CAN VOLUNTEERS CONTRIBUTE TO INVASIVE SPECIES DETECTION AND SCIENCE?

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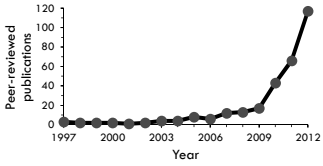
WISCONSIN'S FIRST DETECTOR NETWORK = WIFDN

Network of volunteers in WI , formed 2013

What is Citizen Science?

- Partnership between scientists and the public to address research questions of common interest



Slide: Abe Miller-Rushing, NPS, SERC Institute

Assessing Benefits and Challenges

Benefits

- **Data collection across spatial and temporal scales**
- Data relevant to local conservation issues
- Connects scientific research to public outreach and education
- Changes in attitudes and behavior

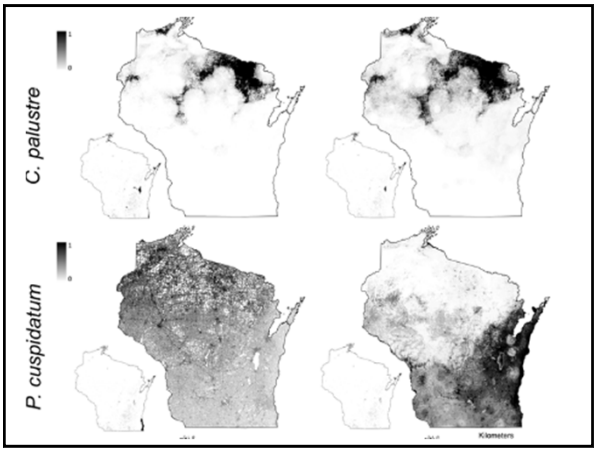
Challenges

- Data quality
  - Increase in data variability
  - Inconspicuous species commonly misidentified
- Data management
- Skeptics

Professional observations

Professional + Volunteer observations

	Garlic mustard	Japanese Barberry	Eurasion Marsh thistle	Japanese knotweed	Wild Parsnip
Professional	72	64	63	58	62
Volunteer	60	61	58	56	6



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Citizen Science: gaining local support

- Community members with shared interests in endangered Red cockaded woodpecker
- Approached Nature Conservancy about growing threats to habitat
- Recent Japanese Stilt Grass incursion is cause for concern, but not yet a crisis
- Known to alter critical fire dynamics of ecosystem
- With training on adaptive land management and scientific method, began mapping extent of invasion
- Experimental treatments started Spring 2014

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RESEARCH REPORT

Scientific knowledge and attitude change: The impact of a citizen science project

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This paper discusses the evaluation of an informal science education project, The Birdhouse Network (TBN) of the Cornell Laboratory of Ornithology. The Elaboration Likelihood Model and the theory of Experiential Education were used as frameworks to analyse the impact of TBN on participants' attitudes toward science and the environment, on their knowledge of bird biology, and on their understanding of the scientific process. The project had an impact on participants' knowledge of bird biology. No statistically significant change in participants' attitudes toward science or the environment, or in participants' understanding of the scientific process, could be detected. The results suggest that projects must make explicit to participants the issues that they are experiencing. In addition, the results suggest that more sensitive measures need to be designed to assess attitude change among environmentally aware citizens.

Introduction

The need to encourage public understanding of science is rarely contested. In societies more and more technological, individuals must be able to make informed decisions regarding scientific issues that affect their personal lives, the well-being of their communities, and national issues such as health care and energy policy. Research has shown, however, that in the United States, the general level of understanding of basic scientific concepts and of the nature of scientific inquiry may be insufficient for the average citizen to be able to make informed decisions (National Science Board, 2002). In this context, efforts have been made in the last decade not only in reforming science education in the nation's school system (National Research Council, 1996), but also in promoting informal science education, or science education outside the classroom (Crane et al., 1994; Falk, Donovan, &

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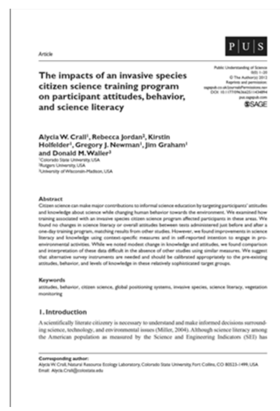

Article

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The impacts of an invasive species citizen science training program on participant attitudes, behavior, and science literacy

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[1]Colorado State University, USA
[2]Rutgers University, USA
[3]University of Wisconsin-Madison, USA

Abstract
Citizen science can make major contributions to informal science education by targeting participants' attitudes and knowledge about science while changing human behavior towards the environment. We examined how training associated with an invasive species citizen science program affected participants in these areas. We found no changes in science literacy or overall attitudes between tests administered just before and after a one-day training program, matching results from other studies. However, we found improvements in science literacy and knowledge using context-specific measures and in self-reported intention to engage in pro-environmental activities. While we noted modest change in knowledge and attitudes, we found comparison and interpretation of these data difficult in the absence of other studies using similar measures. We suggest that alternative survey instruments are needed and should be calibrated appropriately to the pre-existing attitudes, behavior, and levels of knowledge in these relatively sophisticated target groups.

Keywords
attitudes, behavior, citizen science, global positioning systems, invasive species, science literacy, vegetation monitoring

1. Introduction

A scientifically literate citizenry is necessary to understand and make informed decisions surrounding science, technology, and environmental issues (Miller, 2004). Although science literacy among the American population as measured by the Science and Engineering Indicators (SEI) has

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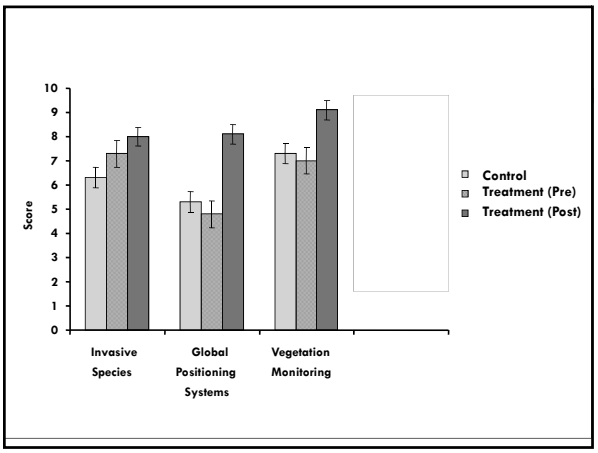
Tested the ability of volunteers to identify invasive plants

- 2009 recruited volunteers and professionals to participate Madison + Ft Collins
- Professionals (WI 31, CO 21)
  - Faculty, graduate students, land managers
- Volunteers (WI 31, CO 28)
  - People involved in an existing volunteer network
- Gave 1 day of training
  - Plant ID and other "skill tests"
    - GPS, Vegetation monitoring



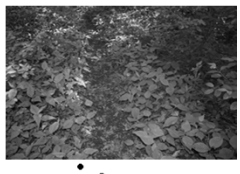
Tested the ability of volunteers to identify invasive plants

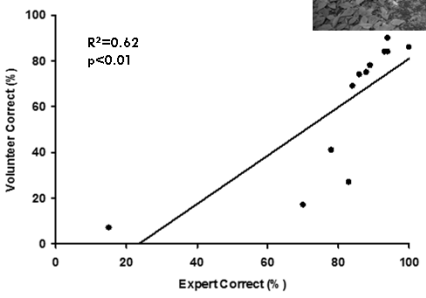
- Selected 6 species at each site.
  - 3 easy to ID
  - 3 hard to ID
- 125 plants along established trails

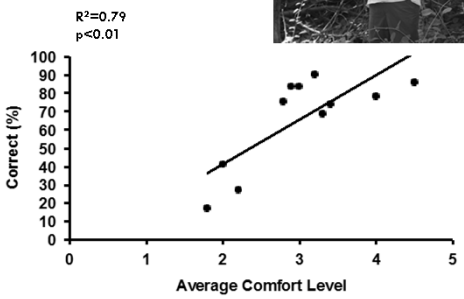
Table 2 Six species taught during the two trainings in Wisconsin and Colorado, including identification difficulty classification

Scientific name	Common name	State	Identification difficulty
R. cathartica L.	Common Buckthorn	WI	Easy
Hesperis matronalis L.	Dame's Rocket	WI	Easy
Alliaria petiolata (M. Bieb.) Cavara & Grande	Garlic Mustard	WI	Easy
R. frangula Mill.	Glossy Buckthorn	WI	Difficult
C. orbiculatus Thunb.	Asian Bittersweet	WI	Difficult
Lonicera sp. L.	Honeysuckle	WI	Difficult
E. esula L.	Leafy Spurge	CO	Easy
Linaria dalmatica (L.) Mill.	Dalmation Toadflax	CO	Easy
Elaeagnus angustifolia L.	Russian Olive	CO	Easy
Carduus nutans L.	Musk Thistle	CO	Difficult
Cynoglossum officinale L.	Houndstongue	CO	Difficult
Cardaria draba (L.) Desv.	Whitetop	CO	Difficult

- Species identification
  - 85% professional vs 70% volunteer
  - 82% conspicuous vs 65% inconspicuous







Additional Research: Data Quality

Protocols Tested in Field

- Genet and Sargent 2003
- Boudreau and Yan 2004
- Delaney et al. 2008
- Crall et al. 2011
- 40 pubs in 2012-2013

Other Solutions

- Statistics to overcome sampling design limitations
  - Kery et al. 2010
  - Snall et al. 2011
- Online Tools
  - Smart filters (Bonter and Cooper 2012)
  - Verification procedures

How we do deal with data quality?

Allows opportunity for us to verify

- Georeferenced pictures emailed to experts
- Experts can be categorized based on
  - Location
  - Species
  - Regulatory status
- Easy for plants, some insects, hard for diseases

Smartphone app/website

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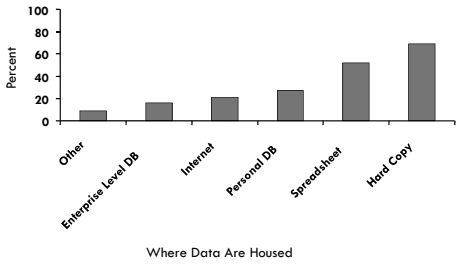
- **Data management**
- Skeptics

Where people store data?

Results from 2007



Where Data Are Housed

Creating tools to improve reporting

- Websites/Applications
  - Provide users with outputs that may be a benefit
  - Tracking/mapping system
  - Reporting system
  - Assistance in identification
- Developing networks/organizations

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- **Skeptics**

Quotes from Skeptics

- "**I may come round to thinking that this term has a place in the scientific lexicon the day the US medical community agrees to use the term 'citizen surgeons' to describe well-meaning souls with a day's medical training…**

Final Thoughts

- Citizens/volunteers can be used to successfully in science
  - Training, Ddata quality
- Citizen scientists want to interact
  - Communication needs to be two-way
- Citizen scientists are not general public
  - More scientifically literate
  - Slightly positive attitude toward science
  - Strong positive attitude toward environment

WISCONSIN'S FIRST DETECTOR NETWORK = WIFDN

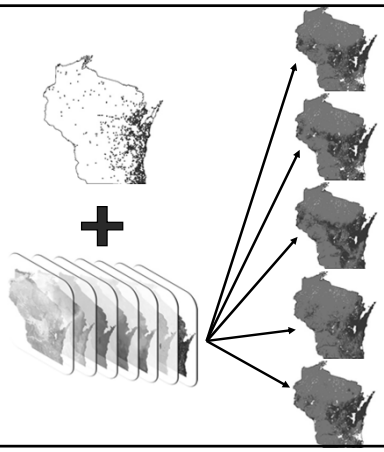
Summary of Impact

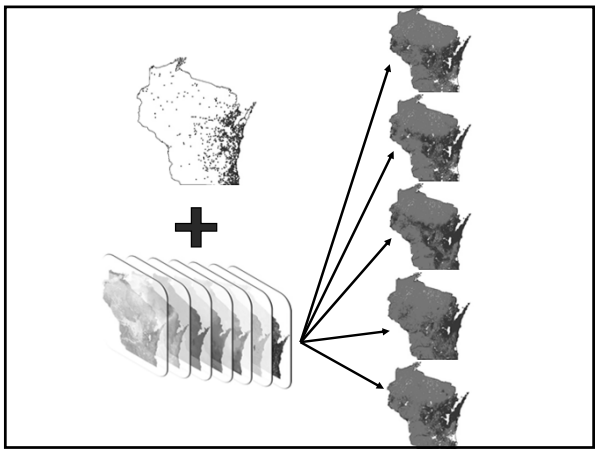
	2014	2015	Total
Participants (online + workshops)	100	305	405
Volunteer hours	517	1,883	2,400
GLEDN Invasive species reports	350	711	1,061
Cerceris insects collected	200	211	411

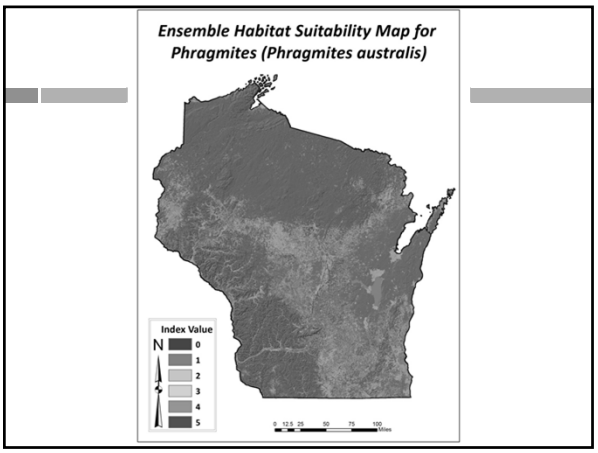
Educational events by WIFDN members also important but difficult to summarize

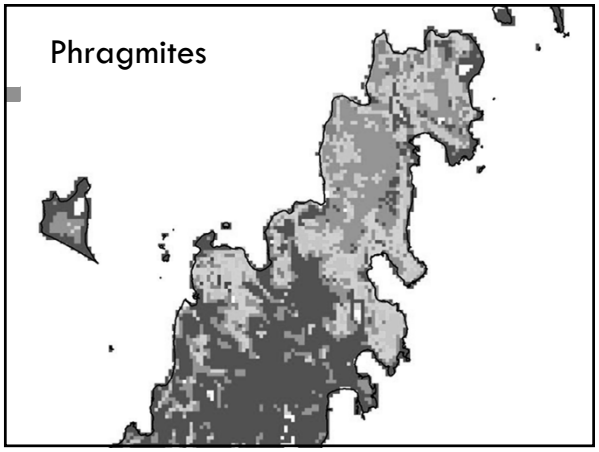
This information is assisting us in predictive modeling efforts in WI!

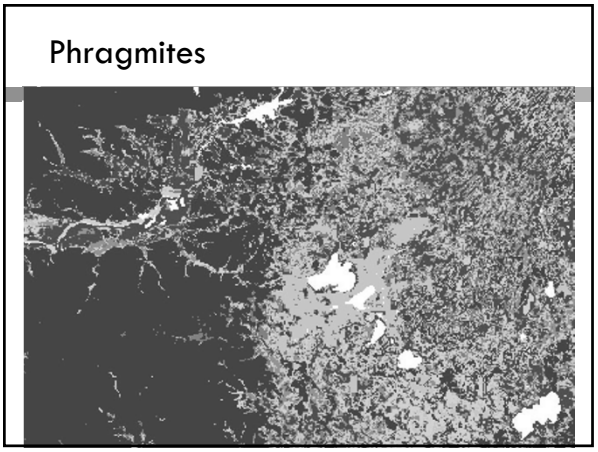
- See handout…..






Ensemble Habitat Suitability Map for Phragmites (Phragmites australis)
Index Value
N
0
1
2
3
4
5
0 12.5 25 50 75 100
Miles


Phragmites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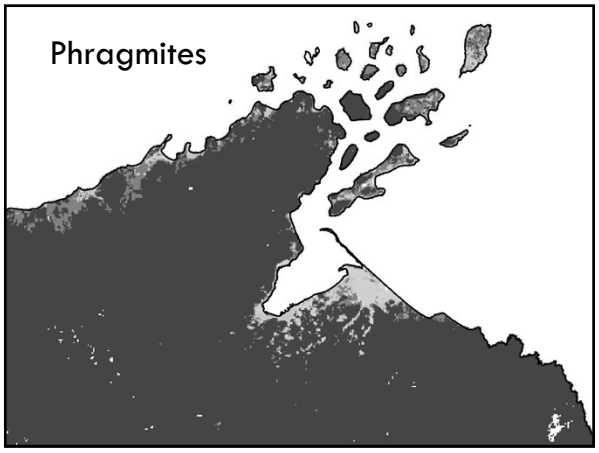
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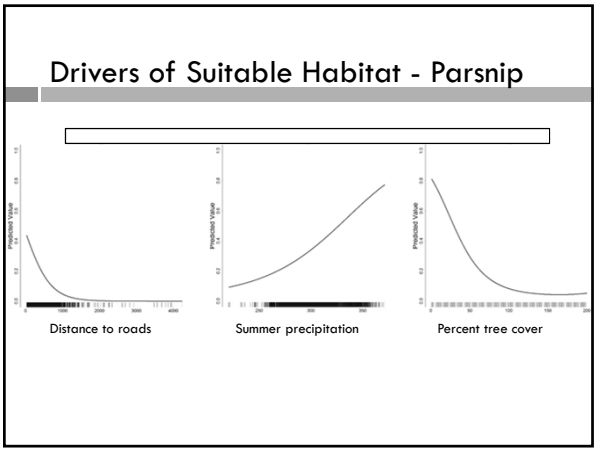
Drivers of Suitable Habitat - Parsnip
Distance to roads
Summer precipitation
Percent tree cover

Questions/Discussion

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