

Citizen science key to keeping pace with environmental change

October 10 2014, by Sandra Hines



Student interns consider how volunteers might characterize marine debris during the development of the newest program under the Coastal Observation and Seabird Survey Team program. Credit: U of Washington

Is it plastic, metal, a fragment, sharp? Does it have a loop in it that a marine animal might stick its head through? Is it small enough and in the color range that an albatross might mistake it for flying fish eggs and eat it?

The latest University of Washington program powered by citizen scientists aims to characterize debris washed up on beaches in terms of potential harm to seabirds and other marine animals.

It's one of thousands of research projects around the globe in which citizens collect, verify, analyze and report data about everything from what's on the beach to what's in the stars.

Better integration of citizen science into professional science is a growing consideration: Earlier this year a policy forum piece in the journal *Science* looked at the topic and in August there were talks by Parrish and UW's Hillary Burgess at the Ecological Society of America's annual meeting in the session "Citizen Science from Sea to Sky: Investigating Ecological Responses to Global Environmental Change."

Here at the UW, citizen science interests faculty members wanting to harness the power of many eyes and hands and to broaden the impact of their work. UW graduate students initiate citizen science efforts and undergraduates work both as volunteers and coordinators of volunteers.

"We're at a tipping point," said Julia Parrish, associate dean for academic affairs and diversity in the College of the Environment. "Our need to know and be able to document environmental issues is growing far beyond the reach of academic science and resource management to keep pace."

Despite the need for information, the practice of citizen science "is not universally accepted as a valid method of scientific investigation," Parrish and co-authors wrote in "Next steps for citizen science," in *Science*. "Scientific papers presenting volunteer-collected data sometimes have trouble getting reviewed and are often placed in outreach sections of journals or education tracks of scientific meetings," they wrote.

At the UW, the natural sciences is just one area in which [citizen scientists](#) have gathered information that has become the basis of published research and resources reports used by managers, legislators and fellow scientists.



JP DuFour, age 8, collects a specimen as tall as he is during the UW Herbarium's 2012 foray in the Colville National Forest. Credit: R Olmstead/U of Washington

Some examples:

- Data gathered by beach walkers who tally dead seabirds that wash ashore as part of the Coastal Observation and Seabird

Survey Team program, known as COASST, have been published in journals such as *Marine Ornithology*, *Marine Pollution Bulletin* and *Journal of Archaeological Science*.

- Annual five-day collecting trips, where volunteers gather as many as 1,000 specimens, enrich the UW Herbarium and contribute to the online reference of choice for regional land managers and professional botanists around the world interested in Pacific Northwest plants. The apps "Washington Wildflower" and "Idaho Wildflower" likewise capitalize on the herbarium holdings, as do efforts now under way to revise the 1973 plant "bible" for the region, the "Flora of the Pacific Northwest."
- Monitoring by volunteers with the UW's Rare Plant Care and Conservation about the plant *Erigeron basalticus* – native to Washington and commonly known as daisy fleabane – was used by the U.S. Fish and Wildlife Service to determine that the plant, while rare, did not need listing under the Endangered Species Act.

With the right training and oversight, volunteers can collect data of quality equal to that collected by experts, according to findings cited in the Science article. To ensure that critiques of citizen science efforts are based on merits of research, rather than unfounded assumptions about the practice, the co-authors wrote that developers must employ sound research or monitoring design, and reviewers should look for evidence of such practices.

Parrish didn't have publications particularly in mind when she spearheaded the Coastal Observation and Seabird Survey Team program 16 years ago. A professor of aquatic and fishery sciences, she was after an even higher standard: data that could stand up in court if need be. Baselines of how many birds die naturally would be needed in the event of major oil spills or other human-caused events that might wind up in court.

For faculty and graduate students interested in tapping into citizen science, Parrish said she'd like there to be easier ways to take advantage of existing programs.

"Imagine all the people doing terrestrial climate work, plant work, plant science, agronomy – are they each going to each create a citizen-science program and train people to identify plants?" she asked. "One way is to create a kind of plug-and-play kind of situation. If at the end of the day, they're all interested in phenology – when things in the natural world reoccur – couldn't we create a single program that everyone could use?"



Students learn about seabird carcass identification, part of a training trip for UW interns who work with science volunteers in the Coastal Observation and Seabird Survey Team program. Credit: U of Washington

The UW should capitalize on its expertise in natural sciences, education and information technology to become a center for citizen science on the West Coast, Parrish said.

"I would love to see the UW leap into the lead on the West Coast on that," she said.

"We're knee-deep in environmental scientists. We also have a wonderful College of Education and a great education program at Bothell. We can learn why people join things and what they get out of it, because you want those volunteer data collectors to stay with you until they get good. The last thing you want is for them to breeze in and breeze out."



Alex Harkness, then a UW undergraduate, scrambles up a white pine to collect a

specimen with cones during a UW Herbarium foray. Credit: R Olmstead/U of Washington

"The UW has a kick-butt computer science program, Information School and digital arts and graphic design programs," Parrish said.

For example Jeff Heer, an associate professor of computer science and engineering, just received a Gordon and Betty Moore Investigator Award and he's committed, among other things, to connect his visualization lab to "big data" produced by [citizen science](#), and especially visualizations targeting non-scientists.

"If we're collecting broad-scale information – big space, long time – we need different tools to bring these data together, to check them out, to visualize them – like a map or a movie – that can go out to people in near real time, not three years later in a publication. Scientists are not necessarily going to do that and neither are education people. IT people are going to do that."

Provided by University of Washington

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