PRIVATE MANAGED FOREST LAND COUNCIL

Report on Road Audit

of

Private Managed Forest Properties

2009

Acknowledgements

This audit was conducted by Phil Blanchard, RPF, and Gordon Butt, PGeo, PAg, who were retained by the Private Managed Forest Land Council for the 2009 Road Audit. We thank the participating MF owners and their representatives for their cooperation in providing audit information and assistance in the field audit site visits.

Executive Summary

The *Private Managed Forest Land Act* (the Act) establishes management objectives for key public environmental values, which are soil conservation, water quality, fish habitat, critical wildlife habitat and reforestation. The requirements for the protection of these key values are set out in related regulations, not limited to, but in particular the Private Managed Forest Land Council Regulation.

In the fall of 2008, the Private Managed Forest Land Council (PMFLC) commissioned a limited scope audit of the private managed forest land program. The purpose of the audit was to review the road management practices of managed forest owners in coastal British Columbia to assess the general standard of construction, maintenance and deactivation activities with the objective to assess compliance of road program activities with the 2007 and 2004 Council Regulation requirements.

The seven private managed forest properties selected represent the range of large, mid-size and small properties on the coast; six are on Vancouver Island and one on the mainland coast. The audit field work was conducted between April 1, 2009 and June 3, 2009.

The audit examined operational activities and requirements in the practices of road construction and maintenance for the period June 2006 to the audit date and for deactivation, September 1, 2007 (the effective period of the new Council Regulation) to the audit date. The audit process involved on-site meetings with each owner. The owners [and/or representative(s)] were interviewed during the audit on matters specific to each field site and the management / operation activity on their managed forest land.

For each managed forest property audit findings were developed from an evaluation of information collected through interviews, map and document reviews and site-specific road observations. The overall audit findings were derived by aggregating the findings from each managed forest property sampled. This audit report presents the findings of the auditors and a description of the objectives, scope and methodology used.

The auditors found that road management practices were consistent with the soil conservation objective by minimizing site loss due to roads. The area occupied by road was appropriate for the topography and harvest methods. However, the auditors found a number of examples where small amounts of sediment had likely entered streams due to road surface erosion or erosion in ditches or around culverts near streams. The auditors concluded that the small amounts of sediment was not a material adverse effect on water quality or fish habitat. This is not a finding of non-compliance but it does identify areas of practice requiring improvement. It is important that owners pay particular attention to drainage structure installation and sediment control practices on their road systems to reduce the risk of the potential for sediment delivery to streams.

The auditors found that the road management program practices assessed on the managed forests audited comply with the requirements of the Private Managed Forest Land Council Regulation for road construction, maintenance and deactivation in regards to soil conservation and the protection of water quality and fish habitat.

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1.0 Introduction

Mandate and Legislation

The Private Managed Forest Land Council (council) was established by the provincial government in 2004 as the agency responsible for administration of the private managed forest land program. Applicable legislation includes the *Private Managed Forest Land Act* (the *Act*); the Private Managed Forest Land Council Regulation (Council Regulation); the Private Managed Forest Land Regulation; and the Private Managed Forest Land Council Matters Regulation. The object of the council is to encourage forest management on private managed forest land, taking into account the social, environmental and economic benefits of those practices.

The *Act* establishes management objectives for the key public environmental values. These are fish habitat, water quality, critical wildlife habitat, soil conservation, and reforestation. The council regulation sets requirements for the protection of water quality, fish habitat, soil conservation and reforestation. Additionally, provision is made in the Private Managed Forest Land Regulation for the wildlife minister to designate land as critical for the survival of one or more species at risk.

The legislation provides the council with powers to set, monitor, investigate and enforce forest practice standards for land assessed as managed forest (MF). The council conducts forest practices audits with respect to the legislated standards and requirements as part of their administrative role. The legislation objectives and practice requirements are summarized in Appendix III of this report.

Background

In December 2008 the council engaged two independent consultants to form the audit team to conduct a limited scope audit of MF properties in coastal BC. The selection of MF properties was made by the council to include large, medium and small MFs that reported road construction after July 2006.

Six of the seven MFs selected are on Vancouver Island; the seventh is on the coastal mainland.

This report presents the findings of the audit and a description of the objectives, scope and methodology used.

Audit Team

Phil Blanchard – lead auditor. Mr. Blanchard is a registered professional forester with over 36 years experience in forest management planning and operations. His responsibilities have included forest tenure management, harvest planning and development, road location and design, road construction, maintenance and deactivation. His experience has been primarily on the coast of BC, 20 years with MacMillan Bloedel Limited followed by over 16 years providing forest management consulting services. As a project manager and supervisor, Mr. Blanchard has undertaken the responsibility to ensure prescriptions or designs have been implemented and operations remain compliant with the applicable legislation. He has also conducted numerous management compliance inspections.

Gordon Butt – auditor. Mr. Butt is a professional geoscientist and professional agrologist as well as a certified arborist. Mr. Butt has over 29 years work experience in the areas of terrain stability assessment, windthrow hazard assessment, soil science and water management. He worked for the BC Ministry of Forests, MacMillan Bloedel Limited and overseas (Malaysia, Thailand, UK) before establishing an environmental consulting firm, Madrone Environmental Services Ltd. He has conducted numerous investigations of landslides, floods, sedimentation events and windthrow primarily on the BC coast.

Observers

The owners and/or their representative(s) accompanied the auditors and participated in the audit process for each MF. Stuart Macpherson, executive director of the council, attended as an observer on one of the MFs audited. The executive director of the Private Forest Landowners Association (PFLA), Rod Bealing, also attended as an observer on one of the MFs audited. Mr. Bealing provides PFLA members with technical and policy support concerning regulatory issues, Best Management Practices (BMP), and extension training.

2.0 Audit Objectives

The purpose of the audit was to review the road management practices of managed forest owners in coastal British Columbia to assess the general standard of construction, maintenance and deactivation activities with the objective to assess compliance of road program activities with the 2007 and 2004 Council Regulation requirements.

3.0 Scope

The 2009 audit terms of reference were set by council as a "limited scope" audit. A limited scope audit involves the examination of selected forest activities and practices undertaken during a defined period, while a full scope audit examines all forest activities and practices.

The scope for this audit covered new road construction / upgrade and maintenance for the period July 2006 to present, and for road deactivation, September 1, 2007 to present, the effective period of the new Council Regulation.

Properties

The seven MF properties included in this audit are:

MF #	Owner	Location	MF Area (hectares)	Road Construction in Audit Period
5	Manulife Canada Ltd.	Lake Cowichan	13,000	Yes
19	Island Timberlands LLP	Cowichan	66,380	Yes
30	Western Forest Products Inc.	Jordan River	10,500	Yes
31	Western Forest Products Inc.	Port McNeill	11,000	Yes
47	Merrill & Ring Inc.	Theodosia River	1,600	Yes
74	Island Timberlands LLP	Port Alberni	71,780	Yes
78	Kapoor Lumber Co. Ltd.	Sooke	2,030	Yes

Each MF was audited and reported on as a single unit even though Western Forest Products and Island Timberlands each had two MFs selected. All have unique conditions that include such things as road access, physical features, local climate or other issues specific to the ownership.

All but one MF are located on Vancouver Island, the exception being MF 47, Merrill & Ring's operation at Theodosia River, accessible by air and water only. The Vancouver Island MFs are located from Port McNeill in the north to Sooke and Jordan River in the south. The Western Forest Products properties in Port McNeill and Jordan River and Kapoor in Sooke have generally less steep ground at lower elevations and typically more mild winters with less snow than the other properties audited. The Island Timberlands (both), Manulife Canada and Merrill & Ring properties have a greater component (comparatively) of steeper ground, and / or higher elevation terrain, and because of their location, the winter storms typically provide a more significant snowpack and colder, longer winters.

All of the properties have a history of harvesting and extensive road networks that have been developed over many years. The amount of second growth timber being harvested is a significant component of total log production; this often results in using old roads, some of which need to be rebuilt or upgraded, rather than constructing new roads in new locations. The same trend holds true for bridges and major culverts.

Fish streams and water supply intakes are generally more abundant at lower elevations but with the coastal weather systems, streams are found at all elevations. All properties audited had fish streams present but not all had water supply intakes.

Audit Process

The council selected the sample of MFs to be audited and notified each owner. Following this notification, the lead auditor contacted the owners to schedule the field assessments and request that they prepare a listing of

roads constructed, maintained or deactivated as per the scope of audit. This information and the most recent annual declarations provided the basis for preparing the audit plan.

An opening meeting involving the audit team, owners or their representatives, and observers, if present, was at the outset of the field visit to each property. The purpose of these meetings was to explain the audit process, provide an opportunity for owners to ask questions, and enable them to inform the audit team of property-specific management strategies and relevant background information. The field sample was then finalized based on the road sample population, accessibility and level of activity at each property.

The owner(s)/representative(s) were interviewed in the field regarding matters specific to each site and associated activities. The audit examined the general standard of construction, maintenance and deactivation activities to assess compliance of these road program activities with the 2007 and 2004 Council Regulation requirements.

For each property audit findings were developed from an evaluation of information collected for each audit sample. This included information from interviews, site-specific maps, field notes, work papers, audit checklists and photographs.

An informal closing meeting was held with each owner and/or representative(s) upon completion of the field assessment phase. The auditors provided a verbal assessment and the provisional findings of the audit for each MF. The overall findings for the audit were derived by aggregating the findings from each MF property.

Audit Sample

Each owner supplied a list of roads constructed that was consistent with the scope of the audit; the road population. At the opening meeting the list of roads / areas / blocks was reviewed to determine which were accessible and which were not at the time due to snow pack, active harvesting or road closure on other owner's land. The audit samples were selected with the auditee from the list of accessible blocks.

Emphasis was placed on assessing construction / deactivation practices concerning stream crossings, major culverts / bridges, sediment and erosion control and associated drainage. Road sections selected, where possible, contained higher risk features such as steep ground, history of instability, fish streams and licenced water supply areas. The owner approach to road maintenance and deactivation was also assessed by reviewing how the program is structured and auditing random sections of road being maintained, giving consideration to the higher risk features listed above.

MF #	Owner	Location	Road Sampled km	% Road Population	Bridges / Major Culverts	Fish Streams	Water Supply Areas
5	Manulife Canada Ltd.	Lake Cowichan	5.1	38	Yes	Yes	No
19	Island Timberlands LLP	Cowichan Copper Canyon / Nanaimo River	2.4	24	No	Yes	Yes
30	Western Forest Products Inc.	Jordan River	4.8	45	Yes	Yes	Yes
31	Western Forest Products Inc.	Port McNeill	6.5	25	Yes	Yes	No
47	Merrill & Ring Inc.	Theodosia River	5.8	57	Yes	Yes	No
74	Island Timberlands LLP	Port Alberni Ash / Cameron	12.9	15	Yes	Yes	Yes
78	Kapoor Lumber Co. Ltd.	Sooke	1.7		No	Yes	No

The majority of road construction / upgrade sampled was located within a harvest block planned, active or completed. Detailed maps were generally available and the audit team selected audit samples from within blocks based on the criteria referenced above. Road sections sampled ranged from about 150m to over 1km but where practicable were 300m to 600m. Where detailed maps were available, the auditor compared the as-built structures such as culverts with the road prescription for size and placement. Factors considered included (but not limited to) maintaining the natural drainage pattern, volume and distance water carried, direct discharge of ditch

water into streams, appropriateness of structure size to flow, risk of erosion, and sediment transport potential and fish passage where appropriate.

4.0 Findings

The overall audit findings for compliance and performance are presented below. The findings are summarized for all properties sampled and reflect the audit team's assessment of the MFs evaluated only, and therefore do not necessarily represent forest practices in other MFs in the Managed Forest Program. Appendix I provides a summary of the observations noted for each MF. A selection of photographs from the audit is found in Appendix 1V.

4.1 Compliance

The auditors found that the road program activities of construction, maintenance and deactivation were in compliance with the regulatory requirements for soil conservation and the protection of water quality and fish habitat. Some problems observed in the field were relatively minor in nature and there was no evidence of material adverse effect to water quality or fish habitat apparent.

Road construction, maintenance and deactivation practices have the potential to adversely affect soil conservation, water quality and fish habitat. The auditors assessed the related practices and outcomes in the field and provide the following observations of effectiveness and opportunities for improvement.

4.2 Observations of Effectiveness

Soil Conservation

The auditors found that the roads were well constructed and appropriately located for the topography and designed harvest methods. Road widths were generally controlled and there was effective placement of turnouts. In many cases shot rock ballast was effective in providing a stable road surface for traffic and one that resisted erosion, especially on steeper hills. Exposed soils on cut slopes and in ditches were revegetated by grass seeding in many cases where there was risk of erosion and sediment transport. Grass seeding was used effectively but not as consistently as it should be. Roads are maintained until the owner decides to deactivate a road. Maintenance practices observed were generally effective in minimizing the risk of landslide or erosion through management of ditch and road surface water. Maintenance practices on roads not currently in use often included the addition of waterbars and cross-ditches, and to a lesser extent, seasonal removal of culverts. The deactivation of roads observed was well done leaving the road prism stable and water flow controlled and outlets armoured where necessary to minimize the risk of landslide or erosion.

Water Quality

Stream channels and the natural drainage patterns were effectively maintained during construction. Although the placement of culverts and sizing were generally very good, there were instances when culvert pipes were too short for the installation, increasing the risk of blockage and resulting erosion potential. Good practices observed were sediment sumps at inlets, ditch blocks to control flow volume, and use of grass seeding to minimize sediment transport or erosion. Post harvest clean out of ditches and culverts is generally current and effective. Water quality around roads was generally protected by effective surface grading and maintenance resulting in relatively little rutting and surface water flow. Use of water bars and cross-ditches (referenced above) on roads contributes to water quality protection. There were examples noted where sediment build-up on bridge decks and approaches has likely been carried to the stream in periods of high water flow.

Fish Habitat

In addition to maintaining the integrity of stream channels and the natural drainage patterns referenced above, with few exceptions streams are classified based on field sampling or local knowledge, or appropriate default classification is implemented in planning. There were also examples noted where streams initially classed as fish streams were determined to be not fish bearing but the maps were not updated to reflect that change. Most log culverts installed on fish streams were adequately sized and well placed (including alignment) and geo-fabric consistently used to prevent the fines from entering the stream. Channels were clear and the openings generous but an opportunity for improvement was noted to ensure sill logs and rip-rap do not encroach on the stream channel width.

New roads constructed in the audit period were providing adequate fish habitat protection. "Legacy roads", those roads constructed prior to the effective date of the PMFL legislation (2004), are not required to comply with the legislation for new construction. The audit determined that where "legacy" issues exist, for example a

"perched" culvert where fish passage is impaired or a road is adjacent to a stream reach increasing the risk of sediment delivery, the owner is generally aware of and dealing with these issues.

Other Observations

Map detail and Standard Operating Procedures (SOPs) for employees and contractors provided is excellent and provide thorough direction. For the exceptions where map detail and SOPs are less specific or not available, the direct communication practices outlined are appropriate.

Road maintenance standards observed are acceptable in that the majority of the roads examined are in good, durable condition with very little evidence of surface erosion.

The amount of road deactivation reported is relatively minor in relation to total road built because the owners are maintaining access for forest protection and other management activities, including future development. Often roads are seasonally maintained for 4x4 traffic by adding cross-ditches and waterbars. The "deactivation" practices observed ranged from "reclamation" of road on a relatively low slope area where the road prism and surface characteristics were returned to near pre-road condition to "deactivation" on a steep side slope where the road prism was stabilized to minimize risk of slope failure and culverts removed to maintain effective drainage. The steep slope sample of deactivation was undertaken to provide a high level of protection of fish habitat and water quality on a major stream below.

4.3 Opportunities for Improvement

Even though most examples of road program activities were effective in meeting the requirements and as in the examples noted were very well done, the auditors noted a number of instances where the standard of practice might be improved. The following examples are all practices that, with consistent application, will significantly reduce risks associated with soil conservation and the protection of water quality and fish habitat:

- revegetate exposed soils where there is risk of erosion and / or sediment transport into streams
- use ditch blocks to ensure that ditch water enters cross-drain culverts, and thus reduce volume of water carried for long distances and / or to reduce energy and erosion potential
- ensure the cross-ditch outlet is armoured
- ensure water bars are effectively located and installed to minimize the surface erosion potential (numbers, depth, angle)
- ensure culverts are long enough to clear the road surface and minimize ravelling and/or adversely affecting the inlet / outlet function
- ensure culvert installations are effective for depth, cover and gradient and the outlet is armoured if necessary to minimize erosion potential
- eliminate (or breach) grader windrow left on one or both sides where there is the potential to trap surface water
- improve water management around bridges to minimize water flow onto the deck or to avoid direct discharge of ditch water into a stream
- avoid placing sill logs or rip rap into the stream channel width

5.0 Conclusion

The auditors found that the road management program practices assessed on the managed forests audited comply with the requirements of the Private Managed Forest Land Council Regulation for road construction, maintenance and deactivation in regards to soil conservation and the protection of water quality and fish habitat for the period July 2006 to June 3, 2009.

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October 1, 2009
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Appendices

Appendix II Definitions and Terms

Note that regulations are from the Private Managed Forest Land legislation including the *Private Managed Forest Land Act*; the Private Managed Forest Land Council Regulation; the Private Managed Forest Land Regulation; and the Private Managed Forest Land Council Matters Regulation.

Act means the *Private Managed Forest Land Act*

Council means the Private Managed Forest Land Council under section 4 of the *Act*

Fish Habitat means an area that is a fish stream or provides habitat for specified species of fish

Fish Stream means the portion of a stream that

1. is frequented by a specified fish species, or
2. has an average slope gradient of less than 20% for each 100 metres of slope distance, unless:
    a. a fish inventory, carried out in accordance with methods acceptable to the wildlife minister, shows that it is not frequented by a specified species of fish, or
    b. the portion of the stream is located upstream of a proven barrier to fish

Licensed water supply intake means a water intake that is in a water supply area or a community watershed contiguous to a water supply area; or is to provide water for human consumption and is licensed under the *Water Act* for a waterworks purpose or domestic purposes if the license is held by or subject to a water users community incorporated under the *Water Act*.

Owner means the person registered in the records under the *Land Title Act* as owner of the land for which there is a management commitment and that is classified as managed forest land under the *Assessment Act*.

Private managed forest land means private land for which there is a management commitment and is classified a managed forest land under the *Assessment Act*

Regulation means the Private Managed Forest Land Council Regulation (BC Reg. 336/2004)

Specified species of fish means one or more of the following species of fish:

> anadromous salmonoids, rainbow trout, brook trout, kokanee, largemouth bass, smallmouth bass, mountain whitefish, lake whitefish, arctic grayling, burbot, white sturgeon, black crappie, yellow perch, walleye or northern pike

Stream means a watercourse, including a watercourse that is obscured by overhanging or bridging vegetation or soil mats, that contains water on a perennial or seasonal basis, is scoured by water or contains observable deposits of mineral alluvium, and

1. has a continuous channel bed that is 100 metres or more in length
2. flows directly into a fish stream, fish-bearing lake or wetland, or a licensed waterworks

Stream channel means the area between the outermost opposing stream banks measured at the point where rooted terrestrial vegetation begins.

Wildlife minister means the minister responsible for the administration of the *Wildlife Act* and includes a person authorized in writing by that minister.

Appendix III Key Public Values, Objectives and Practice Requirements

The *Private Managed Forest Land Act* establishes forest management objectives, and the Private Forest Land Council Regulation (BC Reg. 336/2004) sets minimum standards of practice, for the protection of soils, water quality and fish habitat, and reforestation.

The Private Managed Forest Land Regulation (BC Reg. 341/2004) makes provision for the wildlife minister to establish an area on MF property as critical wildlife habitat for the survival of one or more species at risk.

The objectives and practice requirements are summarized below.

Soils
The soil conservation objective for areas where harvesting is carried out is to protect soil productivity on those sites by minimizing the amount of area occupied by permanent roads, landings, and excavated trails.

The regulations require an owner who carries out timber harvesting to:

- Restrict the amount of area occupied by unproductive soil as a result of access structures to the minimum necessary to safely and efficiently conduct harvesting.
- Adequately rehabilitate and reforest temporary access structures.
- Minimize soil erosion and minimize any increase of landslide hazard.
- Take reasonable measures to minimize impact of erosion events.

Water Quality and Fish Habitat
The water quality objective is to protect human drinking water both during and after harvesting. The objective for fish habitat during and after harvesting is to retain sufficient streamside trees and understory vegetation to protect the natural variation in stream temperature and to provide:

- sufficient cover and in-stream habitat for fish,
- a continuous source of nutrients and large woody debris,
- a vigorous mass of roots capable of controlling stream bank erosion; and
- a filter to prevent transport of sediment into stream channels

The regulation requires an owner who carries out timber harvesting in water supply areas and near fish habitat to:

- Retain understory vegetation and non-commercial trees within 5 metres of the edge of a stream channel to the fullest extent possible without damaging water supply installations, reducing water quality at supply installations or causing harm to fish or fish habitat.
- Ensure that woody debris or physical disturbance at a site do not result in damage to riparian areas that are seasonally occupied by one or more species of fish.
- Retain the minimum required number and size of trees on each side of every 100 metres of a stream channel as specified in the legislation for two classes of streams channels; e.g.: 1.5 to 3 metres wide & 3 metres and wider.
- Ensure that roads constructed with running surfaces wider than 5.5 metres are at least 30 metres from the edge of a stream channel (with a width of at least 1.5 metres) except at a stream crossing.
- Ensure that if yarding timber across a stream with a channel of at least 1.5 metres that the timber is suspended over the stream and that damage does not occur to the stream banks, streambed, retained trees, fish, fish habitat or a licensed water supply intake.
- Ensure that if broadcasting fertilizer in a water supply area, the fertilizer is not applied within 100 metres upslope of a licensed water supply intake or within 10 metres of a flowing stream that is observable from the air, and to ensure the application does not cause nitrate levels in a stream to exceed 10 ppm downstream or cause water quality to fail to meet established water quality objectives.
- Notify the council within 24 hours of becoming aware of a landslide or debris flow if the event has deposited debris into a stream on the owner's land after August 1, 2004.

General requirements for streams in the regulation requires that an owner who constructs or deactivates roads, trails, quarries or disposal sites or carries out timber harvesting must:

- Ensure that access structures are stable and streams are maintained in their existing courses.
- Ensure the amount of soil erosion that enters a stream is minimized.

- Ensure that machine tracks within 5 metres do not result in exposed mineral soil that leads to sedimentation.

Critical Wildlife Habitat
The objective for critical wildlife is to facilitate long-term protection of habitat by enabling government to assess whether critical wildlife habitat is present and to foster efforts to protect critical wildlife habitat when present on private managed forestland.

When an area of critical wildlife habitat is established on a private managed forest, an owner must carry out any timber harvesting and related activities, and any road construction, in accordance with the requirements of the notice given or amended by the wildlife minister.

Reforestation
The reforestation objective where timber has been harvested or destroyed is to promptly regenerate the areas with a healthy, commercially valuable stand of trees that is not impeded by competition from other plants or shrubs

The regulation requires an owner of an area that is harvested or destroyed after the area became the owner's managed forest to:

- Restock the area within 5 years of completion of harvesting or the date the timber was destroyed with a minimum of 400 well distributed crop trees per hectare on the Coast and 600 trees per hectare in the Interior
- Regenerate the area within 15 years of completion of harvesting or date the timber was destroyed with a set minimum number of well distributed trees that exceed the height of competing vegetation by 50% on the Coast and 25% in the Interior.

Appendix 1V Road Audit Photographs

1. Culvert inlet armoured with placed shot rock.

2. Culvert too short and outlet partially plugged.

3. Natural drainage pattern maintained.

4. Effective pullback and cross-ditch on deactivated road.

5. New steel girder, concrete deck bridge replaced an old log stringer, gravel deck bridge on this old, heavily used main line. Note use of rip-rap and grass seeding.

6. Settling basins in ditchline can be cleaned out periodically to help to reduce risk of sediment delivery.

7. Looking down-grade. Note rill erosion caused by ditch water discharging onto running surface of road.

8. Silt fence installed on ditch before stream to help minimize sediment deposition.

9. Culvert inlet partially blocked by sediment build-up. Digging a sediment trap would help here.

10. Culvert ditch block, and ditch cleared after harvest to prevent road fill encroaching.

11. Large wood box culvert; sill logs well back to leave clear channel clear channel.

12. Logging on very new, well ballasted road.

13. New road, ditch cleared of debris after right-of-way logs loaded out.

14. Wood culvert with sill logs well back leaving channel undisturbed. Note use of geo-fabric used to contain fines.

15. Example of road reclaimed and restocked after harvest completed.

16. Legacy road issue – perched culvert outlet on fish stream.

17. Culvert removed on deactivated road. Rip-rap remains in place to protect soil from erosion.