



Forest Service
U.S. DEPARTMENT OF AGRICULTURE

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EXPERIMENTAL FORESTS AND RANGES

A NATIONAL NETWORK FOR LONG-TERM SCIENCE,
INNOVATION, AND STEWARDSHIP

A seedling provenance study following wildfire at Fort Valley Experimental Forest in Arizona. This type of long-term research helps assure well-adapted and productive future forests. Forest Service photo by Erika Reiter.

How do our Nation's forests support the strength of our economy, the resilience of our infrastructure, and the health and safety of our communities? The U.S. Department of Agriculture, Forest Service helps answer that question with its experimental forests and ranges, the largest and longest running natural resource research network in the United States. Established almost 120 years ago, this network includes more than 80 sites. Here, scientists and land managers study how forests function, how they change over time, and how management decisions play out on real landscapes. With decades of data, the sites illuminate forests, water, wildlife, working lands, and human communities.

Forest Service experimental forests and ranges are living laboratories where scientists, land managers, partners, and the public can ask questions, test ideas, and develop management solutions that benefit society. The first experimental forest was established in 1908 at [Fort Valley Experimental Forest](#) to better understand why forests here failed to regenerate after logging. Since then, scientists at these sites have worked closely with partners to answer practical questions such as:

- Which treatments best help ponderosa pine (*Pinus ponderosa*) and lodgepole pine (*P. contorta*) forests regenerate after drought, insects, disease, and fire?
- How do forest thinning, prescribed fire, timber harvest, and roads affect water quality, streamflow, sediment movement, and wildlife habitat?
- What forest management actions restore red spruce (*Picea rubens*), sustain mixed-oak (*Quercus* spp.) forests, improve rangeland conditions, and balance timber, grazing, recreation, and wildlife needs?

This combination of research, land management applications, and technology transfer is foundational to how experimental forests and ranges operate.

Experimental forests and ranges provide something few institutions can sustain—dedicated, field-based laboratories where scientists, land managers, and other partners study real ecosystems at the scale and duration needed to understand change. These sites demonstrate the unique value of Forest Service research—future-focused, practical, place-based work that helps land managers make better decisions and serve the American public.

LONG-TERM DATA FOR LONG-TERM QUESTIONS

The value of experimental forests and ranges can be measured in the data collected in long-term studies. Research and monitoring on many experimental forests produce continuous, irreplaceable datasets that are valuable for scientists and land managers in the Forest Service, at educational institutions, in the wood products industry, and at agencies and organizations worldwide.

These datasets are like ecological memory. Because many natural resource questions unfold over decades, it is extremely difficult to make wise decisions about future actions without proper understanding of past conditions. Forest succession patterns, wildlife habitat changes, insect and disease dynamics, drought and fire impacts, changes to watersheds—the effects of these cannot be captured by a 5-year study. The long-term records at experimental forests and ranges help scientists and managers understand what is changing, why it is changing, and how managers can respond.

For example, decades of data from the [Fraser Experimental Forest](#) in Colorado helped scientists evaluate how mountain pine beetle (*Dendroctonus ponderosae*) outbreaks affect nitrogen cycling and forest dynamics. That kind of record is essential for understanding forest health disturbances that develop over time and for anticipating how ecosystems may respond after major change.

An adult mountain pine beetle treading pitch in ponderosa pine.
Courtesy photo by Whitney Cranshaw,
Colorado State University,
Bugwood.org.



The Silas Little Experimental Forest in New Jersey is an international destination for innovation in wildland fire science and field experimentation. A research ecologist uses a terrestrial laser scanner to measure fuels and fire effects. Experimental forests serve as key locations for training, demonstrations, and workshops. Forest Service photo by Nate Sapp.

APPLYING SCIENCE TO REAL PROBLEMS

Experimental forests and ranges are in every major ecosystem in the United States, from northern hardwoods to grasslands and fire-adapted forests, as well as tropical forests. While individual sites help answer local questions, the broad network allows scientists to compare patterns across regions, ecosystems, and climate gradients. This national reach is helping land managers work across boundaries to adapt to drought, extreme weather, wildfire, invasive species, and forest health decline.

Scientists at the [Silas Little Experimental Forest](#) in New Jersey, for example, are studying how fire embers move through fire-prone landscapes and across the wildland-urban interface. Embers are a major driver of wildfire spread and a primary source of structure ignition across the Nation, yet current fire behavior models struggle to predict their movement. Findings are helping managers pinpoint fire risk, predict fire spread, and protect communities and infrastructure.



RESEARCH TO PRACTICE

Experimental forests and ranges make science tangible by serving as sites where research results have been tested and translated into practice:

- Experiments at the [Caspar Creek Experimental Watershed](#) (California) demonstrate how different timber harvesting approaches affect streamflow, erosion, and sediment delivery, providing guidance for sustainable management.
- Long-term, whole-watershed experiments at the [Hubbard Brook Experimental Forest](#) (New Hampshire) demonstrate the effects of forest disturbance and management on water quality and ecosystem health.
- Data gathered on the [Luquillo Experimental Forest](#) (Puerto Rico), the largest and only tropical forest in the experimental forest and range network, has contributed significantly to the understanding of how tropical forests respond to hurricanes, climate variability, and land-use change, informing tropical forest management and restoration practices.
- Research at the [H.J. Andrews Experimental Forest](#) (Oregon) demonstrates long-term approaches to forest management, ecosystem monitoring, and restoration, helping translate ecological research into management strategies.
- Scientists at the [Desert Experimental Range](#) (Utah) study sustainable grazing practices and rangeland management techniques for arid ecosystems.
- Long-term cooperation between scientists at the [Coweeta Hydrologic Laboratory](#) (North Carolina) and the University of Georgia demonstrates how forest management and natural disturbances influence watershed processes in Southern Appalachian forests.

Field technicians collect rain and temperature data in the Luquillo Experimental Forest in Puerto Rico after Hurricane Irma. For nearly a century, staff at the Luquillo have provided unmatched data and insights on how tropical forests recover from hurricanes, landslides, and other disturbances. This type of post-disturbance research helps managers recover from and plan for future hurricanes and other large events. Forest Service photo by Grizelle González.



A forest technician measures longleaf pine (*Pinus palustris*), a high-value timber species, on the Palustris Experimental Forest in Louisiana. Staff at the Palustris test the best methods for reforesting southern pines on land degraded by harvest, hurricanes, and other disturbances. Forest Service photo by Preston Keres.

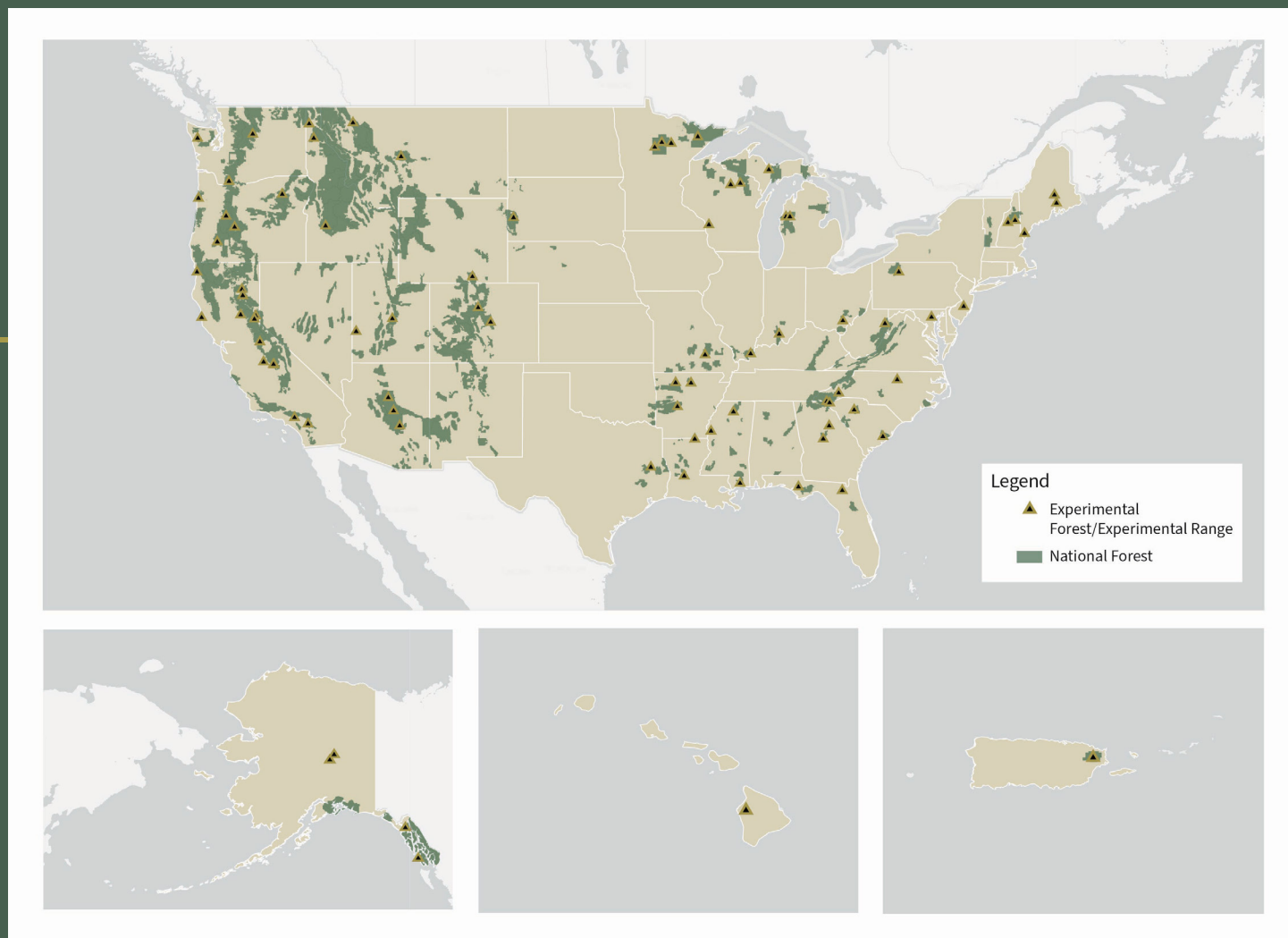


HOTSPOTS FOR PUBLIC BENEFIT

Today's forests and ranges face unprecedented challenges—from land conversion to invasive pests and increasing wildfire.

Innovation—spurred by the long-term data collected on experimental forests and ranges—helps land managers and policymakers respond to these issues and sustain the values and benefits of natural lands.

As the Nation experiences accelerating environmental change, experimental forests and ranges are more important than ever to ensure land managers can sustain the health, productivity, and resilience of the Nation's forests and grasslands.



Forest Service experimental forests and ranges in the conterminous United States, Alaska, Hawaii, and Puerto Rico.



To learn more about
experimental forests and ranges

