

**Implementing AIM Monitoring of Renewable Resources  
to Inform Land Use Plan Effectiveness Evaluation and NEPA Analysis**

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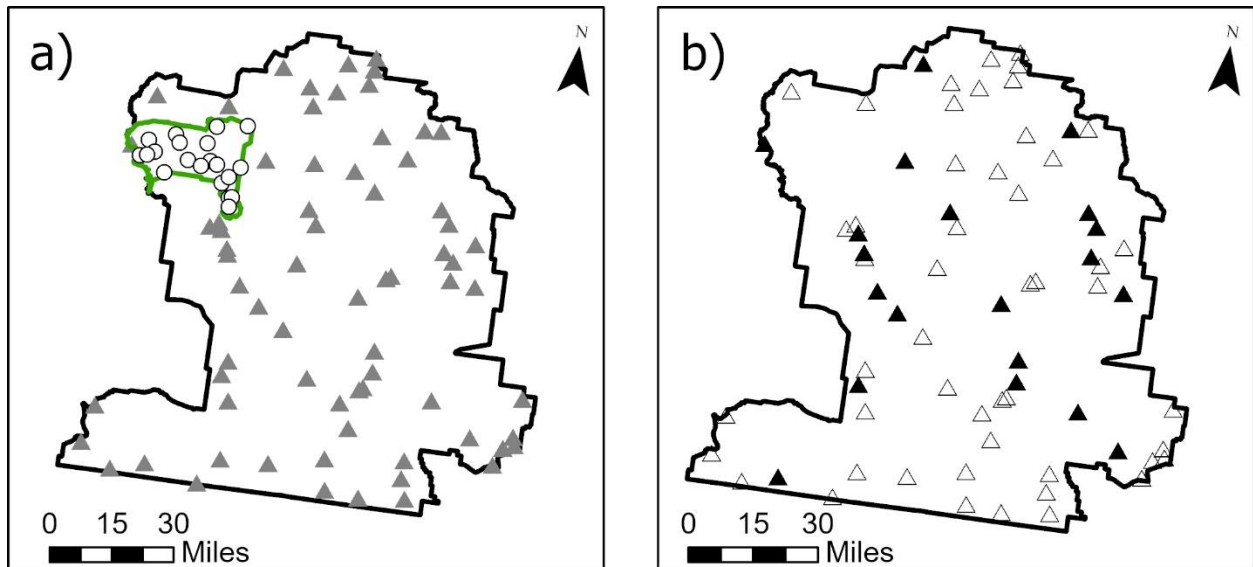
*Note that this process can be applied to other types of monitoring as well. More information about AIM implementation can be found on the BLM AIM website (<https://www.blm.gov/aim/>).*

**Planning and Initiating AIM Monitoring**

To initiate AIM monitoring, local monitoring leads should first coordinate with the AIM State Lead(s) or State Monitoring Coordinator along with appropriate Field and District line officers to ensure funding and resources are available to complete monitoring work. Next, identify the roles and responsibilities for each member or group involved in an AIM effort. Individuals and groups involved in an AIM effort include: (1) Field Office AIM Monitoring Lead(s); (2) AIM State Lead(s) and/or Monitoring Coordinator; (3) an Interdisciplinary Team (ID Team); (4) National Operations Center (NOC) AIM team members; and (5) the monitoring data collectors. Next, monitoring leads should form an ID Team. Monitoring is more efficient when implemented across programs and resources; therefore, monitoring leads should collaborate with other resource specialists in their office to begin identifying monitoring goals and objectives, planning workload, and requesting funding for AIM monitoring efforts. This process ensures engagement across the district or field office and that monitoring is meeting the needs of multiple program areas. The ID Team is also an essential group for establishing benchmarks during monitoring design and analysis and reporting. The last step of monitoring planning and initiation is to work with the ID Team to draft a Monitoring Design Worksheet (MDW; available on the [BLM AIM Resources website](#) at bottom of right column of page). The MDW documents management objectives to guide successful monitoring efforts and communicates design specifications for creating the monitoring sample design. Filling out the worksheet (and keeping it up to date) is important not only for planning monitoring, but also for using data in analysis.

**Monitoring Design**

The attainment of renewable resource objectives set forth in land use plans and resource management plans (RMPs) should be assessed using statistically valid sample designs on a rotating sample schedule (Figure 1). Sample designs are intended to be comprehensive across all BLM lands and ascertain the combined effectiveness of plan objectives as described in land use plans. Effectiveness monitoring is the process of collecting data to determine whether desired outcomes (expressed as goals and objectives in the land use plan) are met (or progress is being made toward meeting them), as the allowable uses and management actions are being implemented. All land use plan sample designs should be cooperative efforts between the NOC, state offices, and the district or field office(s) implementing the sample design.



- Intensification Monitoring Locations
- ◻ Intensification Area
- ▲ Land Use Plan Monitoring Locations
- ▲ Non-Revisit Monitoring Locations
- △ Revisit Monitoring Locations
- ◻ Land Use Plan Area

Figure 1. a) Example of an unstratified spatially balanced monitoring design for upland renewable resources addressing land use plan effectiveness and other management objectives. Monitoring locations were selected randomly such that every location within the land use plan area had a known chance of being sampled, enabling inferences across the entire landscape. Example inferences include the percentage of the landscape where non-native invasive species are present or the average bare soil cover in the land use plan area. When additional information is needed in a specific area within the planning unit, sampling can be intensified by adding monitoring locations as shown, and additional indicators can be added as well. A subset of land use plan monitoring locations is sampled each year over five consecutive years to complete the sample design.

Figure 1. b) After the first five-year land use plan monitoring cycle is completed, the land use plan monitoring design is repeated to detect trends and inform future land use plan evaluations, land use plan development and other management objectives. Many land use plan monitoring locations should be revisited (revisit locations) to increase statistical power to detect trends. Even locations that are only visited once (non-revisits) increase power to explain spatial variability in the land use plan area.

Where land use plan objectives correspond with state or regional land health standards (43 C.F.R. § 4180), efficiencies can be gained through development of sample designs to simultaneously assess the attainment of both land use plan objectives and land health standards. The AIM indicators and information can be used, with supplemental indicators as necessary, to assess the attainment of land health standards. A cross-walk of indicators to standards is available in Appendix 1 of [BLM Technical Note 453](#). To achieve multiple monitoring and assessment purposes, sample intensification in target areas of high value or conflict (e.g., National Conservation Lands, mitigation sites, grazing allotments, restoration areas) or to monitor habitat areas for species of concern (e.g., desert tortoise, Lahontan cutthroat trout, prairie chicken, Gunnison or greater sage-grouse) may be required (Figure 1a). The required number of sample points for each reporting unit will vary, depending on factors such as the size and

variability of the reporting area, the scope of the proposed management activity, the desired level of confidence, and funding availability.

### **Data Collection**

BLM terrestrial indicators (interagency Monitoring Manual for Grassland, Shrubland and Savannah Ecosystems Vol. I), lotic indicators (BLM Technical Reference 1735-1 and 1735-2), and riparian and wetland indicators (draft BLM Field Protocol for Lentic Riparian and Wetland Systems) should be collected using consistent methods and electronic data capture. Protocols are available on the [BLM AIM Resources website](#). Supplemental indicators should be identified during the development or periodic review of the Monitoring Design Worksheet (available on the [BLM AIM Resources website](#) at bottom of right column of page). The use of dedicated seasonal field crews established within the BLM or hired through contracts or agreements with partner organizations is highly recommended and has proven to be the most repeatable and least costly option for data collection efforts. Contracts or agreements should be administered by the BLM AIM State Monitoring Lead in cooperation with the field office monitoring coordinator and the NOC. These crews must receive training in data collection and stewardship protocols from BLM National AIM Team certified trainers, including method calibration and quality control. Certified trainers include AIM state leads, district staff, field office staff or partners who have recently completed the AIM train-the-trainer course. District and/or field office staff should serve as local experts to organize logistics, day-to-day operations, and safety of the field crews. Everyone involved plays important roles in ensuring the quality and completeness of the data and that in-season calibration requirements are met. Specific training requirements and resources are listed on the [BLM AIM Training website](#).

### **Data Storage**

AIM data should be captured and managed electronically by the field crew, the field and/or district office, and the state office such that they can be uploaded and stored in the terrestrial, lotic, and riparian and wetland monitoring databases at the NOC. After quality control at the field level, data are submitted to the NOC for final quality control, central storage, and management. Indicator values calculated from the data are made available annually by the NOC through the EGIS web portal and direct access to the database in ArcGIS. Consult data management protocols and other relevant information for collecting and ensuring the quality of AIM data. Data management protocols and data access tools are available on the [BLM AIM Resources website](#).

### **Analysis and Reporting**

AIM data indicator values, and the underlying sample design, should inform estimates of the status of renewable resources at the land use plan scale as well as broader (e.g., ecoregional) and finer (e.g., intensification areas, treatment areas, habitat areas, watersheds) scales. AIM data and related satellite-derived map products are available through webmaps, ArcGIS, or download from the [BLM AIM website](#). State offices and district/field offices should be responsible for reporting at the land use plan scale and finer units. The NOC provides analytical tools, indicator estimates, and other technical support as needed. State, regional, and national monitoring results

will be analyzed and reported by the NOC, HQ, and BLM science partners. Baseline data collected during the first five years of monitoring can be used to assess status. Trend estimates will be possible over time and can be reported along with the annual estimates. Additional national-scale BLM monitoring data are collected using a national sample design and are available to supplement data collected through district and field office sample designs (e.g., National Terrestrial Survey, also known as the BLM Landscape Monitoring Framework, and National Lotic Survey, also known as the Western Rivers and Streams Assessment).

The BLM Land Use Planning Handbook describes the tracking “and reporting for assessing the effectiveness of land use plan objectives for renewable resources. Effectiveness monitoring is the process of collecting data to determine whether desired outcomes (expressed as goals and objectives in the land use plan) are met (or progress is being made toward meeting them) as the allowable uses and management direction are being implemented. A Monitoring Design Worksheet (available on the [BLM AIM Resources website](#) at bottom right column of page) should be developed that identifies monitoring indicators, desired conditions, protocols, and timeframes that will be used to evaluate and determine whether or not desired outcomes are being achieved. Land use plan reporting should occur on a five-year basis, as documented in the evaluation schedule. AIM data and related satellite derived map products should provide the baseline and the trend data for renewable resource objectives and benchmarks related to uplands, riparian and wetlands, streams and rivers, water quality, and habitats. Supplemental indicators should be added, as necessary, for resource objectives where the AIM data does not provide adequate information. Other assessment protocols such as Habitat Assessment Framework (HAF), Interpreting Indicators of Rangeland Health (IIRH), and Proper Functioning Condition (PFC) are effective assessment tools and can be included as multiple lines of evidence for supporting evaluation of land use plan effectiveness. Practical guidance for using AIM data to inform land use plan effectiveness evaluations is provided in a simple workflow on the BLM internal Planning SharePoint site under Plan Evaluations and in [BLM Technical Note 453](#).

### **Training and Resources**

Monitoring protocol trainings required for this activity will include AIM methods (interagency Monitoring Manual for Grassland, Shrubland and Savannah Ecosystems Vol. I, BLM Technical Reference 1735-1 and 1735-2, and the draft BLM Field Protocol for Lentic Riparian and Wetland Systems, all available on the [BLM AIM Resources website](#)). Protocol trainings should be from BLM National AIM Team certified trainers who have recently completed an AIM train-the-trainer course, which can include AIM state leads, district staff, field office staff or partners. Each state is encouraged to send trainers to the AIM train-the-trainer course each year to ensure that they maintain a complete training cadre. Additional training for supplemental methods such as shrub shape for HAF, IIRH, or PFC may also be required. Training for BLM staff in writing measurable objectives and the use and interpretation of data is available via AIM Project Leads Training, Decision Support, Planning and NEPA Academy, periodic webinars, and program-specific trainings. Trainings will be coordinated through the BLM NOC with the BLM National Training Center and partnering offices or regional training facilities. Specific training requirements and resources are listed on the [BLM AIM Training website](#).

## **Roles and Responsibilities**

<b>Step</b>	<b>Activity</b>	<b>Responsible Entity</b>
Monitoring Planning/Funding	Monitoring plan (Monitoring Design Worksheet) Secure/Manage Funding Maintain agreements and contracts	District/Field Office with oversight and coordination from the State Office AIM Coordinator
Monitoring Design	Land use plan area statistical design Sample intensifications Targeted samples Identify monitoring locations including plot revisits	NOC and science partners <sup>†</sup> , with substantial input from Field Office, District Office and State AIM Monitoring Coordinator
Data Collection	Coordinate with field crews Ensure training of field crews Oversee collection of AIM indicator data using electronic data capture	Field crews with oversight and coordination from the District/Field Office and the State AIM Coordinator
Data Quality Control	Field data-entry validation Initial, mid-season and final quality control checks	Field crews with oversight and coordination from the District/Field Office and State AIM Coordinator; Final quality control by NOC
Data Storage	Calculate indicators Upload field data to central database Make data available on BLM network	NOC with AIM science partners <sup>†</sup>
Analysis	Many possibilities, from simple charts or graphs to proportional area estimates, to trend analysis, to causal determinations	Varies; NOC and AIM science partners <sup>†</sup> provide centralized technical support and tools especially for large-scale or complex analyses
Reporting	Land use plan evaluation report NEPA documents Other BLM program reports	Appropriate field, district, and/or state office leads

<sup>†</sup>AIM science partners currently include USDA-ARS Jornada, Utah State University National Aquatic Monitoring Center, and Colorado Natural Heritage Program.