

Indicator 1.09:

U.S. Forest Sustainability Indicators <https://www.fs.usda.gov/research/inventory/sustainability>

Status of onsite and offsite efforts focused on conservation of genetic diversity

Mark Nelson

July 1, 2022

What is this indicator and why is it important?

Indicator 1.09 describes the extent of onsite and offsite conservation efforts for native species at the genetic level. Onsite efforts are those conducted in the field, such as efforts to increase populations of endangered species. Offsite efforts are conducted in laboratories, greenhouses, arboreta, seed banks, seed orchards, and similar facilities. Sustainable forest management requires a commitment to conserve locally or regionally adapted populations of native species using a combination of onsite and offsite approaches. This indicator helps to measure that commitment.

What does the indicator show?

Onsite conservation of genetic diversity is provided by parks and other protected areas, genetic and ecological conservation areas, reserved forest areas, and through planned natural regeneration. Onsite conservation efforts for genetic diversity of plants and animals vary greatly in spatial extent and intensity of management. Many public forests include genetic conservation for common species as a primary management goal and are managed intensively for species that are rare, threatened, endangered, or of special concern. Some private forests also are managed to conserve genetic diversity. These onsite efforts to conserve genetic diversity largely overlap with efforts to conserve species diversity that are described for Indicator 1.06.

Offsite genetic conservation efforts tend to be intensive and often focus on breeding programs or archival programs. These measures are sometimes undertaken, for example, to ensure that seed used for replanting after

harvest has sufficient genetic diversity. Offsite genetic conservation occurs at zoos, seed banks, seed orchards, clonal archives, arboreta, and similar facilities. These are summarized in table 9-1. Institutions differ in the proportion of total effort focused on forest species. Some institutions work on global and domestic forest genetic diversity conservation.

What has changed?

This indicator was not reported in 2003. Compared with the 2010 report and 2015 report (unpublished), the current report shows a slight increase in numbers of organizations and programs involved in conservation of genetic diversity (table 9-1), but the extent to which these reported numbers represent actual changes in conservation effort is unclear.

Are there important regional differences?

Many broadscale, onsite efforts to conserve genetic diversity are associated with public forest land and protected areas. Much public forest land is managed to conserve species diversity and genetic diversity as part of a multi-objective management strategy. In the United States, public forest land and protected forests in all ownerships are concentrated in the West (see Indicators 1.02 and 1.06).

Offsite programs for conservation of genetic diversity are widely dispersed. Zoos, arboreta, and seed banks often work on global and national issues associated with genetic conservation. Facilities such as seed orchards, clonal archives, and provenance tests that grow plant material are constrained by the climate where they are located, but they also can participate in international efforts to conserve genetic material.

Why can't the entire indicator be reported?

Conservation of genetic diversity occurs in many places and many ways. Extensive (primarily onsite) efforts aimed at genetic conservation take place on public and private lands across the United States. Arboreta, herbaria, seed collections, seed orchards, zoos, and dedicated breeding programs are intensive approaches (primarily offsite) for conservation of genetic diversity. These are funded by Federal, State, and local governments and by nongovernmental organizations. Ecologists, botanists, biologists, and foresters at universities across the United States are engaged in projects to conserve genetic diversity of forest plants and animals. State and local native plant societies organize private individuals devoted to both genetic and species conservation. No practical way exists to enumerate all such efforts or the proportion of their efforts that is concentrated on forest-associated species.

For forest land managed by a number of Federal agencies (the U.S. Department of Agriculture, Forest Service; the U.S. Department of Interior, Fish and Wildlife Service, National Park Service, and Bureau of Land Management; and the U.S. Army Corps of Engineers) most management decisions consider effects on genetic and species diversity, with particular emphasis on species of regional, national, or global conservation concern (see Indicator 1.05). Some State, county, and private forests are managed with emphasis on conservation of species and genetic diversity. So are numerous private lands, including those protected by conservation easements or land trusts. It is not possible to enumerate all such efforts, or to discern the proportion of such efforts associated with conservation of genetic diversity of forest-associated species. The quantitative information presented in this indicator does not include many of these efforts and, thus, likely underestimates the total magnitude of work devoted to the conservation of genetic diversity.

Table 9-1—Summary of agencies, institutions, and organizations that work on conservation of genetic diversity.

Category	Number (number from previous report)	URL
The American Public Gardens Association (APGA) includes member institutions in all 50 states, the District of Columbia, Canada and seven other countries.	> 520	http://www.publicgardens.org/
Arboreta and other public gardens that have a substantial focus on woody plants and that collect and display trees, shrubs, and other woody plants for the benefit of the public, science, and conservation, are listed under the Morton Register of Arboreta. (Includes international members.)	87	http://www.arbnet.org/morton-register-arboreta
The Center for Plant Conservation coordinates national efforts that conserve threatened and endangered species in offsite collections (primarily botanic gardens and arboreta).	39 (36)	http://www.centerforplantconservation.org/
States that fund forest tree nursery programs with total expenditures of tens of millions of dollars. Many have associated seed orchards. Thirty-five Federal nurseries are managed within 12 States. Hundreds of private tree nurseries comply with State efforts, as do dozens of commercial suppliers of tree and shrub seed.	38 (33)	http://www.rngr.net/resources/directory

Category	Number (number from previous report)	URL
<p>A number of Federal agencies have programs to actively manage offsite seed stores that conserve much native genetic diversity, such as the USDA Forest Service’s National Forest Genetics Laboratory, the Bureau of Land Management’s Seeds of Success program (range and forest species) and the National Center for Genetic Resources Preservation (a small percentage of which is forest species), which is managed by the USDA Agricultural Research Service. USDA National Center for Genetic Resources Preservation cooperates in the storage of forest species germplasm. The United States cooperates with other international gene bank programs, including the Consultative Group on International Agriculture Research and the Svalbard Global Seed Vault.</p>	<p>Several</p>	<p>https://www.fs.usda.gov/NFGEL/ https://www.fs.usda.gov/psw/locations/placerville/ https://www.fs.usda.gov/rm/wildlife-terrestrial/genetics/ http://www.srs.fs.usda.gov/sifg/ http://www.ars.usda.gov</p>
<p>The USDA Forest Service has various research units dedicated to studying genetics, such as the Institute of Forest Genetics, Wildlife Conservation Genetics Program, Forest Genetics and Ecosystem Biology, Energy, Climate, Tree Genetics for Managing Forest Ecosystems, Genetics and Management of Invasive Pests, and the Hardwood Tree Improvement and Regeneration Center. Several other Federal agencies and universities conduct forest genetics research.</p>	<p>Several</p>	<p>https://www.fs.usda.gov/psw/locations/placerville/ https://www.fs.usda.gov/rm/wildlife-terrestrial/genetics/ http://www.srs.fs.usda.gov/sifg/ https://www.nrs.fs.usda.gov/4509/ https://www.nrs.fs.usda.gov/units/htirc/</p>

Category	Number (number from previous report)	URL
<p>The Plant Conservation Alliance is a consortium of 10 Federal agencies and more than 300 non-Federal cooperators representing various disciplines within the conservation field. Cooperators include many of the arboretums and botanical gardens mentioned above. Agencies and cooperators work collectively to solve the problems of native plant extinction and native habitat restoration. Federal agencies in the Alliance include the Bureau of Land Management, Department of Defense, Federal Highway Administration, National Park Service, Office of Surface Mining Reclamation and Enforcement, USDA Agricultural Research Service, USDA Forest Service, USDA Natural Resources Conservation Service [formerly Soil Conservation Service], U.S. Fish and Wildlife Service, and the U.S. Geological Survey [formerly National Biological Service].</p>	<p>>300 (280)</p>	<p>http://www.nps.gov/plants/</p>
<p>Native plant societies in the United States collect, preserve, and propagate native seed sources for use in restoration projects. Many are associated with the Plant Conservation Alliance. The American Horticultural Society and USDA Forest Service (among others) provide lists of native plant societies in each State and province of the United States and Canada, botanical gardens and arboreta, other botanical resources, and conservation organizations.</p>	<p>Many (88)</p>	<p>http://www.ahs.org/gardening-resources/societies-clubs-organizations/native-plant-societies</p> <p>https://www.fs.usda.gov/managing-land/wildflowers/links</p>

Source: Data compiled in 2020, with reference to numbers from previous Sustainability Reports.