Guidance for Forest Monitoring under FSC

Meeting Forest Stewardship Council requirements

Monitoring is a critical component of good forest stewardship and is a means to evaluate the ecosystem services that a forest produces. Forest Stewardship Council® (FSC®) certification requires regular monitoring of the forest to ensure that current conditions are known and that measurements and/or observations are documented so they can be referenced later.

Monitoring provides an opportunity to practice observing your forest carefully, to help you better know your land. It entails knowing the forest's composition and health, condition of roads and drainage systems, presence of invasive species, wildlife habitat, stream conditions, etc. Being familiar with the forest helps with early detection of potential problems and informs decision making prior to management activities. The benefits of monitoring may also include helping you remember which year a storm hit, how often you see signs of wildlife, how long a habitat pile lasts, when you planted those trees or shrubs, when you harvested, or understand if your investment of time and resources contributed to desired changes in the forest.

The extent of your monitoring system depends on the scale and intensity of your forest management. Forest resources can be inventoried and monitored using various techniques, ranging from simple visual assessments to more complex statistical sampling of attributes such as snag density, timber volume, and stream-side canopy. The kind of forest you have, and your management objectives, will determine which attributes you measure and how often you monitor them.

For family forest owners, the monitoring format does not need to be complicated. Pick a system that is easy for you to use and that works for your family or community. This could be a spiral notebook, a spreadsheet, a file of photos with some annotations, an annual summary or report that you share with your community. Monitoring can also be a lot of fun as it is an opportunity for time out in the woods and deepening your understanding of the forest.

This document covers the following topics:

- **Summary of minimum FSC monitoring requirements**
- **NNRG resources for forest monitoring**
- **Detailed Breakout of FSC Indicators for Monitoring and Recommendations**
- **Appendix: Principle 8: Monitoring and Assessment - *excerpt from FSC-US Forest Management Standard***

Summary of minimum FSC monitoring requirements

At a minimum, FSC requires that land managers maintain a basic monitoring program to document the following forest management attributes:

1. Yield of all forest products harvested.
2. Growth rates, regeneration and condition of the forest.
3. Harvested volume of non-timber forest products and condition of harvested areas.
3. Composition and observed changes in the flora and fauna.
4. Environmental impacts of harvesting and other operations.
5. Costs, productivity, and efficiency of forest management.

Additional qualitative forest monitoring should be conducted during regular walks through the forest, and the resulting field notes periodically added to an appendix of the forest management plan. Management plans should then be periodically updated based on the results of monitoring.

The following attributes should be monitored, at a minimum, via written observations:

1. Growth of newly planted seedlings.
2. Location, presence, and abundance of invasive species.
3. Fish and wildlife presence.
4. Snags and downed logs.
5. Forest roads and drainage systems.
6. Chemical use (chemical type, application date, amount, method, effectiveness).

Remember: Photo points count as monitoring too! They are a helpful addition to your records and show changes over time.

The remainder of this document provides both detailed monitoring guidelines that have been extrapolated from the FSC Standards, and the literal FSC Standards, which can be used to help craft a customized and detailed monitoring plan for your forest.

Annual monitoring of road and culvert systems

Per the FSC-US Forest Management Standard, Indicator 8.2.d.2: land managers need to have a forest road system monitoring program in place to assess the condition and environmental impacts. Land managers will document and describe the road system infrastructure, areas of high risk, and describe how the monitoring and maintain the transportation system. Land managers will annually monitor their forest's transportation system, including culverts and other drainage.

Monitoring includes:

- Observing (then maintaining) bridges, culverts, and ensuring functional drainage
- Observing (then maintaining) roads for large cracks, sink holes, other damage or indicators or erosion
- Observing uphill side of roads for erosion into ditch systems
- Observing downhill side of roads for erosion into streams, ponds, or wetlands
- Observing water flows
- Evaluating orphaned roads, culverts, bridges, and road conditions

NNRG resources for forest monitoring

NNRG has developed several guides and inventory calculators to help land owners carry out the collection of forest measurements and monitoring including: stand inventory, road and drainage monitoring, biodiversity, and woody biomass.

Forest Inventory and Monitoring

Guidebook

- https://www.nnrg.org/wp-content/uploads/2015/02/NCF-Inventory-Monitoring-Guidelines.pdf

Data Workbook (Excel Calculator)

- https://www.nnrg.org/wp-content/uploads/2015/02/NCF-Inventory-Program.xls

Road and Drainage Monitoring

Roads Tab of annual FSC monitoring workbook

- https://www.nnrg.org/wp-content/uploads/2015/04/Annual-FSC-Reporting-Workbook.xlsx

Roads worksheet

- https://www.nnrg.org/wp-content/uploads/2015/02/Form4_roads.pdf

Forest Biodiversity Assessment

Guidebook

- https://www.nnrg.org/wp-content/uploads/2015/02/Forest-Biodiversity-Assessment-Guide.pdf

Data Sheets

- Douglas-fir stands - https://www.nnrg.org/wp-content/uploads/2015/02/Biodiversity-Field-Form_DF.pdf
- Early seral stands - https://www.nnrg.org/wp-content/uploads/2015/02/Biodiversity-Field-Form_EarlySeral.pdf
- Oak woodlands - https://www.nnrg.org/wp-content/uploads/2015/02/Biodiversity-Field-Form_OakWoodland.pdf
- Ponderosa pine stands - https://www.nnrg.org/wp-content/uploads/2015/02/Biodiversity-Field-Form_Ponderosa.pdf

Streams and Wetlands

Streams worksheet

- https://www.nnrg.org/wp-content/uploads/2015/02/Form5_streams.pdf

Wetlands worksheet

- https://www.nnrg.org/wp-content/uploads/2015/02/Form6_wetlands.pdf

Woody Biomass

Guidebook

- https://www.nnrg.org/wp-content/uploads/2019/01/Woody-Biomass-Calculator-guidebook.pdf

Data Workbook (Excel Calculator)

- https://www.nnrg.org/wp-content/uploads/2019/01/Woody-Biomass-Calculator.xlsx

Other Monitoring Resources

https://www.nnrg.org/resources/monitoring-and-inventory-tools/
https://www.nnrg.org/resources/monitoring-and-inventory-tools/what-to-monitor/

Oregon State University Extension's EM 9058, *Measuring Your Trees*
http://extension.oregonstate.edu/catalog

- How to measure trees to get an estimate of timber volume and growth.

Oregon State University Extension's EC 1129, *Tools for Measuring Your Forest*
http://extension.oregonstate.edu/catalog

- Basic coverage of tools used for traversing forest land and measuring trees.

Oregon State University Extension's PNW 630, *Basic Forest Inventory Techniques for Family Forest Owners*
http://extension.oregonstate.edu/catalog

- Thorough coverage of tool use and plot sampling methods for timber. Includes links to how-to videos.

Detailed Breakout of FSC Indicators for Monitoring and Recommendations

What is Monitored?	Who?	How?	When?	Remarks
8.1.a. Consistent with the scale and intensity of management, the forest owner or manager develops and consistently implements a regular, comprehensive, and replicable written monitoring protocol.				
FF Indicator 8.1.a For Family Forests, the forest owner or manager develops and consistently implements a regular, comprehensive, and replicable written monitoring protocol. Monitoring may be scaled to the size and intensity of the management operations that affect the resources identified in C8.2.				
8.2.a.1. For all commercially harvested products, an inventory system is maintained. The inventory system includes at a minimum:				
a) species, b) volumes, c) stocking,	Forest Manager/Landowner	Forest inventory used to prepare forest management plan; post harvest inventory updates; data updates after management or other stand-changing events	Planning reconnaissance; after active management practices	Quantitative/qualitative data commensurate with the intensity of management
d) regeneration	Forest Manager/Landowner	Post-harvest site inspections; reforestation survival exams	Typically four to five months after harvest or planting and again three years after harvest or planting.	Quantitative/qualitative data commensurate with the intensity of management
e) stand and forest composition and structure; and	Forest Manager/Landowner	Forest inventory used to prepare forest management plan; post harvest inventory updates; data updates after management or other stand-changing events	Planning reconnaissance; after active management practices	Quantitative/qualitative data commensurate with the intensity of management
f) timber quality	Forest Manager/Landowner	Forest inventory used to prepare forest management plan; post harvest inventory updates; data updates after management or other stand-changing events	Planning reconnaissance; after active management practices	Quantitative/qualitative data commensurate with the intensity of management

8.2.a.2. Significant, unanticipated removal or loss or increased vulnerability of forest resources is monitored and recorded. Recorded information shall include date and location of occurrence, description of disturbance, extent and severity of loss, and may be both quantitative and qualitative.	Forest Manager/Landowner	Post-event site inspections	After fires, catastrophic pest outbreaks, wind storms, etc.	Quantitative/qualitative data commensurate with the intensity of management
8.2.b The forest owner or manager maintains records of harvested timber and NTFPs (volume and product and/or grade).	Forest Manager/Landowner	The forest manager/owner keeps records of commercial harvests (typically as needed for state and federal income tax purposes). Harvest volumes are reported to the Group Entity, who prepares annual summary data.	Ongoing with annual summary reports.	Quantitative/qualitative data commensurate with the intensity of management
8.2.c. The forest owner or manager periodically obtains data needed to monitor presence on the FMU of:				
1) Rare, threatened and endangered species and/or their habitats;	Forest Manager/Landowner	As part of initial forest inventory and prior to commencing site disturbing activities based on a check of the State Biological Survey/Natural Heritage Inventory. The State Conservation Agency and other partners like The Nature Conservancy usually conduct landscape-level monitoring and prepare Wildlife Action Plans and other ecological assessments referenced as part of the Group's Forest Management Planning System.	Ongoing	Quantitative/qualitative data commensurate with the intensity of management
2) Common and rare plant communities and/or habitat;	Forest Manager/Landowner	As part of initial forest inventory and prior to commencing site disturbing activities based on a check of the State Biological Survey/Natural Heritage Inventory/Wildlife Action Plan and other ecosystem planning tools. The State Conservation Agency and other partners conduct landscape-level monitoring and prepare Wildlife Action Plans and other ecological assessments referenced as part of the Group's Forest Management Planning System.	Ongoing	Quantitative/qualitative data commensurate with the intensity of management
3) Location, presence and abundance of invasive species;	Forest Manager/Landowner	Forest inventories, internal monitoring, FIA-CFI plots, state forest health reports.	Ongoing	Quantitative/qualitative data commensurate with the intensity of management

4) Condition of protected areas, set-asides and buffer zones;	Forest Manager/Landowner	Forest inventories, timber harvest administration, internal monitoring, Natural Heritage Inventory reviews, etc.	Typically as part of management planning process, internal audits, State Conservation Agency assessments	Quantitative/qualitative data commensurate with the intensity of management
5) High Conservation Value Forests (see Criterion 9.4).	Forest Manager/Landowner	Usually, landscape level assessments conducted by the State Conservation Agency. See assessments identified in the Group's Forest Management Planning System.	Ongoing	Quantitative/qualitative data commensurate with the intensity of management
8.2.d.1. Monitoring is conducted to ensure that site specific plans and operations are properly implemented, environmental impacts of site disturbing operations are minimized, and that harvest prescriptions and guidelines are effective. [See also: Indicator 6.5.b Forest operations meet or exceed Best Management Practices (BMPs) that address components of the Criterion where the operation takes place. Indicator 5.3.a Management practices are employed to minimize the loss and/or waste of harvested forest products. Indicator 5.3.b Harvest practices are managed to protect residual trees and other forest resources, including: soil compaction, rutting and erosion are minimized; residual trees are not significantly damaged to the extent that health, growth, or values are noticeably affected; damage to NTFPs is minimized during management activities; and techniques and equipment that minimize impacts to vegetation, soil, and water are used whenever feasible. See indicators regarding opening size limits, tree retention, and RMZ buffers in 6.3.f, 6.3.g and 6.5.e. Also, safety-related considerations in 4.2.a and 4.2.b.]	Forest Manager/Landowner	Forest Manager/Landowner timber sale administration; internal monitoring by the Group Entity; BMP compliance monitoring by State Conservation Agencies; OSHA safety compliance monitoring by federal or state agencies.	During and after active management	Quantitative/qualitative data commensurate with the intensity of management
8.2.d.2. A monitoring program is in place to assess the condition and environmental impacts of the forest-road system. [Guidance: Road system monitoring may include but is not limited to: potential slope failures, erosion and water quality impacts, aquatic species' passage, overall road extent and density, and impacts of skid trails and other non-permanent roads. Monitoring requirements may be minimized in areas where there is no management activity and/or on non-active roads]	Forest Manager/Landowner	Usually informal monitoring during property visits by Forest Manager/Landowner, although larger properties might have regular road/trail inspections; timber harvest administration; Group Entity as part of internal monitoring; State Conservation Agency as part of BMP monitoring	Ongoing	Quantitative/qualitative data commensurate with the intensity of management

8.2.d.3. The landowner or manager monitors relevant socio-economic issues (see Indicator 4.4.a), including the social impacts of harvesting, participation in local economic opportunities (see Indicator 4.1.g), the creation and/or maintenance of quality job opportunities (see Indicator 4.1.b), and local purchasing opportunities (see Indicator 4.1.e).	**Generally Not Applicable - Family Forests**			State-level Forest Action Plans prepared under the U.S. Farm Bill and other state and regional strategic forestry plans generally adequately address socio-economic issues related to family forests.
8.2.d.4. Stakeholder responses to management activities are monitored and recorded as necessary.	**Generally Not Applicable - Family Forests**			The Group Entity could play a role in responding to stakeholders, although this is less likely to be an issue for small-scale operations on family forests.
8.2.d.5. Where sites of cultural significance exist, the opportunity to jointly monitor sites of cultural significance is offered to tribal representatives (see Principle 3).	**Generally Not Applicable - Family Forests**			State conservation agencies generally handle relations with tribes.
8.2.e. The forest owner or manager monitors the costs and revenues of management in order to assess productivity and efficiency.	Forest Manager/Landowner	Informal for family forests, usually associated with taxes and investment planning	Ongoing or after active management	
8.3.a. When forest products are being sold as FSC-certified, the forest owner or manager has a system that prevents mixing of FSC-certified and non-certified forest products prior to the point of sale, with accompanying documentation to enable the tracing of the harvested material from each harvested product from its origin to the point of sale.	Forest Manager/Landowner	Included in Group operating procedures	Group establishment, with procedures updated as needed.	
8.3.b The forest owner or manager maintains documentation to enable the tracing of the harvested material from each harvested product from its origin to the point of sale.	Forest Manager/Landowner	Forest manager/owner keeps certified harvest records and reports volumes to the Group Entity. Owner submits cutting notice/report to Group Entity. Group Entity reviews harvests and prepares annual summaries.	In conjunction with harvests	
8.4.a. The forest owner or manager monitors and documents the degree to which the objectives stated in the management plan are being fulfilled, as well as significant deviations from the plan.	Forest Manager/Landowner	Forest management database review of scheduled/completed practices, internal monitoring	Annual work planning, internal reviews	The landowner has a duty to periodically check their practice implementation schedule.

8.4.b. Where monitoring indicates that management objectives and guidelines, including those necessary for conformance with this Standard, are not being met or if changing conditions indicate that a change in management strategy is necessary, the management plan, operational plans, and/or other plan implementation measures are revised to ensure the objectives and guidelines will be met. If monitoring shows that the management objectives and guidelines themselves are not sufficient to ensure conformance with this Standard, then the objectives and guidelines are modified.	Forest Manager/Landowner	Internal monitoring. Group policies outline conditions under which plans should be updated.		
8.5.a. While protecting landowner confidentiality, either full monitoring results or an up-to-date summary of the most recent monitoring information is maintained, covering the Indicators listed in Criterion 8.2, and is available to the public, free or at a nominal price, upon request. [FF Applicability: Only those elements determined to be applicable to Criterion 8.2 need to be included in the monitoring results and/or summary.]	Forest Manager/Landowner	Annual public summary report.		
Additional Monitoring Issues Elsewhere in the FSC-US Forest Management Standard				
Indicator 6.6.e If chemicals are used, the effects are monitored and the results are used for adaptive management. Records are kept of pest occurrences, control measures, and incidences of worker exposure to chemicals. FF Guidance: Monitoring and recordkeeping may be brief and less technical for family forests, such as keeping a log or list of chemical use and application dates, rates, methods of application, the application area and effectiveness.	Forest Manager/Landowner	Forest Manager/Landowner keeps logs or informal records of pesticide use (especially for over-the-counter type products), although group policies might involve more formal record keeping for restricted use products or products covered FSC derogations. Landowner may also want to keep records of non-chemical controls to show that pesticides are only used when alternatives are not available/practical.	Ongoing with pesticide use prescriptions, purchases, application. Possibly involving annual summary reports for restricted use products.	
Indicator 6.8.c If biological control agents are used, their use is documented, monitored and strictly controlled in accordance with state and national laws and internationally accepted scientific protocols. A written plan will be developed and implemented justifying such use, describing the risks, specifying the precautions workers will employ to avoid or minimize such risks, and describing how potential impacts will be monitored.	Forest Manager/Landowner	Federal Animal Plant Health Inspection Service (APHIS) regulator review; State Conservation Agency implementation or permits		

Indicator 6.9.b If exotic species are used, their provenance and the location of their use are documented, and their ecological effects are actively monitored. [Guidance: Monitoring intensity reflects the persistence and risk posed by the species and may be justified by consultation with regional experts or literature.]	Forest Manager/Landowner	State Conservation Agency invasive species assessments and control regulations		
Indicator 9.4.a The forest owner or manager monitors, or participates in a program to annually monitor, the status of the specific HCV attributes, including the effectiveness of the measures employed for their maintenance or enhancement. The monitoring program is designed and implemented consistent with the requirements of Principle 8. FF Indicator 9.4.a Low risk of negative social or environmental impact for private family forests.	**Generally Not Applicable - Family Forests**			Usually addressed by the State Conservation Agency

Appendix: Principle 8: Monitoring and Assessment

Complete with FF Indicators and Guidance v1.0, 2010
Available at: https://us.fsc.org/download.fsc-us-forest-management-standard-v1-0.95.htm

Principle 8: Monitoring and Assessment

Monitoring shall be conducted -- appropriate to the scale and intensity of forest management -- to assess the condition of the forest, yields of forest products, chain of custody, management activities and their social and environmental impacts.

Intent: A key aspect of forest management is monitoring to ensure that current conditions are known and can be compared with desired future conditions and management objectives, and as necessary to adjust management techniques to address social, economic or environmental effects. Monitoring ensures that forest management, conservation, and restoration objectives continue to be met as effectively as possible, even given unanticipated outcomes and/or changing conditions. Principle 8 is concerned with design and implementation of the monitoring program. Principle 8 also identifies requirements that enable an FSC chain-of-custody to operate.

Monitoring programs shall be designed appropriate to the scale and intensity of forest management.

FF Guidance: On family forests, for certain elements of the monitoring plan, a brief, non-technical and qualitative monitoring approach might be adequate to ensure compliance. Attributes such as harvest volume, and stand stocking, will require quantitative monitoring. Any approach pursued must assure that regular monitoring of the condition of the forest is occurring.

C8.1 The frequency and intensity of monitoring should be determined by the scale and intensity of forest management operations as well as the relative complexity and fragility of the affected environment. Monitoring procedures should be consistent and replicable over time to allow comparison of results and assessment of change.

Indicator 8.1.a Consistent with the scale and intensity of management, the forest owner or manager develops and consistently implements a regular, comprehensive, and replicable written monitoring protocol.

Guidance: Monitoring should be focused on data that are of sufficient detail to evaluate current conditions, the effects of management on economic, environmental, and social resources of the FMU, and to track progress towards desired future conditions and management objectives.

The monitoring program should describe procedures and their frequency, and be sufficient to ensure that current conditions are known and can be compared with desired future conditions and management objectives.

Scale of operations: Medium and large ownerships are expected to have systematic and robust data collections for resources that are affected by management, while smaller operations may have informal and qualitative requirements for data collection.

Intensity and frequency of operations: More and/or better data are needed for resources that are significantly or frequently altered (e.g., timber stocking composition, and stand structure) than for those that are minimally impacted (e.g., protected areas where there are no operations).

FF Indicator 8.1.a For Family Forests, the forest owner or manager develops and consistently implements a regular, comprehensive, and replicable written monitoring protocol. Monitoring may be scaled to the size and intensity of the management operations that affect the resources identified in C8.2.

C8.2 Forest management should include the research and data collection needed to monitor, at a minimum, the following indicators:
a) Yield of all forest products harvested.
b) Growth rates, regeneration and condition of the forest.
c) Composition and observed changes in the flora and fauna.
d) Environmental and social impacts of harvesting and other operations.
e) Costs, productivity, and efficiency of forest management.

FF Applicability: The requirements of the Indicators associated with this Criterion are FMU-specific and might not all be applicable for all family forests. The certifying body and landowner/manager shall determine which components are applicable based on the management plan and operations. For example, Indicators 8.2.d.3, 8.2.d.4, and 8.2.d.5 are generally not applicable to family forests. An inventory system (Indicator 8.2.a.1) must be maintained.

Indicator 8.2.a.1 For all commercially harvested products, an inventory system is maintained. The inventory system includes at a minimum: a) species, b) volumes, c) stocking, d) regeneration, and e) stand and forest composition and structure; and f) timber quality.

Guidance: Information gathered and maintained as part of the inventory system is dependent on the scale and intensity of the management objectives.

Indicator 8.2.a.2 Significant, unanticipated removal or loss or increased vulnerability of forest resources is monitored and recorded. Recorded information includes date and location of occurrence, description of disturbance, extent and severity of loss, and may be both quantitative and qualitative.

Guidance: Removal, loss or increased vulnerability of forest products may result from poaching, fire, pests, disease, storm, over-browsing or other depredation, infestation by invasive species or other disturbances.

Indicator 8.2.b The forest owner or manager maintains records of harvested timber and NTFPs (volume and product and/or grade). Records must adequately ensure that the requirements under Criterion 5.6 are met.

Indicator 8.2.c The forest owner or manager periodically obtains data needed to monitor presence on the FMU of:
1) Rare, threatened and endangered species and/or their ***habitats***;
2) Common and rare plant communities and/or habitat;
3) Location, presence and abundance of invasive species;
4) Condition of protected areas, set-asides and buffer zones;
5) High Conservation Value Forests (see Criterion 9.4).

Intent: It is not the intent of Indicator 8.2.c to require that all species be monitored, but rather to focus on monitoring of habitat conditions (as indicated by Criterion 6.2 and Criterion 6.3).

Guidance: Monitoring should be adequate to address the habitat conditions required by Criteria 6.2, 6.3, 6.4, and Principle 9.

The intensity of monitoring required to address habitats protected by Criteria 6.2, 6.4, and Principle 9 is relative to the degree of protection and allowed management activities. For protected areas, informal monitoring may be sufficient. However, if management may have adverse impacts on a species (for example, intensive harvesting in a small watershed with endangered fish), then population monitoring may be necessary. Wherever RTE species are involved, more intense evaluation and protection actions are likely required. Consultation with conservation agencies responsible for the species or habitat type may be used to determine the level of monitoring.

Common plant and wildlife species habitat is primarily addressed by monitoring the abundance and distribution of plant communities and/or habitat types and their associated development, size class and/or successional stages. Approaches to classifying plant communities and development stages are described in the guidance to Indicator 6.1.a.

The intensity of monitoring for other elements of Criterion 6.3 is dependent on the scale and intensity of the operations. Elements monitored may include: analysis of habitat connectivity as landscape-scale habitat features as indicated by forest inventory, cover type data, and aerial imagery; condition of riparian zones and other important habitats; and the size and abundance of snags and live decay trees.

Informal approaches to monitoring invasive species (e.g., pre-harvest site inspections) may be adequate if the observations are routinely made and adequate to identify invasive species in early stages.

Indicator 8.2.d.1 Monitoring is conducted to ensure that site specific plans and operations are properly implemented, environmental impacts of site disturbing operations are minimized, and that harvest prescriptions and guidelines are effective.

Guidance: This includes evidence of potential impacts to soil and water quality, wetlands and riparian zones, and instances of erosion or damage to non-target species.

Short-term impacts are monitored during and at the close of operations.

Long-term impacts are monitored at an appropriate length of time after the operation to ensure that protection measures (e.g., water bars) are stable and functioning. Once protection measures are determined to be stable and effective, additional long-term monitoring may not be required.

Indicator 8.2.d.2 A monitoring program is in place to assess the condition and environmental impacts of the forest-road system.

Intent: The forest-road system includes trails used for motorized recreation.

Guidance: Road system monitoring may include but is not limited to: potential slope failures, erosion and water quality impacts, aquatic species' passage, overall road extent and density, and impacts of skid trails and other non-permanent roads.

Monitoring requirements may be minimized in areas where there is no management activity and/or on non-active roads.

Indicator 8.2.d.3 The landowner or manager monitors relevant socio-economic issues (see Indicator 4.4.a), including the social impacts of harvesting, participation in local economic opportunities (see Indicator 4.1.g), the creation and/or maintenance of quality job opportunities (see Indicator 4.1.b), and local purchasing opportunities (see Indicator 4.1.e).

Indicator 8.2.d.4 Stakeholder responses to management activities are monitored and recorded as necessary.

Indicator 8.2.d.5 Where sites of cultural significance exist, the opportunity to jointly monitor sites of cultural significance is offered to tribal representatives (see Principle 3).

Indicator 8.2.e The forest owner or manager monitors the costs and revenues of management in order to assess productivity and efficiency.

Intent: This Indicator is closely related to Criterion 5.1, which identifies that economic viability should take into account environmental, social and operational costs of production.

Revenues include income from timber and non-timber resources, recreational leases, payments for ***ecosystem services***, and other forest uses within the FMU.

C8.3 Documentation shall be provided by the forest manager to enable monitoring and certifying organizations to trace each forest product from its origin, a process known as the "chain of custody."

Intent: ***Chain-of-custody*** (CoC) is an important aspect of the FSC system. For products claimed to be sourced from FSC-certified forests, CoC tracks certified products from the forest of origin throughout the supply chain. The critical first link in the supply chain, and the focus of this Criterion, is from the point of harvest to the transfer of ownership, and it is the responsibility of the forest owner/manager of a FSC-certified forest to maintain the integrity of certified products within this first link in the supply chain.

Indicator 8.3.a When forest products are being sold as FSC-certified, the forest owner or manager has a system that prevents mixing of FSC-certified and non-certified forest products prior to the point of sale.

Indicator 8.3.b The forest owner or manager maintains documentation to enable the tracing of the harvested material from each harvested product from its origin to the point of sale.

Intent: This Indicator does not require the landowner or manager to maintain a Chain-of-Custody certificate, but rather to be able to sell an FSC-certified product as certified to a Chain-of-Custody business.

C8.4 The results of monitoring shall be incorporated into the implementation and revision of the management plan.

Indicator 8.4.a The forest owner or manager monitors and documents the degree to which the objectives stated in the management plan are being fulfilled, as well as significant deviations from the plan.

Indicator 8.4.b Where monitoring indicates that management objectives and guidelines, including those necessary for conformance with this Standard, are not being met or if changing conditions indicate that a change in management strategy is necessary, the management plan, operational plans, and/or other plan implementation measures are revised to ensure the objectives and guidelines will be met. If monitoring shows that the management objectives and guidelines themselves are not sufficient to ensure conformance with this Standard, then the objectives and guidelines are modified.

Intent: This Indicator requires that the results of monitoring be reflected in the implementation of the management plan. Revisions to the management plan as a result of monitoring are also addressed in Criterion 7.2.

C8.5 While respecting the confidentiality of information, forest managers shall make publicly available a summary of the results of monitoring indicators, including those listed in Criterion 8.2.

Indicator 8.5.a While protecting landowner confidentiality, either full monitoring results or an up-to-date summary of the most recent monitoring information is maintained, covering the Indicators listed in Criterion 8.2, and is available to the public, free or at a nominal price, upon request.

FF Applicability: Only those elements determined to be applicable to Criterion 8.2 need to be included in the monitoring results and/or summary.

Guidance: Information that is considered confidential can be presented in such a way as to protect its confidentiality, including data on production, inventory, growth and costs of operation, and other information deemed to provide a competitive advantage or proprietary in nature. This information can be represented in the public summary as trends, percentages, or in terms of their relation to the goals and limits outlined in the management plan.