Public Lands Foundation Position Statement
The Integration of Science, Data and Management in Public Land Management

Executive Summary

Effective natural resource management is grounded in the integration of science, data and management. Science helps identify potential natural resource management risks and opportunities. Observations and other sources of geospatial information help identify where these risks and opportunities occur on the landscape. Management entails taking actions to address these risks and opportunities. The Bureau of Land Management (BLM) has undertaken many initiatives over the years to advance the integration of science, data and management. While some of these initiatives were not sustained, others appear to be solid building blocks to further science management integration in the Bureau.

The BLM now faces five major, interrelated challenges concerning the integration of science, data and management. First, the BLM needs to update science policy and ensure there is adequate funding to support the BLM's science infrastructure including the science portal and critical staff. Second, the Bureau must encourage field-level initiatives in observation and adaptive management, and then recognize such innovations when they prove to be effective and encourage other field offices to embrace them. Third, the Bureau must continue its efforts to standardize its data. Fourth, the BLM needs to work with its primary science providers including the U.S. Geological Survey (USGS), U.S. Forest Service (USFS) and the Cooperative Ecosystem Studies Units (CESUs) and other partners to establish procedures to periodically synthesize existing science and data, identify emerging science and data needs, and their potential management implications. Finally, the Bureau needs to continue to pursue regional landscape collaborations which are playing an increasingly critical role in helping land managers understand and address natural resource management challenges that transcend traditional jurisdictional and ownership boundaries.

Background

The BLM is a line and staff organization. At every level of the organization, there is a line officer responsible for exercising the authorities delegated to her or his position. And at every level of the organization, there are staff specialists responsible for advising the line officer on potential management actions including, among other considerations, relevant science and data. The authorized officer is ultimately responsible for weighing the relevant legal, scientific, economic and political considerations in making public land use decisions. Staff specialists are expected to

keep informed of potentially relevant science and data. However, both management and staff often may not be aware of the latest science or data on the subject matter they are working on because of an inadequate system of technology transfer.

While the BLM does fund some applied scientific research, it is not a research organization. It generally relies on other state and federal agencies, academia, and non-governmental organizations to conduct original research; synthesize existing science; conduct assessments of condition and of potential risks and opportunities; and identify potential management responses to such risks and opportunities.

With the enactment of the National Environmental Policy Act (NEPA) in 1970 and the Federal Land Policy and Management Act (FLPMA) of 1976, Congress created requirements for the BLM to share such deliberations with interested parties and formally notify them of any resulting decisions. NEPA also requires that all agencies of the Federal government use a systematic, scientific, interdisciplinary approach in planning and decision making that may have an impact on the human environment, along with guidance on the processes and methods to be used in the NEPA process. FLPMA requires that, in the development and revision of land use plans and in the management of the public lands, the BLM use a systematic interdisciplinary approach to achieve integrated consideration of physical, biological, economic, and other sciences.

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Well-designed work processes facilitate this integration of science, data and management. Poorly designed work processes inhibit this integration. The BLM has basic work processes for collecting and analyzing data; conducting planning; authorizing use and enforcing permit conditions; designing and implementing on-the-ground projects; constructing and maintaining facilities; and providing visitor and community services, including law enforcement and wildland fire suppression.

Over the last several decades, there have been a number of overall trends within the BLM (and other natural resource management agencies) concerning this interface of science, data and management. These trends involve changes in the scope and scale of analysis. They have been driven by significant changes in scientific understanding, the availability of multi-scale geospatial data, and computing technology. These trends include: (1) The focus of analysis expanded from resource occurrence to ecosystem functions and processes. (2) The geographic scale of analysis has increased from specific land use authorizations or projects to field office or district office-scale analyses, to regional multi-scale analyses. (3) There has been movement toward using standardized data and standardized analyses. (4) There has been an effort to move data out of project files and into managed and shared data bases. (5) There has been movement to more effectively integrate science and data across resource programs. Examples of how the BLM has included these changes or trends in past efforts is attached.

In concert with these trends through the years, the BLM has increasingly looked at science, data and management integration as a corporate enterprise. Director Cy Jamison appointed the BLM's first National Science Advisor, Mike Dombeck, in the early 1990s. He later served as acting Director of BLM and also as Chief of the USFS. The BLM adopted *A Strategic Plan for Science and Technology* in 1991, established a National Science and Technology Center (NSTC) in 1995, chartered a *National Science Council* in 1996 (IB 96-161), and released a BLM *Science Strategy* in 2000. The strategy set forth an overall approach to science with three primary objectives: (1) To delineate the role of science in BLM decision-making and public land. (2) To establish a clear process for identifying science needs and priorities and to assure that those needs are reflected in the Bureau's Strategic Plan and budget. (3) To provide a mechanism for communicating the Bureau's science needs, sharing its science and results, and highlighting its science opportunities on BLM managed public lands.

In 2007, the BLM concluded a major evaluation of the organization, *Management for Excellence (M4E)*, which reaffirmed the importance of science and data in managing the public lands and recommended establishing a National Science Committee comprised primarily of BLM managers from different levels of the organization and different programmatic areas. *M4E* also recommended abolishing the NSTC and re-establishing a National Operations Center (NOC) with a Division of Resource Services to serve the role of the NSTC.

In 2013, the BLM's Executive Leadership Team (ELT) sponsored an interdisciplinary team to develop recommendations to further integrate science and management in the BLM. Their report, *Advancing Science in the BLM: An Implementation Strategy*, was released in 2015 (IB No. 2015-040, 3/18/2015). https://www.blm.gov/policy/ib-2015-040 The Strategy outlines two basic goals: to ensure effective and consistent science integration into the BLM's work processes and to ensure that relevant and timely scientific information is accessible to BLM staff and managers.

The Advancing Science Strategy also includes five key principles and practices for managers and staff to focus on to integrate science successfully into public land management decisions and associated work processes. These are: (1) Use high-quality information relevant to the problem or decision being addressed, relying on peer-reviewed literature when it exists. (2) Recognize the dynamic and interrelated nature of socioecological systems within which the BLM operates. (3) Acknowledge, describe, and document assumptions and uncertainties. (4) Use quantitative data when it exists [and applicable qualitative data], in combination with internal and external professional scientific expertise. (5) Use transparent and collaborative methods that consider diverse perspectives.

In 2016, a new National Science Committee (NSC) was established. The Committee's charter includes the following vision statement: "The BLM is a resource management agency that uses science as one of the critical inputs in its decision-making processes at every level. BLM managers and specialists deliberately obtain and apply mission-oriented science in every office, in every program, and in every project." Implementing the Advancing Science Strategy, the NSC created a science portal at the NOC to facilitate the sharing of scientific information across the Bureau. It also prepared an Instruction Memorandum: Principles and Practices of Integrating Science into Land Management (IM 2017-030, 1/24/2017) to provide related policy guidance to the field.

Along with these Bureau initiatives, the Department of the Interior also has increasingly looked at science as a corporate enterprise. Examples include the following three Departmental Manuals:

- Integrity of Scientific and Scholarly Activities (305 DM 3, 12/16/14) https://www.doi.gov/scientificintegrity
- *Implementing Landscape Scale Approaches to Resource Management* (604 DM 1, 1/19/17) https://www.doi.gov/sites/doi.gov/files/elips/documents/604-dm-1.pdf
- *Conservation and Restoration of the Sagebrush Biome* (604 DM. 2, 1/19.2017) https://www.doi.gov/sites/doi.gov/files/elips/documents/604-dm-2.pdf

Discussion

The BLM has undertaken many initiatives over the years to advance the integration of science, data and management. While some of these initiatives were not sustained, others appear to be solid building blocks to further science management integration in the Bureau. The BLM now faces five major, interrelated challenges concerning the integration of science, data and management.

• The Bureau needs to further institutionalize the most promising of the initiatives it has undertaken over the last several decades to further integrate science, data and management. This includes issuing permanent guidance and creating steady funding streams for the BLM's "science" infrastructure, including the science portal at the NOC and critical geospatial analyst positions at the NOC and in the field.
• It is critical that the BLM encourage field-level initiatives in observation and adaptive management. It is equally important that the Bureau recognize such innovations when they prove to be effective and encourage other field offices to embrace them.
• The BLM must move forward with standardizing its core data and its core analyses. Standardized data and analyses will expedite the BLM's ability to prepare land use plans and environmental impact assessments. It also will enable the BLM to roll-up data across programs and offices to participate in regional and national assessments of condition and trend.
• There is an exponential growth in the available science and data. The BLM needs to work with its primary science providers (USGS, USFS and the CESUs) and other partners to establish procedures to periodically synthesize existing science and data, identify emerging science and data needs, and identify the potential management implications of the science and data.
• Regional landscape collaborations are playing an increasingly critical role in helping land managers understand and address natural resource management challenges that transcend traditional jurisdictional and ownership boundaries. The BLM should identify keys to successfully participating in such collaborations, including recommended actions to facilitate the horizontal and vertical flow of information within the collaboration and within the BLM.

Actions are recommended to address each of these challenges.

PLF Position

1. The BLM should issue permanent guidance on science, data and management integration, including a description of the integration-related responsibilities of the ADs, the SDs, the NOC,

the National Science Committee, Data Geospatial Steering Committee, and of the BLM's three standing management committees – the Executive Leadership Team, the Field Committee and the Resources and Minerals Committee.

2. The BLM should create steady funding streams for the BLM's "science" infrastructure including the on-line science portal at the NOC and critical geospatial analyst positions at the NOC and in the field.

3. The BLM's NSC should develop proposed actions, for the BLM ELT's consideration, to encourage field-level initiatives in observation and adaptive management, to recognize such innovations when they prove to be effective and to encourage other field offices to embrace them. A commitment to the ongoing professional training of field specialists should be incorporated into these proposed actions.

4. The BLM's leadership should make data and analysis standardization a priority for the Bureau's resource programs at every level of the organization. Where possible, these data and analysis standardization activities should be coordinated with other state and federal agencies to leverage the value of single inclusive data bases and joint analyses.

5. The BLM should work with USGS, USFS, the CESUs, and other partners to develop protocols and funding streams to periodically synthesize existing science and data, identify emerging science and data needs, and identify potential management implications of the science and data. Since many natural resource management issues vary from region to region, these syntheses of existing science, emerging needs, and potential management implications, should probably be done on a regional basis.

6. The BLM's National Science Committee should develop proposed actions at the national, state and local scale, for the BLM ELT's consideration, to enhance the BLM's ability to participate in regional, multi-scale, cross-jurisdictional natural resource management collaborations, including recommended actions to share information about such collaborations horizontally and vertically within the BLM.

Examples of Science used by BLM to address changing trends and changes in science, data, and management

•   The focus of analysis expanded from resource occurrence to ecosystem functions and processes. Early examples of this change in focus include Fish and Wildlife 2000 (1987), the Riparian Area Management Policy (1987), and Ecosystem Management in the BLM: From Concept to Commitment (1994).

•   The geographic scale of analysis has increased from specific land use authorizations or projects to field office or district office-scale analyses, to regional multi-scale analyses. The Northwest Forest Plan (1994) and the Interior Columbia Basin Ecosystem Management Project (2003) are early examples of regional, cross-jurisdictional, multi-scale analyses. A more recent example includes the Greater Sage Grouse Conservation Plan Amendments (2015).

•   There has been movement toward using standardized data and standardized analyses. Standardized data and analyses were incorporated into the Northwest and Coastal Oregon Plan Revisions (2016) and the Desert Renewable Energy Conservation Plan in California (2016). Other examples of a move toward standardized data are the terrestrial and aquatic components of BLM's Assessment, Inventory and Monitoring (AIM) Strategy. https://aim.landscapetoolbox.org/wp-content/uploads/2020/02/AIM-Fact-Sheet-2020.pdf

•   There has been an effort to move data out of project files and into managed and shared data bases. The BLM's Navigator and Landscape Approach Data Portal are two examples of such data sharing: https://navigator.blm.gov/home and https://landscape.blm.gov/geoportal/catalog/main/home.page.

•   There has been movement to more effectively integrate science and data across resource programs. Early examples include the Healthy Lands Initiative (2007), the Integrated Vegetation Management Handbook (2008), and the Land Health Manual (2009).

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