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	Planning Rule Required Monitoring Element (36 CFR 219.12(a)(5))	Forest	Detailed Monitoring Question	Forest Plan Driver/Rationale	Measurement Indicator(s)	Question Status	Data Collection Methodology	Frequency	Best Available Scientific Information References
1	Element 1: Status of select watershed conditions (see FSH 1909.12, chapter 30, Section 32.13a)	Both	To what extent are management activities maintaining or restoring watershed functions?	GMNF: -Forestwide Goal 4 FLNF: -Forestwide Goal 4	1) Number of sub-watersheds in each watershed condition class. 2) Number of essential projects completed in priority watersheds per year.	NEW QUESTION	1) Utilize the Watershed Condition Assessment Tracking Tool (WCATT) to identify how many sub-watersheds on each Forest are in which functionalist category. Qualitatively describe any changes from prior years and what led to those changes. 2) Report the number of Watershed Restoration Action Plan-identified Essential Projects that were completed each year per Forest. Utilize the Watershed Improvement Tracking (WIT) database. Qualitatively describe how completion of these projects, if any, move the Forest toward meeting goals. Collect annually, report biennially.	1) Annually 2) Annually	Watershed Condition Framework, and Watershed Condition Classification Technical Guide
2	Element 2: Status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems (see FSH 1909.12, chapter 30, Section 32.13b)	Both	To what extent are management activities conserving or improving water quality?	GMNF: -Forestwide Goal 2 (Fisheries Objectives) -Forestwide Goal 4 -Forestwide SWA Standards 1-4 and 7 -Forestwide SWA Guidelines 1-6, 11-12, and 14 -Forestwide Road Design and Construction Standards 3 and 6 FLNF: -Forestwide Goal 2 (Fisheries Objective) -Forestwide Goal 4 -Forestwide SWA Standards 1-8 -Forestwide SWA Guidelines 1-14 -Forestwide Road Design and Construction Standards 3 and 6	1) Miles of stream and acres of lake/ pond on NFS lands by Vermont/ New York water quality classification. 2) Ambient Biomonitoring Network (ABN) stream reach score for a representative subset of stream reaches across the Forest. 3) Implementation and effectiveness monitoring for Best Management Practices (BMPs).	NEW QUESTION	1) Review state reporting of 303(d) waterbodies (Impaired Waters). Find spatial data of these waterbodies, clip to GMNF and FLNF administered lands, and calculate miles and acres as needed. 2) Utilize any available data from the Vermont Department of Conservation that documents current year ABN data on NFS lands in Vermont. Qualitatively assess implications for land management impacts on surface water quality. 3) Review all BMP monitoring completed by the Forest for each two-year BMP monitoring reporting period and provide qualitative discussion of impacts of land management activities on surface water quality. Differentiate between GMNF and FLNF.	1) Biennially, in line with 303(d) reporting periods 2) Annually 3) Biennially	Clean Water Act. https://www.epa.gov/tmdl https://dec.vermont.gov/watershed/map/monitor/biomonitoring National Best Management Practices for Water Quality Management on National Forest System Lands Volume 1: National Core BMP Technical Guide
3	Element 2 Status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems (see FSH 1909.12, chapter 30, Section 32.13b)	Both	To what extent are management activities and natural processes leading to increased structural diversity within forested stands and across forested landscapes, moving areas toward desired objectives identified under Goal 2 of the Forest Plan?	Forest Plan Goals 2 and 6	1) Number of acres and proportion of each forest type in each age class. 2) Number of acres and proportion of harvest acres treated with uneven-aged management. 3) Number of acres treated explicitly to enhance early successional characteristics. 4) Number of acres treated explicitly to enhance late successional characteristics. 5) Number of acres treated with various methods to explicitly enhance the health, longevity, and/or structural diversity of forested stands at the stand and landscape scales.	NO CHANGE	Vegetation treatment activity as tracked in the Forest Activity Tracking System (FACTS) and FSVeg databases	Every 5 years	n/a
4	Element 3 The status of focal species to assess the ecological conditions required under § 219.9 (see FSH 1909.12, chapter 30, Section 32.13c)	GMNF	Does the headwater streams ecosystem provide a full array of riparian and aquatic communities and stream channel types supported by the varied physiographic conditions across the Forest?	Forest Plan Goals 2 and 4	Number of wild brook trout per stream mile.	NO CHANGE	A subset of the historically sampled streams will be selected where, three reaches will be sampled, and the combined value will be used to estimate a "trout per mile" statistic which will be used as an index. Ideally this will be further refined in the future. Sampling may be conducted using 3 pass depletion or single pass IBI.	Annually	Carle, F.L. and M.R. Strub. 1978. A new method for estimating population size from removal data. Biometrics 34:621-630 Rosgen, D.L. 1996. Applied River Morphology. 2nd edition. Wildland Hydrology Books, Pagosa Springs, CO. 390 pp S.J. Kozel and W.A. Hubert. 1989. Factors influencing the abundance of brook trout in forested mountain streams. Journ. of Freshwater Ecology 5(1):113-122 Y. Kanno, B.H. Letcher, J.C. Vokoun, and E.F. Zipkin. 2014. Spatial variability in adult brook trout (<i>S. fontinalis</i>) survival within two intensively surveyed headwater stream networks. Can. J. Fish. Aquat. Sci 71: 1010-1019 Raleigh, R.F. 1982. Habitat suitability models: Brook trout. USDI Fish and Wildlife Service. FWS/OBS-82/10.24. 42 Vermont Agency of Natural Resources. 2015. Riparian Management Guidelines for Agency of Natural Resources Lands. VTANR. 72p

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1	Element 3 The status of focal species to assess the ecological conditions required under § 219.9 (see FSH 1909.12, chapter 30, Section 32.13c)	FLNF	Does the grasslands ecosystem provide a full array of habitat types across the Forest and align with the Forest Plan for overall abundance?	Forest Plan Goal 2	Detection and non-detection, and relative abundance of savannah sparrow.	NO CHANGE	Utilize sampling method refined by Dr. Charles Smith during years of surveys on the FLNF. This method is described in yearly reports from surveys conducted on the forest. Method includes a meandering surveys across grassland units, while recording species presences and use.	Annually	Personal communication with Dr. Charles Smith: https://www.pwrc.usgs.gov/bbs/participate/BBS%20Instructions.pdf . Dieni, J.S. and S.L. Jones. 2002. A field test of the area search method for measuring breeding bird populations. <i>Journal of Field Ornithology</i> 73(3): 253-267. Ralph, C.J., G.R. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. <i>Handbook of Field Methods for Monitoring Landbirds</i> . USDA Forest Service GTR PSW-149. Albany, CA. Smith, C.R. (ed.) 1990. <i>Handbook for Atlasng American Breeding Birds</i> . Vermont Institute of Natural Science, Woodstock, VT. 70 pp.
6	Element 4 The 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 (see FSH 1909.12, chapter 30, Section 32.13b)	Both	What are the population trends for sensitive plants? To what extent are management activities sustaining or enhancing habitat conditions for sensitive plant populations?	Forest Plan Goal 2	Population trends for plants listed as Regional Forester Sensitive Species (RFSS): 1) Number of ramets or genets 2) Percent reproductive 3) Spatial extent of population 4) Number of populations of a species 5) Ranked condition of populations	NO CHANGE	Rare plant populations are monitored every five years (every ten years for aquatic species); the subset monitored in any given year is determined by its last monitoring date and its population trend. Monitoring visits are timed to occur within the appropriate phenological window (i.e. flowering or fruiting time). Data collected includes size and extent of the population, number of reproductive individuals, percent reproductive, number of populations of a species, and known or observed threats. The population trend is estimated using these data. For example, populations with fewer total individuals, fewer reproductive individuals, or a smaller spatial extent, from the last monitoring date, are said to be declining. Additional data are collected and can be found in the Vermont Rare Plant Survey form. These forms are then reported to the state.	Every 5 years for terrestrial species Every 10 years for aquatic species	https://www.regulations.gov/document/FWS-R4-ES-2016-0121-0069 https://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/Your_Woods/Library/VTNNHP%20Rare%20Plant%20PC%20Form.pdf
7	Element 5 The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives (see FSH 1909.12, chapter 30, Section 32.13d)	Both	To what extent are management activities providing high quality recreation services that meet the expectations of the public?	Forest Plan Goal 12	1) Percent Meets Expectations (PMEs) in NVUM (mean visitor satisfaction compared to mean importance). PME data reported for developed facilities, access, services, and feeling of safety in developed sites, undeveloped areas, and designated wilderness. 2) Trend in number of visitors, visitor satisfaction and changes in visitor participation by activity over 5 year NVUM reporting periods.	REVISED QUESTION	Visitor satisfaction from National Visitor Use Monitoring (NVUM).	Every 5 Years	National Visitor Use Monitoring (NVUM) information available at: https://www.fs.usda.gov/about-agency/nvum
8	Element 6 Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area (see FSH 1909.12, chapter 30, Section 32.13e)	Both	Within site plots how are soil/site quality and productivity changing over the long term, in response to factors such as acid deposition, climate change, invasive species, and other environmental problems? More specifically: 1) Are soil nutrient levels changing, and are the changes affecting soil/site productivity? 2) What toxins exist in the soil (e.g. from the atmosphere), and how are they changing in quantity and type over time? Is this affecting productivity?	Forest Plan Goal 3	Within site plots established in wilderness areas measure changes over time for: 1) Soil quality - Soil nutrient levels and toxins by major horizon. 2) Soil productivity - Forest Health 3) Soil climate - Soil temperature and moisture, depth of freezing, correlated with selected meteorological parameters.	NEW REQUIRED - MOVED FROM OTHER RETAINED MONITORING	1)Vermont Long-term Soil Monitoring Methods Manual Version 2, Description Protocols V2017 and Sampling Protocols V2017 2) Forest Service Long Term Ecological Monitoring Project Methods	Every 10 years	Ross, D. S., Bailey, S. W., Villars, T. R., Quintana, A., Wilmot, S., Shanley, J. B., Halman, J. M., Duncan, J. A., & Bower, J. A. (2021). Long-term monitoring of Vermont's forest soils: Early trends and efforts to address innate variability. <i>Environmental Monitoring and Assessment</i> , 193(12). https://doi.org/10.1007/s10661-021-09550-9
9	Element 6 Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area (see FSH 1909.12, chapter 30, Section 32.13e)	Both	To what extent are destructive insects and disease organisms impacting healthy forest conditions?	Forestwide S&Gs 2.3.9 - Forest health and disturbance processes	Insect or disease infestations. 1) Number of outbreaks by species. 2) Acres affected by species.	REVISED QUESTION	Reports provided by Forest Health Protection Office in Durham NH and VT-ANR-FPR annual Forest Insect and Disease Conditions reports. Supporting documentation from stand level data collected in FSVeg (NRIS)	Every 5 years	n/a
10	Element 7 Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities (see FSH 1909.12, chapter 30, Section 32.13f; and FSH 1909.12, chapter 10, section 13.1)	Both	How do actual resource and service accomplishments compare to those projected in the Forest Plan Appendix D, Proposed and Probable Practices?	Forest Plan Goal 1	Actual annual resource and service accomplishments for management activities listed the Forest Plan, Appendix D, Table D-5.	NO CHANGE	Compile information from annual accomplishment reports, sold timber sale contracts, and personal communication with resource program managers.	Annually	n/a
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1	Element 8 The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C)) (see FSH 1909.12, chapter 30, Section 32.13g)	Both	To what extent are management activities impacting soil quality and productivity?	Forest Plan Goal 3 Objective: Minimize the adverse impacts on soils from management activities.	Within the Forest Service Soil Disturbance Monitoring Protocol sampling and monitoring areas what is the: 1) Amount of forest floor impacted 2) Amount of topsoil displacement 3) Severity of rutted, burned or compacted soil 4) Severity of platy/massive soil structures, or puddled soil	NO CHANGE	USFS Soil Disturbance Monitoring Protocol. Collect data annually and evaluate every 5 years.	Annually	Page-Dumroese, D.; Neary, D.; Trettin, C., tech. eds. 2010. Scientific background for soil monitoring on National Forests and Rangelands: workshop proceedings; April 29-30, 2008; Denver, CO. Proc. RMRS-P-59. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 126 p.
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