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## BLM Research and Development

### 2004 RESEARCH AND DEVELOPMENT ACTIVITIES (\$000)

Conduct of R&D by Activity	2003		2004		2005	
	B.A.	Outlay	B.A.	Outlay	B.A.	Outlay
Basic Research	0	0	0	0	0	0
Applied Research	10,889	10,889	11,768	11,768	10,240	10,240
Development	1,472	1,472	1,945	1,945	1,828	1,828
R&D Facilities	192	192	192	192	187	187
Conduct of R&D performed by Colleges and Universities*	2,738	2,738	2,729	2,729	2,258	2,258
Indirect Costs Related to R&D Performed by Colleges and Universities*	700	700	700	700	600	600
Merit Reviewed Scientific Research*	0	0	0	0	0	0
<b>Total</b>	<b>12,553</b>	<b>12,553</b>	<b>13,905</b>	<b>13,905</b>	<b>12,255</b>	<b>12,255</b>

*\*Numbers inclusive in Applied Research totals listed above.  
Estimated distribution (by percentage) of funding by R&D performers: In-house Activity (BLM, Federal and State agency partners) - 70%, private industry - 0%, colleges-university - 25%, other non-profit - 5%*

### PROGRAM OVERVIEW

The ultimate objective of the BLM Research and Development program is to make better use of new data, information, and knowledge to improve the management of the Nation's lands and resources. The BLM's Research and Development program supports improvements in organizational effectiveness, furthers the long-term goal of working with partners to identify scientific information needs, and then communicating these needs to research agencies, universities, and other non-governmental organizations. The Applications of Science program was established by Congress in 2002 in order to assure that this scientific information is current and can be made available to BLM managers. The Application of Science program is now an important component of its Research and Development program, assisting the BLM to expand its capacity to collect and use natural resource information. For further information on the Application of Science program, please refer to the section in the Soil, Water, and Air program.

The BLM has developed a formal Science Strategy that includes a process for identifying high-priority science needs and then meeting these needs either internally or in collaboration with science partners such as the USGS, other agency science providers, and universities. The strategy also includes the identification and cataloging of scientific opportunities on the public

lands, such as those found within Research Natural Areas, National Conservation Areas, and National Monuments. The BLM is currently preparing management plans for several NCAs and National Monuments, which will include the identification of science opportunities and research needs.

The U. S. Geological Survey serves as the primary research-science Bureau for the Department, addressing the scientific questions and research needs of the land-management bureaus. The BLM relies on the science capabilities within the USGS as its largest single source of scientific research support, although the BLM works with other Federal agencies, State agencies, and other organizations to meet its overall science needs. The USGS Geologic, Water Resources, and Geography Disciplines, support the BLM's mineral assessment, mining-related hydrologic studies, and abandoned mine land efforts. The USGS Biological Resources Discipline addresses the majority of the BLM's science needs relating to managing biological resources.

The BLM is a founding partner in the network of Cooperative Ecosystem Studies Units that have recently been established at several of the Nation's leading universities by a number of Federal agencies. The BLM is increasingly making use of these CESU partnerships to meet its science needs and involve U.S. universities and colleges to a greater extent in providing sound science for managing the public lands and resources.

In 2005, the BLM will be beginning new investigations, including

- Studying pinyon-juniper woodlands in Arizona to focus on the prehistorical, historical, and current ecology of these woodlands to understand how they can best be managed in a sustainable manner.
- Studying desert rangeland management and salinity reduction study in cooperation with the Bureau of Reclamation in Colorado.

The BLM will also pursue its ongoing projects, including continuing:

- Laying the foundation for future management actions for protection. Projects will include establishing baselines for resources in BLM's National Monuments and NCAs, understanding and evaluating the effects of energy development in the Rocky Mountain and Alaskan regions, improving management of western forests, controlling exotic species and weeds, and restoring of shrub-steppe and arid desert habitats.
- Exploring a late Cretaceous dinosaur fossil bed in northern Alaska, using a revolutionary tunneling technique to excavate this site situated in permafrost terrain.
- Studying endangered species in the San Joaquin Valley in California. Due to variation in the annual precipitation and resulting vegetation, complications resulting from an extensive wildfire in the study area, and the need to collect data through a cycle of "wet" and "dry" years, the cooperating agencies plan to continue data collection in the San Joaquin Valley through the next several years.
- Determining how alternative management decisions affect biological diversity and recreation opportunities in chaparral and woodland ecosystems in California.

- Investigating the development of land use strategies to reduce fuel loading and promote the regeneration of knobcone pine on BLM lands in California.
- Conducting research and monitoring the effects of prescribed fire in the California sequoia forests, while additional studies will gather data on important vertebrate species within the same forest areas.
- Conducting archaeological investigations in Colorado in an effort to gain a better understanding of the origin of the first Americans in Colorado.
- Studying the effects of fragmented habitats on sage grouse ecology and behavior in Idaho.
- Examining how native mammalian grazers and top avian and mammalian predators directly and indirectly influence plant community dynamics and food web structures in the grasslands of the Intermountain West in Montana.
- Identifying and developing methodologies for native-origin seed collection, propagation, production and storage in the native plant materials development program in Utah and Nevada. Seeds from native vegetation are important for use in rehabilitating habitats damaged or destroyed by fire and invasive species.
- Planning similar efforts for elsewhere in the West, where projects are planned, in coordination with the U.S.D.A. National Resource Conservation Service and private seed growers, to furnish native seed, especially seed from native shrubs, forbs and some grasses, for restoration and reclamation efforts. Attention will continue to be focused on the Great Basin, where invasive species and wildfire have severely disrupted native ecosystems and additional research is urgently needed to provide information useful in restoring damaged habitats. The newly established Great Basin CESU is expected to help the BLM meet many of its science needs in this area.
- Expanding the Native Plant Materials Development Project, a program of seed collections, genetic and seed germination research directed at developing seed bank and plant cultivars for restoring native plant populations and degraded ecosystems in several western states. This project is a combined effort of the BLM with nonprofit organizations, universities and State, Federal and local governments agencies to address the continued habitat deterioration and restore biodiversity in western ecosystems.
- Studying the effectiveness of new state-of-the-art wildlife structures, including highway underpasses, deer fencing, and earthen escape ramps, for the passage of wildlife under an interstate highway in Utah.
- Studying the potential impacts of natural gas developments on sage grouse in Wyoming in conjunction with the University of Wyoming.
- Understanding and promoting forest diversity and protecting riparian and aquatic resources through the Cooperative Forest Ecosystem Research project in the Pacific Northwest. Most of the research related to the Northwest Forest Plan is long-term in scope and is expected to continue for several years.

In addition to these projects, new research, studies and assessments will be initiated, and past research, studies and assessments will be continued to provide information related to development of energy and mineral resources and how best to protect valuable hydrological resources, as well as aquatic, riparian, and terrestrial habitats, in areas of energy and mineral development. Wyoming, Colorado, Alaska, Utah and New Mexico are likely to be areas of focus for many of these efforts.

The Research and Development program supports the Department's Strategic Plan through its use of partnerships, a "supporting pillar" of the Plan, and science, the foundation for the plan. Many of the results of the program will fall within the mission goals of the Strategic Plan: Resource Protection, Resource Use, Recreation, and Serving Communities.

### **2003 PROGRAM PERFORMANCE ACCOMPLISHMENTS**

Although the BLM's need for more data and information continues to increase, substantial progress was made in obtaining data and information in 2003 by the BLM, USGS, and other science partners. Highlights include:

- Continuing development of GIS techniques and databases for monitoring and understanding changing resource conditions and management situations of BLM-administered lands;
- Continuing development of new techniques and plant cultivars for restoring habitat damaged by exotic invading weeds and wildfire;
- Continuing efforts to collect new data and information on the resources of the BLM's NCAs and National Monuments to facilitate better management and provide information needed for development of land use plans. Efforts focused on paleontology, cultural resources, plant and animals inventories, and human use;
- Continuing progress in the development of a cost-effective, reversible wild horse contraception vaccine, and continuation of efforts to understand the change in herd dynamics with vaccine use;
- Continuing progress in studies on sage grouse and restoration of sage grouse habitat in shrub-steppe ecosystems to gain a better understanding of sage grouse biology and ways to restore populations of this species and its habitats in this degraded, fragmented ecological system;
- Continuing assessments of energy and mineral resources, and research into techniques to minimize negative effects on other natural resources during exploration and development;
- Continuing ecological studies directed at better implementation of forest ecosystem based management in the Oregon Coast Range and the forested areas covered by the Northwest Forest Plan;
- Continuing to work with the USGS Recoverability and Vulnerability of Desert Ecosystems Project to provide land managers with the scientific understanding needed to conserve and restore threatened desert landscapes. Full recovery of the most sensitive species in the Mojave has been estimated to possibly take as long as two thousand years, so it is critical that the BLM conserve and protect existing fragile resources;
- Continuing progress in work-related to the Northwest Forest Plan research and monitoring effort, as well as continuing development of the Cooperative Forest Ecosystem Research Program and the development of a Coastal Landscape Analysis and Modeling System to research issues relevant to implementing forest ecosystem based management, specifically in the Oregon Coastal Range;
- Developing a prototype strategy for obtaining existing information on regional resource conditions, integrating data from various agencies and sources, evaluating data quality and converting regional information into a format useful to managers on the Colorado Plateau; and,

- Assessing land use and water-quality issues from naturally-occurring toxicants, such as selenium, and assessments of mercury contamination and mercury impacts in aquatic systems and biota, especially on the western slopes of Sierra Nevada.

### **2004 PROGRAM PERFORMANCE ESTIMATES**

In 2004, the BLM will begin new and continue past research and development efforts towards:

- Initiating studies with the USGS to understand the potential long-term responses in the hydrologic and ecologic systems overlying potential mining areas to provide information to assist the BLM in its management decisions related to resource mining permits;
- Initiating studies on salt loading into the Colorado River, a major concern since water is a primary source of irrigation and drinking water for the lower basin states;
- Initiating a study on Bonneville Salt Flats in Utah to determine why the salt crust is deteriorating and whether commercial potash production from nearby federal leases and private lands is responsible for the deterioration of this unique and scenic geological resource;
- Continuing studies with the DOE, USGS, and U.S. Army Cold Regions Research and Engineering Laboratory on a number of concerns related to energy development;
- Continuing studies with the USGS to monitor and evaluate landslide hazards at sites in California, Colorado and Washington;
- Continuing studies in the Cooperative Forest Ecosystem Research Program, emphasizing conifer and hardwood tree improvement and forest diseases;
- Continuing to progress on studies on the juniper invasion of shrube-steppe ecosystems in the northern Great Basin and Pacific Northwest;
- Continuing to inventory and evaluate past management treatments of pinyon-juniper;
- Continuing a four-year study in Utah of symbiotic relationships between soil mycorrhizae and vegetative communities, and the importance of this relationship to the success of ecosystem restoration and rehabilitation efforts;
- Continuing studies with the USGS on native grasslands and managed rangelands to quantify ecosystem condition, determine rare plant patterns, appraise species richness, and identify areas of native plant diversity. Studies will continue on understanding decreased nutritional content of plants, reduced diversity and productivity of native species, decreased water availability, diminished soil microbial populations, and accelerated rates of soil-surface erosion in desert and arid ecosystems;
- Continuing, as an ongoing integrative program, mapping infestations and accurately monitoring the spread of invasive species on western rangelands, as well as improving methods for predicting areas most vulnerable to invasions, and assessing the effects of management practices and natural disturbances on invasions;
- Continuing studies at the Grand Staircase-Escalante National Monument, focusing on developing sustainable grazing and livestock management techniques compatible with the area's arid environment; characterization of the area's hydrology, monitoring changes in terrestrial and aquatic insects and invertebrates related to the cessation of grazing in the Escalante River corridor and studying the distribution and ecology of Escalante River fishes;
- Continuing research efforts on wild horses, working to refine multiple-year contraceptive vaccines, focusing on population modeling and fertility control on herd dynamics;

- Completing studies on the effects of human-caused disturbance on marbled murrelets in California's Headwaters Forest, and continuing studies of the effects of livestock grazing on a community of species at risk of extinction in the San Joaquin Valley;
- Continuing studies with the U.S. Forest Service on the ecology of Sequoia groves and to gather data for use in developing strategies to apply prescribed fire as a means to maintain giant sequoia grove health while reducing fuel hazards;
- Continuing research on fire ecology, focusing on understanding the effects of wildland fire on wildlife habitat and ecosystem structure, function, sustainability, and restoration; and,
- Continuing studies with the U.S. Army Cold Regions Research and Engineering Laboratory to monitor and study the long-term effects of wildfire on tundra soils and vegetation.

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