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Forest Service Manual 2000 – National Forest Resource Management

Chapter 2040 – National Forest System Monitoring

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Approved by: Christopher French, Deputy Chief, National Forest System

Date approved:

Responsible Staff: Ecosystem Management Coordination (EMC)

Explanation of changes: Following is an explanation of the changes throughout the directive by section.

Chapter 2040 – Establishes a new chapter and new direction for all types of monitoring activities across the National Forest System to track conditions and inform evidence-based decision-making and adaptive management. This chapter replaces existing direction in Forest Service Manual 1940 – Inventory, Monitoring, and Assessment Activities that established an information framework and related business operations for data collection. This chapter complements existing direction in Forest Service Handbook 1909.12 chapter 30 – Land Management Plan Monitoring and Forest Service Manual chapter 3410 – Detection, Monitoring, and Evaluation.

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2040.01 – Authority

The following authorities authorize the Forest Service to conduct monitoring, adaptive management, evidence-based decision-making, and data lifecycle management. Some of these authorities expressly anticipate cooperative roles with Tribes, Alaska Native corporations, Native Hawaiian organizations, State, and Federal agencies. Other related authorities direct the Forest Service Research and Development deputy area to collect, analyze, and share data under the Forest Inventory and Analysis program.

National Environmental Policy Act of 1969 (Pub. L. 91-190, 42 U.S.C. 4921-4347).

Section 102 directs that all agencies of the Federal government shall utilize a systematic, interdisciplinary approach to ensure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on the human environment. See Forest Service Handbook 1909.15-National Environmental Policy Act Handbook. See Council on Environmental Quality (CEQ) regulations implementing the NEPA, particularly the sections relevant to monitoring of decisions at 40 CFR sections 1502.3 and 1505.3.

Range and Renewable Resources Planning Act of 1974 (Pub. L. No 93-378), as amended by the National Forest Management Act of 1976, as amended (Pub. L. 94-588, 16 U.S.C. 1600 et. seq.).

The Act provides for the Forest Service to "ensure research on and (based upon continuous monitoring and assessment in the field) evaluation of the effects of each management system..."

Subpart A of the implementing regulations at National Forest System Land Management Planning Rule, as Amended (36 CFR 219, July 1, 2017) sets out the planning requirements for developing, amending, and revising land management plans for units of the National Forest System. Section 219.12 describes monitoring requirements and the application of adaptive management. See Forest Service Handbook 1909.12 zero code for direction specific to adaptive management and chapter 30 for direction specific to monitoring and adaptive management.

Information Quality Act of 2001 (Data Quality Act, Pub. L. 10-554, sec. 515).

The Government Accountability Office uses the name "Information Quality Act" (IQA). IQA directs the Office of Management and Budget to issue government-wide guidelines that "provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies." Other Federal agencies are also required to publish their own guidelines for information quality and peer review agendas.

Federal Information Technology Acquisition Reform Act of 2014 (Pub. L. 113-291, div. A, Title VIII, subtitle D).

This puts the Federal agency Chief Information Officers in control of information technology (IT) investments with the objective to improve IT management within an agency by reducing duplicative systems, examining software licensing options, making the business case for acquisition, and consolidating data centers.

Forest and Rangeland Renewable Resources Research Act of 1978 (Pub. L. 95-307 sec. 3, 16 U.S.C. 1642(e), as amended by Pub. L. 105-185, Title II, § 253(b),(c)).

Section 3(c)(1)(A) requires the Forest Service to increase the frequency of forest inventories in matters that relate to atmospheric pollution and conduct such surveys as are necessary to monitor long-term trends in the health and productivity of domestic forest ecosystems and submit annual reports on research and monitoring efforts. This Act authorizes the Forest Inventory and Analysis program.

Foundations for Evidence-Based Policymaking Act of 2018 (Pub. L. 115-435, 5 U.S.C. 311-315).

Section 101 emphasizes collaboration and coordination to advance data and evidence-building functions in the Federal Government by statutorily mandating Federal evidence-building activities, open government data, and confidential information protection and statistical efficiency. Section 101 also states that the head of each agency shall establish evaluation officers and an advisory committee on data for evidence building.

Agriculture Improvement Act of 2018 (The 2018 Farm Bill, Pub. L. 115-334).

Section 8629 reauthorized the Collaborative Forest Landscape Restoration Program and continued the statutory requirement that the Program use a multiparty monitoring, evaluation, and accountability process to assess the positive or negative ecological, social, and economic effects of projects implementing a selected proposal for not less than 15 years after project implementation commences. Program funding can be used to pay for monitoring of restoration treatments on National Forest System lands. This Act also requires improving use and integration of remote sensing technologies.

Crowdsourcing and Citizen Science Act of 2017 (Pub. L. 114-329, 15 U.S.C. 3724).

This Act recognizes that crowdsourcing and citizen science projects contribute to a variety of unique benefits. These include accelerating scientific research, increasing cost effectiveness to maximize the return on taxpayer dollars, addressing societal needs, providing hands-on learning in science, technology, engineering, and math (STEM), and connecting members of the public directly to Federal science agency missions and to each other. This Act also grants Federal science agencies the direct, explicit authority to use crowdsourcing and citizen science to encourage its appropriate use to advance Federal science agency missions and stimulate and facilitate broader public participation in the innovation process, yielding numerous benefits to the Federal Government and citizens who participate in such projects.

2040.02 – Objective

As an agency, the Forest Service monitors to measure progress toward social, economic, and ecological objectives, within the financial and technical capabilities of the Agency based on evidence, and to adapt land and resource management practices. Exhibit 01 shows that monitoring informs how the Agency practices adaptive land and resource management. The Forest Service may monitor ecological, social, and economic conditions to respond to public concerns when there is a high degree of uncertainty, and to determine if management approaches are effective. Information management is an important component of monitoring and is critical to successfully implementing this policy and adaptively managing lands and resources.

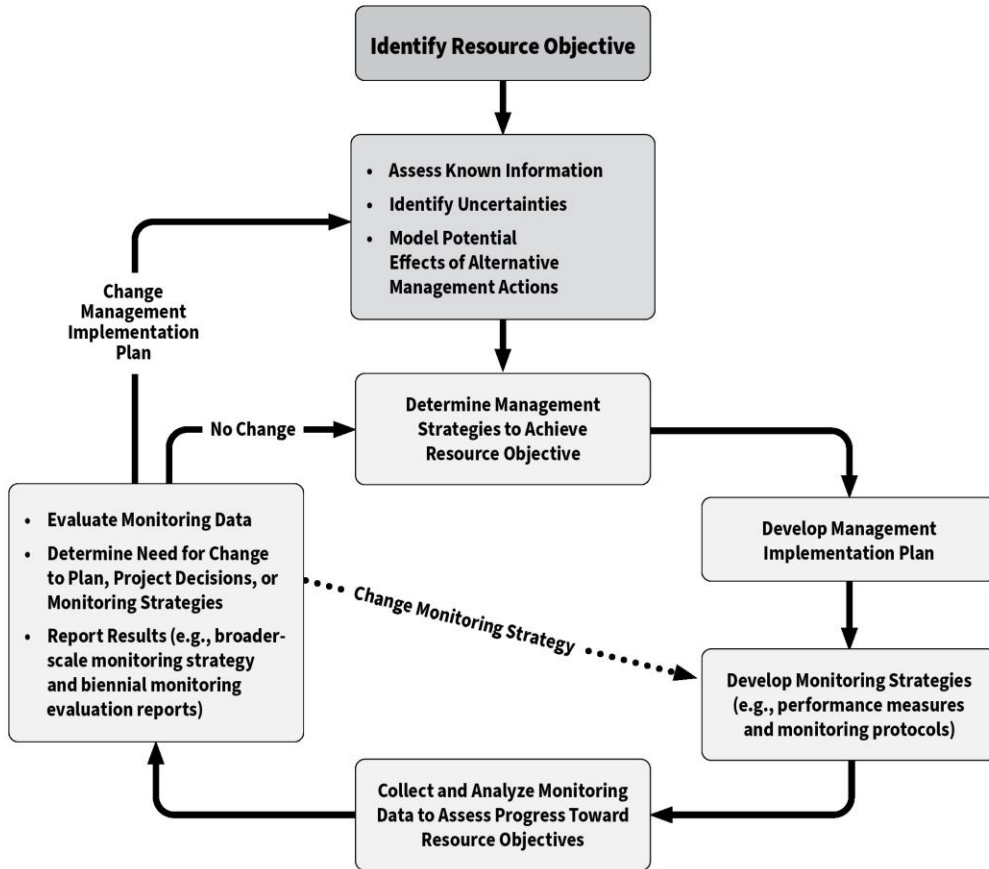
The Forest Service's objective is for National Forest System monitoring to promote learning to reduce uncertainty, inform land and resource management practices, and comply with laws, regulations, and policy, within the financial and technical capabilities of the Agency. The Forest Service achieves these objectives through five fundamental principles:

1. Conduct monitoring strategically and efficiently.
2. Be transparent by tracking, meeting, and sharing monitoring commitments.
3. Base monitoring methods on accurate, reliable, relevant science and Indigenous Knowledge.
4. Engage in internal and external partnerships.
5. Use current technology and existing data sets and data management systems.

With this policy, the Forest Service builds upon the Agency's existing monitoring foundation by governing the development and implementation of efficient, transparent, science-based monitoring programs that use high-quality monitoring questions and data to adaptively manage National Forest System lands ensuring that monitoring programs benefit the needs of the Agency. In doing so, the Forest Service relies on data from existing monitoring programs to increase efficiency and avoid duplicative efforts.

2040.02 – Exhibit 01

Monitoring to Inform Adaptive Land and Resource Management



2040.03 – Policy

It is the policy of the Forest Service to monitor National Forest System lands and resources to track conditions and inform evidence-based decision-making and adaptive management, within the financial and technical capabilities of the Agency. This is done in a way that:

1. (Principle 1). Is strategic and efficient. Monitoring is:
 - a. Relevant to land and resource management needs, addresses uncertainty, and provides information needed to examine monitoring program effectiveness and evaluate whether management practices are effective. The Forest Service adjusts through a structured learning process such as adaptive management.
 - b. Coordinated and integrated across staff areas, program areas, and organizational levels, and with other agencies, State and local governments, Tribal governments, Alaska Native corporations, Native Hawaiian organizations, and others outside of government.
 - c. Capitalizes on existing monitoring programs, such as Forest Inventory and Analysis, and addresses multiple needs.
 - d. Aligned with Agency mission, strategic goals, law, regulation, policy, and other business requirements to eliminate redundancy, maximize usefulness, and streamline monitoring commitments. Monitoring priorities reflect important management issues, challenges, and uncertainties while informing management decisions.
 - e. Reviewed and evaluated at least every 5 to 7 years at national-, regional-, and unit-levels to support decisions about what information is needed, the frequency that its needed, and at what land-management scale and scope it informs.

Outcomes are approved and funded by the applicable Responsible Official (National Forest System Deputy Chief, Regional Forester, or Unit Supervisor), documented in a way that creates continuity as personnel change, and made available to internal and external partners and interested and affected parties.

The review and evaluation process includes the following steps:

1. Determine information needs and gather existing monitoring activities.
2. Identify where information needs are not being addressed through existing monitoring activities and look for opportunities to streamline (for example, consider using existing data and protocols or discontinuing monitoring activities that no longer meet information needs) to address information gaps.
3. Consider the most appropriate scale of monitoring needed.

4. Consider the risk and consequence of not obtaining monitoring data to inform land and resource management.
 5. Consider the importance of being able to quickly respond to landscape or other changes (for example, consider the frequency and detail of monitoring needed).
 6. Consider funding and staffing capabilities, partnerships, and/or similar criteria.
2. (Principle 2). Is transparent and tracks, meets, and shares monitoring commitments. Monitoring is:
- a. Designed and implemented to meet monitoring objectives based on Agency and public needs at the appropriate organizational, temporal, and spatial scale.
 - b. Committed to only when it is necessary and useful to inform land and resource management information needs. Once committed to, monitoring is fully implemented until an evaluation process identifies the monitoring information is no longer relevant to Agency needs.
 - c. Transparent to those within the Agency, Tribes, Alaska Native corporations, Native Hawaiian organizations, other Federal agencies, States, and other interested and affected parties through meaningful engagement and tracking and sharing monitoring questions, commitments, protocols, and results.
 - d. Communicated using clear and concise language in a form and style that is relevant to the intended audience, understanding that unique consideration should be given to the specific needs of Tribes, members of Tribal communities, Alaska Native corporations, and Native Hawaiian organizations during government-to-government interactions.
3. (Principle 3). Is based on accurate, reliable, and relevant science and Indigenous Knowledge. The Forest Service identifies and evaluates:
- a. Monitoring objectives, questions, indicators, data sources, and analysis methods (provided via a National Forest System menu of examples or other tool or mechanism) that focus on Agency monitoring needs at national, regional, and unit scales to inform land and resource adaptive management, reveal trends, and reduce uncertainty. The menu of examples or other similar tool or mechanism is regularly revised to reflect changing Agency needs and updated science, technology, and data sources. A core set of indicators and definitions is retained for accurate analysis of trends through time.
 - b. Sample design and established data collection protocols (provided via a National Forest System protocol repository) and data acquisition and analysis methods to ensure accuracy, precision, relevance, and replicability through time, location, and

organizational change. The repository is regularly revised to reflect changing Agency needs and updated science, technology, and data sources.

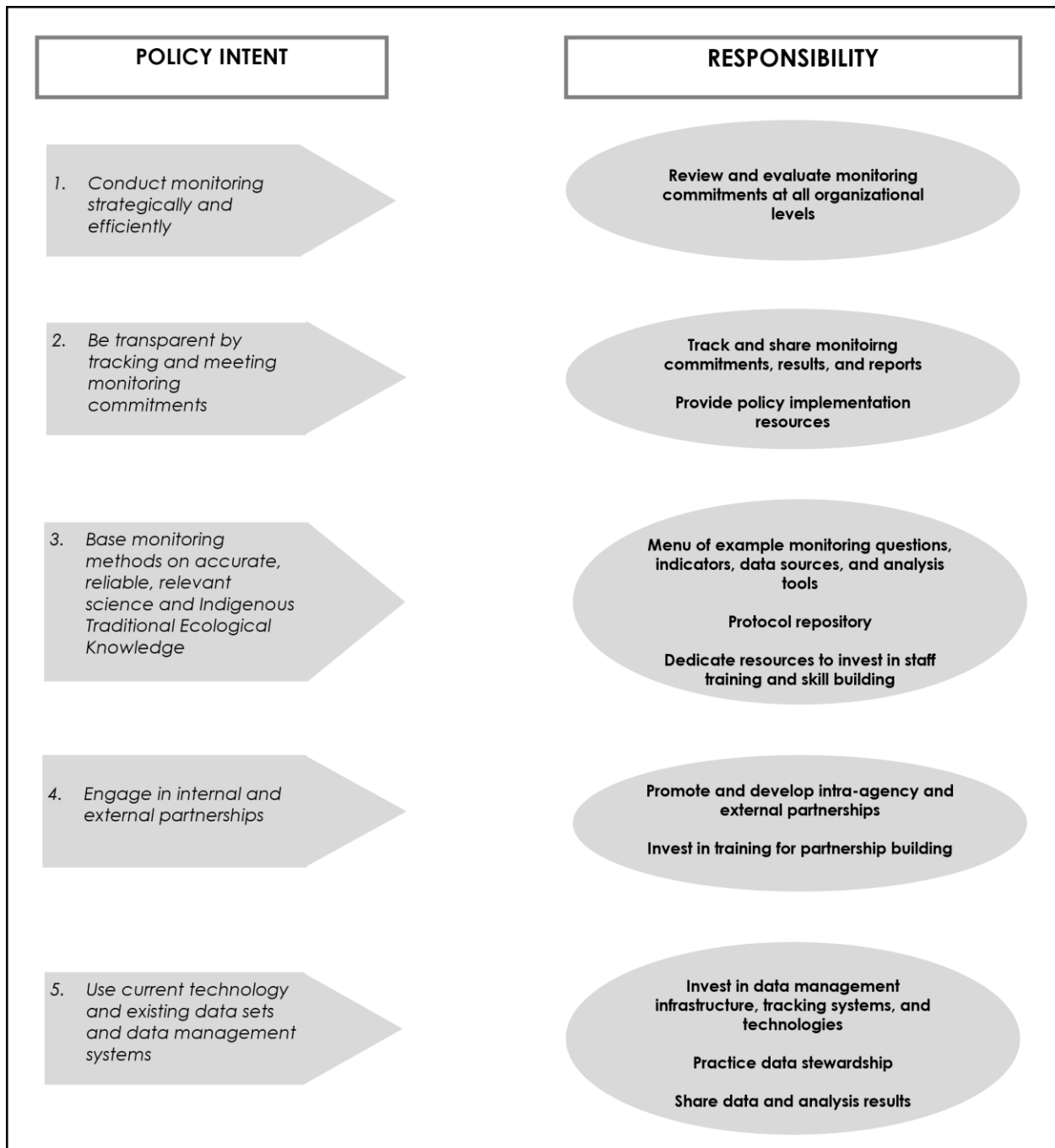
- c. Skills, training, and technology necessary to design, collect, store, analyze, and interpret monitoring data and information to facilitate adaptive management.
 - d. How established broader-scale monitoring and national dataset and reporting mechanisms can be leveraged for monitoring program efficiencies.
4. (Principle 4). Engages in internal and external partnerships. The Forest Service:
- a. Recognizes the important role of intra-agency partnerships among the National Forest System, Research and Development, State, Private, and Tribal Forestry, and others to design and implement monitoring and analyze and report monitoring results.
 - b. Integrates multiparty monitoring and other external partnerships to add capacity and expertise.
 - c. Recognizes the value of building and maintaining partner relationships and ensures that staff have the skills, training, and experience necessary to work with partners and administer partnership agreements.
 - d. Allows for exchange and use of monitoring data with external agencies and other landowner monitoring efforts to foster learning across jurisdictional boundaries.
5. (Principle 5). Uses current technology and existing datasets and data management systems. The Forest Service:
- a. Uses existing datasets, reporting mechanisms, and information products that meet established quality and metadata criteria to gather information that addresses key management question protocols.
 - b. Ensures data integrity and ease of access through appropriate data entry, storage, management, and sharing methods.
 - c. Invests in technology that promotes efficiency, data quality, and transparency and invests in improving or expanding existing data systems and connecting data sets that span regional or organizational boundaries to meet monitoring needs and address key management questions.
 - d. Invests in technology that promotes quantification of remote sensing data, user-friendly and accessible databases, web-based spatial tools, and electronic onsite field data capture.

2040.04 – Responsibility

See exhibit 01 for a summary of the responsibilities across all organizational levels as described in this section. Exhibit 01 shows how each responsibility fulfills the objective, the five guiding principles, and the intent as described in policy section 2040.03.

2040.04 – Exhibit 01

Policy and Responsibility Sections Crosswalk



2040.04a – National Forest System Deputy Chief

The National Forest System Deputy Chief works closely with other Deputy Chiefs, including Research and Development and State, Private, and Tribal Forestry and their staffs, Regional Foresters, and Washington Office National Forest System Directors, to evaluate how well existing monitoring programs inform land and resource management.

The Deputy Chief's primary roles are to consider the importance of monitoring to provide critical information needed for land and resource management when setting priorities and budgets to provide implementation resources. The Deputy Chief will also regularly call attention to the use and quality of monitoring and challenge staff to continually improve their monitoring programs. The Deputy Chief will:

1. Direct the Ecosystem Management Coordination Director or designees to coordinate monitoring and adaptive management efforts and expertise across Agency Deputy Areas and with other National Forest System Directors to support regions.
2. Regularly review and approve national-level review and evaluation process results coordinated across National Forest System Director Areas and in collaboration with other Deputy Areas.
3. Review and approve recommendations from Washington Office Directors, working with the USDA Natural Resources and Environment Assistant Chief Information Officer and Assistant Chief Data Officer, on needed investments in data lifecycle management infrastructure, data tracking systems, and technologies, using established information technology and data governance processes. Recommendations should be encouraged to be included as part of periodic Chief's Reviews of regions or other similar mechanisms.
4. Promote monitoring partnerships at logical spatial scales that consider ecological, social, and economic conditions of National Forest System lands.
5. Review and approve a report, tool, or other mechanism, developed at least every 5-7 years by the Ecosystem Management Coordination Director in coordination with others, which summarizes implementation outcomes from this policy and recommendations for adapting the Agency's approach.
6. Identify and provide resources to promote successful implementation of this monitoring policy to ensure that the Agency is capable and qualified to perform monitoring and to promote and facilitate monitoring partnerships. Resources include funding, training, expertise, equipment, and time.
7. Ensure that all existing or new monitoring direction provided in other National Forest System directives is reviewed for consistency with this policy. If any changes are needed to existing monitoring direction, ensure that they are initiated within 3 years of finalization of this policy. Ensure that any new monitoring direction initiated after finalization of this policy conforms to this policy.

2040.04b – Washington Office National Forest System Directors

Washington Office National Forest System Staff Directors, conferring with Research and Development and State, Private, and Tribal Forestry Deputy Area Directors and Regional Foresters or their designees, compare programmatic monitoring data and information needs and seek ways to rely on and maintain existing datasets and reporting mechanisms, share monitoring data and information, and ensure the resulting data is sufficient to inform adaptive management. They will:

1. Provide monitoring and adaptive management assistance, support, training, guidance, and learning opportunities to regions.
2. Regularly review and evaluate national-level monitoring, as described in policy section 2040.03.1e. Provide national-level review and evaluation process-outcome recommendations to the Deputy Chief through the Ecosystem Management Coordination Director.
3. Work with the Research and Development Inventory Monitoring and Assessment Research Director and the State, Private, and Tribal Forestry Forest Health Protection Director to use national monitoring datasets and reporting tools to meet programmatic information needs.
4. Work with the Office of Tribal Relations Director to ensure Indigenous Knowledge protocols and correlating national monitoring datasets and reporting tools meet the Office of Tribal Relations programmatic information needs.
5. Make strategic investments to support using national datasets and expand existing monitoring systems rather than designing additional systems.
6. Assess if current protocols, databases, and reporting applications are meeting National Forest System monitoring needs. Ensure data steward and data manager program oversight and reporting is being accomplished.
7. Work with the USDA Natural Resources and Environment Assistant Chief Information Officer and the Assistant Chief Data Officer to define requirements for data lifecycle management infrastructure and analysis applications to meet monitoring needs.
8. Work with the USDA Natural Resources and Environment Assistant Chief Data Officer and Assistant Chief Information Officer to consider using other Federal or State agency or partner databases or data management systems to gain efficiencies and/or improve inhouse systems to track and share monitoring information. Only develop new systems based on the results of a business requirements analysis and an evaluation of staffing and funding capabilities. Provide recommendations to the Deputy Chief.

9. Work with Unit Supervisors and partners to develop optional-use tools and mechanisms, as described in policy section 2040.03.3, for monitoring questions, to establish protocols, and/or for other needs.
10. Periodically provide information to the Ecosystem Management Coordination Director to compile one National Forest System-wide report summarizing implementation outcomes from this policy.
11. Evaluate the extent and location of existing legacy monitoring data and explore methods for using contemporary technologies to increase accessibility, assess data quality, and facilitate efficient data use.
12. Collaborate with intra-agency and external partners to solicit contributions to monitoring and data collection, analysis, management, and reporting processes. Ensure that partner-managed protocols or datasets address Agency needs.

2040.04c – Ecosystem Management Coordination Director

The Ecosystem Management Coordination Director or designees coordinate with other National Forest System Directors; the Research and Development Deputy Area Director; the State, Private, and Tribal Forestry Deputy Area Director; and Regional Foresters or their designees to understand and promote monitoring efforts and programs. The Director or designees provide support and ensure that monitoring effectively and efficiently meets Agency needs. They will:

1. Lead a collaborative effort across National Forest System program areas and, with other Deputy Area Directors, regularly review and evaluate national-level monitoring, as described in policy section 2040.03.1e. Provide national-level review and evaluation process-outcome recommendations to the Deputy Chief for review, approval, and dissemination. Share approved national-level review and evaluation process outcomes with others, including Regional Foresters, for their consideration and use when they review and evaluate regional-level monitoring.
2. Lead a collaborative effort across National Forest System program areas and with Deputy Areas, Regional Foresters, and partners, develop optional-use tools and mechanisms to achieve the intent described in policy section 2040.03.3.
3. Coordinate development, support, and technical transfer of national reporting and analysis tools that support monitoring questions and indicators based on national datasets that are collected for this purpose.
4. Provide leadership, support, training, guidance, and learning opportunities and foster collaboration networks for employees to enhance monitoring and adaptive management skillsets. Doing so includes adaptive management implementation guidance (for example, how monitoring fits into the adaptive management cycle) or other approaches to address uncertainty (for example, scenario planning, how approaches inform decision-making, and identifying useful triggers and benchmarks).

5. Develop a report, tool, or other mechanism that summarizes implementation outcomes from this policy and recommendations for adapting the Agency's approach at least every 5-7 years. Coordinate the development of a report, tool or other mechanism with Regional Foresters and other National Forest System Directors. A report can take the form of a dashboard, data visualization, or be captured as part of an existing report. Whenever possible, use existing reporting requirements and mechanisms to facilitate preparation and/or distribution.
6. Collaborate with internal and external partners to solicit their contributions into monitoring and data collection, management, and reporting processes.

2040.04d – Regional Foresters

Regional Foresters or their designees, working closely with Washington Office National Forest System Directors and Unit Supervisors, convene discussions and coordinate across units and program areas within their region to consider the importance of monitoring when setting regional priorities. Regional Foresters or their designees ensure that monitoring across the region effectively and efficiently meets the Agency's needs. They will:

1. Regularly review and evaluate regional-level monitoring across program areas, referencing and tiering to the resulting streamlined monitoring needs based on national-level review and evaluation process outcomes (see sec. 2040.04c) before finalizing. Share approved regional-level review and evaluation process outcomes with Unit Supervisors for their consideration and use when they review and evaluate unit-level monitoring. Integrate regional review and evaluation process outcomes with broader-scale monitoring requirements from the Planning Rule (36 CFR 219) and demonstrate clear connections between regional-scale monitoring and other efforts such as State and partner collaboration.
2. Coordinate across program areas about the tools described in policy section 2040.03.3, especially when developing broader-scale monitoring strategies. Contribute to tool content to ensure they reflect the informational needs of the region and public.
3. Ensure that regional-level or broader-scale monitoring is accurate, reliable, and relevant to management needs. Results are evaluated with adaptive management needs considered, reported, and communicated to meet the needs of the responsible official and the public. When more rigor is needed, use national monitoring datasets and systems and ensure that established data collection protocols are used.
4. Ensure monitoring data meet data quality standards and open data requirements and are entered with accompanying metadata into Agency-wide corporate databases or other approved internal or external data systems.
5. Track implementation of this policy at the regional level and periodically provide information to the Ecosystem Management Coordination Director to coordinate

development of a report, tool, or other mechanism that summarizes implementation outcomes of this policy and recommendations to adapt the Agency's approach (see sec. 2040.04c).

6. Dedicate funds and other resources to units to complete monitoring corresponding with results from the regional-level review and evaluation process and to leverage multiparty monitoring.
7. Ensure that staff who are involved in monitoring have the training, skills, and technology necessary to collect, store, analyze, and interpret monitoring data and facilitate adaptive management. In coordination with Unit Supervisors, conduct analysis and reporting of monitoring results at the regional-level to minimize the unit-level workload.
8. Ensure program managers and others involved have the training, skills, and experience necessary to build relationships, work with Tribes, Tribal organizations, partners, and administer partnership and co-stewardship agreements.
9. Coordinate with internal and external partners to solicit their contributions into monitoring and data collection, management, evaluation, and reporting processes and to promote partnerships that address regional management questions.
10. Facilitate data and information sharing with partners, across units, with other regions, and with other interested and affected parties.
11. Organize regional trainings and learning opportunities, which supplement national adaptive management and monitoring trainings, to build capacity for monitoring and improve how monitoring results are used to adaptively manage.

2040.04e – Administrative Unit Supervisors (Forests, Grasslands, and Areas)

Administrative Unit Supervisors, working closely with Regional Foresters, convene discussions and coordinate across districts and program areas to ensure they consider the importance of monitoring in providing critical information needed for land and resource management when setting unit priorities and to ensure monitoring across their unit effectively and efficiently meets the Agency's information needs. They will:

1. Regularly review and evaluate unit-level monitoring, referencing and tiering to the resulting monitoring needs based on regional-level review and evaluation process outcomes (see sec. 2040.04d) before finalizing. Share approved unit-level review and evaluation process outcomes with District Rangers so district-level monitoring reflects review and evaluation process outcomes. Integrate unit-level review and evaluation process outcomes with land management plan monitoring program development or revisions and biennial monitoring evaluation reporting requirements from the Planning Rule (36 CFR 219). Consider data availability and use beyond unit boundaries.

2. Coordinate across program areas to use the tools described in policy section 2040.03.3 especially during land management plan monitoring program development or revisions and when developing biennial monitoring evaluation reports. Contribute to tool content to ensure they reflect the information needs of the unit and public.
3. Ensure that unit-level monitoring is accurate, reliable, and relevant to management needs. Results are evaluated with adaptive management needs considered, reported, and communicated to meet the needs of the responsible official and the public. When more rigor is needed, ensure established data collection protocols are used. In coordination with Regional Foresters, provide necessary information to regional program managers so that they can conduct analysis and reporting of monitoring results at the regional-level to minimize the unit-level workload.
4. Ensure that monitoring data meet data quality standards and open data requirements and are entered with accompanying metadata into corporate databases or other approved data systems.
5. Collaborate with internal and external partners to solicit their contributions to monitoring and data collection, management, and reporting processes, and to promote partnerships that address unit-level management questions.

2040.04f – District Rangers

District Rangers, working closely with Unit supervisors, will convene discussions and coordinate across program areas to ensure that monitoring across their Districts effectively and efficiently meets the Agency's information needs. They will:

1. Ensure that district-level monitoring reflects monitoring needs based on unit-level review and evaluation process outcomes (see sec. 2040.04e). Ensure that district-level monitoring is accurate, reliable, and relevant to management needs. Results are evaluated with adaptive management needs considered, reported, and communicated to meet the needs of the responsible official and the public. When more rigor is needed, ensure established data collection protocols are used.
 - a. Integrate monitoring evaluation and reporting with biennial monitoring evaluation reporting requirements from the Planning Rule (36 CFR 219).
 - b. When appropriate and in coordination with Unit Supervisors, provide necessary information to unit or regional program managers so they can conduct analysis and report monitoring results at the unit- or regional-level to minimize the district-level workload.
2. Ensure monitoring data meet data quality standards and open data requirements and are entered with accompanying metadata into corporate databases or other approved data systems.

- Promote district-level internal and external partnerships to address unique management questions.

2040.05 – Definitions

Adaptive Management. Adaptive management is a structured, cyclical process for resource management decision-making in the face of uncertainty and changing conditions with feedback from monitoring to actively test assumptions, track relevant conditions over time, and measure management effectiveness.

Assessment. The identification and evaluation of existing information to support land management and resource planning (FSH 1909.12.05).

Business Requirements. A need identified as necessary for successful achievement of business goals/objectives, (including strategic, tactical, legal, or operational objectives). Business requirements may be represented in a variety of contexts and are most often defined in response to establishing requirements for processes, compliance to business direction, and to identification of information technology functionality requirements.

Citizen Science. See multiparty monitoring.

Corporate Database. Enterprise-wide information management systems using a common information structure and processes to store, maintain and access shared automated inventory, monitoring, and assessment data.

Data Lifecycle Management. The practice of collecting, keeping, and using data securely, effectively, efficiently, and throughout its life, including acquisition, storage and maintenance, use, archiving, and destruction.

Data Standardization. National Forest System management systems that use a common information structure to load, store, maintain, and access shared inventory, monitoring, and assessment data, allowing for easier reporting capabilities.

Data Quality. The degree to which data is accurate, complete, timely, consistent with all requirements and business rules, and relevant for a given use. See also information quality.

Desired Conditions. A description of specific social, economic, and/or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed. Desired conditions must be described in terms that are specific enough to allow progress toward their achievement to be determined, but do not include completion dates (36 CFR 219.7(e)(1)(i)). Desired conditions are achievable and might reflect social, economic, or ecological attributes, including ecosystem processes and functions (FSH 1909.12.05).

Established Protocol. Detailed instructions for conducting a survey to support inventory, monitoring, or assessment activities. These instructions include information on sampling procedures, data collection, management, analysis, and reporting of results. Established protocols are scientifically validated and justified. They promote continuity of data collection methods for both the duration of the survey and among similar surveys in different areas.

Indigenous Knowledge. A body of observations, oral and written knowledge, innovations, practices, and beliefs developed by Tribes and Indigenous Peoples through interaction and experience with the environment. (see OSTP and CEQ Memo, November 30, 2022).

Information. Information is the result of processing, manipulating, and organizing data in a way that adds to the knowledge of the receiver.

1. **Information Management.** How an organization plans, collects, organizes, uses, controls, disseminates, and disposes of its inventory, monitoring, and assessment information.
2. **Information Quality.** The utility, objectivity, and integrity of information. “Utility” is the usefulness of the information to its intended users, including the public. “Objectivity” addresses whether disseminated information is being presented in an accurate, clear, complete, and unbiased manner to ensure accurate, reliable, and unbiased information. “Integrity” is the security of information—protection of the information from unauthorized access or revision to ensure that it is not compromised through corruption or falsification (67 FR 8451).

Inventory. A collection of data in a given area through a set period of time. Inventories help explain how a resource is progressing, but they do not detect change through time.

Monitoring. The systematic collection and analysis of repeated observations or measurements to evaluate changes in natural resource, social and/or economic conditions and progress toward meeting resource or management objectives. The types of monitoring addressed in this policy include:

1. **Effectiveness Monitoring.** Monitoring to determine whether resource objectives were met. Effectiveness monitoring, alongside implementation monitoring, is a critical component of an adaptive management approach to land and resource management. Comparing monitoring results with expected results might indicate a need to initiate, intensify, or alter management actions.
2. **Implementation Monitoring.** Monitoring actions implemented to address if planned management activities occurred and if the activities occurred in the planned location, time, and extent.
3. **Multiparty monitoring.** A way to collaborate with external partners and organizations through sharing responsibility, decision-making and ownership to collect, evaluate and report monitoring information. Includes concepts such as citizen science, community science, crowdsourcing, and other partnership techniques and methods.
4. **Surveillance Monitoring.** Designed to document resource change through time. This type of monitoring is not tied to specific predictions of how a natural resource will respond to management or environmental stressors.

5. **Validation Monitoring.** Assesses the continuing validity of assumptions considering new information and resource conditions.

Open Data Requirements. Require Federal agencies to make each data asset of the agency available in an open format and make each public data asset of the agency available as an open government data asset under an open license (Pub. L. 115-435 Open Government Data Act, 44 U.S.C. 3506).

Uncertainty. Having incomplete control of management actions, errors in measurement and sampling variation, environmental variability, and an incomplete understanding of system dynamics or management outcomes.