Great Bear Rainforest Order Operational Implementation Committee:

Annual Report Statement
May, 2019

Preamble

The Operational Implementation Committee's (OpIC) Annual Report is intended to update the CFN-MFLNRORD EBM Forum and the Nanwakolas-MFLNRORD EBM Forum (collectively, the 'Forums') on progress made towards implementing key indicators within the Great Bear Rainforest Order. While much effort has been directed towards the implementation of the Order, the process has proven challenging. Resultantly, the OpIC Chairs have drafted this Annual Report Statement to highlight key achievements and outline current and anticipated impediments with the intention of providing context for the Forums.

1. Accomplishments

OpIC's primary focus has been to establish the required elements necessary to meet legal obligations resultant from the LUO. Key highlights since its introduction are:

- Completion of the Red & Blue Field Manual
- Implementation of the Red & Blue Field Manual
- Initiated 17 LRD's within the plan area
- 4 LRD's at or near first iteration status
- FAQ communication regarding the Landscape Reserve Design Process
- Data management – TEM/PEM SSG implementation data, harvest depletion updates, SSG Representation table, yew and bear den reporting, web-mapping application development, other tables and spatial layers to support implementation
- Analysis and report drafting related to harvest bias
- Input on the G2G commissioned review of EBM for ecological goals in the GBR (Zielke Report, 2019)
- Participation in Coastal Experimental Watersheds discussions (assessments and monitoring, 2019)

2. Challenges

The GBRO's statutory and non-statutory environment is new, complex, and highly technical in nature. The perspectives of stakeholders, crown and First Nation governments is diverse leading to frequent differences of opinion as they relate to implementation objectives. Implementation of EBM within this context has proven challenging at times. Additional challenges are anticipated as the implementation process progresses. The co-chairs have highlighted some of the key current and anticipated challenges below.

Technical Issues

- Progress on LRDs has been slow because:
    - Tracking and planning to address the interplay between Plan Area legal and landscape level non-legal SSG targets is challenging and time consuming.
    - The process and outcome requirements are complex and difficult to communicate to non-technical and unfamiliar technical audiences
    - Efforts to address old forest representation requirements for all SSGs tends to conflict with efforts to address protection and stewardship of important First Nation values in the LRD process.
    - The terms and conditions of confidentiality agreements between First Nations and the LRD Lead/Technical Team require careful consideration. First iterations of these agreements have been slow to develop
    - Of the inability to use best available and consistent data for LRD planning (e.g., the inability to use updated inventory and lack of common access to consistent quality LiDAR)
    - LRDs at times have exceeded Managed Forest targets to meet stakeholder requests, with the outcome resulting in out of scope / potentially poor reserve designs
    - First Nation communities are engaging in multiple provincial and federal G2G processes and are capacity stretched, and the technical complexity of the LRD process and requirements creates a disincentive.
- OpiC's time and attention has often been distracted by tabling and pursuit by some members of issues that are outside of the scope of OpIC (e.g., discussions related to claims of harvest bias)
- There are sometimes differing priorities between the South and the North GBR

Governance Issues

- RSP involvement in technical committee's and sub-groups within OpIC has the potential to politicize outputs and create a divisive environment
- Multiple arrangements between Licence Holders and RSP has resulted in information lags and differing commitments making the process difficult to implement in a group setting
- OpIC requires clear direction and support from the G2G Forums related to key implementation issues

Conclusion

OpIC maintains that while EBM implementation is challenging and complex by it's very nature, it is an achieveable and worthwile goal. With minor adjustments to some of its technical and governance elements, we believe that implementation may be simplified and produce more robust and resilient results. OpIC members remain commited to the on-going process and the development of an effective relationship with the Forums.

2018 OpIC Annual Report
May 15, 2019

Prepared by the OpIC Annual Report Committee: Matt Garmon, Tyson Berkenstock (chairs), Tania Barnes, Scott Mitchell, and Jody Holmes.

Introduction

The Operational Implementation Committee (OpIC) Annual Report summarizes the yearly collective progress made by those responsible for implementing the Great Bear Rainforest Order. OpIC is convened by the CFN-MFLNRORD EBM Forum and the Nanwakolas-MFLNRORD EBM Forum (collectively the "G2G Forums"). The purpose of the OPIC to is to provide a working forum in which Nanwakolas, Coastal First Nations, MFLNRORD and Licensee technical representatives share information and collaborate to:

1) Provide coordination and support to the development, implementation and reporting of Landscape Reserve Designs (LRDs);
2) Provide coordination and support to forestry operating area recharting in the GBR Plan Area;
3) Track and report on information about key indicators of GBR LUO implementation;
4) Communicate with all licensees, G2G and LRD Technical teams; and
5) Develop and maintain a warehouse of GBR land and resource inventory and GIS data.

The OpIC submits reports on a quarterly and annual basis to the G2G Forum. Quarterly reports include verbal and written descriptions on progress. The annual report is a comprehensive, written summary which details implementation progress using key indicators defined by the G2G Forum. The key indicators (defined below) may be modified in subsequent years to include additional measures, at the direction of the G2G Forum.

OpIC Membership includes:

- 1 representative from each of the following; MFLNRORD, Western Forest Products Inc., Interfor Corporation, BC Timber Sales, Timberwest Forest Corp., Nanwakolas and 3 representatives from CFN.

The following outlines OpIC's commitments regarding Annual Reports:

On an annual basis, providing detailed written reports to the G2G Forums, which will be made publicly available via websites. Such written reports will summarize and present information related to:

a) Plan area Natural and Managed Forest targets
b) Old forest representation
c) LRDs completed, updated or amended
d) Unmitigated Managed Forest impacts
e) Inventory and information updates
f) Engagement with tenure holders and First Nations
g) Grizzly and Black bear dens
h) Western Yew retention areas
i) Other matters as requested by the G2G Forums

The purpose of the OpIC Annual Report is to track and report out on achievement of the plan area targets, summary of inventory updates and summarize engagement with tenure holders and First Nations. Each Annual Report is based on the previous calendar year, and is provided to the G2G EBM Forum by the end of February each year.

Definitions

- Plan area Natural Forest Target – is the area required to be identified and maintained in the Order areas that is a natural forest area that continues to grow older over time subject to natural disturbance and non-forest tenure activity and has an area of 3,108,876 hectares, as defined in Part 1, Division 3, Objective 6 of the GBRO.
- Plan area Managed Forest Target – is the area required to be identified and maintained in the Order areas that is an area of managed forest of 550,032 hectares that is or will be available for timber harvest, as defined in Part 1, Division 3, Objective 6 of the GBRO.
- Old forest representation – is the long term Old Forest Representation Target for a site series group(SSG). This amount has been set legally for each SSG for the plan area (Column A in Schedule G of the GBRO) and at the landscape unit level as part of the implementation targets which have been provided by the Province. https://ebmdata.ca/
- LRDs completed, updated or amended – LRDs means a system of landscape reserves in a landscape unit which is designated to meet requirements for old forest representation, and simultaneously contributes to protection of Aboriginal Heritage Features, Aboriginal Forest Resources and other land use objectives. List which LRDs have been completed or amendment in the applicable reporting year. Provide completion of LRDs in the context of what was planned for the year.
- Unmitigated Managed Forest impacts – is a means for tracking where a managed forest target is not achieved for a SSG within a Landscape Unit (LU) for the purposes of tracking and ensuring the legal managed forest targets over the plan area are met.
- Inventory and information updates – list any TEM or VRI updates that have taken place in the applicable reporting year.
- Engagement with tenure holders and First Nations – meaningful participation for all tenure holders and First Nations is integral to building the LRD. List which tenure holders and First Nations participated in the building of each LRD and any subsequent amendments.

Annual Summary

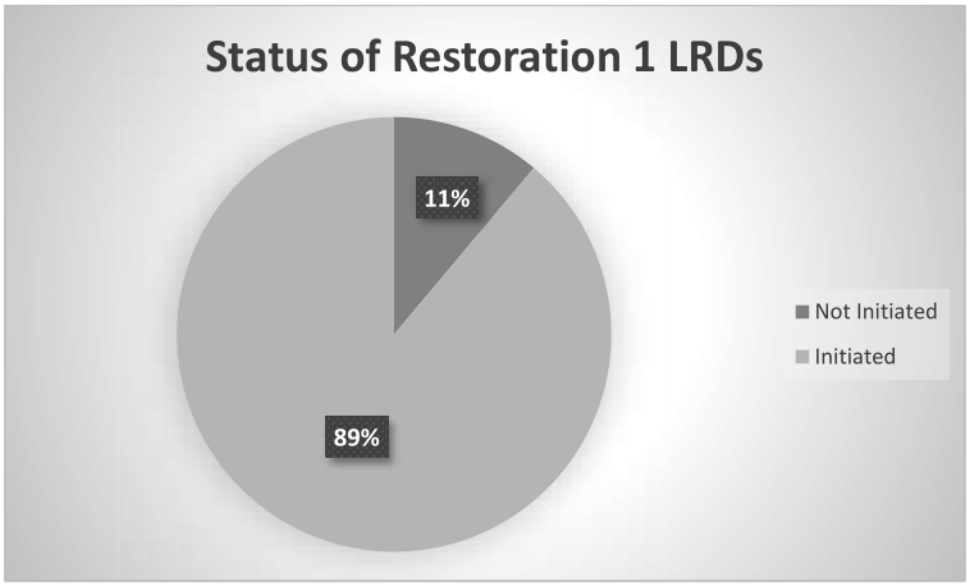
LRDs completed, updated or amended

As of December 31, 2018, of a total of 145 landscape units (LUs) in the Great Bear Rainforest, 23 are predominantly park, conservancy, SFMA or BMTA, therefore not requiring an LRD. Of the remaining 122 LUs that require LRDs, no LRD's have been completed to date. In total, 13 LRDs have been initiated, 11 of which occur in Restoration Type 1 LUs.

The GBRO identified nine Type 1 Restoration LUs and prioritized them for LRD completion including: Thurlow, Gilford, Whalen, Fulmore, Knight East, Gray, Estero, Lull-Sallie and Phillips. Of the nine Type 1 Restoration Landscape Units, 8 are in process and one (Whalen) has not yet been initiated. The Whalen

Landscape Unit is currently being deferred for LRD planning[1]. The completion status on an area basis of the Type 1 Restoration LRDs is shown in Figure 1.

Figure 1. LRD Status in Type 1 Restoration LUss on an area basis as of December 31, 2018

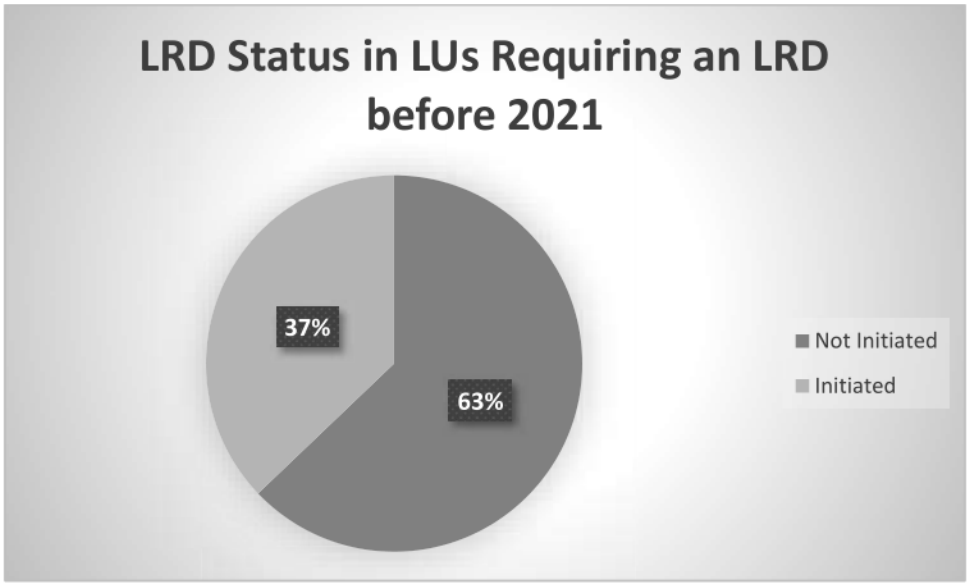


As per the GBRO, LRDs must be completed in all Type 1 Restoration Landscape units within two years of the date of establishment of the Order, or as soon as practicable thereafter. The data layer necessary to complete the LRDs was delayed and provided by the Province in June of 2017, resulting in delays in initiating and completing these LRDs.

Prior to 2021 LRDs must also be completed in any other LUs where harvesting is occurring or planned to commence prior to 2021. A preliminary assessment of how many landscape units will require LRDS prior to 2021 can be made based on recent past harvest history. Between 2016 and 2018, harvesting has occurred in 31 LUs, 5 of which are Type 1 Restoration LUs. Of those 31 LUs, harvesting did not exceed 10 hectares in three. Figure 2 illustrates the LRD status for those LUs where LRDs are required to be completed prior to 2021. Including the 4 additional Type 1 Restoration LUs without logging activity between 2016 and 2018 brings the minimum total number of LUs which will require LRDS prior to 2021 to 35 LUs. Further assessment of planned activity prior to 2021 may increase this number.

[1] Despite its status as a Restoration Landscape Unit, the Whalen LRD is deferred as there are no planned harvest activities. Tenure holders will continue to complete LRDs for priority Landscape Units where harvesting is anticipated or occurring. The Whalen LRD process will proceed prior to a tenure holder initiating harvest planning in this Landscape Unit or within 5 years of the establishment of the GBRO, whichever occurs first.

Figure 2. LRD Status in LUs where LU require completion prior to 2021 (i.e. Type 1 Restoration LU or harvesting has occurred, between 2016 and 2018)



Engagement with tenure holders and First Nations

A status update of engagement with tenure holders and First Nations for the LRDs, by Timber Supply Area (TSA), that were in process of completion in the reporting year is included in Table 1. Amendments that were completed in the reporting year are summarized in Table 2. Appendix 1 illustrates the distribution of the LRDs and their completion status throughout the GBR as of December 31 of the applicable reporting year. As of December 31, 2018, a total of 13 LRDs are currently in process. As per the LRD Framework, all First Nations whose traditional territory overlaps each respective LRD have been invited to participate on the tech team. Similarly, all forest tenure holders have also been invited to participate in the tech team.

Table 1. LRD completion status as of December 31, 2018

TSA	LU	Restoration Type 1 or 2	Trading Group	Status	First Nations engaged on Tech Team	First Nations engaged in review capacity	Tenure holders engaged on Tech Team	Tenure holders engaged in review capacity
GBR South	Estero	1	1	In progress		Kwiakah, We Wai Kai, K'omox[2], Wei Wai Kum[2]	Interfor (lead), TWest, BCTS	
	Fulmore	1	1	In progress	Wei Wai Kum[2], Tlowitsis[2], K'omoks[2], Da'naxda'xw/	We Wai Kai, Kwiakah	TWest (lead), BCTS, Interfor, Wei	

[2] represented by Nanwakolas Council

					Awaetlala[2], Homalco		Wai Kum[2], WFP	
	Gilford	1	2	In progress	Kwikwasut'inxw Haxwa'mis, Mamalilikulla[2], Tlowitsis[2]	Holmalco, We Wai Kai, Gwawaenuk	Interfor (lead), BCTS, TWest	
	Gray	1	1	In progress	Wei Wai Kum[2], Tlowitsis[2], K'omoks[2], Homalco	We Wai Kai, Kwiakah	TWest (lead), BCTS, Interfor, WFP	
	Huaskin	2	5	In progress	Gwa'Sala-Nakwaxda'xw	Gwawaenuk	BCTS (lead), Gwa'nak, Interfor	
	Knight East	1	2	In progress	Da'naxda'xw\Awaetlala[2], Mamalilikulla[2]	We Wai Kai, Wei Wai Kum[2]	Interfor, BCTS	
	Lull-Sallie	1	2	In progress	Da'naxda'xw/ Awaetlala, Mamallilikulla		Interfor (lead), WFP	BCTS
	Miriam	2	2	In progress	Kwikwasut'inxw Haxwa'mis	Gwawaenuk, Mamalillikulla[2], Dzawada'enuxw[3]	BCTS (lead), Interfor, WFP	
	Phillips	1	1	In progress	Kwiakah	Wei Wai Kum[2], Tla'amin, We Wai Kai	WFP (lead), Interfor	
	Stafford	n/a	1	In progress	Wei Wai Kum[2]	Kwiakah, We Wai Kai	WFP (lead)	
	Thurlow[4]	1	1	In progress		Homalco, We Wai Kai, Wei Wai Kum[2], K'omoks[2]	TWest (lead), BCTS, Interfor,	
GBR North	Don Peninsula	n/a	n/a	In Progress	Heiltsuk, Kitasoo		WFP (lead), Heiltsuk Forest Products, Interfor, Kitasoo Forest Products	
	Roderick	n/a	n/a	In progress	Heiltsuk, Kitasoo		WFP (lead), Heiltsuk	

[3] invited to participate but no response received to date

[4] Pilot LRD developed by Kremsater/Lewis. Formal LRD Technical Team will form in 2019.

							Forest Products, Interfor, Kitasoo Forest Products	
	Whalen	1	11	Not initiated				

Table 2. LRDs amended as of December 31, 2018

TSA	LU	Restoration Type 1 or 2	Trading Group	Date LRD amended	Nature of amendment	First Nations engaged	Tenure holders engaged

Inventory and information updates [5]

During 2018 there was a depletions update, a hard reserve update and an exclusions layer update incorporated into the Terrestrial Ecosystem map layer used for planning (now known as TP14c). In addition, there were also updates to the Grizzly Bear and the Northern Goshawk habitat layers.

Forest Analysis and Inventory Branch (FAIB) is in the early stages of a planned multi-year LiDAR acquisition initiative to support 'LiDAR-enhanced' VRIs. LiDAR will be used primarily to provide better information on tree heights and volumes. The Province is defining a LiDAR acquisition plan for the GBR.

Appendix 2 illustrates the relative proportion of the plan area that has TEM.

Plan Area Natural and Managed Forest Targets

Part 1, Division 3, Objective 6 of the GBRO requires:

- *3,108,876 hectares of forest to be identified and maintained as Natural Forest that continues to grow older over time; and*
- *550,032 hectares of forest to be identified and maintained as Managed Forest that is or will be available for timber harvest.*

To track progress on the spatialization of the targets, we have initially undertaken an aspatial regional analysis. This will be supplemented by increasingly spatial analysis over time as LRDs are completed.

An aspatial analysis of the Regional Managed Forest Target shows that it is currently possible to meet the 3,108,876 hectares regional Natural Forest target and the 550,032 hectares regional Managed

[5] Examples could include: TEM updates (periodic), harvest depletions (annual), broad inventory updates (age, FMLB) from new VRIs (periodic), THLB updates (periodic), GBRO exclusions layer (periodic) etc.

Forest target. There are ~596,000 hectares currently identified as THLB and potentially available to meet the Managed Forest Target at the regional scale. Of this amount of THLB, approximately 46,000 hectares is necessary to meet Old Forest Representation Target (OFRT) and Minimum Old Forest Retention Level (MOFRL) targets leaving a total of 550,032 hectares of Managed Forest. The regional Natural Forest Target is currently being met and tracked aspatially as the combination of both mapped non-THLB and the THLB needed to meet the OFRT and MOFRL targets. The age profile baseline of the Natural Forest has been calculated aspatially as of 2016 and will continue to be monitored over time as the forest cover is aged and depletions are updated.

As LRDs are completed, we are also tracking towards achieving these targets spatially. As no LRDs have reached the completion stage in 2018, reporting against these targets is not yet possible. In future Annual Reports, progress will be provided in Appendix 3.

Unmitigated Managed Forest Impacts by Landscape Unit

The Managed Forest targets have been provided to licensees at both the plan area which are legally enforceable, and at the Landscape Unit level, which are guidance targets that roll up to the plan area targets. If guidance targets are not met by landscape unit there is flexibility to offset impacts between Landscape Unit Trading Groups. Additional flexibility between trading groups may also be made available with specific G2G approval.

As no LRDs have been completed to date, it is not possible to report against specific Landscape Unit guidance targets at this time. A roll up of how much of the OFRT, the MOFRL and the Managed Forest target area has been spatialized by LU will be summarized in Appendix 4 in future Annual Reports. Appendix 4 will demonstrate both the total area of Managed Forest that is available aspatially and what portion of the plan area targets has been spatialized through completed LRDs in the reporting year compared to the guidance target amount expected.

Work is ongoing between the Thurlow LRD technical team and the Province to finalize the LRD and confirm or mitigate constraints and impacts. Thurlow LRD challenges and potential solutions will be fully documented to serve as learnings for other LRDs in the GBR.

Grizzly and Black bear dens

A common data structure for reporting of Grizzly and Black bear dens was finalized by OpIC in late 2018. Retention of bear dens is summarized in Table 3 of this report. Of the 7 bear dens identified and retained, 5 were retained in either stand level retention or LRDs.

Table 3. Identification and retention of bear dens

TSA	Landscape Unit	Number of dens identified	Number of dens retained
GBR North	Fish Egg	1	1
GBR South - Pacific	Gilford	2	2
GBR South - Pacific	Yeo	1	1
GBR South - Kingcome	Allison	1	1
GBR South - Kingcome	Broughton	1	1

TFL25	Stafford	1	1

Western Yew retention areas

A common data structure for reporting Western Yew retention was finalized by OpIC in late 2018. Retention of Western Yew is summarized in Table 4 of this report.

Table 4. Identification and retention of Western Yew

TSA	Landscape Unit	Occurrences of yew trees identified in conjunction with a development area (#)	Yew retained (ha)	Yew retained (#)	Yew harvested (ha)	Yew harvested (#)
GBR North	Draney	70	n/a	70	n/a	0
GBR North	Fish Egg	14	n/a	14	n/a	0
GBR North	Johnston	4	n/a	4	n/a	0
GBR North	Clyak	1	n/a	1	n/a	0
GBR South	Gilford	276	n/a	198	n/a	78
GBR South	Huaskin	1471	n/a	1,107	n/a	364
GBR South	Allison	61	n/a	61	n/a	0
GBR South - Kingcome	Belize	6	n/a	3	n/a	3
GBR South - Kingcome	Belize	21	n/a	18	n/a	3
GBR South - Kingcome	Belize	25	n/a	13	n/a	12
GBR South - Kingcome	Lull-Sallie	1	n/a	1	n/a	1
TFL 47	Fulmore	13		13	n/a	n/a
TFL 47	Gray	8		8	n/a	n/a
TFL 47	Thurlow	3		3	n/a	n/a

Appendices

Appendix 1. LRD Completion status (see map)

Appendix 2. TEM mapping overview (see map)

Appendix 3. No results available for 2018 Annual Report

Appendix 4. No results available for 2018 Annual Report

CFN-BC and Nanwakolas-BC G2G EBM Technical Teams, Great Bear Rainforest Order 2021 Review

Terms of Reference for the Review Process

Goal and Purpose

This Terms of Reference (ToR) provides a framework that will guide the CFN-BC EBM Technical Team and Nanwakolas-BC EBM Technical Team in collaborating to complete a review of Ecosystem-Based Management (EBM) implementation in the Great Bear Rainforest (GBR) by March 31, 2021 in a manner consistent with the Coastal First Nations Term Sheet (5.2), Nanwakolas Implementation Agreement (5.1.1) and Reconciliation Protocols (Appendix C).

Coastal First Nations Term Sheet (5.2)
The Parties will work with CFN to develop a protocol and terms of reference to complete a preliminary review of the proposed GBR LUO by March 31, 2021 and a more comprehensive review by March 31, 2026

Nanwakolas Implementation Agreement (5.1.1)
The Parties agree to undertake periodic reviews (limited review in March 2021, and more comprehensive in March 2026) of the Great Bear Rainforest Land Use Order (2016) and related land-use designations through the Nanwakolas Forum

The goal of the review is to reach consensus on recommended adaptive improvements in EBM implementation arrangements including potential amendments to the Great Bear Rainforest Order (GBRO) and changes to other GBR EBM policies and direction.

Purpose

The purpose of conducting the GBR EBM Review is to:

1. Assess the effectiveness of the GBRO and related GBR EBM policy and direction in relation to EBM ecological and human well-being goals;

June 26, 2019

2. Identify gaps and areas of potential improvement in the GBRO and related GBR EBM policies and direction; and,
3. Develop recommendations for the Province, the CFN member Nation, and Nanwakolas member Nation governments regarding amendments to the GBRO and changes to GBR EBM policy and direction.

Desired Outcomes

Through the EBM Review the CFN-BC EBM Technical Team and the Nanwakolas -EBM Technical Team will collaborate and seek to:

1. Understand the range of approaches being used to implement GBRO objectives;
2. Increase the effectiveness of GBRO objectives;
3. Reduce the complexity and increase the practicability of EBM ecological integrity management direction;
4. Enhance the opportunities and supporting policies intended to enable community level progress toward EBM human well-being goals; and
5. Improve arrangements for G2G and stakeholder information sharing, collaboration, communication and transparency.

Principles

The following principles will guide the review:

1. Decision-making on the review process and the development of recommendations to the Province and First Nations governments will be consensus-based;
2. Key forest sector and NGO stakeholders will have an opportunity to provide input and inform the recommendations;
3. Other First Nations will have an opportunity to provide input and inform the recommendations;
4. The review will be based on the most relevant and timely ecological and human well-being information, including scientific, indigenous and local information and knowledge; and,
5. The review of relevant EBM legislation, policy and direction will be timely, efficient and carefully consider the impact that revisions could have on ecological integrity and human well-being goals and objectives.

June 26, 2019

Scope and Deliverables

The GBRO review will consider and develop recommendations related to:

- Amendments to the GBRO, and
- Changes to policy and arrangements directly related to implementation of EBM in the GBR including supporting EBM management direction.

Membership, Roles and Responsibilities

Member names, affiliations for all designated CFN, Nanwakolas and BC representatives, and their respective roles and responsibilities are provided in Appendix A.

Meetings

The CFN-BC EBM Technical Team and the Nanwakolas -EBM Technical Team will collaborate to act as the Project Management Team and will convene meetings and conference calls on an as-needed basis.

A note-taker will record meeting notes and distribute notes to the G2G TT within a 2-week period. The Co-Chairs will then review comments, finalize meeting notes and distribute them to other members of the G2G TT.

Workplan and Milestones

The CFN-BC EBM Technical Team and the Nanwakolas EBM Technical Team will collaborate to follow the work-plan in Appendix B. The CFN-BC EBM Technical Team and the Nanwakolas EBM Technical Team may jointly or independently develop more detailed workplans as required to give direction to contractors and support staff tasked with completing specific research and analysis tasks.

General

Work under this Terms of Reference will be carried out in accordance with the provisions of CFN Term Sheet, Nanwakolas Implementation Agreement and the CFN-BC Reconciliation Protocol and the Nanwakolas-BC Reconciliation Protocol.

June 26, 2019

The CFN-BC EBM Technical Team and Nanwakolas EBM Technical Team will collaborate with the goal of achieving a consistent and coordinated process and timeline for the review. At any time CFN or Nanwakolas may engage directly with BC on matters specific to the interests of their respective member Nations.

Recommendations and other work products will be delivered to relevant CFN, Nanwakolas and Provincial decision makers for consideration and approval.

In the event the CFN-BC EBM Technical Team and/or the Nanwakolas EBM Technical Team are not able to reach consensus on bilateral or collective recommendations, it is anticipated that any additional consultative measures that may be required to discharge the legal obligations of the Parties could occur concurrently with consultation with non-participating First Nations.

Approved

M Child
_____Date: July 12, 2019
Merv Child, Nanwakolas Council

_____Date: August 20, 2019
Paul Kariya, Coastal First Nations - Great Bear Initiative Society

_____Date: July 10, 2019
Craig Sutherland, Assistant Deputy Minister
Ministry of Forests, Lands, Natural Resource Operations and Rural Development

June 26, 2019

Appendix A – LUO Review Roles and Responsibilities

Forum	Purpose	Representatives	Roles and Responsibilities
CFN-BC EBM G2G Technical Team and Nanwakolas-BC EBM Technical Team	• Standing group of senior CFN, BC, and Nanwakolas management and technical level representatives which collaborates when appropriate to oversee and coordinate EBM implementation including 2021 GBRO Review • Identifies and Resolves Technical Issues • Prepares a summary report of GBRO recommendations	CFN: Dan Cardinall Heiltsuk: Matt Garmon Metlakatla: Steve Lehnert Kitasoo: Evan Loveless Wuikinuxv: Andra Forney Nanwakolas: Jordan Benner BC: Ben Morton and Jeff Sheldrake Co-chairs for the 2021 Review: Dan Cardinall, Jordan Benner and Jeff Sheldrake	• Provide overall coordination of GBRO Review activities • Ensure the GBRO Review is managed in a fair, open and transparent manner, and that the G2G TT strives to meet target timelines. • Manage communications and information-sharing between the G2G TT members, analysts and support staff in an efficient and timely manner. • Address technical issues raised by the Analysis Team. • In the event the G2G TT is unable to reach consensus on a matter, and the matter is a technical issue, refer the matter to an issue-specific sub-committee. • Refer policy and other non-technical issues to the CFN-BC Governance Forum Working Group and the Nanwakolas-BC Working Group and BC designates as needed. • Maintain records of G2G TT issues and discussions related to the GBRO Review. • Jointly draft a G2G TT summary report which will include: GBRO Review consensus recommendations, description of unresolved issues, and views of all members on unresolved issues. • CFN and Nanwakolas representatives will engage the respective CFN Stewardship Directors Committee and Nanwakolas First Nations in the GBRO Review. • BC representatives will engage provincial staff as needed.
Analysis Teams	Undertake Analysis of GBRO Effectiveness and Options	Various CFN, Nanwakolas and FLRNO staff and independent contractors as required.	• Under direction of the G2G TT, undertake analyses required to complete GBRO Review • Provide G2G TT options and recommendations regarding technical issues. • Collaborate with G2G TT as required

Forum	Purpose	Representatives	Roles and Responsibilities
CFN-BC Governance Forum Working Group	Standing team of senior representatives of CFN and BC which manages and coordinates implementation of the amended CFNRP and other agreements including outstanding land use commitments such as EBM.	CFN: Paul Kariya and Guujaaw BC: John Allan, Mark Zacharias, Doug Caul	• Provides coordination and issue resolution support on request of G2G TT. • Coordinates discussions to address specific strategic and political issues among relevant CFN and BC officials.
Nanwakolas Council-BC EBM Working Group & Executive	Designated senior and executive representatives of the Nanwakolas Council and BC which direct and establish the scope of work undertaken by the EBM Forum's continued implementation of EBM in a manner consistent with the Nanwakolas EBM Forum Terms of Reference.	Working Group Nanwakolas: Merv Child BC: Jeff Sheldrake Executive Nanwakolas: Dallas Smith BC: John Allan	• Provides issue resolution support on request of G2G TT • Coordinates discussions to address specific strategic and political issues among relevant Nanwakolas and BC officials.
CFN, Nanwakolas, and BC Decision Makers	Designated representatives of Nanwakolas, CFN and BC who are mandated by their respective governments to make land and resource decisions.	First Nation elected and/or hereditary leadership as appropriate. Provincial Minsters or designates.	• Reviews the G2G TT GBRO Review recommendations and makes decisions in accordance with respective laws, policies and customs. • CFN and BC decision-makers have the option of referring issues back to the CFN EBM Forum. • Nanwakolas and BC decision-makers have the option of referring issues back to the Nanwakolas Council and BC designates.

Appendix B - 2021 GBR Order Review – Draft Work plan

Task	Activity / Deliverable	Description	Responsibility	Deadline
1.	ToR discussion	Review draft ToR and workplan and discuss 2021 scope and scale.	G2G TT	Dec 17, 2018
2.	GBRO ToR / Workplan - BC approvals	Review and seek approvals	BC	May 2019
3.	GBRO ToR / Work Plan	Submit to the CFN Stewardship Directors Committee and Nanwakolas Council for approval.	Nanwakolas / CFN	May - June, 2019
4.	Develop G2G preliminary summary of GBRO Issues and potential solutions.	Compile and scope preliminary list of GBRO issues. Identify potential legislative or policy solutions, where possible.	G2G TT	June - July, 2019
5.	Data Gathering and Monitoring Results	Compile and review best available information (analysis/monitoring project results) regarding the GBRO and EBM implementation issues. Sources include: • HWB Assessment and Community Engagement Project; • Ecological Integrity/HWB Review Project; • Nanwakolas Guardian Monitoring results • CFN Guardian Monitoring results • Analysis Team desk top GIS analysis • JSP/OPIC inputs • CEWs	G2G TT	April - November, 2019
6.	Following review of data gathering, analysis, and monitoring results, amend preliminary list of issues and proposals to improve EBM implementation effectiveness	G2G TT develop revised list of issues with proposed solutions – include impact/implication analysis and additional input from JSP.	G2G TT	November - March, 2020

Task	Activity / Deliverable	Description	Responsibility	Deadline
7.	s.16			
8.	Seek confirmation from Decision Makers on next steps.	Update for Decision Makers on progress, results of initial review/assessment. Seek approval on proposed next steps.	G2G TT	April – May 2020
9.	Update Workplan	Following feedback from Decision Makers, update work-plan (below)	G2G TT	May - June, 2020
10.	Draft GBRO Amendments	TBD		
11.	Stakeholder review and First Nations consultation	TBD		
12.	Draft Final Report on Proposed GBRO Amendments	TBD		
13.	Adoption of Recommended Solutions Package	TBD		
REVIEW and RECOMMENDATIONS COMPLETED				
14.	Consultation with FNs	TBD		
15.	LUO Amendment process	TBD		

Appendix C - BACKGROUND

In 2006 the Coastal First Nations (CFN)[1] and the Province of British Columbia (BC) entered into "Strategic Land Use Planning Agreements" (the "SLUPAs") and the "Land and Resource Protocol Agreement" (the "LRPA").[2] Under the SLUPAs and the LRPA, the CFN and BC agreed to implement Ecosystem-Based Management (EBM) in the Central and North Coast in a manner that maintains ecosystem integrity and improves human well-being concurrently over time.

During the same year Nanwakolas First Nations and BC signed a Land Use Planning Agreement in Principle (AIP) that committed to establishing a government-to-government (G2G) arrangement to develop and implement EBM within Nanwakolas First Nations' Traditional Territories in the South Central Coast, including portions of the Great Bear Rainforest.

In 2006, pursuant to the Nanwakolas AIP and following G2G discussions, BC established the South Central Coast Land Use Objectives Order (the "SCC LUO"). In 2007, pursuant to the CFN SLUPAs and the CFN LRPA and subsequent G2G discussions, BC established land use orders for the Central and North Coast (the "CNC LUOs"). Both the SCC and CNC LUOs include land use objectives that guide implementation of EBM. These LUOs were amended in 2009 to more fully implement EBM, and at that time the CFN, Nanwakolas and BC committed to complete a review of the LUOs by March 31, 2014.

In 2009, CFN and BC entered into a Reconciliation Protocol (the "CFNRP"). Schedule B of the CFNRP established collaborative arrangements for the CFN and BC to make land and resource decisions (CFN Engagement Framework). That year BC and Nanwakolas ratified the Nanwakolas Strategic Engagement Agreement (the "Nanwakolas "SEA") prescribing consultation levels and steps for land and natural resource management decisions in Nanwakolas member First Nation territories. In 2011, Nanwakolas and BC entered into a Reconciliation Protocol Agreement. While the CFN Engagement Framework and Nanwakolas SEA and RP have been amended, they both continue to apply to decisions the Province makes under the Land Act, including approval or amendments of LUOs. According to both agreements the signatories will collaboratively develop a special engagement process to amend LUOs.

A review of the 2009 LUOs was undertaken between 2013 and 2016. In March, 2016 BC rescinded the 2009 LUOs and established the Great Bear Rainforest Order (GBRO), following joint

[1] For the purposes of these terms of reference Coastal First Nations means the Metlakatla, Gitga'at, Kitasoo-Xaixais, Heiltsuk and Wuikinuxv nations.

[2] Coastal First Nations includes the Nuxalk Nation which signed their SLUPA in 2008.

recommendations from forest industry and conservation organizations, G2G discussions, and in accordance with the following CFN and Nanwakolas agreements signed in 2016:

- BC/CFN EBM Term Sheet (the "CFN Term Sheet")
- CFNRP Amended, 2016 (the "amended CFNRP")
- BC/Nanwakolas EBM Implementation Agreement
- Nanwakolas Reconciliation Protocol Agreement

In the BC/CFN Term Sheet and amended CFNRP the CFN and BC agreed to reaffirm governance arrangements for EBM implementation including establishing a G2G Technical Team to implement and monitor the GBRO and to work with Nanwakolas to complete a preliminary review of the GBRO by March 31, 2021. Similar commitments were made by BC and Nanwakolas in the EBM LoU which endorsed the BC/Nanwakolas EBM Forum to continue to oversee EBM implementation, to collaboratively engage with CFN as required, and to review the GBRO by March 31, 2021.

Since the establishment of the 2016 GBRO the CFN/BC EBM Technical Team and the Nanwakolas/BC EBM Forum have been collaborating on a joint EBM G2G Technical Teams (the "G2G TT") to oversee EBM implementation.

Following the CFN Term Sheet and the Nanwakolas EBM Implementation Agreement, the CFN, Nanwakolas, and BC (the "Parties") committed to develop a G2G process for the 2021 Review of the 2016 GBRO including commitments and requirements for G2G Discussions and Engagement. These terms of reference constitute that agreement and provide the parameters for the joint G2G TT to oversee the GBRO 2021 Review.

Schedule 1 –JSP & JSP-Province Benchmarks

Successfully achieving the goal of final implementation of EBM will be facilitated through the establishment of a limited numb er of benchmarks for bilateral work at the strategic and technical level that can be used for both internal and external accountability purposes.

The benchmarks listed in Schedule 1 are intended to frame the core working elements of JSP activity to achieve the final implementation of EBM. They reflect JSP elements of EBM that helped form the basis for the establishment of the 2016 Great Bear Rainforest Land Use Order on January 28, 2016 and the Great Bear Rainforest (Forest Management) Act on March 1, 2016 and the June 13, 2016 JSP letter from the province. Each element can be referenced to a number of documents that were negotiated between the Province and JSP as well as previous JSP agreements.

JSP will conduct an annual assessment of progress towards achieving final implementation of EBM including the benchmarks list ed below. The first such assessment was completed June 26, 2017 and will be shared with the Province when available. JSP will also conduct an independent assessment of progress against the JSP milestone agreements in 2021 and 2026, which will also be shared with the province

SCHEDULE 1: KEY JSP & JSP-Province BENCHMARK DELIVERABLES AND TARGET COMPLETION DATES

KEY BENCHMARKS (Responsibility)	DOCUMENT REFERENCES	Delivery Date	Provincial benchmark
GBRO IMPLEMENTATION			
1. Completed : a) **LRD Methodology** consistent with JSP MoA approach (G2G, JSP) i. Productivity/Leading Species Pilot Project (JSP) ii. Proposal for inclusion of language for 2 indicators (leading species/productivity and listed site series found in site series groups) (JSP to G2G) b) **LRD Framework** Consistent with JSP MoA approach (G2G, JSP) i. Proposal for inclusion of 2 additional indicators in LRD Framework Checklist (JSP to G2G) b) FSPs are consistent with implementing LRD Methodology (licensees, Prov)	JSP MoA LRD Methodology LRD Framework OpIC ToR	Complete* May 31 '19	Yes
2. Completed GBRO Background and Intent document Consistent with spirit and intent of JSP MoA approach	JSP MoA	Complete	Yes
3. Completed Ministerial Direction for LRD Methodology and First Nations Meaningful Engagement (Prov)	JSP MoA	Complete	Yes

4. Completed Red/Blue Listed Plant Communities and Old Growth Field Identification Manuals a) Completed final ToR for Red/Blue List Plant Communities and Old Growth Field Manuals (JSP, TW, G2G) b) Mutually agreed to expert selection (JSP, TW, G2G) c) JSP/TW signoff on final draft Manual (JSP, TW) d) G2G approval/endorsement & publication of final Manual (G2G) e) Operational direction consistent with Manuals is completed (CFCI/TW/JSP) f) Effectiveness Monitoring Framework for field Manual completed. g) Monitoring assessment report completed	LRD Methodology Appendix 7 and 8 GBRO definitions and Schedule N & O 2016 JSP letter from the Province s. 18 and Schedule 8 JSP/TW letter to G2G (Oct 15 '15)	**June 1 '19** Complete Complete Complete* Complete*Jun 30 '19 f) Initial draft g) 2021	YES
5. FSP amendments finalized and approved a) Submitted FSP amendments consistent with the GBRO, LRD Methodology and voluntary reference to the Red/Blue & Old Field Manuals(licensees) b) Timely approvals of FSP amendments (Province)	GBRO	Complete Complete	No Yes
6. Completed Landscape Reserve Designs as per GBRO (JSP/TW/G2G as appropriate, see below a) Training for QPs provided by Terry and Laurie (Prov) b) Finalized LRD Priority completion list OpIC c) Thurlow, Fulmore and Gray LRDs completed by Terry Lewis and Laurie Kremsater (or other mutually agreed consultants) collaboratively with **JSP/TW/G2G** d) Completion of LRDs in all Type 1 Restoration LUs (Licensees) e) Completion of LRDs in all areas with 30% total targets and/or LUs where road building or harvesting intended before 2021 Licensees f) Annual Risk Assessment (i.e until LRD completion in the GBR) - spatial monitoring of actual and planned harvesting i. *JSP REQUEST: GBR Future/Planned Harvest (i.e. cutblocks and/or roads) - planned (permitted and non permitted) harvest assessment (by MU, LU, licensee, seral class, SSG, SSS*). **(BC technical team is seeking direction on requesting licensees provide future/planned harvest. This is a new ask, not identified in JSP commitments (Sheldon, 2016) and would require an expanded provincial mandate.)** ii. Past Harvest (see 9e) **(Prov)**	2016 JSP letter from the Province s. 17(a)LRD Methodology LRD Framework GBRO s. 7(1)(a) GBRO s. 5(4)(a)	a) Complete b) In process c) In process d) on or before Dec 31, 2020 e) on or before Jan 29, 2021 f) on or before May 31st '19 and every September 30 2020 onwards until LRDS are complete.	Yes No Yes No No

7. Completed LRD Quality Assurance (G2G EBM Forums) a) Completion of QA process document b) Completion of Quality Assurance on a subset of representative LRDs	LRD Methodology LRD Framework	Oct 31, 2019 2020 Q1 onwards	Yes
IMPLEMENTATION OF GBRFM ACT AND ASSOCIATED REGULATIONS			
8. Finalization of GBRFM Act (Province)	Province Letter to JSP	Complete	Yes
9. Implementation of GBRFM Act (Province) a) Completed GBRFM Act associated Regulations b) Designate new AAC c) Subdivision and re-amalgamation of TSAs d) Designation of SFMAs e) Past Harvest Reporting - GBR Actual Annual Harvest Levels (2014-2018 & then annual updates) relative to FN undercut allocations and 25 million m3 over 10 years – 2014 onwards) **(BC technical team have a mandate to deliver on JSP commitments. Reporting on additional metrics beyond harvest volume is a new ask and not identified in JSP commitments (Sheldon, 2016). An expanded provincial mandate would be required.** *i.* harvest volume (***JSP REQUEST***: *and other mutually agreed to metrics as appropriate) (by MU/licensee and* ii. *ha by MU/LU/licensee (seral class, site series group, site series surrogate (productivity/leading species*)	2016 JSP letter from the Province – Schedule 2	Complete (a – d) e) by May 31 '19 and then by September 31 2020 annually onwards	Yes
NEW PROTECTED AREAS			
10. Final designation of new Protected Areas (SFMAs, BMTAS, Conservation Areas etc.) as appropriate (Province/G2G) a) **Decision re: potential revision to Park Act and/or GBR Act** b) **Final "tribal park" designation via revised Act**	2016 JSP letter from the Province	BC technical team expect direction from Executive on next steps early June. More detail will be provided once G2G have been briefed.	Yes
11. Completed BMTA Documentation (EBM bulletin) OR, Documented process for review of proposed activities within BMTAs		BMTA Management Planning – In process	Yes
INSTITUTIONAL MECHANISMS			

12. Completed mutually supportable institutional mechanisms frameworks (EBM Forums) as follows**:** a) Structure and process flow diagram that identifies how each of the institutions interacts with each other.	2016 JSP letter from the Province s. 25(a) utilizing Schedule 7 as a starting point for discussions	Complete	Yes
b) **Completed Terms of Reference to govern Prov-JSP Collaborative Strategic Implementation Committee** (CSIC) – which will include JSP roles in both technical and strategic problem solving **(Province/JSP)**	2016 JSP letter from the Province s. 16 and s. 25(b)(i) refers to Schedule F of the May 25, 2009 Letter from the Province (Steve Carr) to JSP as a starting place for discussion	Complete	Yes
c) **Decision support and transparency framework** including (JSP/G2G): i. Adaptive Management Function ii. Monitoring Function iii. Data Management Function	2016 JSP letter from the Province s. 25(c) utilizing Schedule 7 as a starting point for discussions	In process	Yes
d) **Completed "Developing Information to Support Decision Making"** schedule (Prov/G2G)	2016 JSP Prov Letter (schedule 4)	Sep 30, 2019	Yes
e) **Review/Refine Schedule: Social Choice Criteria, Transparency and Review Mechanisms as appropriate " (JSP/Prov/G2G)**	2016 JSP Prov Letter (schedule 5)	Sept 30, 2020	Yes
13. Plan Area and Regional OpIC a) OpIC ToR completed b) OpICs convened c) RSP invited to OPIC annual report committee d) OpIC Annual Report completed	As per OpIC ToR	Complete Complete Complete March 31 '17 and annually thereafter	Yes
14. Completed TOR for JSP EBM Implementation Committee (JSP)	JSP MoA s. 77(a) and (c)	Jun 30, 2019	No
COMMUNITY FOREST AGREEMENTS			
15. Completed mutually supported EBM Engagement proposal for CFA holders and proposal to Province/G2G (as appropriate) (JSP/CFA Holders) • Bella Coola CF have approached BC with interest in exploring EBM implementation. The Province will run initial analysis of new TEM data to assess what SSGs, if any, would put pressure on CFA operations. BC will also look at the distribution of red- and blue-listed plant communities to gauge the potential levels of retention required in those units. Further discussions between BC/BCCF will continue to explore potential inclusion in GBR.	2016 JSP letter from the Province s. 14	In process	Yes

16. Consideration of a CFA EBM engagement proposal from JSP as appropriate **(Province/G2G)**	2016 JSP letter from the Province s. 14	awaiting outcome of 15	Yes
ANNUAL REPORTING, PERIODIC REVIEWS, SOCIAL CHOICE			
17. Annual Reporting, Periodic Reviews, Social Choice (JSP) a) Completed annual JSP check-ins b) Review OPIC annual Report c) Determination as to whether an extraordinary social choice review is warranted	JSP MoA s. 77(e)(i)	On or beforeMarch 31, 2018 and annually onwards	No
18. Completed JSP 5 year Bilateral Review (JSP) a) Completed ToR for JSP independent assessment b) Independent assessor hired c) Completed independent assessment d) Provision of JSP recommendations to G2G (including determination as to whether a social choice review is warranted)	JSP MoA comment AU 48, s. 49(d)	**(Jan 31, 2020)** on or before Sept 15, 2019 Oct 1, 2019 Dec 31, 2019 Jan 31, 2020	No
19. Completed 5 year Periodic Review (Province/G2G)	2016 JSP letter from the Province s. 21	Mar 31, 2021	Yes
20. Completed preparation for 10 Year Routine Periodic Review (G2G, JSP) a) Completed review of timber supply review assumptions, baseline and sensitivity analysis (to begin up to 3 years prior) b) Completed review of implications of any New Legal Requirements	2016 JSP letter from the Province s. 20 JSP MoA	Mar 31, 2023	Yes
21. Completed JSP bilateral 10 Year periodic review (JSP) a) Completed ToR for JSP independent assessment b) Independent assessor hired c) Completed independent assessment d) Provision of JSP recommendations to G2G e) Completed JSP bilateral assessment of follow-up review schedule (10 years +)	JSP MoA s. 49 2016 JSP Province Letter	Sep 15 '2023 Oct 1, 2023 Dec 31, 2023 Jan 31, 2024 Feb 15, 2024	No
22. Completed 10 year Periodic Review (Province/G2G)	2016 JSP letter from the Province s. 21	Mar 31, 2026	Yes

Review of Ecosystem Based Management for ecological goals in the Great Bear Rainforest

By Ken Zielke RPF and Bryce Bancroft RPBio

For GBR Provincial Government and First Nations Government Decision-Makers

October 31, 2019

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Executive Summary

The Great Bear Rainforest (GBR) on British Columbia's Pacific Coast is globally significant for ecological, social and cultural values. Technically, ecosystem based management (EBM) implementation started 15 years ago with several updates since then. Industry professionals and ENGOs started implementing "transitional elements of EBM" as early as 2004. Two Land Use Orders to direct EBM were designed by provincial and First Nations governments and enacted by the province in 2007 and amended in 2009 and 2013. Eventually the two Orders were replaced in 2016 by one land use order - the Great Bear Rainforest Land Use Objectives Order (GBRO) after a review of implementation up to that point. This 2019 review is a part of the periodic 2021 review of the GBRO, committed to in 2016 by the province/First Nations GBR governing body known collectively as the G2G.

The purpose of this review was to determine the effectiveness of the program or system used to implement EBM in the GBR to enable suitable progress on its ecological goals. This review was not about determining whether implementation of EBM is effective to meet its ecological goals for ecological integrity. As well, this review does not directly address how the G2G bodies make their decisions and conduct their business nor examine GBRO objectives and related direction that is linked to indigenous/aboriginal interests.

EBM implementation in the GBR represents the culmination of millions of dollars in investment, decades of scientific investigation, analysis, multi-lateral discussions and negotiations between parties with different world views and priorities. Changes to the Land Use Order in 2016 increased the degree of complexity in EBM and its implementation framework, based on a multitude of agreements and memorandums of understanding.

Many positive advances to meet ecological goals have been made under the GBR's EBM approach. The proportion of protected areas and their effective distribution is unprecedented, comprehensive and scientifically credible, establishing a solid foundation for conservation of biological diversity in the region. Licensees are confident in their understanding of stand level requirements and their application of them on the ground. Examples exist of licensees going beyond legal requirements to meet the intent of EBM and address First Nations and local stakeholder priorities. And, the province, First Nations, industry and ENGOs have together learned a considerable amount about the science behind EBM through their implementation efforts.

Even so, the complexity of the GBR EBM approach remains a primary concern for all participants. Clearly, it is far too early in the implementation of the GBRO to diagnose or discuss failures against the ecological goals. Yet, issues are starting to emerge, both on the ground and in the implementation framework itself. We believe some of these issues should be regarded as warning signals that need to be proactively addressed.

Everyone is concerned right now that no landscape reserve designs (LRDs) have been completed when the GRBO requires that roughly over 40 LRDs be approved or established by

2021. Many across the spectrum of people we interviewed felt the legal targets for LRDs are too rigid and restrictive. Challenges in meeting all three LRD targets may be resulting either in weaker designs, from an ecological perspective, and/or significant impacts on the managed forest. Various LRD concerns about data, indicators and quality assurance are also emerging. Discussion of these issues has stalled progress on the LRDs themselves. Some success has been experienced addressing a few of these concerns using a third-party group of experts.

At the same time, concerns about harvest levels and sustainability are impacting progress on some LRDs. Industry and First Nations are working on some case studies that bring LRD and harvest planning together and some different approaches to harvest allocation which may better address some of these concerns.

Even though most licensees are confident in their implementation of EBM stand level requirements, which make up the bulk of the GBRO, success cannot be confirmed without comprehensive monitoring. Likewise, it is impossible to know if issues on the ground identified by First Nation stewardship offices and Guardian Watchmen are isolated incidents or more pervasive, or if other perceived concerns at the stand level are significant.

We believe a strong adaptive management program of implementation, effectiveness and validation monitoring combined with research is needed to support continuous improvement across the GBR. Some preliminary efforts are underway to get started on this work, but a framework for such a program is not yet in place. s.16

s.16

We have made some suggestions to develop an adaptive management program that will improve transparency while concentrating on questions of most concern to those involved in implementation. As well, we have suggested some changes in the implementation teams to help them be more responsive to solving issues before they become problems. We suggest a greater involvement of credible specialists collaborating with practitioners is important to ensure success. s.16

s.16 We also suggest changes to the GBRO to focus LRDs on "sound effective design" rather than on numbers. At the same time, we suggested some small adjustments and specific tasks to better facilitate implementation and success.

Lastly, we suggest that everyone involved in EBM implementation, particularly those at a higher level, remember that to be successful, EBM must continue to be viewed as a grand experiment, a learning experience that will shift and grow over time. A commitment to adequately resource continuous learning and management will be important.

Introduction

Ecologists began to identify key components of what would become 'ecosystem management' and then 'ecosystem based management' as early as the 1930s in North America. By the late 1980s a general 'ecosystem management' approach to land management was being advocated by many scientists, and a working definition emerged in the mid-1990's.[i] Ecosystem based management (EBM) evolved because of a concern that 'traditional' forest management practices were resulting in a 'biodiversity crisis', and because traditional management appeared to be failing to decrease the rate of loss of species and forested ecosystems.[ii] Its intent was to defend the intrinsic value of ecosystems to maintain social and economic options for future generations.

Today, EBM is recognized at a global policy level through, for example, the Malawi principles, which guide the implementation of the Convention on Biological Diversity (UNEP 1998; CBD 2014).[iii, iv] In Europe it has become one of the main guiding principles in environmental governance at national, regional, and local levels.[v, vi, vii]

The Great Bear Rainforest (GBR) on British Columbia's Pacific Coast is globally significant for ecological, social and cultural values. With 64,000 square kilometres of area on BC's Central and North Coast, the GBR is fifty percent larger than Switzerland and almost as large as Ireland. The GBR represents one quarter of the world's remaining coastal temperate rainforest and is part of the largest remaining intact rainforest system left on the planet.[viii] Temperate rainforests are rare ecosystems found in only eleven regions of the world, mostly in coastal zones with heavy rainfall. The province and local First Nations have committed to protecting one third of the region, while implementing an EBM approach to guide forestry and other activities on the "managed landbase" outside of protected areas.

In 2004, the Coast Forest Conservation Initiative (CFCI) group of forest companies began voluntarily implementing seven transitional EBM elements from the land use plan within the Central Coast area under an agreement-in-principle with major ENGOs in the Rainforest Solutions Project (RSP). The primary guidance for this work was the 2004 EBM Handbook, which brought together several years of scientific work completed by the Coast Information Team.[1] At the same time, the province and local First Nations began to negotiate agreements

[1] The Coast Information Team (CIT) was an independent, multidisciplinary group established and supported by the Provincial Government of British Columbia, First Nations governments, the forest industry, environmental groups, communities and later the federal government, as part of the implementation of the 2001 CCLCRMP (Central Coast Land and Coastal Resource Management Planning) Phase I Framework Agreement. The CIT operated under a joint Memorandum of Understanding between these parties. The purpose of the CIT was to provide independent information and analyses for the development and implementation of ecosystem-based management in the north and central coastal region of British Columbia, including Haida Gwaii/Queen Charlotte Islands. The CIT was led by a management committee and the technical team was made up of nine project teams. These teams consisted of scientists, practitioners, and traditional and local experts from the Provincial Government, First Nations, environmental groups, the forest industry and communities.

culminating in a legal approach to EBM articulated in two 2007 land use orders, one for the South Central Coast and one for the Central and North Coast.

The two Land Use Orders were amended in 2009 and 2013. Eventually the two Orders were replaced in 2016 by one land use order - the Great Bear Rainforest Land Use Objectives Order (GBRO) after a review of implementation up to that point.[ix]

Technically, EBM implementation started 15 years ago with several updates since then. This review is a part of the periodic 2021 review of the GBRO committed to in 2016 by the province/First Nations GBR governing body known collectively as the G2G.

Purpose and Approach

The purpose of this review was to determine the effectiveness of the program or system used to implement EBM in the GBR to enable suitable progress on its ecological goals. Specifically, the objectives of this review were to:

1. Examine the EBM ecological goals/intent related to ecological integrity within the GBR for its implementation direction.
2. Explore and describe the expectations of the EBM program/system[2] for progress toward EBM ecological goals at different spatial scales.
3. Explore and describe the program/system design for implementation of EBM.
4. Qualitatively investigate EBM implementation with the following question - Is the program/system used for EBM implementation in the GBR designed to effectively enable sufficient progress on its goals for ecological integrity?
5. Provide recommendations to improve EBM program/system design and implementation going forward.

Not within the Scope of this Review

This review was not about determining whether implementation of EBM is effective to meet its goals for ecological integrity. First, it is too early in the process of implementation for such a determination to be useful. Secondly, such assessment would require extensive detailed field-based ecological sampling and analysis, which is a much larger project.

The focus for this review of implementation was on systems, processes and people. It was intended to help improve the likelihood that ecological goals will be met over time.

This review did not evaluate the processes, relationships or functioning of the province-First Nations (G2G) governing bodies of decision-makers. Rather, the review focused on the system, processes and people more directly connected to the ecological integrity side of EBM implementation, who inform and bring issues to the G2G for decisions. This is not to say that the G2G will not find ideas in this review useful in their decision making. Nonetheless, this

[2] Program / system - is the directing framework, delivery structure and manner in which EBM is implemented.

review does not directly address how the G2G bodies make their decisions and conduct their business. Neither did it address GBRO objectives and related direction linked to indigenous/aboriginal interests.

Approach

General approach to the project

The focus of this review was to talk to those involved in implementation of EBM about progress toward ecological goals. s.16
s.16

To further explore the intent, structure and function of the EBM implementation program in the GBR we reviewed legislation, regulations, land use orders, negotiated agreements, published literature, reports, planning documents, guidance documents, and other related documents and data.

Approach to this report

The sections that follow in this report use the facts obtained from both the interviews and the document review. First, we explain our understanding of the EBM ecological goals and then the EBM implementation framework in the background section. In the next section, we present our findings regarding how well implementation is working to make adequate progress on its ecological goals, based on what people told us.

Throughout the document, after every major or discreet topic we present some "authors' observations" in yellow text boxes. These summarize some key points, highlight our general thoughts about the topic and, present ideas to address concerns and issues that are emerging. In effect, they serve as mini-conclusions for each significant section or subsection. We also have a "conclusions" section at the back end of the report that provides a higher level amalgamation of these thoughts. We approached the report in this manner because we felt it would be more convenient to the reader to see our conclusions for each topic after we had presented the facts as we understood them, then to summarize those conclusions at the end.

EBM Ecological Goals in the GBR

Historic Origins

In 1994, the United States Forest Service described EBM as an ecological approach to management that blends the needs of people and environmental values in such a way to produce diverse, healthy, productive and sustainable ecosystems.[x] The 2004 EBM Handbook, and other early CIT documents, refer to the GBR's dual EBM goals to maintain ecological integrity while promoting human well-being. [xi, xii, xiii] The EBM handbook defined ecological integrity as:

> *The abundance and diversity of organisms at all levels, and the ecological patterns, processes, and structural attributes responsible for that biological diversity and for ecosystem resilience.*

Holt et al. (2004) explained that key aspects of ecological integrity include maintaining normal ecological functions under varied conditions, resilience to stress and continued self-organisation.[xiv] They suggested "normal function," "resilience," and similar components of ecosystem integrity are often captured operationally using measurable surrogates such as: amount of unmanaged forest, amount of structural retention, amount of disturbed soil, amount of buffered stream length and other such indicators. These aspects of ecological integrity were later explicitly defined in measurable terms within GBR legislation and land use orders.

Legislation and Land Use Orders

Legislation enacted in 2016 to support continued implementation of EBM in the GBR includes: the GBR Forest Management Act, the GBR Forest Management Regulation and the GBR Special Management Areas Regulation. The Special Management Areas Regulation describes new protected areas set aside in the GBR in 2016. The GBR Forest Management Act and regulations designated the GBR as a forest management area with new Timber Supply Areas (TSAs) replacing previous TSAs in the area. It also allowed for modifications to the application of the Forest Act in the GBR. An allowable annual cut (AAC) is stated in the Act for the entire GBR forest management area and the new TSAs within it, allowing for periodic re-determinations of AAC by the provincial Chief Forester as are normally provided under the Forest Act after 2026 (the end of the AAC adjustment period for EBM). The GBR Forest Management Act and Regulations also describe how the various legal tools associated with managing AAC within the GBR will apply.

A land use order is the legal instrument used by the province to define specific legal requirements for EBM planning and practices in the GBR. Under the current Forest and Range Practices Act (FRPA) licensees must prepare a forest stewardship plan that is consistent with the current land use order, the Great Bear Rainforest Land Use Order (GBRO).

The preamble to the GBRO broadly commits to maintaining ecological integrity under EBM, stating ecosystem integrity is being maintained when adverse effects to ecological values and processes are minimal or unlikely to occur. The GBRO has prescribed legal requirements stated as "objectives" related to elements of ecological integrity. These elements include:

- Functional riparian forest
- Fens, marshes, forested swamps, active fluvial units, aquatic/fish habitat
- Upland streams generally.
- High Value Fish Habitat and Important fisheries watersheds
- Ecological representation, red and blue listed plant communities, landscape reserve design, restoration zones and restoration landscape units and managed and natural forest area.
- Stand level retention and retention of western yew
- Grizzly bear habitat, black bear dens and Kermode habitat

As a 34-page package with 19 schedules, these legal requirements are intended to direct management of the amount, type and severity of disturbance associated with timber harvest and related activities to maintain the natural diversity of species, biological communities, ecological processes and functions (including the ecosystems' ability to adequate recover from the disturbance).

The GBRO legal requirements, intended to maintain ecological integrity, are based on millions of dollars of scientific and technical work, numerous reports, analyses, reviews and guidance documents prepared by independent scientists, practitioners and traditional and local experts first in the CIT in the early 2000's[xv] and later by collaborative working groups and technical teams comprised of provincial government, First yNation, ENGO, and Industry technical and professional representatives.

The 2016 GBRO built on the 2007 Land Use Orders that were amended in 2009 and again in 2013. ENGOs wanted to move EBM forward toward the goal of "low ecological risk" in the GBR, while industry wanted to maintain acceptable economic opportunities. First Nations looked to protect all cultural and ecological elements important to them, while continuing to develop the G2G relationship and gain more economic opportunities for their coastal communities. At the same time, recommendations from the Forest Practices Board and others to improve definitions, direction and guidance for EBM were also being considered.[3, xvi, xvii, xviii]

Preparation of the GBRO started with a request from the provincial government to the Industry and ENGOs that together comprise the Joint Solutions Project (JSP – see inset). JSP took several years to produce 80 pages of complex recommendations for EBM. ENGOs were satisfied that the document addressed their desire to meet their interpretation of low ecological risk.[xix] Industry participants modelled various scenarios for application of the recommendations and felt the impacts on timber supply were acceptable. The modeling by JSP informed more detailed analysis at the G2G table of timber supply and carbon budgets which led to agreement on the the AAC set in the GBR Forest Management Act.

The Joint Solutions Project (JSP)

In the mid 1990's the ongoing Central Coast LRMP process was experiencing significant resistance from ENGOs concerned that some forest companies were continuing to harvest and planning to develop in areas the ENGOs considered to be especially sensitive, while the LRMP was not addressing the most important ecological issues.[xx] The group of ENGOs, known as the Rainforest Solutions Project (RSP) eventually initiated an international boycott campaign against forest companies operating in the central coast.

By 1999 major forest companies operating in the area formed the Coast Forest Conservation Initiative [CFCI] and agreed to stop harvesting operations in contested areas providing the environmentalists stopped their market campaign. In 2001, CFCI joined with RSP in a collaborative arrangement called the

[3] While the GBRO was being prepared, in 2014, residents of Sonora Island complained to the Forest Practices Board about harvesting of old forest and rare plant communities in the Southern GBR on Sonora Island. The Board made recommendations to government to improve definitions and guidance in the GBR and these recommendations were considered in the preparation of the GBRO.

Joint Solutions Project (JSP), dedicated to finding innovative solutions to management challenges in the Great Bear Rainforest. JSP includes forest industry professionals from the Coast Forest Conservation Initiative which includes Interfor Corporation, Western Forest Products, Catalyst Paper, Howe Sound Pulp and Paper and BC Timber Sales, together with ENGO representatives from the Rainforest Solutions Project which includes ForestEthics, Greenpeace and Sierra Club of BC. The group continues to operate under agreements to use a collaborative process to find innovative solutions in the Great Bear Rainforest.

JSP provided their recommendations document to the G2G, who after lengthy discussions adopted most of the recommendations as part of a broader package that included establishment of new land use objectives intended to provide enhanced protection and stewardship of aboriginal heritage features and related values. Industry told us they were surprised - they thought the JSP recommendations would be simplified by the G2G, but as the JSP recommendations were translated into legal language, they became more complex.

Also, in 2016 the G2G collaborated to prepare a 46-page Background and Intent document (BID) to provide supplemental information regarding the intent of the legal objectives in the GBRO, and context for understanding and implementing the objectives. The overall goal was to facilitate a clear understanding of the GBRO. For each section of the Land Use Order, the BID provides relevant definitions and a scientific and/or technical rationale for the requirements (legal objectives in the Order). The BID also goes on to provide guidance, occasionally very detailed, for implementation of individual GBRO requirements. We expect that the 2016 BID provides more clarity than the 2008 BID, although this is not stated in the document.

JSP believe they have clarified their shared understanding of the "spirit and intent" of EBM in their various agreements.

Authors' Observations

Groups involved in the GBR from local First Nations communities, provincial/international ENGOs, forest industrial companies and the provincial government collaboratively designed a conceptual understanding of "maintaining ecological integrity" consistent with the scientific literature. They used this understanding to design an EBM system currently reflected in the 2016 GBR legislation, land use orders and intent documents.

EBM under the 2016 GBRO represents the culmination of millions of dollars in investment, decades of scientific investigation, analysis, multi-lateral discussions and negotiations. It is nothing short of monumental in its achievement. To reach agreement across numerous highly diverse groups with different priorities, world-views and values on an approach to management that respects the current science is commendable.

There are several other points worth highlighting. Firstly, the approach to EBM was recognized to be complex at the time the 2016 GBRO was enacted. Some who were involved in its creation were surprised at its ultimate complexity. Secondly, the specific EBM requirements in the GBR were almost entirely developed by forest industry professionals and ENGOs. Some members of G2G were skeptical that the complex ecological targets could effectively be implemented, but supported moving forward with the GBRO as part of a broader G2G agreement on continued

EBM implementation. As a result, participating First Nations and the province approved the requirements and gave them legal standing.

The EBM Implementation Framework

In March 2006 a number of First Nations in the GBR and the province entered into Strategic Land Use Planning Agreements (SLUPAs), a Coastal First Nations-BC Land and Resource Protocol (LRP) and a Nanwakolas-BC Land Use Planning Agreement in Principle (AIP) wherein they agreed to implement Ecosystem-Based Management (EBM) in the Central and North Coast area ("the Great Bear Rainforest" or "GBR Plan Area"). In March 2009 First Nations that were signatory to the LRP and the AIP and the Province agreed to a definition of Full Implementation of EBM.

In 2014, the Supreme Court of Canada's unanimous Tsilhqot'in decision shifted the legal landscape and reinforced the need for the Province to reconcile how it engages with First Nations to manage the land base. In July 2017, the Province committed at a strategic level to working towards the implementation of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and the Truth and Reconciliation Commission (TRC) Calls to Action, by working in partnership with Indigenous peoples of British Columbia to establish government-to-government (G2G) relationships built on a foundation of respect, rights, and reconciliation. This commitment is already reflected to an extent in the structure of EBM implementation. The province and First Nations are working to further strengthen this commitment in the EBM governance framework.

EBM implementation is supported by a collaborative framework (Fig 1). The framework was mostly informed by the agreements mentioned above and the 2014 JSP agreement, which also informed the development of the GBRO. Ultimately decision-making rests with each First Nation and the provincial decision-makers.

Government-to-Government Governance Forum

The government-to-government (G2G) province-First Nations governance forum brings together senior representatives of the Coastal First Nations (CFN)[4] organization representing member Nations from the north and north-central coast and, the Nanwakolas[5] First Nations (Nanwakolas) representing member Nations from the south-central coast, together with senior ministry executives from the Ministry of Forest Lands, Natural Resource Operations and Rural Development (FLNRORD), the Ministry of Indigenous Relations and Reconciliation and the Ministry of Environment and Climate Change Strategy. This group considers issues and

[4] CFN member Nations include the Wuikinuxv Nation, the Metlakatla First Nation, the Kitasoo Indian Band, the Heiltsuk Nation, the Gitga'at First Nation and the Nuxalk Nation.

[5] The Nanwakolas member Nations include the Mamalilikulla-qwe'qwa'sot'em First Nation, the Tlowitsis First Nation, the Da'naxda'xw awaetlala First Nation, the Gwa'sala-'nakwaxda'xw First Nation and the K'omoks First Nation.

coordinates matters that are political and strategic in nature and often broader than just the GBRO, settling disputes that cannot be resolved by groups lower down.

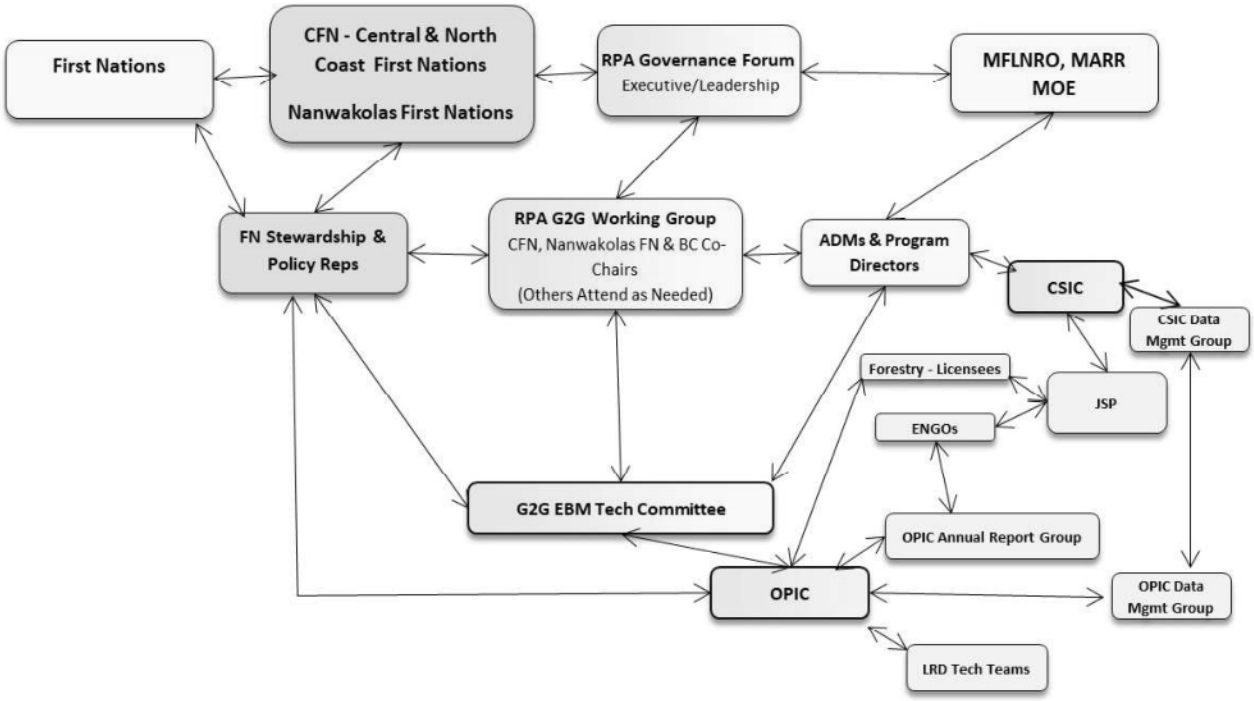

Fig 1. Logic model for the EBM implementation process. At the G2G Working Group level, CFN and Nanwakolas have separate tables. They come together on particular common issues, but general the tables work independently.

For both umbrella First Nations groups, the CFN and the Nanwakolas, the term G2G refers to the arrangement established by their respective Reconciliation Protocol Agreements signed with the province of BC.[xxi, xxii]

G2G Governance Forum Working Group (GFWG)

There are 2 GFWGs, one for CFN and one for Nanwakolas. Generally, they operate independently but occasionally come together to address common issues and work activities. It is in these groups that the government bureaucracies come together for most high level problem-solving related to the GBR. The GFWG coordinates discussions, works for, and reports to their respective First Nations Executive and Senior Management and the provincial resource Deputies Committee who report to their respective Ministries.

Through the GFGW, First Nations stewardship and policy reps may meet with Deputy Ministers and other senior officials to discuss implementation issues being addressed at the technical level and to set priorities. The province takes the results of these discussions to coordinate options to facilitate actions within the planning framework.

This group also provides the mandate for the EBM review process and the approval of solutions resulting from that process. The GFGW also oversees other initiatives including recharting, developing tenure options, timber supply, carbon budget analyses, ministerial direction letters to statutory decision-makers and other projects not directly related to the GBRO. The group has a dispute resolution mechanism. Implementation issues that cannot be solved lower down in the G2G technical level may be pushed up to this level. Members of the GFGW report that in-between EBM reviews no implementation issues have been raised from the technical level to the GFGW.

G2G EBM Technical Team

Under the umbrella of the GFWG, the G2G EBM Technical Team coordinates and directs EBM policy and technical work on a G2G basis.[6] This group includes key policy and technical-level staff knowledgeable of EBM implementation. This group addresses broad implementation challenges and issues, considering the implications and options and will advise the GFWG.

The EBM Tech Team has FLNRORD and First Nations co-chairs and other representatives from FN working committees and the province. Specifically, they coordinate and oversee delivery of the technical aspects of the EBM Term Sheet - signed by First Nations umbrella groups and the province to evidence their continuing efforts to work together towards the continued full implementation of EBM as agreed to by the parties in 2009.[xxiii] This work may include: management plans for special management areas or conservancies; overseeing implementation of any Landscape Reserve Designs (LRDs), including LRD technical oversight, quality assurance, and planning issue resolution; monitoring, research and compliance auditing related to EBM implementation; maintenance of inventory and planning data for the GBR LUO area; and other matters as directed by the working group

Members say there are lots of 'moving pieces' in the background not directly related to EBM that nonetheless provide important context for the discussion that occurs within this group.

Collaborative Implementation Steering Committee (CSIC)

CSIC brings together the province and key GBR stakeholders represented by JSP. Its erms of reference states that CSIC is intended to "oversee the effectiveness of collaborative JSP stakeholder engagement, and that oversight may be delivered through several connected working groups and committees." The TOR goes on to say the "CSIC structure links to the G2G governance structure through the channels appropriate to the given issue/item."

The province says CSIC is JSP's avenue into the G2G EBM Technical Team providing ideas and recommendations to this group for consideration. Basically, if JSP has a substantive issue for the G2G EBM Technical Team to consider, they present it through CSIC.

A foundational document for CSIC is a June 22, 2016 letter of understanding between JSP and government.[xxiv] JSP says the content of the 2016 letter was essentially written by them as a list

[6] This work is conducted without prejudice to consultation requirements unless specified otherwise.

of items they felt were important to be addressed for proper EBM implementation. They said the province turned it into a letter which was signed by the Deputy Minister at the time, Tim Sheldan. The letter forms a list of commitments between the two parties. For example, in it, the province committed to work with JSP to develop a mutually supportable institutional mechanisms framework. It also acknowledged continued support from JSP for EBM implementation is contingent on outcomes meeting expectations in the JSP recommendations, or successful problem-solving between the province, First Nations and JSP.

The letter has detailed commitments related to agreements, terms of reference, guidance documents, timelines and other specific details related to implementation activities such as the LRDs. As such, this letter became important direction for implementation, subject to discussions and process at the G2G tables. Progress on commitments established in the 2016 Letter are tracked by the Province and JSP through a benchmark deliverables document[xxv]

Operational Implementation Committee (OPIC)

OPIC is a group of industry and First Nations professionals who work to determine how to best implement the GBRO direction for EBM, according to their terms of reference which is subject to G2G approval. It is the primary implementation policy group. Under the GBRO, there is a legal obligation for industry licensees to implement EBM, but under G2G policy they must work with FN. The group is therefore comprised of professionals from Western Forest Products, Interfor corporation, BC Timber Sales, TimberWest, Nanwakolas and CFN. The group has two co-chairs representing the forest industry and First Nations. The MFLNRORD has a technical representative on this committee, but only as an advisor.

Technical specialists attend and contribute to OPIC from time to time. Also, technical reps from other forest licensees and First Nations are invited to participate on matters directly affecting them including: assessing and recommending changes to Plan Area representation targets and/or minimum landscape unit old growth retention levels; resolving potential disproportionate wood flow impacts; resolving LRD issues with LRD technical teams; and recommending LRD issues to G2G Forums for resolution, when they cannot be resolved within OPIC. OPIC has a responsibility to communicate out to all forest licensees.

The OPIC TOR emphasizes that effective and efficient implementation of many aspects of the GBRO will require good faith cooperation and information sharing among Forest Licensees operating in the GBRO area, particularly with respect to Landscape Reserve Design (LRD) development, operating area recharting, regional and subregional implementation monitoring, and information management. A key principle for the OPIC is "fair and equitable outcomes at the appropriate scale." OPIC members are to make their best efforts to reach consensus. If they cannot do so, the issue gets bumped up to the relevant G2G forum for resolution. To date, this has rarely been done.

The OPIC TOR underscores a role for OPIC on the roll-out of LRDs. Specifically, OPIC is to provide coordination and technical support for the establishment, development and implementation of LRDs. OPIC is to tracks progress on LRDs and compile aggregate information about completed LRDs. OPIC also is intended to provide direction and assistance

to LRD technical teams, resolving issues and facilitating trades of pertinent targets between technical teams. Where issues cannot be resolved by OPIC, they are forwarded to the G2G EBM Technical Team for resolution. OPIC also: coordinates EBM training opportunities; provides coordination and technical support for licensee area re-charting discussions; makes recommendations to G2G forums on adjustments to GBRO targets based on new or updated inventory data.

There are two key OPIC subcommittees – the OPIC data management group and the OPIC annual reporting group. The data management groups helps MFLNRORD maintain a document archive and data warehouse, and provides the technical support to the LRD technical teams. The OPIC annual reporting group reports out an annual basis, publicly-available, written reports summarizing information related to: GBR Natural and Managed Forest targets, old forest representation, completed, updated or amended LRDs, unmitigated Managed Forest impacts, inventory and information updates, First Nations, grizzly and black bear dens and, engagement with other tenure holders.

LRD Technical Teams

LRD Technical teams are convened by licensees as needed to undertake development of LRDs for specific landscape units to meet coarse landscape level GBRO targets for biodiversity and other ecological objectives, as well as those for heritage and traditional cultural values.[xxvi, xxvii] LRDs are an intermediate level planning product that provide a bridge between strategic and site level planning over time (For more information on LRDs, see APPENDIX 1).

A framework and planning method for the preparation of strategic landscape reserve designs (SLRDs) was agreed to in April 2009 under the previous Land Use Orders. Over the next two years planners and technical teams modelled and designed SLRDs for all of the landscape units in the GBR Plan Area. The Province provided funding to First Nations through Strategic Landscape Unit Planning Agreements (SLUPA) and Coast Sustainability Trust (CST) to participate in the design process. These initial SLRDs had no legal or regulatory standing and were implemented as general guidance for operational planning. Also, the SLRDs sought to spatially address representation targets under the previous land use order that were significantly less complicated than those under the GBRO.

The GBRO requires all holders of licenses or tenures with an AAC of more than 20,000 m^3 per year, to develop and implement LRDs for the landscape units they will be operating in. Direction within the GBRO is sufficiently different from previous Land Use Orders that it was decided an LRD would not build on an existing SLRD, but would be built independently based on its own criteria.

In accordance with the LRD Policy Framework, each technical team should include: all licensees with an interest in the landscape unit (or group of landscape units), First Nations representatives and a lead qualified professional who is responsible for the process. The licensee with the greatest interest in a landscape unit or groups of landscape units will often take leadership for the LRD technical team as the "lead licensee."

Initially the lead professional collates and integrates common EBM datasets and other landscape-specific information. The LRD Technical Team and/or the lead professional undertake engagement with applicable First Nations who are not participating directly in the LRD Technical Team and also initiate contact to gather input from other relevant licensees and stakeholders.

The lead professional and the LRD technical team prepares a first iteration draft of the LRD following the 2016 methodology.[xxviii] The lead is supposed to circulate this first iteration LRD to applicable First Nations, licensees and stakeholders for review, comment and input. The lead then reviews and discusses input received with the LRD Technical Team, assesses the design for deficiencies as per the LRD Methodology, adjusts the design as required to produce a final iteration of the proposed LRD. Final iterations are then circulated for a final round of review and comment to LRD Technical Team representatives and are subsequently submitted to OPIC along with a written description of remaining issues and potential solutions.

OPIC discusses issues and solutions and provides recommendations to the lead professional to guide development of a final LRD. Deficiencies or issues which cannot be resolved by OPIC, including policy issues, are forwarded to the First Nation-Provincial G2G forums for resolution. OPIC also provides completed final LRDs to relevant G2G forums. Issues or concerns raised by the G2G forums will be referred back to OPIC and the LRD technical team. G2G Forums or their technical teams may periodically undertake a quality assurance process to assess LRD process effectiveness and identify design deficiencies.

Operational implementation of LRDs on the ground

Forest Licensees plan harvesting, roadbuilding and other activities consistent with the GBRO and the LRD through their forest stewardship plans. They may make small adjustments to the LRD as they plan harvesting and collect more detailed site level data on the ground, gaining additional clarity on whether certain stands truly possess old characteristics and meet criteria for rare listed plant communities. How the decisions for such adjustments are made can be contentious, particularly where LRDs have not yet been finalized. A comprehensive 62-page guidebook was published in 2019 to assist professionals on the ground, especially in the challenging Southern GBR.[xxix]

Under the Coastal First Nations Reconciliation Protocol (RP) and Nanwakolas Strategic Engagement Agreement (SEA), decision making on all operational permits and leases, including those for forestry (forest stewardship plans, cutting permits and road permits) follow an "Engagement Framework" process defined in Schedule A & B of the RP and SEA respectively. This means EBM implementation at the administrative and operational level is also governed by shared decision-making processes. Forest stewardship plans submitted by licensees are referred to First Nations under the engagement framework where they are reviewed by joint provincial-First Nations working groups and recommendations provided to government and First Nations Decision Makers.

Agreements, Term Sheets, protocols, MOUs, and Strategies

There are numerous agreements in place in the GBR that set the foundation for how the various players – First Nations, the province, industrial tenure-holders and ENGOs – will work together to implement EBM.

In the Great Bear Rainforest, the Province has committed to developing an enriched concept of reconciliation that integrates conservation, economic development and stewardship with shared decision making. Through reconciliation agreements, legislation and other arrangements, provincial and First Nation's governments in the Great Bear Rainforest are seeking to build a stable investment environment founded upon healthy and resilient ecosystems; a model that will promote long-term economic development, improved social outcomes and cultural resurgence and revitalization. Reconciliation Protocol Agreements between the province and each of the CFN and Nanwakolas set the protocol for the two governments to work together in G2G decision-making groups. Term Sheets signed between the province and each of the CFN and Nanwakolas groups of First Nations provide evidence of continuing progress on working together towards full implementation of EBM and to confirm commitments made by the province and the First Nations groups in respect of continued full implementation of EBM.

Non-Indigenous and sector stakeholders, including industry, environmental groups and the philanthropic sector have an important role to play in supporting the G2G vision in the GBR. Through business-to-business arrangements, community-based initiatives, conservation financing and strategic level dialogue with the Province and First Nations, these stakeholders are helping to shape the long-term success of the Great Bear Rainforest agreements.

The 2014 JSP recommendations also included recommendations to help structure implementation. Those recommendations together with recommendations designed by JSP in the 2016 'Sheldan letter' from FLNRORD formed a key part of the implementation strategy for EBM. As well, various parties have memorandums of understanding (MOUs) between one another describing approaches and principles for implementation that compliment or take the interpretation of EBM beyond the GBRO background and intent document. For example, the industry licensee, TimberWest, has a MOU with both RSP and a local stakeholder group concerning planning and practices on Sonora and East Thurlow Islands. RSP also says it has some verbal agreements with industry professionals governing the non-legal spirit and intent of EBM.

Authors' Observations

The G2G governance structure spans implementation levels from the most strategic to operations on the ground. Ultimately the structure links to First Nations and provincial executive decision-makers at the top. The G2G structure appears to work collaboratively and interactively across these levels, engaging JSP and other stakeholders in various formal and informal ways. The process to this point seems to keep people talking to one another, avoiding appeals outside of the process, such as legal challenges. The EBM implementation logic model might appear complex, but that is not surprising considering the size of the area, the number of

players involved and the complexity of the GBRO. The model does however have some aspects worth highlighting.

It is important to note, for example, that underlying all agreements, legislation and land use orders in the GBR is the desire by the province and Indigenous Nations to promote long-term economic development, improved social outcomes and Indigenous cultural resurgence and revitalization founded upon healthy and resilient ecosystems. This is the primary context for EBM in the GBR going forward.

The approach to EBM implementation decision-making is mostly informed by numerous agreements between the province and various First Nations and, the existing administrative structure FLNRORD already had in place. The approach to operational EBM implementation is based on the 2014 JSP recommendations and the 2016 'Sheldan letter' from FLNRORD. The contents of both documents were essentially designed by CFCI industry members and ENGO members of JSP. The direction from them was considered by the G2G, finalized and reflected in various G2G agreements and arrangements. Beyond the Sheldan letter, for which most commitments have been completed, there is no clearly-written comprehensive implementation strategy for EBM.

For implementation of EBM, CFCI industry licensees have access to the G2G both through OPIC and CSIC, as well as through various formal and informal channels such as the government rechart memorandum of understanding. The CSIC TOR is somewhat vague in its description of intent. Through CSIC industry accesses the G2G as part of a collaborative JSP team with RSP. TimberWest is not a member of CFCI, so it officially only has access to the G2G through OPIC. RSP only accesses the G2G through JSP in CSIC. Its participation in OPIC is relatively minor – on the Annual Report subcommittee.

The operational and decision-making groups included in the logic model for EBM implementation will all soon have a terms of reference document to clarify their responsibilities and their fit within the implementation structure – some of the G2G groups are just finalizing theirs.

Findings – What we learned about Implementation

Approach to this section

Successful implementation of EBM to maintain ecological integrity while meeting societal needs is a complex challenge. It could be characterized as a "wicked problem" in that: it can be described in different ways that may have different solutions; the problem is unique; there is always more than one plausible explanation for outcomes; there is no single right test or true test of a solution; and the solutions cannot be true or false, although they can be more or less effective.[xxx, xxxi, xxxii]

Because successful implementation of EBM is a wicked problem, it is impossible to determine if any approach to EBM, including that described in G2G agreements and in various regulatory instruments such as the GBRO, is the 'right' approach. The best that can be achieved for an EBM approach is to start with some direction grounded in the current experience, knowledge and science, as is the case in the GBR, and then learn and improve the approach over time. Indeed, the working group who produced the foundational EBM handbook recognized this by saying "the Handbook provides a useful starting point for implementing an ecosystem-based approach."[xxxiii] Accordingly, the best that can be achieved for an EBM implementation system is to ensure EBM is being implemented true to its intent and able to facilitate continued learning and improvement over time.

This section is organized into two broad subsections – one that will explore management toward ecological goals for EBM in the GBR, or actual implementation and, one that explores the implementation framework that is currently in place to support EBM implementation. The goal is to determine what can be learned from the experience of EBM implementation up to this point and make recommendations that will contribute toward continuous improvement.

Management Toward Ecological Goals for EBM in the GBR

In this section we explore actual implementation or management activities including planning and practices as they are described in legislation, regulations, land use orders and associated guidance. We have identified what was described as working well as well as the issues associated with management that have emerged since 2016.

Conservancies and Other Major Set-asides

Parks and similar areas in the GBR comprise 471,000 hectares of lands that are fully protected, more than 7% of the total area of the GBR. Parks may allow for restricted commercial and industrial activities including businesses such as tourism and hotels, as well as allowing for fishing, hunting and industrial activity such as mining and commercial logging.[xxxiv, xxxv]

New Protected Areas called conservancies were created for the GBR, primarily by amending the Park Act to include a new designation that recognized protection and stewardship of biodiversity and aboriginal cultural, social and ceremonial values and uses have priority over

other activities and uses. Up to 1.5 million hectares, or more than 23 percent of the GBR, is now protected under this new conservancy designation. Conservancies were set aside to protect and maintain biological diversity and natural environments, to preserve and maintain social, ceremonial and cultural uses of First Nations, to protect and maintain recreational values and to ensure that any development of natural resources within them occurs in a sustainable manner. Commercial logging, mining, and hydroelectric power generation are prohibited in these areas, except local run-of-river projects to service nearby communities.

Biodiversity, Mining and Tourism Areas (BMTAs) comprise 309,000 hectares, almost 5 percent of the GBR. These are areas where the primary use is biodiversity conservation and protection of key ecological and cultural values. Commercial forestry and hydroelectric generation linked to the power grid are not allowed.

Special Forest Management Areas (SFMAs) have recently been established over 273,000 hectares, or more than 4 percent of the GBR, in areas where hydroelectric generation, mining and tourism development is allowed as long as it maintains ecological integrity. Commercial forestry is not allowed. It is expected that some of these may become conservancies or Biodiversity, Mining & Tourism areas or Conservancies over time. Discussions are also underway at the G2G table to explore a new form of protected areas.

All in all, more than one third of the area of the GBR has been set aside in large protected areas that exclude timber harvesting. This translates into protection for: 40 percent of known salmon-bearing streams; 55 percent of estuaries & 42 percent of wetlands; 34 percent of old growth forest and 39 percent of mature forest 30 percent of all habitat for key species like northern goshawks, marbled murrelets, and grizzly bears.[xxxvi]

Authors' Observations

The proportion of protected areas within the GBR in a network of set-asides where timber harvesting is excluded is unprecedented for a region of equivalent size in British Columbia. These protected areas are mostly well-distributed throughout the GBR, except in the very southern portion. The tally of habitats and special ecosystems protected by these areas alone is impressive.

The GBR network of large protected areas and other set-asides is comprehensive and credible, establishing a solid foundation for the conservation of biodiversity generally, and the maintenance and health of regionally important species and species-at-risk. Being diverse and well-distributed, it will provide useful reference points to quantify human impacts and cumulative effects in other areas nearby. Indeed, protection of biodiversity and habitats also depend on management outside these large protected set-asides.[xxxvii] Yet, they provide important context for EBM implementation planning and practices across the managed landbase.

Progress on Landscape Reserve Designs

Even though much of the GBRO addresses stand level practices, the preamble describes a specific intent to maintain the range of forested ecosystems by establishing a number of regional and landscape level objectives, all linked to landscape reserve designs or LRDs. The implication is that new requirements for LRDs were a focus for the GBRO as an update to the previous land orders. It is not surprising that much of what we heard from those implementing EBM under the GBRO was linked to LRDs.

Accomplishments

LRD planning in the GBR is a new legal requirement. As such, considerable time has been spent over the past three years in the various EBM implementation teams and committees discussing details of the implementation requirements for LRDs. Considerable learning has occurred, since questions have emerged that were unimagined by the drafters of both the JSP recommendations and the GBRO. Many First Nations support EBM objectives and are moving forward with planning to engage in development of LRDs, building operational protocols and data-sharing agreements to ensure implementation is consistent with their interests and perspectives. All this is positive, yet actual accomplishments have been slow.

There are 168 landscape units in the GBR, which theoretically could all be included in an LRD at some point. The GBRO, Section 5(4) requires LRDs to be completed within five years of the establishment of the order where operations are active or planned.[7] Under this requirement, LRDs will likely be needed for 43 landscape units by 2021. So far, 12 LRD technical teams have started LRDs in 12 landscape units, mostly in the more challenging southern GBR, where "Restoration Landscape Units[8]" are found (See Inset below for a discussion of the unique challenges for LRDs in the Southern GBR). With a seven-step process for completion, one LRD team has started step 1, seven are working on step 2 and/or step 3 and four are working on step 4 and/or step 5. So far, no LRD's have moved through all seven steps and been endorsed or approved by the G2G. RSP is suggesting licensees will be non-compliant with the GBRO if in 2021 they are harvesting without relevant LRDs in place.

The shift to LRDs and formal adoption of new TEM and other inventory data made the non-legal prototypic SLRDs irrelevant, so they are essentially ignored. But development of LRDs to replace SLRDs is much slower than anticipated. With no spatial reserve designs in place, most

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[7] Section 5(4) of the GBRO - For the purposes of preparing a landscape reserve design: (a) complete Landscape Reserve Designs within five years of the date of establishment of this order in those Landscape Units where harvesting is occurring or planned to commence within 5 years; or (b) complete Landscape Reserve Designs prior to declaring areas or prior to the application for a road permit or cutting permit in those Landscape Units where harvesting is currently not occurring or is not planned to commence within 5 years.

[8] Nine landscape units within the GBR are identified as Type 1 Restoration LUs (Thurlow, Gray, Fulmore, Estero, Knight-East, Stafford, Gilford, Lull-Sallie, and Whalen); four are identified as Type 2 Restoration LUs (Lower Klinaklini, Huaskin, Snowdrift and Miriam). These LUs have a prolonged harvesting history, little remaining old forest and a relatively high proportion of red- or blue-listed plant communities.

licensees are still relying on aspatial targets, raising concerns from RSP that some of the best sites for old forest representation are in danger of being harvested.

The structure for the LRD model was established in the GBRO, the LRD Policy Framework and the LRD Planning Guide, all of which were developed by G2G by considering the recommendations and input from JSP, including industry professionals from CFCI and ENGO representatives from RSP. The 2016 LRD targets were based on recommendations by JSP, while the G2G built the methodology. The intent was to manage to JSPs interpretation of low ecological risk using several targets and maintain a very precise managed forest target over the entire GBR. The detailed methodology for development of the LRDs was created by a respected conservation biologist with many years of experience in the GBR. CFCI modeling suggested what was intended could be accomplished, although it is proving much more difficult to actually implement.

Some FLNRORD staff are not sure the number of LRDs completed to date is a reasonable measure of success, expecting the process to improve once the first few are completed. Nanwakolas, for example have LRDs going on in all 10 landscape units in their collective territory and feel they are poised for good progress. But a relevant question for this review remains, "What are the issues that have made this process so slow?" Answers to this question may inform improvements to the approach going forward.

The Unique Challenges for LRDs in the Southern GBR

The most challenging part of the GBR for meeting the intent of landscape level requirements in the GBRO has proven to be the most southerly portion, particularly the islands found in Johnstone Strait, north of the Strait of Georgia. Because the terrain is highly operable, extensive logging occurred over the past century, often followed by intense fires, which caused further disturbance. Many remnant Douglas-fir and the occasional remnant redcedar were left individually or in clumps throughout this area and they are now large veteran trees with old characteristics. Second growth has re-established throughout the area, with some trees large enough to mimic old trees.

In these highly diverse second growth stands, definitions for old forest in land use orders, including the GBRO, are not particularly useful. These LUs have relatively little true old forest remaining. The focus for LRDs is to include what little old forest is left and "recruit" younger stands to grow old over time. Short and long-term targets for conservation are lower in these landscape units because of their current condition, and because of their substantial contribution to long-term timber supply within the GBR. In addition, many have been designated Restoration Landscape Units and have a relatively high proportion of red- or blue-listed plant communities in comparison to the remainder of the Order Area.

The G2G EBM Technical Team decided initial LRDs should be focused in the southern GBRO to fine tune the approach in the most challenging environment. Both before and since the GBRO was established local stakeholders questioned the implementation of LRD representation requirements and stand level interpretations in this area, making several complaints to the Forest Practices Board. Licensees have been working closely with these stakeholders but progress on LRDs has been slow. Eventually the G2G asked experienced ecologists to assist with implementation by developing a field guidebook.

RSP and local stakeholders believe industry is abusing the discretion provided by the GBRO to choose LRD recruitment stands in theses southern units. Industry says they are using highly qualified biologists and ecologists to design the LRD and do quality control on any adjustments being made by field crews.

The Complexity of LRDs

Almost everyone we talked to about EBM implementation, including industry, First Nations FLNRORD, ENGOs and independent biologists and ecologists, said the LRD requirements and methodology are overly complicated. s.16

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Challenges Meeting both Managed and Natural Forest Targets

While the LRD framework provides non-legal direction related to aboriginal values and interests, there are three important legal targets for the LRD focused on landscape level biodiversity in the GBRO:

1. minimum old forest retention generally, but not always, set at 30 percent;
2. old forest representation targets and
3. a managed forest target[9].

The three legal targets together are intended to balance the landbase between managed forest and natural forest. Both minimum old forest and representation targets contribute to the natural forest along with constraints from other values.[10] Old forest representation targets account for natural disturbance and, together with the minimum old forest threshold, apply to ecological units known as site series groups[11]. Although some of the targets established for landscape units allow flexibility to meet legal requirements higher up, most LRD technical teams find these targets to be fairly rigid in their application.

With LRD implementation bogged down, especially in the Southern GBR (see inset below), FLNRORD, First Nations and some Industry professionals involved in OPIC are suggesting the old forest representation targets for the LRD are too restrictive. They say these tight requirements do not allow LRD technical teams to properly fit the plan to the unique nature of each landscape unit. Even the biologist who designed the methodology and is a lead professional on a number of LRD technical teams, believes the targets have made the exercise overly-focused on numbers rather than on sound effective design (see Inset below for an

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[9] The managed forest target was set legally in the Order for the entire GBR. This number was essentially divided up between all the landscape units with non-legal targets provided for each to ensure the GBRO target is met overall.

[10] The GBRO defines managed forest as the area of productive forest that is or will be available for timber harvest. The natural forest is defined as the area of productive forest that is not managed forest, meaning it will not be available for timber harvesting.

[11] Site series groups - means a group of site series defined by terrestrial ecosystem mapping (TEM) as discernable sites capable of producing the same late seral or climax plant communities within a biogeoclimatic subzone or variant.

explanation of sound effective design). RSP agrees this is a problem, saying that optimizing for all things simultaneously is a recipe for failure. Both RSP and the biologist suggest the rigid targets can force less-than-optimal reserve decisions.

LRD lead professionals, as well as industry and First Nations licensees, believe impacts on the managed forest targets may be unavoidable in many landscape units. Some FLNRORD specialists question the precision being used to try to meet the managed forest target. RSP also says the whole LRD conversation seems overly-driven by the managed forest target. At the same time, many industry and First Nations professionals say they think the managed forest target is an important backstop to provide some safeguards for the working forest.

What is "sound effective design" of an LRD? *(Taken from the 2016 Landscape Reserve Design Methodology[xxxviii])*

Sound effective LRD design for biodiversity at the landscape level includes aspects of both geometry and content. The geometric elements of sound design include considerations of size, configuration, distribution, connection, landscape fit and important stand level features.

Size: Larger reserves are more ecologically valuable than smaller reserves because they include a greater amount of habitat, have more forest interior compared to edge habitat and have greater long-term integrity. The Order Area already contains some very large, entirely protected watersheds and conservancies in the order of 1000's of hectares. Within an individual LU, 'large' would be in the order of 100's of hectares. However, having only a few large reserves in an LU would mean they would tend to be isolated from one another. Small reserves should be for special areas or naturally small ecosystems (ponds, swamps, etc.), not for common non-productive rock bluffs or, for alienated land.

Configuration: Highly irregular boundaries, protruding peninsular shapes and narrow linear/curvilinear polygons have a high proportion of edge and provide little forest interior (a circle is the optimum shape for minimal edge and maximal interior condition). Polygons with less edge and more interior conditions tend to be more ecologically valuable than shapes with high edge to area ratios.

Distribution: Reserves should capture a range of elevations in the LU from valley bottom to ridge-tops and be geographically dispersed throughout the LU rather than concentrated in one area.

Connection: Connecting reserves by means of spatial continuity both across-valley and along-valley facilitates the movement and migration of both animals and plants, and likely increases resilience in the face of climate change. Spatial connections are also supplemented by the functional connections afforded by a permeable Managed Forest matrix outside of reserves comprised of WTPs, in-block retention and riparian and other site-level reserves. Linkages to adjacent LUs (e.g. through low passes) and other protected areas further facilitate migration.

Fitting with the landscape - Reserve boundaries should 'fit the landscape' wherever feasible using boundaries that follow natural breaks. For example, designers should include avalanche site series groups (SSGs)[12] in reserve where they are adjacent to or form part of important habitat (e.g. GBRO Schedule 2 - grizzly bear habitat) and/or where they occur in a vegetation mosaic with reserved forested SSGs, particularly if those coincide with lower capability/suitability grizzly habitat. For representation of

[12] SSGs are unique combinations of growing conditions (climate and geography) and plant assemblages based on the historical level of natural disturbance. The GBRO sets old forest targets by SSGs for the entire GBR. These targets are listed in Schedule G of the GBRO.

alpine SSGs, it is preferred to place it in 2-3 relatively large LRD polygons, preferably continuously and substantially linked down through mountain hemlock parkland and forest, montane and submontane variants to yield a reserve polygon that encompasses the full elevational range within the LU.

Incorporating important stand level features - Red and blue-listed plant community occurrences should be included. Both size and location of an occurrence determine whether a red- or blue-listed plant community should be managed as a stand level feature or incorporated into LRD. Stand level features not intended for future harvesting (e.g. resource features, red-listed ecosystems) that meet the size and location criteria should contribute to meeting representation targets and minimum old forest levels and form part of the LRD. Since encompassing the full range of productivity/capability and the diversity of leading species/stand types is a design consideration, the designer should keep this variability in mind when selecting areas to include in reserves. Reserves should capture the range of species and productivity types.

An important principle for LRD preparation is to overlap minimum old forest and representation targets as much as possible with areas where timber harvest is prohibited or constrained for values other than conservation of biodiversity. In some cases midway through planning, local First Nations asked LRD technical teams to add large reserves, previously not identified, to the LRD to protect key areas of concern. The LRD teams find these late-additions make impacts on the managed forest hard to avoid when trying to meet representation targets and apply sound design features. Similar challenges have occurred during LRD planning when constrained area was suddenly increased from newly-established reserve strategies for species at risk such as northern goshawk.

FLNRORD staff, together with some industry and First Nations professionals suggest the LRD targets should provide guidance rather than rigid legal tests. LRD lead professionals in the southern GBR said it can be very difficult to find the last 20 percent of the representation targets for many site series groups, forcing them to find 60-70 small "bits and pieces" scattered over the LU, which makes an effective design difficult. There are some 'flexibilities' currently built into the GBRO targets. Yet, because they may require negotiated trades between landscape units and in some cases across First Nation territories, most parties believe these flexibilities are impractical. An alternate option suggested by several professionals was to allow for a greater proportion of the representation targets in an aspatial distribution. However, this approach does not encourage sound effective design.

Ecologists and biologists said that sound design should be more important than the actual targets, to a degree. Everyone we spoke to agreed the old forest targets by site series group are useful to provide direction for the design, but the approach should focus on sound ecological design for conservation of biodiversity, overlapping with reserves or management for other values, including areas, sites and values important to First Nations. Currently, the LRD methodology allows structurally more diverse habitats to be slightly over-represented, trading area off with more common stands having average conditions. Ecologists and biologists suggested this trade-off could be expanded in some areas. Further, some suggest when an LRD falls short of targets, but the lead professional is satisfied with the design, a written rationale could be prepared and presented to the G2G Technical Team along with the plan for approval.

Concerns about Indicators and Data

Related to and often complicating concerns about targets are technical questions about indicators and data.

A potential bias toward species and site productivity

Dominant in discussions about indicators and data is a concern by RSP and local stakeholders about the loss of old forest remnants of Douglas-fir and redcedar on high productivity sites in southern landscape units. Because few truly old growth stands dominated by these species exist on highly productive sites, the opportunity to reserve stands with old structural attributes mostly exist in older mature stands. RSP is afraid LRDs are not capturing these stands and instead they are at risk of being harvested, aided by industry licensees' use of new LiDAR technology.

Now, RSP is questioning the loss of species and productivity indicators, suggesting they should be included to describe the ecological units used for representation planning in LRDs. It believes LRDs in the south as a result are weighted toward low productivity sites. It say it is self-evident that the heterogeneous nature of site series group polygons, some which are very large, allows licensees to harvest the most productive portions with desirable species, while saving less productive sites with less desirable species in the LRD. RSP says many of the remnant clumps and groups they care most about are less than 1 ha, the minimum to include in the LRD. They suggest the large remnant redcedar are so rare, none of it should be cut.

RSP currently questions the loss of species and productivity indicators as the metric used for representation targets[13] in the transition from site series surrogates under the 2009 land use orders to site series groups under the GBRO. The result, it believes, are LRDs in the south weighted toward low productivity sites. It would like to see most remnant clumps and even individual large remnant redcedar left standing on higher productivity sites.

FLNRORD suggests the concerns of RSP and local stakeholders are at such a fine scale it would not be practical for licensees to target these sites for the LRD. They say the complexity of building in additional indicators for LRD planners would make design unworkable. LRD lead professionals agree. Licensees highlight several practical challenges in the field with the fine-scale resolution for listed plant communities currently used in the 2019 guidebook.

At least one LRD lead professional in southern landscape units has done some analysis and does not believe the LRDs are focused high up on the slopes or on rocky patches where lower productivity sites are found. She suggests significant area in reserves is often found lower

[13] Prior to the 2016 GBRO, ecological representation used a mix of forest inventory attributes for species and site productivity to combine with age data, as a surrogate (site series surrogate or SSS) for the more specific terrestrial ecosystem mapping (TEM) data by site series, since TEM mapping was sporadic on the Coast. By 2016 TEM mapping was mostly completed for the GBR so the GBRO could specify site series groups rather than site series surrogates.

down on more productive ground to also meet objectives for riparian and stream protection, First Nations values and northern goshawk habitat.

Industrial licensee professionals disagree that LiDAR is being used to locate and harvest "the best" examples of older stands with valuable species on highly productive sites. They pointed out LiDAR is a useful tool to determine tree heights and ground slopes, but is not helpful in identifying species and other attributes. At the same time, some LRD lead professionals said LiDAR has been quite helpful for them to locate concentrations of larger trees in second growth, which they assume will have better attributes than uniform smaller second growth.

Government specialists, some industry and First Nations licensee professionals, LRD lead professionals and ecologists all agree that the concerns raised by RSP and local stakeholders about species and productivity are useful to consider as a quality assurance measure once initial LRD designs are complete. They do not agree the GBRO requires changes to address this concern.

Other Specific Data Concerns

Ecologists and others suggest the richness of the TEM data is being underutilized in LRD planning. The ecologists say TEM polygons provide detailed proportions of the various sites series found in them, citing up to three proportional site series components called 'deciles.'[14] However, LRD planners only use the "dominant decile," which potentially ignores a significant portion of the information provided in TEM. LRD lead professionals explain that three deciles would make planning so complex it would virtually be impossible. They are confident they can capture an acceptable cross-section of sites in the LRD using proper design criteria and the dominant decile in TEM. Both the ecologists and the LRD lead professionals agree the complete data (all deciles) found in TEM polygons would best be used as a quality assurance check after LRDs are completed.

RSP expressed a concern that industrial licensees will not share proprietary LiDAR data, saying EBM needs to have the best quality data available to everyone. Some licensees point out their LRD team members, including RSP and local stakeholders, have equal access to their data, including LiDAR. Still, FLNRORD staff believe the province, First Nations and RSP are all at a disadvantage due to the relative data disparity with industry licensees. Industry licensees say they are supportive of the province acquiring seamless LiDAR coverage for the GBR and updating its inventory heights with LiDAR heights. Yet, they point out existing licensee LiDAR data was a significant capital investment for industry so they expect to be fairly compensated for those data.

General Data and Tracking Concerns

RSP and other stakeholders have concerns about the general quality of data and resolution of mapped polygons used by planners to build LRDs in the GBR. These concerns have prompted many debates in the CSIC data management group. Of central concern is the question of when

[14] CFCI licensees say they hired a well-respected Coastal ecologist in 2015 who found a good correlation between this rich TEM data and field site conditions.

to rely on inventory and TEM data and when to use field-verified data. GIS specialists in FLNRORD point out that it would be impossible to ground-truth entire LRDs. And, if ground truthing only occurs on cutting permits planned for harvest as is currently the case, it provides a biased view since it will always exclusively be done in the managed forest rather than across a broad sample of the LRD. They also said the targets were set at a strategic level using inventory data appropriate for that scale. They believe, for consistency of application and tracking, the inventory should be used to meet targets for representation. They suggested inaccuracies that reduce or improve intended conservation of biodiversity will balance out, especially across large portions of the GBR. Everyone agreed that field-based data is required to build reserves for red or blue listed plant communities.

Some tracking challenges were noted by industry licensee professionals. For example, red-listed plant community data are not rolled up by FLNRORD in their annual tracking update for OPIC. This is because FLNRORD relies on its RESULTS data-base for EBM updating and this database does not track red listed plant communities. Some licensees said they are tracking these communities on their own, but it is not clear if all licensees are following their lead.

Another challenge with RESULTS is that FLNRORD district staff noted some licensees are slow to enter data into RESULTS. Because the FLNRORD data specialist only rolls up the data once per year, district staff have seen this issue lead to over-harvesting in some site series groups where a LRD is not yet in place and licensees are relying on aspatial data to meet representation targets. Except for the annual RESULTS update completed by FLNRORD, it has been up to individual licensees to design their own tracking, checklists and reporting tools and to liaise with other licensees to ensure their practices are meeting the legal requirements in a particular landscape unit. First Nations have noted some licensees are particularly diligent at doing this.

The 2019 old-red-blue guidebook

RSP told us they were not happy with the 2019 guidebook, saying it increased the impact on the managed forest, making it harder to get more desirable older mature forest with good structure into the LRD. All the ecologists we talked to said they believe the guidebook does exactly what it was intended to do. The guidebook uses comprehensive sets of criteria to first determine if a stand should qualify as 'old growth' and then determines if it qualifies as a 'sufficiently established' listed plant community. If stands qualify as old growth, they must be included in an LRD when that particular site series group is technically in deficit. LRD lead professionals and industry licensee professionals agree the definitions in the guidebook have expanded the range of sites that will be determined to be old in the field. To reduce impacts on the managed forest, they must find stands to pull out of the LRD into the managed forest, which is sometimes a challenge.

The province agreed to conduct an effectiveness review of Field Guide implementation. It intends to examine the uptake by industry licensees, process standardization and whether the Guide is capturing appropriate/anticipated stand profiles

Restoration landscape units and zones

Restoration landscape units are designated under the GBRO to restore landscape level biodiversity where there has been extensive past forest development activity. Restoration zones are a special case or subset of landscape-level reserves found elsewhere in the GBR. Restoration zones are to be comprised of a minimum of 30 percent of each site series group with some flexibility for achieving this target. To expedite restoration of old forest, silvicultural treatments and thinning activities are allowed.

RSP is concerned that the 'restoration' label applied to these landscape units and zones is misleading. Nothing special is being done ecologically in these landscape units beyond recruiting non-old forest to develop into old forest by 2264, which is generally done in other landscape units. Ecologists and biologists involved in LRDs agreed. They said the "restoration" label used in some of these landscape units ignores their importance for economic activity, having been targeted for a drawdown provision in the GBRO that allows for significant reductions in the minimum old forest target.

First Nations Engagement in LRDs

Licensees and LRD lead professionals have found when they engage First Nations in LRD planning, the Nations often ask for more constraints based on areas that are important to them. In some cases Nations are not embracing the LRD concept. Licensees suggested this may be why no LRDs have yet been completed. Some wonder if LRDs should remain a work in progress, with no formal completion date.

First Nations agree the approach should perhaps be a bit more flexible. Individual Nations are generally cautious about sharing information related to some cultural areas, but will gradually share more information as engagement proceeds. As well, they said licensees must be careful thinking they have agreement with a Nation because, for example, the person with the appropriate knowledge may not have been in the room at the time. There will always be a new emphasis and priorities for community members as EBM progresses through time.

This open-ended continuously-changing approach can increase uncertainty and risk for industry licensees, who generally prefer set rules and clear agreements. But First Nations say the GBRO targets for the LRD are too restrictive to accommodate all their interests, which cannot be added on at the back end. Some industry professionals agree. In the end First Nations professionals say LRD success comes down to clear communications and sound relationships. First Nations point out some industry licensees have some work to do on those two elements.

Authors' Observations

LRD planning in the GBR is new and exceedingly complex. It is not surprising over the past three years efforts on LRDs have been focused on helping all players understand the intent, methodology and emerging issues. Still, many suggest only a handful of people truly understand LRDs, a significant vulnerability for implementation if it is indeed true. It will continue to be a barrier going forward unless it is addressed with better training and communication.

A significant vulnerability for EBM implementation related to LRDs is that the GBRO requires over 40 LRDs to be completed by 2021 and currently not one is finished. It seems the past three years have been an enormous learning experience as everyone grappled with difficult LRD questions in the most challenging GBR landscape units. Some expect LRD planning will make significant strides soon. Yet, clearly the timetable for completion was unrealistic, considering the learning curve for everyone involved. As well, we encountered numerous concerns and suggestions for improvement. Change and improvement over time is normal for any new, complex approach.

Many across the spectrum of people we interviewed felt the legal targets are too restrictive, forcing LRD technical teams to be overly-focused on numbers rather than sound design features. All three key GRBO biodiversity targets for the LRD have an important role to set some goalposts for planning. Most people suggested these targets should be non-legal aspirational goals, rather than locked-down legal targets. Tight coupling, as in the rigid legal targets for LRDs, can create vulnerabilities for complex systems.[xxxix] Adding more flexibility or slack into such a system can be helpful. It is interesting to note that some G2G members believe First Nations do not have the same sense of ownership with the GBRO and its targets as they did with the pre-2016 less-complicated land use order.

An approach that focuses more on sound and effective design features rather than rigid legal targets, could work if it relied on the LRD qualified lead professional's judgement and knowledge to create the plan and the G2G EBM Technical Team's strategic wisdom to review the design in the context of the balance between ecological and human well-being goals. There may be advantages to using third-party qualified LRD lead professionals for this approach. Clear principles for planning would be critical for all involved to ground decision-making on what is most important.

As discussion over challenging LRDs progressed in the GBR, concerns about indicators and data were raised, mostly by local stakeholders, RSP and some ecologists. It is not clear if these are the 'game-changing' issues some groups may think they are. Nonetheless, they are important questions that deserve some scrutiny. We believe the idea to use these data and indicators in quality assurance checks for LRDs is reasonable and wise.

It is clear that a good long-term priority would be for the province to acquire seamless LiDAR coverage for the GBR to improve transparency with equal access to the best data for all parties.

The amount of ground-truthing required to ensure LRD design meet intent will continue to be contentious in some landscape units, regardless of what FLNRORD data specialists say. Likely it will not be necessary in most places for representation objectives, but it will be unavoidable to verify listed plant communities. And, licensees dealing with concerned local stakeholders may need to do more ground-truthing than elsewhere in the GBR.

All parties need to continue to collaboratively address the tracking challenges over time. Comprehensive tracking of relevant 'trackable' indicators is the first step in credible implementation monitoring.

The use of the term "restoration" to describe some special landscape units and zones is misleading. While recruitment and restoration are an important focus in these landscape units, a more neutral label for them would be helpful if they are a priority for timber harvesting in the GBR.

A smooth, flexible amendment process for LRDs that fits better with First Nations engagement challenges and aligns with the priorities of the G2G could be helpful. As well, First Nations values should be the starting point for all LRDs, if they are not already. It is critical that efforts are made to help First Nations understand the LRD process and its benefits for their territory. It is also critical that licensees continue their efforts to strengthen relationships with First Nations in the GBR.

Harvest Levels and Allocations

There are emerging concerns in the GBR, particularly in the north, that harvest levels and allocations are having an impact on the ecological goals of EBM even though it is arguable whether this concern is directly related to EBM implementation since it is not directly linked to the GBRO. As the primary disturbance feature across the landscape, the rate of harvesting significantly influences EBM implementation. Lindenmayer and Cunningham (2013) proposed that over-commitment of natural resources is the root cause of most ecological problems.[xl]

Harvest levels were established as allowable annual cut (AAC) under the GBR Forest Management Act and regulations. FLNRORD says their recent analysis shows current actual harvesting in the GBR is only 15 percent below the projected AAC. Industry professionals point out this harvesting is mostly occurring under older 'declared' cutting permits, rather than under the GBRO.

Most First Nations professionals in the northern part of the GBR told us they were concerned about the sustainability of the AAC across their respective territories. Some Nations are so concerned they refuse to support either harvesting or LRD planning until this issue is addressed. The Nations say there are too many licensees trying to find timber volume in the same areas. Some FLNRORD staff say a significant contributor to this issue was the application of previous "undercut volumes" to the GBR harvest allocations.[15] RSP point out that while there was agreement on a sustainable AAC of 2.5 million cubic metres per year, this was pushed up to 2.7 million cubic metres per year with the addition of new licenses with undercut volume.

The undercut volume allowed the province to provide opportunities for First Nations to get started as participants in the forest sector. FLNRORD specialists say this unused volume always adds some pressure to the timber supply and it may be particularly acute in the GBR because of a challenging profile of timber types and the tendency for most licensees to always target the "best timber" for harvesting.

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[15] Undercut volume – is volume that was allocated in previous cut control periods but not harvested. It is tracked by the province and is frequently used to issue new licenses to harvest it, sometimes targeted at certain timber types.

Some First Nations professionals say the problem is the difference between what is economic and operable on-paper using provincial inventory data compared to what is actually on the ground. They estimate only about half the volume allocated is operable and economic.

Both First Nations and RSP point out that current harvesting is mostly targeting higher-value red and yellow cedar stands over more common lower-value hemlock and true fir stands. The Forest Practices Board pointed this problem out a decade ago, so this is not a recent concern.[xli] RSP is concerned if this trend continues without an LRD in place, the quality of reserves for representation will be much lower. Some industry licensees admit the only way to maintain a truly sustainable harvest at current harvest levels is to harvest across the profile of high-value and lower-value stands. CFCI professionals say they conducted a limited analysis of previous harvests and found it to be similar to the profile. Some industry professionals acknowledged in recent rechart discussions (see below) that if harvesting across the profile cannot be achieved because of market conditions, particularly for whitewood, harvest levels may need to be reduced to acknowledge economic realities.

Related to this issue, is the current "recharting process" to identify where licensees are going to operate in the GBR timber supply areas. With some new First Nations licenses and new timber supply areas within the GBR, G2G is engaging licensees in a process to decide who will operate where until 2026. Industrial licensees, particularly in the north/central GBR, feel they already conceded between 25 and 50 percent of their AAC and so are looking for the flexibility to harvest timber over relatively large areas.

First Nations say area-based charting can lead to over-harvesting in particular territories. They would like to have more control over the rate of harvesting disturbance in their territory. CFN is proposing a two-tiered model for timber supply analysis that would assess timber supply at the TSA and TFL and First Nation territory simultaneously. The proposal also involves informal establishment of harvest partitions so that harvest levels in each territory can be monitored and managed relative to the territory scale supply analysis. Discussions are underway among First Nation and industry licensees to pilot an alternative approach to recharting that allows for the collaborative monitoring and management of harvest in each First Nation territory, and provides incentives for enhanced cooperation at operational and business levels.

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Authors' Observations

While timber harvesting levels and allocations can influence EBM implementation and impact the ecological goals of EBM, it is also linked to economic and social objectives at a relatively high level in the G2G governance framework, which are outside the scope of this review. Nonetheless, we have a few observations relevant for LRDs.

Currently, the province is considering how to introduce landscape level planning into harvesting operations and management across BC under changes to FRPA and supporting regulations. Some industry professionals suggest this approach may help address the current concerns about the LRD and sustainability, including overharvesting of cedar, if strategies were built for both timber harvesting and LRD reserves at the same time. Currently Western Forest

Products and the Kitasoo First Nations are trying this approach in the Roderick Landscape Unit. Still, it will be critical to determine how rate of harvest will be spatially applied prior to such planning. Settling the rechart questions should be a priority for all players in the GBR.

Most LRD technical teams are saying LRDs will have some impact on the Managed Forest area and therefore on AAC. At the same time, there is widespread concern about sustainability of the current harvest level generally and for cedar specifically, even over the short term. The G2G is aware of these concerns and will determine whether intervention in AAC levels or how it is allocated prior to 2026 is warranted. Further comment on AAC determination and allocation is beyond the scope of this review. We do suggest it would be useful to have a broader analysis of the harvest profile against the forest profile to determine the scope of the concern regarding overharvesting of cedar. This would best be done by a third party.

Planning and Practices for Stand Level Requirements

More than 70 percent of the guidance provided in the GBRO's companion background-and-intent document is directed at stand level planning and practices. This is the "managed matrix,"[16] important for conservation of biodiversity to provide connectivity between landscape level reserves and structural legacy features to diversify habitat elements and promote recovery, "lifeboating" some species through disturbance phases over time.[xlii, xliii] Important stand level management requirements for EBM include those for; stand level retention, protection of yew trees, bear dens, special habitats, culturally modified trees or other First Nations cultural resource values, aquatic habitat, high value fish habitat, active fluvial units, forested swamps and red/blue listed plant communities.

A few licensee professionals mentioned they are a bit frustrated with some of the specific stand level requirements in the GBRO. For example, they are puzzled by the requirement for a reserve to buffer non-fish bearing lakes from disturbance in the Northern and north-central portion of the GBR. There has been little formal training for EBM on the Coast since 2006.

Licensee professionals say the 2019 guidebook[xliv] for old forest and listed plant communities (the guidebook) is helpful to identify red and blue listed plant communities during cutblock planning and layout, particularly in the southern portion of the GBR. Licensees say the guidebook has provided their crews with considerable confidence in their decisions regarding red and blue listed plant communities.

Professionals for major industry licensees believe they are implementing the stand level requirements in the GBRO true to its intent, although they have little data or quantitative evidence to back up those claims. They said their field crews are relatively comfortable working with the stand level GBRO requirements, which are similar in structure and intent to previous land use orders. Some First Nations licensee professionals said it is too early for them

[16] Managed matrix – the area outside of large reserves and conservancies and landscape-level reserve networks, that is technically available to timber harvesting and other management activities but is subject to stand-level EBM requirements and guidance.

to judge their own implementation of EBM stand level requirements since they have done little harvesting under their new tenures.

Nanwakolas First Nations in the southern GBR have developed a cedar protocol to maintain options for cultural values, based on interviews with First Nations cedar carvers. The Nations would like to see reserve buffers around high valued trees to maintain connections to the forested environment these trees developed in. The Nations are currently working with industry professionals to implement the protocol, even though it is not part of the GBRO.

To address their priority for cultural and fish values in the southern GBR, First Nations are developing an information-sharing protocol to use with industry professionals early in the planning process. Still, some industry licensees stick with the option allowed in the GBRO to use the streamside protection provided under the Forest and Range Practices Act (FRPA), rather than the more onerous GBRO option. Other industry licensees are using the GBRO stream protection requirements regardless of the FRPA option available to them.

Some First Nations suggested industry professionals are good at adjusting planning and practices to solve emerging issues and challenges for stand level EBM requirements. One Nation is working with industry professionals to design cutblocks to maintain visual quality beyond legal requirements in support of the Nation's tourism businesses. Other First Nations say monitoring of industry planning and layout by their Guardian Watchmen is finding a few issues that are impacting First Nations cultural values, mostly from windthrow.

Concerns from local stakeholders have emerged in the southern GBR about industry protection of listed plant communities under the GBRO. Industry professionals said this occurred because guidance was inadequate until 2018, when nearly-completed drafts of the guidebook started to surface. Up to that point, industry professionals had to make their own interpretations of the GBRO and establish memorandums of understanding with concerned local stakeholders.

One industry licensee in the southern GBR deferred logging plans until the guidebook was finished to try to address these stakeholder concerns. On completion of the guidebook, it said it made a considerable effort to further address concerns of local stakeholders. It reported sampling more than 10,000 individual trees for accurate ages to use with guidebook direction. As well, the licensee said it engaged an ecologist to do quality assurance inspections in the field.

Concerns have been raised from stakeholders and district FLNRORD staff that some licensees may not be meeting the GBRO intent based on cutblock size and amount of retention. It seems in some areas an aggregation of cutblocks have been harvested, merging into one large early seral[17] patch. The GBRO has no restrictions on maximum cutblock size and FRPA allows such a practice when landscape level planning is conducted as is intended in the GBR. However, no approved LLPs are yet in place.

Some ecologists and biologists say that large patches of aggregated harvesting may actually be beneficial for biodiversity, since it will maintain larger, more intact contiguous old or mature seral patches elsewhere on the landscape. FLNRORD is concerned about the potential for

[17] Seral - A seral community (or sere) is an intermediate stage found in ecological succession

licensees to mis-apply GBRO stand level retention rules in some areas based on block size or to double-count internal retention for aggregations of small blocks. At the same time, harvesting by others in the same general areas are raising no concerns due to stand level retention practices that go beyond GRBO requirements.

Industry licensees suggest that roughly three years into implementation of the GBRO is too early to assess stand level practices since many cutblocks logged during this transition period were "declared[18]" under the previous land use orders. FLNRORD district staff suggest some licensees abused this transitional allowance by initially submitting poor quality forest stewardship plans revised for the GRBO that were subsequently rejected by district staff. These same licensees then were slow to revise their plans, allowing themselves more time to include higher numbers of declared cutblocks.

The Forest Practices Board received two complaints in the GBR about stand level practices but has investigated only one under the new GBRO. Almost 4000 complaints were submitted to FLNRORD Compliance and Enforcement Branch (CEB) provincially in the 2017-18 fiscal year, and 99 percent involved the Wildfire Act, FRPA, Land Act or the Water Sustainability Act. It is rare that CEB receives a complaint about EBM stand level activities in the GBR and even rarer that a determination is made for a non-compliance.

Authors' Observations

The bulk of the GBRO includes detailed prescribed requirements for planning and practices at the stand level. The importance of stand level practices for conservation of biodiversity cannot be understated. Some licensees question the intent of a few requirements. Most find the guidebook for old forest and listed plant communities has helped them gain confidence in some of the more challenging stand level decisions. Licensees believe they are generally meeting the intent of the GBRO requirements but have little data to prove it. Others suggest industry professionals are good at adjusting planning and practices to solve emerging issues and challenges. In some cases, licensees are going beyond GBRO requirements to help address specific local concerns and values. In other cases, issues are being raised about licensee practices that are contrary to the direction and/or intent of the GBRO.

Legal direction for stand level practices was established under the GBRO to avoid situations that would presumably be 'bad' for the goals of EBM. Where licensees are clearly going beyond GBRO requirements, it is presumably 'good' for EBM. With the complexity of the GBRO, it is in the troublesome grey areas between the 'good' and the 'bad' that practices can stray off-track and go unnoticed. Without comprehensive implementation monitoring, it is difficult to say if specific issues being noted in the field are isolated incidents or more pervasive. Further

[18] Declared cutblocks – Under the Forest Planning and Practices Regulation, a person who prepares a forest stewardship plan may identify an area as a declared area if, on the date that the area is identified, (a) the area is in a forest development unit in effect, and (b) all activities and evaluations that are necessary in relation to inclusion of cutblocks and roads in the area have been completed. Declared cutblocks allow for harvesting consistent with requirements in place at the time activities and evaluations were completed.

speculation on possible non-compliance with the GBRO cannot be substantiated, nor would it be credible to promote stand level EBM practices as mostly being 'good' regardless of how many people believe that to be true.

It is difficult to use either inspections by FLNRORD's Compliance and Enforcement Branch (CEB) or the Forest Practices Board to gauge implementation performance on stand level GBRO requirements to this point. It is true neither the Board or CEB have received many complaints under the GBRO, nor examined many practices. Yet, potential complainants have to first understand the complex legal requirements to recognize a non-compliance when they see it and, be willing to draw the attention that being a complainant can bring. As well, the remote, difficult access and challenging terrain in the GBR limits the ability to observe practices and, the consequences of poor practice may not be noticeable for years or even decades as some effects are cumulative. Finally, based on the findings of a recent Forest Practices Board report, it is unlikely CEB currently has the capacity nor the expertise to credibly conduct the type of inspections required to enforce all of the requirements under the GRBO.[xlv] Even so, a well-designed and comprehensive implementation monitoring program goes beyond compliance to ensure the intent of the requirements are being met, which is critical to advance learning and continuous improvement.

Both industry and First Nations licensees may be correct when they suggest it is too early to make any definitive conclusions about implementation of GBRO stand level direction. Yet, it will be difficult to make definitive conclusions at any point in the future without credible and comprehensive implementation monitoring.

Monitoring and Continuous Improvement

The 2016 GBRO states "the implementation of ecosystem-based management will be monitored and if monitoring results determine that ecosystem integrity is not being maintained or human well-being improved, this order may be reviewed and amended." This commitment to monitoring, review and adaptive management is confirmed by the province in agreements with First Nations, Industry and ENGOs. Yet all the industry and First Nations professionals we spoke with said the current general lack of monitoring[19] in the GBR is a significant gap in the implementation of EBM.

Since the first set of land orders for EBM were enacted in 2009, little monitoring has been carried out. The provincial Forest and Range Evaluation Program (FREP) conducted monitoring under its protocols, but that monitoring was criticized by licensee professionals as having too few samples and being FRPA-focussed with no monitoring of specific GBR practices. Some professionals say FREP has provided them with little useful information. District FLNRORD staff say EBM implementation monitoring requires something more than what FREP can provide.

For EBM, implementation monitoring includes both monitoring of reported implementation data and monitoring of planning and practices on the ground. FLNRORD maintains a tracking

[19] Monitoring means to observe and check the progress or quality of something over a period of time.

system to monitor representation and other targets relative to GBRO requirements. It updates this system every year, using harvesting depletions and other data from the RESULTS database. s.16

Some First Nations have started collecting useful monitoring data for practices on the ground through the Guardian Watchmen program. Several Nations have been conducting field monitoring and modelling for First Nations values and objectives under the GBRO. Some have shown significant learning points to help avoid excessive impacts from windthrow during layout and design of cutblocks.

All parties involved in EBM recognize the lack of monitoring to this point is a problem. They admit it is difficult to discuss implementation of EBM if there is little data to show how things are rolling out. Scientists involved in EBM in the GBR recognize implementation monitoring is important and point out effectiveness monitoring is also helpful to determine effectiveness of practices to meet the intent of the GBRO requirements. As well, they say continuous learning and improvement of EBM would also require a validation monitoring and research program to check EBM assumptions and fill knowledge gaps. Scientists in FLNRORD Coastal Regional say they have been promoting an EBM research program for several years. This program they point out would be aimed at addressing some of the effectiveness and validation questions for EBM and would use an active adaptive management approach. [20, xlvi] Some funding has been set aside for this effort and work is ongoing to establish research on the ground.

The G2G EBM technical team is responsible for developing a monitoring and adaptive framework for the GBR. They say detailed technical work was completed on an adaptive management framework several years ago but it failed to produce something tangible. Since then, JSP agreed to work on recommendations for a framework. It has discussed some ideas proposed by RSP, but currently there is no agreement, even within RSP, on how to proceed. The G2G says it is wary of investing in development of a highly complex approach to adaptive management predicated on monitoring a multitude of indicators that may not reveal significant issues in a timely way. Some members of G2G have proposed it would be more effective to develop a system that is more oriented toward identifying issues via the sharing knowledge among practitioners and managers and developing a response system with capacity to solve problems and resolve issues when they are identified or occur.

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[20] Active adaptive management - involves deliberately managing outside the bounds of legal and non-legal direction to examine differences between alternative management approaches or practices (hypotheses). Adaptive management can also use passive approaches, where managers assume that a single approach is correct (based on existing data), implement the policy that this "best" model predicts will have the desired outcome, and then monitor and evaluate actual outcomes. Because passive approaches have some significant risks if used exclusively, active approaches are attractive. However, active adaptive management can be costly and difficult to apply in some cases.[xxxvii]

Authors' Observations

A complex management system like EBM with complicated legal rules, such as those found in the GBRO, demands a degree of rigour in monitoring to ensure what is prescribed actually occurs on the ground. In fact, the ability to periodically assess the implementation of the GBRO and associated agreements is fundamental to the long-term legitimacy and success of the EBM. It is not possible to make any statements about the success of EBM without reliable comprehensive evidence about the status of implementation on the ground. Clearly this is a gap that must be filled in the GBR.

It is critical for learning that monitoring goes beyond ensuring licensees are meeting legal requirements. Proper implementation monitoring should make suggestions related to how to best implement in the interests of meeting the intent of EBM, as is being done with the Guardian Watchmen windthrow monitoring. Also, implementation monitoring should feed into a comprehensive and coordinated adaptive management strategy for EBM that blends monitoring and research to support learning among all parties. Clearly this is a priority for all parties in the GBR.

Successful adaptive management is challenging. Where it has been most successful is when researchers are "embedded" with those actually implementing a strategy, addressing the key issues, questions and assumptions that are most important to the implementers and the implementation. There are some successful examples to draw on – for example, MacMillan Bloedel/Weyerhaeuser BC Coastal Group's adaptive management program for their Coast Forest Strategy[xlvii, xlviii] and the approach used by Millar Western for their detailed forest management planning in northern Alberta.[xlix, l] In 2004, ecologist David Lindenmayer[21] called the MacMillan Bloedel/Weyerhaeuser approach, "the best, most well-planned and carefully executed adaptive management program in forests anywhere in the world.[li]"

[21] Dr Lindenmayer is the Professor of Conservation and Landscape Ecology for the Fenner School of Environment and Society, Australia National University and an Officer of the Order of Australia for distinguished service to conservation and the environment.

The framework for EBM implementation

> *"The core principles of ecosystem management cannot be translated into formal rules defining acceptable and unacceptable conduct. Rather, they all clearly involve considerable amounts of discretion, deliberation and learning. Accordingly, the challenge of ecosystem management is not in the first instance a legal one. Rather it is an institutional one: How is our society organized to facilitate ecosystem management?"*
>
> *E. Meidinger (1997)*[lii]

In this section we explore concerns and issues related to the framework, or actual system, established to implement EBM in the GBR, including the processes, participation of the parties involved and, the technical and scientific expertise being provided for support. Some of the issues described in the previous section may be strongly influenced by the structure and processes that provided the context for their emergence.

The EBM implementation has been heavily influenced by the multitude of agreements and memorandums of understanding between the key players. Unravelling these agreements to make changes to the framework could be challenging.

Again, we did not explore the G2G decision-making structure or processes, as it is outside the scope of this review.

General Observations of the Framework

The implementation framework for EBM has provided for some progress with EBM under the GBRO. Industry licensees say the G2G governance structure, as a foundational underpinning of EBM implementation is a welcome change in how it has altered the conversation for resource management by providing greater opportunities for them to engage with both provincial and First Nation government structures. They say the implementation process has required all parties to learn about the values, interests and goals of the others, while together exploring and discussing the technical aspects of EBM. Some participants on both sides of the G2G believe the implementation framework is working fairly well, even though the recognize some things are not effective. Everyone points out there are capacity challenges and the pace of implementation is slower than expected. Some in FLNRORD say they are impressed by the collaborative, respectful way all parties work as a group of partners and the level of trust they have developed between them.

It is clear to us from our interviews all parties seem to know each other well and generally respect, and understand each other. However, we noted a pervasive trust issue. s.16
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s.16 Some G2G representatives believe the complexity of EBM is largely to blame. FLNRORD staff say the CSIC-OPIC-G2G EBM Technical Team portion of the framework for implementation is itself complicated, adding it is a challenge to keep track of how these groups work together.

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Authors' Observations

The framework for EBM implementation is intended to facilitate and support decisions associated with the implementation of EBM. While most requirements for EBM under the GBRO have been in place in some form for a decade, some requirements, such as those for the LRDs are relatively new. Some progress has been made on these new requirements but it has been slow, while many implementation concerns are emerging (see previous section).

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s.16 Successful EBM is a complex "wicked" problem and as such, intuitive understanding of how well it works and what is happening is less likely to be correct. Issues are more likely connected to other issues or misjudgments in puzzling ways. Managing complex systems in wicked planning environments requires careful and humble decision-making, the open sharing of bad news and an emphasis on doubt, dissent and diversity.[liii] The apparent GBR myth that once an agreement was in place, the difficult part was done, must be dispelled.

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OPIC

Most participants in OPIC believe the concept - to bring together the practitioners from both industry and First Nations to consider operational challenges and issues – is a good idea. s.16

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s.16 Lead professionals for LRDs say that outside of the OPIC data management group, OPIC has made no decisions or provided little guidance to assist the LRD process.

OPIC was supposed to solve problems. When LRD technical teams encountered issues they could not solve, they were supposed to take them to OPIC. But the lead proponents of LRDs are also involved in OPIC, so they say they are basically taking issues to themselves to solve. Some First Nations and industry licensees say OPIC is probably doing what it can, but the challenge is capacity. All participate in OPIC "off the side of their desks," and few have much extra time to commit to it. Consequently, participants say too often little gets done in OPIC meetings, which are mostly a "let's talk" session rather than a decision-making forum. For example, it took OPIC over a year to finalize a process for collection of data for yew and bear dens.

RSP is a member of the OPIC annual reporting subcommittee, mostly because it says it was not allowed to join the greater OPIC group. It says the biggest challenge for OPIC is its' composition of operational professionals who are not used to thinking at a higher strategic level. OPIC members say it has neither the mandate, the structure nor the resources to meet many of the expectations many parties have for it. s.16

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Author's Observations

The concept of having an operational team of "implementers" across the range of industry and First Nations licensee professionals working together collaboratively to discuss issues they all face is, in our opinion, an excellent idea. Yet, the fact is, because the people in these groups are implementers, they have little spare time to contribute to a group such as OPIC. We believe they should not be expected to go beyond brainstorming issues and potential operational solutions. s.16

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Groups like OPIC have been effective elsewhere when the greater group of implementers directly inform a smaller subgroup of one to several individuals whose primary full-time focus is to lead and manage implementation generally, and the operational implementation team specifically. One example of a successful group of this nature was the operational working group used by MacMillan Bloedel /Weyerhaeuser BC Coastal Group in 1998 to 2005 for its Coast Forest Strategy. Divisional foresters and engineers participated on the working group but were only expected to impart their observations and suggestions during the meetings. A company staff member, who was mostly focused exclusively on the Forest Strategy, organized and led the sessions and used the information provided to make decisions moving forward. Consulting foresters, biologists and ecologists occasionally were engaged to provide supplemental information to support those decisions. Occasionally, some decisions were

deferred to a higher level, but those situations were rare. While this example may not compare precisely to the complexity and "wickedness" of EBM implementation in the GBR, it may hold some useful, practical lessons.

Clearly, choosing people to manage and lead OPIC would need to be done carefully to garner confidence and trust. In fact, RSP suggests a third-party secretariat.

CSIC and JSP

CSIC is an interesting component of the implementation framework. It is the access point for RSP to the G2G, but only after it consults with industry members in CFCI to come to an agreement as JSP. It also provides industry professionals another access point beyond OPIC, but only those who are members of CFCI and only through agreement with RSP. This arrangement is clearly starting to frustrate both ENGOs and Industry.

JSP emerged in the early 2000's as a mechanism for industry and ENGOs to reach an understanding that would facilitate effective implementation of the recommendations emerging out of the Central Coast land use plan for EBM. Much has changed since then. The province and First Nations have set in place a shared G2G governance structure and several iterations of Land Use Orders have provided more clarity in direction. Agreements signed in 2014 by RSP and CFCI detailed recommendations on a few elements of EBM that the G2G subsequently agreed to implement as part of broader implementation solutions package. Few of the current CFCI participants in JSP were present for finalizing of those agreements and delivery of the recommendations to G2G.

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CFCI say they would like to have direct access to the G2G rather than having to reach consensus first with RSP. Some non-CFCI industry members are even more frustrated with their inability to access the G2G. First Nations professionals agree that 'implementers' need a direct link to the G2G.

The Unique Role of RSP

By representing important ENGOs with an interest in the GBR, RSP is a key component of JSP and therefore CSIC. It also sits on three LRDs technical teams in the southern GBR. It has presence in OPIC on its' Annual Report Subcommittee.

The province recognizes RSP as a key player in implementing EBM in the GBR. A number of First Nations view RSP as playing an important role in helping the Nations advocate for their concerns. They acknowledge EBM would not be as advanced in its thinking without RSP. But not all First Nations support RSP's current involvement in EBM. Some Nations question RSP's aggressive involvement in operational implementation, saying its' priorities are too different than those of the province, First Nations and industry.

CFCI professionals say they gave RSP its power and voice in JSP, but are now concerned it is involved too deeply in their operations. Further, they say negotiated agreements within JSP to direct EBM made sense at the time, but negotiating the minutia of every detail of implementation does not. Rather, the current approach is stalling implementation efforts by both CSIC and OPIC. They point to the development of the 2019 guidebook as an example. Three well-respected ecologists were chosen to develop the guidebook. When they presented it to JSP, the conflicting feedback from CFCI and RSP was frustrating for the ecologists who felt the process suffered from "too many cooks in the kitchen."

RSP believes the role it best serves is that of the champion for the spirit and intent of the ecological aspects of EBM. In the void created by a lack of monitoring, it is trying to ensure implementation stays on track, asking the hard questions about accomplishments and process.

Authors' Observations

Any discussion of CSIC and JSP with licensee professionals quickly becomes focused on RSP. RSP is an important stakeholder in the GBR. It was instrumental in reaching an agreement between all parties and in crafting the vision for EBM. Its' collaboration with industry in JSP helped to facilitate shared recommendations to G2G. We believe it should have a role in the GBR, doing what it believes it does best - as a champion of the intent of EBM. We question whether RSP participation in JSP and CSIC best serve that role, in the context of implementation.

JSP was a necessary mechanism for industry and RSP to build an understanding of EBM together. However, the context for management in the GBR has changed. First Nations now share governance with the province and management with industry. It is awkward that some industrial players in CFCI 'negotiate' with RSP on aspects of EBM implementation, while the general OPIC alliance of industry and First Nations licensees are also trying to work on implementation issues.

Industry and First Nations professionals should be working together to determine how to best implement GBRO EBM requirements on the ground. This group (OPIC) should have access directly to G2G decision-makers, reporting progress, explaining the rationale for certain

approaches and occasionally asking for higher level decisions. At the same time, it is useful to have a stakeholder group, like RSP, with a keen interest in the intent of EBM, keeping a skeptical eye on implementation as it unfolds. In complex wicked environments, it is critical to have a group that continually looks for small failures and near misses. This type of skepticism should be encouraged and it is best done by a group with a different perspective than the implementers.

The challenge for the GBR is how to structure RSP's participation in EBM going forward. Clearly to play the role of the skeptical stakeholder, it needs full access to all new information and data as it emerges from the implementers. It also needs access to the implementers to voice its concerns and make suggestions. For implementation, this interaction should be input, not negotiation. Negotiation results in grey compromises – the lowest common denominator between two points of view, with results that are average at best. Successful implementation requires what best meets the intent of EBM in the most operationally feasible manner.

OPIC should consider RSP's input. When OPIC decides not to follow that input, a full explanation, linked to science and technical logistics should be provided to RSP. Support from scientists and/or technical specialists may be required to assist in these discussions. Finally, RSP should also report any outstanding concerns periodically to the G2G.

Technical and science support for EBM implementation

From OPIC's inception, a FLNRORD Coastal Region specialist has provided primary technical advice and tracking support to the operational team. But now that specialist is close to retirement. Licensee and First Nations professionals, LRD lead professionals, and RSP all voiced strong concerns about the loss of institutional memory that will occur when this specialist is gone, illustrating a critical vulnerability in the OPIC structure.

Occasionally the FLNRORD Coast Regional ecologist provides some technical advice to LRD technical teams and others regarding the science behind EBM. At the same time, the ecologist has been promoting a program of research and adaptive management that is moving ahead slowly in the southern GBR. Yet, EBM and the GBR is but one of many responsibilities the ecologist has to juggle in her position with FLNRORD.

When the old forest and listed community guidebook was long past its deadline and stalled, the province decided to engage three respected consulting ecologists to work on it. They created a product that met its objectives and is now successfully being used by licensees in the field.

Most operational and government professionals we interviewed agreed that a greater and more consistent use of scientific and technical support to help address EBM questions and issues, similar to what was done with the guidebook, would be useful. Ecologists and biologists agree. They believe with greater involvement of scientists, there may be some opportunities to simplify the approach to EBM. RSP suggests some consistent science support is necessary to start to consider EBM in the context of improving resilience to potential impacts from climate change.

Some licensees point out, scientists also need to consider, and make greater use of, traditional knowledge. For example, discussions with some Nations during the preparation of the LRD brought to light important local traditional knowledge of grizzly bear habitat that would have been useful when scientists developed the habitat maps for the GBRO.

Authors' Observations

Through all our interviews there was a common concern that the biggest issue facing implementation was complexity – complexity in the EBM approach and the framework for implementation. There may be opportunities to simplify EBM. We suggested some in the previous section about management toward EBM goals. Some ecologists speculate that further simplification may be possible. Another mechanism to address the vulnerability in systems imposed by complexity is increased transparency. As mentioned previously, lack of transparency is a common concern among GBR participants. A general lack of monitoring and other data has likely contributed to the lack of trust that is pervasive between the various players involved in implementation.

With the 2019 guidebook for old and listed plant communities we have seen how use of credible specialists can help sort through key EBM questions to improve transparency and come to a resolution. Most of those involved in EBM implementation would like to see this type of approach expanded.

We believe effective implementation of EBM with continuous learning and improvement (adaptive management) requires consistent involvement of credible specialists – scientists and technical experts – in a structured, managed program of support. We believe credible specialists collaborating with practitioners to address key implementation questions, issues, concerns and needs should be foundational to such a program. As well, we believe to ensure success, the design and management of an adaptive management program of monitoring and research aimed at the key questions and issues emerging out of implementation should also be a collaborative effort between credible specialists and practitioners who are actually involved in implementation. Using the principles of adaptive management, this group should be closely connected to or embedded in OPIC. Specialists within this group should also be utilized to peer review LRDs and help address key questions raised by RSP and others, working with OPIC and others to hasten resolution. A 'sustainable' group of technical specialists should be responsible for tracking, general data consistency and quality assurance, again working closely with key licensee professionals in OPIC. For example, they may take the lead on exploring the use of productivity and species data for quality assurance. This group should also work with licensee technical professionals in OPIC to develop and refine tools for record-keeping and analysis.

We believe a small core of scientists and supporting technical specialists will be required fulltime to support this effort, with the capacity to provide replacement as people retire or move on. This core group will need to be supplemented with other consulting specialists from time to time when important questions emerge that require monitoring, research or other project work to resolve, such as with the 2019 guidebook.

Conclusions

Throughout the document, after every major or discreet topic we present some "authors' observations" in yellow text boxes. These highlight our general thoughts about the topic and ideas to address concerns and issues that are emerging. In effect, they serve as mini-conclusions for each section. This "conclusions" section at the back end of the report summarizes those observations and adds some general perspectives.

Note – All the conclusions here are our opinion based on what we heard and learned about EBM in the GBR. For more detail, refer to the yellow "Authors' Observations" after each topic section.

EBM implementation in the GBR represents the culmination of millions of dollars in investment, decades of scientific investigation, analysis, multi-lateral discussions and negotiations between parties with different world views and priorities. It is nothing short of monumental in its achievement. Yet as changes were made in 2016, some aspects of EBM including the GBRO took on a higher degree of complexity. As well, the implementation framework, built on a multitude of agreements and memorandums of understanding, was similarly complex.

Many positive advances to meet ecological goals have been made under the GBR's EBM approach. The proportion of protected areas and their effective distribution is unprecedented, comprehensive and scientifically credible, establishing a solid foundation for conservation of biological diversity in the region. Licensees are confident in their understanding of stand level requirements and their application of them on the ground. Numerous examples exist of licensees going beyond legal requirements to better meet the intent of EBM and address First Nations and local stakeholder priorities. And, the province, First Nations, industry and ENGOs have together learned a considerable amount about the science behind EBM through their implementation efforts.

Even so, the complexity of the GBR EBM approach remains a primary concern for all participants. EBM by its very nature is complex and the GBR biophysical setting and social-economic and cultural circumstances adds to that complexity. So, a certain amount of complexity in EBM is unavoidable. Complexity in any system, be it an approach to EBM or the structure and make-up of an aircraft introduces vulnerabilities for issues and failures to occur, particularly if elements are tightly coupled, as in EBM with its legal requirements under the GBRO. Clearly, it is far too early in the implementation of the GBRO to diagnose or discuss failures against the ecological goals. Yet, issues are starting to emerge. We believe some of these issues should be regarded as warning signals that need to be proactively addressed.

Everyone is concerned right now that no LRDs have been completed when the GRBO requires that roughly over 40 LRDs be approved or established by 2021. Many across the spectrum of people we interviewed felt the legal targets for LRDs are too rigid and restrictive. Challenges in meeting all three LRD targets may be resulting either in weaker designs from an ecological perspective and/or significant impacts on the managed forest. Various LRD concerns about data, indicators and quality assurance are also emerging. Discussion of these issues has stalled progress on the LRDs themselves. Some success has been experienced addressing a few of these concerns using a third-party group of experts.

At the same time, concerns about harvest levels and sustainability are impacting progress on some LRDs. Approaches to planning that integrate timber management spatially with LRD networks may provide some solutions. Industry is working on case study examples of this type of planning, which fits with the current provincial vision for changes to FRPA that will incorporate landscape level planning on most management units.

Even though most licensees are confident in their implementation of EBM stand level requirements, which make up the bulk of the GBRO, success cannot be confirmed without monitoring.[22] Likewise, it is impossible to know if localized issues identified by First Nation stewardship offices and Guardian Watchmen are isolated incidents or more pervasive, or if other perceived concerns at the stand level are significant.

We believe the the lack of EBM monitoring is a serious issue. We believe a strong adaptive management program of implementation, effectiveness and validation monitoring combined with research is needed to support continuous improvement across the GBR. Some preliminary efforts are underway to get started on this work, but a framework for such a program is not yet in place. The most pressing concern is the lack of implementation monitoring. For EBM, this includes both monitoring of reported implementation data and monitoring of planning and practices on the ground. Some EBM data is currently being reported periodically. Requirements for reporting and/or the analysis of that data may need to be expanded, but we believe the most pressing need is for implementation monitoring of practices on the ground.

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There are five proven mechanisms to address vulnerabilities in a working system.[liv] For the 'system' to implement EBM, there may be some opportunities to reduce complexity, which should be explored with ecologists and biologists. We think introducing slack into an approach tightly-coupled with legal requirements for LRDs can help make implementation less rigid and more resilient.

More than anything else, we believe greater transparency will help address the pervasive lack of trust. A well-designed and resourced monitoring program is critical. A data management and tracking system accessible to all will also help, as will avoiding confusing and misleading terms. We also believe the wicked nature of EBM itself means the implementation framework requires a degree of skepticism built-in to reduce 'group-think' and ensure nothing falls through the cracks. Some improvement in the structure of implementation teams may also help them become more responsive to solving issues before they become problems.

[22] Monitoring means to observe and check the progress or quality of something over a period of time.

Lastly, we suggest that everyone involved in EBM implementation, particularly those at a higher level, remember that EBM will continue to be a grand experiment, a learning experience that will shift and grow over time. The apparent GBR myth that once an agreement was in place, the difficult part was done, must be dispelled. The GBR is a massive area, diverse in its ecology, heritage and culture. EBM will continue to be a complex challenge with many uncertainties. It is important to be humble. We will never "get it right." The best we can do is continue to learn together and keep managing in the direction that seems best at the time. A commitment to adequately resource continuous learning and management will be important.

Suggestions for Improvement

Introduction.

EBM in the GBR is not broken, nor has it failed. We do however see warning signs that we feel should be addressed. All of the suggestions below will in our opinion help build trust and improve implementation, based on what we heard from people involved in the process. We agree with Meidinger (1997) who pointed out that EBM cannot just be translated into formal rules, because it requires considerable amounts of discretion, deliberation and learning.[lv]

Some suggestions would require a change in either the GBRO or the legislation. Some groups may have to let go of historical agreements or memorandums of understanding. We recognize some of these suggestions may be challenging to implement. It is our hope that these suggestions at the very least spark ideas for change to address the key issues described in this report. For more detail on these suggestions, see the "Authors' Observations" in the yellow text boxes at the end of each section.

Summary of Suggestions

1. Establish a full-time, dedicated core team to manage implementation in the GBR generally, and OPIC specifically. This group should report to the G2G. First Nations and Industry OPIC members who are implementers should only be expected to provide input, feedback, advice and recommendations to this core management group, who will make most OPIC-related implementation decisions on behalf of the whole group. Criteria to bump occasional decisions up to the G2G Technical Team should be developed.

2. Establish a group of several scientists and a separate group of technical specialists dedicated to supporting the implementation management group and OPIC. Both the science group and the technical group may only include 2-3 people but should have resources to engage additional consultants when required to design and implement the adaptive management program, peer review LRDs and, address key questions and issues as they emerge. It is critical that these groups work closely with the core management team and OPIC, not separate from them. These groups should incorporate First Nations traditional knowledge by finding ways to network and collaborate with the traditional knowledge holders. The technical specialists should be responsible for developing a data management system for all licensees that will address tracking, general data consistency and quality assurance with a focus to provide access for all to the best data available and, continuous improvement. The science group and the technical group should be used, along with OPIC practitioners, to report to the G2G about questions and issues of interest.

3. Put in place a comprehensive and coordinated adaptive management program for EBM implementation based on the GBRO requirements, blending monitoring and research to support learning among all parties. To maximize relevance and continuous improvement, the adaptive management program should focus on key questions, issues and assumptions related to successful implementation. These questions or issues may be surfaced by implementers (OPIC), RSP, First Nations and the province. Ultimately First Nations and the province (the G2G) should decide the priorities. However, the starting point should be credible implementation monitoring that goes beyond ensuring licensees are meeting legal requirements to make suggestions for improvements related to the intent of EBM. Implementation monitoring should eventually be complemented by effectiveness monitoring, validation monitoring and research. This program would need to link into any of the monitoring work and related initiatives currently underway with First Nations and other groups. A timeline and budget will need to be clarified for this.

4. Formalize RSP's preferred role as a skeptical EBM watchdog, focussing on the intent of EBM. We believe this to be a formal organizational change. We suggest RSP should review work completed by and for OPIC including: new LRDs, tools and processes, monitoring results, research and other supporting data. This does not mean they should be part of OPIC. RSP should be asking questions and providing other input to OPIC for consideration and/or follow-up with scientific or technical experts. RSP should also report periodically to the G2G. CSIC and JSP should be phased out as a formal component of the implementation framework. Industry will have access to the G2G through OPIC.

5. Amend the GBRO, making LRD targets aspirational – as goals to strive for, rather than the rigid legal targets they currently are. This would include changes to the language in the GBRO for managed and natural forest targets, including targets for minimum old forest and old forest representation. Under this new approach, the emphasis for LRD planning would be on sound and effective LRD design while trying to get as close as is technically and operationally reasonable to the "aspirational" targets. Once satisfied with the design, the LRD lead professional would then write a rationale they will be prepared to defend. This is especially important if there are significant deviations from the targets. The LRD together with the rationale should then be peer-reviewed by other scientists. The G2G would then review the LRD and approve it or ask for changes, considering the feedback from the peer review and their own strategic priorities. Trade-offs can then be made by LRD decision-makers on specific LRDs with complete information in hand. Consider requiring LRD team leads to be third-party professionals – although this may be challenging from a capacity standpoint.

6. Explore combining LRD planning with timber harvest planning to help address the current concerns about the LRD and sustainability, including overharvesting of cedar.

Build on the lessons from the work currently being completed by Western Forest Products and the Kitasoo First Nation in the Roderick Landscape Unit. This approach would include LRD lead professionals working with licensee harvest planners and analysts as a collaborative team. This approach also fits with where the province is planning to go with its vision for landscape level planning throughout BC, so work with provincial landscape level planning leads in the Office of the Chief Forester. It is anticipated this integrated approach may take some time to build and implement.

7. A broader analysis should be completed of the harvest profile against the forest profile to determine the scope of the concern regarding overharvesting of cedar. This would best be done by a third party.
8. Amend the GBRO timetable requiring more than 40 LRDs to be completed by 2021, since meeting that deadline appears unlikely at this stage.
9. Design a flexible amendment process for the LRD that fits better with the province's flexible, evolving approach to First Nations engagement and reconciliation.
10. First Nations values, foundational to the GBRO, should be the starting point for LRD development, if they are not already.
11. The province should make it a priority to acquire seamless LiDAR coverage for the GBR to improve transparency with equal access of the best data available for all parties.
12. Consider replacing the term "restoration" to describe landscape units and zones in the LRD. Replace it with a more neutral term that also reflects the economic importance of these areas.
13. Licensees and the province should work to improve First Nations understanding of the LRD process and its importance for their territory.
14. Licensees should work to continue to strengthen their relationships with individual First Nations.
15. A clear implementation strategy should be developed to guide implementation from this point on, starting with broad direction from the G2G and involving all parties participating in implementation, with final approval by the G2G.

For more information – see the "Authors' Observations" yellow text box at the end of discreet topic sections in the report.

APPENDIX 1 Landscape Reserve Designs in the GBR

The intent of landscape reserve designs (LRDs) is to identify how biodiversity, First Nations, wildlife and managed forest objectives of the GBRO can most effectively be addressed spatially in each Landscape Unit and across the GBR Area as a whole. LRDs are also intended to create a transparent and stable planning environment to help guide forestry development and operations. Final LRD products include a map and associated GIS products identifying the locations of reserves along with a report summarizing the process used, including stakeholder engagement and the key attributes of the LRD.

Specifically, LRDs are supposed to protect and maintain First Nations traditional heritage and cultural features and resources; address GBRO targets for old forest, most importantly those for minimum old forest retention, old forest representation and the Managed Forest, while focusing on ecosystems and habitats that have high value, or are rare or at risk. As well, LRDs are to maximize maintenance of ecological function of the features included in reserves for connectivity, forest interior and other considerations important for conservation of biodiversity and, where required, restore representative old forest by recruiting stands, considering age, productivity and structural complexity.

LRD technical teams seek to capture multiple cultural and ecological values overlapping the same locations. Technical teams also seek to maintain GBR economic opportunities by minimizing impacts on the Managed Forest and seeking to address other resource related economic opportunities such as carbon credits.

To build an LRD, the LRD technical team starts with an area of interest – the landscape unit which is the focus of the LRD, minus netdowns for private land and non-participating area-based tenures. Legislated reserves, including large conservancies are delineated as well as other reserves such as Wildlife Habitat Areas. Next, the LRD team considers constraints based on First Nations and stakeholder values. At this point the team assesses representation by ecological units known as site series groups (SSGs) and determines which may have deficits based on existing reserves and potentially constrained areas. They then determine if they can address the SSGs of concern by building connections or larger patches within the network of reserves. Incursions into the Managed Forest may be necessary, although the goal is to minimize them.

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Advancing the Economic Component of Human Well-Being in the GBR Region: Challenges and Opportunities

Addendum to:
Inventory of Economic Development Initiatives in the GBR Region
2019 Update

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