

MS 1735 – INVENTORY AND MONITORING OF ECOLOGICAL RESOURCES

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CHAPTER 1 OVERVIEW

1.1 Purpose

This manual sets forth the authorities, responsibilities, and policies for collecting, managing, and applying high-quality, science-based inventory, assessment, and monitoring information related to **ecological resources**¹ on public lands managed by the Bureau of Land Management (BLM). This manual addresses the monitoring of diverse ecological resources as required by statute and policy, including vegetation, soils, habitats, fish, wildlife and special status species populations, surface water features, groundwater, wild horse and burro populations, genetic diversity, air resources, and others. This manual draws upon the BLM’s **Assessment, Inventory, and Monitoring (AIM) Strategy, principles, and program**, BLM’s nationally standardized monitoring approach for the condition and trend of upland, stream and river, and wetland and riparian resources.

Inventory, assessment, and monitoring information (or “monitoring information”) provides evidence to support land management planning and decision-making in accordance with the BLM mission to sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations. In particular, this information addresses the **land health fundamentals and standards**, which are set by and according to regulation and inform the BLM’s responsibility for sustaining healthy public lands for future generations. This manual provides an integrative framework to ensure that monitoring activities are well-coordinated, efficient, and provide maximal information. This guidance applies to national, regional, and local monitoring activities across program areas, including but not limited to: national inventories of public lands; land use planning and plan effectiveness monitoring; evaluation of land health standards; fish, wildlife, and special status species habitat management; aquatic resources management; rangeland management; wild horse and burro management; management of the National Landscape Conservation System; planning for and evaluating effectiveness of fire and fuels management, restoration and reclamation; and monitoring authorized uses.

1.2 Objectives

The goals of the BLM’s monitoring activities are to maintain a current inventory of public lands and provide information for land management decision-making, in keeping with the principles of multiple use and **sustained yield** and other applicable statutes, regulations, and policy. The objectives of this manual are two-fold:

- A. Provide a standardized approach for the inventory, assessment, and monitoring of ecological resource condition and trend on public lands managed by the BLM, building on the AIM principles.
- B. Provide the basis for applying ecological resource information to BLM land management decision-making.

¹ Words appearing in bold are defined in the glossary.

These policies guide the BLM in achieving our mission across program areas engaged in management of ecological resources, in alignment with the laws that guide those program areas (refer to 1.3 Authority). They also ensure that monitoring is as efficient and cost-effective as possible.

Through the policies in this manual, the BLM invests in key products of adaptive monitoring programs (Kachergis et al. 2021), including integrated, interdisciplinary monitoring plans; high quality, standard data and information about the condition and trend of ecological resources; electronic databases and data management procedures; appropriate monitoring designs; map products derived from remote sensing; and evidence-based, defensible actions, land uses, and **adaptive management** decisions.

Indigenous Knowledge is an important source of information for ecological resource management, meeting the standards of “high-quality information” (43 CFR 6101.4(f)), and an important component of the BLM’s trust responsibilities. Indigenous Knowledge may be useful for inventory, monitoring and assessment and to inform specific decisions. Many additional laws and policies govern the use of Indigenous Knowledge and therefore we do not cover Indigenous Knowledge in detail in this manual. However, the principles described in this manual may also apply to Indigenous Knowledge.

1.3 Authority

This section lists statutes and regulations that require, give rise to the need for, or otherwise direct or inform the collection, management, and application of high-quality, science-based inventory, assessment, and monitoring information related to ecological resources on BLM-managed lands.

A. Legislation

1. Alaska National Interest Lands Conservation Act (ANILCA) of 1980, 16 U.S.C. § 3101 et seq. ANILCA establishes and directs land management responsibilities specific to Alaska.
2. Anadromous Fish Conservation Act of 1965, 16 U.S.C. § 755 et seq. The Anadromous Fish Conservation Act authorizes the Secretary of the Interior to initiate with States a cooperative program for the conservation, development, and enhancement of the Nation’s anadromous fish. 16 U.S.C. § 757a.
3. Antiquities Act of 1906, 54 U.S.C. § 320101 et seq. The Antiquities Act authorizes the President to declare historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest and reserve land as national monuments for the protection of such objects.
4. Clean Air Act (CAA) of 1970, 42 U.S.C. § 7401 et seq. The CAA regulates air emissions and provides for a program of air quality assessments and monitoring to understand air pollutants and plans for the reduction of emissions for areas that do not attain certain air quality standards.

5. Clean Water Act (CWA) of 1987, 33 U.S.C. § 1251 et seq. The CWA provides for a program of water quality assessment and monitoring to identify and assess sources, extent, and effect of aquatic pollutants. 33 U.S.C. § 1271.
6. Crowdsourcing and Citizen Science Act of 2017, 15 U.S.C. § 3724. The Crowdsourcing and Citizen Science Act authorizes collaboration between Federal science agencies and the public, including in the collection and analysis of data.
7. Endangered Species Act (ESA) of 1973, 16 U.S.C. § 1531 et seq. The ESA charges Federal agencies to utilize their authorities to achieve the purposes of the Act by carrying out programs and activities for the conservation of endangered and threatened species, and ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of designated critical habitat for such species. In so doing, agencies are required to use the best scientific and commercial data available. 16 U.S.C. § 1536.
8. Federal Land Policy and Management Act (FLPMA) of 1976, 43 U.S.C. § 1701 et seq. FLPMA directs the Secretary to prepare and maintain on a continuing basis an inventory of all public lands and their resource and other values. This inventory shall be kept current so as to reflect changes in conditions and to identify new and emerging resource and other values. 43 U.S.C. § 1711. In the development and revision of land use plans, the Act further directs the Secretary to rely, to the extent it is available, on the inventory of the public lands, their resources, and other values. 43 U.S.C. § 1712(c)(4).
9. Fish and Wildlife Coordination Act of 1934, 16 U.S.C. § 661 et seq. The Fish and Wildlife Coordination Act provides for surveys and investigations of the wildlife of the public domain. 16 U.S.C. § 661.
10. Government Performance and Results Act (GPRA) of 1993, Pub. L. 103-62 (Aug. 3, 1993). The GPRA establishes for Federal agencies the goal of integrating budget and performance by directing those agencies to establish performance plans containing indicators upon which measurement of success will occur; to ensure, to the extent practicable, information relevancy, accuracy, and timeliness; and to assess program performance primarily according to outcome goals, rather than output goals, including outcome goals associated with cost, understandable dissemination, and mission achievement.
11. Healthy Forest Restoration Act, 16 U.S.C. § 6501 et seq. The Healthy Forest Restoration Act provides for the systematic gathering of information to address the impact of insect and disease infestations and other damaging agents on forest and rangeland health. 16 U.S.C. § 6501(4).
12. Information Quality Act of 2001, Pub. L. 106-554, section 515 (Dec 21, 2000). The Information Quality Act directs Federal agencies to ensure and maximize the quality,

objectivity, utility, and integrity of information disseminated, including statistical information, to ensure the information is useful, clear, and sound.

13. National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. § 4321 et seq. Section 102 of NEPA directs federal agencies to use 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. 42 U.S.C. § 4332(A). NEPA directs agencies to make information that is useful for restoring, maintaining, and enhancing the quality of the environment available to the public. 42 U.S.C. § 4332(J).
14. National Trail System Act of 1968, 16 U.S.C. § 1241 et seq. The National Trail System Act provides for the establishment and management of recreation, scenic, and historic trails.
15. Public Rangelands Improvement Act (PRIA) of 1978, 43 U.S.C. § 1901 et seq. PRIA directs the Secretary to update, develop (where necessary), and maintain on a continuing basis an inventory of range conditions and record of trends of range conditions on the public rangelands. 43 U.S.C. § 1903(a).
16. Surface Mining Control and Reclamation Act (SMCRA) of 1977, 30 U.S.C. § 1201 et seq. SMCRA requires surface mining operations to restore the land affected by surface mining to a condition capable of supporting the uses which it was capable of supporting prior to any mining, or higher or better uses of which there is reasonable likelihood. 30 U.S.C. § 1265(b)(2). Surface mining reclamation plans must describe the condition of the land to be covered by the permit prior to any mining including the uses existing at the time of the application and, if the land has a history of previous mining, the uses which preceded any mining; and the capability of the land prior to any mining to support a variety of uses giving consideration to soil and foundation characteristics, topography, vegetative cover, and, if applicable, a soil survey. 30 U.S.C. § 1258.
17. Taylor Grazing Act (TGA) of 1934, 43 U.S.C. § 315 et. seq. The TGA provides for the administration of grazing lands and their resources to provide for the orderly use, improvement, and development of rangelands, and authorizes the continued study of erosion and flood control to protect and rehabilitate those lands. 43 U.S.C. § 315a.
18. Title II of the Omnibus Public Land Management Act of 2009, 16 U.S.C. § 7201 et seq. The National Landscape Conservation System was established in order to conserve, protect, and restore nationally significant landscapes that have outstanding cultural, ecological, and scientific values. Fulfilling the purposes of this Act requires thorough inventory and monitoring of those values.
19. Wild and Scenic Rivers Act of 1968, 16 U.S.C. § 1271 et seq. The Wild and Scenic Rivers Act provides for the administration of certain rivers with outstanding values.

20. Wild and Free-Roaming Horses and Burros Act of 1971, 16 U.S.C. § 1331 *et seq.* The Wild and Free-Roaming Horses and Burros Act provides for the management of wild free-roaming horses and burros in a manner that is designed to achieve and maintain a thriving natural ecological balance on public lands, with consideration given to the recommendations of qualified scientists in the field of biology and ecology. The Act directs the Secretary to maintain a current inventory of wild free-roaming horses and burros on given areas of the public lands to assist in making determinations as to whether and where an overpopulation exists and whether action should be taken to remove excess animals.
21. Wilderness Act of 1964, 16 U.S.C. § 1131 *et seq.* The Wilderness Act provides for the administration of areas designated as wilderness and the preservation of the the wilderness character of such areas. 16 U.S.C. § 1131. In implementing the Wilderness Act, agencies must necessarily monitor and inventory wilderness attributes to identify and evaluate how selected actions and conditions related to wilderness character are changing.

B. Regulations

1. Conservation and Landscape Health (43 CFR part 6100). The Conservation and Landscape Health Rule provides for the use of conservation to support ecosystem resilience and prevent permanent impairment, unnecessary degradation, and undue degradation of public lands.
2. Data Collection Categorical Exclusion (43 CFR 46.210(e)). Nondestructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research, and monitoring activities are categorically excluded from environmental review under NEPA unless any of the extraordinary circumstances identified in 43 CFR 46.215 apply.
3. Fundamentals of Rangeland Health (43 CFR subpart 4180 (2005)). The Fundamentals of Rangeland Health provisions of the grazing regulations provide for the evaluation of rangeland conditions against established rangeland health standards.
4. NEPA (40 CFR chapter V, subchapter A). Council on Environmental Quality (CEQ) regulations that implement NEPA require that agencies shall ensure the professional integrity, including scientific integrity, of the discussions and analyses in environmental documents. Agencies shall make use of reliable existing data and resources and may make use of any reliable data sources, such as remotely gathered information or statistical models. They shall identify any methodologies used and shall make explicit reference to the scientific and other sources relied upon for conclusions in a NEPA analysis. When implementing decisions, agencies may provide for monitoring to ensure that their decisions are carried out and should do so in important cases.
5. Resource Management Planning (43 CFR subpart 1610). The BLM planning regulations establish a process for the development, approval, maintenance,

- amendment, and revision of resource management plans, including the intervals and standards for monitoring and evaluation to determine plan effectiveness. Inventory data and information are collected in a manner that aids application in the planning process, including subsequent monitoring requirements.
6. Surface Management (43 CFR subpart 3809). The BLM surface management regulations provide for a monitoring plan for operations authorized by the mining laws to assess the impact of operations, including but not limited to effects on surface and groundwater quality and revegetation efforts.
 7. Wild Horses and Burro Management Inventory and Monitoring (43 CFR 4710.2). The BLM wild horse and burro regulations provide for maintenance of a record of the herd areas that existed in 1971, a current inventory of the numbers of animals and their areas of use, and herd and habitat characteristics within established herd management areas.

1.4 Responsibility

- A. *The Director and the Deputy Directors* are responsible for the overall management of the agency, including the implementation of this policy. The Director sets Bureau-wide priorities relating to coordinated ecological resource inventory, assessment, and monitoring on public lands under BLM administration within the framework of laws, regulations, and Departmental policy. Deputy Directors develop and maintain inventory, assessment, and monitoring guidelines and standards, identify Bureau staffing and training necessary to ensure coordination between inventory, assessment, and monitoring procedures and other Bureau procedures, and evaluate their effectiveness. They also ensure that related management policies and guidelines they are responsible for are compatible with the standards and requirements established in this Manual.
- B. *Assistant Directors* are responsible for—
 1. Providing guidance in meeting the Director’s priorities during the development of policies, objectives, priorities, and general procedures for implementing inventory, assessment and monitoring activities that address ecological resources;
 2. Providing appropriate resources to BLM directorates, state offices, and centers to ensure consistent and timely implementation of this policy;
 3. Providing for program development and support to state offices to implement this policy consistently; and
 4. Coordinating with Tribal governments, Federal and State agencies, and non-governmental organizations, as appropriate, when implementing this policy.

C. *Division Chiefs* are responsible for—

1. Developing, approving, and implementing procedures for carrying out the policies, objectives, and priorities for inventory, assessment, and monitoring activities;
2. Ensuring efficiency of inventory, assessment, and monitoring processes and procedures by leveraging BLM core methods and available remote sensing products, and integrating data collection and use practices across programs to the maximum extent possible.
3. Collaborating with other BLM divisions, state offices, and centers to ensure the objectives of this policy are integrated and consistently implemented;
4. Allocating appropriate resources for inventory, assessment, and monitoring activities and associated tools and data analysis; and
5. Coordinating, as appropriate, with Tribal governments, Federal and State agencies and non-governmental organizations to meet inventory, assessment, and monitoring information needs.

D. *National Assessment, Inventory, and Monitoring Coordinator* is responsible for—

1. Developing and maintaining up-to-date policies, objectives, priorities, and general procedures for standardized inventory, assessment, and monitoring of uplands, streams and rivers, and wetland and riparian ecosystems across the BLM, as established through the AIM program;
2. Providing technical expertise and resources regarding ecological inventory, assessment, and monitoring across the BLM to ensure efficient and effective implementation of inventory, assessment, and monitoring related policies;
3. Developing agency budget allocations and guidance pertaining to inventory, assessment, and monitoring of ecological resources in coordination with other program leads, including recommending funding allocations to state offices and centers;
4. Monitoring AIM program implementation expenditures and performance in compliance with government accountability requirements;
5. Reviewing existing and proposed inventory, assessment, and monitoring processes and procedures periodically to ensure that core methods and available remote sensing products are used to the maximum extent possible, redundant processes and procedures are eliminated, and that data collection and use practices are integrated across programs to the maximum extent possible.

6. Collaborating with other national program leads and state office program leads to ensure consistent and efficient implementation of inventory, assessment, and monitoring related policies;
7. Coordinating with Tribal governments, Federal and State agencies, and non-governmental organizations on inventory, assessment, and monitoring activities;
8. Working with the BLM's National Operations Center and National Training Center to develop science initiatives, tools, and training materials relevant to the AIM program and related policies;
9. Facilitating reviews of new and proposed legislation, regulations, and policies as needed to determine how they affect the policies and objectives of BLM with respect to inventory, assessment, and monitoring of ecological resources;
10. Reviewing Resource Management Plans and associated documents;
11. Communicating with Division Chiefs about resource conditions and trends nationally to ensure they have current information; and
12. Maintaining science partnerships that connect the BLM to innovation in support of BLM inventory, assessment, and monitoring activities and increase coordination of those activities across boundaries.

E. *National Program Leads* are responsible for—

1. Developing and maintaining up-to-date policies, objectives, priorities, and general procedures for inventory, assessment, and monitoring of ecological resources at a national level, particularly for program-critical methods and indicators not available through the AIM program;
2. Developing agency budget allocations and guidance pertaining to inventory, assessment, and monitoring of ecological resources, particularly for program-critical indicators and methods not available through the AIM program;
3. Coordinating with the National AIM Coordinator, other national program leads and state office program leads to ensure consistent and efficient implementation of inventory, assessment, and monitoring related policies, including use of core methods and available remote sensing products, elimination of redundant processes and procedures, and integration of data collection and use practices across programs to the maximum extent possible.
4. Communicating with the national AIM coordinator regarding how new and proposed legislation, regulations, policies, and court rulings as needed to determine how they affect the implementation of this policy in their programs;

5. Working with the BLM's National Operations Center and National Training Center to develop science initiatives, electronic data capture, data management and analysis tools, as well as training materials relevant to program-critical methods and indicators and related policies;
6. Coordinating with Tribal governments, Federal and State agencies, and non-governmental organizations on inventory, assessment, and monitoring activities.

F. *State Directors* are responsible for—

1. Overseeing implementation of consistent, integrated ecological resource inventory, assessment, and monitoring activities on public lands under BLM administration within areas of their authority in accordance with BLM policy and objectives;
2. Coordinating with other state directors, Tribal governments, Federal and State agencies, and non-governmental organizations, as appropriate, when implementing inventory, assessment, and monitoring policies;
3. Ensuring the application of information about the condition and trends of ecological resources into land management decision-making, land use plans and plan effectiveness evaluations, and public land use authorizations, consistent with applicable law;
4. Establishing and maintaining an interdisciplinary workforce that provides expertise regarding the implementation of the policies and objectives of ecological resource inventory, assessment, and monitoring activities at the state, district, and field level, including designating State Monitoring Coordinator(s) who lead state-level AIM program efforts and any necessary technical support; and
5. On an annual basis, reporting results from inventory, assessment, and monitoring activities at the state level to the Director, Deputy Directors, and Assistant Director for Resources and Planning.

G. *State Monitoring Coordinator(s) and State Data Analysts* are responsible for—

1. Communicating and assisting in implementing the policies, priorities, and procedures for inventory, assessment, and monitoring of ecological resources within the state, working with BLM staff at the state leadership, district, and field levels;
2. Coordinating implementation and reporting of standardized inventory, assessment, and monitoring of uplands, streams and rivers, and wetlands and riparian ecosystems within the state, as established through the AIM program;
3. Coordinating the AIM program work plan and budgeting efforts and recommending funding allocations that will best achieve the objectives of this policy;

4. Tracking AIM program expenditures and reporting performance and accomplishments for their state. This includes conducting periodic program reviews to assess the adequacy and effectiveness of staffing levels, budget, training, and other resources to achieve program policies and priorities;
5. Collaborating with other State Office program leads involved in managing ecological resources to ensure inventory, assessment, and monitoring data collection and information application are integrated with their respective programs including use of core methods and available remote sensing products, elimination of redundant processes and procedures, and integration of data collection and use practices across programs to the maximum extent possible;
6. Communicating standard inventory, assessment, and monitoring protocols and data management procedures by organizing required protocol training and regular calibration to keep field and district offices current on policy changes;
7. Partnering with National Operations Center and Headquarters AIM staff and other program monitoring staff in execution of this policy;
8. Maintaining cooperative working relationships with State and Federal agencies, universities, and local groups relative to the inventory, assessment, and monitoring of ecological resources;
9. Providing technical expertise and support to state leadership and district and field offices to ensure current information about condition and trends of ecological resources is included in land management decision-making, land use plans, and public land use authorizations;
10. Communicating with the national AIM coordinator regarding new and proposed policies and court rulings as needed to determine how they affect the implementation of this policy in their state(s); and
11. Communicating with Branch Chiefs, Deputy State Directors, and State Directors about state-level resource conditions and trends to ensure they have the current information.

H. *Line Officers, including District and Field Managers*, are responsible for—

1. Implementing inventory, assessment, and monitoring of ecological resources within areas under their authority, in conformity with BLM policies, objectives, priorities, and general procedures;
2. Maintaining adequate staffing with appropriate expertise to support local inventory, assessment, and monitoring data collection and use of data in decision-making, including close integration with Interdisciplinary Teams and NEPA processes;
3. Providing for interdisciplinary monitoring plan development and implementation within the district office and/or field office;

4. Ensuring that monitoring is implemented consistent with policies and procedures to ensure data quality and usability of data, including ensuring staff and monitoring teams are trained according to standardized protocols;
 5. Ensuring that land management decisions, land use plans, and public land use authorizations, and the relevant workflows for decisions, plans, and authorizations, fully incorporate available information about the conditions and trends of ecological resources as outlined in this policy;
 6. Using an interdisciplinary approach when 1) considering multiple resource values, needs, and opportunities; 2) selecting and using monitoring methods and techniques designed for specific management objectives; and 3) analyzing data using standardized workflows to ensure that resource interrelationships are considered;
 7. Coordinating, as appropriate, internally within the BLM, and externally with Tribal governments, Federal and State agencies, universities, and non-governmental organizations relative to inventory, assessment, and monitoring of ecological resources;
 8. Communicating with State Directors about resource conditions and trends to ensure they have the current information across their district or field office.
- I. *National Operations Center* is responsible for—
1. Coordinating with national program leads to understand data requirements, plan implementation, and make necessary adjustments to ecological resource inventory, assessment, and monitoring methods and workflows, in conformity with BLM policies, objectives, priorities, and general procedures;
 2. Establishing and maintaining an interdisciplinary workforce that provides specialized expertise supporting the implementation of inventory, assessment, and monitoring activities at the state, district, and field level, especially monitoring specialists and data managers;
 3. Providing technical support and expertise across the BLM to ensure consistent implementation of ecological inventory, assessment, and monitoring activities, in coordination with the AIM coordinator and national program leads;
 4. Developing and implementing training on inventory, assessment, and monitoring and related activities, in coordination with the AIM coordinator, national program leads, and the National Training Center, to meet BLM workforce needs;
 5. Developing, managing, and maintaining internal and external systems for standardized ecological resource inventory, assessment, and monitoring data, including electronic data capture, data quality assurance and control, data access, and analysis and reporting;

6. Preparing, reviewing, and evaluating BLM and other scientific technical references, user guides, technical notes, and other documents supporting the policies and objectives of BLM inventory, assessment, and monitoring activities in coordination with the AIM coordinator and national program leads;
7. Identifying standard approaches for selecting monitoring locations and analyzing and reporting monitoring information, implementing these approaches, and providing necessary documentation, using specialized statistical expertise;
8. Reporting on ecological resource conditions and trends nationally and as needed for specific projects; and
9. Maintaining science partnerships that connect the BLM to innovation in support of BLM inventory, assessment, and monitoring activities and increase coordination of those activities across boundaries.

1.5 References

- A. USDOJ Departmental Manual 301 Chapter 7, Departmental Responsibilities for Consideration and Inclusion of Indigenous Knowledge in Departmental Actions and Scientific Research.
- B. USDOJ Departmental Manual 305 Chapter 3, Integrity of Scientific and Scholarly Activities.
- C. USDOJ Departmental Manual 516 Chapter 11, Managing the NEPA Process -- Bureau of Land Management.
- D. USDOJ Departmental Manual 522 Chapter 1, Adaptive Management.
- E. USDOJ Departmental Manual 523 Chapter 1, Climate Change Policy.
- F. BLM Handbook H-1601-1 (Rel. 1-1693), Land Use Planning Handbook.
- G. BLM Handbook H-1684-1 (Rel. 1-1820), Fund Code Handbook.
- H. BLM Handbook H-1740-2 (Rel. 1-1714), Integrated Vegetation Management Handbook.
- I. BLM Handbook H-1742-1 (Rel. 1-1702), Burned Area Emergency Stabilization and Rehabilitation Handbook.
- J. BLM Handbook H-1790-1 (Rel. 1-1710), National Environmental Policy Act Handbook.
- K. BLM Handbook H-3809-1 (Rel. 3-336), Surface Management.
- L. BLM Handbook H-4180-1 (Rel. 4-107), Rangeland Health Standards.

- M. BLM Handbook H-4700-1 (Rel. 4-116), Wild Horse and Burro Management.
- N. BLM Handbook H-4710 (Rel. 4-90), Management Considerations (Public).
- O. BLM Handbook H-9211-1 (Rel. 3-398), Fire Planning Handbook.
- P. BLM Handbook H-9214-1 (Rel. 9-429), Fuels Management and Community Assistance Handbook.
- Q. BLM Manual Section MS-1270 (Rel. 1-1804), Records Management.
- R. BLM Manual Section MS-1794 (Rel. 1-1807), Mitigation.
- S. BLM Manual Section MS-6100 (Rel. 6-131), National Landscape Conservation System Management.
- T. BLM Manual Section MS-6220 (Rel. 6-140), National Monuments, National Conservation Areas, and other similar designations.
- U. BLM Manual Section MS-6250 (Rel. 6-138), National Scenic and Historic Trail Administration.
- V. BLM Manual Section MS-6280 (Rel. 6-139), Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation.
- W. BLM Manual Section MS-6310 (Rel. 6-138), Conducting Wilderness Characteristics Inventory on BLM Lands.
- X. BLM Manual Section MS-6320 (Rel. 6-139), Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process.
- Y. BLM Manual Section MS-6330 (Rel. 6-134), Management of BLM Wilderness Study Areas.
- Z. BLM Manual Section MS-6340 (Rel. 6-135), Management of Designated Wilderness Areas.
- AA. BLM Manual Section MS-6400 (Rel. 6-136), Wild and Scenic Rivers – Policy and Program Direction for Identification, Evaluation, Planning, and Management.
- BB. BLM Manual Section MS-6500 (Rel. 6-114), Wildlife and Fisheries Management.
- CC. BLM Manual Section MS-6600 (Rel. 6-117), Fish, Wildlife, and Special Status Plant Resources Inventory and Monitoring.
- DD. BLM Manual Section MS-6720 (Rel. 6-118), Aquatic Resources Management.

- EE. BLM Manual Section MS-6840 (Rel. 6-125), Special Status Species Management.
- FF. BLM Manual Section MS-7100 (Rel. 7-87), Soil Resource Management.
- GG. Kachergis, E., S.W. Miller, S.E. McCord, M. Dickard, S. Savage, L.V. Reynolds, N. Lepak, C. Dietrich, A. Green, A. Nafus, K. Prentice, and Z. Davidson. 2022. Adaptive Monitoring for Multi-Scale Land Management: Lessons Learned from the Assessment, Inventory, and Monitoring (AIM) Principles. *Rangelands* 44(1) pp. 50-63.
- HH. Toevs, G.R., J.J. Taylor, C.S. Spurrier, C. MacKinnon, M.R. Bobo. 2011. Assessment, Inventory, and Monitoring Strategy: For Integrated Renewable Resources Management. USDI-BLM National Operations Center, Denver, CO.

1.6 Policy

Healthy, functioning ecosystems are the basis for BLM’s management of public land under principles of multiple use and sustained yield (43 CFR § 6101.1). To achieve the BLM’s mission, ecological resource inventory, assessment, and monitoring activities must provide information about ecosystem condition and trend to guide land management decision-making. Ecological resource information must address the land health standards and associated fundamentals, which are the BLM regulatory framework for sustaining healthy lands for future generations (43 CFR § 4180.2 (2005), 43 CFR subpart 6103). The fundamentals and standards inform maintenance of ecological functions critical for plant, fish, wildlife and special status species habitat; soil, air, and water quality; and rangeland, forestry, and riparian management. These policies for inventory, assessment, and monitoring of ecological resources on the public lands are intended to guide the BLM in achieving land health standards across program areas engaged in management of ecological resources, in alignment with the laws that guide those program areas (refer to Authorities). These policies also guide our understanding of ecological resources beyond land health, including the resources, objects and values and other characteristics of the National Landscape Conservation System.

The BLM’s policies for inventory and monitoring of ecological resources and applying ecological information to land management decision-making follow:

A. Inventory, Assessment, and Monitoring of Ecological Resources

1. BLM resource management programs are strongly encouraged to coordinate ecological resource inventory, assessment, and monitoring activities within the BLM and with Tribal governments, Federal and State agencies, and non-governmental organizations, as needed, to increase effectiveness, reduce costs, and avoid duplication of effort.
2. Inventory, assessment, and monitoring activities should follow a structured implementation process (Illustration 1) to guide monitoring program development and implementation.

3. The BLM should prioritize the use of BLM core methods and available remote sensing map products to avoid unnecessary or duplicative collection of inventory, assessment, and monitoring data. For example, the BLM should avoid using multiple methods to measure the same indicator. Similarly, programs should coordinate monitoring activities to minimize duplicative data collection and maximize data sharing.
4. Interdisciplinary monitoring plans should be completed and reviewed annually and updated when necessary to guide inventory, assessment, and monitoring activities and ensure that these activities meet information needs across BLM programs and workflows at the district and/or field office level. Monitoring plans must rely on resource management plan objectives as the guide for setting priorities and designing inventory, assessment, and monitoring activities to satisfy requirements imposed by FLPMA or other applicable authorities and maximize monitoring integration. These plans must also take into account land health standards, Recovery Plans and biological opinions for threatened and endangered species, National Landscape Conservation System characteristics, or other ecological resource objectives required by law or policy. At a minimum, monitoring plans should include: 1) a summary of existing policy and management guidance; 2) management goals and objectives that tie to policy and guidance; 3) **monitoring objectives** (i.e., **SMART objectives**); 4) indicators including measurement protocols (field-based or remote sensing); 5) reporting areas; 6) a description of the process for selecting monitoring locations including planned timeframes; and 7) documentation of quality assurance and quality control procedures (Illustration 1).
5. This policy directs that inventory, assessment, and monitoring data collection employ BLM standardized **core, contingent, and supplemental monitoring methods** where available and relevant to the monitoring objectives in the monitoring plan. Specifically:
 - i. Where the monitoring plan identifies nationally standardized core and contingent indicators, field data collection must follow the standard core and contingent methods to allow data comparisons across the BLM and with partners and to streamline data use. Core indicators and methods are recommended wherever the BLM implements monitoring and assessment of ecological resources; contingent indicators and methods are recommended when the monitoring plan identifies that the resulting data are needed or when there is reason to believe they are necessary at a particular site.
 - ii. When an indicator in the monitoring plan is not provided by established core or contingent methods, field data collection should follow commonly used peer-reviewed **supplemental methods** from the BLM, DOI, other Federal agencies, States, universities, or scientific organizations. Also consider approved **qualitative assessment protocols** as they may provide additional insights. Available standardized supplemental methods or

- qualitative assessments that are actively supported by BLM resource management program(s) or state(s) are preferred in order to facilitate protocol training, data collection, data access, and application to decision-making.
- iii. Meaningful **covariate methods and indicators** are recommended wherever the BLM implements ecological monitoring. Covariates account for natural spatial or temporal variation in indicators and assist with interpreting indicator values. Common covariates include landform, slope, and soil descriptions.
 - iv. Interpreting ecological resource condition and trends and determining causes of change often requires monitoring of climate, land uses and disturbance history (e.g., type, extent, intensity, timing).
 - v. Monitoring plans should consider available **remote sensing map products** to inform monitoring objectives. Such products can provide continuous maps of indicators, covariates, land uses, and disturbances across landscapes as well as trends through time.
6. Inventory, assessment, and monitoring activities are strongly encouraged to use appropriate monitoring designs that address monitoring objectives to fulfill cross-program information needs. For field-based monitoring of large areas (e.g., land use planning areas or ecoregions), statistically valid random sample designs are appropriate. Data from randomly located field plots can also be used to address local questions. For field-based monitoring of small areas, non-random or targeted sample design approaches may be appropriate, especially when they address questions such as effects of land use or disturbance. Remote sensing map products complement field-based monitoring by informing field monitoring designs, by providing continuous maps of ecological resource condition and trends, and by revealing changes through time.
 7. Data collectors are required to complete protocol training on a regular basis to ensure data quality when collecting data to be uploaded into standard databases. Protocol trainings are also very beneficial for other BLM staff, especially those involved in data management and those who are tasked with applying ecological resource information in decision-making.
 8. When feasible, data collection is strongly encouraged to use modern electronic data capture, management, and storage tools in order to ensure data quality and accessibility.
 9. Nationally standardized core and contingent method data should be submitted according to data management protocols in a timely fashion following completion of quality assurance and control requirements.

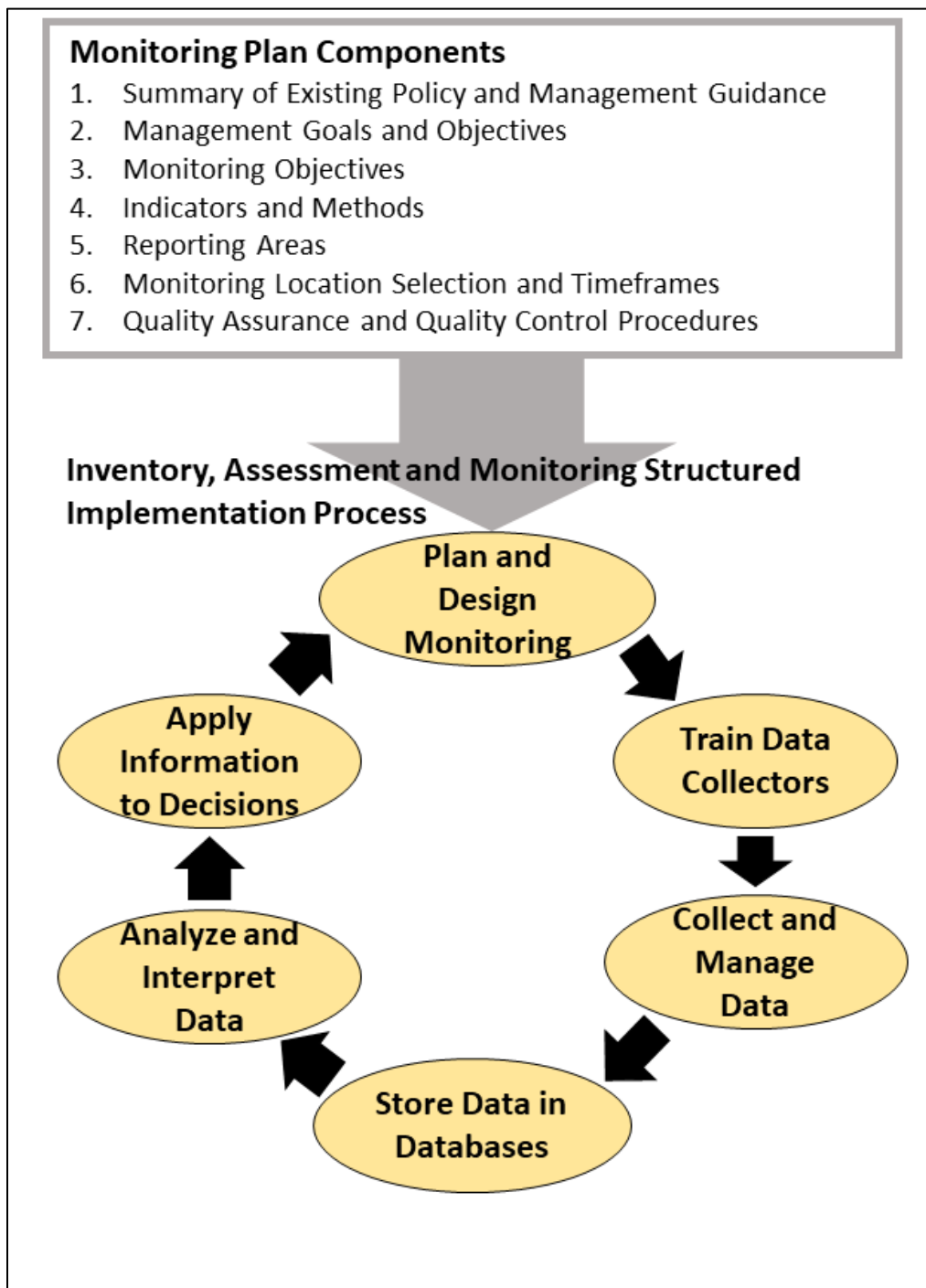
10. The BLM must store ecological inventory, assessment, and monitoring data in standardized databases and make data available to BLM staff and the public so they can be used for a variety of purposes related to public land management, reporting, and scientific research.
11. Inventory, assessment, and monitoring data management must employ appropriate data quality assurance and quality control procedures to ensure that the resulting information is high-quality. Quality assurance and quality control requirements must be met for data to be uploaded into standard databases.
12. BLM should focus inventory, assessment, and monitoring efforts based on priorities, and ensure that the intensity is commensurate with resource values; issues and resource conflicts; and levels of management.
13. Workloads and/or costs associated with inventory, assessment, and monitoring implementation for specific decisions should be covered by the project(s) and/or program(s) that require the decision.

B. Applying Ecological Resource Information to Land Management Decisions

1. The BLM's resource management programs are strongly encouraged to develop and use standard workflows for applying available inventory, assessment, and monitoring information to specific decision types or processes.
2. Where available and relevant, authorized officers must use high-quality inventory, assessment, and monitoring information to understand resource conditions and inform decision-making across program areas (refer to Chapter 2).
3. Authorized officers should consider multiple lines of evidence within an analysis framework in reporting and decision-making processes. Standardized quantitative monitoring data, remote sensing maps, and geospatial analyses should be considered along with legacy monitoring data when relevant and available. Indigenous Knowledge should also be considered when it meets standards for objectivity and utility set forth in DOI Information Quality Act Guidelines.
4. If authorized officers do not use relevant and available data in decision-making, they must explain why.
5. Analyses of inventory, assessment, and monitoring information should be, as appropriate, incorporated into or referred to in reports and decision documents, and be accompanied by a clear rationale describing how data were applied to decision-making.
6. BLM should focus data analysis efforts on priorities and avoid unnecessary or duplicative analysis of inventory, assessment, and monitoring data. For example, broader-area assessments may be available to describe the affected environment relevant to an action that is proposed within a smaller area.

7. Workloads and/or costs associated with data summaries for specific decisions should be covered by the project(s) and/or program(s) that require the decision.

Illustration 1 - Components of an interdisciplinary monitoring plan to ensure that inventory, assessment, and monitoring activities meet information needs across resource



management programs and decision types. These plans initiate and inform a structured implementation process for inventory, assessment, and monitoring activities.

1.7 File and Record Maintenance

Many aspects of inventory, assessment, and monitoring involve the creation, maintenance, use, retrieval, access, security, and disposition of government records (refer to MS-1270, Records Management). The BLM must ensure that the data it collects, uses, and disseminates relates to the agency's mission requirements, is of known quality, and is applied and used objectively. To satisfy this requirement, staff should routinely synthesize collected data in field or technical reports. All records should be maintained in the appropriate case file and comply with applicable BLM corporate data standards. All geospatial data, including maps and geospatial layers, will comply with national geospatial standards and will be compatible with BLM corporate data standards such as those outlined for AIM core and contingent methods. Program- or state-specific data management requirements may also exist for supplemental methods and should be followed when applicable. The time necessary to comply with the requirements outlined in this section for files and records maintenance will be budgeted as part of the program.

CHAPTER 2 INTEGRATION OF BLM ECOLOGICAL RESOURCE MONITORING ACTIVITIES ACROSS RESOURCE MANAGEMENT PROGRAMS

Many BLM resource management programs and decision processes share a need to report on ecological resource conditions and trends. Therefore, BLM resource management programs are directed to coordinate resource inventory, assessment, and monitoring activities in order to support the BLM's multiple use and sustained yield management approach, avoid duplication, and ensure efficient use of personnel and funding. Relevant available inventory, assessment, and monitoring information must be used to inform BLM reporting and decision making including:

- A. Reporting the national condition and trend of lands and waters;
- B. Land use planning and land use plan evaluation;
- C. NEPA analysis of the affected environment and environmental effects of BLM actions;
- D. Authorization of permitted uses;
- E. Conducting **watershed condition assessment** and land health standards evaluation;
- F. Assessment of fish, wildlife, and plant species habitat conditions and population trends, including threatened and endangered species and special status species such as Greater Sage-Grouse;
- G. Determinations of excess wild horses and burros;
- H. Restoration planning, including prioritization;
- I. Evaluating effectiveness of fire and fuels management, restoration, and reclamation;
- J. Consideration of federally designated areas; and
- K. Adaptive management.

Addressing the BLM's information needs represents a significant workload. Through the AIM strategy and program, nationally standardized core **indicators** have been chosen to address the land health fundamentals and standards, an important data need across many types of decisions. Thus, application of AIM core, contingent and covariate methods can streamline ecological monitoring effort across the BLM. State, district, or field offices should use their interdisciplinary program of work to prioritize monitoring data collection timelines and locations among different program areas. The resulting monitoring needs should be integrated and documented in the district or field office monitoring plan. The allocation of funding and staffing should be determined based on the balance of benefits to each program.

Some resource management programs have more specific inventory, assessment, and monitoring policy. While this policy does not supersede existing program guidance which may have more

specific requirements, it provides direction to integrate monitoring efforts as much as possible and to look for opportunities to eliminate inconsistent, redundant and unnecessary monitoring.

CHAPTER 3 FEDERAL AND STATE COORDINATION

Ecological resource inventory, assessment, and monitoring activities should be coordinated with Tribal governments, Federal, and State agencies and universities and non-governmental organizations, when appropriate, to avoid duplication of effort and maintain the desired consistency in the study of similar or interrelated resources and management actions. Cooperation with State agencies, which often have primary authority and responsibility for the management of fish and wildlife populations, is an essential component of ecological resource inventory, assessment, and monitoring.

Chapter 4 Reporting and Accountability Requirements

State offices are required to complete annual reporting of accomplishments beyond basic program elements as outlined in the Bureau's annual work plan. These reports are designed to maintain or increase awareness of program activities and emerging issues across state offices and Headquarters and to better communicate the BLM's role in conservation, restoration, partnerships, and community outcomes.

All BLM offices are responsible for adhering to activity-based costing principles (refer to H-1684). The 1610 subactivity and associated program elements are limited in use to actions directly benefiting Decision Support, Planning, and NEPA and driven by or caused by the AIM program. When available ecological resource information is insufficient for a specific decision, the resource management program(s) that may be influencing ecosystems through their actions or authorizations are responsible for funding additional inventory, assessment, and monitoring work, data management, data analysis, and reporting required for the decision. All BLM offices are responsible for coding time and work accurately in accordance with the Bureau's budget structure and the benefitting subactivity concept.

Technical program reviews or other program assessments should be routinely completed by program leads at the state and/or headquarters level. Program reviews can be singularly focused or multifaceted to examine budget allocations, short- and long-term performance, staffing levels and structure, data collection and management, and policy adherence and to identify emerging issues and technologies. Periodic reviews of current and proposed inventory, assessment, and monitoring processes and procedures should be conducted to ensure that core methods and available remote sensing products are used to the maximum extent possible, redundant processes and procedures are eliminated, and that data collection and use practices are integrated across programs to the maximum extent possible. Reviews should be designed to enhance program delivery while maintaining a high degree of program accountability at each level of the organization consistent with policy.

CHAPTER 5 TECHNICAL SKILLS

To successfully implement ecological resource inventory, assessment, and monitoring policies and related activities, including the AIM program, the BLM requires significant breadth and depth of professional skills. Subject matter experts in terrestrial, aquatic, and wetland ecology are essential for monitoring planning, data collection, data management, data analysis, and application to decision-making. Since the breadth and depth of knowledge, skills, and abilities required by these activities exceeds the capacity of any one employee, the BLM should employ a range of technical specialists with a focus on positions in the Ecology (0408), Rangeland Management (0454), Botany (0430), Natural Resources Management and Biological Science (0401), Soils (0470), Hydrology (1315), Wildland Fire Management (0456), Fish Biology (0482), and Wildlife Biology (0486) series. Data management roles can be filled using the Data Science (1560), GIS and Data Specialist (0301), or Program Analyst/Data Science (0343) series. The BLM should strive for functional redundancy in ecological resource knowledge and skills and invest in continuing education to successfully implement the above policy. BLM must also establish early career positions and career ladders to ensure long-term monitoring program development and momentum.

Cross-program integration of inventory, assessment, and monitoring activities is greatly facilitated by a monitoring lead or coordinator within each administrative unit. These specialists manage implementation of monitoring plans for specific projects. In addition, data analysts can facilitate application of inventory, assessment, and monitoring information to decision-making. Data analysts have skills to distill information into understandable and engaging formats so that it can be easily used in decisions. The BLM has created standardized position descriptions for state office Monitoring Coordinators and Data Analysts (Natural Resource Monitoring). The Monitoring Coordinator position descriptions are in the 0408 series (GS-12) and the Data Analyst position descriptions (GS-5/7/9/11) are in the 0401 series. Both position descriptions allow the BLM to hire specialists with scarce skillsets to support inventory, assessment, and monitoring activities across the BLM.

The National Operations Center (NOC) provides centralized technical support for ecological resource inventory, assessment, and monitoring activities across the BLM when funded by BLM resource management programs. Monitoring technical specialists are needed to accomplish this work. For example, the NOC provides tools to collect, manage, access, and analyze nationally standardized AIM data. The National AIM Team consists of specialists dedicated to the entire lifecycle required to implement upland, stream, river, wetland and riparian ecosystem monitoring, including ecologists, monitoring implementation coordinators, data managers, data analysts, and a biostatistician. The NOC coordinates closely with the National Training Center to ensure that required training in AIM protocols is available to BLM staff and data collectors. Other resource management programs may consider this model for program-critical indicators and methods.

Glossary of Terms

-A-

Adaptive management. Adaptive management is “a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood” (DOI Manual 522 DM 1). Adaptive management requires clearly identified outcomes and monitoring to determine whether management actions are meeting desired outcomes; and, if not, to facilitate management changes that will best ensure that outcomes are met or reevaluated. Adaptive management recognizes that knowledge about natural resource systems is sometimes uncertain (43 CFR 46.30).

AIM Strategy. A BLM strategy document (Toevs et al. 2011) that describes principles for improving BLM natural resource monitoring for integrated ecological resource management. The document was inspired by a series of Office of Management and Budget and Government Accountability Office audits of BLM monitoring activities which found that the BLM could not report on ecological conditions above the local project level. The document was informed by a formal stakeholder engagement process across the BLM at local, regional, and national levels.

AIM principles. BLM principles for improving natural resource monitoring for integrated ecological resource management, building on decades of experience. The original AIM principles were identified in the 2011 AIM Strategy (Toevs et al. 2011) and included core indicators and consistent methods; statistically valid sampling framework; remote sensing; and data management. The AIM principles were refined through time based on experience with AIM program implementation, culminating in a 2021 paper reflecting on the AIM principles (Kachergis et al. 2021). The 2021 paper described six AIM principles: standardized field methods and indicators to allow data comparisons throughout BLM and its partners; data management and stewardship to ensure data quality, accessibility, and use; appropriate sample designs to minimize bias and maximize what can be learned from collected data; integration with remote sensing to optimize sampling and calibrate continuous map products; structured implementation to guide monitoring plan development, implementation, and management decisions; and data use through standard workflows and analysis frameworks that empower land managers to make data-supported decisions.

AIM program. The Assessment, Inventory, and Monitoring (AIM) program provides an approach for integrated, cross-program inventory, assessment and monitoring of ecological resources at multiple scales of management as well as standardized, broadly applicable monitoring methods and tools consistent with the AIM Strategy.

Assessment. The estimation or judgement of the status of ecosystem structures, functions, or processes, within a specified geographic area at a specific time. An assessment is conducted by gathering, synthesizing, and interpreting information from observations or data from inventories and monitoring. An assessment characterizes the status of resource conditions so that the status can be evaluated.

-C-

Calibration. The act of comparing measurement values from a scientific process, observation or instrument to ensure that data are consistent and repeatable within an acceptable range.

Contingent methods. Standardized procedures for collecting ecological indicator data applicable across different ecosystems and resource management programs, but which are relevant to a limited set of management concerns or questions. Contingent methods and indicators should be considered when they are relevant to project- or location-specific management objectives or concerns. Standardized contingent methods and associated indicators have been identified for uplands, streams and rivers, and wetlands and riparian areas via the AIM Strategy, and associated data are collected and managed through the AIM program.

Core methods. Standardized procedures for collecting ecological indicator data that are applicable across many different ecosystems, management objectives, and agencies. Core methods and indicators should be considered wherever the BLM implements monitoring and assessment of ecological resources. Broadly relevant core methods and associated indicators have been identified for uplands, streams and rivers, and wetlands and riparian areas via the AIM Strategy, and associated data are collected and managed through the AIM program.

Covariate methods or covariates. Measured or derived parameters used to account for natural spatial or temporal variation in a core, contingent, or supplemental method or indicator. Covariates provide information about the ecological potential of monitoring locations and assist with interpretation of monitoring data. Necessary covariate methods are recommended wherever BLM implements ecological monitoring. Broadly relevant covariate methods and associated indicators have been identified for uplands, streams and rivers, and wetlands and riparian areas via the AIM Strategy, and are implemented through the AIM program. AIM covariates include landform, slope, and soil descriptions.

-D-

Design or monitoring design. A procedure for selecting samples from a population of interest. In field-based ecological monitoring, a sample is often a single monitoring location such as a plot or stream reach.

-E-

Ecological resources. Biological and physical components of ecosystems and the interactions among them. Ecological resources provide many benefits to society including clean water, healthy soils, habitats, and biodiversity. Understanding ecological resource condition and trend is essential for effective land management under FLPMA and related laws and policies.

-H-

High-quality information. High-quality information means information that promotes reasoned, evidence-based agency decisions. Information that meets the standards for objectivity, utility, and integrity as set forth in the Department's Information Quality Guidelines qualifies as high-

quality information. Indigenous Knowledge qualifies as high-quality information when it is gained by prior, informed consent free of coercion, and generally meets the standards for high-quality information.

-I-

Indicator. A component of a system whose characteristics are measured and used as an index of an attribute of interest. For example, the cover of native and invasive plant species are indicators of land health.

Indigenous Knowledge. The following are generally agreed upon universal concepts that are often used to describe Indigenous Knowledge (IK). IK is a body of observations, oral and written knowledge, innovations, technologies, practices, and beliefs developed by Indigenous Peoples through interaction and experience with the environment. It is applied to phenomena across biological, physical, social, cultural, and spiritual systems. IK can be developed over millennia, continues to develop, and includes understanding based on evidence acquired through direct contact with the environment and long-term experiences, as well as extensive observations, lessons, and skills passed from generation to generation. IK is developed, held, and stewarded by Indigenous Peoples and is often intrinsic within Indigenous legal traditions, including customary law or traditional governance structures and decision-making processes. Other terms such as Traditional Knowledge(s), Traditional Ecological Knowledge, Genetic Resources associated with Traditional Knowledge, Traditional Cultural Expression, Tribal Ecological Knowledge, Native Science, Indigenous Applied Science, Indigenous Science, and others, are sometimes used to describe this knowledge system. (301 DM 7)

Inventory. Baseline data about the location, extent, type, or attributes of resources on a landscape. Examples of inventory include satellite-derived vegetation maps or population counts of a species.

-L-

Land Health Fundamentals and Standards. Land health fundamentals describe conditions that relate to the health and functionality of watersheds, ecological processes, water quality, and threatened and endangered species, Federal proposed or candidate threatened and endangered species, and other special status species. Land health standards are based on the fundamentals and describe the minimum requirements for healthy lands. Standards are used to develop objectives in land use plans.

-M-

Monitoring. The periodic observation and orderly collection of data to evaluate (1) existing conditions, (2) the effects of management actions, or (3) the effectiveness of actions taken to meet management objectives.

Monitoring objective. Statement that provides a means of evaluating whether management goals or objectives are achieved. Also refer to *SMART objectives*.

-Q-

Qualitative assessments. Protocols that use structured observations of indicators and criteria to describe, categorize, or judge conditions at a point in time. Assessments that are primarily qualitative are complementary to quantitative information and often incorporate the use of quantitative indicators and measurements. Qualitative assessments should follow existing, peer-reviewed protocols. Examples include Interpreting Indicators of Rangeland Health and Proper Functioning Condition.

Quality assurance. A proactive process employed to maintain data integrity and a continuous effort to prevent (e.g., through training, calibration, proper technique), detect (e.g., through on-plot data review, client-side data validation), and correct (e.g., through readjustments in response to data review) measurement errors.

Quality control. A reactive process to detect measurement errors during or after the data collection process is complete.

-R-

Remote sensing map products. Maps or map products that represent continuous indicator values such as cover of a given plant functional type, amount of bare soil, or greenness of vegetation. These products utilize reflected or emitted radiation measured from a distance by sensors such as satellites or radar (e.g. remote sensing data). Field-collected data, such as AIM data, are used to train and validate the remote sensing data using statistical models. This results in a spatially explicit model of the indicator of interest conveyed in a map.

-S-

Supplemental methods. Methods that provide additional indicators necessary to address specific management questions, beyond what the BLM standardized core and contingent methods provide. They may be included when core and contingent methods are insufficient to inform a particular management objective. For example, offices completing ecosystem restoration projects may be interested in plant density to track plant population dynamics of restored areas. Supplemental methods should follow existing, peer-reviewed protocols and be identified using a thoughtful screening process. Available standardized supplemental methods or qualitative assessments that are actively supported by BLM resource management program(s) or state office(s) are preferred in order to facilitate protocol training, data collection, data access, and application to decision-making.

Sustained yield. The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of BLM-managed lands without permanent impairment of the productivity of the land. Preventing permanent impairment means that renewable resources are not permanently depleted and that desired future conditions are met for future generations. Ecosystem resilience is essential to the BLM's ability to manage for sustained yield.

SMART objectives. Monitoring objectives that are Specific, Measurable, Achievable, Relevant, and Time-bound.

-W-

Watershed condition assessment. A process for assessing and synthesizing information on the condition of soil, water, habitats, and ecological processes within watersheds relative to the BLM's land health fundamentals. A watershed condition assessment may include assessment of one or more of watershed physical and biological characteristics, landscape intactness, and disturbances.