be included.

FINDINGS: None of the programs outlined, with the exception of the LSI RSEA have indicators that deal directly with treaty rights. This includes the ABA process even though it specifically states that it will manage impacts to treaty rights (Appendix 2). The RSEA process is embarking on work to develop indicators relating to treaty rights; however it is currently in the very early stages of development and

[32] http://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/cumulative-effects-framework for Assessment, Management and Procedures policies.

[33] These principles were developed as an approach to measuring sustainable development after the first Rio Earth Summit in 1992. They have been revised in 2009 and are now termed the Bellagio STAMP. http://disciplinas.stoa.usp.br/pluginfile.php/106018/mod_resource/content/1/texto_3.pdf

far from implementation. In addition, indicators that reflect treaty rights directly must be developed in a territory and Nation specific context and this does not appear to be the case within the RSEA framework.

Thresholds and Limits

The concept of ecological thresholds or natural limits is identified in the literature (Noble 2015), and is a key to understanding the implications of management actions on terrestrial and aquatic ecosystems. Terminology varies, but it is clear that moving elements of ecosystems away from 'natural' conditions increases risks, and there are thresholds or limits where risks increase to a point where they have significant ecological consequences.

Acknowledging, understanding and respecting ecological limits is a central element of ecosystem-based management or *sustainable* development.

FINDINGS: B.C.'s current approach to management does not acknowledge the presence of ecological limits, or the notion that there is a level of impact that cannot be crossed or that cannot be mitigated. This is apparent at both landscape and local scales in Northeast BC. At the landscape scale, the lack of regional protection has resulted in development being allowed to be pervasive over the whole landscape – this lack of planning has ignored the known science that this will have significant ecological consequences.

At a more local scale, within the ABA for example, there are no actual limits to the amount of disturbance that is permitted. The management triggers, if crossed, appear to require only procedural changes (e.g. reports), not actions to prevent the breach of a threshold.

This approach is not consistent with the basic principles and discoveries of the science of ecology. Where ecological limits are known, they must be respected. Where such limits are not known, precautionary management limits should be implemented and monitoring of consequences undertaken.

The B.C. Auditor General states:

"The current condition of most values is also unknown, and few thresholds are in place. These gaps in information make it difficult for decision-makers to interpret risk and make informed decisions about development proposals".

The AG identifies a need to assess 'risks' and determine choices based on clear information about those risks. In general, the programs used by the Province of B.C. do not identify or acknowledge risks or ecological limits.

Assess impacts against ecological and cultural benchmarks, not against policy

In order to avoid the issue of the shifting baseline (Pauly 1995), a historic baseline must be used to measure change. Without this, each generation continually reanalyzes its concept of ecological or population condition based on only the experience of that generation.

The fundamental call for cumulative effects assessment stemmed from an identified need to understand the condition of the landbase in relation to risks to all aspects of its ecology (genes, species, ecosystems, processes). As a result, cumulative effects assessment is intended to understand the condition of the landbase in relation to natural baselines. Existing policy decisions do not provide a useful baseline against which to understand actual risks to ecological systems because they already incorporate some level of 'social choice' (e.g. ensuring that Wildlife Habitat Areas (WHAs) are maintained within 1% of provincial AAC, rather than assessing how many WHAs are needed to meet their stated goal).

FINDINGS: None of the programs identified by the province clearly articulate an ecologically grounded baseline. For example, the ABA measures against policy targets and therefore fails to meet a central test of a cumulative effects analysis. It is therefore better described as an implementation-monitoring

program rather than an effectiveness monitoring or cumulative effects program. The FLNRO cumulative effects program uses a natural range of variation as its target, but only for some indicators and this work remains under development with only some reports being released to the public. The Boreal Caribou Implementation Plan simply states that no historic information on caribou populations is available. MoE (2010) has noted the need for traditional ecological knowledge studies to fill this gap, but none have yet been undertaken[34].

Analysis Contemplating the Future

Future scenarios are needed to assess likely trends, so management can respond before critical limits are reached. This applies to forecasting both the future development potential /pressures, and understanding how this may affect future ecological health[35].

FINDINGS: None of the programs identified, with the possible exception of the BCIP, currently make decisions based on future scenarios. The ABA in particular therefore continues to assess effects and mitigation on a 'project by project' or at least year by year basis. The BCIP did project out the implications of its strategy, resulting in estimates of a reduction in total boreal caribou to 1/3rd of its current number (from 1512 to 531 animals over 50 years), and with likely extirpation of two of six ranges. No additional decisions were made to offset this reduction in order to actually recover caribou based on these scenarios. The draft Cumulative Effects Framework policy suggests that future scenarios will be used but to date a methodology and implementation of these is undeveloped and therefore unknown. As stated above, we have concerns that the framework says the work will be used to support existing policies, so the link back to real decision-making is very unclear.

Adequate understanding of the effects of disturbance

In any analysis of cumulative effects, it is important to understand the functional impacts of key disturbance agents. For example, the impacts of roads and other linear corridors have been well documented in the literature as having both direct and indirect effects on ecological values (Main Text; Daigle 2010 for B.C. context[36]). For an effective assessment tool, these effects must be adequately quantified and included in assessment work.

FINDINGS: As the key tool assessing stewardship in the Northeast, the ABA generates a 'disturbance layer' from the data on activities on the land. No 'buffers' or 'zones of influence' are applied to this layer, which assumes therefore that only the direct footprint of a development has any impact on ecological or treaty right values and indicators. As a result, the ABA understates the true extent of cumulative effects of disturbance on ecological values and treaty rights. The refusal to include buffers in their analysis is contrary to the provincial mitigation policy, which acknowledges an "area of influence[37]".

To generate a realistic understanding of impacts, a disturbance layer should reflect the existing literature on the effects of disturbance on the values described by the indicators. The ABA process should include sensitivity analyses to reflect any uncertainty in the science or Traditional Ecological Knowledge.

Managing Assumptions

In any analysis, many assumptions are made about indicators, their relationship to disturbance, population responses etc. Key assumptions should be identified, quantified, and managed for

[34] MoE 2010. Science Update for the Boreal Caribou in British Columbia.
[35] See examples in Firelight. 2014. Fueling Change. Upstream implications of the B.C. LNG Sector. Phase 1 and Phase 2 (2014).
[36] Daigle, P. 2010. A summary of the environmental impacts of roads, management responses and research gaps. A literature review.
[37] http://www.env.gov.bc.ca/emop/docs/EM_Policy_May13_2014.pdf

appropriately. For some assumptions, being 'wrong' has significant impacts on the outcomes, and these assumptions should be scrutinized particularly carefully.

FINDINGS: Some of the programs evaluated here outline the key assumptions being made, and in some circumstances test these assumptions in modeling environments (e.g. the Boreal Caribou Implementation Plan). However, the key assessment tool for the northeast, the ABA, does not make the key assumptions held within its analysis procedure explicit.

A key assumption is that climate will remain a constant into the future. However, the effects of climate change are actively being felt in the north east today. The impacts from climate change are difficult but critical to include in decision-making. The Status Report on boreal caribou notes that climate change will likely exacerbate existing negative impacts on populations (MoE 2010). However, this does not appear to have been taken into account in decision-making for this species, and none of the other programs relating to land and water stewardship in NE B.C. even appear to contemplate climate change scenarios and their implications.

Independent Oversight

Independent monitoring of effectiveness and general independent oversight are important elements of a comprehensive land management system, especially when the rate and scale of development is as significant as it is in both the oil and gas and mining industries.

FINDINGS: In the forest management context, the Forest Range Evaluation Program program has been working to develop an effectiveness monitoring program, even though funding to do so has been reduced (FPB 2014[38]). However, this program does not apply to landscapes dominated by development other than forest management, and there has been a government reluctance to revise policy on the basis of the findings of the FREP program. There is no effectiveness monitoring program associated with any aspect of oil, natural gas or mining development in Northeast B.C.

In addition, also in the forest management context, the Forest Practices Board was created in 1995 as a result of the high level of concern relating to forest management. Their specific mandate is to provide public assurance of good forest practices in BC. The FPB is a well-respected organisation that provides this role today with respect to forestry. With the massive expansion in oil, gas and mining there have been repeated calls for the development of a Resource Practices Board – which would provide the same independent oversight for the whole of resource management in B.C. Although attempts to create a level playing field for different industries have been repeatedly requested, these attempts so far have not been followed up by government.

A Tabular Summary of Programs

The left hand column of Table 3 below provides a description of each program, as defined by the province of B.C.. A brief review of the program relating to likely effectiveness in a stewardship context in BRFN territory is identified on the right.

[38] FPB 2014. An Evaluation of the Forest and Range Evaluation Program.

Table 3. Programs contributing to stewardship in Blueberry River First Nation territory.

*The left hand column describes the Program in the words of the B.C. government. The right hand column provides a summary of the key points relating to the program. The text in **bold** references the likely utility with respect to Blueberry River FN territory in particular.*

CE Assessment Initiative	**Programs relevant to stewardship in BRFN territory. This Column is the list and description provided by government relating to existing programs in NE BC.**	**Key Concerns relating to general Effectiveness. Comments specific to BRFN in bold.**
Provincial CE Framework	• The Framework includes provincial policy, procedures and tools that enable the assessment of cumulative effects to a set of resource values at a landscape scale. • The Northeast CE program is guided by these policies and procedures and will incorporate provincial CE values when methods are completed. • Aimed to be rolled out April 2016.	• 5 reports on cumulative effects are in development, one of which was a Grizzly Bear report, released in March 2016. There is a lack of consistent structure between reports at this time. Some drafts reports follow cumulative effects literature quite closely, and report on conditions in relation to a historic ecological benchmark, but other draft reports do not. • Generic development of indicators – tangentially relevant to FN values. • No clear framework for linking to regulation and policy revision within FLNRO or in other ministries as required. Draft policy suggests outcomes of analysis will focus on support of current policy and regulations. • No clear oversight of oil and gas or mining development. • The CEF website shows definition of CE to include economic *values*. This may result in a failure to focus on the primary purpose of CE analysis which is to understand combined impacts *on the environment*, so they can be fully weighed in a trade-off analysis. • Current CEF under development – final utility will depend on current decisions about how the work is framed. If it reflects only policy, and not functional limits, it will not be a useful CE assessment tool. Plus, if there is no potential for changing current management then it will not be a useful management tool. **BRFN Relevance: Program under development. Some potential to provide useful information, but draft reports are variable to date. Lack of agreement of whether the CEF will assess against policy or ecological benchmarks will be a critical decision in the frameworks potential utility. Lack of integration with policy / regulation revision. Unclear how CEF will meaningfully influence land management.**
LNG Environmental Stewardship Initiative (ESI)	• ESI is a collaborative process between First Nations, the Province and industry that will identify and assess risks to key environmental values of interest to First Nations arising out of LNG development in Northern B.C. • ESI provides a forum to identify and fund projects such as resource inventories, monitoring, and ecosystems restoration and enhancement initiatives that will support resource management decision-making in B.C.	• Potential to support baseline development of concepts and data in areas where projects are underway. • No formal links to a process for decision-making. • Potential to explicitly include treaty right values as indicators. • Is a 3 year development process with a large number of stakeholders. May provide useful indicators and analysis, but is currently in early stages of development with very unclear route to final implementation.

CE Assessment Initiative	**Programs relevant to stewardship in BRFN territory. This Column is the list and description provided by government relating to existing programs in NE BC.**	**Key Concerns relating to general Effectiveness. Comments specific to BRFN in bold.**
	• In the Northeast, a LNG ESI demonstration project has been initiated with Treaty 8 First Nations to explore the relationship between the Regional Strategic Environmental Assessment concept and the Northeast CE program.	**BRFN Relevance: Potentially useful to develop cautionary thresholds based on indicators that relate to treaty rights directly, however, the slow pace of development is a concern in BRFN's highly impacted territory. No mechanism to deal with the need for immediate action to prevent further losses.**
Federal Review of Cumulative Effects Assessment & Management Approaches	• The Canadian Council of Ministers of the Environment has identified cumulative effects as a priority issue and formed a Cumulative Effects Working Group last October. Members include representatives from each province and territory as well as the federal government. It is currently undertaking a review and analysis of CE assessment and management approaches across the country.	• Basic Principles for CEA released but no substantive review available at this time. • Timeframe and content unknown **BRFN relevance: no relevance at this time.**
CE Management		
OGC Area Based Analysis (ABA)	• ABA supports improved consideration of CE within the Oil and Gas Commission's application review process. • Active use of ABA began in January, 2015. Lessons learned through early implementation, ongoing use and enhancements and from efforts to work with one sector - oil and gas - will be used to support CE implementation across the natural resource sector in Northeast Region. • Work is ongoing between the Commission and FLNRO to ensure alignment with values and the overall data structure and assessment methods. • As the Commission's act and regulations change, and as new stewardship and cumulative effects policy is developed, ABA will be responsive and evolve over time.	• see Appendix 2 for detailed review. • Only two of nine proposed indicators are currently assessed under ABA, so not a meaningful cumulative effects assessment. • Existing indicators are old forest and riparian habitat, which have significant technical issues with how they are identified and assessed within the ABA. • No indicators deal directly with Treaty Rights. • Does not undertake analysis at ecologically relevant scales that pertain either to the scale of application of treaty rights, or ecologically relevant scales. • Uses targets or triggers that reflect the bottom end of the ecological range. Does not provide an 'early warning' framework as promised. • Does not include key indicators such as caribou which is a major value and at significant risk in many areas of the northeast. • Assumes only a direct footprint for disturbance. Does not acknowledge buffers or 'zone of influence'. • Does not have a clear or transparent link to support regulation / policy reform as needed, nor a specific role in a decision-making framework. • Individual responsible for condition of the land is unknown. • Puts onus on industry to 'minimize, avoid, reduce', but sets no 'limits' on development. • Preliminary work to standardize elements of policy across agencies (e.g. old

CE Assessment Initiative	**Programs relevant to stewardship in BRFN territory. This Column is the list and description provided by government relating to existing programs in NE BC.**	**Key Concerns relating to general Effectiveness. Comments specific to BRFN in bold.**
		growth management areas), but this so far is piecemeal and only applies in a limited area within BRFN territory. **BRFN Relevance: this is the key stewardship approach relevant to LNG development. It has significant flaws from both Treaty Rights and ecological perspectives (Appendix 2).**
Boreal Caribou Implementation Plan	• The plan is a comprehensive approach to Boreal Caribou management that guides all natural resource development and management activities in defined caribou habitats. • The plan aligns B.C.'s management with the federal Boreal Caribou recovery strategy. • The caribou habitat management regime is being updated to reflect the latest ecological information. • CE management responses include improving the consistency in the regulatory regime between FRPA and OGAA for Boreal Caribou management.	• The current BCIP has a number significant limitations including lack of inclusion of Traditional Ecological Knowledge; lack of baseline data for establishing range targets; limited telemetry data with inherent limitations on its applicability; no effort to map preferred fine-scale habitat features; lack of consideration of cumulative effects, and no meaningful conservation for areas already tenured to oil and gas development. • The current plan has no limits to development, nor any meaningful restoration requirements to move already impacted ranges back towards the recovery target in a timely manner outlined by Environment Canada's Recovery Strategy. • The BCIP is currently under review by government, but specific details are currently unavailable. The current plan, from its own analysis (See Cichowski et al. 2012), results in a predicted caribou decline from 1512 animals to 531 in 50 years, and two ranges are effectively managed to extirpation over 50 years. These caribou have ecological links to adjacent herds (e.g. connectivity between other ranges). Currently released numbers of caribou show the population already to have declined to around ~750 animals. **BRFN Stewardship Relevance: There are significant concerns about the failing of the plan to limit development and to actively work to recover caribou habitat in a timely manner. Development continues within known high value caribou habitat even though the populations are continuing to decline.**
Peace- Liard Moose Management Plan	• The purpose of the plan is to update the current Northeast Moose management framework. • A comprehensive review is being undertaken with First Nations and stakeholders on the status of Moose populations and the existing regulatory framework. • An implementation strategy will be developed with proposed regulatory revisions, enhanced inventory, etc. • Priority Moose habitat is currently included in the Northeast CE program through the wildlife habitat areas indicator. The outcomes of this plan will enhance the ability to incorporate Moose into future CE assessments as a First	Concerns about the PLMMP include: • This plan lacks a comprehensive vision for the region. It provides primarily abstract and generic guidance that is unconnected to other provincial policies and regulations. • Implementation strategies are undefined – and so it is unknown how the objectives can be met, and by whom (how are oil and gas or energy and mines bound by the plan?). • The plan provides no vision for future secure good condition moose habitat – it does not include a plan to protect and restore key areas of moose habitat, but rather focuses on buffering small stand level features without dealing with fragmentation and habitat loss overall.

CE Assessment Initiative	Programs relevant to stewardship in BRFN territory. This Column is the list and description provided by government relating to existing programs in NE BC.	Key Concerns relating to general Effectiveness. Comments specific to BRFN in bold.
	Nations cultural value.	• The plan does not address increased pressure by non-aboriginal hunters provided for by the pervasive road access throughout the territory. **BRFN relevance: No urgent actions are envisioned by the plan to halt the significant decline in moose in the parts of BRFN territory.**
Old Growth Management Areas (OGMAs) Working Group	• The purpose of the OGMA working group is to improve the consistency of old forest management under Land Act and OGAA. • First set of OGMAs has been established under OGAA and the boundaries are consistent with those for forestry. • Old forest is a current CE value assessed in the Northeast CE program. Management approaches for OGMAs are incorporated into the Northeast CE assessment and management of old forest.	• OGMAs have been established under the OGAA Environmental Management and Protection Regulation for a small portion of the Northeast - the region around the Kiskatinaw watershed (Jan, 2015). However, development can occur in OGMAs set aside in the forest management context by other development types such as oil, gas and mining, and in the Kiskatinaw region there are almost zero OGMAs that do not have an oil and gas footprint within them (see Main Report). The functional effectiveness of these areas set-aside for biodiversity values is not measured or managed. • Elsewhere in the Northeast, no OGMAs are recognised by the OGAA, and in many areas no spatial OGMAs are identified at all. Therefore, no comfort is provided that ecologically relevant levels of old forest are maintained across the landscape. The functional effectiveness of the remaining old growth is unknown and unmonitored (e.g. how large are patches and how many roads, well sites, and other development occurs in these areas). **BRFN Relevance: No spatial OGMAs are designated in parts of BRFN Territory, which means no protection for old forest from natural gas development in these areas, and no understanding of how much and where old forest is maintained in the landscape and in what condition.** **In other areas, spatial OGMAs are set aside, but can be impacted by other development. The biological effectiveness of this strategy is not monitored or assessed.**
Northeast Water Strategy (NEWS) and Northeast Water Tool (NEWT)	• Released in March 2015, the strategy brings together the needs of First Nations, communities, industry and the environment into a single blueprint for monitoring and managing water resources to ensure human and ecosystem needs are met now and into the future. • The overarching objectives of the NEWS are unified water stewardship, healthy aquatic ecosystems, clean water and the sustainable use of water resources in the region. To fulfil these objectives, the NEWS identifies five action areas:	• The action areas of NEWS are generalized and do not give sufficient priority to First Nations concerns and values. • No clear roles for First Nations are provided for in the implementation of NEWS • There are many technical concerns about NEWT that are summed by the 2015 decision by the Environmental Appeal Board, which found that “at this time there is no way of knowing the accuracy of results generated by NEWT,” so that it “should not be relied upon as the primary tool for estimating hydrologic characteristics at a point of interest.” **BRFN Relevance: Does not currently provide a significant contribution to stewardship**

CE Assessment Initiative	Programs relevant to stewardship in BRFN territory. This Column is the list and description provided by government relating to existing programs in NE BC.	Key Concerns relating to general Effectiveness. Comments specific to BRFN in bold.
	○ Enhance information to support decision-making. ○ Strengthen the regulatory regime. ○ Co-ordinate and streamline decision-making processes. ○ Enhance monitoring and reporting. ○ Build a water stewardship ethic. • The Province will partner with First Nations, other levels of government, industry, communities and academia to implement the strategy over the next three years. The information generated on water quantity and quality will be used for CE assessment of water. Management actions implemented in this strategy will support CE implementation relating to water quality and quantity.	**decision-making in BRFN Territory.**

Summary of the Effectiveness of Current Stewardship Initiatives

The suite of programs provided have a number of significant issues relating to their potential to inform and direct governments and the public about landbase condition, and about risks to values including the environment and the ability to meaningfully maintain treaty rights.

The FLNRO Cumulative Effects Program started with a good potential to meet some of the key tests for creating an effective program to identify risks to inform decision-making. However, in development of the program, different values are being evaluated differently in different reports, highlighting a lack of clear direction within the program. Whether its assessment potential is fulfilled will depend on whether the reports are finalized using historic / natural baselines or policy baselines, and whether risks to the environment are assessed independently of risks to economic drivers. These will be critical decisions to ensure that this program results in a proper and meaningful cumulative effects assessment and management framework, rather than merely an implementation-monitoring program. In addition, the Cumulative Effects Framework seems to make it clear that revising policy or regulation is not within its mandate – this is clearly problematic as an *a priori* decision as it assumes that existing policies and regulations are adequate. Given that the policies and regulations vary across ministries and in their application to different industries, and have not been evaluated for their effectiveness, this is a significant contextual gap.

The Area-based Analysis of the OGC is the primary tool used to manage oil and gas development. However, it does not provide a robust tool – this is elucidated in detail in Appendix 2.

Some of the other programs outlined above, provide some potential insight into stewardship in the northeast, but collectively they do not provide an integrated collective program with analysis linked to stewardship decision-making. Programs such as the Boreal Caribou Implementation Plan have not been properly integrated into OGC management frameworks, and this combination has so far failed to steward boreal caribou back from the brink of extirpation.

In summary the suite of tools provided by the B.C. government is lacking because:

- They are not directed by appropriate land use planning;
- They are not designated within a management framework (policy / regulations) that is responsive to 'learning and responding' – key decisions on the land are not affected by the results of assessment;
- Treaty Rights are not explicitly identified nor managed within any of the government's processes or programs;
- No ecological limits are identified beyond which development must not cross;
- There is no comprehensive systematic process that measures and manages cumulative effects. The programs in place (e.g. the OGC ABA) have a series of technical and process flaws;
- There is no explicit management responsibility; no-one is ultimately responsible for the condition of the land.
- And there are a litany of technical concerns with the existing programs and decision-making processes.

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Appendix 2: A Review of the OGC Area-Based Analysis.

The OGC Area Based Analysis overview states: *Cumulative effects are defined as the "changes to environmental, social and economic values caused by the combined effect of past, present and proposed activities and events on the land base." Considering effects on only a project- or sector-specific basis can allow unintended impacts to accumulate over time. ABA incorporates key principles embodied in cumulative effects assessment methodology, and will be used as part of the Commission's permitting and authorization process.*[39]

We find there are fundamental[40] and technical flaws with the current ABA process that collectively prevent the ABA from fulfilling this stated promise. In particular, and of great concern to Blueberry River First Nation, the ABA does not address the cumulative effects to treaty rights or the ecological values that matter for treaty rights.

This report has two sections:

ABA review: a review of the existing ABA context and specific methodology – many of these issues have been raised previously by Blueberry River First Nation but have not yet been adequately responded to by the OGC. Within this section we identify key gaps and make recommendations to fill those gaps.

Case study: this section compares the ABA and management direction for an individual watershed with analyses undertaken by others (both in government and outside). This case study illuminates the defects of the ABA, as the ABA results do not reflect either the type of analysis nor conclusions reached by others for the same landbase.

Section 1: ABA Review and Recommendations

A: Fundamental Flaws:

We believe the ABA cannot provide an effective process for analysing and managing for cumulative impacts with respect to Blueberry River Treaty Rights or for ecological values because of a number of Fundamental Flaws. Without resolving these fundamental issues the technical issues itemised in Part B will not provide effective resolution.

#1: Inadequate direction on land use values

In the Auditor General's 2015 report on cumulative effects, the province of BC states that landscape planning provides the context for determining land values for a region, within which finer scale decisions can then be made. Both the Auditor General and the Forest Practices Board (FPB) have identified significant issues with existing land use plans for providing adequate direction[41, 42]).

As the FPB has acknowledged, the land use plans in the northeast of the province are out of date. In any case, when developed, these land use plans did not incorporate First Nation values or Treaty Rights. And, existing plans do not reflect current scientific understanding of base levels of protection required to maintain ecological values into the future[43].

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[39] OGC 2014: Area-based Analysis Results for Northeast British Columbia.

[40] This terminology is stated as 'Contextual and Content concerns' in Appendix 1 of this report.

[41] FPB 2008; FPB 2011; Auditor General 2015;

[42] FPB. 2008. Provincial Land Use Planning: Which way from here. FPB Special Report FPB/ SR/ 34.

[43] Canada's stated goal is to achieve 17% representation as a signatory to the Convention on Biological Diversity. Science suggests on the order of 50% of a region needs to be managed for conservation to maintain long term process and functions. This region has approximately 4% in protected areas (Lee and Hanneman 2012).

Practical immediate and significant gaps in landscape planning include spatial identification and protection of critical core areas required to maintain the practice of Treaty Rights, and core ecological areas to ensure adequate ecological representation and protection of critical habitat.

Recommendation: Work collaboratively with BRFN to identify core areas that must be off-limit to development. This is not intended to reflect a comprehensive land use planning exercise but a focused exercise to fill critical gaps in the immediate term.

#2: Treaty Rights values do not have an indicator within the ABA

Of the 9 potential indicators identified in the ABA none directly reflect First Nation Treaty Rights. This clearly prevents the ABA analysis – even if it was a part of a clear and transparent decision-making process (which we believe it is not – see below) – from assessing and managing the effects of development on Treaty Rights.

Recommendation: Work collaboratively with BRFN to identify specific indicators that reflect the ability to practice Treaty Rights.

#3: Key Uncertainties are not considered

Immediate uncertainties, such as the implications of natural fires for landscape condition, are not reflected in the triggers and interpretation used by the ABA. In addition, larger scale uncertainties such as climate change are not considered at all.

Recommendation: Identify and quantify key uncertainties with the potential to influence landscape condition. Ensure these uncertainties are appropriately considered in analysis and decision-making.

#4: ABA assesses against existing policy and therefore does not follow best practices of cumulative effects assessment:

CE assessment is intended to understand the condition of the landbase in relation to natural baselines. Different policies have different 'social choice' decisions already incorporated into them, and therefore do not provide a useful baseline against which to understand actual risks to ecological systems. As a result of taking this approach the current ABA approach is better described as implementation monitoring.

Recommendation: Use ecological information to define indicators and appropriate targets to understand the current condition of the landbase. Do not intermix policy decisions with the notion of cumulative effects indicators, thresholds, and baselines.

#5: Unclear Management Responsibility (or, No One to Tell)

There is no explicit framework that defines the decision-making process or identifies the decision-maker who has ultimate responsibility for maintaining values into the future. If a trigger is exceeded, the onus is on industry to avoid, minimise, reduce impacts to Crown land, but without clear direction.

ABA material says "Using ABA, a Commission SDM can assess the impact of proposed oil and gas activities on ecological, cultural and social values in the context of all other development activities". However, there is no transparent or available policy that explains how this is done. This issue of having 'no-one to tell' is identified by the FPB (2011) and the AG (2015) as a flaw in provincial approaches to CE.

Recommendation: Develop policy to identify a clear decision-making framework. Identify clear management responsibility within government for landscape condition.

B: Technical Flaws:

There are a number of technical flaws encompassed within the existing OGC ABA and management process. This section presents a number of the most significant technical flaws. Blueberry River expects to be involved in further talks about these and other flaws of the ABA and to be engaged meaningfully when the OGC addresses each of them.

#1: Inadequate Indicators

Of the 9 ABA identified indicators, only 2 are currently implemented: hydroriparian and old growth. This despite ABA documentation that identifies the high priority need for implementation of some of the other identified indicators (e.g. for caribou – since '*woodland caribou are in decline', and 'the inclusion of this value is an immediate priority and is planned to be completed before end of 2014'*[44]*).* The ABA is incomplete, even on its own terms. Even putting aside its other flaws, the ABA does not constitute an effective cumulative effects assessment or management tool at this time because it considers so few values.

Recommendation: Complete the indicators already identified by the ABA, especially those identified as critical. Do not undertake any further development in habitat of critical species, in particular for caribou, before an adequate assessment and management procedure is in place.

Recommendation: Review proposed indicators to ensure they adequately reflect ecological values at appropriate scales and have appropriate, ecologically based management triggers identified. Develop new indicators, such as linear disturbance, as necessary.

Recommendation: Resolve the fundamental flaw identified above that no indicators directly address First Nation Treaty Rights.

#2: The Hydroriparian indicator does not include impacts on all of the hydroriparian habitat and does not provide an accurate assessment tool for water quantity

The Hydroriparian indicator is described as reflecting the condition for 'riparian habitat and water quantity'. However, the ABA measures disturbance only on a portion of the hydroriparian ecosystem - the Riparian Reserve Zone as defined by the EMPR policy. These reserve zones do not identify all elements of the hydroriparian ecosystem. This is a critically important distinction because many riparian features such as small streams, large wetlands and intermediate sized lakes are not ascribed a reserve zone in policy. Therefore, the ABA cannot detect, report on, or consider any interaction between disturbance and those riparian features not given a reserve zone.

The Hydroriparian indicator fails to reflect any disturbance impact on significant portions of the riparian ecosystem because not all component parts of the riparian ecosystem are included in the indicator definition.

Recommendation: Redefine the riparian habitat indicator to include all elements of the hydroriparian ecosystem.

In addition, the ABA relies on the Northeast Water Tool (NEWT) to assess water quantity. We have many concerns about NEWT, especially in light of the 2015 decision in which the Environmental Appeal Board found that "at this time there is no way of knowing the accuracy of results generated by NEWT," so that it "should not be relied upon as the primary tool for estimating hydrologic characteristics at a point of interest."

[44] BC OGC. 2014. (PAGE 19). Area-Based Analysis Results for Northeast British Columbia.

Recommendation: Work with Blueberry River to address the defects and limitations of NEWT and other hydrological tools for use within Blueberry River territory, especially where hydrological and other data is sparse.

#3: The Disturbance layer assumes an impact from the direct footprint only

The ABA generates a 'disturbance layer' from the data on activities on the land. No 'buffers' are applied to this layer, which assumes therefore that only the direct footprint of a development has any impact on ecological or Treaty Right values and indicators. Extensive literature contradicts this assumption. As a result, the ABA understates the true extent of cumulative effects of disturbance on ecological values and treaty rights.

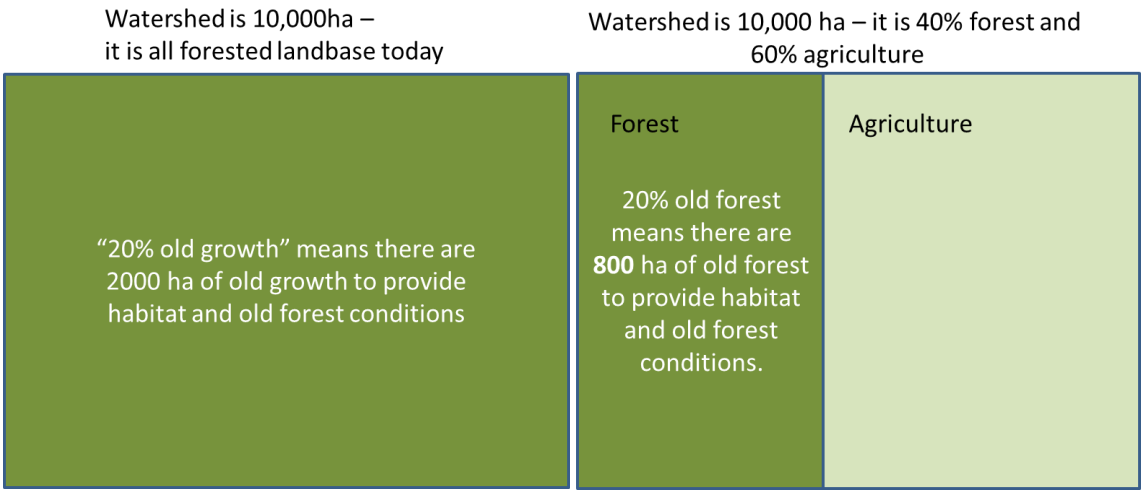
Recommendation: The disturbance layer should reflect the existing literature on the effects of disturbance on the values described by the indicators. The OGC must work with Blueberry River to define the appropriate zone of Influence or 'buffers'. The ABA process should include sensitivity analyses to reflect any uncertainty in the science or Traditional Ecological Knowledge.

#4: The Unit of Analysis used allows entire watersheds to have little or no old forest remaining and yet pass the old forest test

The old forest indicator measures the amount of old forest present within massive areas (e.g. 8.9 million ha for the Boreal Plains). This allows some watershed units to have lots of old forest while other watersheds can have no old forest and collectively they both 'pass the old forest test'. This mismatch of scales is critical because as ABA states, "*A significant portion of B.C. forest biodiversity is associated with older forest stands and associated structural elements, such as dead and dying trees and downed wood".* None of the animals that use old forest and that would be harmed by its destruction can move hundreds of kilometers or more to find habitat in distant watersheds. The ABA fails to capture the different condition of different watersheds and their ecosystems, but those watershed-level effects are critical to the ongoing exercise of treaty rights. This basic idea is commonly understood in other resource management fields – for example in forestry, old forest targets have to be met at the scale of watersheds / landscape units.

Recommendation: The analysis of old growth can use the ecological information generated at the scale of Natural Disturbance Units to <u>set</u> the old growth target, but that target must be <u>applied</u> at the scale of watersheds to provide an ecologically or humanly relevant assessment of ecological condition.

In addition, the old forest analysis asks how much old forest remains in today's forested landbase. Where significant areas within a watershed have been converted to a non-native ecosystems, such as agriculture, this can result in a significant disconnect between the apparent total old forest in a watershed, and the actual area of old forest that is available as habitat within that watershed.



This is an example of the shifting baseline syndrome[45].

Recommendation: where ecosystem conversion has occurred to a non-native ecosystem, this must be reflected in the ABA analysis on cumulative effects.

In addition, in some cases, it may be necessary to undertake analysis at an even finer scale than watersheds, to reflect the real values that maintain ecological services. For example, important components such as mineral licks will require finer scale analysis and these considerations must be addressed as indicators are developed.

Recommendation: Development of critical indicators related to ecological and First Nation Treaty Rights must be implemented immediately, and must be applied at ecologically appropriate scales.

#5: ABA Management 'triggers' do not protect ecological values

a) For the old forest indicator, the Management Trigger reflects the bottom end of the scientific range for natural levels of old forest and is therefore not precautionary

The identified target for each NDU is set at or below the lowest number from the 'range of natural old forest' identified by Delong 2011. Even if measured at an appropriate watershed scale, this approach sets the 'trigger' at the bottom of the range, rather than at a precautionary level (as the ABA documentation suggests). This is important as, even if the analysis was undertaken at an appropriate scale (which it currently is not) it allows development to drive each unit to an ecological minimum leaving no flexibility to adapt to broader uncertainties such as fire, climate change, or incorrect assumptions. This non-precautionary approach introduces serious risk for the ecological values in question, as well as for Blueberry River's treaty rights.

E.g. the trigger for Boreal Plains NDU is 17%, while the natural range is defined as 17-49%. The trigger for Wet Mountain NDU is 55%, whereas the natural range identified is 84 – 93% old forest. Similar patterns exist for the other NDUs and their management triggers.

Recommendation: use Management Triggers that are less aggressive and allow some room for risks and uncertainty – i.e. reflect the midpoint of the range of natural, not the bottom of the range or below.

[45] Pauly, D. 1995 defined the Shifting or Sliding Baseline – a concept which can result in a loss of perception of change when generations of people redefine what is 'natural' based on their own generations experience.

b) **The Hydroriparian trigger does not reflect the potential disturbance on all hydroriparian habitat**

The trigger for hydroriparian is stated in the ABA as being a precautionary "greater than 95% intact". However, since the indicator does not include all hydroriparian features it is impossible to know the actual level of intactness of the riparian system. The ABA currently does not measure it.

Additionally, as identified above, the analysis assumes only the direct footprint of disturbance impacts ecological values since no buffers are added to the disturbance layer. Even given these concerns, many OGC basins are identified as not meeting this management trigger, but we would expect this to increase if ecological 'zones of influence' were acknowledged in the analysis.

Recommendation: Identify hydroriparian habitat based on best available ecological knowledge, and buffer the disturbance layer based on science to ensure that the management triggers reflect all potential impacts.

#6: Individual Permits are processed without either short- or longer-term historic and future context

The ABA considers only the individual impact of a permit on current conditions as analysed by the ABA process. It does not account for the thousands of permits applied for annually, many of which are processed at the same time. For example, Blueberry River received 9,252 permit referrals from the OGC in 2015. The ABA does not appear to consider the potential impacts of the many permits that are being considered concurrently by the OGC.

In addition, the ABA does not explicitly consider either a historic baseline, nor develop future scenarios to provide context for its decision-making.

Recommendation: The ABA should assess all outstanding and pending permits for a watershed in each evaluation.

Recommendation: Work with Blueberry River to develop an appropriate historic baseline, plus future scenarios, to assess cumulative effects on ecological values and treaty rights

#7: No Management Limits

If a trigger is exceeded, the onus is on industry to avoid, minimise, and reduce impacts, but there are no actual limits to the amount of disturbance that is permitted. The management triggers, if crossed, appear to require only procedural changes (e.g. reports), not actions to prevent the breach of a threshold.

This approach is not consistent with the basic principles and discoveries of the science of ecology. Where ecological limits are known, they must be respected. Where such limits are not known, precautionary management limits should be implemented and monitoring undertaken.

Recommendation: Identify clear limits at appropriate scales beyond which development will not be permitted. Ensure these are responsible, reflect all relevant values including treaty rights, and are based on the best available science.

#8: No Follow-up Monitoring or Regular Review

It is necessary with all systems to ensure that assumptions are tested and management responses changed if and when new information becomes available.

Recommendation: Ensure monitoring to test key assumptions is in place.

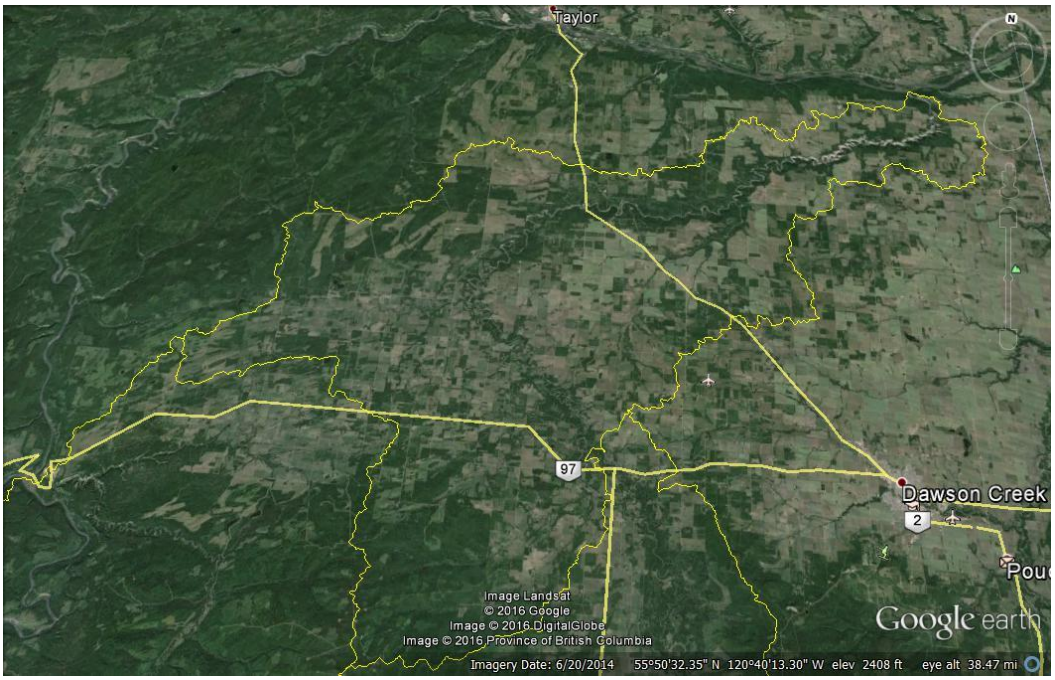
Recommendation: Ensure the ABA is constantly improved using a clear and reliable process, where new information is incorporated as a part of business as usual.

Section 2: Case Study – The Lower Kiskatinaw Watershed

The Kiskatinaw Watershed is located in the south Peace region, within Blueberry River territory. This watershed was chosen as a Case Study because it has been the subject of a number of different cumulative effects analyses, allowing us to compare both the methods used and the conclusions reached about landscape condition in this specific place.

The Lower Kiskatinaw Watershed is one of 69 OGC watersheds identified for the Northeast of BC. It is part of the larger Kiskatinaw watershed that is reflected in the Case Studies below.

In the figure below, the Lower Kiskatinaw watershed is outlined in yellow, with highway 97 and 2 running through it. The watershed has seen fairly extensive conversion to a non-native ecosystem (i.e. agricultural land which is predominantly privately owned). The approximately 60% of this watershed that is now agriculture therefore has little or no functional forested ecosystem, and its hydrologic patterns are significantly disrupted. In the remainder of the forested area within this watershed, there are few larger patches of contiguous forest except in the very south of the watershed. This OGC basin is about 60,000ha in size.



In short, the cumulative effects analyses conducted prior to the ABA (and independently of the OGC) follow standard practice, reflect scientific literature, and confirm significant adverse cumulative effects on the ecological values in this watershed. In contrast, and as discussed in more detail above, the ABA has serious methodological and scientific defects. As a result of those defects, the ABA departs from the other analyses and finds only limited effects on the Lower Kiskatinaw watershed.

Analysis #1: OGC Area-based Analysis

The report generated by the ABA for the Lower Kiskatinaw watershed concludes:

For Old Forest: the ABA report states that old forest is 'normal', and no management triggers are exceeded. No additional consideration is therefore required for oil and gas development relating to the forest values in this watershed.

The old growth analysis finds that old growth is normal because the ABA does not ask what level of old growth is present in this large watershed (it currently stands at ~ 5% of this 60,000ha) but rather asks

whether the massive NDU of the boreal plains (8.9 million ha) meets a target level of old growth. The ABA does not actually assess the amount of old growth forest in this – or any other – watershed. The significant reduction in old forest in the Lower Kiskatinaw is clear from the figure above, as well as from the fact that approximately 60% of its landbase has been converted to agriculture. The lack of old forest in this watershed is clearly material to the species and functions relating to old forest here, since 60,000ha is much larger than most species' home ranges. For those species to be able to live in this watershed, the old forest must be located here, not elsewhere in the Boreal Plains NDU.

Hydroriparian indicator: the ABA report states that riparian intactness is 91.4%, which puts the watershed in an enhanced management trigger.

No specific direction is available from the OGC as to what actions will be taken to increase riparian intactness in the future. To our knowledge, no permits have been rejected as a result of being in the enhanced management zone.

As explained in the technical review above, the ABA analysis of riparian intactness is incomplete. The riparian intactness numbers do not include any assessment of riparian condition / habitat or functioning on the 60% of the watershed that is agricultural land. On the remaining forested portion, the ABA assesses disturbance only of a subset of the hydroriparian ecosystem, and it does not buffer the disturbances so reports out on the direct disturbance footprint only. The ABA does not provide any sense of the uncertainties introduced by making these assumptions.

In Summary: the ABA report states that old forest is normal, and that riparian habitat intactness is 91.4% (just below the trigger of 95%). This gives the general impression that this watershed is in good condition, and that minor modification to layout of oil and gas activities would result in an intact / functioning watershed.

Analysis #2: Forest Practices Board Cumulative Effects Analysis: Dawson Creek[46]

In the context of undertaking a special investigation into the state of cumulative effects management in BC, an independent provincial watchdog, the Forest Practices Board (2011) undertook a case study cumulative effects analysis for the larger Kiskatinaw watershed. This larger watershed encompasses the Lower Kiskatinaw reported on above.

The FPB analysis examined four valued ecosystem components (forest soil, winter habitat for caribou, and drinking water quality and quantity). Here we report only on the conclusions for their forest-related indicator (caribou winter habitat) and the conclusions for drinking water quantity, since they most closely relate to the current ABA analysis.

The FPB report notes that historic, current and predicted future conditions should be analysed to generate meaningful cumulative effects results. In their report, the two historic conditions (mid 1980s and mid 1990s) were compared to the current condition of the landbase in 2007. These historic and current conditions were then compared to future scenarios of development. For each valued ecosystem component, 'limits' were identified in advance of the analysis, based on best available information. These limits are used to interpret the significance of the results for each indicator.

FPB Results: Historically, caribou ranged throughout the Kiskatinaw watershed, but today only a subset of the watershed is used as winter caribou habitat, as a result of the human disturbance in the watershed (FPB 2011). The FPB used the full watershed and this sub-area of inhabited land as two different analysis units. The FPB developed indicators that reflect the caribou value namely core habitat, average core habitat patch size, and density of linear corridors. (A process the ABA has as yet been

[46] FPB 2011. Cumulative Effects: From Assessment Towards Management. FPB/ SR/ 39. Plus Appendix Report: A Case Study for the Kiskatinaw River Watershed. Special Report.

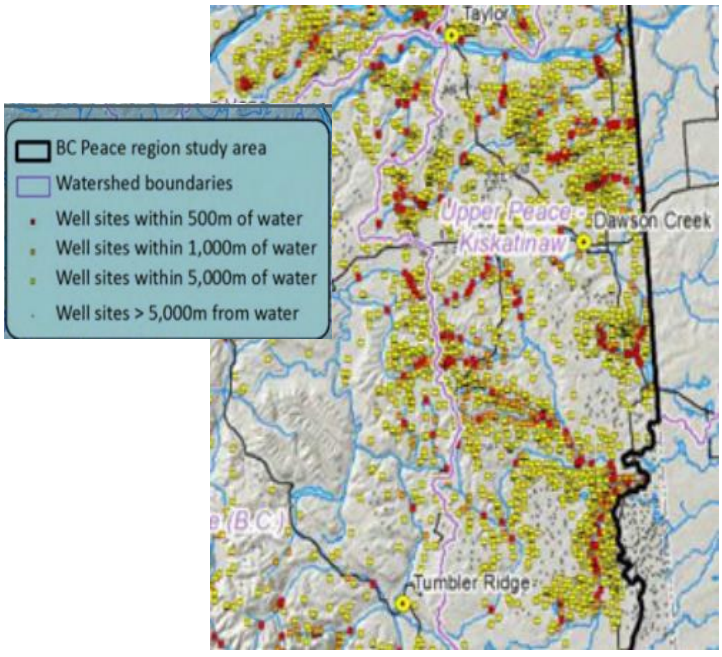
unable to complete). All disturbances on the landscape were buffered, and the potential effects evaluated. The FPB report concludes:

Caribou have likely retreated south in the study area, as habitat quality has deteriorated because of increased human activity. All indicators of winter habitat quality for caribou have deteriorated over time, to the point where they have exceeded the limits of concern derived from published literature. As a result, there is no need to project these indicators to 2017. Any additional industrial development will drive the indicators further from the limits set.

For drinking water, the FPB report concludes:

The CEA found relatively unambiguous indications of changes in the flow regime of the river, over the period of record, that indicate a concern for drinking water quantity. Additional human activity, particularly in the form of drilling for natural gas, has the potential to cause withdrawals from the river that exceed limits of concern.

In Summary: the FPB demonstrates important aspects of a framework for doing effective cumulative effects analysis, using multiple indicators and measuring changes over time in relation to ecological limits identified from literature and from which they interpret their analysis results. In addition to identifying concern for caribou habitat and drinking water, the FPB identifies a large number of problems with the existing use of cumulative effects assessments for resource management in BC. Key flaws include the lack of any requirement to assess the effects of the *"myriad of minor activities that are continually authorized on the land. The result is these remain largely unknown and unmanaged"*. Attempts to solve these problems are largely unsuccessful because there are no "*institutional mechanisms to use the results of the assessments – that is, there is no one to tell"*. In addition, values must be linked to indicators that actually reflect the values. This process must *"include the notion of limits".* The FPB concludes that methods for effective cumulative effects analysis are well documented and researched, but that there is a need for **"a comprehensive land management framework in which those methods could be used".**



Analysis #3: Lee and Hanneman, 2012[47]

In a cumulative effects analysis for the broader Peace region, this report identifies the large number of different disturbance agents that have caused a change from the natural conditions in the Peace Region.

The report provides data on the large array of disturbances by watershed. For example, at the time of the analysis, there were 8517 petroleum and natural gas facilities, 358km^2 of pipeline right-of-ways and 9781km^2 of active oil and gas tenures in the study area.

The report summarises 15 broad categories of development types and overlaps them to understand the cumulative footprint of all activities. The disturbance layer is buffered to understand the potential implications of impacts over and above the direct footprint.

[47] Lee,P.G. and M. Hanneman. 2012. Atlas of land cover, industrial land uses and industrial-caused land changes in the Peace Region of British Columbia. Report prepared for Global Forest Watch and David Suzuki Foundation.

A single disturbance layer – the number of well sites adjacent to wetland and riparian features – is shown as an example for the Kiskatinaw watershed (Figure above).

In summary: Lee and Hanneman compile results by watershed zones and conclude that:

- 90.2% of the Upper Peace-Kiskatinaw is disturbed;
- 66.9% of the entire study area was disturbed when applying a 500m buffer to disturbances;
- the Upper Peace-Kiskatinaw watershed had the highest numbers of water crossings in the region, with 747 water crossings (of a total of 2296 in the region);
- two of five watersheds (Beatton and Upper Peace Kiskatinaw) have very few remaining intact forest landscapes (<6% each); and
- three of the 10 caribou herd ranges that are all or partly within this study area were more than 50% disturbed by development in 2012.

This analysis included the effects of all industrial development, including agriculture and other factors not included in the ABA analysis. They also identify the low overall level of protection in this region (~ 4% in protected areas), so there is not an ecologically appropriate amount of the landbase that is off-limits to development where natural processes can persist.

Analysis #4: Nitschke 2008[48]

This cumulative effects analysis is focused on the Peace-Moberly as a study area (which overlaps in part with the Kiskatinaw watershed). Habitat models based on forest cover attributes were developed for a wide range of species. A historic scenario (1970s) was compared to current (mid 2000s) to look at change over time. The study identified that a significant increase in the area affected by industrial disturbance had led to a change in landscape structure and a significant change in forest biodiversity. The approach looks at how individual species interact with specific habitat elements, looking for data driven 'thresholds' that result in population changes for species that thrive in different environments. Early seral species increased in number in the region, while older forest, and old forest species declined in relation to natural conditions because of forest fragmentation.

In summary, the Nitschke analysis concludes that the decrease in *'interior habitat was one of the variables that significantly impacted the response of modeled species'*, and it notes that the reduction in interior habitat (i.e. undisturbed blocks of older forest) was a predominant cause of species decline. The author notes that other researchers have identified that species requiring old growth and interior habitat were likely to be most effected by cumulative development, and concludes that this study shows "*interior species requiring mid-late seral coniferous forest have already been adversely impacted by cumulative development"* (2008).

The multiple changes that were shown to have occurred over space and time from the variety of different footprints resulted in a *"cumulative effect of recent resource development on ecological integrity that is both additive and synergistic. The proposed acceleration of development will increase the risk to maintaining the biodiversity and ecological integrity in the Peace Moberly region"*.

Case Study Conclusion:

Before the ABA was introduced, there had been a number of cumulative effects assessments in the south Peace region. Those analyses followed the scientific literature of how to undertake an effective cumulative effects analysis, including identifying multiple indicators, forecasting historically and into the future, buffering the effects of disturbance to reflect scientific literature on how disturbance affects

[48] Nitschke, C.R. 2008. The cumulative effects of resource development on biodiversity and ecological integrity in the Peace-Moberly region of Northeast British Columbia, Canada. Biodivers. Conserv. 17: 1715- 1740.

values, and identifying limits against which to interpret the effects. **However, the ABA does not use these same methods that are well documented in the literature of cumulative effects assessment.**

The pre-ABA cumulative effects studies reviewed above all raise concerns about the pervasiveness of the effects of development across the region that encompasses Blueberry River territory. They identify serious harms and risks, including local extirpation of species, loss of interior habitat required to maintain key species, and the density of the disturbance footprint, especially in some large watersheds within the south Peace region. **By contrast, the ABA is the only "tool" that suggests the landscape of the Blueberry River First Nation territory is a 'normal' or 'intact' ecosystem. All the other analyses suggest that ecological limits have been or soon will be surpassed for a variety of species and processes.**

As outlined in Section 1 of this report, we have identified a large number of fundamental and technical concerns regarding the Area-based Analysis and management system. The results for a specific landscape as viewed through different studies demonstrate that **the issues raised are significant and have profound implications for our understanding of the ecological condition of Blueberry River First Nation territory.**

Section 3: Next Steps

The ABA does not meet its stated goal of meaningfully assessing cumulative effects. It does not assess cumulative effects on Blueberry River treaty rights and it does not meet its own objective in assessing cumulative effects on ecological values. The OGC should not use (or allow proponents to use) this instrument in place of real cumulative effects assessment. Among other things, Blueberry River is deeply concerned that some proponents appear to be using ABA results to mitigate and justify significant cumulative effects for purposes of the BC environmental assessment process.

The OGC must work with Blueberry River to address the flaws in the ABA discussed above. As noted, at this time, the ABA is not a cumulative effects assessment tool. It should not be used or presented as such a tool at this time, and its results should not be used as a substitute for a real cumulative effects assessment. In order to address these flaws properly, Blueberry River and the OGC will require a transparent and timely process for discussions. Blueberry River also will require meaningful capacity funding and other technical support, as Blueberry River has already spent a significant amount of time and money to identify and help the OGC address a number of issues with the ABA.

Appendix 3: United Nations Aichi Targets as signed by Canada.

The Land Stewardship Framework outlined by BRFN follows the path laid out by the United Nations Convention on Biological Diversity – which has set the Aichi Biodiversity Targets, to which Canada is a signatory.

Aichi Biodiversity Targets

- Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society
- Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use
- Strategic Goal C: improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity
- Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services
- Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building

Table Below outlines Canada's specific commitments under this strategy.

Reference	Target
	Canada
Goal A	By 2020, Canada's lands and waters are planned and managed using an ecosystem approach to support biodiversity conservation outcomes at local, regional and national scales.
Target 1	By 2020, at least 17 percent of terrestrial areas and inland water, and 10 percent of coastal and marine areas, are conserved through networks of protected areas and other effective area-based conservation measures.
Target 2	By 2020, species that are secure remain secure, and populations of species at risk listed under federal law exhibit trends that are consistent with recovery strategies and management plans.
Target 3	By 2020, Canada's wetlands are conserved or enhanced to sustain their ecosystem services through retention, restoration and management activities.
Target 4	By 2020, biodiversity considerations are integrated into municipal planning and activities of major municipalities across Canada.
Target 5	By 2020, the ability of Canadian ecological systems to adapt to climate change is better understood, and priority adaptation measures are underway.
Goal B	By 2020, direct and indirect pressures as well as cumulative effects on biodiversity are reduced, and production and consumption of Canada's biological resources are more sustainable.
Target 6	By 2020, continued progress is made on the sustainable management of Canada's forests.
Target 7	By 2020, agricultural working landscapes provide a stable or improved level of biodiversity and habitat capacity.
Target 8	By 2020, all aquaculture in Canada is managed under a science-based regime that promotes the sustainable use of aquatic resources (including marine, freshwater and land based) in ways that conserve biodiversity.
Target 9	By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem-based approaches.
Target 10	By 2020, pollution levels in Canadian waters, including pollution from excess nutrients, are reduced or maintained at levels that support healthy aquatic ecosystems.
Target 11	By 2020, pathways of invasive alien species introductions are identified, and risk-based intervention or management plans are in place for priority pathways and species.
Target 12	By 2020, customary use by Aboriginal peoples of biological resources is maintained, compatible with their conservation and sustainable use.
Target 13	By 2020, innovative mechanisms for fostering the conservation and sustainable use of biodiversity are developed and applied.
Goal C	By 2020, Canadians have adequate and relevant information about biodiversity and ecosystem services to support conservation planning and decision-making.
Target 14	By 2020, the science base for biodiversity is enhanced and knowledge of biodiversity is better integrated and more

	accessible.
Target 15	By 2020, Aboriginal traditional knowledge is respected, promoted and, where made available by Aboriginal peoples, regularly, meaningfully and effectively informing biodiversity conservation and management decision-making.
Target 16	By 2020, Canada has a comprehensive inventory of protected spaces that includes private conservation areas.
Target 17	By 2020, measures of natural capital related to biodiversity and ecosystem services are developed on a national scale, and progress is made in integrating them into Canada's national statistical system.
Goal D	By 2020, Canadians are informed about the value of nature and more actively engaged in its stewardship.
Target 18	By 2020, biodiversity is integrated into the elementary and secondary school curricula.
Target 19	By 2020, more Canadians get out into nature and participate in biodiversity conservation activities.