



NatureServe®

A Network Connecting Science With Conservation

CITIZEN SCIENCE STRATEGY





WORKING TOGETHER

CITIZEN SCIENTISTS AND THE NATURESERVE NETWORK

Citizen science taps the human passion for exploration and discovery to illuminate our understanding of the natural world. It encourages amateur participants to take an active part in creating knowledge, aligning their interests and labor with those of professional scientists.

Citizen science benefits society by increasing scientific knowledge and capacity, promoting scientific literacy, and encouraging broad public engagement in decision-making about natural resource use and management. Advances in mobile computing, online mapping, and web technologies mean that nearly anyone on Earth can collect valuable observation data on species and their habitats.

The NatureServe network possesses a unique combination of existing data, expertise, computer applications, and a network of partnerships that complement and support citizen science. We believe that collaborating with citizen scientists is an important, cost-effective means for documenting patterns of biodiversity in a rapidly changing world.

VISION FOR CITIZEN SCIENCE ENGAGEMENT

NatureServe will partner with and build upon existing citizen science programs aligned with our data standards and organizational mission. We will provide citizen scientists with tools to collect and manage data that improve overall quality, interoperability, and applicability.

By connecting citizen science data to larger international datasets and broader scientific networks, we can increase citizens' enjoyment of their experiences in the natural world and help ensure that their activities contribute directly to effective conservation and resource management.

These collaborations with citizen scientists will further expand the reach, effectiveness, and impact of the NatureServe network and its scientific, technical, and professional staff.

MUTUAL BENEFITS OF COLLABORATION

NatureServe's experience can address scientific concerns hindering the widespread use and application of citizen-collected data.

Our network's methods and systems rely on a foundation of clearly documented, rigorous standards that support both data quality and the aggregation of large volumes of data from multiple sources. Our distributed network supports data at multiple spatial scales and consistently handles both absence data and sensitive location data on at-risk species. We also routinely utilize field surveys as the foundation for sophisticated spatial models and trend analyses for species and habitats.

BENEFITS TO CITIZEN SCIENTISTS

Volunteers participate in citizen science projects for many reasons—personal enjoyment and education, hands-on exploration and discovery, environmental concerns, or responsible stewardship of the natural world. By expanding its collaborations with citizen scientists, the NatureServe network can enhance these intangible benefits by helping them:

- Learn more about the patterns and distribution of species and habitats across geographic scales
- Interact and engage with professional scientists
- Acquire first-hand knowledge of processes and tools that support large-scale investigation and understanding of biodiversity
- Earn personal and professional validation of their interest, expertise, and efforts
- Gain access to and provide input on newly developed tools, apps, and data
- See their data put into wider use in research and policy settings

BENEFITS TO NATURESERVE

By increasing the network's engagement with citizen science initiatives, NatureServe can advance its scientific mission by helping to:

- Increase the number of observations for species of interest and their habitats, leading to:
 - More accurate assessments of conservation status
 - Improved sets of conservation priorities
 - More effective on-the-ground conservation
- Increase the capacity of NatureServe network members to conduct field surveys
- Forge new, professionally rewarding partnerships that also increase awareness of the value of the network and its members
- Increase opportunities to fund inventory and monitoring activities

PHOTO CREDITS

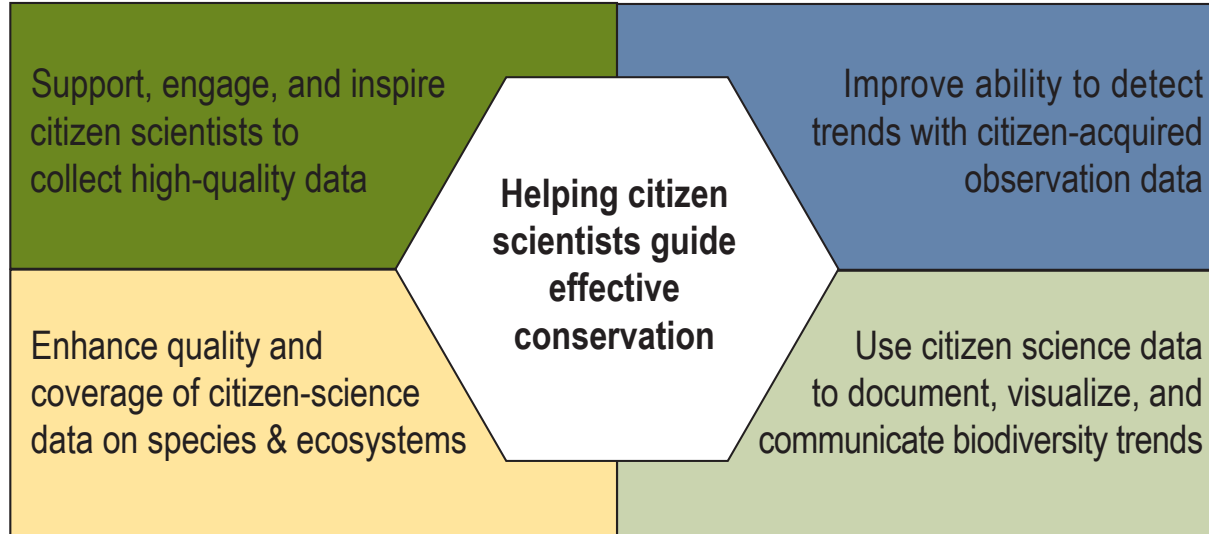
Right: Shooting video of bats with phone at Bracken Cave, Comal County, Texas © Jon Marshall, DJCase.com (flic.kr/p/6YpcAM)

All others: 2011 NatureServe/Sam Sheline. Goldman Sachs Community Team Works project co-hosted by the New York Natural Heritage Program (www.nynhp.org) and NatureServe at Breezy Point, Long Island.



NATURESERVE'S CITIZEN SCIENCE STRATEGY

To continue providing the scientific basis for effective conservation, NatureServe will engage with citizen scientists to expand ongoing efforts to monitor trends in the distribution, condition, and threats associated with biodiversity. We envision four strategic results:



SUPPORT, ENGAGE, AND INSPIRE CITIZEN SCIENTISTS TO COLLECT HIGH-QUALITY DATA

To strengthen the usefulness of citizen science data for species of interest and increase the flow of high-quality observations into larger datasets, the NatureServe network will:

- Build or strengthen **partnerships** with existing citizen science initiatives that emphasize scientific rigor and complement our strengths
- Identify **high-priority information needs** well-suited to citizen observations and coordinate efforts to acquire them
- Promote citizen science opportunities online and at targeted events to **inspire people** to get involved with their local network member
- Create **training programs and materials** that catalyze widespread adoption and dissemination of tools that support partners' collection of high-quality data on at-risk species and all types of ecosystems
- Develop effective ways to **motivate citizen scientists** through individual recognition, sharing of information, and incorporation of their data into online map products
- Pose recurring **field observation challenges** to inspire citizen scientists' engagement
- Cultivate relationships with partners and funders focused on **education and public engagement**



IMPROVE THE ABILITY TO DETECT TRENDS WITH CITIZEN SCIENCE OBSERVATION DATA

The greatest potential benefit of data collection by citizen scientists is the sheer number of “boots on the ground.” Many NatureServe network organizations already use information gathered by citizen scientists, and scaling up such efforts would significantly expand the constructive impacts of citizen science.

To facilitate broader, more effective use of citizen-derived data in applied conservation, NatureServe will build on existing experience, tools, and relationships to:

- Improve the quality of incoming citizen-science data by collaborating with partners to develop or modify **user-friendly data templates and mobile apps**
- Develop the functionality to **import citizen scientists’ datasets** into international datasets for at-risk species, invasive species, ecological systems, and vegetation
- Ensure the inclusion of data **quality-assurance** protocols and appropriate metadata
- Partner with regional pest plant councils and other programs to aid in **early detection and mapping** of high-priority invasive, non-native species
- Engage with partner citizen science programs to encourage their use of **standard data structures** for biological information

USE CITIZEN SCIENCE DATA TO DOCUMENT, VISUALIZE, AND COMMUNICATE BIODIVERSITY TRENDS

Citizen scientists have the potential to produce the very large sample sizes needed to detect trends in distribution of species and ecosystems. By publishing and reporting on these activities, the NatureServe network and its partners can demonstrate citizen scientists’ importance as producers of knowledge while rewarding their achievements and reinforcing their impulse toward shared responsibility and civic engagement.

Working with existing repositories of citizen-derived observation data, the NatureServe network can:

- Create **visualization products and summary statistics** for the species and ecosystems tracked by the NatureServe network
- Develop data-mining techniques that have robust methods for deriving **indicators of significant change** in species populations and/or biodiversity distributions over time
- Use data-mining techniques to analyze and publish information about **emerging trends** for species and habitats of concern, as well as create national and international views of invasive species work in iMapInvasives
- Make information easily accessible for practitioners, policy-makers, and citizens by **publishing citizen-science data** on web resources like NatureServe Explorer and LandScape America

ENHANCE QUALITY AND COVERAGE OF CITIZEN SCIENCE DATA ON SPECIES AND ECOSYSTEMS

Citizen scientists can use existing data and maps from the NatureServe network to help guide their data-collection efforts and ensure they are looking for the right species and habitats in the right places. Leveraging this authoritative knowledge can direct inventory efforts, identify likely targets, and improve the quality of observations.

By increasing access to existing scientific resources for citizen science projects, NatureServe staff and partners will:

- Target and collect species observations that **reevaluate occurrence viability** of known populations
- **Review accuracy** of vegetation maps or georeferenced photos of pre-determined sample sites to assess trends in the condition of ecosystems
- Facilitate data entry and quality control by **generating checklists and photos** of target species
- **Encourage surveys** in areas within the range of specific species, but where no documented observations yet exist
- Build improved understanding of both the species present in an ecosystem and **species-habitat relationships**
- Provide information on hotspots of current data collection activity to **guide targeted inventory**



HELPING CITIZEN SCIENCE GUIDE CONSERVATION

Collaborations between citizen and professional scientists that focus on observing, measuring, and monitoring environmental phenomena offer an unprecedented means of transforming the scientific enterprise needed to guide effective conservation.

When paired with recent advances in network and computing technologies, the combined structure and expertise of the NatureServe network can expand the profile and use of citizen science in on-the-ground conservation at local, regional, national, and global scales. By establishing greater connections between citizen scientists and conservation practitioners, the NatureServe network can help ensure that the selfless impulses that prompt citizen scientists to action are rewarded with improved conservation priorities and outcomes.

We firmly believe that, by working alongside citizen scientists and the organizers of such initiatives, we will empower communities to identify and commence the actions most needed to combat the greatest threats and protect the highest priority plants, animals, and places.

LEARN MORE

Healy Hamilton, Ph.D.

Chief Scientist & Vice President for Conservation Science
703-908-1889 | healy_hamilton@natureserve.org



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