

Dark citizen science: Reviving old, lost, and overlooked citizen science records

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Abstract

Attics, libraries, museums, historical societies, and many other places are full of records of past amateur naturalists, hunters, fishermen, gardeners, and others who made valuable observations of species occurrences and behaviors, drew maps, collected specimens, and recorded weather and other phenomena. These records, which are often overlooked, are invaluable to study how species, landscapes, and environmental conditions have changed over the past century or more. In this poster, we describe our work using “dark citizen science” in Acadia National Park in Maine. Acadia’s museum collection contains over one million items, including plant and animal specimens, photographs, reports, field notebooks, maps, and other documents and objects. Moreover, the libraries, historical societies, and colleges in the surrounding communities contain millions more. Acadia National Park has begun an ambitious project to digitize these specimens and records and make them freely available in an online database. At the same time, we are engaging volunteers to help pull key data--starting with species occurrences, abundance, and phenology--out from these records and transcribe them into databases. One of the first of these projects has shown that the park has lost nearly 20% of its flora over the past 100 years. We are working with researchers to use these historical records and new field observations to understand why these losses occurred and to identify species that are likely vulnerable to future environmental changes. These dark citizen science records provide critical data to protect our environment and also provide compelling personal stories that can engage the public in science and conservation.

What is “dark citizen science?”

Dark citizen science is information and data that was gathered by non-professional scientists and then forgotten about--now residing quietly in museums, historical societies, attics, basements, and shoeboxes. These records are far more abundant and valuable than is generally recognized. With modern technology and often with the contributions of new citizen scientists, these records can be digitized and analyzed to provide insights into our changing environment or other scientific and social challenges.

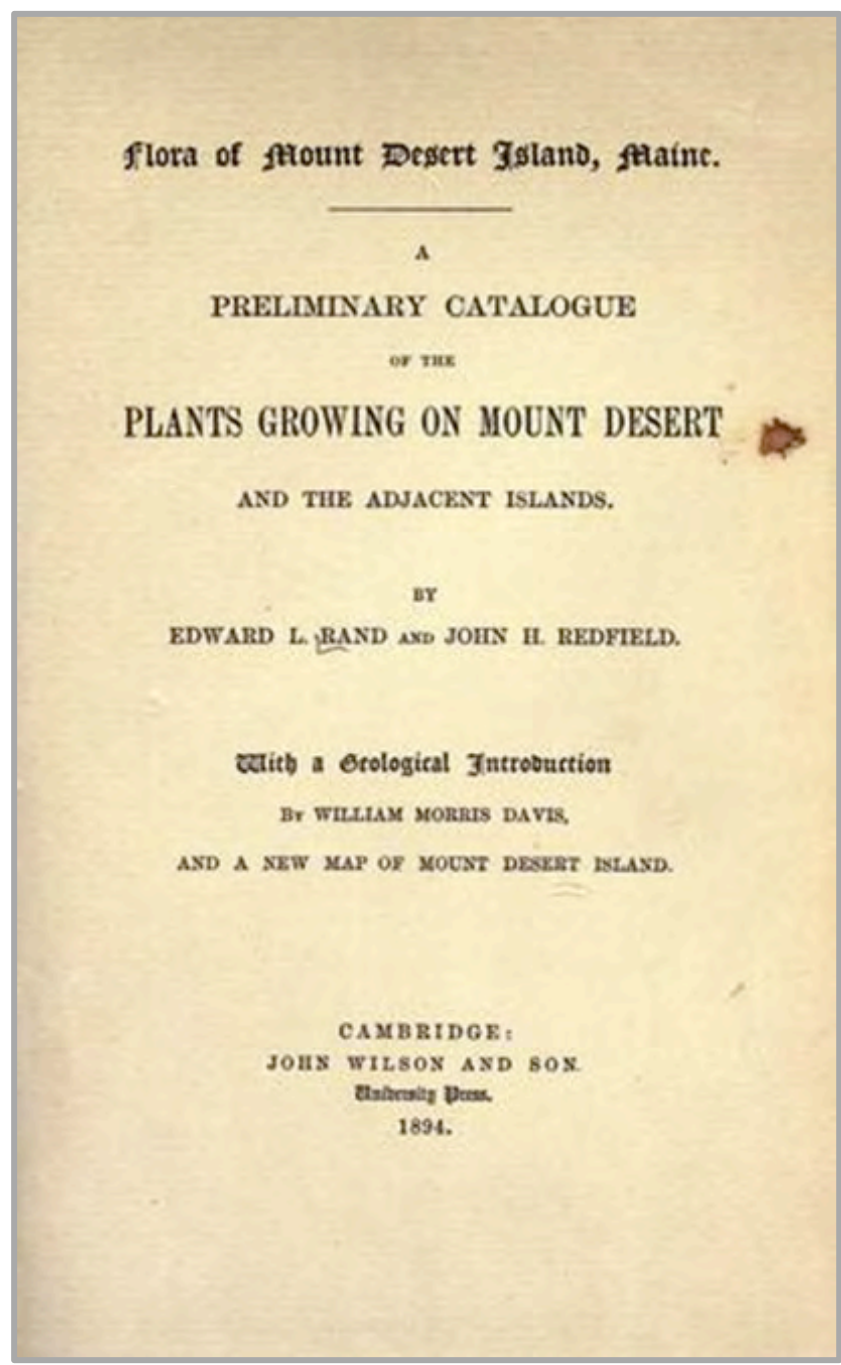
The Champlain Society, a group of students and amateur naturalists, undertook some of the first scientific explorations of Mount Desert Island, and helped instigate its protection as a national park. The area’s value for science was noted in the founding legislation that protected it as what is now Acadia National Park.



John H. Redfield, an attorney and amateur botanist, worked with Edward Rand, a member of the Champlain Society, to inventory the flora of Mount Desert Island, Maine circa 1880s.

Photo credit: The Archives of the Gray Herbarium

Rand and Redfield’s published flora contains information about the abundance and collection location of nearly 1500 species of vascular plants, bryophytes, lichens, and algae on Mount Desert Island and surrounding islands. This flora is now being used to understand how the flora has changed over the past 130 years.



Making dark citizen science easier to find and to use

Dark citizen science documents are often stored and forgotten about. Digitizing documents, specimens, and other records (scanning them then uploading them to an online database) makes it easier for many people to find and use them. Transcribing data contained in them to spreadsheets and databases, and updating taxonomy, can make them even more valuable to scientists. Digitization and transcription can be done by professionals or volunteers, or a combination of both, using tools that are affordable and readily available--e.g., scanners or copiers, external hard drives, and Google Drive or other online spreadsheets and data entry interfaces.

Boxes of archived research documents that are in the process of being scanned and uploaded to an online database. Without digitization, much dark citizen science data and other information is lost to science, which is tragic at a time when they can make key contributions to our understanding of long-term and rapid environmental changes.

Photo credit: NPS/Kate Pontbriand

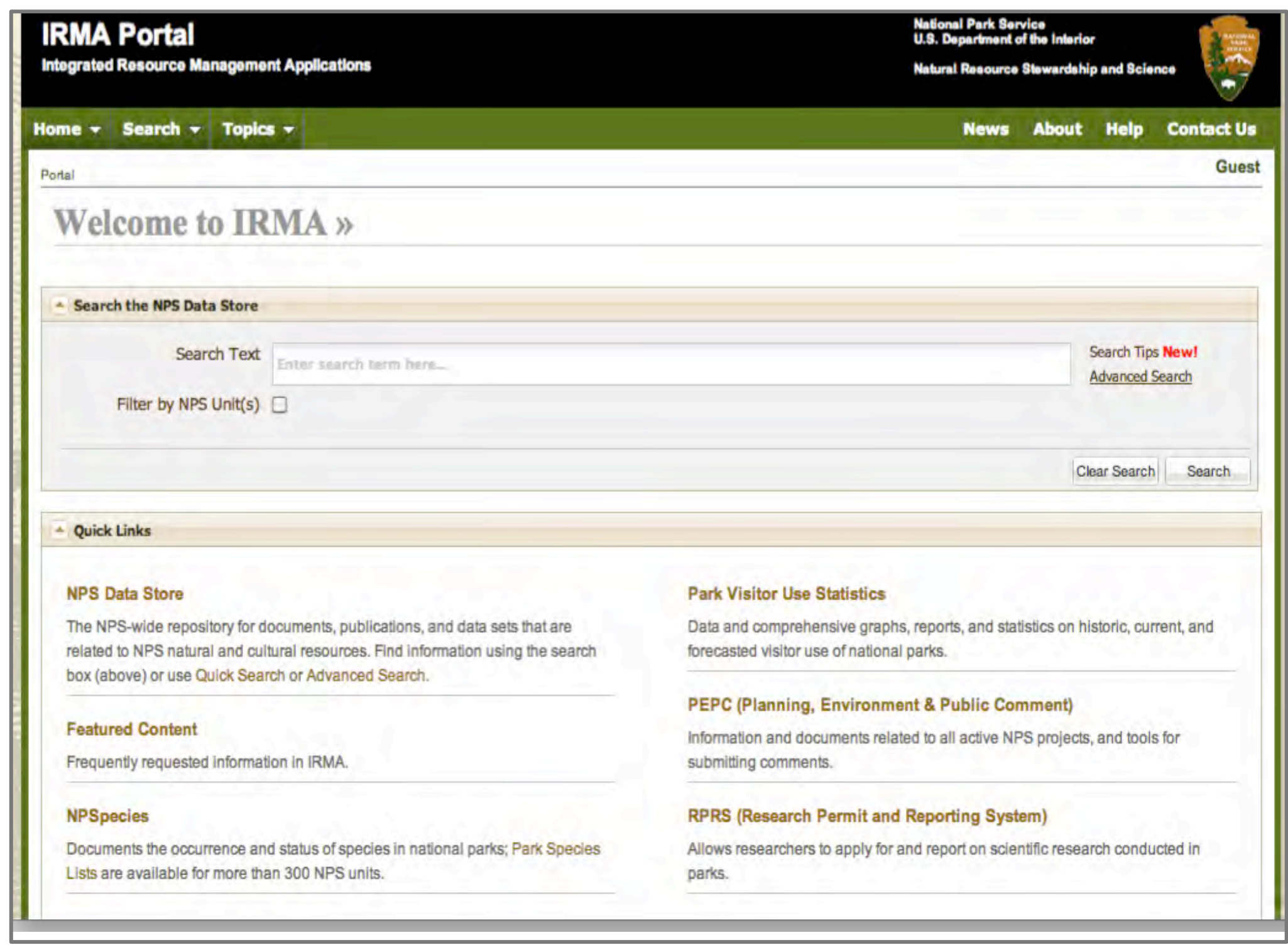


Photographing herbarium records or other biological specimens (many or most of which were collected by amateurs) can allow them to be accessed online and used in more scientific studies. Currently many collections of biological specimens are closing or losing funding from underuse.

Photo credit: NPS/Abe Miller-Rushing

We upload the historical records and transcribed data sets to IRMA, or the Integrated Resource Management Applications, an online information management system created by the National Park Service. We have developed standards for metadata, controlled vocabularies for keywords, and links among related records that make it easier for researchers, educators, and staff to find records they are looking for.

irma.nps.gov



What are we finding?

About 20% of plants found in Acadia National Park in the late 1800s (recorded by citizen scientists) have disappeared and many more have declined in abundance. This is a similar rate of decline as has been found in other, more developed areas of New England. We are currently investigating why these losses have occurred, but the severity of the declines is surprising given that much of the area has been protected as a national park for 100 years.

Plants lost or disappearing from Acadia National Park



Pipsissewa
Chimaphila umbellata

Photo credit: Glen Mittelhauser



Spoonleaf sundew
Drosera intermedia

Photo credit: Glen Mittelhauser



Oysterleaf
Mertensia maritima var. *maritima*

Photo credit: Glen Mittelhauser



Single delight
Moneses uniflora

Photo credit: Glen Mittelhauser

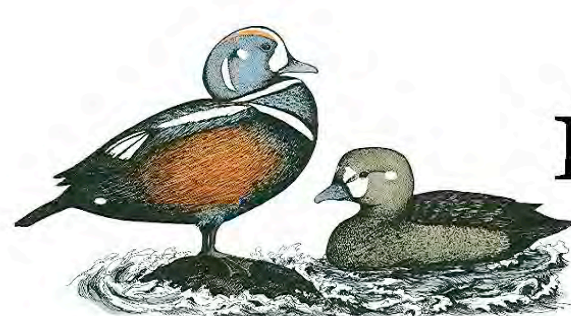
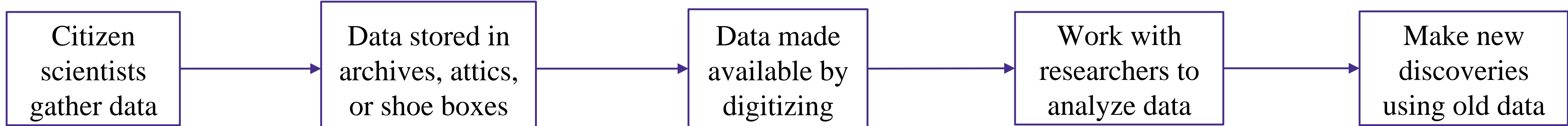
Where are we going? And take-home lessons

We are continuing to digitize records and are working with researchers to use them. Our current projects are focused on past records of the abundance and phenology of species, including records of insect observations, bird migration dates, intertidal biodiversity, and other wildlife observations. These projects take advantage of the most common types of dark citizen science records, feed into ongoing research projects, and help meet the critical need of park managers to understand how park resources are changing and how they might protect them in the future.

We have found that working with researchers to analyze records and communicate their results is important to optimizing our methods and to increasing the awareness of these records for other researchers, educators, and park staff. This awareness, in turn, increases use of the records.

We have also found that members of the community very much appreciate our interest in dark citizen science records that they or their parents, grandparents, or other relatives gathered. As more people become aware of our work, more community members are volunteering to donate historical records, some of which are astonishing in their scientific value and all of which have interesting stories to tell.

Process for gathering then using dark citizen science



Maine
Natural History
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