

Results of a Survey of Managed Forest Operations Protecting Drinking Water Quality

December 2016

Prepared for:

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Executive Summary

The Managed Forest Council (Council) regulates forest management activity on private managed forest land in British Columbia under the *Private Managed Forest Land Act*. One key management objective under the legislation is the protection of water quality for domestic consumption. Council undertook this study to evaluate whether harvesting practices on Managed Forests (MF) are undertaken in a manner that protects drinking water quality for licensed water intakes, and to determine if owners are aware of their regulatory responsibilities related to their protection. A survey of MF owners and water licensees examined communications between owners and licensees, awareness of regulatory requirements, assessments and practices relating to protection of water quality, and water quality related concerns.

Council identified both individual water licenses (WL's)¹ and licensed waterworks intakes (LWI's)² within one kilometer downstream of Managed Forest land throughout the province. Although a few actively managed large and medium sized MFs constitute most of the area in the program, the majority of MFs are small holdings; and most of those are not being actively harvested. Of the 25 MFs included in the survey 18 responded for a response rate of 72%, and of the 142 water licensees surveyed, 69 responded for a response rate of 49%.

The study found that MF land owners' assessments, planning procedures and operational practices meet standard practices for the forest industry. Larger MFs achieve greatest consistency, while those used by the smaller MF's are generally appropriate for the scale of their operation.

Responses generally indicated effective communication between MFs and water licensees. In some instances, individual water licensees were being notified in advance of works even though this is only required for licensed water intakes.

Of the 44 WL respondents surveyed, approximately half indicated that their water quality had changed to some extent over the past 10 years. One-third of the 15 LWI respondents noted a change in water quality over that same period. Of those who noted a change in water quality, approximately one-half partially attributed the change to activities on the adjacent MF. However, there were a wide variety of other potential causes noted.

¹ An individual licensed water intake means any water supply intake licensed under the *Water Sustainability Act* for use for human consumption.

² A licensed waterworks intake means a water intake that (a) is to provide water for human consumption, and (b) is licensed under the *Water Sustainability Act* for (i) a waterworks purpose, if the licence is held by or is subject to the control of a municipality, regional district or improvement district, or (ii) a domestic purpose, if the licence is held by or is subject to the control of a water users' community incorporated under the *Water Users' Communities Act*.

This study affirms that water quality planning assessments and operational practices conducted by private managed forest land owners are consistent with forest industry standards and the scale of their operations. In many instances, individual water licenses are considered in these assessments and practices despite this not being a requirement under the *Private Managed Forest Land Council Regulation*. Impacts from forest management activities are an important consideration for both licensed waterworks intake and individual water license holders.

1.0 Background

The Managed Forest Council (Council) regulates forest management activity on private managed forestland in British Columbia under the *Private Managed Forest Land Act* (Act). One key management objective for the council is the protection of water quality for domestic consumption. Council is conducting a study to evaluate whether the current regulatory framework under the Act and regulations meets the intent of the objective for the protection of drinking water.

The Managed Forest Council had recently completed a project that identified the number of individual Water Licenses (WL's) and Licensed Waterworks Intakes (LWI's) inside and within one kilometer downstream of Managed Forest land throughout the province. This next phase is to develop and administer a survey with a sample of managed forest owners and water licensees. The survey is intended to gather data on the assessments, practices, interactions and processes used by managed forest owners in their operations to protect water resources within and downstream of their managed forest.

2.0 Methodology

The project is intended to address the following questions and issues:

- What assessments, planning procedures and practices are used to guide forest management activities and protect water quality?
- How do the standards for assessments, planning, and practices compare to the industry standard (primarily defined by practices on Crown land)?
- Is there a variation in the complexity of assessments and pre-harvest planning used to address protection of downstream drinking water resources depending on the size of the managed forest, the number of water users, or the sensitivity of the watershed?
- Are there regional differences in assessments and planning (coast vs. interior)?
- What is the nature of communication between managed forest owners and water licensees?
- What is the level of knowledge of managed forest owners and water licensees about the presence of the other and notification in advance of work requirements?
- Are there impacts of forest management on water (as perceived by WL holders)?
- What is the status of water licenses – i.e. are licenses being used for domestic consumption purposes or are they abandoned or being held as a reserve supply?
- What are the qualifications of those doing the assessments and planning?

The project was undertaken in several phases as described below:

Two draft surveys were developed, one for managed forest owners and one for water licensees. The survey questions were developed from those provided by Council in the project proposal. The **water licensee survey** included the following sections:

- Background information related to the water license;
- Awareness of private managed forest land and associated regulatory requirements;
- Concerns about water.

The **survey of managed forest owners** included the following sections:

- Awareness of nearby water licenses and requirements from the *Private Managed Forest Land Council Regulation*;
- Practices related to water quality protection;
- Communications with water licensees and other forest operators.

The sampling plan was developed based on work previously done by the Managed Forest Council staff which identified water licenses within or close to managed forests. Only managed forests with a record of some harvesting or road building activity in the last ten years were included in the survey.

The sampling plan and the draft survey questions were presented and discussed at the Council meeting on October 15, 2015.

The sampling plan is as shown below in Table 1:

MF size	Coastal Managed Forest	Interior Managed Forest	Coast License POD	Interior License POD	Total License POD
Large (>5000 ha)	6 (3)	6 (5)	47	27	77
Medium (500 to 5000 ha)	7 (6)	4 (2)	22	22	44
Small (<500 ha)	5 (5)	4 (4)	10	14	24
Total	18 (14)	14 (11)	79	63	142

Note – the numbers in brackets () refer to the number of unique MF owners or managers in each category. Several of the MF's have the same owner or manager and are included in the sample since they are associated with water licenses.

The water points of diversion (POD's) are those associated (e.g. within the MF or within 1 km downstream) with each MF category. They are a sample of the total number of POD's associated with each managed forest.

While the sample size is not large, it is intended to be sufficient to provide Council with an assurance that risks to water quality from the current activities of managed forest owners have been accurately identified. The sample size was also designed to have a buffer in it for potential non-responses from water licensees (since it is possible that contact information may be outdated).

Both WL's (individual water licenses) and LWI's (licensed waterworks intakes) are included in the sample. LWI's are held by local governments, improvement districts, or a water user's community. LWI's are referenced in several sections of the *Private Managed Forest Land Council Regulation* with respect to practice requirements, while WL's are not.

Trial surveys were sent out to a sub-sample (6 managed forests and 12 water licensees) in November 2015 in order to confirm that the survey was clear, easy to complete, and would produce the results that were desired. This was followed up by a telephone interview to provide additional feedback.

The final survey was sent out in late- January 2016. Based on the feedback received from the earlier trial sample, some additional clarification about managed forest land was provided to the water licensees and three alternative methods of completing the survey were offered (paper form with stamped, addressed envelope, fillable pdf form on the internet, or telephone interview). MFC staff identified mailing addresses and telephone numbers through the water license database.

The survey forms are included in Appendix 1.

3.0 Results and discussion

Table 2 – Survey sample and responses

MF size	Managed Forest Population & response				Water license population & response			
	Coast		Inter		Coast		Inter	
	Pop.	Resp.	Pop.	Resp.	Pop.	Resp.	Pop.	Resp.
Large	3	3	5	3	47	25	27	11
Medium	6	4	2	2	22	11	22	9
Small	5	2	4	4	10	6	14	7
Total	14	9	11	9	79	42	63	27

The overall response rate for the MF survey was 72% and for the water license survey was 49%. Of the 42 coast region responses, there were 17 from LWI's and 25 from WL's. The interior response consisted of 1 LWI and 26 WL's. The primary reason for low response rate to the WL survey is likely due to the accuracy of the initial database. Some of the addresses were likely incorrect, phone numbers were difficult to find, and some of the properties had been sold.

A general summary of results along with discussion is provided below.

3.1 Managed Forest owner survey

This section contains an overview of the survey results.

3.1.1 – Awareness of water licenses and regulatory requirements related to protection of drinking water

Table MF 1 - Are you aware of any licensed water intakes (LWI's) or individual water licenses (IWL's) located either on your managed forest or within 1 kilometer downstream of the managed forest?

	Coast			Interior		
MF size	L	M	S	L	M	S
Yes	3	3	2	2	1	3
No		1		1	1	1

Table MF 2 - If so do you know whom the license holders are?

	Coast			Interior		
MF size	L	M	S	L	M	S
Yes	3	3	2	3	1	2
No					1	1

The MF's were selected for the survey based on whether they had at least one water license intake either within the MF or within 1 km downstream. It is possible that water licenses where the respondent answered "No" are not currently active. The responses show generally good awareness by MF holders of adjacent water licenses. It is worth noting that in the process of completing the survey it was evident that there is a wide variation in computer and internet literacy among both MF holders and water licensees. Even though an online database of water license locations exists, all MF holders may not know how to access the information.

Table MF 3 - Is all or part of your managed forest in a designated Community Watershed?

	Coast			Interior		
MF size	L	M	S	L	M	S
Yes	3	2	1	2	2	
No		2	1	1		4

This question was intended to refer to Community Watersheds as defined in the *Forest Planning and Practices Regulation* (under the *Forest and Range Practices Act* (FRPA)). These have either been established under the Forest Practices Code and

grand-parented under section 180 of FRPA or established under the *Government Actions Regulation* and have specific requirements relating to forest operations on Crown land. Specific requirements under the *Private Managed Forest Land Act* for roads, stream classification and associated tree retention, fertilizer use, water intake protection, and notification are linked to “licensed waterworks intakes” (LWI’s). Community Watersheds accordingly only apply to Crown land, not private managed forest land. Some respondents appear to have interpreted it in a more general sense, taking it to mean watersheds with licensed waterworks intakes that belong to local governments and provide water to large populations. They included large watersheds supplying water to Comox, Courtney, Nanaimo, and Nelson in this definition.

Table MF 4 - If yes does this affect planning, practices, or communication with water licensees?

	Coast			Interior		
MF size	L	M	S	L	M	S
Yes	3	2	1	2	1	
No						

Nevertheless, many of the responses indicated that CWS status did affect their operations. (It is worth noting that some respondents, as explained previously, consider some of the larger watersheds supplying water to communities as CWS even though they are not designated as such). In some cases, it is because the respondent participates in watershed planning groups established by the water licensee, in others instances the MF covered a portion of the watershed and the MF operator also operated on Crown tenure elsewhere in the watershed, thus creating an expectation for similar management.

Table MF 5 - Are you aware of the regulatory requirements (e.g. as specified in the Private Managed Forest Land Act Regulation) and associated guidelines (Managed Forest Council Field Practices Guide - 2015) for the protection of drinking water?

	Coast			Interior		
MF size	L	M	S	L	M	S
Yes	3	4	2	3	2	3
No						1

Most of the respondents, particularly those from the medium and large MF’s rated their understanding of individual PMFLCR and Managed Forest Council Field Practices Guide requirements as good to excellent. They were also asked to rate their awareness of individual requirements.

3.1.2 – Practices relating to water quality protection

Table MF 6- In looking at assessments that you complete before, during, or after harvesting or road constructions activities that protect drinking water resources downstream of the managed forest. Which of these assessments do you use?

Location	Number of positive responses					
	Coast			Interior		
Assessments/ MF size	L	M	S	L	M	S
Equivalent Clear-cut Area (ECA) calculations	2	1	-	1	1	-
Sedimentation hazard mapping	3	1	-	-	1	-
Terrain stability field assessment (TSFA)	3	2	-	2	2	-
Wind-throw risk assessment	3	3	1	2	2	1
Identification of road hazards	3	3	1	3	2	1
Riparian Assessment	3	3	1	2	2	1
Overall watershed assessment	3	1	-	2	2	-
Other	1	1	-	1	-	1
Total responses	3	4	2	3	2	4

The above results show that most MF operators are completing assessments as appropriate for their particular situation. Some of the assessments, particularly overall watershed assessments and equivalent clear-cut area calculations, are not relevant for small managed forests since the MF may include only a small part of the watershed. In some cases, TSFA's may be less relevant on small MF's, since steeper ground may be avoided due to equipment limitations.

Table MF 7 - Can you provide examples of these assessments for the information of the Managed Forest Council?

MF size	Coast			Interior		
	L	M	S	L	M	S
Yes	3	2	1	2	1	1
No		2	1	1		2

Several comments were made regarding how these assessments guided forest management activities.

Table MF 8- Do you currently have an Environmental Management System (EMS)?

MF size	Coast			Interior		
	L	M	S	L	M	S
Yes	3	2	2	2		1
No		2		1	2	3

The operators of small MF's who indicated that they had an EMS were mostly organizations that also had other operations such as Crown forest tenures.

Table MF 9 - Are the assessments listed in question 4 above, part of a formal management system?

	Coast			Interior		
MF size	L	M	S	L	M	S
Yes	3	1	2	2		
No		2		1	2	4

For those respondents that answered “No” to the above questions, a variety of responses were provided about how assessment results and recommendations were documented ranging from no documentation, to recording on pre-work documents and checklists.

Table MF 10- Do you measure results relative to plans, if so how?

	Coast			Interior		
MF size	L	M	S	L	M	S
Yes	3	2	2	3		1
No					1	1

Responses to “if so how” included post-harvest assessments, internal audits, ongoing monitoring, and walk through field review without a written report.

Qualifications of staff who conducted assessments related to the protection of drinking water downstream of managed forests included the professionals used broadly in the forest industry such as Registered Professional Foresters (RPF), Registered Professional Biologists (RPBio), Professional Geoscientists (PGeo), Professional Engineers (PEng). Most of the medium and large managed forests and a significant number of the small ones were either managed by RPF's or had regular involvement by an RPF.

Table MF 11-Which of these operational practices do you use to protect water quality?

Practices / MF size	Number of positive responses					
	Coast			Interior		
	L	M	S	L	M	S
Identifying hazards and using a risk management approach	3	3	1	3	2	2
Construction of minimum road required for safe and efficient operations.	3	4	1	3	1	3
Culverts and bridges are designed for peak flows	3	4	1	3	2	3
Maintain at least minimum distances for roads from streams.	3	4	1	3	2	3
Appropriate riparian tree retention.	3	4	1	3	2	3
Re-vegetation of exposed, erodible soils.	3	3	1	2	2	2
Maintenance of natural drainage patterns & channel locations.	3	3	1	3	2	3
No road construction within 100m upslope of a LWI	3	2	1	3	1	2
No direct discharge from ditches and cross-drains culverts into streams.	3	4	1	3	2	3
Use of riprap for velocity reductions, sediment traps as necessary.	3	4	1	3	2	1
Build roads with stable cut and fill slopes.	3	4	1	3	2	2
Crossings are designed and built to protect stream channel and banks.	3	4	1	3	2	2
Appropriate road maintenance until deactivation	3	4	1	3	2	3
Roads and trails are deactivated if no longer needed	3	3	1	3	2	2
Use of rainfall shutdown guidelines	3	2	1	3	1	1
Use of appropriate harvesting equipment & layout to minimize soil disturbance	3	4	1	3	2	2
Other:	1	1	1	3	-	1
Total responses	3	4	2	3	2	4

Several responses were received regarding how practices compared to “accepted forest industry standards of professional practice”. Many suggested that the practices were comparable or better, some noted that the practices were similar to those on their Crown tenures operations; others (small MF’s) noted that the scale of their operations was much different than that of industrial forestry.

There are 16 practices listed in the above table that relate to protecting water quality. Most respondents used most or all of them. Most of these (aside from riparian reserves or retention) are very similar or identical to what would be done on Crown forestland.

Table MF 12- Do your plans, assessments, and practices differ depending on whether the downstream points of diversion (POD's) are licensed water intakes (referenced in the PMFLAR) or individual water licenses (not referenced in the PMFLAR)?

	Coast			Interior		
MF size	L	M	S	L	M	S
Yes	1	1		1	1	
No	2	3	2	2	1	1

Practices were generally similar, however notifications may differ.

Table MF 13 - Do they differ depending on the number of water users or the sensitivity of the watershed?

	Coast			Interior		
MF size	L	M	S	L	M	S
Yes	2			2	1	
No	1	4	1	1	1	1

Some respondents noted that their practices differ depending on the sensitivity of the watershed, not whether there are water users.

3.1.3 – Communication with other forest operators and water licensees

Table MF 14- Do you interact/cooperate with other forest operators (if there are any in the watershed) with respect to watershed assessments and/or assessing the impact of forest management activities?

	Coast			Interior		
MF size	L	M	S	L	M	S
Yes	3	1	1	1	1	1
No		3	1	2	1	3

Many of the “No” responses could be considered to be “not applicable” in that there were no other operators in the watershed, or else their MF was so small relative to the Crown land logging around it that their activities had minimal impact and therefore there was no reason for communication.

Table MF 15-Do you notify individual water licensees prior to road construction or deactivation?

	Coast			Interior		
MF size	L	M	S	L	M	S
Yes	3	1	1	2	2	1
No		3	1	1		2

Notification was done by a variety of methods including phone, email, mail, knocking on doors, etc.

Table MF 16 - Is there additional communication beyond the required notification for road works?

MF size	Coast			Interior		
	L	M	S	L	M	S
Yes	3		1	1	2	1
No		3	1	1		1

Additional communication included attending watershed meetings, organized either by water user groups or the MF, and communication about access to water intakes on MF private property for maintenance purposes.

3.1.4 Additional thoughts or comments

There were a significant number of comments from respondents. Comments have been organized around several common themes:

- **The standards and regulations currently in place are adequate as they are.** The professional reliance model is robust enough to protect water quality. There is pressure to maintain the “social license” to harvest by not affecting the neighbour’s water.
- **Scale of operations and experience with the land base.** Some of the small MF operators noted that while they may not have the formal systems that larger operators do, they do have the familiarity with the forest. In two cases, they have either lived on or managed the forest for 50+ years. Also on some of the smaller MF’s harvesting is done at such a small scale that impact on water is likely to be minimal. Several WL respondents also commented on the greater continuity of personnel on the adjacent MF than on nearby Crown forestry operations.
- **Riparian retention requirements are too low.** One respondent noted that in order to deal effectively with the variety of situations that are encountered (wind-throw risk, stand species, stand density, etc.) that higher levels of retention are necessary. Some respondents said that they were using FRPA riparian reserves in their MF’s in some cases. This was generally in cases where the MF was near Crown forest land where the MF holder was also operating. The reasons for this approach included minimizing confusion among logging contractors, minimal lengths of streams running through the MF, and public expectations.

3.2- Water license survey

3.2.1 – Water license background

This section contains an overview of survey results.

Table WL 1- Is the water license presently being used to supply water for domestic consumption purposes?

MF size	Coast						Interior					
	L		M		S		L		M		S	
Type	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI
Yes	12	8	6	4	3		7		5		6	
No	3	2	1		1	1	3		3		1	

Table WL 2 -If not, are you intending to use it for these purposes in the future?

MF size	Coast						Interior					
	L		M		S		L		M		S	
Type	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI
Yes	1	1				1	3		1		1	
No	2	1			1		1		2			

Table WL 3- What is the approximate number of households currently connected to the water system?

Number of households	Coast			Interior		
	Large MF	Medium MF	Small MF	Large MF	Medium MF	Small MF
1	3	6*	1	5	1	5
2-5	5		1	3	3	1
6-20	1	1			1	
20-100						
100+	10	3	1	1		

The water licenses sampled included both individual water licenses (WL's) and licensed water intakes (LWI's). The individual water licenses usually supplied from 1-5 households, the licensed water intakes usually supplied greater than 6 and in some cases large populations (45,000 people in one case).

Approximately 80% of the water licenses were presently being used to supply water for domestic consumption purposes and approximately 50% of the ones that were not presently used for this purpose intended on doing so in the future. (*The 80% figure may be somewhat high since there is likely more incentive to participate in the survey if you are currently using the water than if you aren't.)

The infrastructure used to divert water varied widely. As one would expect, many of the LWI's had very sophisticated systems. Some of the individual water licenses also had reasonably sophisticated diversion and delivery systems.

3.2.2 – Awareness of private forest land and associated regulatory requirements

Table WL 4 - Are you aware that there is private managed forest land (e.g. private land that is classified as managed forest land under the Assessment Act) within 1 kilometer upstream of your water point of diversion (POD)?

	Coast						Interior					
MF size	L		M		S		L		M		S	
Type	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI
Yes	10	9	5	4	1	2	8	1	6		6	
No	3	1			3		3		2		1	

Most, but not all, of the water licensees were aware of the private managed forestland near or upstream of the water intake.

Table WL 5 - Have you ever been notified prior to road construction or deactivation work on this private forestland?

	Coast						Interior					
MF size	L		M		S		L		M		S	
Type	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI
Yes	5	7	3	2	1	1	2	1	2		3	
No	9	3	4	2	3		9		6		4	

Section 23 of the Private Managed Forest Land Council Regulation (PMFLCR) specifies that:

“At least 48 hours before an owner or a contractor, employee or agent of the owner commences road construction or deactivation within 1 km upstream of a licensed waterworks intake, the owner or a contractor, employee or agent of the owner must notify the holder of a license for the licensed waterworks intake of the pending construction or deactivation.”

This requirement applies only to the LWI's not to the individual WL's. As shown in Table WL 5, while most appear to be complying with the regulation (e.g. notifying the LWI's and not the WL's) there were a significant number of cases in which individual WL's were notified. There were however some LWI's who indicated that they had not been notified. In some instances where they were not notified, respondents commented that being notified would be an improvement. In one instance where the MF operator did not notify the WL holder, when the WL holder initiated the contact, the MF operator was extremely cooperative, and indicated that

he was unaware of the location of the water intake and implied that the water license database may not be up to date.

Table WL 6 - Have you had any other interactions with managed forest owners since 2004?

MF size	Coast						Interior					
	L		M		S		L		M		S	
Type	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI
Yes	4	8	2	3	1	1	3	1	2		3	
No	8	2	4	1	3	1	7		6		4	

As would be expected, other interaction was generally more frequent with LWI's and included a wide range of items, from individual WL holders who had known the adjacent MF owner (usually a small individually held MF) for many years and had a good relationship with the owner, to annual meetings between a large MF operator and the LWI (in this case a Regional District). Some respondents noted that communication was better in the past when operations on the MF were handled by company staff instead of the contractors who are now responsible.

Table WL 7 - Are you aware of specific assessments, plans, or practices that the managed forest owner has implemented in order to protect drinking water quality?

MF size	Coast						Interior					
	L		M		S		L		M		S	
Type	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI
Yes	3	7	1	1	1	1						
No	11	3	5	3	2	1	10	1	7		7	

Most respondents (approximately 85%) indicated they were not aware of specific assessments, plans, or practices used to protect drinking water quality. Awareness was higher among LWI's than for WL's. Two coastal LWI's noted that the MF holder did a complete watershed assessment, and then in one case implemented the recommendations which has gradually improved water quality.

Specific requirements of the Private Managed Forest Land Council Regulation were listed in the survey form and respondents were asked to rate their awareness of each one on a scale of 1 to 5. Many of the respondents indicated little awareness of most of the requirements; with the exception of those who indicated that they had a background in the forest industry. With respect to specific requirements, the awareness of tree retention adjacent to streams, road setbacks from streams, protecting licensed waterworks intakes was slightly higher than some of the other requirements.

3.2.3 – Water concerns

Table WL 8 -Has your water quality changed over the last ten years?

MF size	Coast						Interior					
	L		M		S		L		M		S	
Type	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI	WL	LWI
Yes	6	4	4	1	2		3				6	
No	6	5	2	3	1	2	6		6		2	

Of the 44 WL respondents, 21 or approximately 49% indicated their water quality had changed to some extent over the past 10 years. Of the 15 LWI respondents 5 (33%) noted any change in water quality over that same period.

Of the respondents who noted some change over the past ten years, about half of them attributed the change in some part to logging on adjacent MF land. However, respondents also indicated other possible causes including subdivisions, ATV's operating in creeks, general recreational use, gas line re-construction, lack of maintenance on the water delivery system, and logging on Crown land and activities on unregulated private land. Other activities that were listed as concerns with respect to water quality included conversion of private forestland into subdivisions and farms. Many preferred access to the MF to be restricted by gates.

Respondents had a lot to say with respect to the improvement of policies and regulations to protect water quality on private managed forestland. Their comments fall under several larger themes:

- **Riparian retention and reserves** – A significant number of respondents (across all sample strata but mostly on the coast) suggested that there should be a requirement for more retention or reserves along streams that supply domestic water. Several noted the differences between the FRPA requirements for Crown land and the PMFLCR requirements.
- **Notification** – Several WL holders said they would like to be notified prior to road construction of harvesting activities. At present this requirement only applies to the LWI's.
- **More oversight on Crown land activities** - Some WL's, adjacent to small interior MF's, noted that much of the impact of forest management is from activities on Crown land since the MF is small. They suggested that there needs to be more oversight of activities on Crown land.
- **Reduced cutting in watersheds** -A few respondents suggested that only partial cutting should be undertaken in watersheds providing drinking water.

In order to provide context for the comments about tree retention and notification requirements the following background information is included:

- Crown land forest management is directed by the *Forest and Range Practices Act* (FRPA) and the Forest Planning and Practices Regulation (FPPR). Riparian reserves and retention as well as notification requirements with respect to protection of drinking water vary according to whether or not the area is within a designated Community Watershed (CWS) or whether fish are present. Riparian reserve requirements also vary by fish presence or absence. Many watersheds on Crown land that supply drinking water are not designated community watersheds, in which case riparian reserves are only required if fish are present.
- On private managed forest land riparian retention requirements vary according to whether or not the area is upstream of a licensed water intake (LWI) or whether fish are present. The PMFLCR specifies retention of a minimum number of commercial trees, and all non-commercial trees and understory vegetation within the riparian area depending on the width of the stream.
- In general, there are more stringent requirements for riparian retention on Crown land under FRPA than required by the PMFLR on private managed forest land.
- Under FRPA, forest licensees must not impact or damage a licensed waterworks, which would include all individual water licenses used for human consumption. Under the PMFLA, an owner's activities must not impact a licensed waterworks intake (LWI).
- Several of the Managed Forests in the survey sample included fairly large CWS areas (e.g. China Creek, Oyster River, Little Qualicum). These Managed Forests are upstream of a LWI and thus regulated accordingly. Many of the watersheds within the survey sample that provided water to the largest populations are not designated Community Watersheds. (e.g. Comox Lake/Puntledge River, Nanaimo watershed, Nelson watershed). These Managed Forests are also upstream of an LWI.

Additionally, in some areas the same operator is managing a Crown tenure and a MF in the same watershed, which may influence the approach to reserves or retention. In other cases, operators may defer harvesting next to main creeks. In others parts of the MF, harvesting may have occurred during a period when it was part of a Tree Farm License with associated *Forest Practices Code Act* or FRPA reserve requirements.

4.0 Summary

The survey was completed by a combination of mailed responses, emailed forms, and telephone interviews. The telephone interviews generated more general comments from respondents in addition to responses to the survey questions. Some WL respondents expressed an interest in learning more about forest management

on private managed forest land and mentioned that they didn't know how to access this information. Some of the small MF respondents noted that while their approaches to assessments and documentation may be different than either larger MF operators or the forest industry on Crown tenures, the practices that they use on the ground are well suited to protecting water quality given the nature of their forest management operations. This was confirmed by some of the associated water licensees.

A summary of the responses to the individual survey topics is as follows:

What is the current status and current use of water licenses?

Most of the 69 water licenses responding (77%) were presently being used to supply water for domestic consumption purposes, although this may have been biased upwards by there being more incentive to respond to the survey if the water was currently being used. One coastal water purveyor noted that they had stopped using some of their surface water licenses due to recent changes in Vancouver Island Health Authority (VIHA) turbidity standards for drinking water.

What type of assessments, planning procedures and practices are managed forest owners using to guide forest management activities and protect water quality?

While the particular assessments that are required to protect water quality will vary according to local conditions; the survey results indicated that MF owners are generally completing assessments that are appropriate for their particular operating situation. These included: equivalent clear-cut area (ECA) calculations; sedimentation hazard mapping; terrain stability field assessments; wind-throw risk assessments; identification of road hazards; riparian assessments; and overall watershed assessments. The types of assessments completed, particularly by large coastal MFs and large and medium interior MF's, are similar to those that would be undertaken by typical forest industry operators on Crown tenures with similar conditions.

Most of the MF respondents indicated that they used most or all of the 16 practices to protect water quality listed in the survey table. These practices were taken from the MFC Field Practices Guide (2015) and include most standard forest industry practices for road building and harvesting that potentially interact with water quality. However, many WL holders indicated that they were not aware of many of the practices used to protect water quality. This is significant, particularly when considered in conjunction with comments about riparian reserves or retention. Many of the practices listed in the survey table, while potentially as or more important to protecting water quality as riparian retention, may not be as obvious to those without a background in the resource industries. It is important to consider that the FRPA riparian reserves, while partly intended to protect water quality, also have other functions including protecting biodiversity. Biodiversity is not

specifically referenced as a management objective for private managed forest land in the *Private Managed Forest Land Act*.

Documentation of assessment recommendations varied widely among respondents, from inclusion in formal EMS systems to virtually no documentation.

Are the size of operation, number of water users, or sensitivity of watershed factors in determining the complexity of assessments and pre-harvest planning used to address protection of drinking water resources?

Smaller MFs completed fewer formal assessments, particularly those which are applicable to entire watersheds (e.g. watershed assessments or ECA calculations). Pre-harvest planning was generally more complex on the larger MF's than on the smaller ones. Some of the assessments may not be applicable to some smaller forests (e.g. ECA calculations or overall watershed assessments) due to the small size of the MF relative to the watershed. In other cases, the small MF's may be operating in a way that minimizes potential impact on water resources (e.g. low levels of harvest, small patch cuts or selection harvest, use of small equipment, etc.). MF operators are generally using assessments that are appropriate for their operating conditions.

Most MF respondents reported no difference in practices depending on whether the downstream points of diversion were LWI's (referenced in the PMFLCR) or individual water licenses. A smaller majority also reported no differences in practices related to the number of water users or sensitivity of the watershed. Many of the larger operators have formalized planning systems that indicate certain practices where drinking water values exist and therefore they have a standard approach.

Nearly all MF respondents with part of their MF in a Community Watershed indicated that this did affect planning practices or communication. In several cases, it related to participation in watershed planning groups established by the water licensee.

Many of the respondents were willing to provide examples of their assessments.

Who is doing assessments and planning, and what are their qualifications?

Professionals with qualifications similar to those used elsewhere in the forest industry did the assessments. Most of the medium and large managed forests and a significant number of the small ones were either managed by Registered Professional Forester (RPF) or had regular involvement by an RPF. The MF's that did not have involvement by professionals were generally small, had been operated by the same individual for many years, and usually had low levels of harvesting and road building.

Are there differences in assessments and planning between managed forests on the coast and interior?

Responses indicated few differences in assessments, planning and practices between the coast and interior. Coastal WL respondents more frequently expressed concerns about riparian reserves or retention. Some MF respondents in all locations indicated that they varied retention levels in response to site-specific conditions. Some interior MF operators indicated that in some cases they used reserves that were similar to FRPA specifications. The reasons behind this approach were primarily related to the more interspersed nature of the tenures in the interior and included: a desire to avoid confusion among logging contractors also working on adjacent Crown tenures; minimal impact on the MF land base due to a fairly short length of stream running through the particular MF; and public expectations. One MF operator who did apply FRPA reserves in his MF noted that while it was an approach that worked for his particular circumstances it would not be appropriate everywhere.

Is there effective communication between managed forest owners and water licensees?

Awareness of the presence of MF's and WL's by each other was generally good (approximately 80% of MF's aware of adjacent WL's and 80% of the WL's were aware of the MF).

Communication also generally appeared to be good between MFs and WLs. In most or all cases the regulatory requirements (notify LWI's prior to road construction or deactivation) were met (65% had been notified). Individual WL's were also notified in about 30% of the responses. These percentages appear to be reasonable given the fact that water license population for the survey was selected based on whether the license was within a MF or within 1 km downstream of an MF, not based on where there had been recent activities in the MF. In some cases, the MF's are very large and recent activities may be in different watersheds or long distances away from the WL's. As a result, 100% notification of the LWI's would not be expected or required. Many respondents indicated there was additional communication specific to the particular situation (e.g. annual meetings to discuss harvesting and road building plans for large watersheds in large MF's, informal contact between individual WL holders and small MF owners with respect to accessing the diversion infrastructure for maintenance in cases where the intake is located on the MF). In one case a WL holder noted that he wasn't notified about logging activity on the MF because the MF holder was not aware of the presence of an intake. Once he initiated the contact the relationship has been good. Other WL holders who were not being notified did mention that they would like to be notified about activities in the MF.

Level of knowledge of regulatory requirements.

Most of the MF respondents, particularly those from the medium and large MF's, rated their understanding of the PMFLCR requirements and the MFC Field Practices Guide practices as good to excellent. Many of the individual WL respondents indicated little awareness of most of the requirements, the exceptions being some of the LWI holders and a few individual WL holders who indicated that they had a background in the forest industry. Some WL respondents indicated a desire to learn more but were not clear on where to access this information.

Do water license holders note any impacts of forest management on water quality?

Of the 44 WL respondents, 21 or approximately 48% of the WL respondents and 33% of the LWI respondents indicated that their water quality had changed in the last 10 years. Of those who indicated that the water quality had changed about half attributed the change in part to logging or associated road building on adjacent MF land. Respondents indicated numerous other causes as potentially contributing to changes. Many of these were related to recreational use and access and some mentioned large scale logging on Crown land. Of the respondents who indicated that they thought the change in water quality was related to activities on adjacent MF land the awareness of the linkage between cause and effect seemed to vary considerably from specific events (slides, road building or logging adjacent to the creek and immediate water quality effects) to more general impressions (they have been logging up there for years and my water quality is not as good as it used to be).

Survey respondents' suggestions for improving policies and regulations to protect water quality on private managed forestland.

Some WL respondents suggested that individual WL holders should be notified prior to activities on MF's. In many, but not all cases, this is already occurring even though not required under the regulation. There are a number of variables that affect this. Communication was generally best where there was a local person who had managed the MF for a considerable period and was known in the local community. Less satisfaction with the communication was reported in cases where the planning and harvesting was contracted out to an organization located elsewhere. While it is partly a matter of notification, a local presence and knowing whom to call if a water user wants to find out about plans and activities are important elements of effective communication.

A significant number of WL respondents expressed concern about the lack of riparian reserves on private managed forest land as compared to Crown land practices. This comment was made by several of the coastal water purveyors (LWI's) and this appears to be an important issue for them. One MF respondent also noted that the retention amounts specified in the PMFLCR are quite low and it is difficult to deal with some sites without increasing the amount of retention

(although they are expressed as minimums in the regulation and therefore can be increased as necessary). This is a complex issue and one that interacts with the management objectives for private managed forestland.

Other MF respondents suggested that the regulations were adequate in their present form and that no changes were needed.

The recent surveys of managed forest owners and domestic water licensees have provided a wealth of information relating to a range of questions related to assessments, practices, communication and program knowledge regarding forest management on private managed forest land in B.C. and protection of water quality.

5.0 Appendix

Appendix 1 – Survey forms:

Managed Forest Council Survey of managed forest owners (January 2016)

Background:

The purpose of this survey is to gather information about the assessments, practices and processes used by managed forest owners to protect water resources within and downstream of their managed forest. This information is solely for the use of the Managed Forest Council. It will be used to help assess the effectiveness of current regulations in protecting water quality. The results will be analyzed and presented in a report for Council's use. All information gathered for individual forests will be strictly confidential. Individual responses will not be included in the report or used in any way. This survey is not connected to any other program or activity that the Managed Forest Council undertakes (e.g. compliance audits). The entire purpose of this survey is to gather information for Council with the goal of evaluating current practices and considering improvements at the policy level. This is an important part of Council's role in setting and monitoring forest practice standards.

Part I – Awareness of requirements from the Private Managed Forest Land Act Regulation

1-Are you aware of any licensed water intakes (LWI's) or individual water licenses (IWL's) located either on your managed forest or within 1 kilometer downstream of the managed forest?

Yes ____ No ____

If so do you know whom the license holders are?

Yes ____ No ____

2- Is all or part of your managed forest in a designated Community Watershed?

Yes ____ No ____

If yes does this affect planning, practices, or communication with water licensees?

Yes ____ No ____

If so how?

3-Are you aware of the regulatory requirements (e.g. as specified in the Private Managed Forest Land Act Regulation) and associated guidelines (Managed Forest Council Field Practices Guide -2015) for the protection of drinking water?

Yes ____ No ____

Please rate your awareness of the following on a scale of 1 to 5 with 1 representing very little knowledge and 5 representing excellent understanding:

Private Managed Forest Land Act Regulation requirements:

- ____ Soil erosion, sediment transport and deposition
- ____ Road setbacks adjacent to streams
- ____ Stream crossings
- ____ Natural surface drainage patterns
- ____ Protecting licensed waterworks intakes
- ____ Notifying the holders of licensed waterworks intakes
- ____ Road maintenance and deactivation
- ____ Fertilizer use near streams
- ____ Tree retention adjacent to streams

Managed Forest Council Field Practices Guide – 2015:

- ____ Road construction practices
- ____ Road maintenance and deactivation practices
- ____ Timber harvesting practices
- ____ Stream classification and riparian tree retention

Part II – Practices related to water quality protection

4-In looking at assessments that you complete before, during, or after harvesting or road constructions activities that protect drinking water resources downstream of the managed forest. Which of these assessments do you use?

- ____ Equivalent Clear-cut Area (ECA) calculations
 - ____ Sedimentation hazard mapping
 - ____ Terrain stability field assessment (TSFA)
 - ____ Wind throw risk assessment
 - ____ Identification of road hazards
 - ____ Riparian Assessment
 - ____ Overall watershed assessment
 - ____ Other
-
-

Can you provide examples of these assessments for the information of the Managed Forest Council?

Yes ____ No____

5-How do these assessments guide your operational forest management activities?

6- Do you currently have an Environmental Management System (EMS)?

Yes ____ No____

Are the assessments listed in question 4 above, part of a formal management system?

Yes ____ No____

If not how do you document results and recommendations?

7- Do you measure results relative to plans, if so how?

8- What are your qualifications or those of staff or contractors who conduct and complete assessments related to the protecting of drinking water downstream of managed forests?

9-Which of these operational practices do you use to protect water quality?

- Identifying hazards and using a risk management approach.
 - Construction of minimum road required for safe and efficient operations.
 - Culverts and bridges are designed for peak flows.
 - Maintain at least minimum distances for roads from streams.
 - Appropriate riparian tree retention.
 - Re-vegetation of exposed, erodible soils.
 - Maintenance of natural drainage patterns & channel locations.
 - No road construction within 100m upslope of a LWI.
 - No direct discharge from ditches and cross-drains culverts into streams.
 - Use of riprap for velocity reductions, sediment traps as necessary.
 - Build roads with stable cut and fill slopes.
 - Crossings are designed and built to protect stream channel and banks.
 - Appropriate road maintenance until deactivation.
 - Roads and trails are deactivated if no longer needed.
 - Use of rainfall shutdown guidelines.
 - Use of appropriate harvesting equipment & layout to minimize soil disturbance.
 - Other: _____
-
-

10-How do you think these practices compare to accepted forest industry standards of professional practice?

11-Do your plans, assessments, and practices differ depending on whether the downstream points of diversion (POD's) are licensed water intakes (referenced in the PMFLAR) or individual water licenses (not referenced in the PMFLAR)?

Yes ___ No___

Do they differ depending on the number of water users or the sensitivity of the watershed?

Yes ___ No___

If so how?

Part III-Communication

12-Do you interact/cooperate with other forest operators (if there are any in the watershed) with respect to watershed assessments and/or assessing the impact of forest management activities?

Yes ____ No ____

If so describe the nature of the interaction:

13-Do you notify individual water licensees prior to road construction or deactivation?

Yes ____ No ____

14-How and when do you communicate with water licensees?

Is there additional communication beyond the required notification for road works?

Yes ____ No ____

Part IV - Summary

15-Do you have any other thoughts or comments that you feel would be helpful in evaluating and improving policies and regulation relating to the management for protection of domestic water quality?

Managed Forest Council
Survey of water license holders within and adjacent to private managed forest land (January 2016)

Background:

The Managed Forest Council is an independent provincial agency established under the Private Managed Forest Land Act to administer the managed forest program and protect key public environmental values on private managed forestland in B.C.

The purpose of this survey is intended to gather information about assessments, practices and processes used by managed forest owners, to protect water resources within and downstream of their managed forest. The information collected will be used solely by the Managed Forest Council to assess the effectiveness of current regulations to protect water quality. The results will be analyzed and a report will be prepared for Council's use. All information gathered on individual forests and water licensees will be confidential. Individual responses will not be included in the report, used in any other way, or provided to other agencies. The sole purpose of the survey is to gather information for the use of the Managed Forest Council to evaluate current practices related to the protection of water quality and consider improvements. This is an important part of Council's role in setting and monitoring forest practice standards for private managed forestland.

Part I - Water license background

1-Is the water license presently being used to supply water for domestic consumption purposes?

Yes____ No____

If not are you intending to use it for these purposes in the future?

Yes____ No____

2-Could you provide a brief description of the infrastructure used to divert water for the water works?

3-What is the approximate number of households currently connected to the water system?

- 1
- 2-5
- 6-20
- 20-100
- 100+

Part II Awareness of private forestland

4-Are you aware that there is private managed forest land (e.g. private land that is classified as managed forest land under the Assessment Act) within 1 kilometer upstream of your water point of diversion (POD)?

Yes___ No___

5-Have you ever been notified prior to road construction or deactivation work on this private forestland?

Yes___ No___

6-Have you had any other interactions with managed forest owners since 2004?

7-Are you aware of specific assessments, plans, or practices that the managed forest owner has implemented in order to protect drinking water quality?

Yes___ No___

8-Are you aware of existing requirements that there are under the Private Managed Forest Land Act Regulation for managed forest owners to protect water quality?

Please rate your awareness of the following regulation requirements for the protection of drinking water quality on a scale of 1 to 5 with 1 representing little or no knowledge and 5 representing excellent understanding and knowledge.

Private Managed Forest Land Act Regulation requirements:

- Soil erosion, sediment transport and deposition
- Road setbacks adjacent to streams
- Stream crossings
- Natural surface drainage patterns
- Protecting licensed waterworks intakes
- Notifying the holders of licensed waterworks intakes
- Road maintenance and deactivation
- Fertilizer use near streams
- Tree retention adjacent to streams

Part III - Water concerns

9-Has your water quality changed over the last ten years?
Yes ___ No ___

If so, what activities do you think may have contributed to this?

10-Are there activities other than forest management on private managed forestland that are of concern with respect to your water quality?

11-Do you have any other thoughts or comments that can contribute to the improvement of policies and regulations to protect water quality on private managed forestland?
