Wisconsin Department of Natural Resources
Project Plan for Developing Criteria and Indicators for Wisconsin's Forests

EXECUTIVE SUMMARY

Since the early 1990's there has been a movement worldwide to seek out a method to measure and quantify sustainable forestry. From this movement the method of using criteria and indicators (C&I) to measure various aspects of the forest, as well as monitor continued progress towards sustainable forest management was created. This method is now being used world and nation-wide. Wisconsin has participated in the development of several C&I systems on both regional and national scales, and has yet to address this process on a statewide scale and specifically monitor and evaluate forest sustainability in Wisconsin.

The overall project goal is to provide the Wisconsin Council on Forestry, our partners and cooperators, Wisconsin citizens, and potential purchasers of Wisconsin forest products with a comprehensive, but manageable set of indicators to assist them in understanding Wisconsin's forest conditions and trends. The project will collect data on a set of indicators that is broad enough to provide the most important information needed to address the five goals of the *Statewide Forest Plan*, yet focused enough to allow efficient and cost-effective assessment and tradeoff analysis to be completed in a timely fashion for policy analysis.

The Wisconsin Council on Forestry can play an important role in the development of statewide C&I by engaging a broad array of interested forestry partners in the decision making process. In addition to providing leadership for statewide C&I development, the Council can serve as a focal point for engaging existing forestry partners and identifying new partners that have a direct interest in C&I development. Formal support from the Council would also provide official backing for this initiative and bring a sense of credibility to the C&I development process.

The approach described in this plan is tailored after the system used by the Oregon Department of Forestry. Oregon has moved through this process and in July of this year published a draft of 19 indicators along with metrics that they have chosen for the state. DNR Forestry staff has researched and reviewed criteria and indicator processes and models and have determined Oregon's process to be one of the most organized and coherent. Oregon staff have also been very helpful, offering assistance to Wisconsin's process as needed.

Ultimately the indicators chosen will provide documentation and credibility to Wisconsin's sustainable management practices. C&I will evolve as time moves ahead and values change, but they will continue to be a part of the planning and monitoring process to ensure the continued sustainable management of Wisconsin's forests.

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In the pursuit of sustainability we must simultaneously control our population, feed our hungry, retain our forests, and leave happy choices for future generations. Like the search for the Holy Grail, the seems likely to elude us, but the quest is essential

--Donald W. Floyd[1]

Sustainability is a complex idea involving environmental, social, and economic factors. Forest sustainability considers the following:

- How to retain and use forests to meet human needs.
- How to preserve the health of forest ecosystems in perpetuity.
- How to make ethical choices that preserve options for future generations.[2]

Purpose

The purpose of this plan is to describe the process that the Wisconsin Council on Forestry proposes to implement with its partners to execute a process and assessment procedure for Wisconsin's progress towards sustainably managing its public and privately-owned forest resources.

The goal is to provide the Wisconsin Council on Forestry, our partners and cooperators, Wisconsin citizens, the Department of Natural Resources, and potential purchasers of Wisconsin forest products with a comprehensive, but manageable set of indicators to assist them in understanding Wisconsin's forest conditions and trends.[*]

Project Objectives

The primary objective of this project is two-fold. The first is to decide on a set of criteria and indicators for Wisconsin, and then to collect data on that set of indicators. The indicators chosen need to be large enough to provide the most important information needed to address the five goals of the *Statewide Forest Plan*, yet small enough to allow efficient assessment and tradeoff analysis to be completed in a timely fashion for policy analysis. The indicators will be a mix of spatial and non-spatial data that can be used to display the condition of Wisconsin's forests at multiple scales (i.e., the eco-region, county, or watershed scale), depending on the policy question. The following are suggested characteristics of good indicators:

- Relevant-- Indicators should be clearly related and relevant to the five goals of the *Statewide Forest Plan*.
- Understandable—Indicators should be clear in content: easily understandable, with units that make sense, expressed in imaginable, not eye-glazing, numbers. The indicator should pass the common sense test applied by the general public.

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[1] Donald W. Floyd, *Forest Sustainability: The History, the Challenge, the Promise* (North Carolina: Forest History Society, 2002), 77.

[2] USDA Forest Service, <http://www.na.fs.fed.us/sustainability/> (15 June 2006)

[*] Format follows Oregon Department of Forestry, *Project Plan for Developing Sustainable Forest Management Indicators for Oregon's Forests and Assessing Progress.*
<http://www.oregon.gov/ODF/RESOURCE_PLANNING/Sustainable_Forest_Indicators_Project.shtml> (20 June 2006)

- Measurable—Indicators should be measurable on a consistent, reliable basis, using well-defined data that can be compiled without long delays.
- Policy relevant—Indicators should be relevant for all stakeholders in the system, including the least powerful.
- Feasible—The value of the information provided by an indicator should exceed the cost to gather it.
- Sufficient to the purpose—Indicators should not contain too much information to comprehend, nor too little information to give an adequate picture of the situation.
- Sensitive to change—Changes in the forest, whether from human actions or natural changes, should elicit a response in an indicator in time to act on it.
- Scale appropriate—Indicators should be measurable at an appropriate scale and not over- or under-aggregated.
- Compatible—With the exception of locally important indicators, indicators should "roll up" into State, regional, and national efforts to define criteria and indicators of forest sustainability.

The second objective is to form a partnership with other agencies and organizations to create a common language used to communicate about forest conditions and monitor trends over time. The 18 C&I proposed as a starting point, are established by the Northeastern Area Association of State Foresters and the United States Department of Agriculture-Forest Service (NAASF/USDA-FS). Wisconsin is a member of this program and has made a previous commitment to monitor these 18 C&I. Data is available for these indicators and the C&I identified have already been acknowledged as relevant to local situations in Wisconsin. As the plan moves forward, DNR Forestry would like to coordinate data collection with other state and federal agencies to create economies of data collection. The resulting information can feed directly into future regional, national, and international evaluations of sustainable forest management. For example, Wisconsin data may be used in the update of the National Report on Sustainable Forests planned for 2008.

Background

Sustainability has emerged worldwide as the most recent unifying concept in forest management. While individual definitions of sustainability differ slightly in their details, there is generally broad based support that sustainable forestry focuses on meeting the needs of current generations, while protecting the ability of future generations to meet their own needs. Throughout this process it is important to keep in mind that sustainability is an ever changing value that we place on forests. As technology, society, and populations change, so will future generations' definition of sustainability.

The five goals of the *Statewide Forest Plan* form a framework around which forest sustainability issues can be organized and discussed and to identify the outcomes the Wisconsin Council on Forestry wants to achieve from a statewide perspective. The 18 C&I, their metrics, and data details have been organized under the five goals in Appendix A. This information can serve as a starting point for choosing C&I for Wisconsin. These 18 C&I should be evaluated for their relevance in the state, and other C&I, potentially from the Montreal 67 could be added to the state list if deemed necessary for sustainable management. Once C&I have been agreed upon, adopted, and in are place, these C&I can provide the Wisconsin Council on Forestry and other policy-makers information describing the environmental, social, and economic conditions at the landscape scale, and provide a cost-effective way to consistently collect important data needed to monitor changes in these conditions over time.

Indicators can produce the additional benefits of conveying critical and complex information more simply to build public confidence and facilitate better communication and cooperation among all parties interested in forest resources.

The indicators should be viewed as being similar to measuring sticks. Indicators provide a tool to make policy objectives measurable. They can tell us what current conditions and trends *are*, but they do not tell us what the desired conditions or objectives *should be*. Determining how to collect data and report data for each indicator is a technical task. Determining what to measure and what the desired condition or range of conditions are political tasks informed by science. These political discussions must consider how best to integrate the environmental, economic, and social benefits of Wisconsin's forests over time.

The endorsement of the use of core indicators is not intended to limit in any way the information collected about our forests. More extensive and detailed monitoring, research, and assessments are encouraged to supplement core indicator data. On the other hand, the use of indicators can help to prioritize and focus limited scientific resources towards issues that are most important to policy-makers.

Assessments that feed information into the core indicators will provide better knowledge of current forest conditions and trends, plus answer questions about inter-resource trade-offs. It is vital for policy-makers to use this information to integrate the needs and values of Wisconsinites into policy proposals. Work has already been moving in this direction through DNR Forestry's ongoing Forest Assessments. It is envisioned that assessment information, based the indicator framework, will play a key role in the next update of the *Statewide Forest Plan.*

Government has traditionally counted outputs (i.e., the number of inspections, plans written, fires suppressed, reports, etc.) to demonstrate compliance with laws or participation in programs. In most cases, compliance with the rules or participation in the program is assumed to lead to achievement of the goal or objective. However, since outputs do not necessarily translate into outcomes, the approach of focusing on program participation does not guarantee that landscape level effectiveness goals like conserving native plants and animals or maintaining productive capacity will be met. Without measurable objectives, government programs can also overshoot the goal or have unintended consequences.

By selecting indicators and desired outcomes based on those indicators, Wisconsin will have a valuable set of tools to describe, and measure progress towards, future conditions of the sustainable forest.

Guiding Principles[3]

The following principles can be used to guide the use of sustainable forest management indicators:

1. **Constructive dialogue works best:** Our society performs best when we find ways to share our common interests democratically and fairly through constructive communication and consensual agreement. Use of sustainable forest management indicators can lead to clear, unambiguous, consensual, public policy decisions that will help prevent confrontation and debate as well as challenges to resource managers by diverse public interest groups pursuing their own particular preferences.

[3] John Fedkiw, D.W. MacCleery, and V.A. Sample, *Pathway to Sustainability: Defining the Bounds of Forest Management* (North Carolina: Forest History Society, 2004), 7-23.

2. **Sustainability is a journey, not a destination:** Society is already in general agreement about the goal of sustainability for our resources and humanity. The pathway to sustainability belongs to all of us. It is the workplace of all resource managers and scientists as well as policymakers and resource interest groups. The struggle to live in harmony with our environment is unending – a challenge for which there is no scientific, perfect, permanent, short-term solution. Vigilance and monitoring through the use of indicators become our task in steering the course to sustainability.
3. **Progress on the sustainability pathway is incremental and adaptive:** The dynamics and unpredictability of science, plus uncertainties about the course of markets, public preferences, and policy, as well as technology and nature, make progress adaptive—an unending learning experience for resource managers, policymakers, and the public alike. Old problems are solved, but new ones appear. Indicators are a tool for a learning society to use to advance systematically, step by step, by making informed decisions and taking sound actions that offer continuing benefits as it steers its way towards environmental, economic, and social sustainability.
4. **A framework for discussion and measurement is needed**: As a learning society, we need a framework that acknowledges the evolving nature of the pathway towards sustainability and its longer-term and larger-scale dimensions. Making that framework explicit through the use of indicators offers the opportunity to create a more communal and hopeful approach for sustaining our society and environment.
5. **There is a wide range of sustainable outcomes:** The uncertainties of nature and our resource science, technology, markets, values, and policy indicate that there is a range of feasible sustainable outcomes. Nature itself does not have a specific goal for its ecosystems, nor does it set targets for the future. Likewise sustainability is not a unique target or a fixed point but a wide range of acceptable or desirable outcomes. There must be a range of acceptable routes or courses to sustainability. The actual route taken is ultimately a political decision in a democratic society.
6. **Separating long-term and short-term decisions is critical**: Public discourse, debate, and confrontations about resource use and management tend to be concentrated on individual practices and lack a strategic understanding of how as we a society advance towards a more sustainable environmental, economy, and society. The outer bounds of sustainability involve long-term policy considerations, whereas choices on the preferable course of action are shorter-term policy considerations, much like adaptive management decisions. Current debates have been more persistent and resistant to general solution partly because we confuse the outer bounds of sustainability with the social choice for a preferred course within those bounds. Instead of trying to address them simultaneously, we must sort out the long-term policy issues of the bounds of the sustainable pathway from the short-term choice of courses within those borders. Indicators provide a needed focus on long-term policies.
7. **Indicators will help light the pathway to sustainability:** Selected indicators must be responsive to public values and equitably address all five *Statewide Forest Plan* goals. The information from indicator measurements will help identify emerging or developing conditions that may constitute a threat to exceed the limits (outer bounds) of sustainability and facilitate the adjustment or improvement of public policies.

Project Work Groups and Project Steps

An ad hoc Sustainable Forest Management Indicator Advisory Committee could be formed to assist the Wisconsin Council on Forestry in building broad understanding, acceptance, and support for the sustainable forest management indicator project. The Advisory Committee would be assisted by technical experts with knowledge regarding the five Statewide Forest Plan goals. State, federal, local government, tribal, and private interests should be represented.

Responsibilities of the Advisory Committee may be to:

1. Coordinate with technical experts to reach both strong policy and technical consensus on a set of recommended sustainable forest management indicators for use in measuring the *Statewide Forest Plan* implementation progress. Clear roles and open dialogue between the Council, the Advisory Committee, and technical work groups would be established.
2. Solicit and summarize broad stakeholder input on both the usefulness of the selected indicators and the desired future outcomes for these indicators.
3. Provide advice to the Council on desired future outcomes for the recommended indicators.
4. Provide advice to the State Forester on future Forest Assessment project priorities.

Proposed representation in the Advisory Committee and technical work group is as follows:

Proposed Sustainable Forest Management Indicator Advisory Committee Representation
Federal, state, and local governments
Private forestry interests
Conservation and environmental organizations
Tribes
University interests

The following table summarizes basic steps in the sustainable forest management indicator project and the point where involvement of the groups may be needed. DNR Division of Forestry would provide support to the project.

Project Steps	**WI Council on Forestry Role**	**Advisory Committee Role**	**Technical Experts Role**
1. Consensus on project plan	✓	✓	✓
2. Core indicator recommendation			✓
3. Feedback on indicator recommendation		✓	✓
4. Endorsement of Indicators	✓	✓	✓
5. Indicator testing			✓
6. Implementation Approval		✓	

Project Steps	WI Council on Forestry Role	Advisory Committee Role	Technical Experts Role
7. Indicator data Collection			✓
8. Evaluation		✓	
Return to Step 2			

Concurrent Tribal Process

While the above steps are being implemented there could be a tribal input process taking place in tandem. Under the WI Council on Forestry's charge, the Division of Forestry can inform the tribes of the project, and request input from them regarding the selection and implementation of criteria and indicators for Wisconsin. Tribes will be invited to a joint meeting that will provide more in depth information and discussion on the project. Tribal input that is received will be compiled and dispersed to the Advisory Committee.

Stakeholder and Other Public Involvement

It is important that the sustainable forest management indicator project remain open and transparent to all stakeholders. Upon the Wisconsin Council of Forestry's recommendation, the Division of Forestry will implement the following three strategies to gain input and disseminate information to and from stakeholders and the public.

1. Coordinate stakeholder meetings at two key times in the planning process. The first will be at the beginning of the project to present the plan and request input. The second will be after criteria and indicators are chosen, as an update to the process.
2. Begin an email distribution list to provide stakeholders and the public periodic updates to the process.
3. Form an internet network where both technical and policy information regarding the core indicator development, data collection, and reporting can be exchanged. The network will also provided opportunities to link the core indicators to other related monitoring, assessment, and research efforts.

Potential Core Indicators

For initial discussion purposes the set of 18 NAASF/USDAFS indicators, arrayed across the five *Statewide Forest Plan* goals will be considered. Appendix A lists these proposed indicators, along with further information and possible data sources for each.

Project Coordination Team

Coordination of the Sustainable Forest Management Indicator Project will be the responsibility of the DNR Forestry's Bureau of Forestry Services Planning and Analysis Section, with the following individuals taking the lead:

Wendy McCown, Director, Forestry Services
Mark Heyde, Chief, Planning and Analysis Section
Vern Everson, Forest Resource Analyst
Amy Peterson, Associate Planner

Timelines

September 2006	Presentation of Project Plan to WI Council on Forestry
December 2006	Advisory Committee and technical expert group formed
December 2007	Request Council endorsement of selected indicators
March 2008	Indicator testing completed and implementation underway Council consensus on desired future conditions for indicators; Internet network in place
March 2010	First cycle of indicator data collection and analysis completed
December 2010	Publish Forest Assessment, based on the core indicator results
June 2011	Public symposium to present and discuss indicator results
December 2012	Publish the new *Statewide Forest Plan* Revise and continue sustainable forest management indicator project

Appendix A: Sustainable Forest Management C&I Data Matrix ***DRAFT***

Statewide Forest Plan **Goal 1: Forests are healthy and protected**					
Criterion 3: Maintenance of Forest Ecosystem Health and Vitality					
Indicator 7: Area of forest land affected by potentially damaging agents (3.a. #15)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
7.1 Tree mortality and damage type	Annual rate of tree mortality in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
7.2 Wildfire	Amount of land burned by wildfire in Wisconsin	USDA Forest Service, Fire and Aviation Management	Statewide	Annual	
7.3 Drought	The number of months of moderate, extreme, or severe drought in Wisconsin	NOAA, National Climatic Data Center	Region	Annual	Data for this report is only available by climate division, not State or regional levels.
7.4 Insects, diseases, plants, and animals	Insects, diseases, invasive plants, and animals that affect forest health in Wisconsin	USDA Forest Service Northeastern Area State and Private Forestry, Cooperative Forest Health Program	Statewide	Annual	
Criterion 5: Maintenance of Forest Contribution to Global Carbon Cycles					
Indicator11: Forest ecosystem biomass and forest carbon pools (5.a #26; 5..b #27; 5.b #28)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
11.1 Forest ecosystem biomass	Carbon in aboveground live tree biomass in forests in Wisconsin	USDA Forest Service, Northeastern Research Station, Forest Carbon Dynamics and Estimation Research Work Unit	Statewide	Annual	
11.2 Forest carbon pools	Forest carbon pools in Wisconsin	USDA Forest Service, Northeastern Research Station, Forest Carbon Dynamics and Estimation Research Work Unit	Statewide	Annual	
11.3 Forest carbon by forest type	Current forest carbon by coniferous and broad-leaved	USDA Forest Service, Northeastern Research	Statewide	Annual	

NOTE: Numbers in parentheses are Montreal Process indicator numbers

	forests in Wisconsin; Above ground tree carbon by forest cover type group in Wisconsin	Station, Forest Carbon Dynamics and Estimation Research Work Unit			
11.4 Change in forest carbon	Average annual change in forest ecosystem carbon in Wisconsin	USDA Forest Service, Northeastern Research Station, Forest Carbon Dynamics and Estimation Research Work Unit	Statewide	Annual	

Statewide Forest Plan **Goal 2: Forests provide a diverse range of native plant and animal species and their habitats**					
Criterion 1: Conservation of biological diversity					
Indicator 2: Forest type, size class, age class and successional stage (1.1.b #2)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
2.1 Forest cover type groups	Amount of forest land by forest type group in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
2.2 Size class	Amount of forest land by size class in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
2.3 Age group; successional stage (text document; no data/graphs)	Amount of forest land by age group in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	

Statewide Forest Plan **Goal 3: Forest are productive, providing raw material for consumers and economic stability for local communities**					
Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies					
Indicator12: Wood and wood products, production, consumption, and trade (6.1.a. #29; 6.1.c. #31; 6.1.e. #33)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
12.1 Value of wood-related products	Total value of wood-related product shipments in Wisconsin; Value added for wood-related products in Wisconsin	U.S. Department of Commerce, Census Bureau, Economic Census	Statewide	Annual	

12.2 Production of roundwood	Production of roundwood harvested, by product, in Wisconsin; Production of roundwood harvested, by major species group, in Wisconsin	USDA Forest Service, Timber Product Output Database	Statewide	Annual	
12.3 Production and consumption of roundwood equivalent	Production and consumption of roundwood equivalents in Wisconsin; Per capita consumption of roundwood equivalents in Wisconsin	USDA Forest Service, Forest Products Laboratory	Statewide	Annual	. Currently these data are only available at the national level.
12.4 Recovered paper	Recovered paper consumed by paper and paperboard mills in Wisconsin	American Forest and Paper Association (AF&PA)	Statewide	Annual	
12.5 Bioenergy (text report) Trade or wood flow (text report) Nontimber forest products (text report)	Use of forest resources for bioenergy	No data reports on bioenergy are available at this time.	Statewide	Annual	
Indicator16: Employment and wages in forest-related sectors (6.5.a. #44; 6.5.b. #45)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
16.1 Wood-related products manufacturing employees	Wood-related products manufacturing employees in Wisconsin	U.S. Department of Commerce, Census Bureau, Economic Census	Statewide	5-year	
16.2 State forestry employees	State forestry permanent employees in Wisconsin; State forestry seasonal/temporary employees in Wisconsin	DNR Forestry	Statewide	Annual	
16.3 USDA Forest Service employees	USDA Forest Service permanent employees in Wisconsin	USDA Forest Service, Human Resources Management	Statewide	Annual	
16.4 Wood-related products manufacturing payroll and wages	Wood-related products manufacturing annual payroll in Wisconsin; Wood-related products manufacturing production workers wages per	U.S. Department of Commerce, Census Bureau, Economic Census	Statewide	5-year	

	hour in Wisconsin				
16.5 State forestry salaries	State forestry employee average annual salaries in Wisconsin	DNR Forestry	Statewide	6-year	

Statewide Forest Plan **Goal 4: Forests are conserved and managed with sound stewardship practices**					
Criterion 1: Conservation of biological diversity					
Indicator 1: Area total land, forest land, and reserved forest land (1.1a.#1; 2.a. #10; 1.1.c. #3)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
1.1 Forest and total land area	Amount of forest land in Wisconsin; Percentage of forest land and nonforest land in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
1.2 Forest density	Forest density in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
1.3 Forest land and population	Amount of forest land and population in Wisconsin; Amount of forest land per person in Wisconsin	U.S. Department of Commerce, Census Bureau; USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
1.4 Reserved forest land	Amount of reserved forest land in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
1.5 Urban forest	Forest and tree cover in urban areas in Wisconsin	USDA Forest Service, Northeastern Research Station, Urban Forestry Unit	Statewide	??	DNR Urban Forestry?
Indicator 3: Extent of forest land conversion, fragmentation and parcelization (3.a. #15)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
3.1 Fragmentation (text report)	There are no data available at this time to directly measure forest fragmentation consistently				

	across Wisconsin.				
3.2 Forest land developed	Acres of forest land converted to developed land in Wisconsin; Amount of land developed by land cover type in Wisconsin	USDA Natural Resources Conservation Service; Natural Resources Inventory	Statewide	Annual	
3.3 Net change in forest land	Net change in forest land in Wisconsin; Net change in forest land to and from other land uses in Wisconsin	USDA Natural Resources Conservation Service; Natural Resources Inventory	Statewide	Annual	
3.4 Additions to and conversions from forest land	Additions to forest land in Wisconsin; Conversions from forest land in Wisconsin	USDA Natural Resources Conservation Service; Natural Resources Inventory	Statewide	Annual	
3.5 Forest parcel sizes	Size of all privately owned forest landholdings in Wisconsin; Size of forest landholdings owned by family forest owners in Wisconsin	USDA Forest Service, National Woodland Owner Survey	Statewide	Annual	
Indicator 4: Status of forest/woodland communities and associated species of concern (1.2.b. #7)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
4.1 Forest and woodland communities	Status of forest and woodland communities in Wisconsin	NatureServe	Statewide	Annual	
4.2 Forest-associated and all species	Status of forest-associated animal species in Wisconsin; Status of all animal species in Wisconsin	NatureServe	Statewide	Annual	
4.3 Forest-associated species of concern by taxonomic group	Percent of forest-associated species of concern* , by taxonomic group in Wisconsin,	NatureServe	Statewide	Annual	*Of concern includes the NatureServe categories vulnerable, imperiled, and critically imperiled.
4.4 Bird populations	Estimated trends of woodland breeding birds in Wisconsin	USGS Patuxent Wildlife Research Center, North American Breeding Bird Survey	Statewide	Annual	

Appendix A: Sustainable Forest Management C&I Data Matrix ***DRAFT***

Criterion 2: Maintenance of productive capacity of forest ecosystems					
Indicator 5: Area of timberland (5.a. #26; 5.b. #27; 5.b. #28)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
5.1 Amount of timberland	Percentage of forest land categorized as timberland compared to reserved and other forest land in Wisconsin; Amount of forest land categorized as timberland compared to reserved and other forest land in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
Indicator 6: Annual removal of merchantable wood volume compared to net growth (2.d. #13)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
6.1 Net growth and removals	Net annual growth and removals of growing stock on timberland in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
6.2 Type of removals	Type of growing stock removals on timberland in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
Criterion 4: Conservation and maintenance of soil and water resources					
Indicator 8: Soil quality of forest land (4.a. #18; 4.d. #21; 4.e. #22)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
8.1 Soil pH	Soil pH at 0-10 cm soil depth in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
8.2 Total soil carbon	Total soil carbon in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
8.3 Estimated bare soil	Estimated bare soil in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
8.4 Bulk density	Bulk density at 0-10 cm soil depth in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
8.5 Calcium-aluminum ratio	Calcium-aluminum ratio at 0-	USDA Forest Service,	Statewide	Annual	

NOTE: Numbers in parentheses are Montreal Process indicator numbers

	10 cm soil depth in Wisconsin	Forest Inventory and Analysis			
Indicator 9: Area of forest land adjacent to surface water and forest land by watershed (4.b. #19)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
9.1 Forested riparian area	Percentage of riparian areas that are forested in Wisconsin; Forest and other land cover types in riparian areas in Wisconsin	USDA Forest Service, Northeastern Area State and Private Forestry, Information Management and Analysis	Statewide	Annual	
9.2 Forest land by watershed	Percentage of forest land by watershed in Wisconsin; Number of watersheds by percentage of watershed forested in Wisconsin	USDA Forest Service, Northeastern Area State and Private Forestry, Information Management and Analysis	Statewide	Annual	
Indicator 10: Water quality in forested areas (4.f. #23; 4.g. #24)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
10.1 Water quality in forested areas (text report)	Data for adequate region-wide measurement of water quality in forested areas are not readily available at this time.				
10.2 Stream miles impaired by percentage of watershed forested	Stream miles impaired by sediment, nutrients, and temperature by percentage of the watershed that is forested in Wisconsin	U.S. Environmental Protection Agency, 303(d) Impaired Waters List (GIS analysis by NA S&PF)	Statewide	Annual	
Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies					
Indicator 14: Investment in forest health, management, research, and wood processing (6.3.a. #38; 6.3.b. #39)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
14.1 USDA Forest Service Northeastern Area State and Private Forestry funding	USDA Forest Service Northeastern Area State and Private Forestry funding given to partners in Wisconsin	USDA Forest Service, Northeastern Area State and Private Forestry, Information Management and Analysis	Statewide	Annual	
14.2 State forestry agency	State forestry agency program	DNR Forestry	Statewide	Bi-annual	

NOTE: Numbers in parentheses are Montreal Process indicator numbers

funding	funding in Wisconsin				
14.3 Funding for forestry research at universities	Funding for forestry research at universities in Wisconsin	USDA Cooperative State Research, Education, and Extension Service (CSREES)	Statewide	Annual	
14.4 USDA Forest Service research funding	Funding for USDA Forest Service Research in Wisconsin by research station	USDA Forest Service, Research and Development	Statewide	Annual	
14.5 Capital expenditures by manufacturers of wood-related products	Capital expenditures by manufacturers of wood-related products in Wisconsin	U.S. Department of Commerce, Census Bureau, Economic Census	Statewide	5-year	
Indicator 15: Forest ownership, land use, and specially designated areas (1.1.c. #3; 1.1.d. #4; 4.b. #19; 6.4.a. #42; 7.1.e. #52)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
15.1 Forest land ownership	Forest land ownership in Wisconsin	USDA Forest Service, Forest Inventory and Analysis	Statewide	Annual	
15.2 State lands	State forests, parks, natural areas, and fish and wildlife areas in Wisconsin	DNR Forestry	Statewide	10-year	
15.3 Protected lands	Protected areas in Wisconsin; Protected land, by ownership in Wisconsin	Conservation Biology Institute, Protected Areas Database	Statewide	Annual	
15.4 Private land with public conservation easements	Private land with public conservation easements in Wisconsin	DNR Forestry	Statewide	5-year	
15.5 Forest land in tax reduction programs	Forest land in tax reduction programs in Wisconsin	DNR Forestry	Statewide	10-year	
15.6 Forest certification	Amount of land certified by the Forest Stewardship Council (FSC) in Wisconsin; Amount of land certified by the Sustainable Forestry Initiative (SFI) in Wisconsin; Amount of land certified by the American Tree Farm System in Wisconsin	Forest Stewardship Council (FSC); American Forest & Paper Association, Sustainable Forestry Initiative; American Forest Foundation, American Tree Farm System	Statewide	Annual	

Appendix A: Sustainable Forest Management C&I Data Matrix ***DRAFT***

Criterion 7: Legal, Institutional and economic framework for forest conservation and sustainable management					
Indicator 17: Forest management standards/guidelines (7.1.d. #51; 7.4.a. #60; 7.4.b. #61)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
17.1 Types of forest management standards/guidelines	Types of forest management standards/guidelines in Wisconsin	DNR Forestry	Statewide	Annual	
17.2 Voluntary and mandatory standards/guidelines	Voluntary and mandatory forest management standards/guidelines applied on all State-owned forest lands in Wisconsin; Voluntary and mandatory forest management standards/guidelines applied on privately owned forest lands in Wisconsin	DNR Forestry	Statewide	Annual	
17.3 Monitoring of standards/guidelines					
Indicator 18: Forest related planning, assessment, policy and law (7.1.b. #49; 7.2.b. #54)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
18.1 State forest planning	Status of comprehensive State forest resource planning in Wisconsin; Type of planning State forestry agencies in Wisconsin have been involved with in the last 5 years	DNR Forestry	Statewide	5-year	
18.2 Private non-industry planning	Forest planning on nonindustrial private forest land--Forest Stewardship plan acres in Wisconsin; Forest planning on nonindustrial private forest land--number of Forest Stewardship plans in Wisconsin	USDA Forest Service, Performance Measurement Accountability System (PMAS)	Statewide	Annual	
18.3 National forest planning	Forest planning on national forest land in Wisconsin	USDA Forest Service, Eastern Region	Statewide	Annual	
18.4 State forest	Status of comprehensive State	DNR Forestry	Statewide	5-year	

assessments	forest resource assessments in Wisconsin				
18.5 Forest laws and policies	Does Wisconsin have a forest practices and/or right to practice forestry act?	DNR Forestry	Statewide	Annual	
18.6 State forest advisory committees	Does Wisconsin have an active State forestry advisory committee?	DNR Forestry	Statewide	Annual	

Statewide Forest Plan **Goal 5: Forests provide multiple recreational opportunities**					
Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies					
Indicator13: Outdoor recreational facilities and activities (6.2.b. #36; 6.2.c. #37)					
Metric	Description of Information	Data Source	Reporting Scale	Reporting Cycle	Limitations/ Considerations
13.1 Participation in outdoor recreation	Outdoor recreation participation in Wisconsin; Days of participation in freshwater fishing, hunting, and wildlife watching in Wisconsin	USDA Forest Service, Southern Research Station, National Survey on Recreation and the Environment; USDI Fish and Wildlife Service, National Survey of Fishing, Hunting, and Wildlife-Associated Recreation	Statewide	10-year; 5-year	
13.2 Federal land open to recreation	Amount of Federal land open to outdoor recreation, by agency, in Wisconsin	USDA Forest Service, Southern Research Station, Recreation, Wilderness, Urban Forest, and Demographic Trends Research Unit	Statewide	Annual	
13.3 Recreational facilities on state land	Number of designated day use, overnight, and water access areas on State land in Wisconsin	DNR Forestry	Statewide	Annual	
13.4 Trails	Motorized and nonmotorized outdoor recreational trails open to the public in	DNR Forestry	Statewide	10-year	

	Wisconsin; Outdoor recreational trails open to the public, by designated trail type, in Wisconsin				
13.5 Campgrounds	Number of campgrounds on public and private land in Wisconsin; Number of campsites on public and private land in Wisconsin	DNR Forestry	Statewide	??	
13.6 Recreational facilities in national forests	Number of developed recreation sites on national forest land in Wisconsin; Miles of trails on national forest land in Wisconsin	USDA Forest Service, INFRA (Infrastructure Application)	Statewide	Annual?	