

The Current State and Future Prospects for Citizen Science

National Water Quality Monitoring Conference
Cincinnati, OH, April 30, 2014

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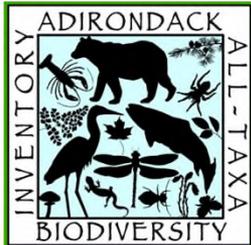
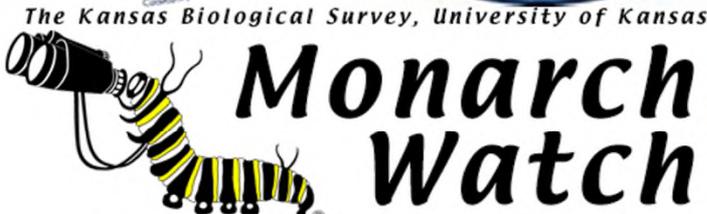
Evaluation Program Manager, Cornell Lab of Ornithology



Environmental Monitoring



nature's notebook



Dedicated to Education, Conservation, & Research



The Lost Ladybug Project

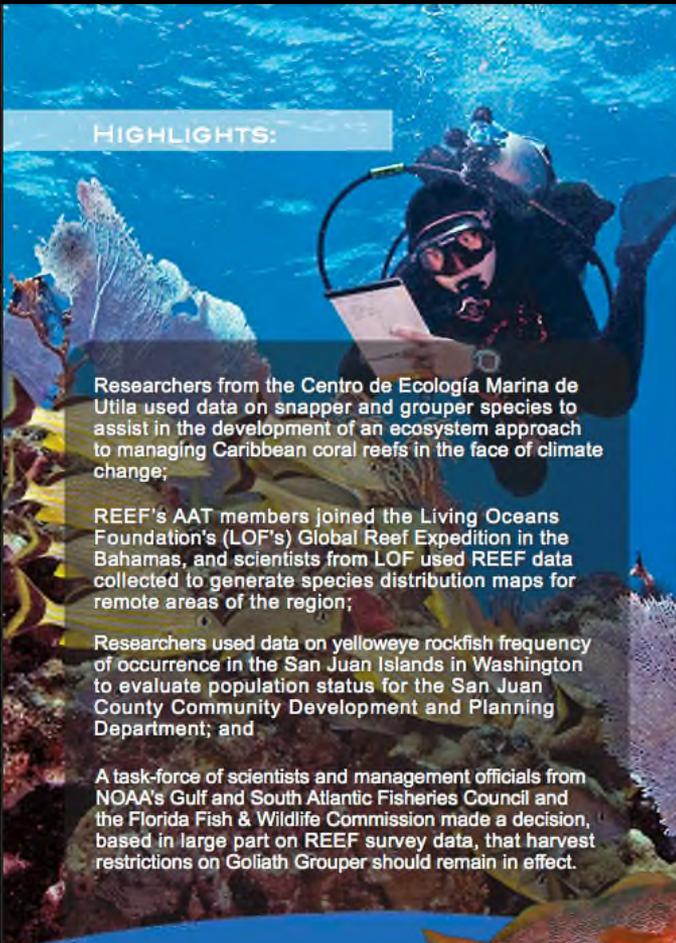


C O A S T



REEF

(Reef Environmental Education Foundation)



HIGHLIGHTS:

Researchers from the Centro de Ecología Marina de Utila used data on snapper and grouper species to assist in the development of an ecosystem approach to managing Caribbean coral reefs in the face of climate change;

REEF's AAT members joined the Living Oceans Foundation's (LOF's) Global Reef Expedition in the Bahamas, and scientists from LOF used REEF data collected to generate species distribution maps for remote areas of the region;

Researchers used data on yelloweye rockfish frequency of occurrence in the San Juan Islands in Washington to evaluate population status for the San Juan County Community Development and Planning Department; and

A task-force of scientists and management officials from NOAA's Gulf and South Atlantic Fisheries Council and the Florida Fish & Wildlife Commission made a decision, based in large part on REEF survey data, that harvest restrictions on Goliath Grouper should remain in effect.

REEF's Volunteer Survey Project generates valuable data on ocean populations, while expanding scientific awareness among its participants. The extensive REEF data set is an important source of information for documenting changes in populations and community structure as well as cataloging biological diversity. REEF provides data to many scientists and researchers from academic institutions and resource management agencies each year. In 2011, REEF fulfilled 18 requests for data files, from scientists at institutions such as NOAA, Oregon Department of Fish and Wildlife (DFW), Seattle Aquarium, the Gilbert Ichthyological Society at the Burke Museum at the University of Washington, Washington DFW, University of Connecticut, University of North Carolina Wilmington, Centro de Ecología Marina, Living Oceans Foundation, and Florida Fish and Wildlife Conservation Commission.

In 2011, researchers published the following articles based on REEF data and projects:

Austler, P, D Grenda, J Godfrey, E Heupel, S Auscavitch and J Mangiafico. 2011. Behavioral observations of Lilliputian piscivores: young-of-year *Sphyraena barracuda* at offshore sub-tropical reefs (NW Atlantic Ocean). *Southeastern Naturalist*. 10(3):563-569

Green SJ, Akins JL, Côté IM. 2011. Foraging behaviour and prey consumption in the Indo-Pacific lionfish on Bahamian coral reefs. *Marine Ecology Progress Series* 433:159-167

Morris, JA, A Thomas, AL Rhyne, N Breen, L Akins, and B Nash. 2011. Nutritional properties of the invasive lionfish: A delicious and nutritious approach for controlling the invasion. *AACL Bioflux*. Volume 4(1): 21-26

Pattengill-Semmens, CV, BX Semmens, and J Nichols. 2011. Patterns of Fish Biodiversity in the Salish Sea. *Salish Sea Ecosystem Conference Proceedings*.

Semmens, BX, EJ Ward, EE Holmes, CV Pattengill-Semmens, and BI Ruttenberg. 2011. Integrating time-series of community monitoring data. *American Fisheries Society Conference Proceedings*

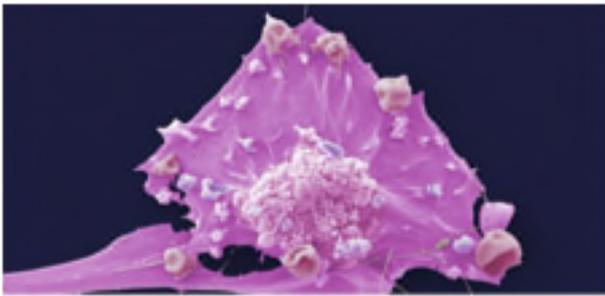


DATA USE & PUBLICATIONS

Data Classification

ZOONIVERSE
REAL SCIENCE ONLINE

Biology



Analyse real life cancer data.

You can help scientists from the world's largest cancer research institution find cures for cancer.

Cell Slider

Climate



Model Earth's climate using historic ship logs

Help scientists recover Arctic and worldwide weather observations made by US Navy and Coast Guard ships.

oldWeather



Classify over 30 years of tropical cyclone data.

Scientists at NOAA's National Climatic Data Center need your help.

CycloneCenter

Humanities



Study the lives of ancient Greeks

The data gathered by Ancient Lives helps scholars study the Oxyrhynchus collection.

ANCIENT LIVES

Nature



Hear Whales communicate

You can help marine researchers understand what whales are saying

WHALEcam



Help explore the ocean floor

The HabCam team and the Woods Hole Oceanographic Institution need your help!

SEAFLOOR EXPLORER



You're hot on the trail of bats!

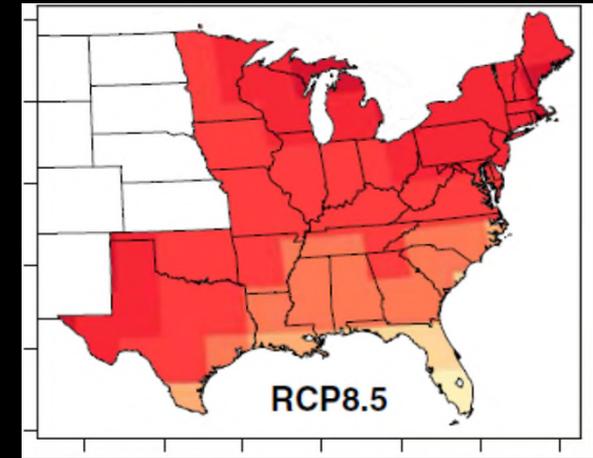
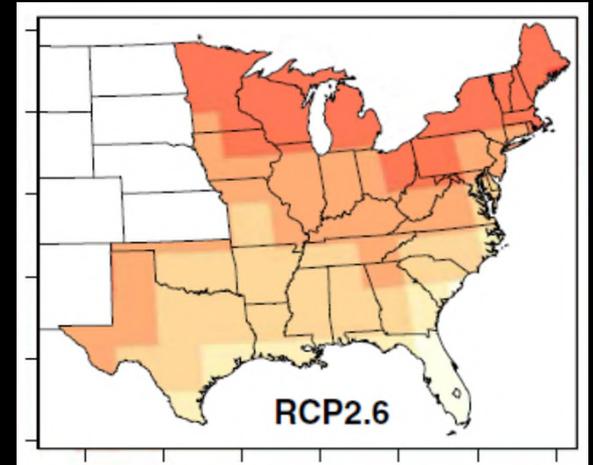
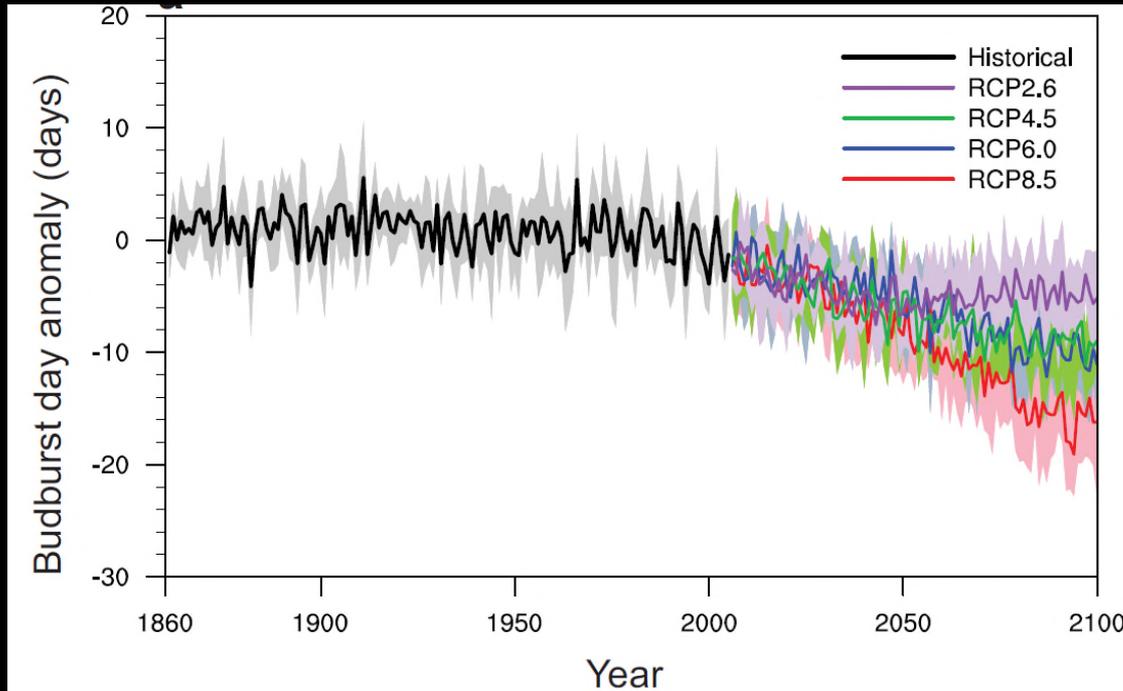
Help scientists characterise bat calls recorded by citizen scientists.

BAT DETECTIVE

Nature's Notebook

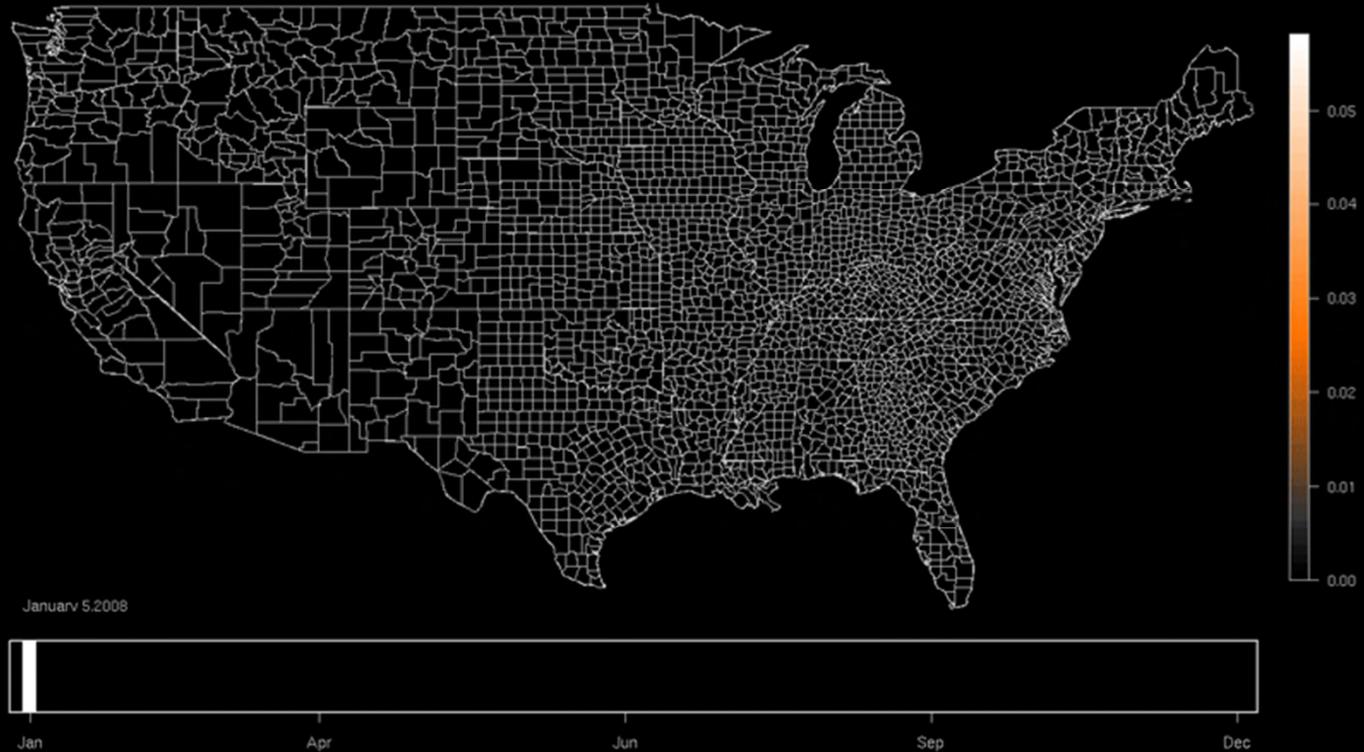
A. rubrum, 2080-2099

Red maple (*A. rubrum*)



Jeong et al., GRL 2013

eBird



Willow Flycatcher annual occurrence

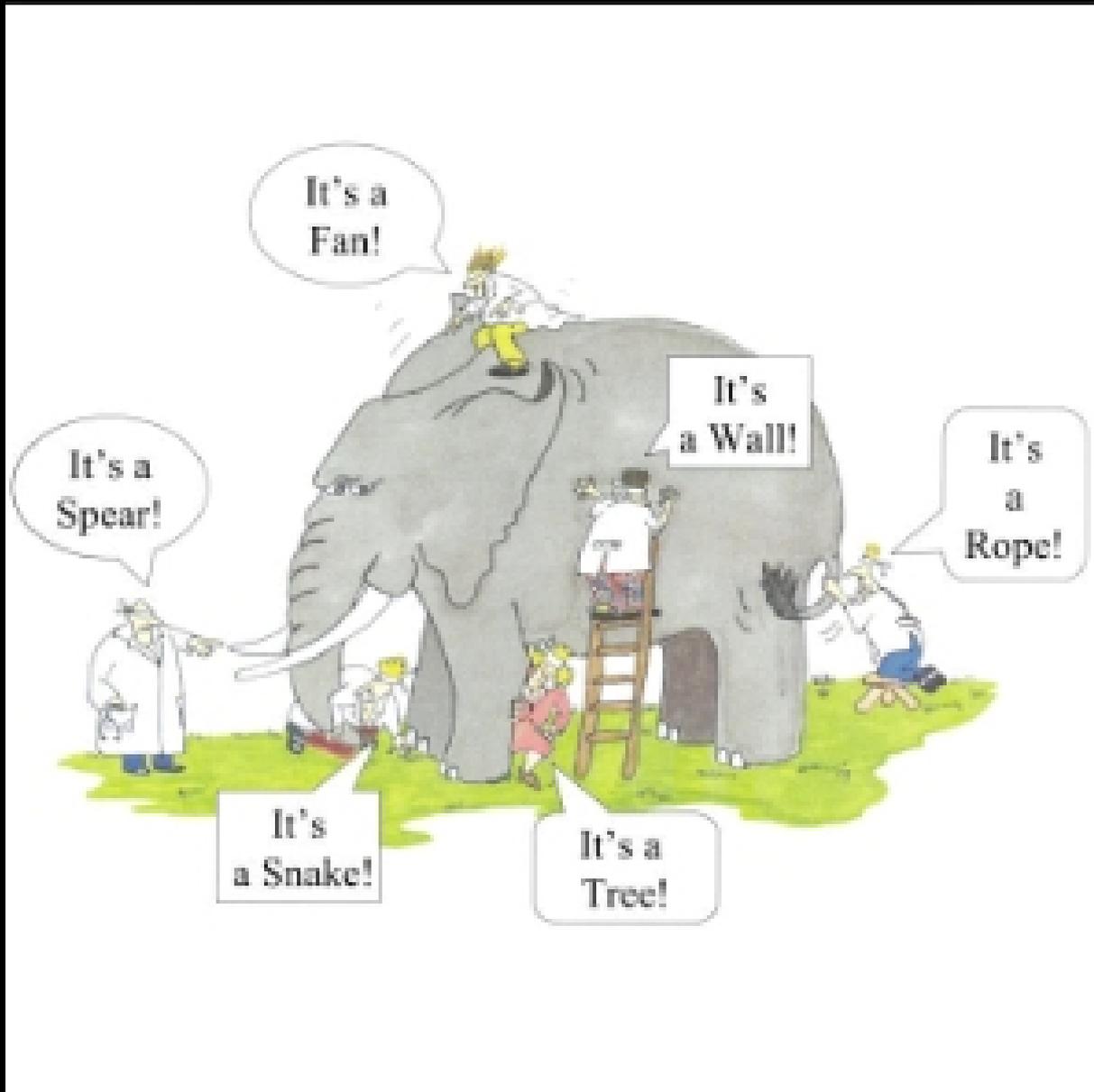
Sea turtle conservation



ALLARM

(Alliance of Aquatic Resource Monitoring)





a.k.a...

Public participation in scientific research

participatory action research

civic science

community science

volunteer monitoring

traditional ecological knowledge

Citizen Science

Volunteers and professionals engaged in collaborative research to generate new science-based knowledge



Models

Contributory

Collaborative

Co-Created

Define a question/issue



Gather information



Develop explanations



Design data collection methods



Collect samples



Analyze samples



Analyze data



Interpret data/conclude



Disseminate conclusions

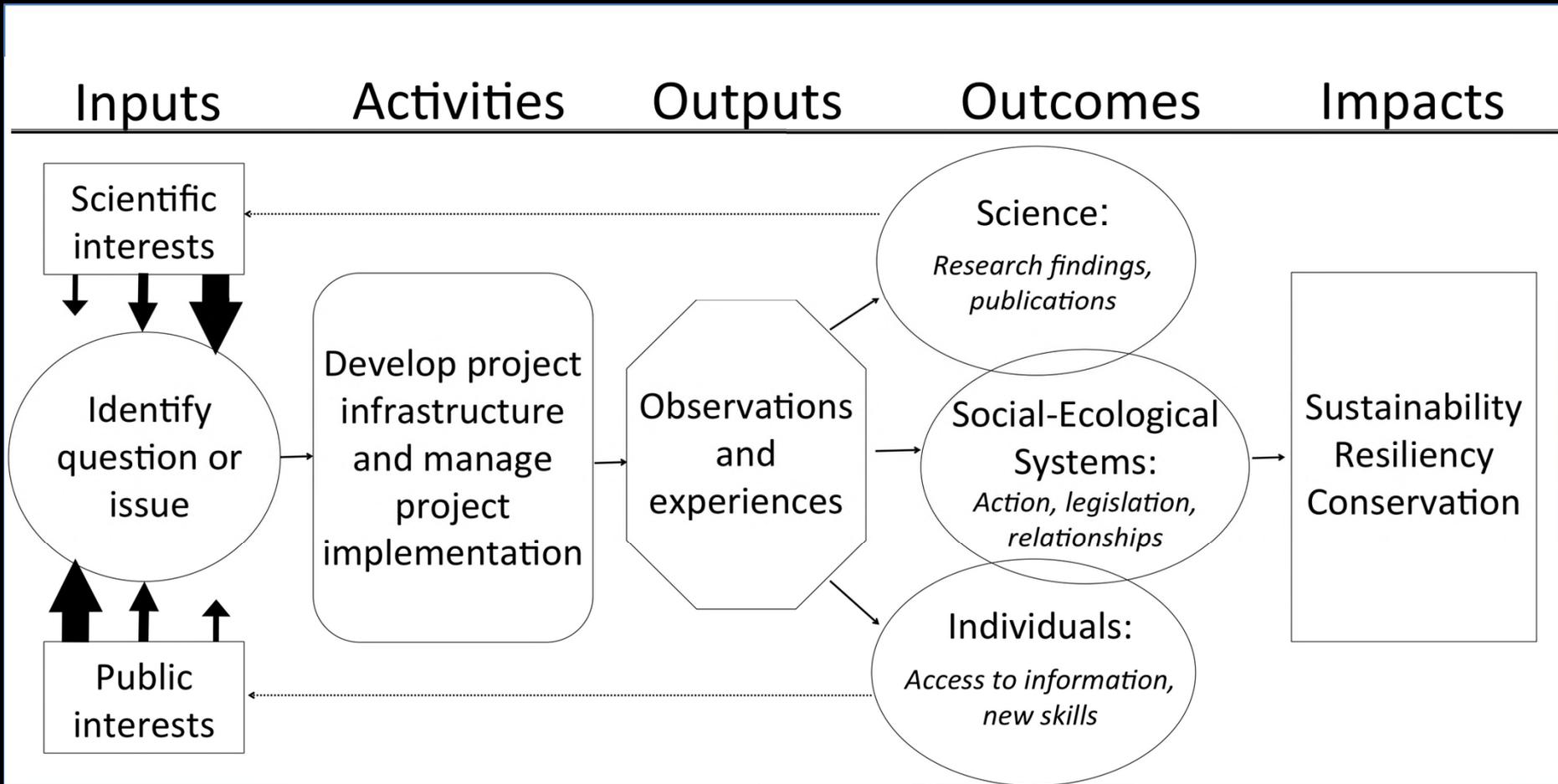


Discuss results/inquire further



Bonney et al. 2009. CAISE Inquiry Group Report

Deliberate design



Shirk et al. 2012

Scientific *knowledge*

Individual *learning*

Social-ecological *impact*



Scientific knowledge



documenting range shifts
(Bonter et al. 2011)



identifying potential mismatches
(Batalden et al. 2007)



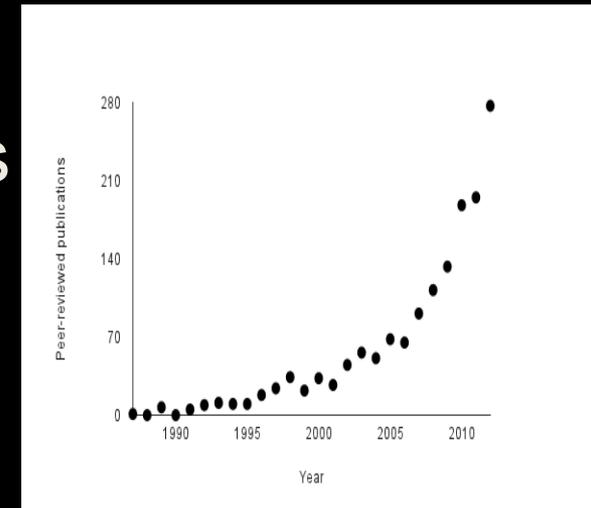
identifying vulnerable species
(Crimmins et al 2008, 2009)



health planning
(Levetin and Van de Water 2008)



anticipating effects on water sources
(e.g., CoCoRaHS)



Individual learning



engage critical thinking
(Trumbull et al. 2000)



science learning, skill acquisition
(Kountoupes and Oberhauser 2008)



environmental stewardship
(Evans et al. 2005)



interest, efficacy
(Crall 2010)



citizen empowerment
(Kolok et al. 2011)

Social-ecological impact



social capital
(Overdevest et al. 2004)



community capacity
(Ballard et al. 2008)



environmental justice
(Wing et al. 2008)

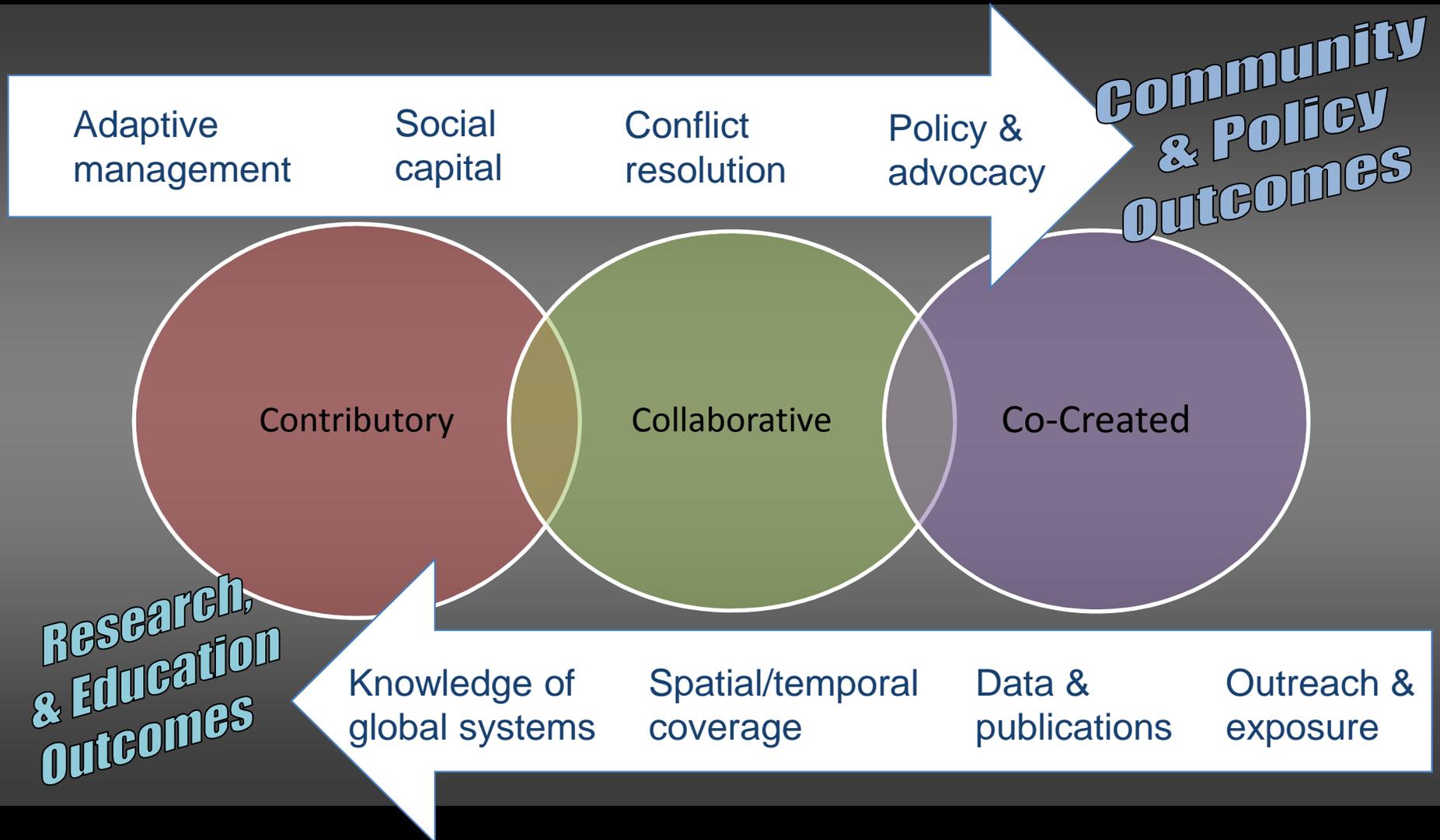


species management
(Delaney et al. 2006)



disaster and conflict resiliency
(Tidball and Krasny 2012)

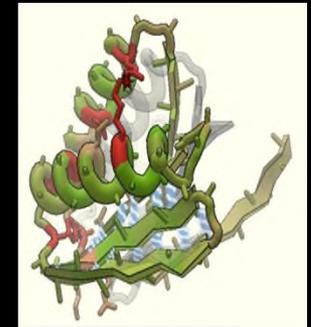
Strengths Analysis Framework



Organizing for Maximum Impact



<http://www.flickr.com/photos/crb/103586567/>



Participant recruitment: Scistarter.org

The screenshot shows the Scistarter.org website with an orange header. The logo 'scistarter beta' is on the left with the tagline 'Science we can do together.' Navigation links for 'home', 'project finder', and 'our blog' are in the center. A search bar with a 'go' button is on the right. The main content area is divided into three columns. The left column features a 'project finder' section with dropdown menus for 'pick an activity' and 'pick a topic', a 'search keywords' input field, and a 'search' button. A blue robot icon is positioned to the right of these elements. The middle column is titled 'projects of the day' and displays a project card for 'Ventus' with a photo of a power plant. The right column details the 'Ventus' project, including its goal ('Help study climate change impacts of power plants.') and task ('Map locations of power generators around the world.'). Below the main content are three promotional sections: 'our blog' with a 'read more' link, 'newsletter' with an email input field and 'GO' button, and 'for scientists' with 'add a project' and 'edit your project' buttons. At the bottom, an 'as seen in' section lists logos for Discover Magazine, Forbes, NPR, BBC, WIRED, and Nature Publishing Group (npg).

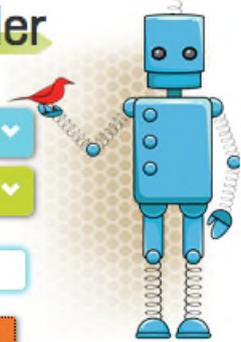
scistarter^{beta}
Science we can do together.

log in / sign up search: go

home project finder our blog

project finder

pick an activity ▾
pick a topic ▾
search keywords
advanced search



projects of the day



Ventus 

goal Help study climate change impacts of power plants.
task Map locations of power generators around the world.

Online

1 2 3 4 5

our blog

Spring has sprung! Citizen scientists like you can now shed your winter layers and say hello again to the great ... [read more](#) 

newsletter

Get awesome projects delivered to your inbox each week. Enter your email address:

for scientists

Add a project and we'll connect you to our community of doers!



as seen in

DISCOVER^{MAGAZINE} Forbes n p r BBC WIRED nature publishing group npg

Capacity building: CitSci.org

The screenshot shows the CitSci.org website. At the top right, it says "Welcome guest Login | My Profile | May 18th 2013". The navigation menu includes "Home", "About Us", "Projects", "Species", "Maps", and "Get Started". The main banner features the text "CitSci.org ~ Supporting the science you do!" over a background image of a person wading in a stream, with a "Join Us!" button. Below the banner are three sections: "Species" with a "Dalmatian Toadflax" card showing a yellow flower; "Featured Projects" with a "PikaNet" card showing a rocky slope and statistics: 100 Participants, 105 Observations, and 1 Photo; and "Discoveries" with a "Sighting in oquacr001" card reported by Donald Tracy on May 17th, 2013. At the bottom left is a "Let Us Help" section with a paragraph about citizen science. At the bottom right is a "Learn More!" section with links for "How To Start A Project", "What's Being Measured", "Developer APIs", "Tutorials", "Links", "News", and "FAQs".

Welcome guest [Login](#) | [My Profile](#) | May 18th 2013

[Home](#) [About Us](#) [Projects](#) [Species](#) [Maps](#) [Get Started](#)

CitSci.org ~ Supporting the science you do!

[Join Us!](#)

Species

Dalmatian Toadflax



Featured Projects

PikaNet



- 100 Participants
- 105 Observations
- 1 Photo

Discoveries

Sighting in oquacr001

reported by
Donald Tracy
on
May 17th, 2013

Let Us Help

We support **your** citizen science. At CitSci.org, you create your own projects where trained volunteers and scientists together answer local, regional, and global questions, inform natural resource decisions, advance scientific understanding, and improve environmental education. We provide tools to empower you and your participants to ask questions, select methods, submit data, analyze data, and share results.

Learn More!

- [How To Start A Project](#)
- [What's Being Measured](#)
- [Developer APIs](#)
- [Tutorials](#) • [Links](#) • [News](#) • [FAQs](#)

DataONE

Got data?



Data Management

Data Policies for Public Participation in Scientific Research: A Primer

DataONE Public Participation in Scientific Research Working Group
August, 2013

Anne Bowser, Andrea Wiggins, and Robert D. Stevenson

Abstract

This guide introduces data policies in the context of Public Participation in Scientific Research, or citizen science. Four types of data policies are examined: user agreements, terms of use, legal policies, and privacy policies. Each is briefly explained with examples from existing citizen science projects and best practices for implementation. Practical instructions that describe how to craft data policies for citizen science projects and information on how data policies fit within the data management lifecycle are included. This guide was designed to inform project managers about data policies for their citizen science programs. Citizen science volunteers will also benefit from this guide by learning about the rights and responsibilities that their contributions entail.

Andrea Wiggins

Equity, Diversity, Inclusion



Engaging
diverse
audiences

Association of Science-Technology
Centers Task Force

The Cornell Lab of Ornithology



BETA VERSION 2.0
Program Development and Evaluation

PUBLIC PARTICIPATION IN SCIENTIFIC RESEARCH: User's Guide for Project Evaluation

Tina Phillips
Marion Ferguson
Rick Bonney
Matthew Minarchek
Norman Porticella

Developing and Evaluating Learning Outcomes



CitizenScience.org

The screenshot shows the CitizenScience.org website homepage. At the top, there is a navigation bar with links for NEWS, ABOUT, PROJECTS, PRACTITIONER TOOLKIT, RESOURCE LIBRARY, COMMUNITY, and OUTCOMES. A search bar is located on the right side of the navigation bar. Below the navigation bar is a large banner image of a woman in a green shirt and hat, smiling and holding a blue glove. The banner text reads "WELCOME TO CITIZEN SCIENCE.ORG" followed by a Latin placeholder text: "Proin pharetra, libero vel ultrices elementum, mauris turpis laoreet justo, pulvinar sagittis turpis crism in mauris." Below the banner is a search bar and a statistics section showing 4,293 Projects, 1,592 Practitioners, and 3,510 Resources. The main content area is divided into two columns. The left column is titled "Citizen Science News" and features three articles: "Arizona Science Center: Bark Beetles and Pointed", "Education: Monarch Larva Monitoring Program", and "Chabot Space & Science Center: Sword Ferns in the Redwood Ecosystem". The right column is titled "Opportunities" and features five items: "Members Needed in Upstate NY in the Job Postings", "PPSR Conference 2013 in the Conferences", "AGTC Conference in the Conferences", "Multilingual Symposium in the Conferences", and "Wagner Assistant Opening in W. CA in the Job Postings".

CITIZEN SCIENCE.ORG

SEARCH GO

NEWS ABOUT PROJECTS PRACTITIONER TOOLKIT RESOURCE LIBRARY COMMUNITY OUTCOMES [LOG IN](#) [Join Today](#)

WELCOME TO CITIZEN SCIENCE.ORG

Proin pharetra, libero vel ultrices elementum, mauris turpis laoreet justo, pulvinar sagittis turpis crism in mauris.

SEARCH GO

4,293 Projects 1,592 Practitioners 3,510 Resources

Citizen Science News

[Projects in the News](#) [News Feed](#) [Social Feed](#)

Arizona Science Center: Bark Beetles and Pointed
Curriculum materials support teachers involving students in data analysis, investigating how spatial and temperature relate to bark beetle outbreaks.

Education: Monarch Larva Monitoring Program
Students and volunteers explore how butterfly populations are impacted by climate change.

Chabot Space & Science Center: Sword Ferns in the Redwood Ecosystem
Student volunteers investigate the effects of a changing climate on the sword ferns.

Opportunities

Members Needed in Upstate NY in the Job Postings
Posted on October 21, 2013

PPSR Conference 2013 in the Conferences
Event Date: August 8, 2013

AGTC Conference in the Conferences
Event Date: August 8, 2013

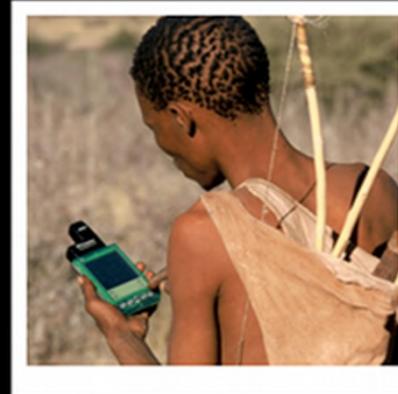
Multilingual Symposium in the Conferences
Event Date: August 8, 2013

Wagner Assistant Opening in W. CA in the Job Postings
Posted on August 8, 2013

Citizen Science Association

“Advance Citizen Science through Communication, Coordination, and Education”

- *Steering Committee plus Working Committees*
- *2000+ members*
- *Annual conference (Feb 2015 @ AAAS)*
- *Peer-reviewed journal (best practices)*



Grand Challenges

- *Air Quality*
 - *Water Quality*
 - *Noise Pollution*
 - *Invasive Species*
 - *Range Shifts*
 - *Emerging Diseases*
 - *Climate Change*
- *over wide geographic areas*
 - *in large quantities*
 - *over long periods of time*
 - *on a diversity of taxa*
 - *in a variety of habitats*
 - *public lands*
 - *private lands*
 - *via standardized methodology*