

Case report

*Prepared by
the Dutch Timber Procurement Assessment
Committee (TPAC)*

on the

Sustainable Forestry Initiative (SFI)

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Index

- 1. Introduction 3
- 2. Case information and research approach 4
 - 2.1 The 2007 storm 4
 - 2.2 The NGO claim 4
 - 2.3 Research approach 5
- 3. Evaluation of the case 6
 - 3.1 Are the relevant Dutch procurement criteria met by SFI? 6
 - 3.2 Did Weyerhaeuser comply with the SFI standard? 7
 - 3.3 Can the landslides be attributed to Weyerhaeuser? 7
- 4. Responses of parties 9
 - 4.1 Response Sierra Club/WFLC 9
 - 4.2 Response Weyerhaeuser 9
 - 4.3 Response State department 9
 - 4.4 Response SFI and PEFC International 9
- 5. Conclusions and recommendations 10
 - 5.1 Conclusions10
 - 5.2 Recommendations10
- 6. Sources 11
- Annex – Assessment SFI against TPAS criteria 12

1. Introduction

This report has been prepared by TPAC, the Committee which assesses timber certification systems on behalf of the Procurement Policy of the Dutch government. The report focusses on a case involving the SFI-certified company Weyerhaeuser in Washington State. The case was brought to the attention of TPAC during its assessment of PEFC International in 2009. The stakeholder presenting the case was Friends of the Earth Netherlands (FoE NL). TPAC did not have the time and the resources to research the case in 2009 and committed itself to do so at a later stage.

For the preparation of the report, TPAC consulted scientific reports, SFI standards, Weyerhaeuser documents, the certification body reports, documents prepared by the US-based NGO Sierra Club, and newspaper articles. In addition, Kathy Abusow of SFI and Peter Goldman of the Washington Forest Law Center were contacted.

The conclusions of the present research will contribute to the preparation of the periodical re-assessment of PEFC International which is planned for 2014.

2. Case information and research approach

2.1 The 2007 storm

A series of three storms affected Western Oregon and Washington State between December 1 and 3, 2007. Significant snowfall occurred at the beginning of the event. Heavy rainfall merged with the rapidly melting snow pack producing record flooding. The worst flooding was near Chehalis, Washington. The Chehalis River experienced one of the worst floods in Washington State history as three locations exceeded record flood levels. At Doty, the river rose 6.7 meters in a 12-hour period. According to the U.S. Geological Survey, the peak flow at Doty far exceeded a 500-year flood event. Debris and logs washed downstream on the South Fork of the Chehalis River. At Curtis, Washington, a temporary log jam of 1.5 miles long and 6 to 9 meters high was formed.¹

Furthermore, the final storm generated hurricane force wind gusts lasting over 30 hours. The six hour rainfall amounts were near a 100-year event. Eleven fatalities were associated with the event, including three in Oregon and eight in Washington. A portion of Interstate 5 near Chehalis was closed for several days. It was estimated that the closure costed the local economy approximately \$4 million per day. In total, the estimated damage exceeded \$1 billion.²

2.2 The NGO claim

Friends of the Earth Netherlands based its case on a complaint that was filed by the Washington Forest Law Center (WFLC) on behalf of the NGO Sierra Club against Weyerhaeuser. The complaint was filed with SFI.

WFLC claimed that Weyerhaeuser's clear-cutting and road-building on steep slopes in the Upper Chehalis and Stillman watersheds was associated with a high concentration of landslides. These in turn contributed in their view to record flooding and damage of the Chehalis River basin during the December 2007 storm. According to the WFLC, Weyerhaeuser's forest practices were highly inconsistent with Best Available Science, and its failure to use Best Available Science contributed to major damage downstream. Despite Weyerhaeuser's acknowledgement that the area is "a landscape vulnerable to mass wasting," Weyerhaeuser harvested forests and built roads on thousands of acres of slopes that had a high hazard rating, probable stream delivery rating, a history of landsliding in the past, high slope instability, high soil erosion potential, and that are located in peak rain-on-snow zones says WFLC.^{3 4}

WFLC furthermore claimed that landslide densities inside Weyerhaeuser harvest and road building units were consistently higher than landslide densities on neighbouring private

¹ US department of Commerce (2008)

² US department of Commerce (2008)

³ WFLC (2009)

⁴ Rain on snow (ROS) events can dramatically impact the pattern of water delivery to streams. When rain falls on snow, water does not infiltrate the soils, as it normally does. Instead, water runs over the surface of the ground into the receiving stream network. This can result in high water levels in streams.

industrial forest lands with comparable precipitation, lithology, stand age, and slope instability. According to WFLC this relationship holds when all variables were included in a logistic regression model: the odds of sliding on Weyerhaeuser lands were 2.2-2.7 times the odds of sliding on other private industrial forest lands in the study area while holding all other variables equal. WFLC says that wood and sediment from these landslides exacerbated the flooding and associated damage downstream.⁵

2.3 Research approach

The claim of FoE NL is that "SFI - and thus PEFC International - does not meet the Dutch Procurement Criteria for Timber".⁶ The substantiation for this claim is the inferred failure of Weyerhaeuser to meet several TPAS principle and criteria (see paragraph 3.1). FoE NL however does not specify *why* the inferred failure of Weyerhaeuser to meet the TPAS principles and criteria leads to the conclusion that *SFI* does not meet the Dutch Procurement Criteria.

Reason of a possible non-compliance with TPAS can be:

- a) the SFI standard is weak permitting that poor forest management practices could be certified. Or
- b) the SFI control mechanisms are weak permitting that poor forest management practices could be certified.

It should be noted that FoE NL also did not rule out the possibility that the alleged weak forest management practices of Weyerhaeuser could be classified as an incident. All in all, TPAC concludes that FoE NL has not presented sufficient evidence that the Weyerhaeuser case is the outcome of a *systemic* failure within the SFI system.

Nonetheless, TPAC has felt the need to research the case in more detail not in the least because of the discussion about the applied forest management practices and the vast damage that was caused by the landslides in the Weyerhaeuser forests. TPAC has formulated two research questions:

- a) Are the relevant Dutch Procurement Criteria met by SFI?
- b) Did Weyerhaeuser comply with the SFI standard preceding the December storm of 2007? (If not, this could be an indication of weak control mechanisms)

A third question that might come up with the reader is: could the landslides of the 2007 storm be attributed to Weyerhaeuser and its forest management practices? TPAC will not attempt to provide a conclusive answer to this question. Primarily because the question goes beyond TPACs assigned task to assess certification systems based on the Dutch Procurement Criteria for timber.⁷

⁵ WFLC (2009)

⁶ TPAC stakeholder forum

⁷ TPAC User Manual (2010)

3. Evaluation of the case

3.1 Are the relevant Dutch procurement criteria met by SFI?

The first part of the evaluation focusses on the question whether the TPAS criteria targeted by FoE NL are met by SFI. FoE NL has listed the following TPAS principle and criteria:

- Principle 2. Taking into account the interests of stakeholders;
- Criterion 1.3. Fulfilment of legal and regulatory obligations;
- Criterion 5.1. Preservation of soil quality;
- Criterion 5.2. Preservation of water balance and water quality;
- Criterion 5.4. Use of reduced impact logging techniques;
- Criterion 8.5. Science-based forest management.

The prevailing SFI standard at the time the case took place was the SFI 2005 – 2009 standard. This standard was reviewed in 2010. TPAC has assessed whether the listed TPAS principle and criteria are met by this SFI standard. A detailed assessment can be found in the Annex of this report.

TPAC concludes that criteria 1.3, 5.2, 5.4 and 8.5 are fully addressed, criterion 5.1 is partially addressed and that TPAS Principle 2 on the interests of stakeholders is inadequately addressed by the SFI standard 2005 - 2009. TPAC notes that the conclusion on Principle 2 reflects the 'old' PEFC meta-standard which also did not sufficiently address the interests of stakeholders. TPAC therefor anticipated this outcome. It should be noted that the PEFC meta-standard has been revised and that the new standard PEFC ST 1003:2010 fully addresses the interests of stakeholders. As is common practice with international systems, the PEFC Council has given the national systems a transition period to adapt to the new meta-standard. This transition period ends May 2013.⁸

⁸ PEFC (2013), PEFC's assessments whether national systems comply with the new metastandard are expected to be finalised within 9–12 months.

3.2 Did Weyerhaeuser comply with the SFI standard?

The second question in this case is: did Weyerhaeuser comply with the SFI standard in the period preceding the 2007 storm? The Washington Forest Law Center has argued that this was not the case. In its complaint to SFI of October 2009, WFLC argued that:

1. Weyerhaeuser's forest practices fail to conserve soil or protect soil productivity.
2. Weyerhaeuser does not appropriately identify or manage geologically important areas.
3. Weyerhaeuser does not adequately plan for wet-weather events.
4. Weyerhaeuser does not replant all of the forests it harvests.
5. Weyerhaeuser does not adequately protect riparian zones.
6. Weyerhaeuser does not comply with state water quality standards.
7. Weyerhaeuser's forest practices are not economically, environmentally, or socially responsible.⁹

In November 2010, QMI-SAI Global, the certifying body (CB) responsible for the certification of Weyerhaeuser, responded formally to the complaint. In its report, QMI-SAI Global states that between 2001 and 2010, QMI-SAI Global has spent 284 audit days on the Weyerhaeuser SFI certified operations in Washington and Oregon. The CB concludes that for each of the seven complaints there is "*sufficient evidence to support that Weyerhaeuser had in place an established environmental management system and were following established forest practices to ...*" 1) conserve soil; 2) identify and manage geologically important areas 3) plan for wet weather events etc. The final conclusion drawn by QMI-SAI is therefore that Weyerhaeuser did meet the Objectives, Performance measures, and Indicators of the SFI standard 2005-2009 prior to the events of December 2007.¹⁰ The CB based this conclusion in particular on its audit reports, the formal response of Weyerhaeuser, interviews with experts, and expert reports.

Although TPAC cannot verify the findings of the CB because some of the sources are not publically available, TPAC has no reason to doubt the conclusion of QMI-SAI Global.

3.3 Can the landslides be attributed to Weyerhaeuser?

TPAC will not attempt to provide a conclusive answer to the question whether the landslides can be attributed to Weyerhaeuser but TPAC will share some thoughts on the question.

The Sierra Club has maintained that the numerous landslides were attributable to Weyerhaeuser and its forest management practices. It claimed – based on a study by research bureau Entrix – that landslide densities inside Weyerhaeuser harvest and road building units were consistently higher than landslide densities on neighbouring private industrial forest lands with comparable precipitation, lithology, stand age, and slope instability.

⁹ WFLC (2009)

¹⁰ QMI-SAI Global (2010)

After the storm, two studies were initiated on the relationship between forest management practices and landslides. One was funded by the Washington Forest Practices Board with a focus on the Washington regulatory framework, the other was performed by Weyerhaeuser scientists Turner et al. focusing on the Weyerhaeuser forest land. The first study is still to be finalised. The second was published in 2010 in *Forest Ecology and Management*.

The Turner study concluded amongst others that aerial photo-based landslide inventory data significantly underestimated the actual number of landslides particularly under older stands with greatest canopy cover. Turner concluded that ground-based data were needed to provide an accurate view. This suggests that the conclusions of the Entrix report which were based on aerial-photo data alone might not have been entirely accurate. Another conclusion of the Turner study was that regardless of stand age or slope gradient, very few landslides occurred in the areas with rainfall levels up to 100-year average return interval. Meaning that in those areas where rainfall was not extraordinary, landslides occurred only occasionally. Finally the Turner study concluded that the spatial variability of both rainfall and slope steepness had a direct influence on landslide densities in the study area, regardless of forest stand age. Also it was found that higher landslide densities in the 0–10 years stand age class, but only where rainfall was greater than 150% of the 100-year event.¹¹ All in all the Turner study seems to suggest that the magnitude of the rainfall has been a better predictor of landslides intensity than forest management practices.

Indeed the December 2007 has been classified as an exceptional event by several scientific sources:

- “Several areas in northwest Oregon and southwest Washington saw daily totals exceeding 140% of the historical 100-year values, in other words, the rainfall totals were truly unusual, if not unprecedented.” – Oregon State University (2009)
- “The damaging flood of December 3-4 on the Chehalis River resulted from exceptionally heavy rainfall that was confined to the vicinity of the Willapa Hills (...). Rainfall in the rest of the basin and in surrounding areas was heavy but in most cases ranked only in the top 10 events of the instrumental record.” – Mote et al. (2007).
- “Many locations received all-time record rainfall for a twenty-four hour period” – Mass (2008).
- “Twenty-four hour rain values approached twenty inches in the Willapa Hills region, which equated to an Average Return Interval (ARI) of 500+ years” - “Parzybok et al. (2011)

All in all, TPAC concludes that there is no conclusive evidence that the high intensity of landslides can be attributed to Weyerhaeuser. The study initiated by Washington Forest Practices Board might provide further details on this topic.

¹¹ Turner (2010)

4. Responses of parties

4.1 Response Sierra Club/WFLC

Following the conclusion of QMI-SAI Global that Weyerhaeuser had complied with the SFI standard previous to the 2007 storm, WFLC filed an appeal on behalf of the Sierra Club. The appeal was filed with the Washington SFI Implementation Committee (SIC). The SIC however concluded that it lacked jurisdiction to decide on the appeal and suggested an appeal to be filed with the responsible accreditation body, ANAB. The Sierra Club to date has not filed such an appeal and has informed TPAC that it is not planning to do so because it does not expect added value from another lengthy appeal procedure.

4.2 Response Weyerhaeuser

Weyerhaeuser responded to the storm with a study to evaluate the relationship between harvesting practices and landslides. It was published in May 2010 in *Forest Ecology and Management*. In March 2010, Weyerhaeuser reached a voluntary agreement with the Washington Department of Natural Resources (DNR) to apply additional protections to the upper Chehalis and Stillman watersheds, including more tools to predict landslides and to avoid landslide-prone slopes.

4.3 Response State department

Following the storm, the DNR launched a study to find out whether state logging restrictions would help to reduce frequency and size of landslides. Also a voluntary agreement with Weyerhaeuser was initiated. Finally, state rules on watershed analysis were strengthened as the storm revealed that the Washington State forest practice rules allowed foresters to work with outdated watershed analysis.¹²

4.4 Response SFI and PEFC International

SFI has not publicly responded to the events of December 2007 or to the complaint filed by the Sierra Club. In an informal reaction SFI has commented that its role in the complaints procedure is to ensure that SFI has a publicly available and credible complaints process but that it has no role in the investigation or resolution of the complaint. SFI therefore did not initiate an evaluation of the events of December 2007 and the role of forest management in the landslides and floods.

The 2010–2014 SFI standard does not include evident changes which are connected to the landslides of 2007. In an informal reaction SFI commented that it did not see the need to adapt its standard as the events of 2007 were the result of a natural disaster. The most noticeable improvement is the indicator on road construction (many of the landslides started near roads). The old indicator 2.3.7. reads: "*Minimize road construction to meet management objectives efficiently.*" The new indicator reads: "*Road construction and skidding layout to minimize impacts to soil productivity and water quality.*" Other relevant indicators such as the ones on wet-weather events and legal compliance have not been adapted.

¹² TDN (2010)

5. Conclusions and recommendations

5.1 Conclusions

It should be noted that TPAC specifically did not assess the complete SFI standard or system.

Two questions were addressed in this report:

- a) Are the Dutch Procurement Criteria as indicated by FoE NL met by SFI?
- b) Did Weyerhaeuser comply with the SFI standard preceding the December storm of 2007?

In addition, TPAC shared its thought on a third question: were the landslides attributable to Weyerhaeuser?

TPAC's answer to the first question is that TPAS criteria 1.3, 5.2, 5.4 and 8.5 are fully addressed and that criterion 5.1 is partially addressed by the SFI 2005 – 2009 standard. However, TPAS Principle 2 on the interests of stakeholders is inadequately addressed by SFI. TPAC notes that the conclusion on Principle 2 reflected the 'old' PEFC meta-standard which did not sufficiently address the interests of stakeholders. In the new PEFC meta-standard – which SFI needs to comply with by May 2013 - this omission is corrected.

The answer to the second question given by QMI-SAI Global is positive; this responsible certification body concluded after investigation that Weyerhaeuser complied with the SFI standard prior to the storm. Regarding the third question TPAC concludes that there is no conclusive evidence that the high intensity of landslides can be attributed to Weyerhaeuser. The study initiated by Washington Forest Practices Board might provide further details on this topic.

5.2 Recommendations

Based on its research, TPAC would like to make the following recommendations:

1. The Sierra Club should consider filing a complaint with the accreditation body if it is not satisfied with the outcome of its complaint with QMI-SAI Global. The complaints procedure may result in an improvement of the quality of the certification body thereby contributing to the quality of the overall SFI system.
2. The magnitude of the damage of the landslides to society and ecology demands from all actors - forest managers, state officials and SFI officials – to evaluate their underlying processes, and to inventory what improvements are within its capacity to prevent repetition. SFI should consider making clear to the public what evaluation it has performed and what its conclusions were regarding improvements to avoid future landslides.

6. Sources

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QMI-SAI Global (2010), formal response to the complaint of the Sierra Club, 3 November 2010.

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Seattle Times (2012), Landslide study bogged down by scientific dispute, 24 June 2012.

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US Department of Commerce (2008), National Oceanic and Atmospheric Administration, Assessment of the Pacific Northwest Storms of December 1-3, 2007.

Washington Forest Law Center on behalf of the Sierra Club (2009), Non-conformance complaint directed at SFI on Weyerhaeuser Forest Practices, 1 October 2009.

Weyerhaeuser (2009), Response to October 1 2009 SFI Non-conformance complaint submitted by WFLC on behalf of the Sierra Club, 13 November 2009

Annex – Assessment SFI against TPAS criteria

Claim FoE NL	Relevant TPAS criteria (according to FoE NL)	Relevant SFI criteria			Comments TPAC
"State water quality standards were violated"	C 1.3. Legal and regulatory obligations that apply to the forest management unit, including international agreements, are fulfilled.	<p>3.1. Program Participants shall meet or exceed all applicable federal, provincial, state, and local water quality laws and meet or exceed best management practices developed under U.S. Environmental Protection Agency–approved state water quality programs or other federal, provincial, state, or local programs.</p> <p>11. Commitment to comply with applicable federal, provincial, state, or local laws and regulations.</p> <p>11.1. Program Participants shall take appropriate steps to comply with applicable federal, provincial, state, and local forestry and related environmental laws and regulations.</p> <p>11.2. Program Participants shall take appropriate steps to comply with all applicable social laws at the federal, provincial, state, and local levels in the country in which the Program Participant operates.</p>	≈	=	<p>The phrases "commitment to comply" and "take appropriate steps to comply" in SFI objective 11 and criterion 11.1 leave room for non-compliance. However SFI criterion 3.1 on water quality laws does not leave any room for interpretation.</p> <p>Conclusion: SFI fully addresses TPAS on this aspect.</p> <p>Remark: the new SFI standard is practically identical on these specific criteria.</p>
"Despite knowing (...) the high potential for damage to public resources, Weyerhaeuser still conducted its forest practices in a way that contributed to and worsened the effects of flooding."	P 2. The interests of directly and indirectly involved stakeholders shall be taken into account.	Objective 12. To broaden the practice of <i>sustainable forestry</i> by encouraging the public and forestry community to participate in the commitment to <i>sustainable forestry</i> and publicly report progress.	≠	≠	
"Thousands of hectares of clear cuts	C 5.1. The soil quality of the forest management unit is	2.3. Program Participants shall implement management practices to protect and maintain forest and soil productivity.	≈	≈	Clearcuts as a forest management method are not

<p>in areas known to have a high risk for landslides have led to large-scale erosion, loss of soil and blocking of waterways. Clear cutting headwater streams also clearly does not fulfil this criterion [5.1].”</p>	<p>maintained and, where necessary, improved, whereby special attention is given to shores, riverbanks, erosion-prone parts and slopes.</p> <p><i>Guidance: Thresholds for allowable maximum altitude and maximum gradient are relevant indicators for the prevention of soil erosion.</i></p>	<p>Indicators:</p> <ol style="list-style-type: none"> 1. Use of soils maps where available. 2. Process to identify soils vulnerable to compaction and use of appropriate methods to avoid excessive soil disturbance. 3. Use of erosion control measures to minimize the loss of soil and site productivity. 4. Post-harvest conditions conducive to maintaining site productivity (e.g., limited rutting, retained down woody debris, minimized skid trails). 5. Retention of vigorous trees during partial harvesting, consistent with silvicultural norms for the area. 6. Criteria that address harvesting and site preparation to protect soil productivity. 7. Minimize road construction to meet management objectives efficiently. <p>3.2. Program Participants shall have or develop, implement, and document riparian protection measures based on soil type, terrain, vegetation, and other applicable factors.</p> <p>Indicators:</p> <ol style="list-style-type: none"> 1. Program addressing management and protection of streams, lakes, and other water bodies and riparian zones. 2. Mapping of streams, lakes, and other water bodies as specified in state or provincial BMPs and, where appropriate, identification on the ground. 3. Implementation of plans to manage or protect streams, lakes, and other water bodies. 4. Identification and protection of nonforested wetlands, including bogs, fens, vernal pools, and marshes of significant size. 5. Where regulations or BMPs do not currently exist to protect riparian areas, use of experts to identify appropriate protection measures. 		<p>prohibited by the TPAS criteria as long as soil quality is maintained and special attention is given to shores, riverbanks, erosion-prone parts and slopes.</p> <p>The SFI criteria do not specifically mention slopes (or a maximum gradient or an maximum altitude). The SFI indicators do mention erosion control measures and criteria that address harvesting and site preparation to protect soil productivity.</p> <p>Conclusion: SFI criteria partially address TPAS.</p> <p>Remark: In the new SFI standard indicator 2.3.7. has been improved as it now includes also skidding (the movement of the log from stump to point of loading). However the definition of a maximum gradient or maximum altitude is not mentioned. This seems to be an omission in the new standard.</p> <p>2.3.7. Road construction and skidding layout to minimize impacts to soil productivity and water quality.</p>
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<p>“The water quality in the forest management unit and downstream were strongly affected.”</p>	<p>C 5.2. The water balance and quality of both groundwater and surface water in the forest management unit, as well as downstream (outside of the forest management unit), are maintained and, where necessary, improved.</p>	<p>3.1. Program Participants shall meet or exceed all applicable federal, provincial, state, and local water quality laws and meet or exceed best management practices developed under U.S. Environmental Protection Agency–approved state water quality programs or other federal, provincial, state, or local programs.</p> <p>Indicators:</p> <ol style="list-style-type: none"> 1. Program to implement state or provincial BMPs during all phases of management activities. 2. Contract provisions that specify BMP compliance. 3. Plans that address wet-weather events (e.g., inventory systems, wet-weather tracts, definitions of acceptable operating conditions). 4. Monitoring of overall BMP implementation. <p>3.2. Program Participants shall have or develop, implement, and document riparian protection measures based on soil type, terrain, vegetation, and other applicable factors.</p> <p>Indicators:</p> <ol style="list-style-type: none"> 1. Program addressing management and protection of streams, lakes, and other water bodies and riparian zones. 2. Mapping of streams, lakes, and other water bodies as specified in state or provincial BMPs and, where appropriate, identification on the ground. 3. Implementation of plans to manage or protect streams, lakes, and other water bodies. 4. Identification and protection of nonforested wetlands, including bogs, fens, vernal pools, and marshes of significant size. 5. Where regulations or BMPs do not currently exist to protect riparian areas, use of experts to identify appropriate protection measures. <p>2.2.6. Use of best management practices (BMPs) <i>[on chemical use red.]</i> appropriate to the situation; for example, (...) <ol style="list-style-type: none"> d. designation of streamside and other needed buffer strips; (...) <ol style="list-style-type: none"> g. monitoring of water quality or safeguards to ensure proper equipment use and protection of streams, lakes, and other water </p>	<p>=</p>	<p>=</p>	<p>The SFI criteria on water quality are elaborate and fully address the TPAS criteria.</p> <p>Remark: in the new SFI standard criterion 3.2 is somewhat extended: protection measures shall also be based on ecological function and harvesting system.</p>
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		bodies; (...)			
<p>"Thousands of hectares of clear cuts and logging roads took place on steep slopes and other high-risk landslide areas."</p>	<p>C 5.4. Avoidable damage to the ecosystem is prevented by application of the most suitable and available methods and techniques for logging and road construction under the prevailing conditions.</p>	<p>2.3. Program Participants shall implement management practices to protect and maintain forest and soil productivity.</p> <p>Indicators:</p> <ol style="list-style-type: none"> 1. Use of soils maps where available. 2. Process to identify soils vulnerable to compaction and use of appropriate methods to avoid excessive soil disturbance. 3. Use of erosion control measures to minimize the loss of soil and site productivity. 4. Post-harvest conditions conducive to maintaining site productivity (e.g., limited rutting, retained down woody debris, minimized skid trails). 5. Retention of vigorous trees during partial harvesting, consistent with silvicultural norms for the area. 6. Criteria that address harvesting and site preparation to protect soil productivity. 7. Minimize road construction to meet management objectives efficiently. <p>3.1. Program Participants shall (...)meet or exceed best management practices developed under U.S. Environmental Protection Agency–approved state water quality programs or other federal, provincial, state, or local programs.</p> <p>Indicators:</p> <ol style="list-style-type: none"> 1. Program to implement state or provincial BMPs during all phases of management activities. 2. Contract provisions that specify BMP compliance. 3. Plans that address wet-weather events (e.g., inventory systems, wet-weather tracts, definitions of acceptable operating conditions). 4. Monitoring of overall BMP implementation. <p>3.2. Program Participants shall have or develop, implement, and document riparian protection measures based on soil type, terrain, vegetation, and other applicable factors.</p>	=	=	<p>SFI fully addresses TPAS criteria.</p> <p>Remark: 2.3 and 3.2 are somewhat extended (see previous remarks).</p>

		<p>Indicators: (...) <ol style="list-style-type: none"> 2. Mapping of streams, lakes, and other water bodies as specified in state or provincial BMPs and, where appropriate, identification on the ground. 3. Implementation of plans to manage or protect streams, lakes, and other water bodies. 4. Identification and protection of nonforested wetlands, including bogs, fens, vernal pools, and marshes of significant size. 5. Where regulations or BMPs do not currently exist to protect riparian areas, use of experts to identify appropriate protection measures. </p>			
<p>"(...) Multiple methods are available to identify unstable areas and minimize landslide rates in forested landscapes, but these seem to not have been used."</p>	<p>C 8.5. Forest management is based on scientific research and, if needed, information on comparable forests types.</p>	<p>Objective 1. To broaden the implementation of sustainable forestry by ensuring long-term harvest levels based on the use of the best scientific information available.</p> <p>1.1. Program Participants shall ensure that long-term harvest levels are sustainable and consistent with appropriate growth-and- yield models and written plans.</p> <p>Indicators:</p> <ol style="list-style-type: none"> 1. A long-term resource analysis to guide forest management planning at a level appropriate to the size and scale of the operation, including <ol style="list-style-type: none"> a. a periodic or ongoing forest inventory; b. a land classification system; c. soils inventory and maps, where available; d. access to growth-and-yield modeling capabilities; e. up-to-date maps or a geographic information system (GIS); f. recommended sustainable harvest levels; and g. a review of nontimber issues (e.g., pilot projects and economic incentive programs to promote water protection, carbon storage, or biological diversity conservation). 2. Documentation of annual harvest trends in relation to the sustainable forest management plan. 3. A forest inventory system and a method to calculate growth. 4. Periodic updates of inventory and recalculation of planned 	=	=	<p>SFI not only demands that forest management is based on scientific research but also that program participants provide funding for the further development of FM research.</p>

		<p>harvests.</p> <p>5. Documentation of forest practices (e.g., planting, fertilization, and thinning) consistent with assumptions in harvest plans.</p> <p>4.2. Program Participants shall apply knowledge gained through research, science, technology, and field experience to manage wildlife habitat and contribute to the conservation of biological diversity.</p> <p>Objective 9. To improve forestry research, science, and technology, upon which sound forest management decisions are based.</p> <p>9.1 Program Participants shall individually, through cooperative efforts, or through associations provide in-kind support or funding, in addition to that generated through taxes, for forest research to improve the health, productivity, and management of forest resources.</p> <p>9.2. Program Participants shall individually, through cooperative efforts, or through associations develop or use state, provincial, or regional analyses in support of their sustainable forestry programs.</p>			
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