Engaging Students as Citizen Scientists

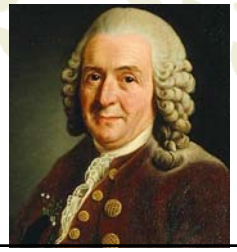
San Diego Children and Nature
Anne Fege and Su Scott
Presented at SDCUE, November 5, 2016

What is citizen science?

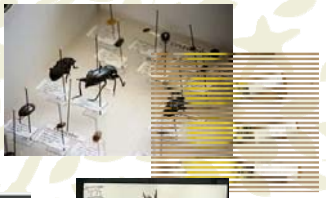
Source: citizenscience.org

History of citizen science

- Prior to the late 19th century when science was professionalized, most science was done by "amateurs" (individuals not paid as scientists)
- In 17th and 18th centuries, amateur experts recruited non-experts to contribute observations and collections

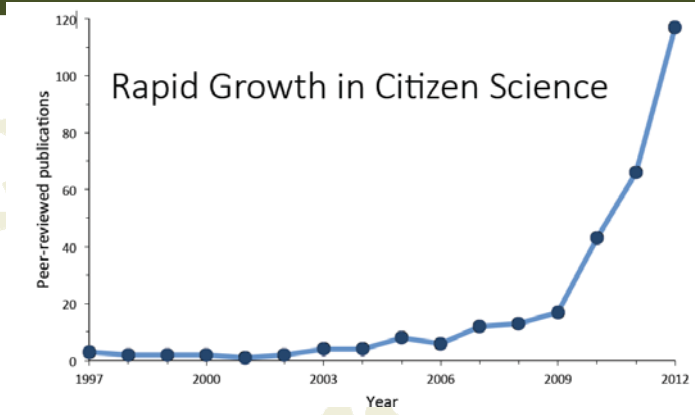


San Diego Natural History Museum



Anne S. Fege and Su Scott, San Diego Children and Nature
www.sdchildrenandnature.org

Citizen Science is increasing!



Source: citizenscience.org

Why Citizen Science?

Research Outcomes

documenting range shifts
(Bonter et al. unpublished data, Batalden et al. 2007)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)

Source: citizenscience.org

Why Citizen Science?

Learning Outcomes

science learning, critical thinking
(Trumbull et al. 2000, Kountoupes and Oberhauser 2008)

environmental action; social networks
(Overdevest et al. 2004)

social capital
(Ballard 2008)

improved policy
(Wing et al. 2008)

Source: citizenscience.org

Public Participation in Scientific Research

- Contributes to the understanding of key scientific concepts
- Builds interest in scientific activities
- Develops science-related skills
- Improves understanding of local conservation issues

Anne S. Fege and Su Scott, San Diego Children and Nature
www.sdchildrenandnature.org

Student experiences

Get Outdoors

Inquiry

Observe

Record data

Analyze

Science

Student learning

Group/project-based work

Technology

Language/Math

Communication/Outreach

Conservation

Networks

Citizen Science as a Learning Tool

- NGSS Science and Engineering Practices
  - Asking questions and defining problems
  - Planning and carrying out investigations
  - Analyzing and interpreting data
- Approaches
  - Start with driving question
  - Incorporate into Project Based Learning
  - Compare with other regions and countries
  - Ask local scientist to visit classroom

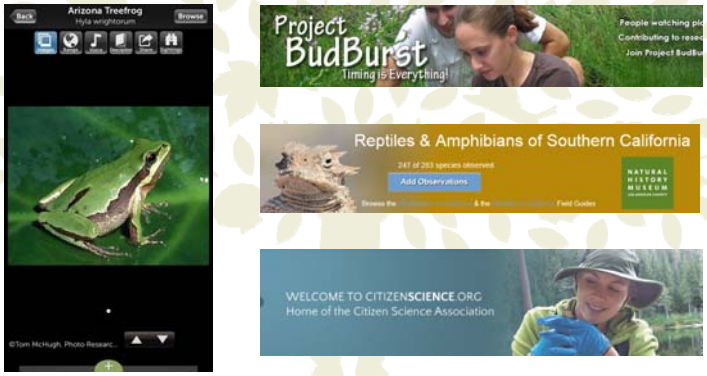
The Nine Steps

1. Scientific question
2. Form a team with scientist, educator, technologist, and evaluator
3. Develop, test, and refine protocols, data forms, and educational materials
4. Recruit participants
5. Train participants
6. Accept, edit, and display data
7. Analyze and interpret data
8. Disseminate results
9. Measure outcomes

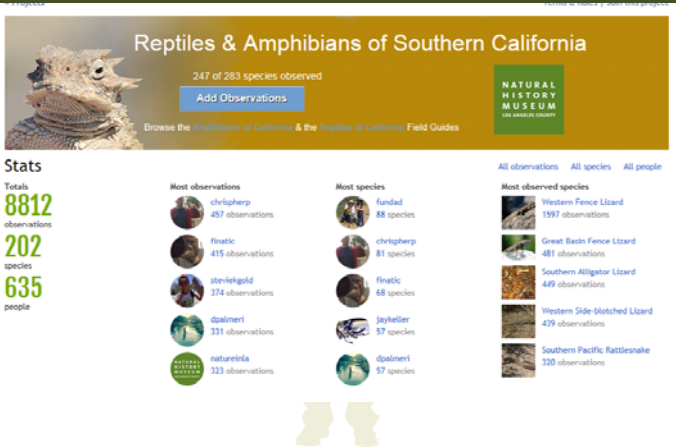
Bonney, 2009

Anne S. Fege and Su Scott, San Diego Children and Nature
www.sdchildrenandnature.org

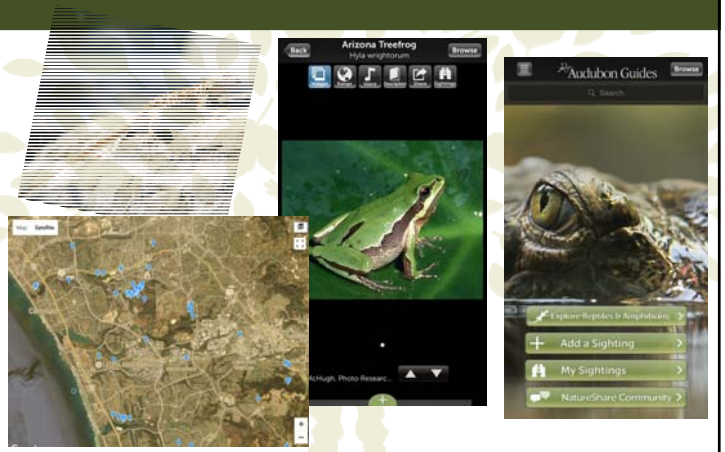
National and local citizen science projects



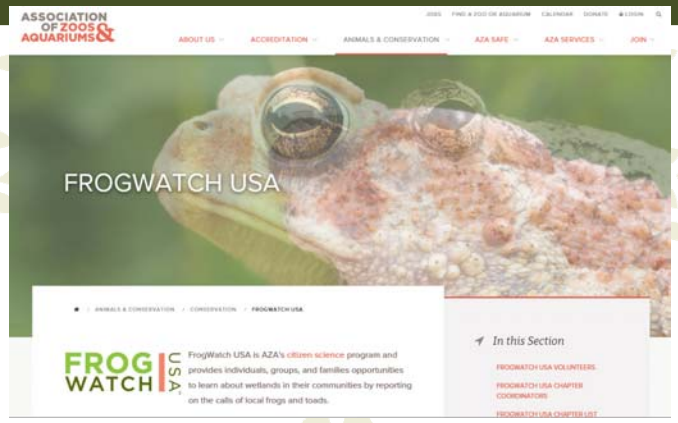
www.inaturalist.org/projects/rascals



www.inaturalist.org/projects/rascals



www.aza.org/frogwatch



Anne S. Fege and Su Scott, San Diego Children and Nature
www.sdchildrenandnature.org

www.gbbc.birdcount.org

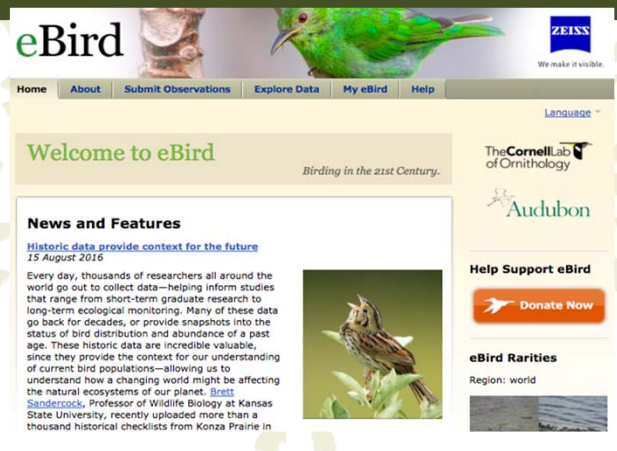
www.monarchwatch.org

www.lostladybug.org

www.celebrateurbanbirds.org

Anne S. Fege and Su Scott, San Diego Children and Nature
www.sdchildrenandnature.org

www.eBird.org



www.usanpn.org

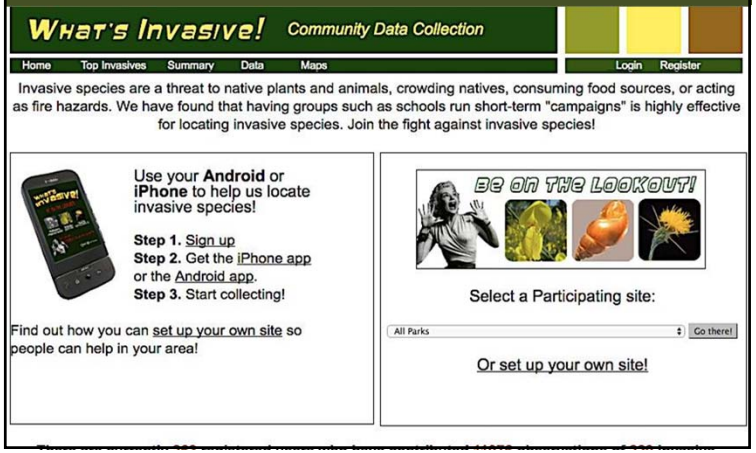
National Phenology Network

Phenology: the scientific study of periodic biological phenomena such as flowering, breeding, and migration, in relation to climatic conditions.

"Nature's Notebook"

www.budburst.org

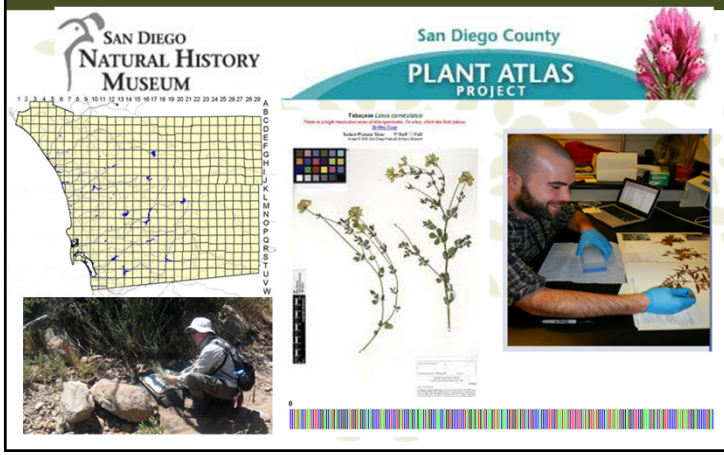
www.whatsinvasive.org



Anne S. Fege and Su Scott, San Diego Children and Nature
www.sdchildrenandnature.org

www.imapInvasives.org

www.sdplantatlas.org



www.seafloorexplorer.org

www.ibol.org and www.barcodeoflife.org

international BARCODE OF LIFE

Goal: the construction of an enormous, online, freely available sequence database.

The Barcode of Life Datasystems (BOLD) online database
> 2.7 million barcode sequences
Approx. 370,000 species.

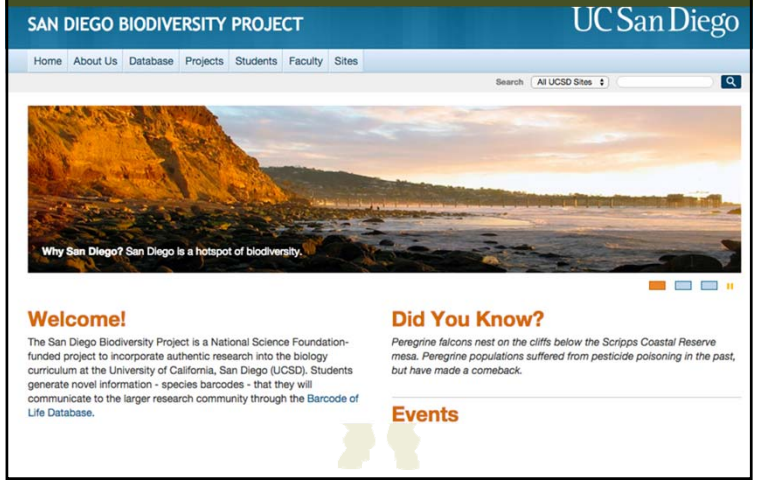
www.ibol.org

The **International Barcode of Life (iBOL)** at the U of Guelph (Canada) increased the speed of barcode data generation and reduced costs.

It will transform the way we look at biodiversity and conservation.

Anne S. Fege and Su Scott, San Diego Children and Nature
www.sdchildrenandnature.org

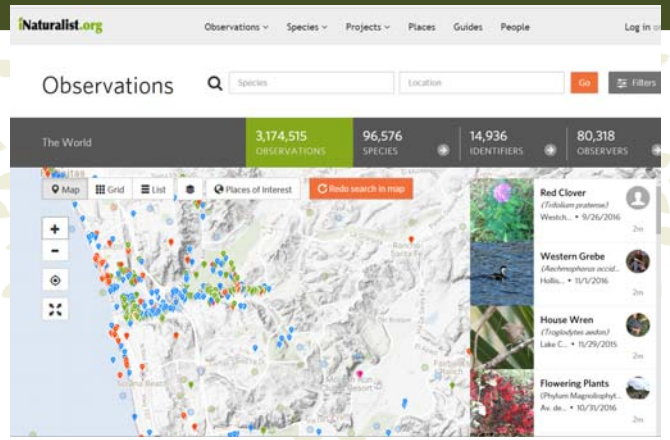
www.sdbiodiversity.ucsd.edu



www.citizenscience.org

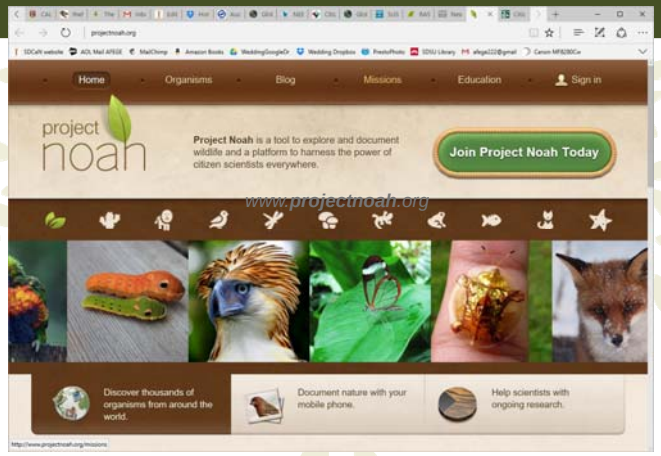
www.citizenscienceacademy.org

www.iNaturalist.org

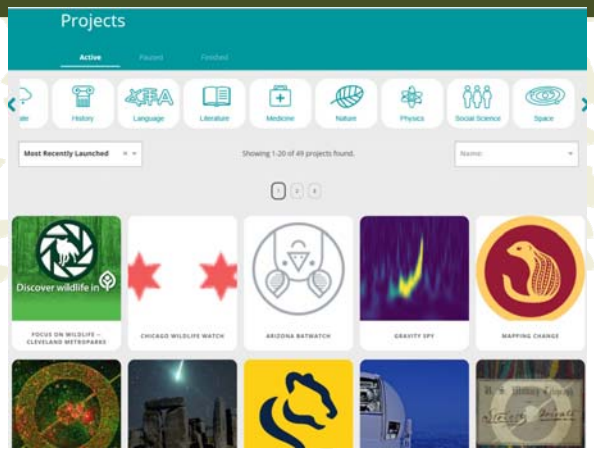


Anne S. Fege and Su Scott, San Diego Children and Nature
www.sdchildrenandnature.org

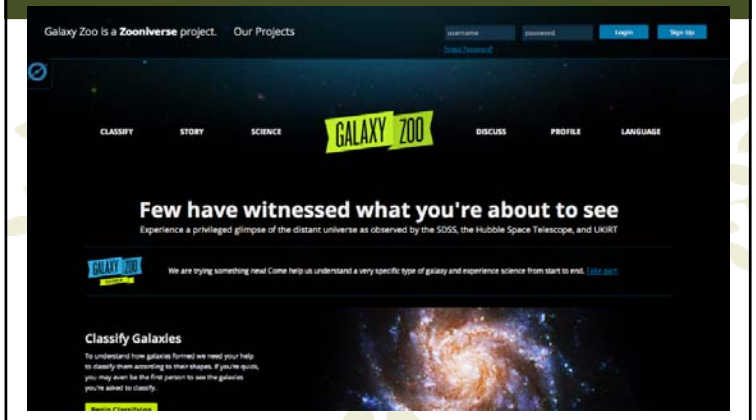
www.projectnoah.org



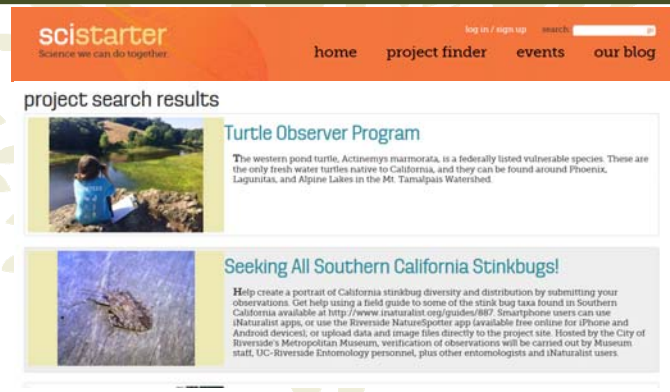
www.zooniverse.org



www.galaxyzoo.org



www.scistarter.com



Anne S. Fege and Su Scott, San Diego Children and Nature
www.sdchildrenandnature.org

www.openscientist.org (blog)

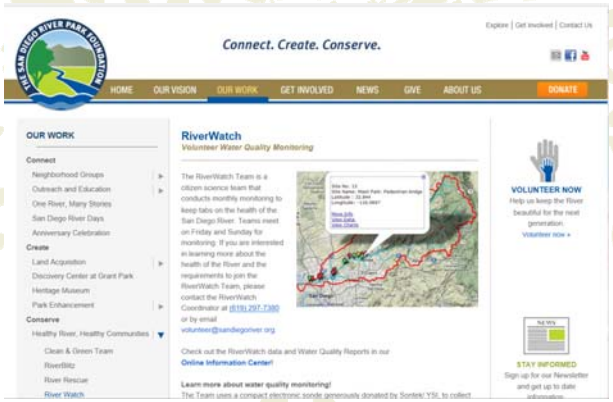
OpenScientist

Projects and opinions from the world of Citizen Science. Because getting started is easy.

San Dieguito River Park

- Argentine ants
- Mammal tracks
- Camera traps
- Reptiles and amphibians
- Botanical surveys
- BioBlitz

River Watch--San Diego River Park



San Diego Zoo Global

Anne S. Fege and Su Scott, San Diego Children and Nature
www.sdchildrenandnature.org

Phenology—Cuyamaca Outdoor School

Ocean Discovery Institute

San Diego Citizen Science Network

www.sdchildrenandnature.org

- Nature educators and community members work together to increase nature opportunities for children
- Vision for children and nature = A world in which all children play, learn, and grow with nature in their everyday lives.

Anne S. Fege and Su Scott, San Diego Children and Nature
www.sdchildrenandnature.org