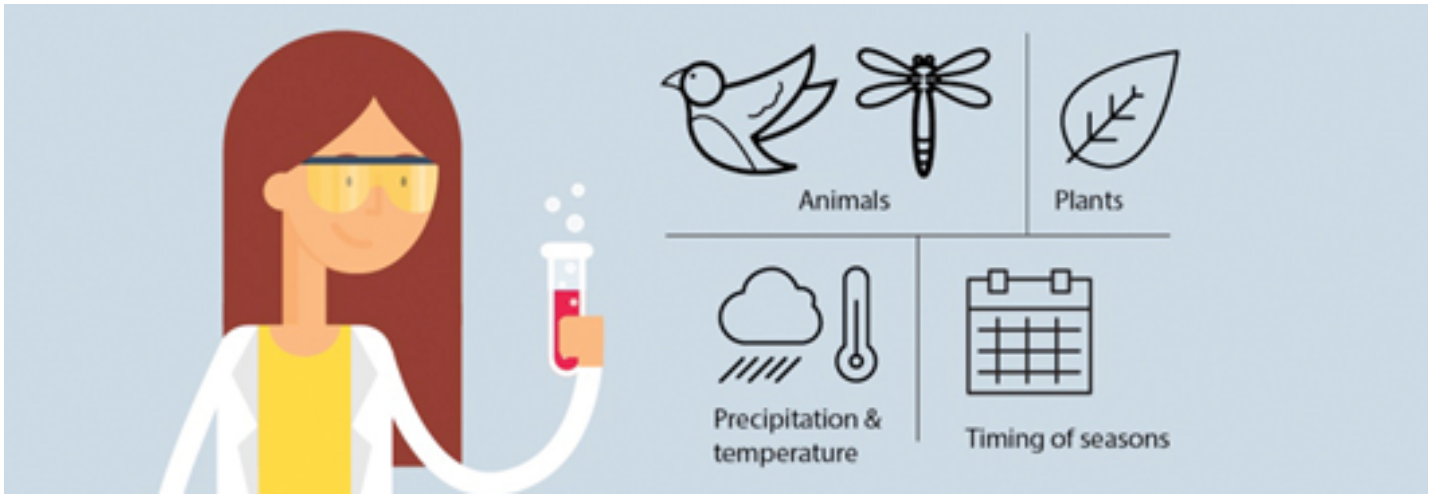
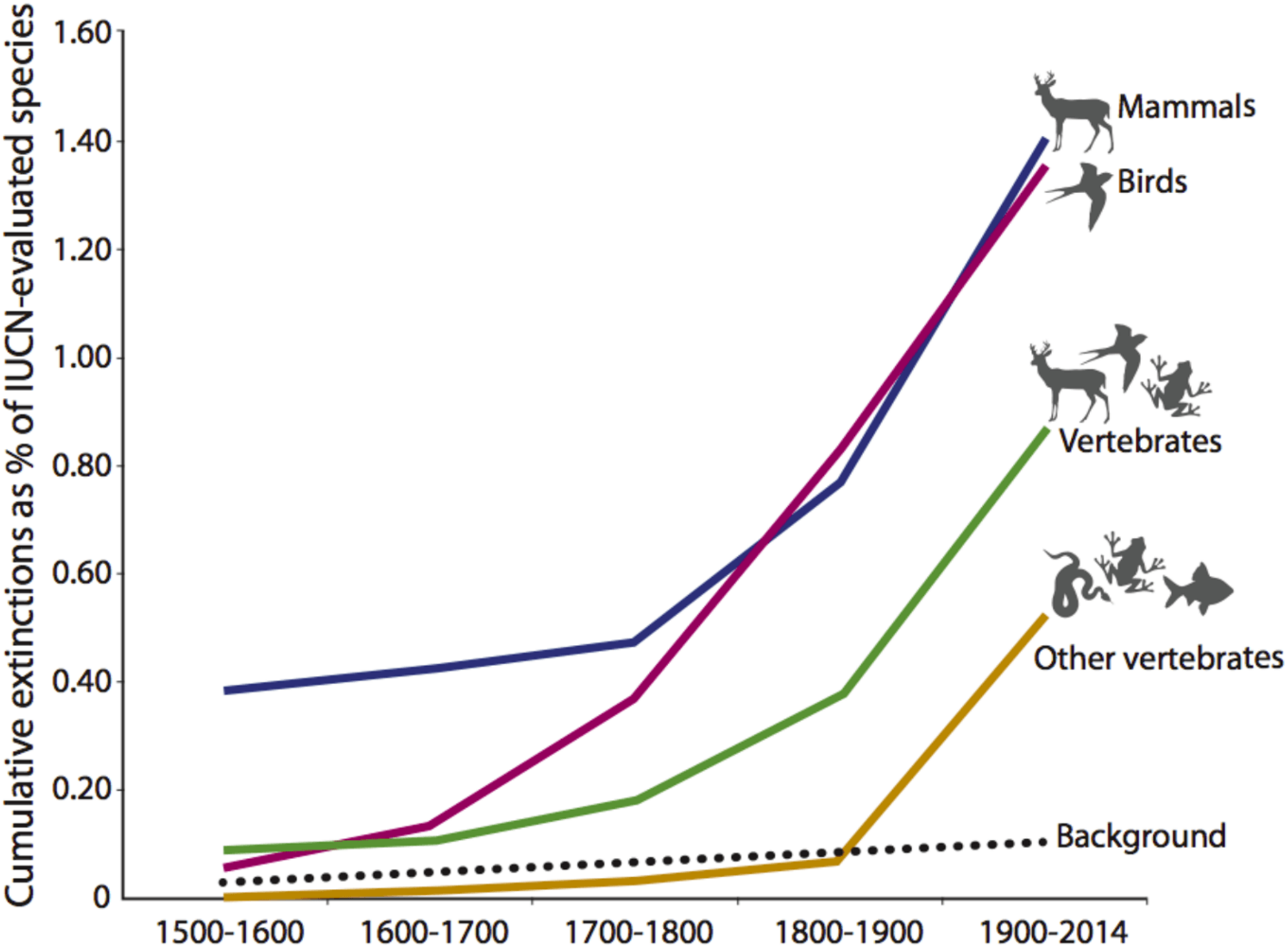
species distribution data are critical: citizen science is a powerful tool

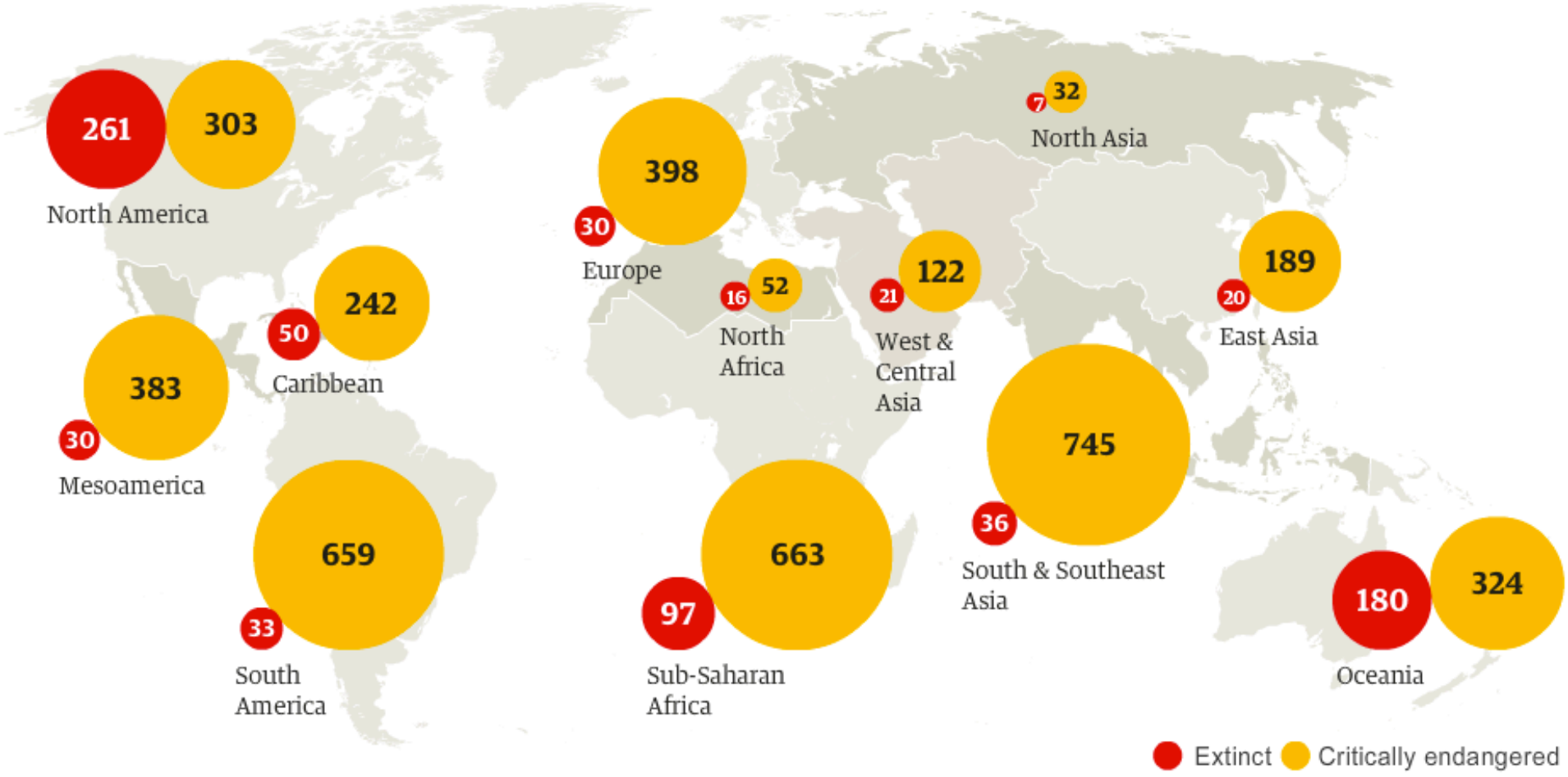


@cjlortie


Cumulative extinctions as % of IUCN-evaluated species
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0
1500-1600
1600-1700
1700-1800
1800-1900
1900-2014
Mammals
Birds
Vertebrates
Other vertebrates
Background

rapid rates of change
100 to 1000 times greater extinction rates

Extinctions and critically endangered species in numbers



SOURCE: IUCN RED LIST

*Red list count began in 1996 but includes extinctions going back to 1500

what was there, is there, will there be?

defining management goals key and overlooked critical element of some citizen science

tool and movement for social good

20,000
volunteers
in all 50 States, D.C., Puerto Rico, the U.S. Virgin Islands and Canada are collecting real-time rain, hail and snow data

59
government organizations
300 federal employees from 59 different government organizations are participating in the Federal Community of Practice on Citizen Science and Crowdsourcing

303
federally funded citizen science & crowdsourcing projects being supported by 25 different agencies

1,600
volunteer groups
in the United States are engaged in water quality monitoring

$2.5 billion
economic value
Researchers at the University of Washington estimate that the in-kind contributions of 1.3–2.3 million citizen science volunteers to biodiversity research have an economic value of up to $2.5 billion per year.

116
BioBlitzes
were held across the U.S. to monitor species in our National Parks in 2016, with an estimated 80,000 volunteers

democratize science

Citizen science can improve conservation science, natural resource management, and environmental protection

Duncan C. McKinley [a] ✉, Abe J. Miller-Rushing [b], Heidi L. Ballard [c], Rick Bonney [d], Hutch Brown [a], Susan C. Cook-Patton [e], Daniel M. Evans [e], Rebecca A. French [f], Julia K. Parrish [g], Tina B. Phillips [d], Sean F. Ryan [h], Lea A. Shanley [i], Jennifer L. Shirk [d], Kristine F. Stepenuck [j], Jake F. Weltzin [k], Andrea Wiggins [l], Owen D. Boyle [m], Russell D. Briggs [n] … Michael A. Soukup [r]

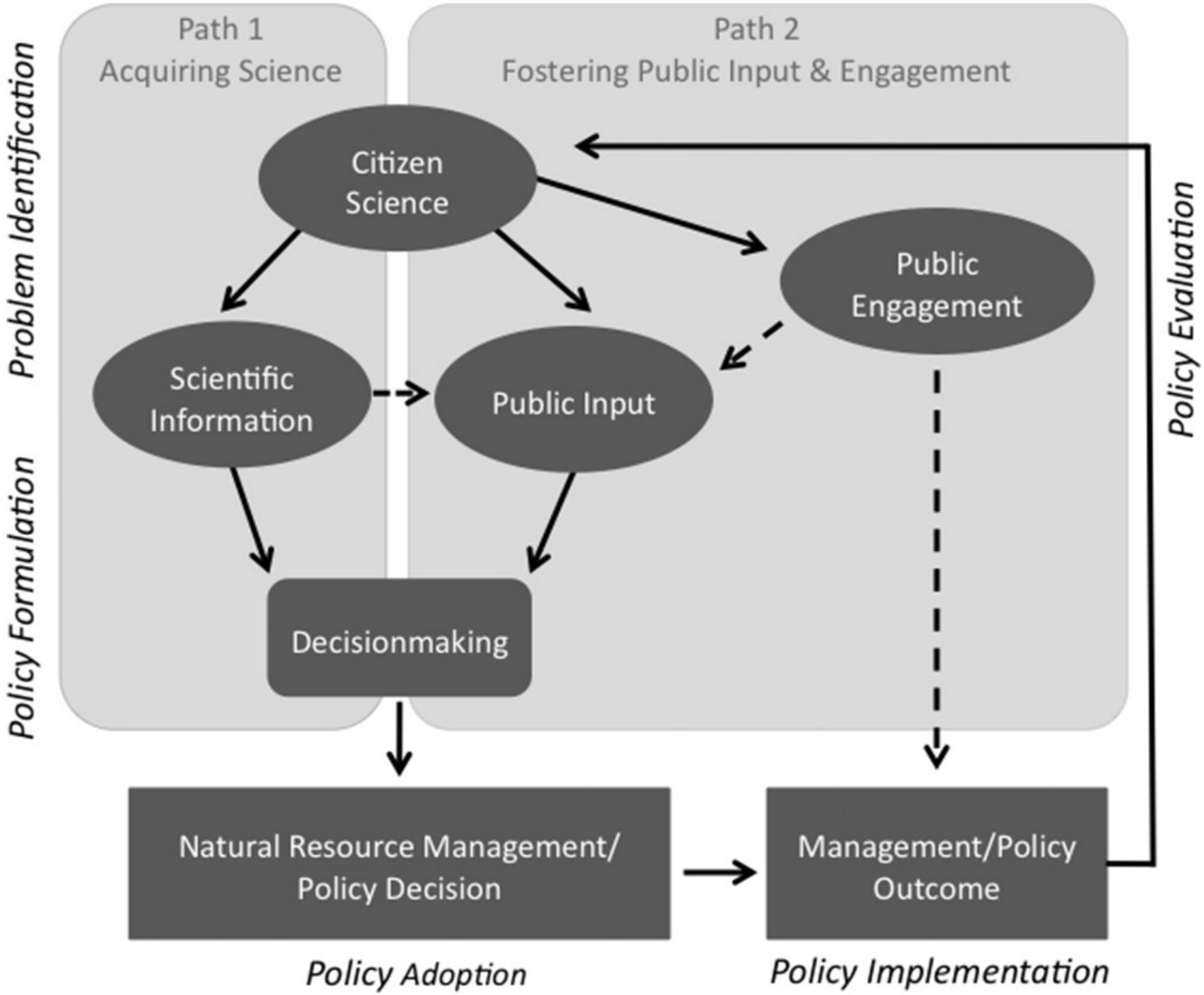
Show more

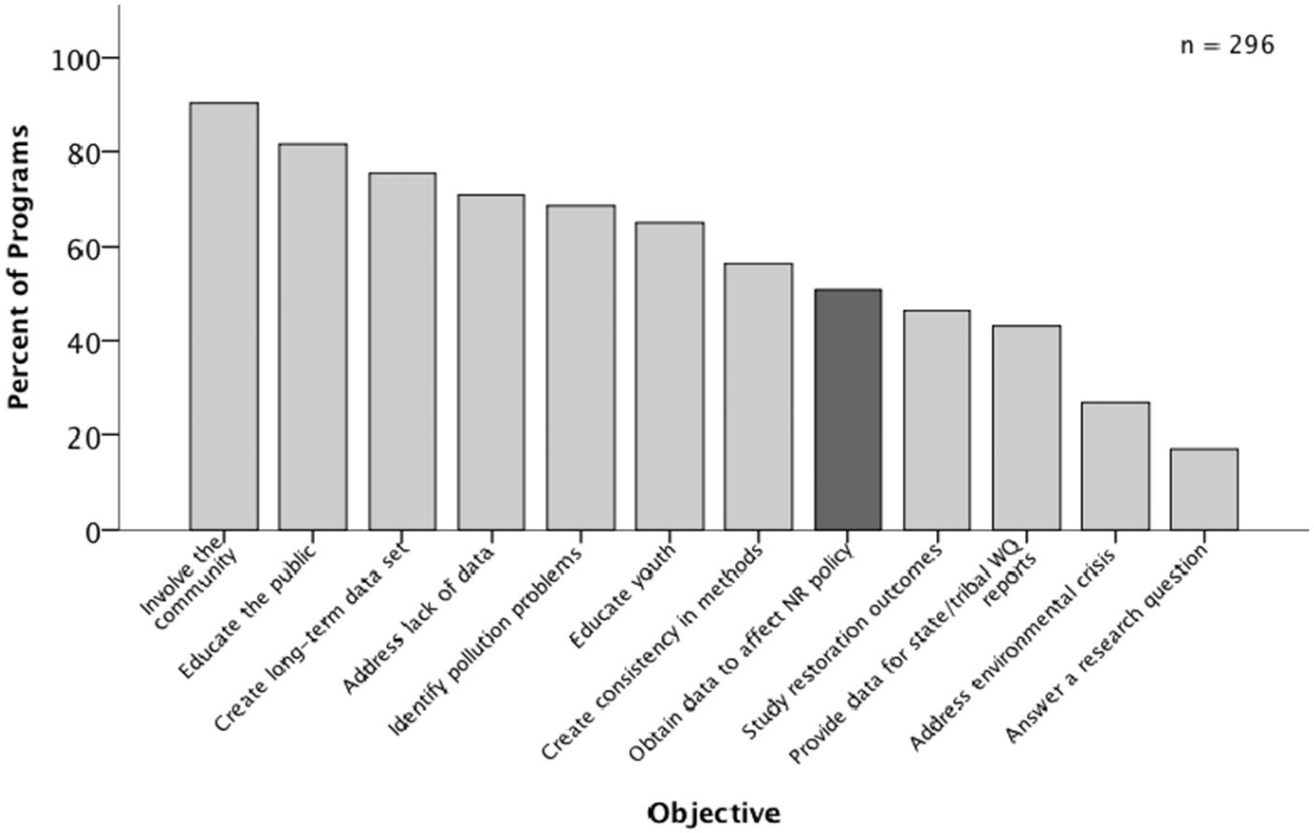
https://doi.org/10.1016/j.biocon.2016.05.015

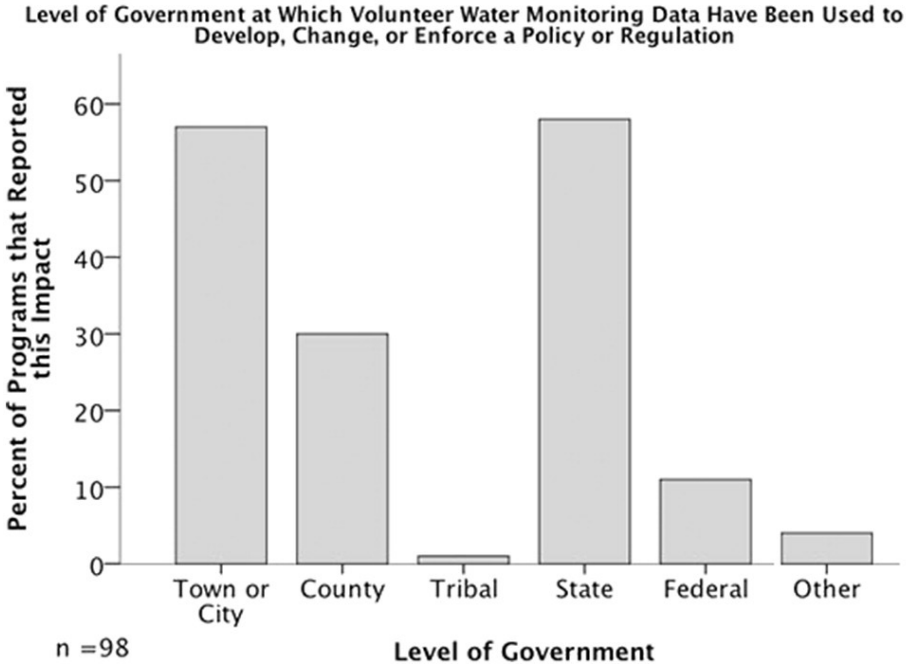
citizen science is the practice of engaging the public
in a scientific project

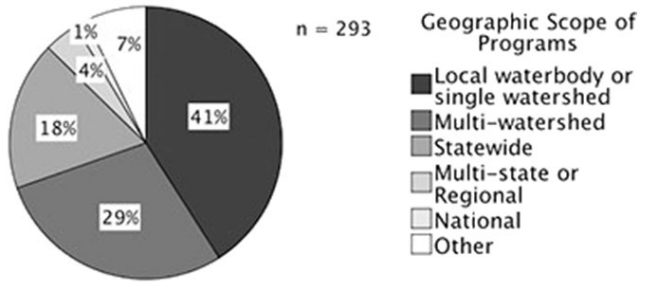
methods

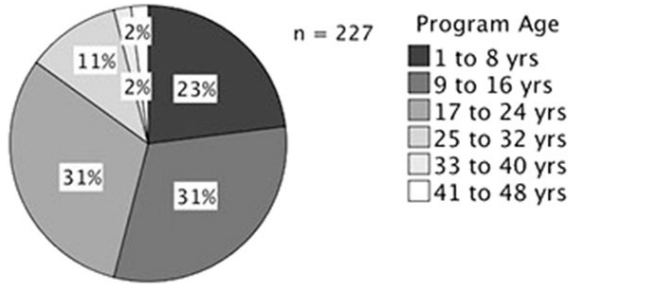
working groups
expert surveys
web of science


Path 1
Acquiring Science
Path 2
Fostering Public Input & Engagement
Problem Identification
Policy Formulation
Policy Evaluation
Citizen Science
Public Engagement
Scientific Information
Public Input
Decisionmaking
Natural Resource Management/ Policy Decision
Management/Policy Outcome
Policy Adoption
Policy Implementation


n = 296
Percent of Programs
100
80
60
40
20
0
Involve the community
Educate the public
Create long-term data set
Address lack of data
Identify pollution problems
Educate youth
Create consistency in methods
Obtain data to affect NR policy
Study restoration outcomes
Provide data for state/tribal WQ reports
Address environmental crisis
Answer a research question
Objective

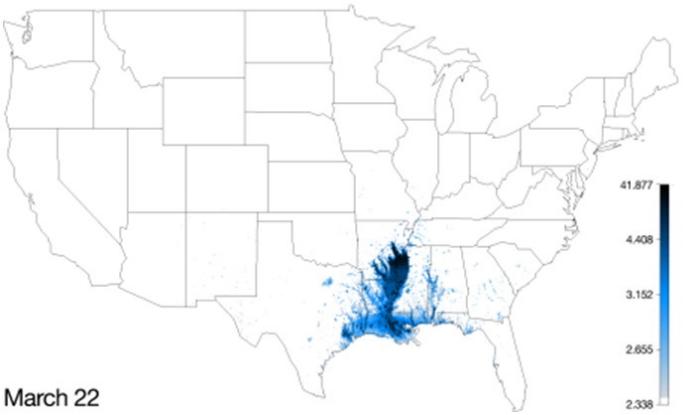

Level of Government at Which Volunteer Water Monitoring Data Have Been Used to Develop, Change, or Enforce a Policy or Regulation
Percent of Programs that Reported this Impact
60
50
40
30
20
10
0
Town or City
County
Tribal
State
Federal
Other
n =98
Level of Government


n = 293
41%
29%
18%
4%
1%
7%
Geographic Scope of Programs
Local waterbody or single watershed
Multi-watershed
Statewide
Multi-state or Regional
National
Other

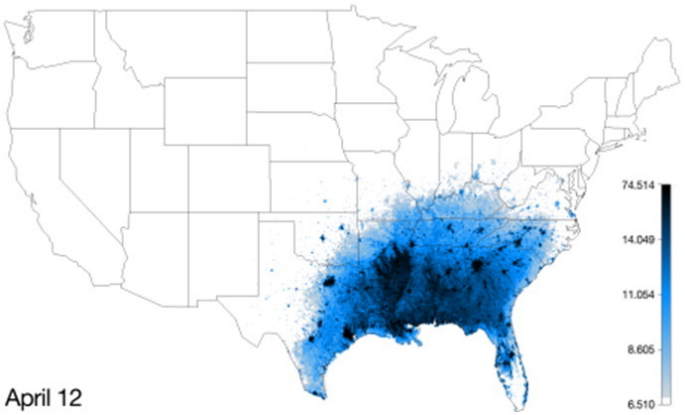

n = 227
23%
31%
31%
11%
2%
2%
Program Age
1 to 8 yrs
9 to 16 yrs
17 to 24 yrs
25 to 32 yrs
33 to 40 yrs
41 to 48 yrs

Chimney Swift

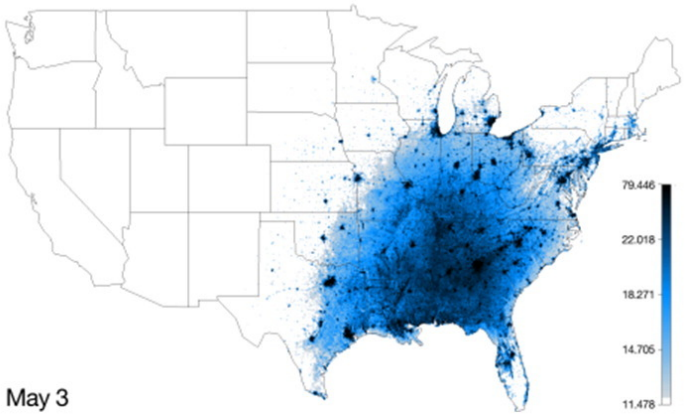
TheCornellLab of Ornithology



March 22



April 12



May 3

data must be open, publicly archived,
and can come in many forms - not just numbers

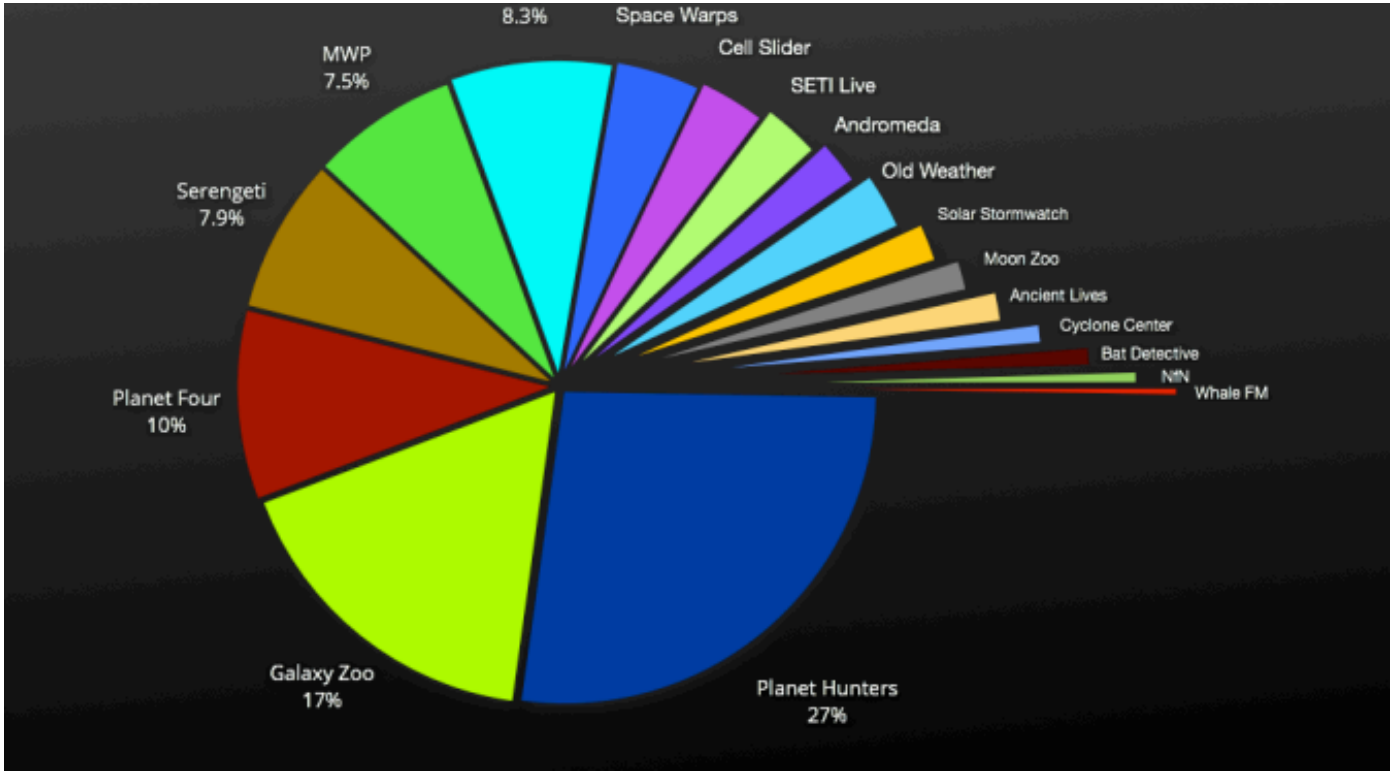
bio4enviro connection

big planet > funding limited > change rapid > bidirectional benefits

tools

Management goal	Science needs	Public input and engagement needs	Sample projects
Species management	Providing information on species abundance, distribution, phenology, and behavior	Public support for and involvement in management decisions	North American Breeding Bird Survey; Monarch Watch; eBird; Grunion Greeters; IceWatch USA
Ecosystem services management	Providing resource valuation; mapping ecosystem services	Public appreciation for ecosystem services	USGS's Social Values for Ecosystem Services (SoLVES)
Climate change, impact assessment, adaptation	Assessing the status, rates, and trends of key physical, ecological, and societal variables and values	Stakeholder engagement in program development, implementation, and evaluation	Nature's Notebook; Community Collaborative Rain, Hail and Snow Network
Invasive species control	Providing real-time monitoring (an early-alert system)	Public support for and involvement in management decisions	IveGot1 app; Bugwood app
Pollution detection and enforcement	Providing information on water and air quality	Stakeholder engagement in identifying problems and solutions; public support for and involvement in management decisions	Bucket Brigade; Clean Air Coalition; Alabama Water Watch Program


iNaturalist.org

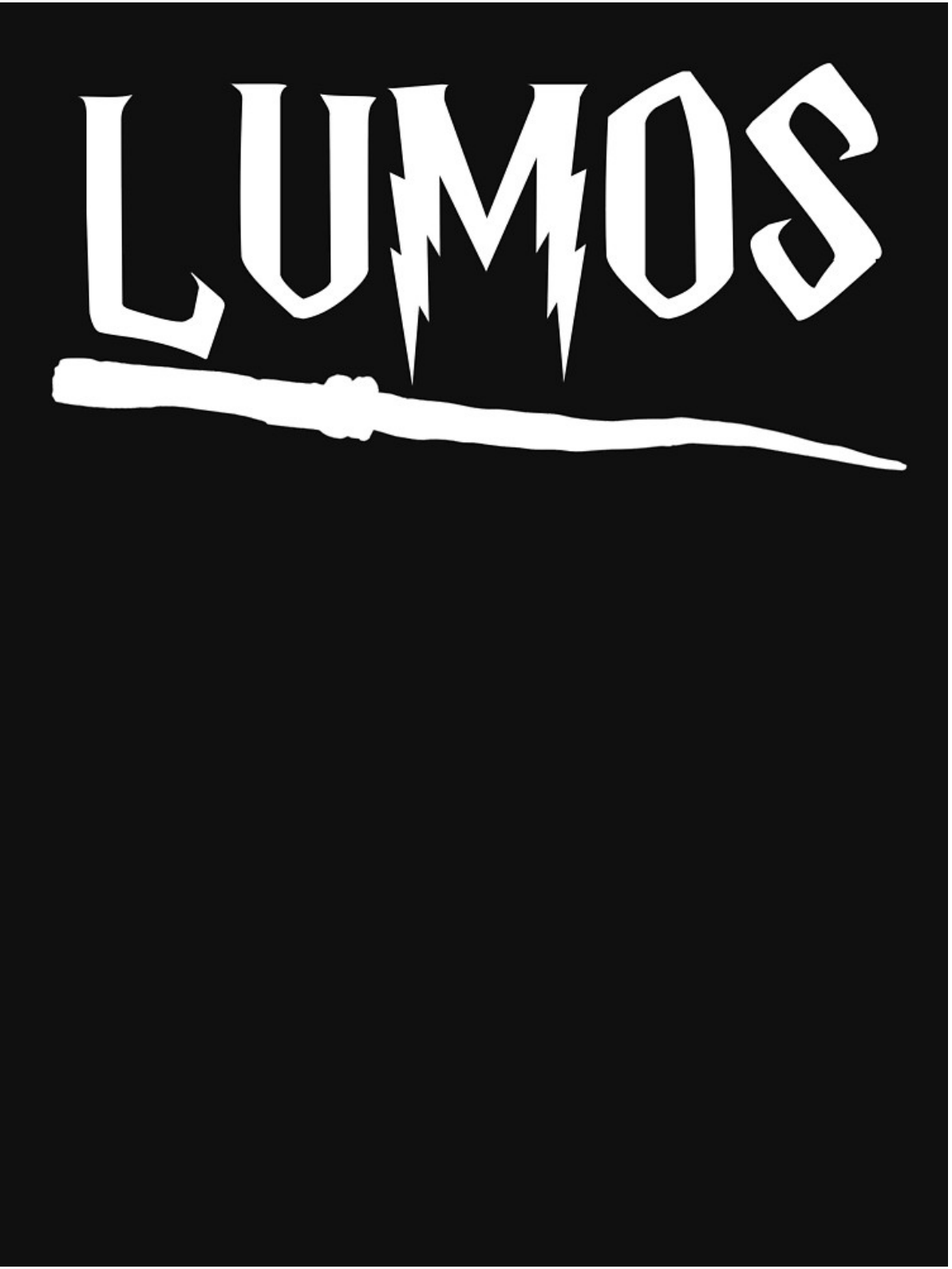

8.3%
Space Warps
Cell Slider
SETI Live
Andromeda
Old Weather
Solar Stormwatch
Moon Zoo
Ancient Lives
Cyclone Center
Bat Detective
NfN
Whale FM
MWP
7.5%
Serengeti
7.9%
Planet Four
10%
Galaxy Zoo
17%
Planet Hunters
27%

52 YEARS OF HUMAN EFFORT

JUNE 27, 2013 TTFNROB 3 COMMENTS

At ZooCon last week I spoke about the scale of human attention that the Zooniverse receives. One of my favourite stats in this realm (from Clay Shirky's book 'Cognitive Surplus') is that in the USA, adults cumulatively spend about 200 billion hours watching TV every year. By contrast it took 100 million hours of combined effort for Wikipedia to reach its status as the world's encyclopaedia.

In the previous year people collectively spent just shy of half a million hours working on Zooniverse projects. Better put, the community invested about 52 years worth of effort[1]. That's to say that if an individual sat down and did *nothing but classify on Zooniverse sites* for 52 years they'd only just have done the same amount of work as our community did between June 2012 and June 2013. The number is always rising too. Citizen science is amazing!



implications