Bureau of Land Management

Discovery Series

TAKE A CLOSER LOOK

NATIVE PLANTS

For learners of all ages

Quick Reference

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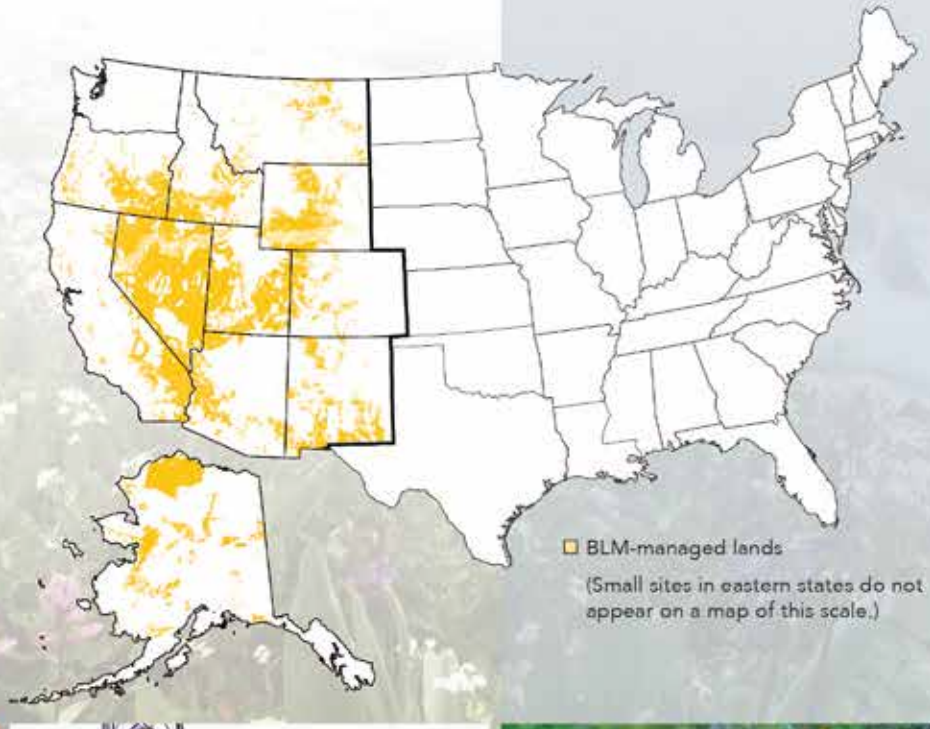
About the BUREAU OF LAND MANAGEMENT

The Bureau of Land Management (BLM) cares for about 245 million acres of federally owned public lands, mainly in the Western United States and Alaska. These lands, representing about one-eighth of our nation's land area, belong to all Americans. In addition, the BLM administers 700 million acres of mineral estate across the entire country.

Public lands are used for many purposes. They support local economies, providing Americans with coal, oil and gas, forest products, livestock forage, and other commodities. As a haven for plants and wildlife, they play a critical role in habitat and resource conservation efforts. They embrace some of our country's most important historical, archaeological, and paleontological sites. Open spaces on public lands offer places for people to play, learn, and explore. In recent years, some BLM lands have been designated as part of the National Landscape Conservation System, a network of lands afforded special status and managed almost exclusively to conserve their scientific, cultural, educational, ecological, and other values.

The BLM is responsible for managing public lands under the principles of multiple use and sustained yield in a manner that best meets the current and future needs of the public. With so many resources and uses, the BLM's job is challenging. Thankfully, countless partners, volunteers, and communities provide invaluable support, helping the agency carry out its stewardship mission. To learn more about your public lands, visit ***http://www.blm.gov.***



NATIVE PLANTS IN AMERICA: An Overview

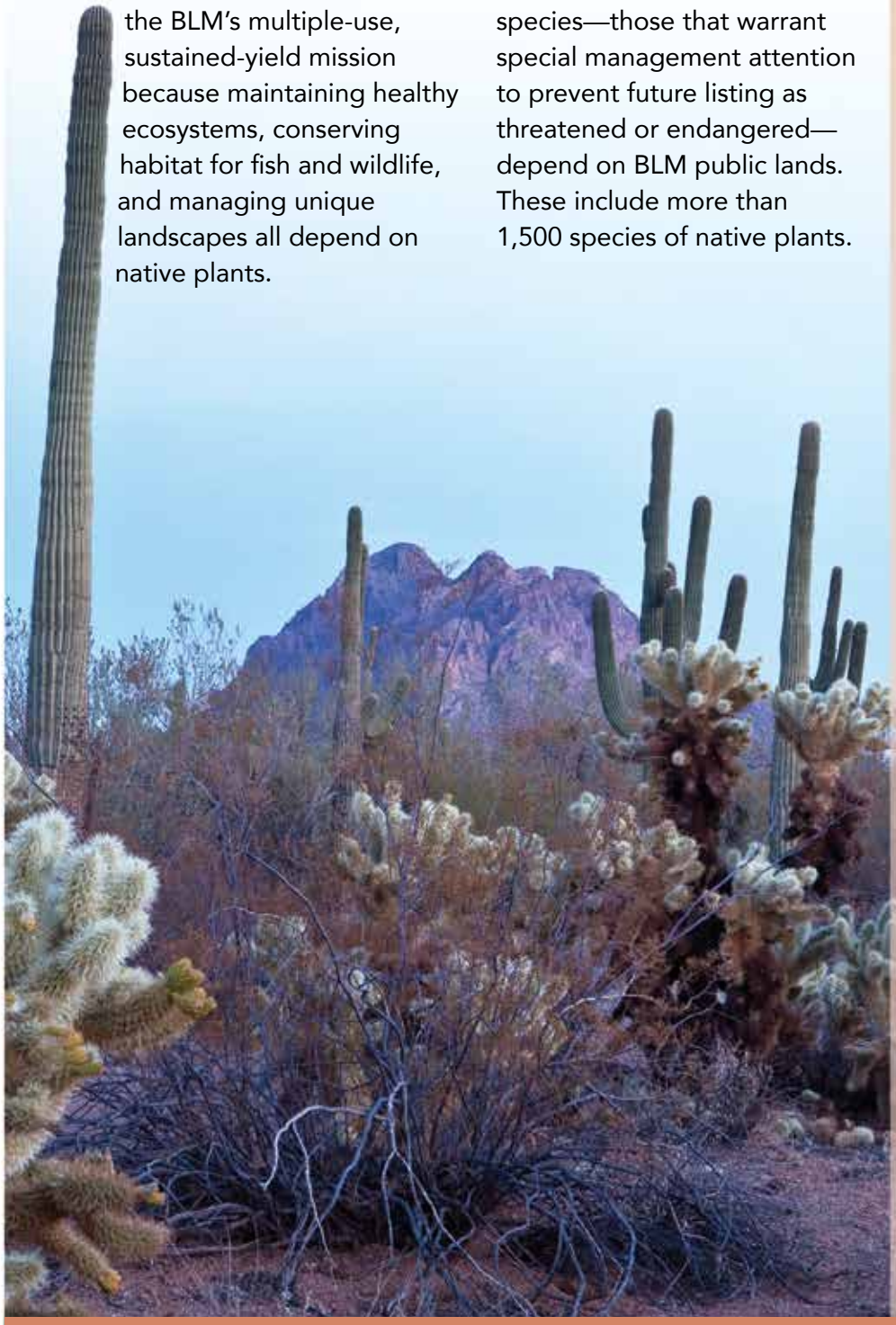
The United States is home to a vast range of wild plant life in a diverse array of ecosystems, including broadleaf forests, temperate grasslands, and desert scrub. From tiny willows in the Arctic to swaying palmettos in the South, from carnivorous bog plants in the Southeast to seasonal wildflowers in the West, America harbors an exceptional variety of native vegetation.

But America's native plant communities are under threat: habitat loss, overgrazing, wildfires, multiplying invasive exotic species, chemical pollution, and climate change have all taken their toll. As natural habitats have been degraded, native plant communities have lost their resilience, and many native plant species have become endangered or extinct. Diversity, which is so essential to stable, balanced ecosystems, has declined. Some threats to native plant communities are specific to particular regions. But others—such as the spread of invasive species—exist virtually everywhere. More than 200 of America's native plant species are estimated to have been lost just since the early 19th century.

As the nation's largest land manager, the BLM has a special responsibility and unique opportunity to slow or stop this decline. BLM public lands encompass more than 50 ecoregions—areas defined by

the native plant communities they host. Sagebrush steppe blankets the Great Basin, piñon and juniper woodlands surround desert grasslands in the Colorado Plateau, and saguaro cacti reach for Sonoran Desert skies in arid shrublands. Native plant communities play a vital role in meeting the BLM's multiple-use, sustained-yield mission because maintaining healthy ecosystems, conserving habitat for fish and wildlife, and managing unique landscapes all depend on native plants.

The native plant communities on BLM public lands offer habitat for iconic western wildlife species, as well as more than 70 wildlife and 170 plant species listed as threatened or endangered under the U.S. Endangered Species Act of 1973. An even greater number of rare and sensitive species—those that warrant special management attention to prevent future listing as threatened or endangered—depend on BLM public lands. These include more than 1,500 species of native plants.

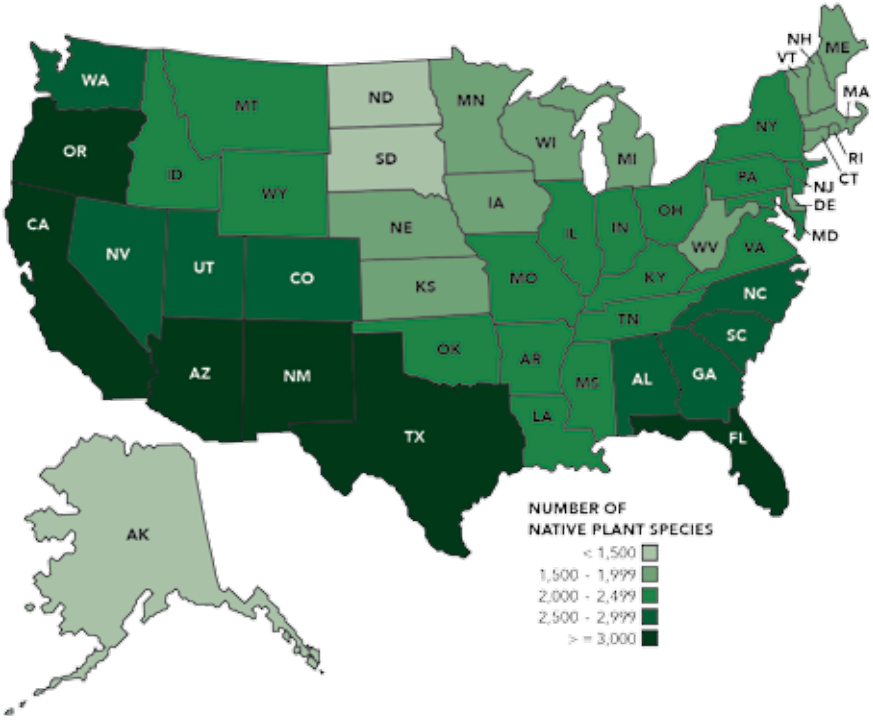


IMPORTANCE OF NATIVE PLANTS: A Wealth of Benefits and Ecosystem Services

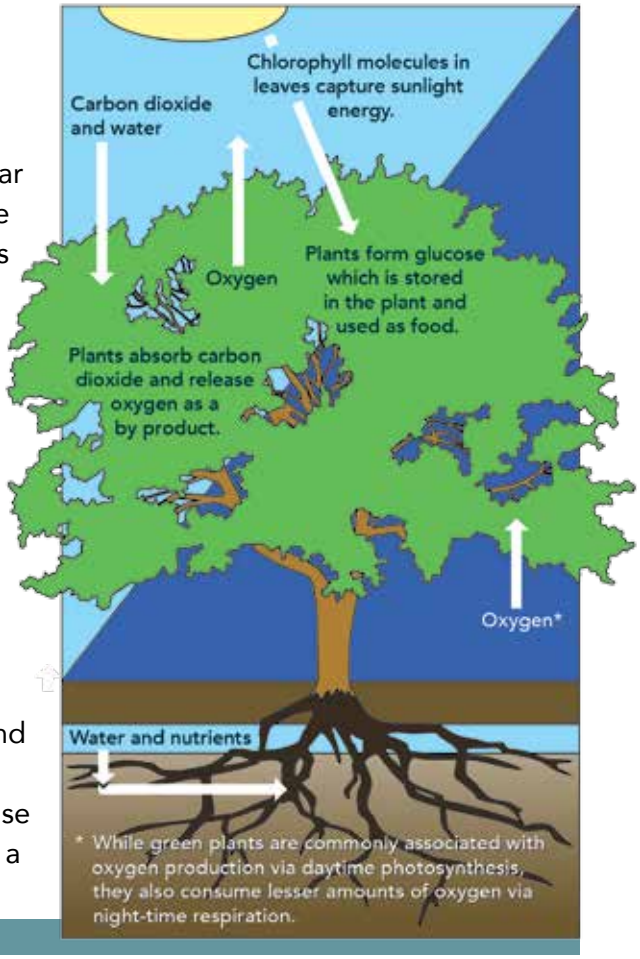
Foundation of Life and Biodiversity

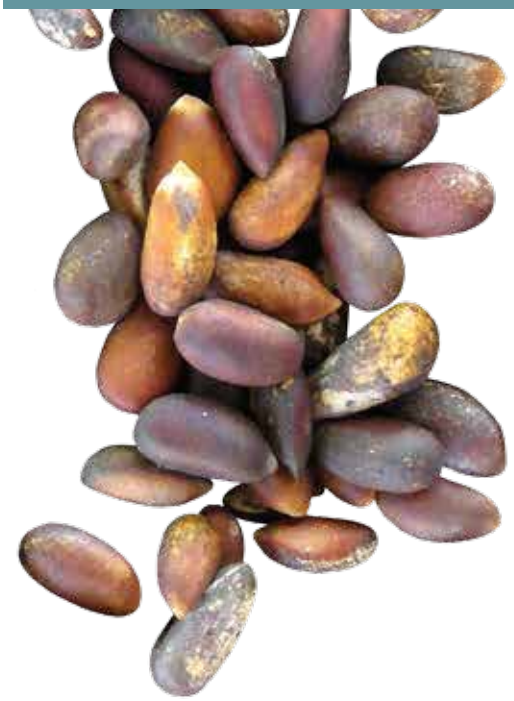
In North America, native species are generally recognized as those that existed on the continent prior to contact by Europeans in the late 15th century. The largest communities of native plant species in the U.S. are found where there is a variety of elevations, landforms, and climatic patterns and in evolutionary "hot spots"—those areas hosting many species of one genus. California leads the nation with more than 5,000 species of native plants, followed by Texas with more than 4,500.

Plants provide the fundamental services upon which most life depends. Through photosynthesis, plants convert water and carbon dioxide into the oxygen and sugars that provide the primary fuel for life. Plants are the foundation of virtually the entire terrestrial food chain, sustaining humans as well as wildlife. Native plant species have generally adapted and evolved with the competing species, predators, and diseases of an area over many thousands of years. They are therefore usually in reasonable ecological balance with their associates and competitors.



Native plant communities provide food, cover, and nesting areas needed by animals adapted to a particular ecosystem, tying together the fates of both the native plants and animals. Native plant species significantly influence overall biodiversity and the fates of individual species adapted to highly specific habitats. For example, the Greater Sage-Grouse is a large, ground-dwelling bird that relies exclusively on sagebrush steppe plant communities of the Western U.S., using sagebrush itself and other native plants for cover and food. Greater Sage-Grouse populations have declined as a





result of loss, degradation, and fragmentation of sagebrush plant communities. Existing sagebrush communities are subject to disease, insect predation, and drought along with long-term stressors, such as fire, changing climate, and incursions of invasive species. Today, there are about 40 percent fewer Greater Sage-Grouse than in the 1970s, occupying only 56 percent of the species' historic territory. The BLM and the U.S. Forest Service are working with other agencies, tribes, and private landowners to conserve and restore the native plants in the remaining sagebrush steppe communities on both public and private lands.

Their Role in Crops, Medicines, and Culture

The benefits of native plants and the ecosystem services they provide extend to humans as well, especially in the form of food sources. Over the centuries, farmers have selectively bred native wild plants into high-yield, disease-resistant crops. However, today 90 percent of the world's food comes from only 20 such plant species; as a result, the genetic makeup of each species of our main food crops is essentially homogeneous. This lack of genetic diversity can result in crop failure if the plants face an unfamiliar disease. For example, in 1970, a new fungus destroyed 15 percent of the U.S. corn crop. Each year, researchers find hundreds of new potential sources of food from wild native plants, which could be developed into alternative or replacement food sources. Two examples on public lands are piñon nuts in the Southwest and wild mushrooms in the Northwest.

An estimated 40 to 50 percent of existing medicines also originated in native plants, whose medicinal qualities were historically discovered by trial and error. For instance, ancient humans noticed that pain disappeared when they drank tea made from the bark of willow trees. In the early 19th century, scientists identified the therapeutic substance in willow bark as salicin, the chemical that led to the development of modern-day aspirin. Native plants also offer an irreplaceable gene pool for new medicines. For example, in 2012, researchers from the University of Kansas' Native Medicinal Plant Research Program identified 14 compounds in the common U.S. wild tomatillo plant that exhibited anti-cancer properties in early testing. The new compounds are showing promise in fighting a number of different cancers without any noticeable side effects or toxicity. Scientists can only speculate about the countless other medicines that are waiting to be discovered; of the 250,000 known plant species on earth, it is estimated that only 2 percent have been chemically analyzed for medical potential.

For Native American tribes with small land bases, BLM public lands are particularly important collecting sites. Native plants have played unique roles in Native American life and cultures for thousands of years. Plants are consumed for food and medicine, but they are also used in ceremonial rites and the cultural revitalization efforts currently being pursued by many tribes. For example, in California, tribal elders use native redbud and sourberry plants in teaching younger tribe members basketry and other traditional arts.

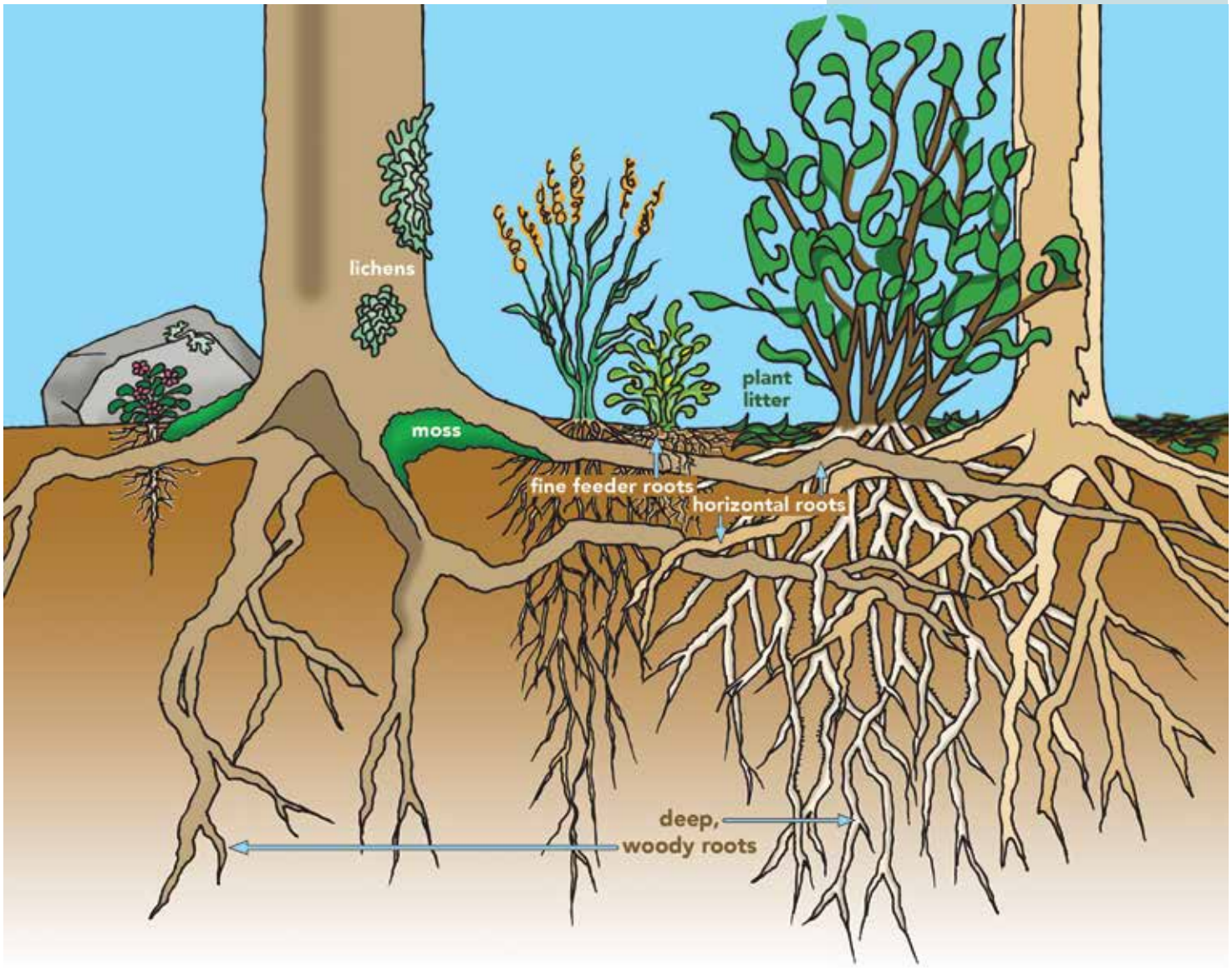
Their Role in Climate Modulation

Once established, native plants are also effective moderators of climate. As concern has grown about the rising concentration of atmospheric carbon dioxide—one of the principal greenhouse gases linked to climate change—so has interest in carbon sequestration. Plants facilitate the sequestration process by removing carbon dioxide from the atmosphere during photosynthesis and storing it as biomass both above ground in leaves and stems and below ground in roots. The biomass later decomposes to organic matter in soils. Since native plant root systems tend to be dense, their roots store great amounts of carbon relative to the leaves, stalks, and other visible portions of the plants. Forests are especially important in this regard, acting as major carbon sinks.

Their Role in Erosion, Flood, and Drought Moderation

Erosion occurs when wind, water, or ice dislodges soil particles and carries the particles off a slope, forming rills and gullies that can even trigger landslides. Raindrops hitting the soil surface can also meld the soil particles into a crust that prevents infiltration, promotes floods, and destabilizes slopes. Native trees and shrubs intercept precipitation before it hits the soil surface, reducing runoff and increasing infiltration.

Native plant communities offer a variety of root systems and interact with lichens, mosses, and other plants to capture moisture, reduce erosion, and increase penetration of water into the soil, thereby reducing both floods and droughts. Plant litter helps to develop organic layers in the soil that also can trap moisture. Deep, woody roots lock soil layers together, horizontal roots connect plants in an interlocking grid, and fine feeder roots form a network through the upper soil layer. The complex root systems of native plants also filter water, absorbing pollutants as the water migrates into the ground. These complex root systems enable established native plant communities to better withstand and recover after wildfires and resist invasion by alien plant species.



NATIVE PLANTS IN CRISIS: A Closer Look

Facing Habitat Loss and Natural Disasters

Overgrazing, residential and commercial development, mining, and other human activities have adversely impacted many native plant communities through habitat degradation or loss. Natural disasters affect plant habitats, too. Such events may have particularly intense impacts on those species with small populations, restricted ranges, slow reproductive rates, or limited dispersal mechanisms. For example, although some native plant species actually depend on regular wildland fires in order to reproduce, a very hot, catastrophic wildfire may wipe out entire populations as well as seeds that could germinate in the future to restore the site. The BLM and other land management agencies work cooperatively to reduce the fuel buildups that feed wildfires and to contain the spread of wildfires that do occur on public lands.

Facing the Threat of Invasive Species

After habitat loss, pesticide use and invasions of nonnative species present the greatest threats to native plants. In a native ecosystem, species evolve together with checks and balances, such as pests, predators, and diseases, that limit the population growth of any one species. When a nonnative species is introduced, it has no limiting factors, and its population may explode, resulting in the loss of native plant species or native plant communities. When nonnative plants rapidly grow and spread over large areas, they are considered invasive plants.

Nonnative plant species often have characteristics that enable them to out-compete native plants for moisture, sunlight, nutrients, space, or reproductive advantage. For example, a nonnative plant may flower more frequently and produce more seeds than local native species, giving it an edge in competition for moisture. Some plants even produce chemicals in their leaves or root systems that inhibit the growth of other plants around them. As a result of such invasions, biodiversity is reduced, hydrologic conditions and flooding regimes are altered, erosion increases, habitat is degraded, wildfires burn longer and spread faster, and the genetic composition of individual native species may be changed through hybridization.

Cheatgrass is an invasive annual grass that is of particular concern on BLM-managed lands, many of which are located in the arid environments in which the species thrives. Cheatgrass produces huge volumes of seeds and easily depletes soil moisture, so it establishes itself quickly on disturbed sites. Mature cheatgrass plants offer poor-quality forage for livestock, and sharp-pointed cheatgrass seeds can harm the mouths of grazing animals. The most profound impact of cheatgrass is its influence on fire regimes. Cheatgrass produces large amounts of connected fuel, which promotes hotter, larger, and more frequent wildfires. Because the interval between fires is shortened, native perennial vegetation is unable to completely recover before the next fire. At the same time, cheatgrass continues to spread, and the cycle continues. Native plant communities, such as sagebrush steppe, are eventually removed from the ecosystem, resulting in a cheatgrass monoculture (when only a single type of plant grows in an area). This invasive plant has been identified as one of the most problematic within historic Greater Sage-Grouse habitats.

Nationally, public lands are being overrun by invasive weeds at a rate of 4,600 acres per day, and 4,000 species of exotic plants have established free-living populations in the U.S. Of these, 700 are known to adversely affect livestock pastures and agricultural lands, and more than 1,000 are a threat to natural areas.

Susceptibility to Climate Change

Many rare, threatened, and endangered native plants are highly susceptible to extinction as a result of climate change, principally because of small population sizes, restricted overall range, and limited suitable habitat types. Climate change can alter plant life stages, such as leaf emergence or flowering period, which may hinder survival and reproduction. Various studies estimate that plant hardiness zones may shift up to 90 miles north or south under the stress of climate change. Some species will likely stay in place and adapt to new conditions; others will gradually migrate to new locations; and still other species will become extinct.

In the face of climate change, nonnative plant species can pose an even greater threat to native plants because nonnatives tend to do well in changing conditions, out-competing native plants for vital resources. It is crucial that conservation efforts protect and manage large areas of habitat for native plants. Without these efforts, climate change will result in changes in ecosystem structure and the possible loss of essential ecosystem services.

The Decline of Pollinator Populations

For 75 to 95 percent of flowering plants, seeds can only be produced when pollen is transferred between flowers of the same species by pollinators that visit flowers to gather nectar or pollen. Most animal pollinators are invertebrates, including flies, beetles, butterflies, moths, and bees. Pollen grains become attached to the animal's body; the pollinator then unknowingly transports those pollen grains when it visits another flower, possibly resulting in successful reproduction of that plant.

Unfortunately, some pollinator species have seen a 90-percent decline in their populations over the last decade, attributable most directly to habitat loss or degradation due to human activities and invasive plant species. Similar to the honey bee die-offs and hive collapses that have been prominently discussed in recent news, populations of native bumble bees have suffered significant mortality. Population declines among pollinating insects can have devastating effects when the plant/pollinator relationship is very specific. For example, the Joshua tree in the Mojave Desert ecosystem is exclusively pollinated by a single species of moth and is unable to reproduce without it.

PRESERVING AND RESTORING NATIVE PLANT POPULATIONS

Categories of Protections Available to Native Plants

The Center for Plant Conservation reports that nearly 30 percent of the native flora in the U.S. are considered to be of conservation concern. More than 850 of them are on the federal list of threatened and endangered species, which is maintained by the U.S. Fish and Wildlife Service. A species is considered endangered when it is at risk of becoming extinct in the near future (if not adequately protected). A species is considered threatened when it is likely to become endangered in the near future (if not adequately protected).

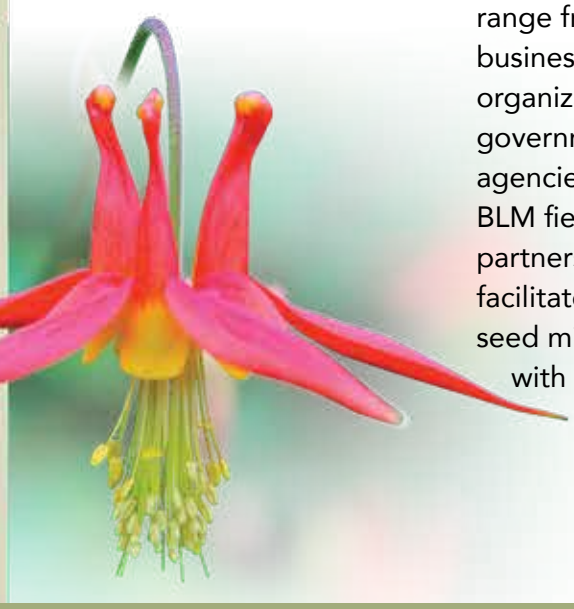
Population numbers are not the only measure of biological importance. High-priority species often include endemics (plants that are native to one specific area and exist nowhere else). These species are particularly susceptible to environmental change and are often indicators of unique and rare habitats. The BLM manages land with significant numbers of endemic species in California, Utah, Nevada, and Arizona.

How Plant and Animal Protections Differ

The conservation process of plants is different from that of animals, because animals can be relocated before a threat to their population reaches a critical level. Additionally, individual animals can move quickly to a different locality if they sense a threat to their survival. Because of their lack of mobility, plants often die when calamity strikes. In many cases, plant communities can be relocated only with great difficulty because of the specific climatic and environmental conditions they require to survive.

One of the best tools for fighting species loss is the Endangered Species Act (ESA) of 1973. Its purpose is to protect and recover imperiled species and the ecosystems upon which they depend. Since it was passed, the ESA has been 99 percent successful in preventing the extinction of listed species. When listed under the ESA, imperiled animals are protected wherever they live, while listed plants are protected only on federal lands.

Because plants do not receive ESA protection on private land, the BLM's role in conserving native plant communities on federal lands is critical. The BLM manages special-status species, which include ESA listed species, ESA candidate species, and rare species, on public lands. The ultimate goal for managing rare plant species is to prevent future listing under the ESA, while listed plants are managed for conservation and recovery of their populations. To address threats and maintain viable populations, the BLM's Plant Conservation Program focuses on four management areas: (1) inventory, to understand where native plants are located and how they are faring; (2) planning, to include native plant management and conservation in all BLM work; (3) monitoring and research, to ensure that current native plant data and trends are used to make informed decisions in managing the land; and (4) coordination across jurisdictional and political boundaries, to ensure that native plant management is both efficient and consistent.



Responding to Climate Change and Habitat Restoration Needs

The BLM Plant Conservation Program works with partner organizations to bring American native plants to the forefront of conservation on BLM public lands. Across the western states and on the scattered BLM public lands in the eastern states, the program addresses many aspects of plant species conservation, including native seed collection, rare plant conservation, restoration, native plant materials development, and public education. These activities are accomplished in cooperation with the program's partner organizations, which range from universities and businesses to nonprofit organizations, tribes, local governments, and other federal agencies. For example, several BLM field offices work in partnership with local tribes to facilitate the use of restoration seed mixes that include species with cultural and other value to tribe members.

Through its Plant Conservation Program, the BLM has taken a lead role in collaborating with partners to develop high-quality seeds and seedlings of America's native plant species for restoration, rehabilitation, and reclamation. The Seeds of Success program coordinates collection of seeds for research and long-term conservation storage. The collection and banking of seeds from native wildland species will help safeguard those that face habitat loss and fragmentation resulting from climate change and other disturbances. The Seeds of Success native seed collection maintains specimens from more than 5,000 native plant species. A portion of these collections is used for research that will help increase the availability of native plant materials and provide information on techniques for successful use of native plants in projects. This work is also done in conjunction with other programs within the BLM, such as testing trials of native forb seeds for use in reclamation projects in Wyoming. Uncertainties associated with climate change make seed banking and native plant materials development a vitally important adaptation strategy for natural resource management, conservation, and ecosystem restoration activities conducted by land managing agencies such as the BLM.

The BLM Plant Conservation Program also has a partnership with NatureServe to develop climate change vulnerability indices for cactus species in portions of the Mojave, Sonoran, and Chihuahuan Deserts, where the BLM is developing solar energy projects. Vulnerability indices evaluate species' sensitivity to climate change. Scientists from the Chicago Botanic Garden in collaboration with Northwestern University are also working with the BLM to develop species distribution models that reflect various climate change scenarios for more than 400 native plants found on BLM public lands. The data from these scientific studies can assist the BLM in making well-informed land management decisions regarding future renewable energy projects.

What's Happening Now

On a national level, the BLM works with the Plant Conservation Alliance, a group of more than 300 public and private organizations that share the same goal: "to protect native plants by ensuring that native plant populations and their communities are maintained, enhanced, and restored." Coordinating with other federal agencies and organizations reduces duplication of effort and pools resources for plant conservation.

On a local level, the BLM has numerous projects run by its many field offices. In cooperation with BLM-Utah's Grand Staircase-Escalante National Monument and the Grand Staircase-Escalante Partners, students from Kanab High School's natural resource management class take field trips to the monument to identify native vegetation and collect seeds from native winterfat plants. Seedlings are grown in their school greenhouse over the winter and planted at the monument in the spring to restore wildlife habitat. In southern Nevada, BLM staff and community volunteers spring into action when the iconic Joshua tree experiences a rare year of exceptional seed production. The seeds are cleaned and placed in conservation storage through the Seeds of Success program. These are just two examples of how partnerships and volunteers—all of us—can make a difference for native plants on our public lands.

How You Can Contribute to Native Plant Protection

Learn more about native plants, get involved, and spread the word!

- Visit the BLM Plant Conservation website at ***http://www.blm.gov/plants*** for more information on plant restoration, conservation, partnership efforts, and the Seeds of Success program.
- Encourage conservation of native plant habitats in your local community.
- Volunteer at BLM sites and in parks, national forests, and other public lands to help protect native plants and their habitats. To view available volunteer opportunities, please visit ***http://www.volunteer.gov.***
- Get involved with a local native plant group, botanical garden, or garden club.

- Never collect native plants from the wild—they might be rare or endangered species!
- Order garden plants only from reputable nurseries that propagate from nursery-grown material.
- Talk to your local garden stores, and ask them to stock native trees, shrubs, annuals, and perennials, as well as plants that supply nectar to pollinators.
- Contact a local school, and share your knowledge and appreciation of native plants with tomorrow's leaders.
- Encourage schools to include plant conservation in their curricula.
- Stay informed: the U.S. Fish and Wildlife Service's endangered species database is at ***http://www.fws.gov/endangered***, and the U.S. Department of Agriculture's Animal and Plant Health Inspection Service maintains lists of federal and state noxious weeds at ***http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/planthealth.***
- If you are at a BLM site or in a national or state park, national wildlife refuge, or other public land site and you think you may have discovered a new invasive species, contact the closest management office to report your findings.
- Avoid inadvertently spreading the seeds of invasive plant species. Learn more at ***http://www.blm.gov/wo/st/en/prog/more/weeds/taking_action.html.***

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BLM Division of Education, Interpretation, and Partnerships
1849 C Street, NW, LM2134
Washington, DC 20240
(202) 912-7457

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NATIONAL SYSTEM OF PUBLIC LANDS
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BUREAU OF LAND MANAGEMENT