## Revised Monitoring Questions and Indicators after Public Input

This attachment outlines the monitoring questions and associated indicators that the Hiawatha National Forest proposes to use from now on, including existing, new, and modified questions. The existing 33 monitoring questions are available on the Forest's website:

(http://www.fs.usda.gov/detail/hiawatha/landmanagement/planning/).

Table 1 includes the mixture of existing, new and revised monitoring questions. Table 2 contains deleted monitoring questions and the rationale for deletion. The Public Input Summary provides the breakdown of public concerns expressed during the 30-day public input period and HIF responses to those public concerns. Any changes to the monitoring questions or the indicators are indicated below through strikeout of original text and underlining revised text.

A list of definitions has been provided at the end of the document for reference.

Table 1. Monitoring Questions Proposed to Address the Eight Required Monitoring Elements

			Measurement &	Original
Proposed Monitoring Question(s)	Indicator(s)	Driver	Reporting	Question
			Frequency	Wording
1. Status of select watershed conditions	See below.	2012 Planning Rule	See below.	
(36 CFR 219.12(a)(5)(i)).		Required Monitoring Element		
1a. To what extent is Forest Plan implementation affecting streams, lakes,	Acres of streams, lakes, ponds and wetland and	BMP Implementation and Effectiveness  Monitoring (use National BMP protocols,	Measure project by project/Report	Not applicable;
ponds and wetlands and their associated riparian ecosystems?	riparian ecosystems	evaluate % implemented and % effective)	every 2-6 years	question.
1b. To what extent are we moving riparian corridors toward the desired condition?	Miles of roads and trails obliterated, relocated outside of or improved in the riparian corridor	Forest Plan Watershed Management Objective 1	Measure annually/Report every 2 years	Not applicable;
	Number of barriers removed for aquatic organism passage and to improve flow and sediment transport	Forest Plan Watershed Management Objective 2		this is a new question.

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
	Acres of non-native	Forest Plan Watershed Management Objective		
	invasive species treated	6; Forest Plan Aquatic Ecosystems Standards and		
	in riparian areas and	Guidelines		
	wetlands			
	Acres of riparian	Forest Plan Watershed Management Objective 7	Measure	Not applicable;
	vegetation		annually/Report	this is a new
	improvements		every 2 years	question.
	Watershed Condition			
	Class Score (25	Forest Plan Watershed Management Objective		
	indicators)	#4 and #52011 Watershed Condition Class	Measure	Not applicable;
	Percentage of fifth level	Framework assessment of 6th level	annually/Report	this is a new
	watersheds with	subwatersheds	every 2-6 years	question.
	improved condition			
	classes			
1c. How is the Forest complying with the	Effectiveness of Best	Clean Water Act (33 U.S.C §1251 et seq. (1972));	Measure	Existing Forest
Clean Water Act requirements?	Management Practices	Forest Service Policy for Water Quality	annually/Report	Plan monitoring
	(BMP) application	Management; National Core BMP Monitoring	every 2 years	question
		Program; Forest Plan Watershed Management		
		Goal 5 - Water quality is maintained to the		
		standards identified by the State of Michigan		

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
2. Status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems (36 CFR 219.12(a)(5)(ii)).	See below.	2012 Planning Rule Required Monitoring Element	See below.	
2a. To what extent are ecologically healthy and productive aquatic ecosystems being restored?	Number of miles of riparian and inchannel stream habitat restored or enhanced during the planning period  Number of lakes restored or enhanced during the planning period	Forest Plan Wildlife Objectives 1, 2, 3; Watershed Goals 3-8; Watershed desired condition  Forest Plan Wildlife Objective 2		
	Number and location of wetlands with aquatic invasive species (AIS) present or absent  Acres treated to control AIS  Acres of wetlands with AIS eradicated  Number of educational contacts related to AIS	Forest Plan Aquatic Ecosystems Standards and Guidelines and Soil Resources Objectives	Measure annually/Report every two years	Existing Forest Plan monitoring question
	Acres of soil hydrologic function impaired by past management activities  Trends in desired native fish population.	Forest Plan Soils Resource Objective 2  2600 – Wildlife, Fish and Sensitive Plant Habitat Management Goals 3, 5, and 6 and Objectives 1, 2, and 3		
2b. To what extent is the Forest maintaining or restoring conditions that result from or emulate natural ecological processes?	Acres of prescribed burn to restore wetland and terrestrial habitat  Number of years since fire occurred compared to historical fire regimes for a given ELTP or biophysical setting	Vegetation Management desired condition 1-3; Goals 1-3; Fire Management desired condition 3	Measure annually/Report every two years	Existing Forest Plan monitoring question

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
	Plant and animal population change before and after management that emulates natural ecological processes (prescribed burning, some timber harvest, mechanical opening treatments, stream flow restoration, etc.)  Compare the current percent of acres measured against the 2005/2006 desired future condition by MA, ELT, early-, midand late seral condition and tree size classes	Vegetation Management desired condition 1-3; Goals 1-3; Fire Management desired condition 3	Measure annually/Report every <del>two</del> <u>ten</u> years	Existing Forest Plan monitoring question
2c. To what extent are insects and disease populations compatible with objectives for restoring or maintaining healthy forest conditions?	Acres, disturbance patterns, severity and trends observed by annual aerial flights for insect and disease damage  Site visits for insect and disease observations	Vegetation Management desired condition 1; Forest Pest Management desired condition 1	Measure annually/Report every two years Measured as needed based on the indicator above/Report every two years	Existing Forest Plan monitoring question
2d. To what extent is Forest management managing undesirable occurrences of fire, insect and disease outbreaks?	Acres harvested by salvage or for sanitation; compare acres treated to acres identified in previous monitoring question	Pest Management Guidelines 1-4	Measure annually/Report every two years	Existing Forest Plan monitoring question
2e. To what extent is Forest management providing ecological conditions to maintain habitat of native and desired non-native species?	Acres of habitat in the appropriate ecological condition needed for native and desired non-native species Plant and animal population levels before and after ecological restoration	TES Goals 1,3; Vegetation Management Guidelines 2,3; Wildlife Structural Guidelines 1- 3	Measure annually/Report every two years	Revised from: To what extent is Forest management providing ecological conditions to maintain viable habitat of native and desired non-native species?

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
2f. To what extent are RNAs and	Acres managed to protect unique values	Land Ownership Goal 2;	Measure	Existing Forest Plan
cRNAs being managed to protect		Prescribed Natural Fire Goal 1	annually/Report	monitoring question
their unique values and how are they		(PNF is an outdated term.	every six years	
contributing to research?		Appropriate Management		
		Response is current term);		
		Objective 1; Land Ownership		
		Goal 2		
2g. To what extent are key terrestrial	Number of den and snag trees per acre in	Vegetation Management	Measure project	Not applicable; this is a
habitat components (e.g., mast,	managed stands	Guideline 3; Vegetation	by	new question.
snags, down woody material) being		Management Structural	project/Report	
provided?		Guideline 1a, 2a, 2b, 3a, 3b, 3c	every two years	
2h. To what extent are existing and	Acres of existing and potential old growth			
potential old growth forest	by forest type		Measure every	
conditions being created? To what	Connectivity of old growth system	Vegetation Management Goals	four years/	Not applicable; this is a
extent are existing and potential old		1-3; Objective 1; Guidelines 1-5	Report every four	new question.
growth forest stands being managed		1-3, Objective 1, Guidelines 1-3	years	new question.
or unmanaged to develop into or			years	
accelerate toward old growth?				
2i. How much even-aged	Acres of even-aged harvest that emulates	Forest Plan 2600-Wildlife, Fish	Measure	Existing Forest Plan
management (especially clear-	natural disturbance regimes, creates	and Sensitive Plant Habitat	annually/Report	monitoring question
cutting) should be used? In what	wildlife habitat (e.g., jack pine barrens	Management. 2400-Vegetation	every two years	
forest types should it be used?	and well-distributed age classes of aspen-	Management Guideline 1		
	spruce-fir mixed stands) and moves			
	toward veg comp goals			

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
3. Status of focal species to assess the ecological conditions required under §219.9 (36 CFR 219.12(a)(5)(iii)).	See below.	2012 Planning Rule Required Monitoring Element	See below.	
3a. To what extent are forest management activities promoting the regeneration of hemlock?	Presence, abundance and spatial distribution of hemlock (focal species is hemlock).	2012 Planning Rule Required Monitoring Element Forest Plan MA 2.3, 4.5, MA 6.1, MA 6.2, MA 6.4 and Dukes RNA all list a hemlock component in the DFC. Forest Plan veg comp goals list hemlock as late seral component.  Key ecosystem characteristics include suitable conditions for hemlock reproduction including shade, moisture and large woody debris. There are 96 birds and 47 mammals associated with hemlock in the north-east US. Acres of new Hemlock recruitment is important to the abundance and distribution.  Scale: Forest wide mixed northern hardwood, hemlock and white pine hemlock late seral ecosystems.	Measure every 5 years (FIA data) and report every 6 years. Also monitor with standard Forest Plan vegetative composition goals monitoring. Monitor project by project with standard stocking surveys.	Not applicable; this is a new question.
3b. To what extent are high quality, free flowing cold water stream ecosystems being provided?	Miles of intact cool and cold water streams and brook trout population trend within those reaches (focal species is brook trout).	2012 Planning Rule Required Monitoring Element Forest Plan DFC goal (25000 watershed management) to manage riparian areas to meet Forest designations for warm, cool and cold water streams. Follow State of Michigan water quality Best Management Practices for managing forest resources. Indian, Carp and Tahquamenon W&S rivers have a DFC to provide resident trout habitat and components of a diverse aquatic ecosystem (i.e., Large Woody Debris).	Measure annually/Report every two years	Not applicable; this is a new question.

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
		Key ecosystem characteristics include; cold water, large woody debris, cobble spawning substrate,		
		aquatic organism passages, mussels,		
		invertebrates, caddisfly, stonefly, creek chub,		
		sculpin beaver dams, and non-native brown trout.		
		Scale: Forest-wide cool and cold water reaches		
		and associated riparian habitat.		
3c. Is the type and frequency of	Sharp-tailed grouse	2012 Planning Rule Required Monitoring Element	Measure	Not applicable;
disturbance associated with dry-sand outwash plains (ELT 10/20) appropriate to maintain ecosystem integrity throughout the historical range of variation?	population trend	Forest Plan (2600) objective to maintain permanent openings within vegetation composition goals for habitat suitable for sharp-tailed grouse. Provide for KW management within forest-wide vegetation goals. Prescribed fire mimicking natural fires used as a management tool (2400). In MA 4.4 provide wildlife habitat for KW and other upland species such as sharp-tailed grouse, KW and Black-backed woodpecker. Provide large openings and savanna complexes.	annually/Report every twoten years	this is a new question.
		Key ecosystem components of dry northern forest/barrens include, frequent fire or management to mimic fire (including timber harvest and prescribed burning), a large number of snags, biological legacies (large red/white pine retained) habitat connectivity resulting in large early successional complexes, pine age-class diversity.  Scale: ELT 10/20, primarily on Management Areas 4.2 and 4.4, Forest-wide.		

Proposed Monitoring Question(s)  4. Status of a select set of the ecological conditions required under §219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern (36 CFR 219.12(a)(5)(iv)).	Indicator(s) See below.	Driver  2012 Planning Rule Required Monitoring Element	Measurement & Reporting Frequency See below.	Original Question Wording
4a. To what extent is the management of the Forest contributing to the conservation of threatened, endangered and species of conservation concern (TES)?	Number of TES species for which recovery actions are accomplished  Acres of habitat improved for TES species  Number of species removed from TES lists  TES population trends  Acres of appropriately stocked jack pine for KW habitat (over or under and with appropriate opening percentage)	Wildlife Goal 5; TES Goals 1, 3; Standards 1, 2; Guidelines 1-4; Land Ownership Goal 2; Eastern Regional Sensitive Species Framework  Lands are adequately restocked as specified in the Forest Plan	Measure annually/Report every two years  Measure every ten years/Report every ten years  Measure annually/Report every two years	Revised from: To what extent is the management of the Forest contributing to the conservation of threatened and endangered and sensitive species?
4b. To what extent is the Forest maintaining the amount and juxtaposition of Canada lynx foraging and denning habitats?	Acres of compacted snow.  Acres of contiguous habitat connectivity  Juxtaposition of forage and denning habitat	Wildlife Goal 5; Canada lynx Goal 1; Guideline 1; TES Standards 1,2; Guideline 4	Measure every two years/Report every two years	Existing Forest Plan monitoring question
4c. To what extent is the Forest working cooperatively with the U.S. Fish and Wildlife Service, state and other federal agencies to update and implement recovery plans and conservation assessments for TES?	Number of consultation efforts  Number of representatives on interagency Recovery Teams	Wildlife TES Goals 3 and 4; Guideline 1	Measure annually/Report every two years	Existing Forest Plan monitoring question

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
5. Status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives (36 CFR 219.12(a)(5)(v)).	See below.	2012 Planning Rule Required Monitoring Element	See below.	
5a. What are the effects of OHVs on the physical, biological and social environment?	Acres of habitat impacted by OHV use Acres of soil compacted, rutted or eroded by OHV use Number of water quality erosion sites caused by OHVs	Motorized/non-motorized Trails Goals 1-3; Objectives 2 and 4  Motorized/non-motorized Trails Goals 1-3; Objectives 2 and 4; Watershed Management Objective 1; Riparian Ecosystem Standard 1 and Guidelines	Measure annually/Report every two years	Existing Forest Plan monitoring question
5b. What are the effects of snowmobiles on the physical, biological and social environment?	Acres of habitat impacted by off trail use	TES Goals 2; Guidelines 1-4	Measure annually/Report every two years	Existing Forest Plan monitoring question
5c. To what extent is the Forest providing snowmobile opportunities?	Miles of designated snowmobile trails	Motorized/Non-Motorized Trails Goals 1-3; Objectives 2 & 4	Measure annually/Report every two years	Existing Forest Plan monitoring question
5d. To what extent is the Forest providing and maintaining a variety of inland lake watercraft accesses in motorized and non-motorized settings?	Number of access sites by setting	Great Lakes and Inland Lakes Access Goal 1; Objective 2	Measure annually/Report every two years	Existing Forest Plan monitoring question
5e. To what extent is wilderness being managed to protect the biological and physical resources and wilderness values while accommodating recreational uses?	Number of Wilderness Performance Elements met	Wilderness Goal 1	Wilderness Performance Elements measure annually/Report every twoten years	Not applicable; this is a new question.

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
5f. To what extent are Wild and Scenic River (WSR) values being managed to protect the biological and physical resources while accommodating recreational uses?	Outstandingly Remarkable Values (ORVs) improved	WSRs Goals 1 and 4	ORVs measured project by project/ reported every two years	Not applicable; this is a new question.
5g. What is the status of visitor use and visitor satisfaction?	National Visitor Use Monitoring (NVUM) Metrics	2012 Planning Rule Required Monitoring Element	Measured every five years/Reported every fivesix years	Not applicable; this is a new question.

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
6. Measurable changes on the plan area	See below.	2012 Planning Rule	See below.	
related to climate change and other		Required Monitoring Element		
stressors that may be affecting the plan				
area (36 CFR 219.12(a)(5)(vi)).				
6a. How are the timing and duration of	Accumulated Winter	2012 Planning Rule	Report every two	Not applicable; this
winter weather conditions changing	Season Severity Index	Required Monitoring Element	years	is a new question.
across the plan area on an annual basis?	(AWSSI). Index is based on			
	data measured on a daily			
	basis:			
	1. Max temperature			
	2. Min temperature			
	3. Snowfall			
	4. Snow depth			

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
7. Progress toward meeting the desired	See below.	2012 Planning Rule	See below.	
conditions and objectives in the plan,		Required Monitoring Element		
including for providing multiple use				
opportunities (36 CFR 219.12(a)(5)(vii)).				
7a. How close are projected outputs and	Comparison of actual to	36 CFR 219.12 (a)(5)(vii) Progress toward	Depending on	Existing Forest
services to actual?	projected outputs and	meeting the desired conditions and	resource this may	Plan monitoring
	services for all resources as	objectives in the plan, including for providing	be measured	question
	described in the Forest Plan	multiple use opportunities. Forest Plan	annually or on a	
	FEISA quantitative and	Appendix A Forest Plan Appendix A.	multiple year	
	qualitative estimate of		interval/Report	
	performance, comparing		every two to ten	
	outputs and services with		years	
	those projected by the			
	Forest Plan.			
7b. How close are projected costs with	Comparison of projected	Documentation of costs associated with	Depending on	Existing Forest
actual costs?	costs with actual costs for	carrying out the planned management	resource this may	Plan monitoring
	project activities for all	prescriptions	be measured	question
	resource		annually or on a	
	areas Documentation of		multiple year	
	costs associated with		interval/Report	
	carrying out the planned		every two to ten	
	management prescriptions		years	
	compared with costs			
	estimated in the Forest Plan.			
7c. To what extent is the Forest meeting	Vegetative composition		Measured <u>every</u> two	Evicting Forest
the vegetative composition objectives?	percentages by ELTP and	Vegetation Management desired condition 1	to ten years/Report	Existing Forest
	MA	and 2; Goals 1-3	every two to ten years	Plan monitoring question

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
7d. Has public demand for commodity uses and non-commodity opportunities changed?	By resource, situations that generate resource damage or demand exceeds Forest capacity to provide	Vegetation Management, Forest Products Goals 1-2; Land Uses Management Goals 1-2; Minerals and Geology Goals 1, 4; Recreation, Great Lakes and Inland Lakes Access Goals 1, 3; Recreation Development and Recreation Facilities Goal 1	Measured annually/Reported every two years	Existing Forest Plan monitoring question
7e. To what extent is the Forest meeting its transportation system objectives?	Miles of roads decommissioned or constructed to be within guidelines Number of effective road closures Miles of roads reconstructed and bridges constructed and/or reconstructed Number of culverts replaced	7700-Transportation system Goals, Guidelines, and Objectives	Measured annually/Reported every two years	Existing Forest Plan monitoring question
7f. To what extent is timber management occurring on lands suitable for such production?	Acres inventoried by stand exams, walk-throughs, photo interpretation and during project-area analysis	Forest Plan Appendix A – Suitability.	Measured project by project/ Reported every two years	Existing Forest Plan monitoring question
7g. To what extent do output levels, location of timber harvest and mix of saw timber & pulpwood compare to those levels?	The difference between actual output of saw timber and pulpwood and projected output	Forest Plan Appendix A.	Measured annually/Reported every two years	Existing Forest Plan monitoring question
7h. Are harvested lands adequately restocked after 5 years?	Acres meeting required minimum percentages through first-, third- and fifth-5 <sup>th</sup> year stocking surveys	Lands are adequately restocked as specified in the Forest Plan.	Measured annually/Reported every two years	Existing Forest Plan monitoring question

			Measurement &	Original
Proposed Monitoring Question(s)	Indicator(s)	Driver	Reporting	Question
			Frequency	Wording
	Acres that fail to meet			
	minimum stocking			
	requirements by silvicultural			
	prescription			

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
8. The effects of each management	See below.	2012 Planning Rule	See below.	
system to determine that they do not substantially and permanently impair		Required Monitoring Element		
the productivity of the land (16 U.S.C.				
1604(g)(3)(C)) (36 CFR 219.12(a)(5)(viii)).				
For purposes of this subpart, a timber				
management system, including even-				
aged management and uneven-aged				
management.				
8a. Are the effects of Forest	Acres of whole tree	2500 Watershed Management – Soil	Measured	Revised from: Are
management, including prescriptions,	harvesting on xeric sands	Resources Goal 2	annually/Reported	the effects of
resulting in changes to the productivity of			every two years	Forest
the land?				management,
				including
				prescriptions,
				resulting in
				significant changes
				to the productivity
				of the land?

Proposed Monitoring Question(s)	Indicator(s)	Driver	Measurement & Reporting Frequency	Original Question Wording
9. To what extent is the Forest meeting its Federal Indian trust responsibility, including, but not limited to, meeting the requirements of memoranda of understanding, consulting with tribes on Forest management and actively seeking collaborative opportunities?	Number of notifications and consultations, e.g., documentation of National Environmental Policy Act notifications and consultations, National Historic Preservation Act and Native American Graves Protection and Repatriation Act consultations Number of consultation meetings Number of collaborative meetings and discussions	Nothing in this Plan or its implementation is intended to modify, abrogate or otherwise adversely affect tribal reserved or treaty guaranteed rights applicable within the Forest. 1500-External Relations Objective 1	Measured annually/Reported annually	Not applicable; this is a new question.
10. How are Heritage properties being protected from damage or disturbance?	Number of heritage structures and sites protected	36 CFR 79; 36 CFR 800; 43 CFR 3; 43 CFR 7; 43 CFR 10. 43 CFR 7; 43 CFR 10. Compliance with 36 CFR 219.11 (d)	Measured annually/Reported every two to ten years	Existing Forest Plan monitoring question

Table 2. Deleted monitoring questions.

Deletion of Existing Monitoring Questions	Rationale
To what extent is the Forest providing OHV opportunities?	Combined into other monitoring questions addressing recreation topics.
How effective are Forest management practices in managing OHV use?	Combined into other monitoring questions addressing recreation topics.
Are habitat trends of MIS consistent with Forest Plan expectations?	The 2012 Planning Rule does not support continued monitoring of management indicator species.
To what extent are Forest management activities achieving semi-primitive ROS objectives?	Combined into other monitoring questions addressing recreation topics.
To what extent are wetlands being protected and wetland functions bring restored?	Combined into other monitoring questions addressing aquatic ecosystem topics.
Are the effects of forest management, including prescriptions, resulting in significant changes to the productivity of the land?	Combined into other monitoring questions addressing productivity of the land.
How are the MOUs between the Forest and Native American Tribes being implemented?	Combined into another monitoring question addressing Indian Trust responsibility.

## Key

**Monitoring Question:** A specific question developed to ensure that monitoring and evaluation address information essential to measuring the effects of Forest Plan implementation.

**Monitoring Indicator:** A statement used in concert with the monitoring question to measure trends, either quantitatively or qualitatively.

**Driver:** Identifies the reasons why we are monitoring a particular element, such as legal requirements for the 2012 Planning Rule.

**Measurement and Reporting Frequency:** How often monitoring information is collected (Monitoring Frequency) and evaluated for reporting (Reporting Frequency).

**Original Question Wording:** If noted, this original wording is from the existing 2006 Forest Plan monitoring program.