

Monitoring questions and indicators for the Cherokee National Forest monitoring plan

MQ	Monitoring Question	Tier ¹	Indicator	Method of Collection	Reporting Frequency	Sources/Partners
Status of Terrestrial Ecological Conditions & Selected Species						
1	Are rare communities being protected, maintained, and restored?	T1	Management in the rare communities listed in the 9F Prescription and land acquisitions that contain rare communities.	Acres maintained or restored in the 9F communities from FACTS Spatial or WIT (where appropriate) or other sources of information. Review land acquisitions for rare communities acquired.	2 years	Forest Botanist, Forest Silviculturist
2.1	Are landscape-level and stand-level composition and structure of major forest communities within desirable ranges of variability?	T2	How many acres of the major forest communities are in an early, open, and closed condition?	Remotely sensed analysis of early open and closed forest overlain on the Table 2-4 CNF forest communities. Exclude areas that are non-forested.	4 years	Forest Silviculturist, GIS Coordinator, GIS Coordinator, GTAC, or additional partners
2.2	Are landscape-level and stand-level composition and structure of major forest communities within desirable ranges of variability?	T1	How many acres were treated to maintain or create open woodlands, savannahs, and grasslands?	FACTS Spatial acres of completed activities overlain on stands being managed as open woodlands.	2 years	Forest Silviculturist, Forest Wildlife Biologist
2.3	Are landscape-level and stand-level composition and structure of major forest communities within desirable ranges of variability?	T2	What are the trends in MIS populations in relationship to the major forest community/condition MIS was selected to indicate?	Data collected from MIS species from USFS and partners. Bird point counts and other monitoring metrics.	1 year	Forest Wildlife Biologist, University of Tennessee
2.4	Are landscape-level and stand-level composition and structure of major forest communities within desirable ranges of variability?	T1	How many acres of hazardous fuels forest land are treated through wildland fire use, prescribed fire, and mechanical treatment annually?	Acres of hazardous fuels treated through wildland fire use, prescribed fire, and mechanical treatment annually. Maps of prescribed burn units are incorporated into the GIS data base annually, by the end of the burning season. Total acres are determined from a GIS query.	1 year	Forest Fire Management Officer

¹ Tier 1 includes questions and indicators where it is within the fiscal capability of the Cherokee National Forest to collect and evaluate the data. The Forest Service is responsible for addressing all Tier 1 questions.

Tier 2 includes questions and indicators that require additional capacity to complete monitoring tasks. The Forest Service would coordinate with stakeholders to address Tier 2 questions. As such, Tier 2 questions have a shared responsibility, and therefore, the Cherokee National Forest monitoring team cannot assure the timing and quality of data collection and/or the evaluation of these questions. For many Tier 2 questions, relationships with partners currently exist, and partners are currently engaged in monitoring collection or data interpretation, while other Tier 2 questions would not be possible without additional resources or capacity.

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2.5	Are landscape-level and stand-level composition and structure of major forest communities within desirable ranges of variability?	T1	How many acres were prescribe burned in each of the major forest communities?	FACTS Spatial acres of completed prescribed burns overlap on Table 2-4 CNF forest communities.	2 years	Forest Silviculturist
3.1	Are key successional stage habitats being provided?	T1	How many acres of old growth have been designated by patch size (small, medium, large) and old growth community type?	Query GIS databases and separate by patch size and old growth community type	4 years	Forest Botanist/ Ecologist, Forest Silviculturist, Zoned silviculturist
3.2	Are key successional stage habitats being provided?	T1	Acres above 3000 feet elevation in early successional habitats or habitats characterized by grassy/herbaceous ground cover and presence/absence of golden-winged warblers in optimal habitats (GWAP standardized methodology).	Field level monitoring and coordination with partners (TWRA, USFWS, AMJV)	2 years	Forest Wildlife Biologist, Partnerships with TWRA, USFWS, NCWRC, NFs of NC
3.3	Are key successional stage habitats being provided?	T1	What is the age class distribution in prescriptions with a vegetation management emphasis?	Where inventory or remotely sensed data is available, spatial analysis of acres by age class for the following Prescriptions: 7C, 7E2, 8A, 8B, 8C, 9H?	4 years	Forest Silviculturist, GIS Coordinator, District silviculturist
3.4	Are key successional stage habitats being provided?	T2	What is the age class and seral class of the major forest communities?	Where inventory or remotely sensed data is available, spatial analysis of acres by age class and seral class for the Table 2-4 CNF major forest communities.	4 years	Forest Silviculturist, GIS Coordinator, District silviculturist, or additional partners
3.5	Are key successional stage habitats being provided?	T1	How many acres of existing permanent openings were maintained or enhanced? Treatments include but are not limited to: NNIS treatments, native plantings, mowing, selective herbicide treatments, targeted prescribed fire, etc.	GIS acres	1 year	Forest Wildlife Biologist, Partnerships with TWRA, USFWS, NCWRC, NFs of NC
4.1	How well are key terrestrial habitat elements being provided?	T2	What are the trends in MIS populations in relationship to the terrestrial habitat attributes for which the MIS was selected to indicate?	Species trends and GIS acres	1 year	Forest Wildlife Biologist or additional partners

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4.2	How well are key terrestrial habitat elements being provided?	T2	Is snag abundance and distribution across the landscape sufficient to provide quality habitat for MIs, rare, and T&E species?	Snag abundance per acre	2 years	Forest Wildlife Biologist, Forest Silviculturist, GIS specialist, FLA
5	Are silvicultural requirements of the Forest Plan being met?	T1	Are silvicultural practices in compliance with the Forest Plan?	Review silviculture prescriptions and harvest, regeneration, and tending practices through field visits, documents review, and other methods.	2 years	Forest Silviculturist
6.1	What are status and trends of forest health threats on the forest?	T1	What are the observed trends of important insects, diseases, and other pathogens affecting forest health and what is being done to address them?	Narrative of observed trends from various sources such as insect trapping results, U.S. Forest Health Protection reports, field observations, and/or remotely sensed observations. Narrative describing treatments that have been implemented. Acres treated by threat where available.	2 years	Forest Silviculturist
6.2	What are status and trends of forest health threats on the forest?	T1	How many acres of non-native invasive plant species were identified and treated?	Acres identified and treated from TESP-IS database	2 years	Forest Botanist
7	What are the status and trends of selected species with viability concerns and/or their habitats?	T2	Have there been status changes, documented new populations or range expansion, of these species (combining aquatic and terrestrial into one)?	Selected species and the population trends. Coordination with partners such as educational entities, TWRA, TDEC, and USFWS	2 years	Forest Wildlife Biologist, Forest Aquatic Biologist, Forest Botanist, and additional partners
8	What are the trends in both populations and associated habitats for selected federally listed threatened and endangered species, proposed and candidate species, and selected species of viability concern on the Cherokee National Forest?	T2	Have there been status changes, documented new populations or range expansion, of these species (combining aquatic and terrestrial into one)?	Much of this will be reliant on the partnership with USFWS and TWRA. A significant portion of the monitoring efforts are completed by partners.	2 years	Forest Wildlife Biologist, Forest Aquatic Biologist, Forest Botanist, and additional partners

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Status of Watersheds, Aquatic Habitats & Selected Species						
9	What is the status and trend in aquatic communities in relationship to habitat conditions?	T1	What are the trends in results of systematic stream fish and/or macroinvertebrate community inventories in relation to physical habitat trends at long-term monitoring sites?	At selected Long-Term Monitoring sites: CNF Stream Habitat Monitoring Protocol of Wadeable Streams; CNF Macroinvertebrate Sampling Protocol for Wadeable Streams; Two-three pass electrofishing surveys	2 years	Forest and District Aquatic Biologist
10.1	What is the status and trend in lotic habitat conditions?	T1	What is the trend in percent fine sediment and particle distribution at long-term monitoring sites?	At selected Long-Term Monitoring sites: CNF Stream Habitat Monitoring Protocol of Wadeable Streams	2 years	Forest and District Aquatic Biologist
10.2	What is the status and trend in lotic habitat conditions?	T1	What is the trend in water temperature at long-term monitoring sites? Is water temperature meeting state standards?	Year-round stream temperature loggers: See CNF Stream Habitat Monitoring Protocol for Wadeable Streams	2 years	Forest and District Aquatic Biologist
10.3	What is the status and trend in lotic habitat conditions?	T1	What is the status and trend in aquatic habitat connectivity?	SARP (Southeast Aquatic Resources Partnership) Protocol & Watershed Improvement Tracker (WIT)	2 years	Forest and District Hydrologist, Forest and District Aquatic Biologist
10.4	What is the status and trend in lotic habitat conditions?	T1	What is the trend in percent canopy cover at long-term monitoring sites?	CNF Canopy Closure for Wadeable Streams Protocol	2 years	Forest and District Hydrologist, Forest and District Aquatic Biologist
10.5	What is the status and trend in lotic habitat conditions?	T1	What is the trend in the amount of large woody debris at long-term monitoring sites?	At selected Long-Term Monitoring sites: CNF Stream Habitat Monitoring Protocol of Wadeable Streams	2 years	Forest and District Aquatic Biologist
11	Are management prescriptions affecting water quality?	T1	Are Forest Standards related to water quality being implemented and are they effective?	CNF Forestry & Roads BMP Implementation & Effectiveness Monitoring Protocol	1 year	Forest Hydrologist
			For other resource activities (fire lines, recreation sites, NNIS treatment sites, etc.) use National BMP Protocols			
12	Are management prescriptions affecting soil quality and site productivity?	T1	Are projects being implemented in compliance with RLMP Goal 8?	Forest Soil-Disturbance Monitoring Protocol	1 year	Forest Soil Program Manager, Forest Timber Program Manager

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13	What is the status and trend of watershed conditions across the forest?	T1	Distribution of watersheds among condition classes and summary of changes from previous monitoring periods.	Watershed Condition Assessment and Tracking Tool (WCATT)	2 years	Forest Hydrologist
14	Where necessary, are watersheds restored to provide resilient ecosystems that support ecological functions and intended beneficial uses?	T1	Progress towards Watershed Restoration Action Plan completion for current Priority Watersheds	Watershed Improvement Tracker (WIT) and Watershed Condition Assessment and Tracking Tool (WCATT)	2 years	Forest Hydrologist
15.1	What are the conditions and trends of riparian areas and floodplain functions and values across the forest?	T1	What is the trend in percent canopy cover in riparian areas across the forest?	Remote Sensing	2 years or as new imagery becomes available	Forest GIS Coordinator, Forest Botanist, Forest Hydrologist
15.2	What are the conditions and trends of riparian areas and floodplain functions and values across the forest?	T2	What is the extent and trend of riparian impacts from roads, trails, administrative area, and dispersed recreation? (Increasing, decreasing, or maintained)	Roads, Trails and Administrative Areas: GIS analysis by HUC12 Dispersed Recreation: Reddington/Henry Protocol or National BMP Protocol for Dispersed Recreation (Recreation B)	2 years for roads, trails and admin areas 1 year for subset of dispersed recreation sites. A reasonable rotation for each site, not to exceed 5 years, will be developed upon completion of the initial inventory.	Forest Hydrologist, Forest Recreation Program Manager, GIS Coordinator, and Recreation seasonal employees
15.3	What are the conditions and trends of riparian areas and floodplain functions and values across the forest?	T1	What are the conditions and trends in riparian stand structure and species composition? Are riparian areas moving towards a condition where they can naturally recruit large wood to channels and floodplains?	Canopy Height – LiDAR TESP-IS Database? Exact methodology TBD		Forest Botanist, Forest GIS Coordinator, Forest Hydrologist
16.1	What are the conditions and trends in wetland habitats?	T1	Are wetlands maintained or mitigated to minimize net loss of wetlands during project planning and implementation?	Review of a subset of project NEPA and Field inspections of project areas (can be concurrent with BMP Monitoring)	1 year	Forest Botanist, Forest Hydrologist
16.2	What are the conditions and trends in wetland habitats?	T1	What is the net gain or loss of wetlands?	Review of Lands Adjustment NEPA	2 years	Forest Hydrologist, Forest Realty Specialist

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17	Is forest management contributing to conditions that maintain or improve biological stream health trends for lotic macroinvertebrate communities?	T1	What are the trends of macroinvertebrate communities at long-term monitoring stations?	Quantitative sampling using CNF Macroinvertebrate Sampling Protocol for Wadeable Streams	2 years	Forest Aquatic Biologist
Social, Cultural & Economic Sustainability						
18	What is the demand for special forest products offered?	T1	What special forest products were permitted and in what quantities?	Query TIM database	2 years	Forest Timber Contracting Officer
19	Are forest products being produced within predicted ranges?	T1	What is the volume of saw timber and pulp wood provided each year?	Report annual volume offered and sold (PTSAR)	2 years	Forest Timber Contracting Officer
20	Are heritage sites being identified and evaluated?	T1	What is the status of cultural resource surveys identification and evaluation?			Forest Heritage Program Manager
21	Are National Register eligible sites being protected?	T1	What is the status of visiting and documenting the condition of eligible sites to determine if they are being protected?			Forest Heritage Program Manager
22	What changes are occurring in the social, cultural, and economic conditions in the areas influenced by national forests in the region?	T1	R8 Broad Scale Monitoring Indicators include but are not limited to population change, unemployment rate, and poverty level.	R8 Broad Scale Monitoring Strategy	5 years	Forest Environmental Coordinator
Recreation Settings, Opportunities, Access & Scenic Character						
23.1	Are opportunities for high quality, nature-based recreation experiences being provided and what are the trends?	T1	What is the trend in recreation uses and visitor satisfaction?	Analysis of National Visitor Use Monitoring (NVUM) report	5 years	Forest Recreation Program Manager

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23.2	Are opportunities for high quality, nature-based recreation experiences being provided and what are the trends?	T1	Are primitive and semi-primitive recreation settings and opportunities maintained or increased?	Review past year's road and trail management activities and changes to recreation facilities that could influence the current Recreation Opportunity Spectrum (ROS). Document trends and changes in acreage of Semi-primitive Non-Motorized (SPNM) settings. Inventoried RN2 and SPNM are the most susceptible to change by access management and capital improvements.	2 years	Forest Recreation Program Manager
23.3	Are opportunities for high quality, nature-based recreation experiences being provided and what are the trends?	T1	Are there any changes in the supply and quality of developed and dispersed recreation opportunities?	Analysis of data from INFRA or annual Performance Attainment Report (PAR) to compare actual recreation outputs with plan projections i.e., PAOTs to standard, products to standard, days to standard, miles of trail to standard, etc. Check status of volunteer agreements.	2 years	Forest Recreation Program Manager
23.4	Are opportunities for high quality, nature-based recreation experiences being provided and what are the trends?	T1	What user impacts, conflicts, and effects are affecting the corridor of the Appalachian National Scenic Trail?	Analysis of NVUM data, local Customer Satisfaction survey tools, GIS mapping of AT shelter sites, trailhead registration data.	2 years	Forest Recreation Program Manager
24	What are the status and trends of recreation use impacts on the environment?	T1	What management actions have occurred at developed and dispersed recreation sites related to wildlife management? What are the levels of human-wildlife interaction at recreation sites?	Number of nuisance bear incidences; number of bear-proofed facilities added; number and type of services added or changed; number of information products developed and distributed; number of law enforcement actions (closure orders, citations).	2 years	Forest Wildlife Biologist, Recreation Program Manager
25	What is the status and trend of wilderness character?	T1	Is wilderness visitor use within limits that do not impair the values for which the wilderness was established?	Review of visitor use in relation to Wilderness Implementation Schedules (WIS) developed through the Limits of Acceptable Change (LAC) process Utilize National Visitor Use Monitoring (NVUM) report.	5 years	Forest Recreation Program Manager
26	What are the status and trend of Wild and Scenic River conditions?	T1	Are free-flowing conditions and Outstandingly Remarkable Values being protected?	Review a variety of projects within the river corridors (these may include prescribed fire, maintenance of trails and recreation facilities, restoration of native communities, control of non-native invasive vegetation and insects and disease outbreaks).	5 years	Forest Recreation Program Manager

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27.1	Are the scenery and recreation settings changing and why?	T1	What are the trends in scenery and recreation settings?	Review current scenic class inventory in GIS for completeness.	5 years	Forest Recreation Program Manager
27.2	Are the scenery and recreation settings changing and why?	T1	How many acres of National Forest land do not meet or exceed established scenic integrity objectives?	Recognize sensitive viewsheds that do not meet scenic integrity objectives. Review a sample of projects (use the treatment and location data in activity tracking system). Projects should include a variety of SIO's, if available.	5 years	Forest Recreation Program Manager
Climate Change & Other Stressors						
28	What are the trends in ambient air quality and acidic deposition and how do the trends effect forest ecosystems?	T2	Ambient air quality and acidic deposition data	Ambient air quality and acid deposition data from sites on or near the forest.	2 years	Regional Office Air Resource Specialists
29	What are the trends in the amount of pollution emitted by forest management activities and their effects on nearby communities?	T1	Air emissions data for compliance with NAAQS, focus on PM 2.5 emissions from prescribed fires	Coordinate with State & local air quality agencies to track emissions from NF lands for compliance with NAAQS, with emphasis on PM2.5 emissions from prescribed fires, ensure NF prescribed fire emissions are considered when they fall within PM2.5 non-attainment areas.	2 years	Forest Fire Staff, Regional Office Air Resource Specialists
30	What measurable changes and trends are occurring in the plan area related to climate change and other stressors?	T1	Temperature, precipitation, and streamflow.	R8 Broad Scale Monitoring and data sources such as NOAA/NCEI Climate at a Glance, NEMAC Climate Explorer, Hydrograph and stream gauge trend data from USGS	5 years	Forest Climate Change Coordinator & Forest Hydrologist