

Communicating the Science of Boston Harbor & Islands

A Second Century Stewardship Workshop



September 2021
Schoodic Institute at Acadia National Park

How I got here...

2004 - 2018 – Science writer and adjunct instructor at University of Maine.

November 2018 – Joined Schoodic Institute and SCS team...

July 2019 – Designed and ran 2.5-day training for '18 and '19 fellows.

November 2019 – Designed and ran 2.5-day training for Pacific Region parks.

February 2020 – Designed and ran 2-day training for Northeast Region parks.

Additional workshops at Ecological Society of America, Society for Conservation Biology, Maine Coast Heritage Trust.



And you?

Draw a picture of yourself in a typical scene of communicating science.

“Strategic communication”

- 1) has a specific audience (WHO);
- 2) has a desired outcome, a change in knowledge, attitude, or behavior of the audience (WHAT, WHY);
- 3) uses methods that are appropriate to the audience and the goal (WHEN, WHERE, HOW).

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1. Organizational boards, members
2. Acadia visitors

1. Show that the organizations are working together.
2. Acadia is changing and science is important to understanding and managing for change.

1. Brochure format reaches older, dispersed audiences and visitors seeking information.
2. Publication = news.

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K-12 Science

- Earth Science (Grade 6)
- Life Science (Grade 7)
- Physical Science (Grade 8)
- 3 “lab” courses (Grades 9-12)

Next Generation Science Standards

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

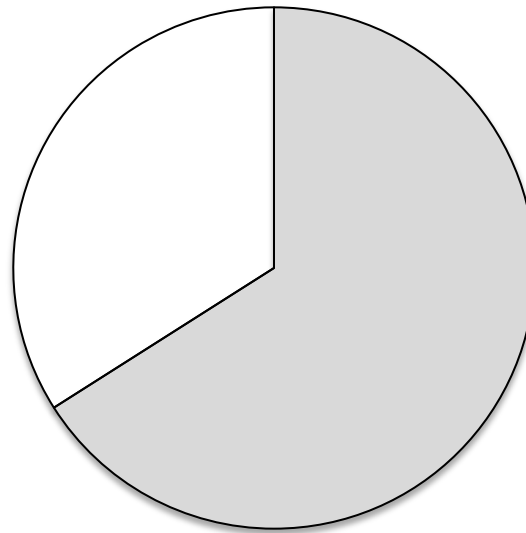
JILL BARSHAY

PROOF POINTS: Rural American students shift away from math and science during high school, study finds

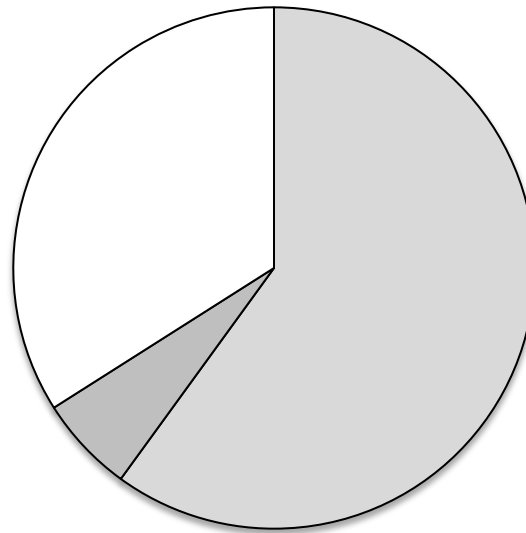
Lower math achievement, fewer course offerings and lower quality teachers block path to science

by JILL BARSHAY July 12, 2021

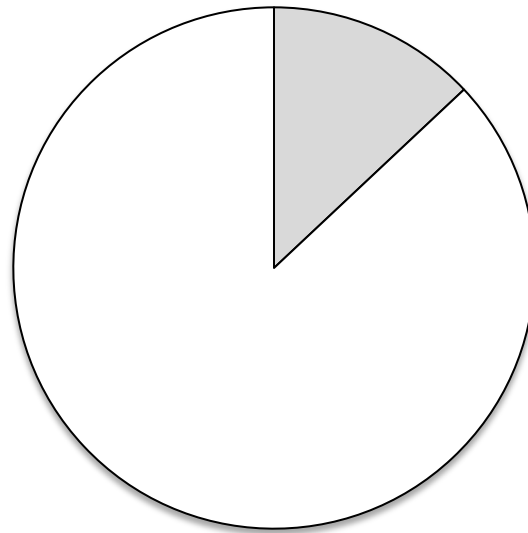




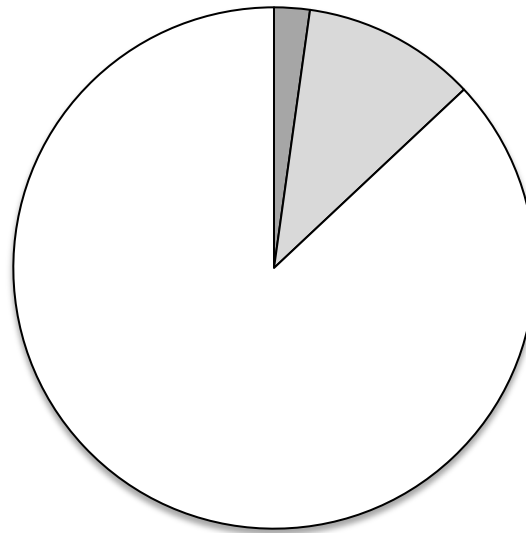
67% of high school
graduates go on to
college.



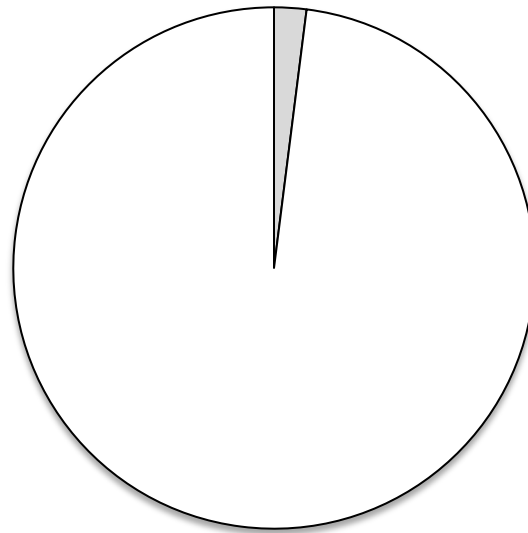
Fewer than 10% of college graduates major in biology or other natural science.



13% of U.S. adults
have a master's
degree.

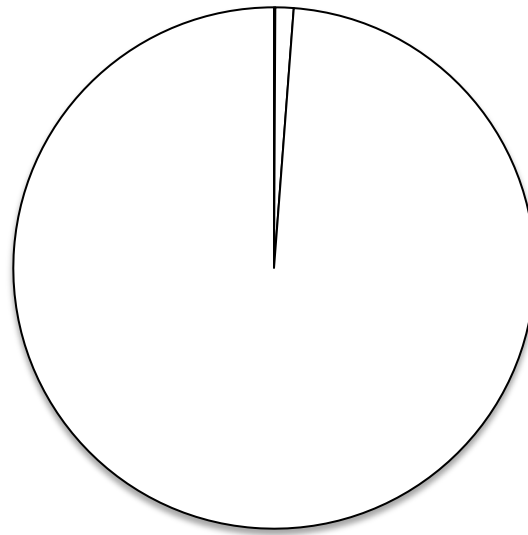


13% of U.S. adults have a master's degree...an only 17% of those in a stem field.



2 % of U.S. adults
have a Ph.D.

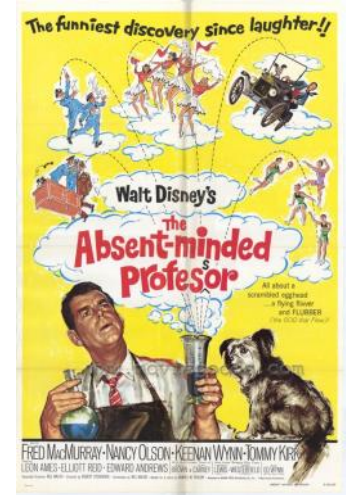
The Curse of Knowledge



2 % of U.S. adults
have a Ph.D....

Only 4% of Ph.D.s are
in biology.

Understanding your audience



“scientists are apt to be odd and peculiar people.”

Google search results for "researcher".

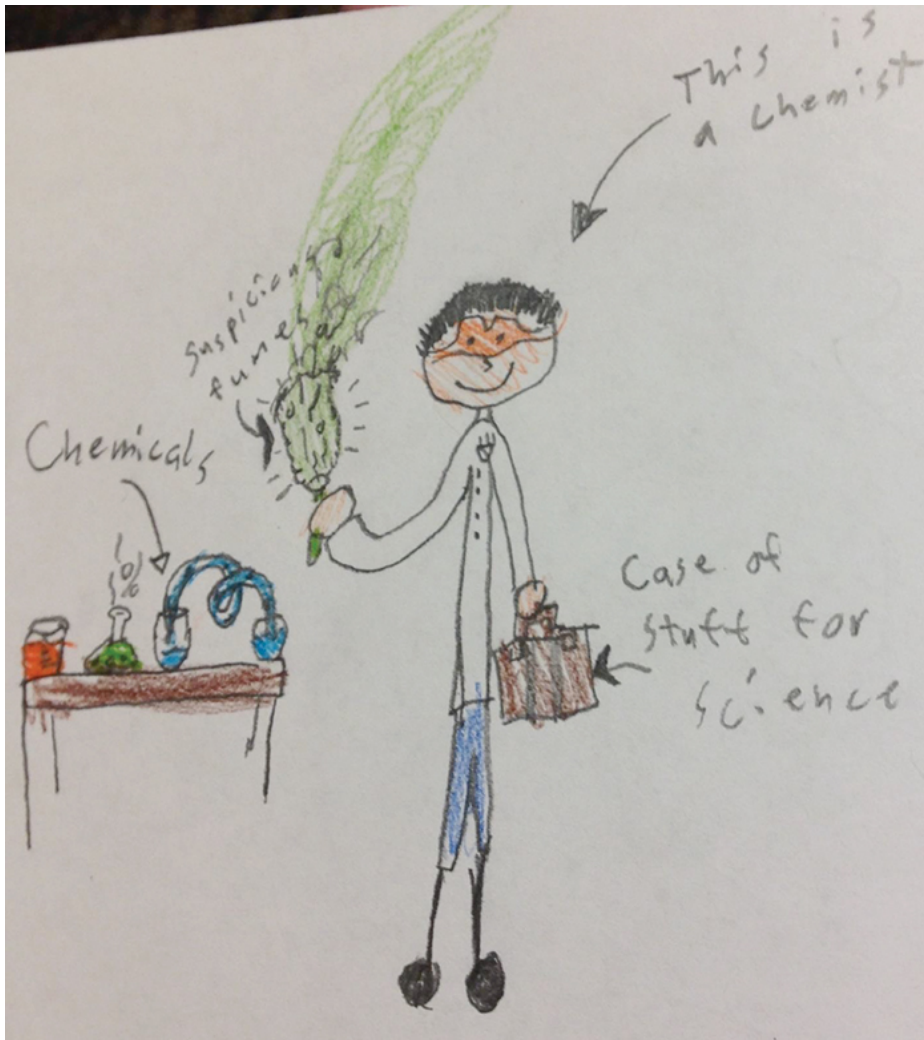
Search bar: researcher

Navigation: All, Images, News, Books, Videos, More, Settings, Tools

Filters: cartoon, clipart, animated, lab, student, science, male, computer, psychology, nurse

Results:

- TED Talks (ted.com)
- Researchers | Victoria University ... (vu.edu.au)
- How to Become a Professional Res... (work.chron.com)
- Nine Habits of a Highly Productive ... (stemcell.com)
- A Researcher's Lifestyle - J-Gate (jgateplus.com)



male

white

indications of danger

presence of lightbulbs

mythic stereotypes (mad, crazed)

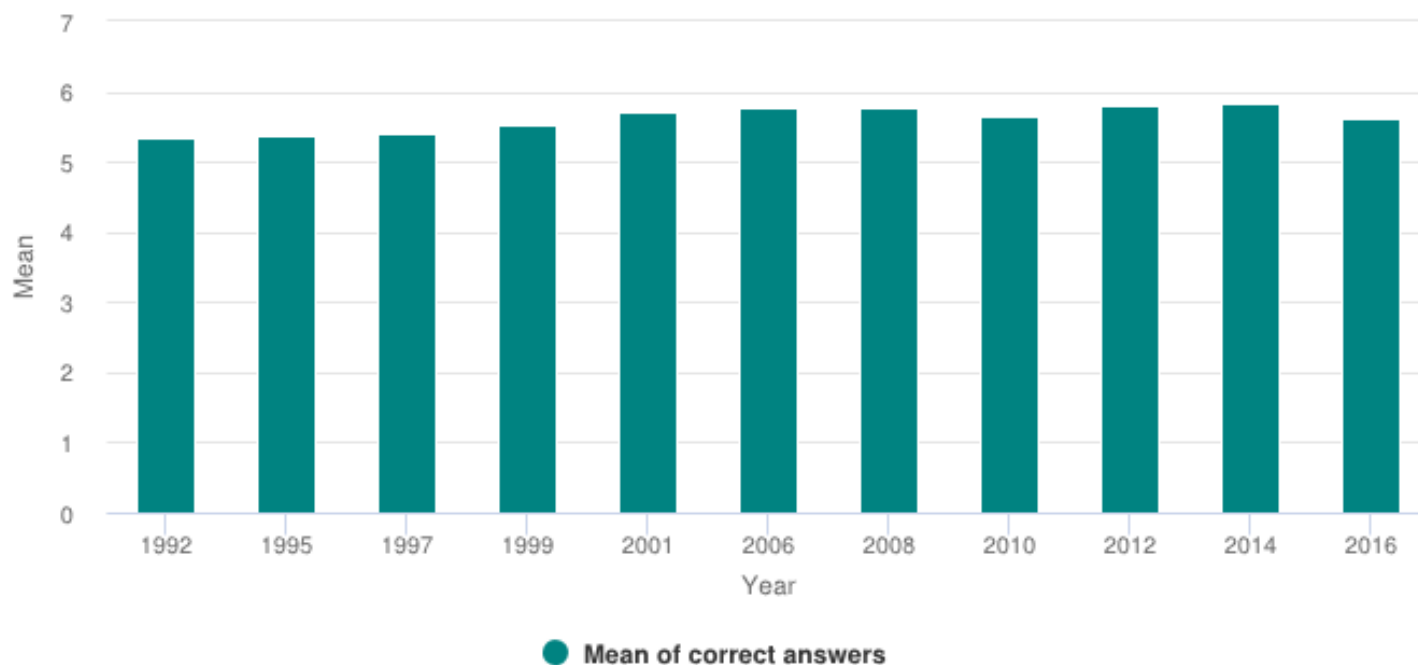
indications of secrecy

indoors

middle aged/elderly

Understanding your audience

Mean number of correct answers to questions asked by National Science Foundation as part of biennial *Science and Engineering Indicators*.



Note(s): Mean number of correct answers to nine questions included in trend factual knowledge of science scale; see Appendix Table 7-2 for explanation and list of questions. See Appendix Table 7-8 for percentage of questions answered correctly. See Appendix Tables 7-9 and 7-10 for responses to individual questions.

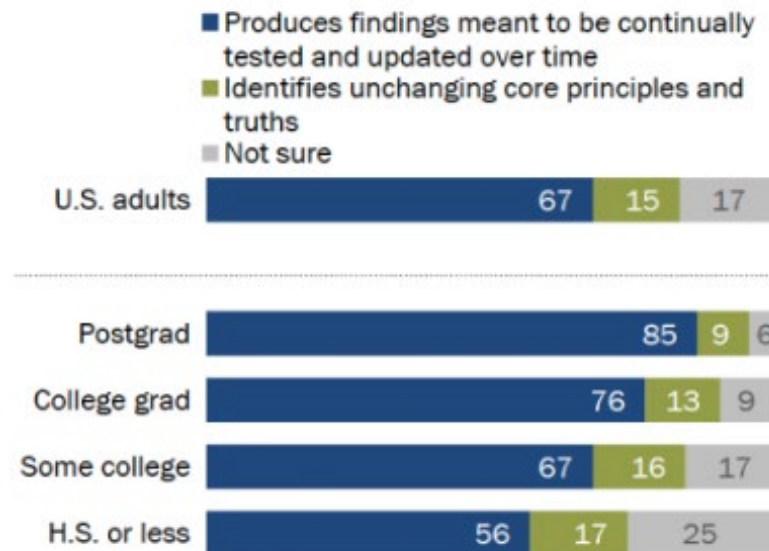
from NSF 2020:

- 24% of American adults know what it means to do a “scientific study.”

from Pew 2019:

67% of Americans see the scientific method as an iterative process

% of U.S. adults who say the scientific method ...



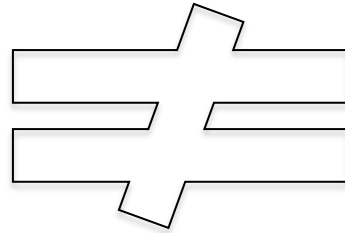
Note: Respondents who did not give an answer are not shown.

Source: Survey conducted Jan 7-21, 2019.

"What Americans Know About Science"

PEW RESEARCH CENTER

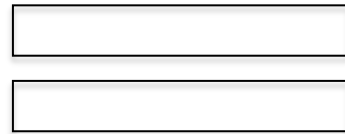
science



knowledge

(what we know)

science



process

(how we know it)



APPENDIX H – Understanding the Scientific Enterprise: The Nature of Science in the Next Generation Science Standards

Scientists and science teachers agree that science is a way of explaining the natural world. In common parlance, science is both a set of practices and the historical accumulation of knowledge. An essential part of science education is learning science and engineering practices and developing knowledge of the concepts that are foundational to science disciplines. Further, students should develop an understanding of the enterprise of science as a whole—the wondering, investigating, questioning, data collecting and analyzing. This final statement establishes a connection between the *Next Generation Science Standards* (NGSS) and the nature of science. Public comments on previous drafts of the NGSS called for more explicit discussion of how students can learn about the nature of science.

Understanding your audience



People care about the Earth.

A majority of voters say it is very important to protect drinking water quality (87%), protect oceans and fish (73%), and protect lakes, rivers, and streams (72%) (TNC 2018)

77 % of Americans are concerned about pollution of lakes, rivers, and streams (NSF 2018)

63 % of Americans worry a “great deal” about pollution of drinking water. (Gallup 2017)

62 % of Americans think we spend too little on environmental problems. (NSF 2016)

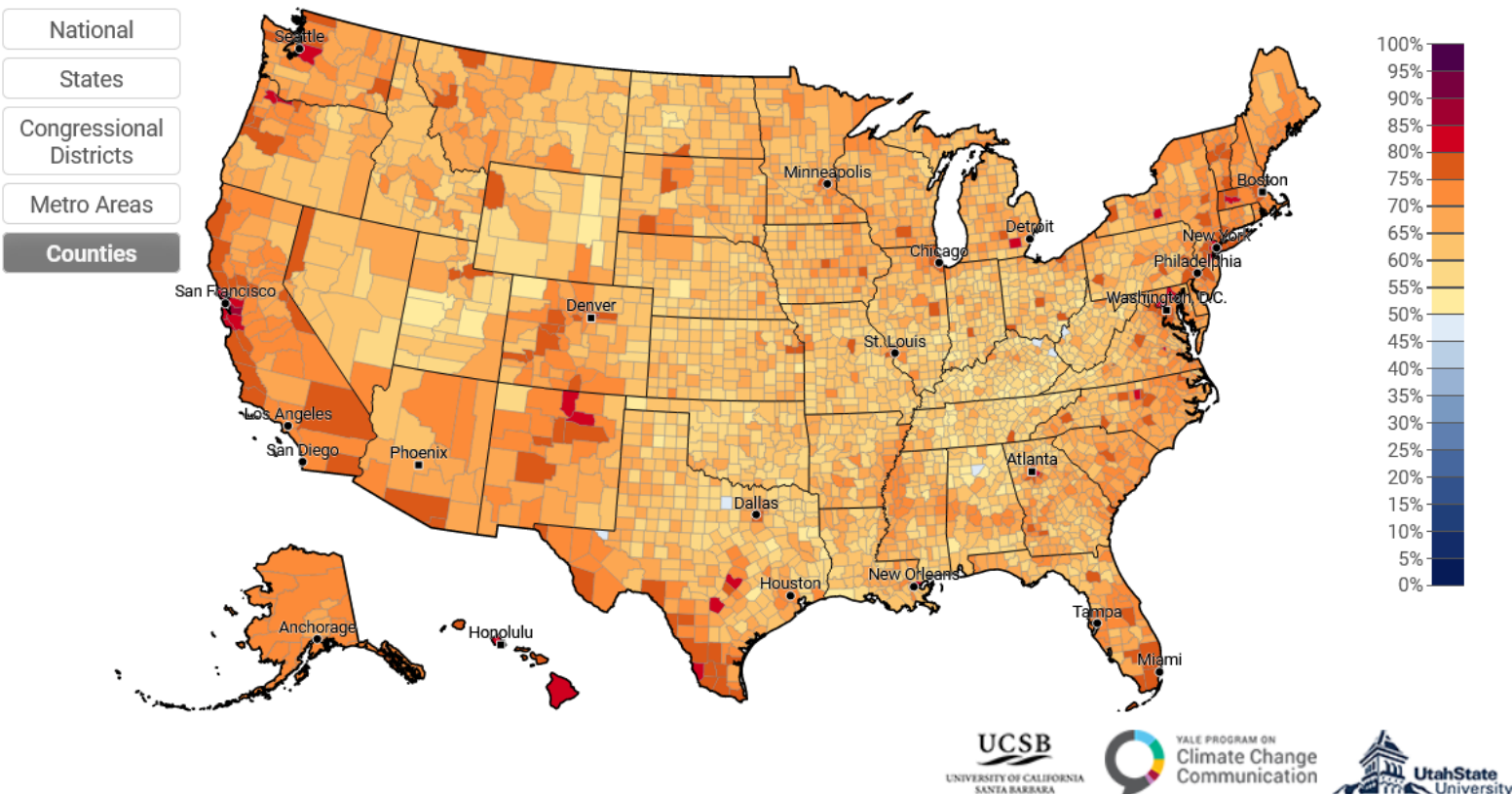
59 % of Americans think environmental regulations are worth the cost. (Pew 2016)



Estimated % of adults who think global warming is happening (72%), 2020

Select Question: Global warming is happening Absolute Value

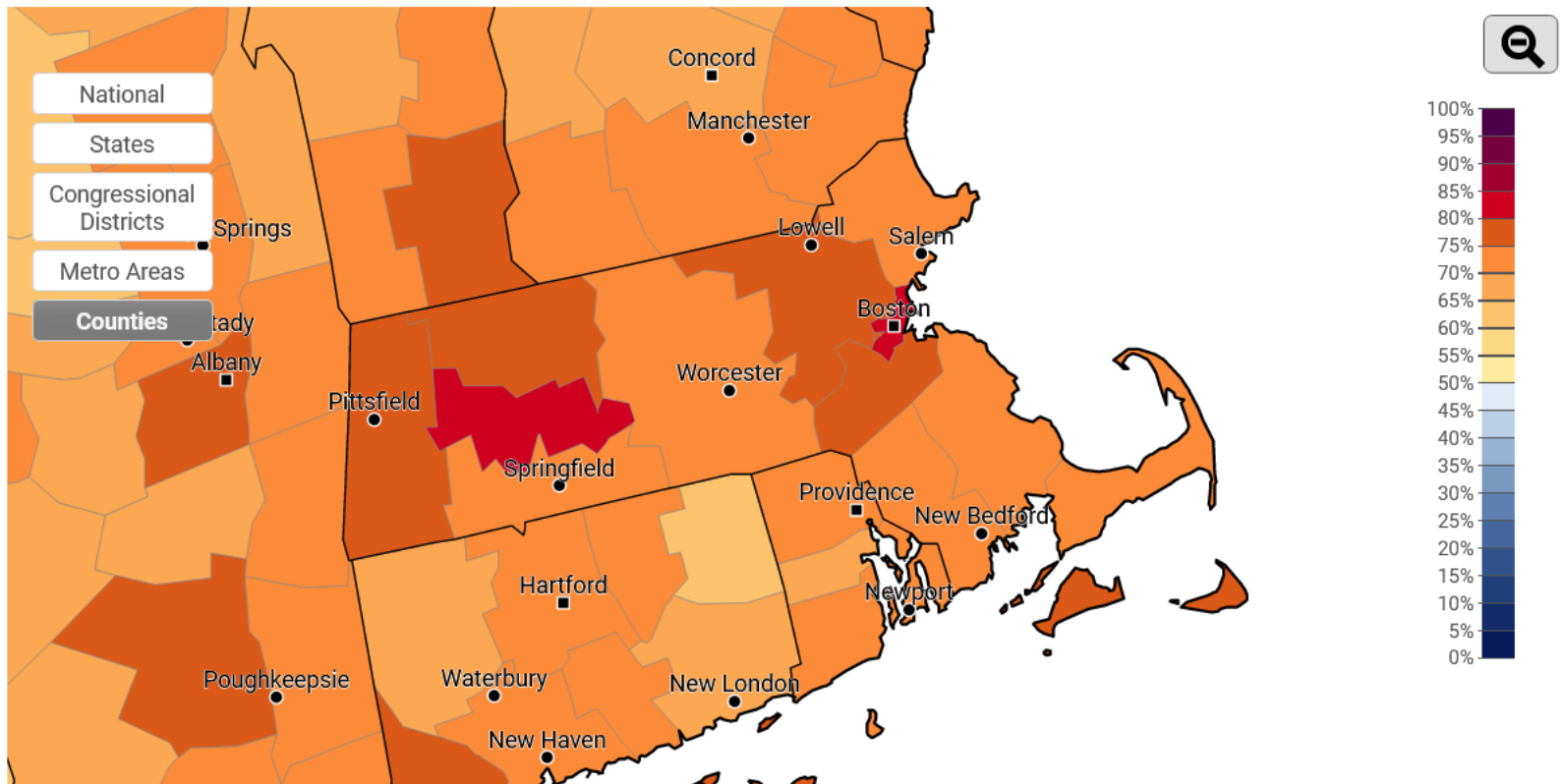
Click on map to select geography, or:



Estimated % of adults who think global warming is happening (72%), 2020

Select Question: Absolute Value

Click on map to select geography, or:



six americas

Alarmed

24%

Concerned

30%

Cautious

19%

Disengaged

5%

Doubtful

12%

Dismissive

10%

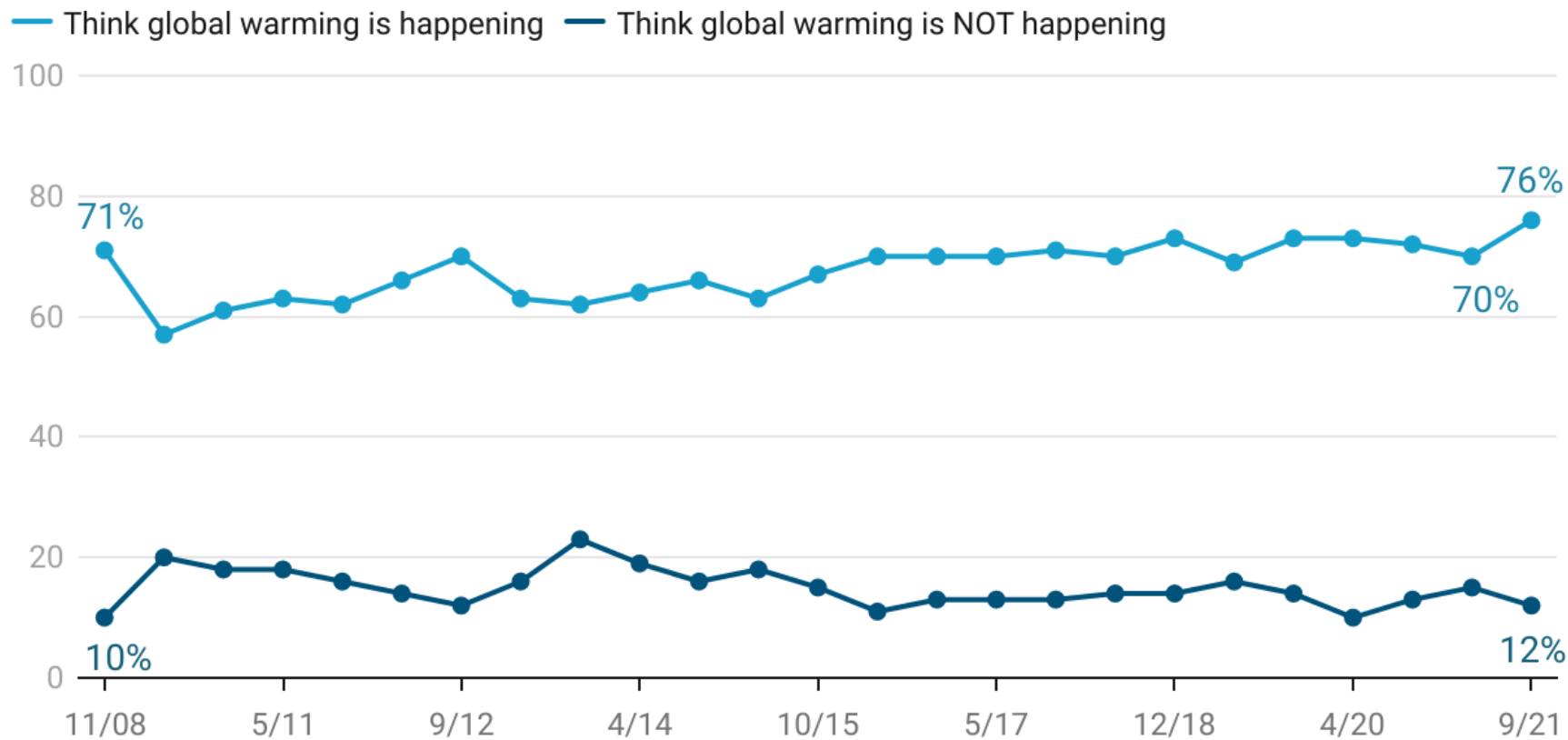
← Highest Belief in Global Warming
Most Concerned
Most Motivated

→ Lowest Belief in Global Warming
Least Concerned
Least Motivated

June 2017– March 2021
(Total cases = 8,322)



Americans' belief that global warming is happening has increased 6 points since March 2021



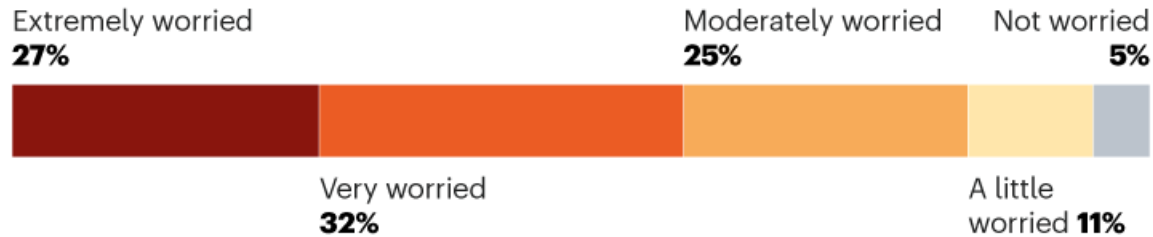
Do you think global warming is happening?

Chart: Sept. 2021, Yale/George Mason University • Created with Datawrapper

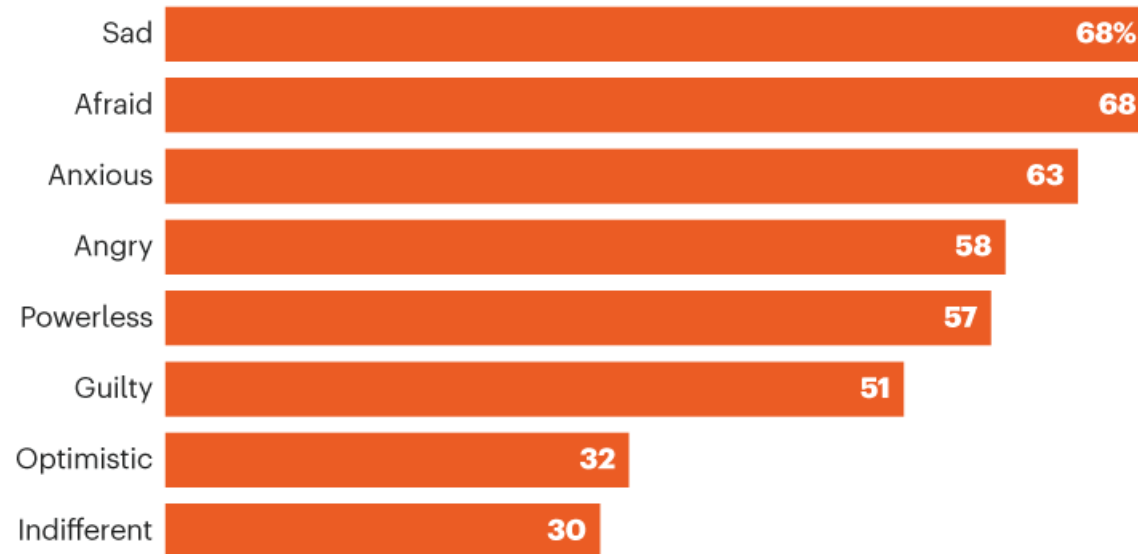
CLIMATE ANXIETY

A survey of 10,000 young people shows that negative feelings about climate change can cause psychological distress.

How worried are you about climate change?



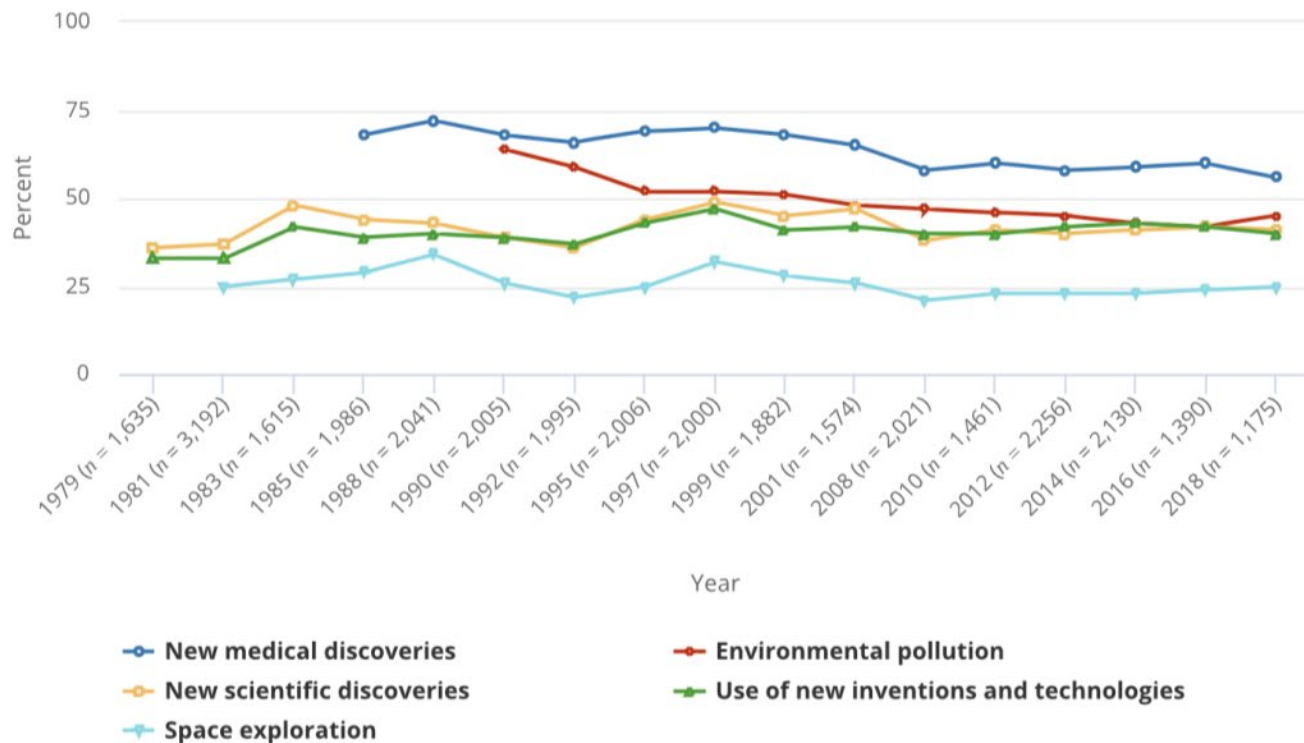
Climate change makes me feel...



Understanding your audience

People are interested in science.

Public interest in selected science-related issues: 1979–2018



Understanding your audience

People want more science stories!

TOPICS THAT READERS WANT TO READ MORE OF



TOPICS THAT READERS WANT TO READ LESS OF



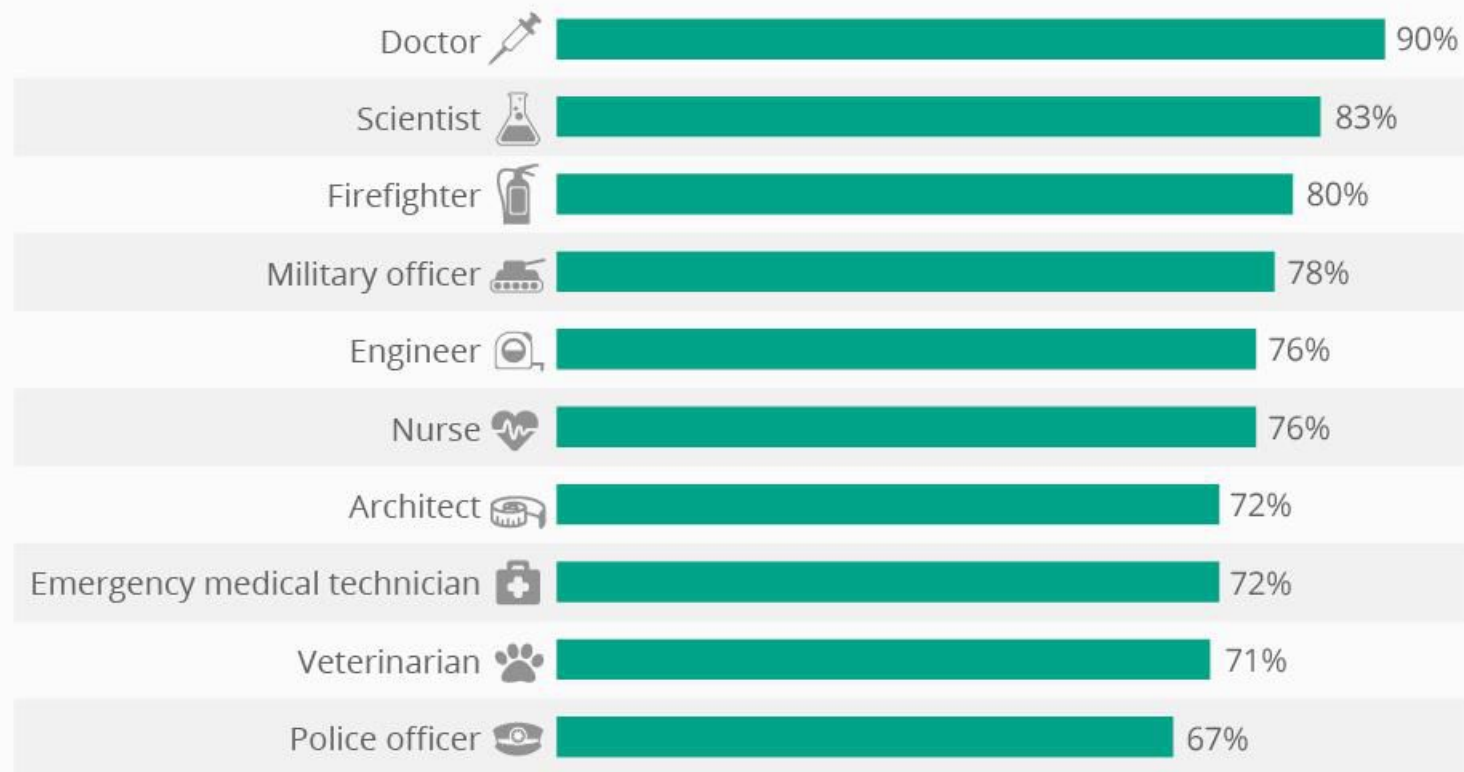
TOPICS READ THE SAME AMOUNT AS THEY WANT COVERED



People respect scientists.

The Most Prestigious Professions In America

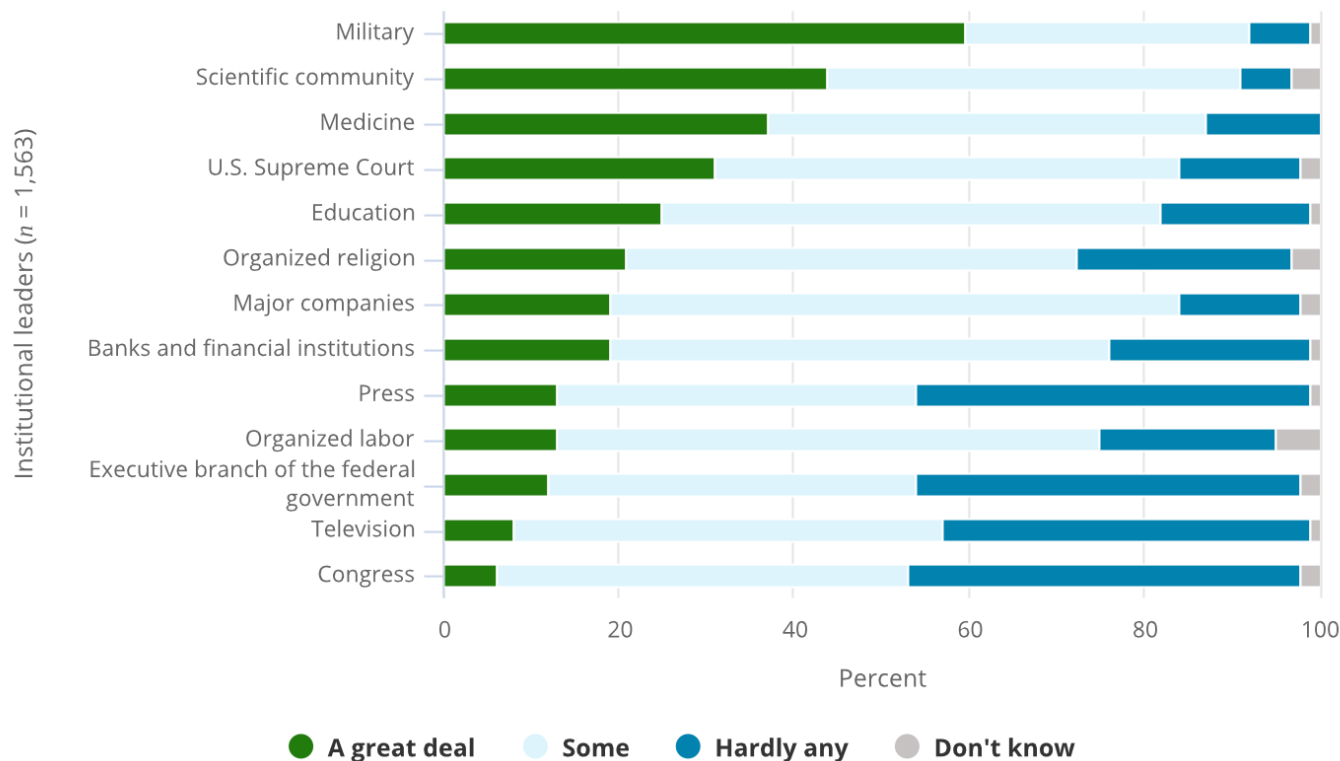
% of people finding the following occupations prestigious in 2016



Understanding your audience

People trust scientists.

Public confidence in institutional leaders, by selected institution: 2018



Note(s)

Percentages may not add to 100% due to rounding. Responses are to the following: *As far as the people running these institutions are concerned, would you say that you have a great deal of confidence, only some confidence, or hardly any confidence at all in them?* See Table S7-7.

Source(s)

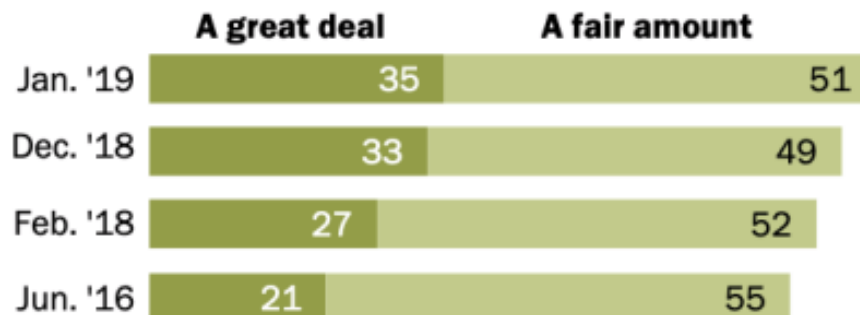
NORC at the University of Chicago, General Social Survey (2018).

Science and Engineering Indicators

People trust scientists.

Americans' confidence in scientists to act in the public interest up since 2016

% of U.S. adults who say they have ____ amount of confidence in scientists to act in the best interests of the public



Note: Respondents who gave other responses or who did not give an answer are not shown.

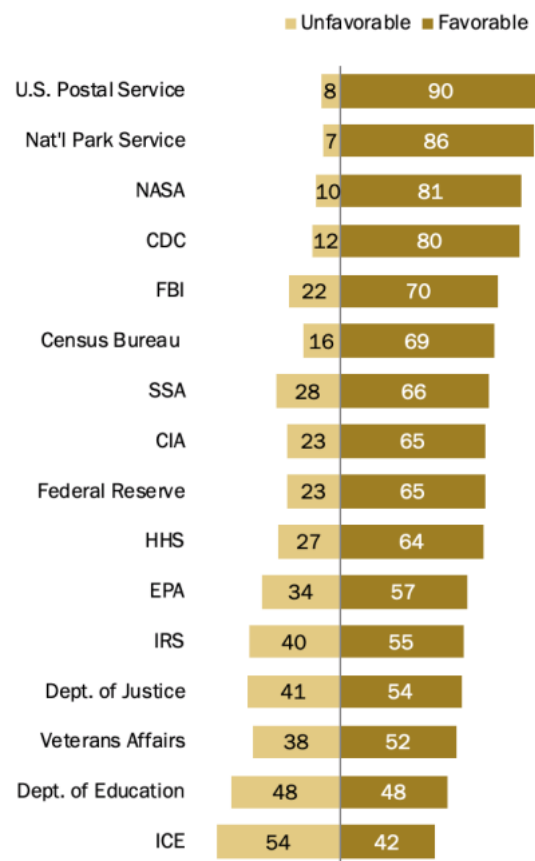
Source: Survey conducted Jan. 7-21, 2019.

"Trust and Mistrust in Americans' Views of Scientific Experts"

PEW RESEARCH CENTER

Public opinion varies across federal agencies; views of ICE still mixed

% who have a ____ opinion of each



Notes: Don't know responses not shown.

Source: Survey of U.S. adults conducted Sept. 5-16, 2019.

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Understanding your audience

People trust NPS (some of them, anyway).

Table 4. Average trust ratings by agency and political ideology.

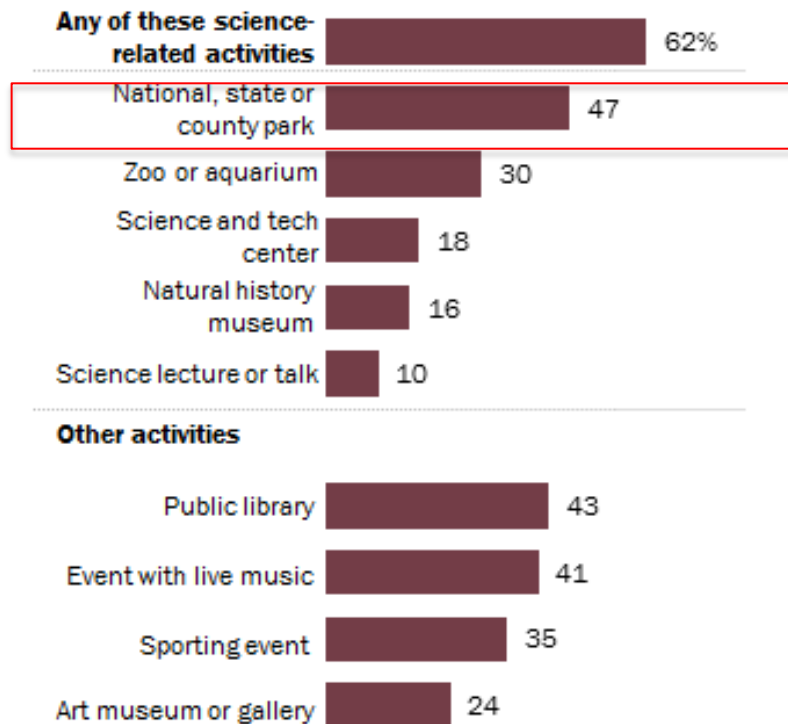
	Very liberal (A)			Moderate (B)			Very conservative (C)			Very conservative trust – Very liberal trust (C–A)	
	Rank	General science trust	Climate science trust	Rank	General science trust	Climate science trust	Rank	General science trust	Climate science trust	General science trust	Climate science trust
NASA	3rd	3.54	3.58	1st	3.38	3.20	1st	3.24	2.88	–0.30	–0.69
NOAA	1st	3.57	3.61	2nd	3.37	3.19	2nd	3.20	2.84	–0.38	–0.77
Smithsonian	2nd	3.57	3.61	3rd	3.24	3.06	8th	2.96	2.60	–0.62	–1.01
CDC	7th	3.41	3.45	4th	3.23	3.05	5th	3.07	2.72	–0.34	–0.73
NSF	6th	3.44	3.47	5th	3.19	3.01	7th	2.98	2.62	–0.46	–0.85
NPS	9th	3.28	3.31	6th	3.18	3.00	3rd	3.10	2.74	–0.18	–0.58
NIH	4th	3.46	3.50	7th	3.13	2.95	9th	2.85	2.49	–0.62	–1.01
USDA	8th	3.28	3.32	8th	3.12	2.94	6th	2.98	2.62	–0.30	–0.69
DOD	11th	2.98	3.01	9th	3.03	2.85	4th	3.08	2.72	0.10	–0.30
EPA	5th	3.45	3.49	10th	3.03	2.85	11th	2.67	2.31	–0.77	–1.17
DOE	10th	3.22	3.25	11th	2.97	2.79	10th	2.76	2.40	–0.46	–0.85
Average		3.38	3.42		3.17	2.99		2.99	2.63	–0.39	–0.79

NASA: National Aeronautics and Space Administration; NOAA: National Oceanic & Atmospheric Administration; CDC: Centers for Disease Control & Prevention; NSF: National Science Foundation; NPS: National Park Service; NIH: National Institutes of Health; USDA: Department of Agriculture; DOD: Department of Defense; EPA: Environmental Protection Agency; DOE: Department of Energy.

Agencies ordered by rank for respondents with moderate political ideologies; table entries are model-based means controlling for age, education, gender, income, race, and church attendance. Furthermore, entries are the average of trust scores between the two different orders of questions.

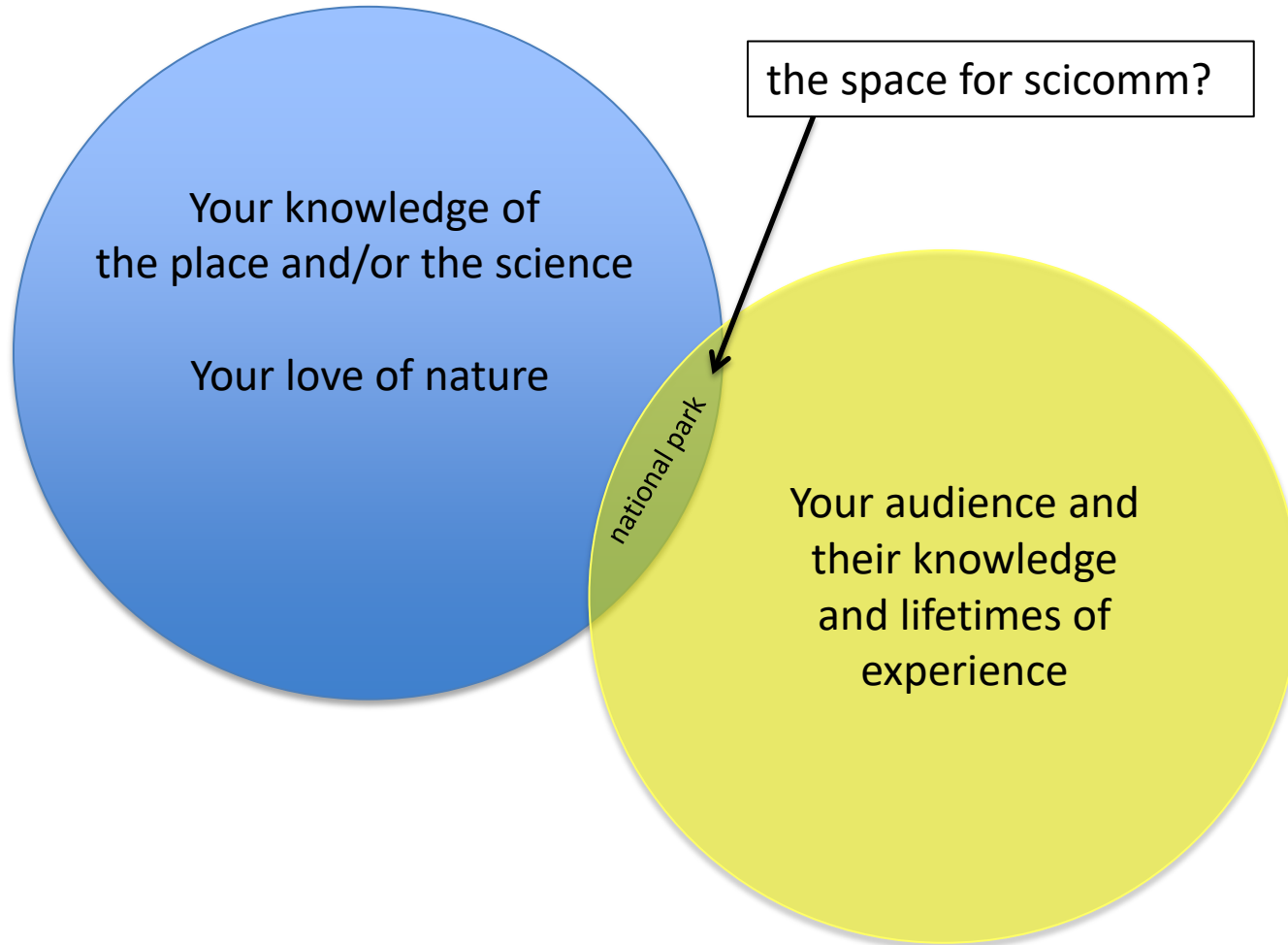
Most Americans have visited a park or other informal science venue in the past year

% of U.S. adults who say they have gone to each of the following in the past year



Note: Respondents who did not give an answer are not shown.
Source: Survey conducted May 30-June 12, 2017.
"Science News and Information Today"

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Understanding your audience



Audience Discussion Questions

Who is your target audience?

What does your audience know, think, feel about Boston Harbor & Islands, your subject, or science in general?

Why might Boston Harbor & Islands be an ideal place to encounter science?

What do you have in common with your audience?

Understanding your purpose

Suggestions of “purpose”?

How to effectively engage young people in citizen/community science programs...**and to inspire them to independently seek out opportunities.**

Identify tactics to better communicate internally and with audiences we seek to reach.

Gain an understanding of story telling with Indigenous perspectives in mind.

Identify the key content and messages that can be relevant to various local areas around Boston Harbor.

How to get community members and students involved with the research

How to communicate our park's research to students in middle grades.