USGS
science for a changing world

Blending art and science to communicate about water

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Science Communicator for the U.S. Geological Survey Water Resources Mission Area

Henry's Fork Foundation Summer Seminar Series

June 14, 2023

U.S. Department of the Interior
U.S. Geological Survey

~~Scientist~~ Science Communicator

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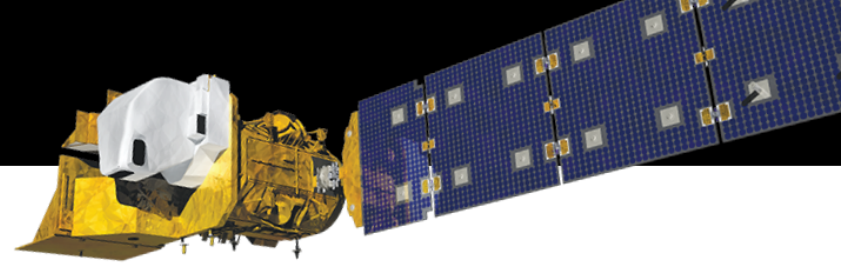
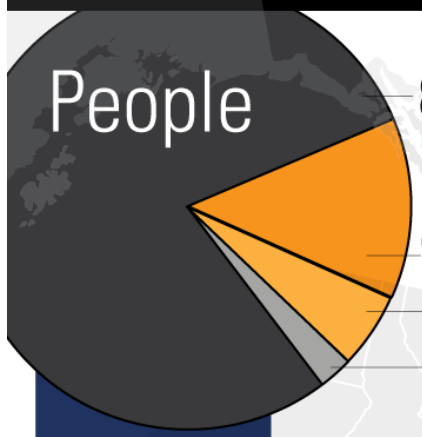
USGS by the Numbers



People



8,190 Employees

1,356 Contractors

564 Emeriti

257 Volunteers

487 Laboratories

Locations

405 Facilities

In all 50 states and 2 territories (Guam and Puerto Rico)

68 Science Centers *(7 Regions)*

22 Programs *(5 Mission Areas)*

10 Climate Adaptation Science Centers
1 National - 9 Regional

Science and Monitoring

165,000+ Publications (since 1879)

54,000 7.5-minute Quadrangles (Topographic Maps)

200 Threatened/Endangered Species Studied

25 Active Patents (85 since 1996)

1 Research Reactor

~20,000 USGS-operated Groundwater Wells in U.S. to Deliver and Monitor Water Levels and Water-quality Data

11,500+ USGS-operated Streamgages

3,800+ USGS-operated Earthquake Sensors in U.S.

~70 U.S. Volcanoes Directly Monitored of 161 Considered Active

14 Geomagnetic Observatories

3 Satellites

150M Remotely-sensed Data Products Distributed (including Landsat)

100% Interferometric Synthetic Aperture Radar (IfSAR) Data Collected in Alaska

89.5% National Coverage of 3DEP High-resolution Elevation Data

55%+ U.S. Coverage of Geologic Maps (Detailed to Intermediate Scale)

171 Geologic Provinces USGS Assesses for Undiscovered Oil and Gas Resources

~100 Mineral Commodities for which USGS Collects National Data for 180 Countries

Partnerships

4,300 Partners/Cooperators

4,675 Contracts (FY21)

41 Cooperative Research Units

54 Water Resources Research Institutes

Funding

$1.49B FY23 Appropriated

$587M FY22 Reimbursable

$309M FY22-23 Bipartisan Infrastructure Law

$42M Disaster Supplemental (no year)

$23.5M Inflation Reduction Act (over 10 years)

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March 2023

Communication to the rescue

"Effective communication is an essential part of science for at least two reasons. First, if nobody hears about your work, you might as well have never done it. And second, especially in today's world, if you don't communicate your research effectively, there are many people around who will communicate it for you, and when they do, it will probably be skewed in order to support whatever agenda they have."

Randy Olson, Don't Be Such a Scientist

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“Tell better stories – and tell stories better.”

USGS Unified National External Communications Framework, 2022

Storytelling 101

And, But, Therefore (ABT) template:

(_____) AND (_____),
BUT (_____),
THEREFORE (_____).

Randy Olson, Houston, We Have a Narrative

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The world is full of brilliant scientists **AND** their science is important for all kinds of societal needs,

BUT they don't always know how to communicate effectively about their work,

THEREFORE we need science communicators who can tell people about their science in a way that is engaging and easy to understand.

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What's your ABT?

(_____) AND (_____),
BUT (_____),
THEREFORE (_____).

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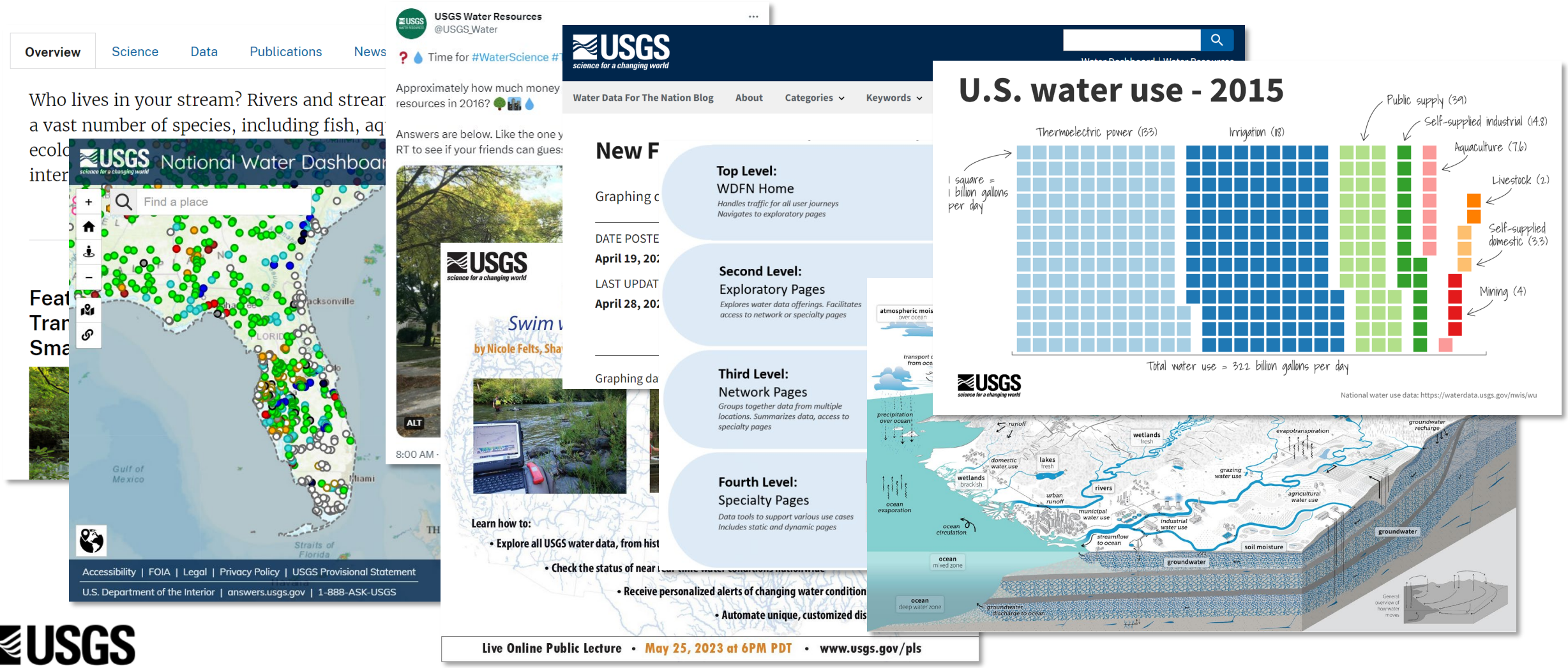
Translator's toolkit



Tool #1: Web content

Clear

Concise

Compelling

Tips and tricks at
www.plainlanguage.gov

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Plain language editing

Original:

"The Proxies Project is a four-year effort (Federal fiscal years 2021-2024) focused on developing models and technical approaches to better estimate concentrations and/or assess risk associated with three contaminant classes: harmful algal blooms (HABs), per- and polyfluoroalkyl substances (PFAS), and a suite of 12 elements of concern (EoC)."

Edited:

"The Proxies Project is a series of studies to improve our understanding of hazardous contaminants in water. These studies develop models and technical approaches for estimating concentrations and assessing risk for three types of contaminants:

- harmful algal blooms (HABs)
- per- and polyfluoroalkyl substances (PFAS)
- 12 elements of concern (EoC)"

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Original:

“For the purposes of this project, a ‘proxy’ (also known as a ‘surrogate’) is defined as measurement or model of a constituent or process that is a substitution (or set of substitutions) for the constituent or process of interest.”

Edited:

“A ‘proxy’ (also known as a ‘surrogate’) is a measurement or model of one thing that helps us understand some other thing that we’re interested in.”

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Tool #2: Social media

USGS Water Resources @USGS_Water · May 3

🎉 #USGSTeamTakeover 🥳

Hi, I'm Amy McHugh! I'm a #hydrologist with the @USGS, and I was recently appointed as the Deputy Delaware River Master.

1 2 24 1,257

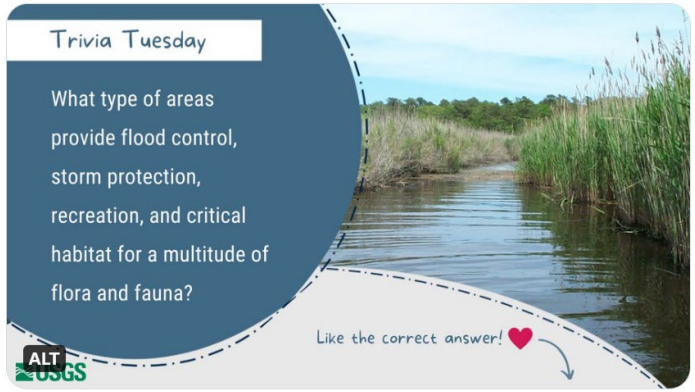
USGS Water Resources @USGS_Water · May 9

❓💧 Time for #WaterScience #TriviaTuesday!

What type of areas provide flood control, storm protection, recreation, and critical habitat for a multitude of flora and fauna?

Answers are below. Like the one you think is correct.

RT to see if your friends can guess correctly!



1 2 5 1,093

USGS Water Resources
@USGS_Water

📢 It's the moment you've all been waiting for:
For @USGS_KS, it's the dam gage, Kansas River at Lawrence, KS [crowd roars]

For @USGS_SAWSC, it's the treehouse gage, Pee Dee River at Bucksport, SC [crowd cheers]

Let the #GageGreatness FINAL begin! 🌟 Learn more and vote 👇

11:04 AM · Apr 3, 2023 · **32.1K** Views

15 Retweets **13** Quotes **30** Likes

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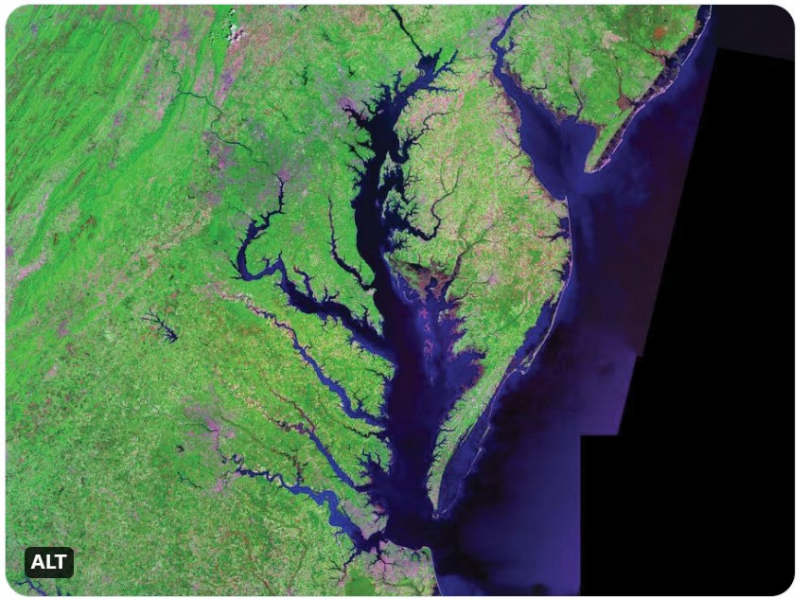
Key takeaway FIRST

USGS Water Resources @USGS_Water · Apr 5, 2022

❕ **New @USGS Study**📘

Using statistical and 3-D numerical modeling, @USGS scientists have found that nitrogen reductions have decreased Chesapeake Bay hypoxia (areas of low oxygen that can cause 'dead zones' that kill aquatic life) from 2016-2019.

pubs.er.usgs.gov/publication/70...
1/5



1 8 23

Background & methods SECOND

USGS Water Resources @USGS_Water · Apr 5, 2022

Seasonal hypoxia is a characteristic feature of the Chesapeake Bay due to human nutrient input from agriculture and urbanization throughout the watershed. Hypoxia causes negative effects on wildlife, ecosystems, and our economy. 2/5

1 1

USGS Water Resources @USGS_Water · Apr 5, 2022

Since 1985, coordinated management efforts have reduced nutrient inputs to the Bay, but summer oxygen concentrations still frequently fail to meet critical water-quality standards, leaving resource managers to question the effectiveness of the reduction efforts. 3/5

1 2

USGS Water Resources @USGS_Water · Apr 5, 2022

This study tested the success of nutrient reduction by modeling how much worse the hypoxia would have been if no reductions had been implemented. It found that, due to the reductions, seasonal hypoxia was shorter and smaller, and the Bay is more resilient to climate change. 4/5

1 1 2

USGS Water Resources @USGS_Water · Apr 5, 2022

Although these results show that efforts to reduce hypoxia have improved ecosystem health in the Bay, the continued occurrence of seasonal hypoxia indicates that more reductions are still needed to protect the Bay's living resources. 5/5

end/🧵

1 2

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USGS Water Resources
@USGS_Water

#WinterIsComing - Get ready to see some salty roads... and some salty streams.

The salts we use to deice our roads negatively impact water quality and the lives of stream organisms. So USGS scientists are researching alternatives like permeable pavement...

🧵

De-icing salt used on roads **impairs nearby water quality and stream health**, prompting USGS scientists to research alternative solutions.

Read the paper:
ALT doi.org/10.3390/w13243513

USGS

3:29 PM · Dec 9, 2022

6 Retweets **4** Quotes **19** Likes

USGS Water Resources
@USGS_Water

Reducing the use of deicers is 1 way green infrastructure can help water quality & availability.

Check out this other USGS study w/ video on how green stormwater practices can reduce runoff, increase streamflow, & improve stream health: usgs.gov/centers/chesap...

end/🧵

Green infrastructure like permeable pavement can be an **effective solution to water quality & quantity issues** like stormwater management.

Read the paper:
ALT i.org/10.3390/w13243513

USGS

3:29 PM · Dec 9, 2022

1 Retweet **3** Likes

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USGS Water Resources @USGS_Water · Nov 30, 2022

Wetlands store less carbon than we thought.

How do we know this, and what does this mean?

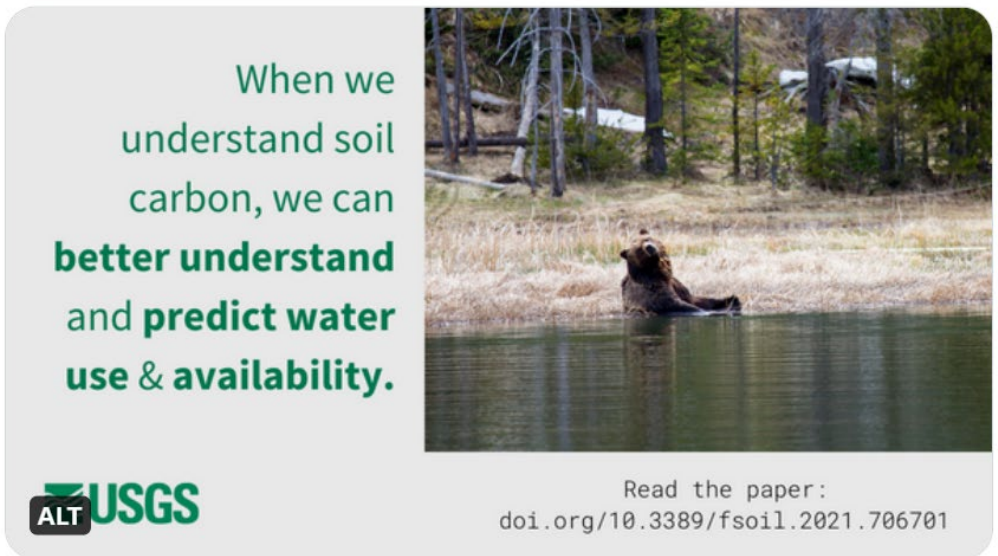
A thread 🧵

1 14 47

USGS Water Resources @USGS_Water · Nov 30, 2022

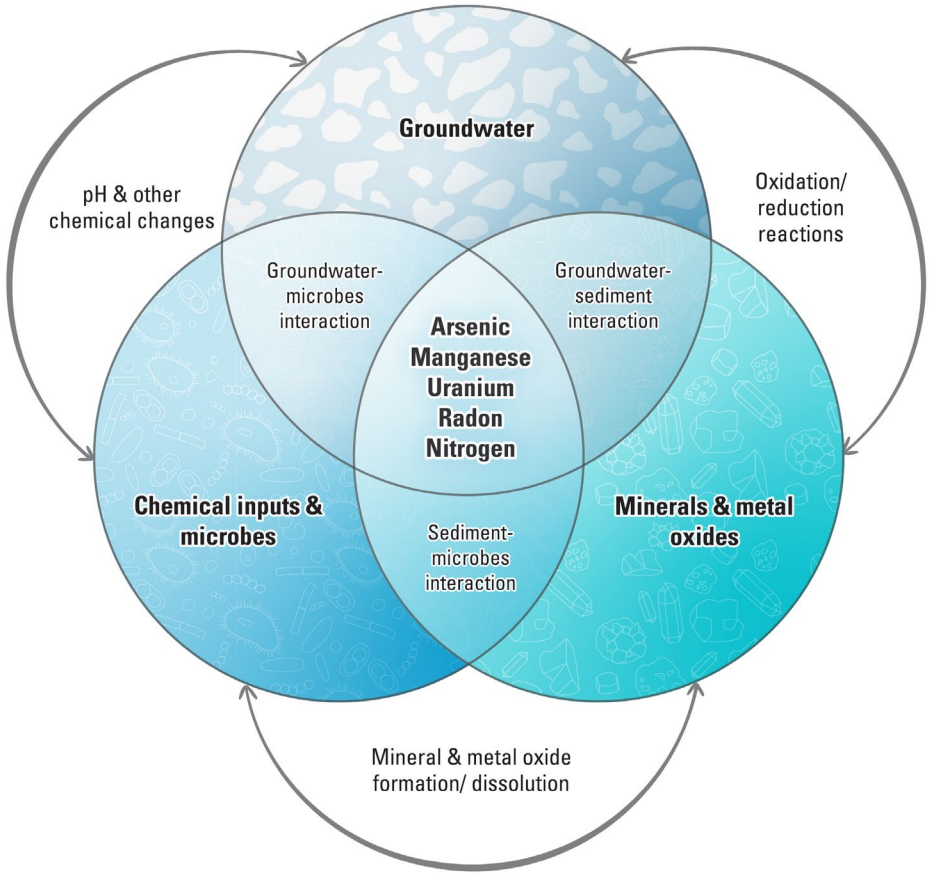
More accurate estimates of SOC storage mean more accurate models of water storage, water quality, & ecosystem resilience 👏👏👏

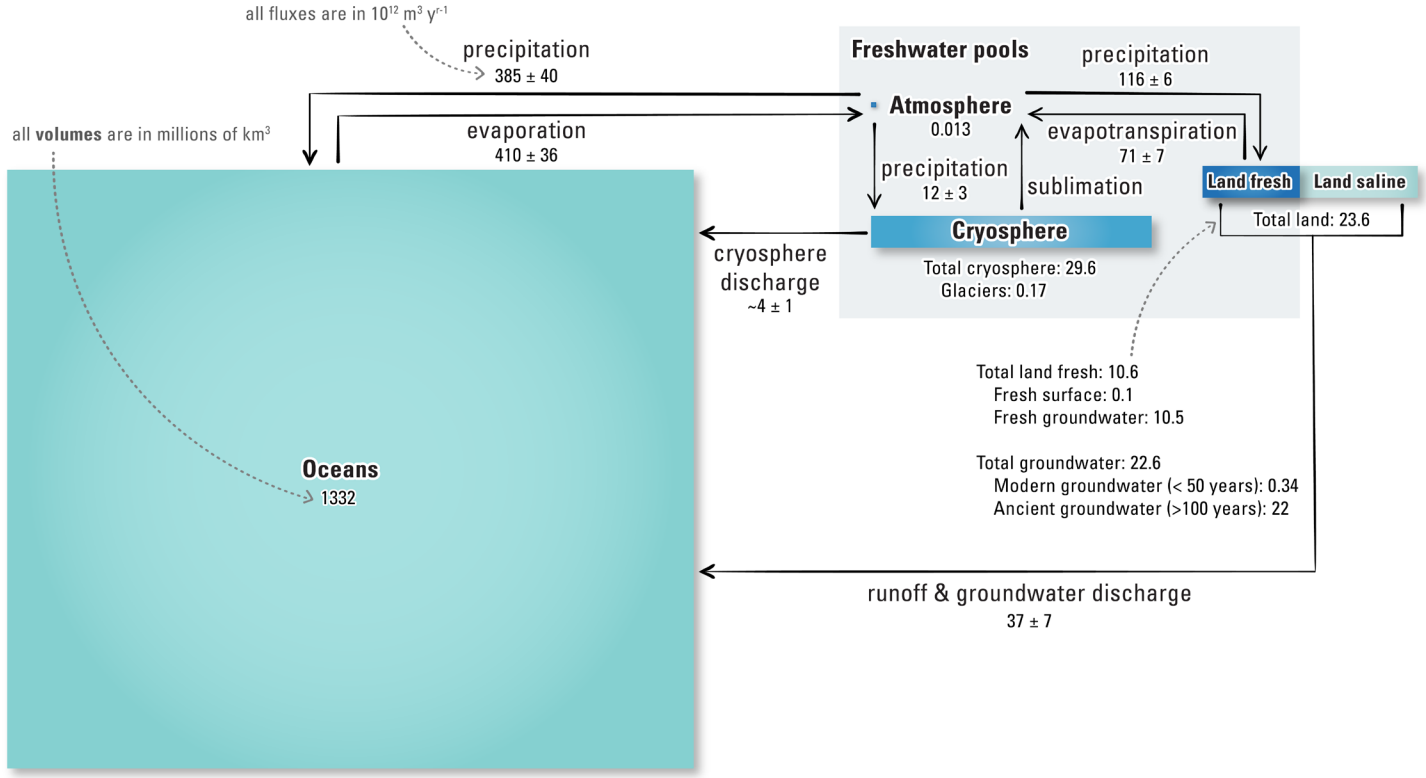
Read the study: doi.org/10.3389/fsoil....
Access the data: doi.org/10.5066/P9H1PI...



1 1 7

Tool #3: Visuals





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U.S. Geological Survey knows **water**

USGS **Water Mission Area** and **Water Science Centers** work together to...

observe
all parts of the water cycle

understand
the water cycle as it relates to water quality and quantity

predict
changes to water availability

deliver
water information to the public, decision makers, and the scientific community






Learn more by visiting us online at **usgs.gov/wma** and following us on social media

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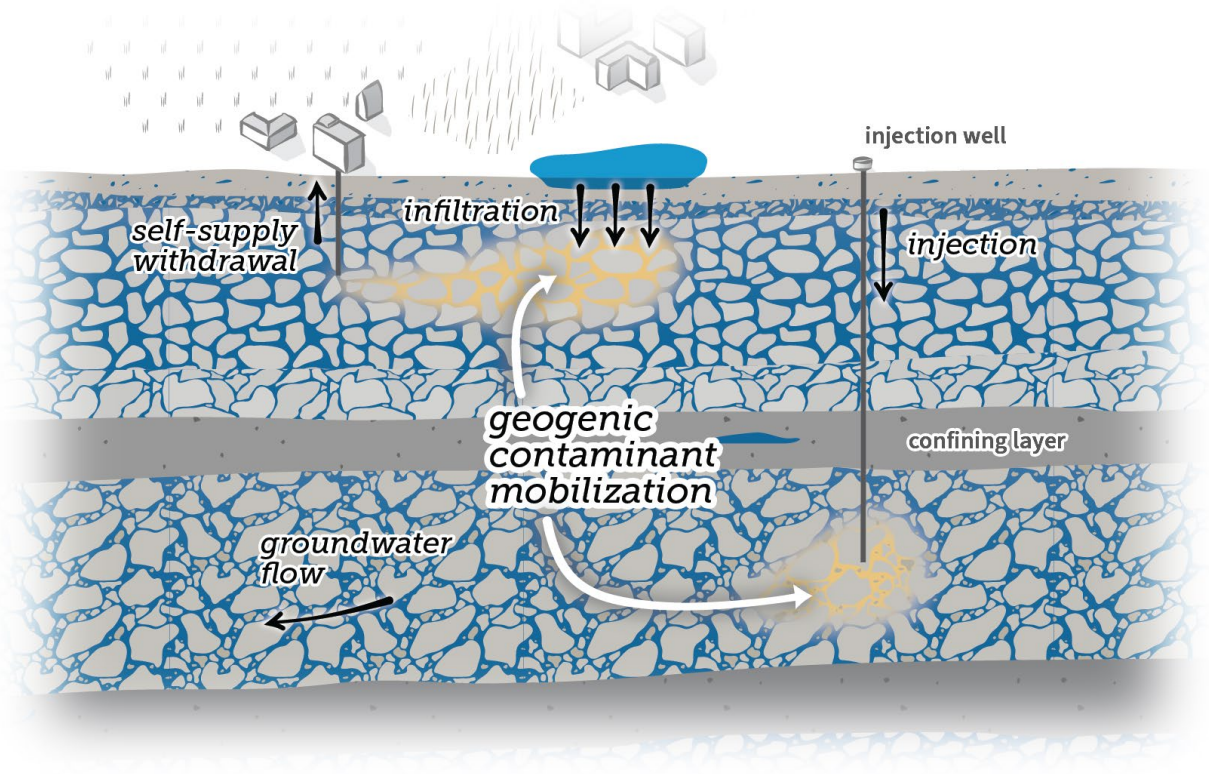
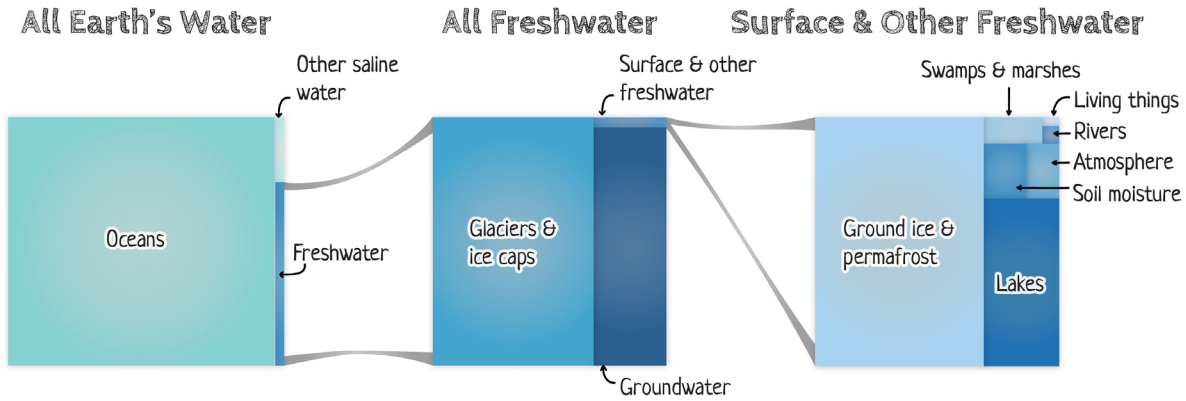

injection well
self-supply withdrawal
infiltration
injection
geogenic contaminant mobilization
confining layer
groundwater flow

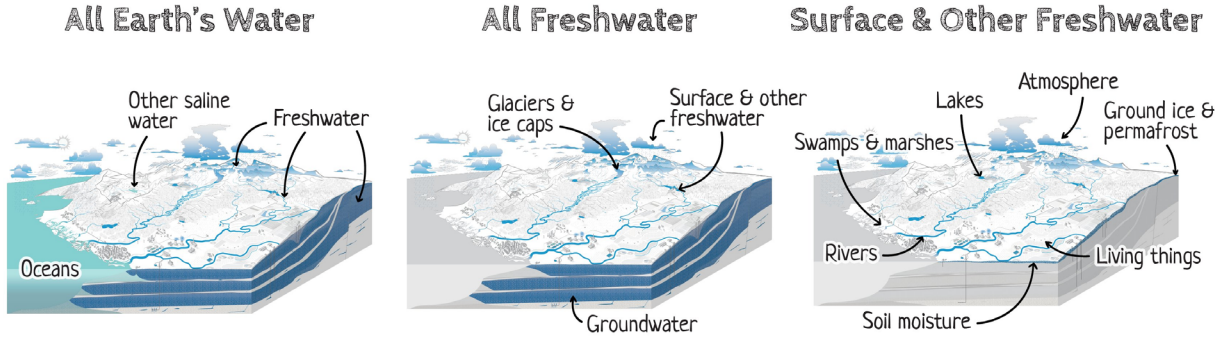
Where's Earth's water?

Where's Earth's water?



USGS science for a changing world
Created by Mandie Carr, USGS
Data: Shiklomanov, I. 1993. "World fresh water resources," in Gleick, P.H. (Ed.), Water in crisis: A guide to the world's fresh water resources. Oxford University Press. ISBN 9780195076288

Where's Earth's water?



USGS science for a changing world
Created by Mandie Carr, USGS. Water cycle diagram by Corson-Dosch, H., et al., USGS, https://doi.org/10.3133/gip221
Data: Shiklomanov, I. 1993. "World fresh water resources," in Gleick, P.H. (Ed.), Water in crisis: A guide to the world's fresh water resources. Oxford University Press. ISBN 9780195076288

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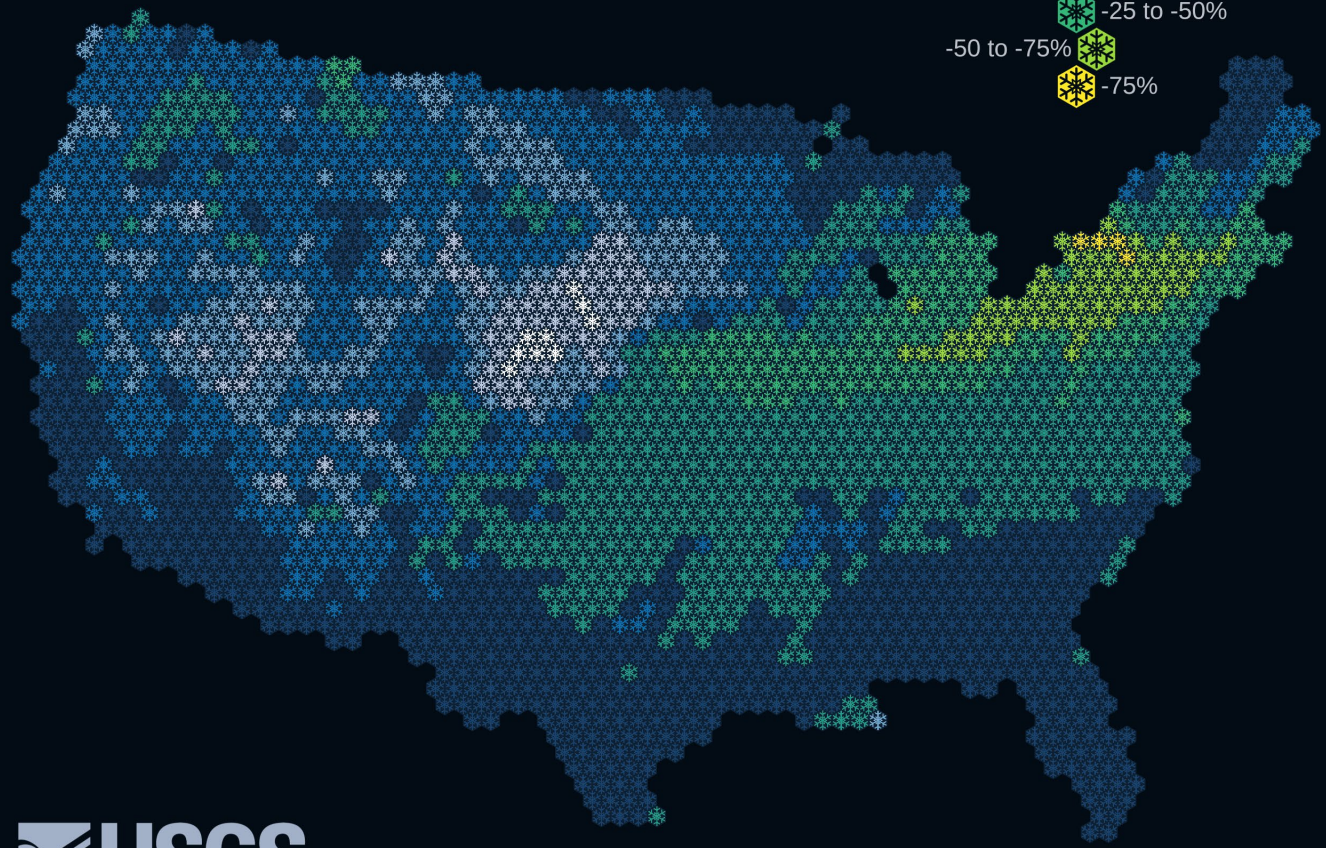
February 2023 Relative Snow Covered Area

Monthly snow covered area compared to 20-year average (2003-2022)



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MODIS Data from: doi.org/10.5067/MODIS/MOD10CM.061

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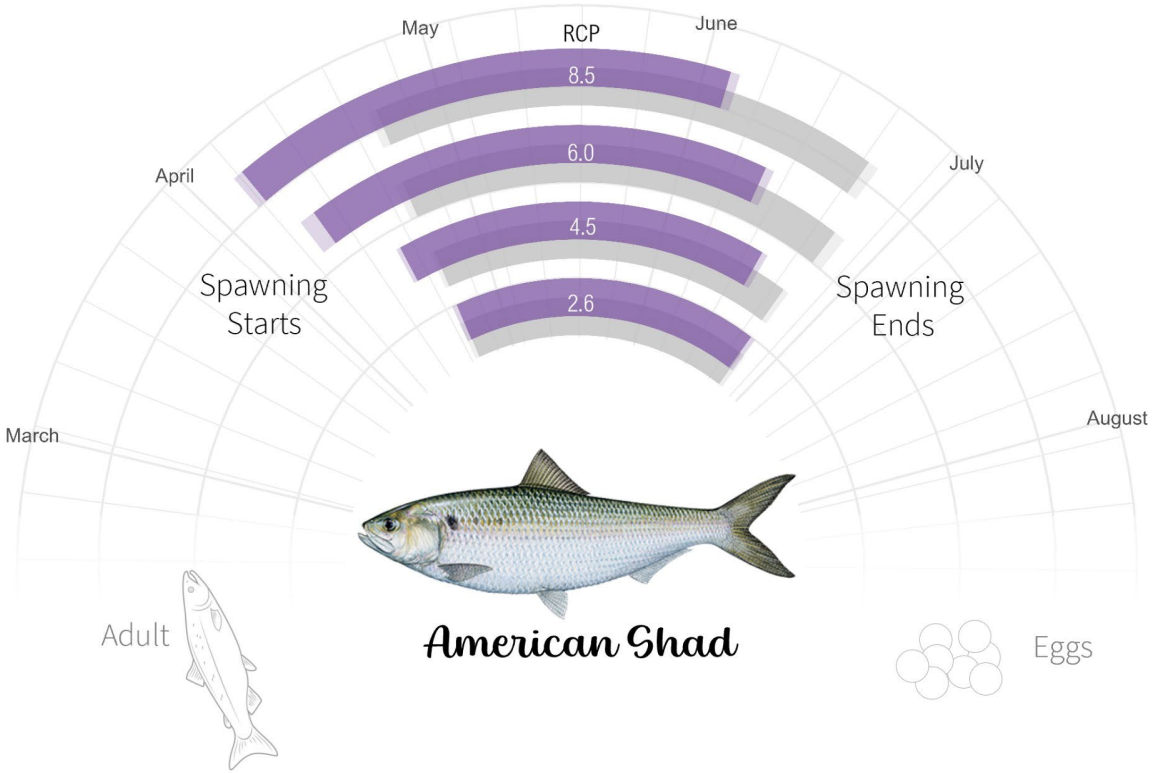
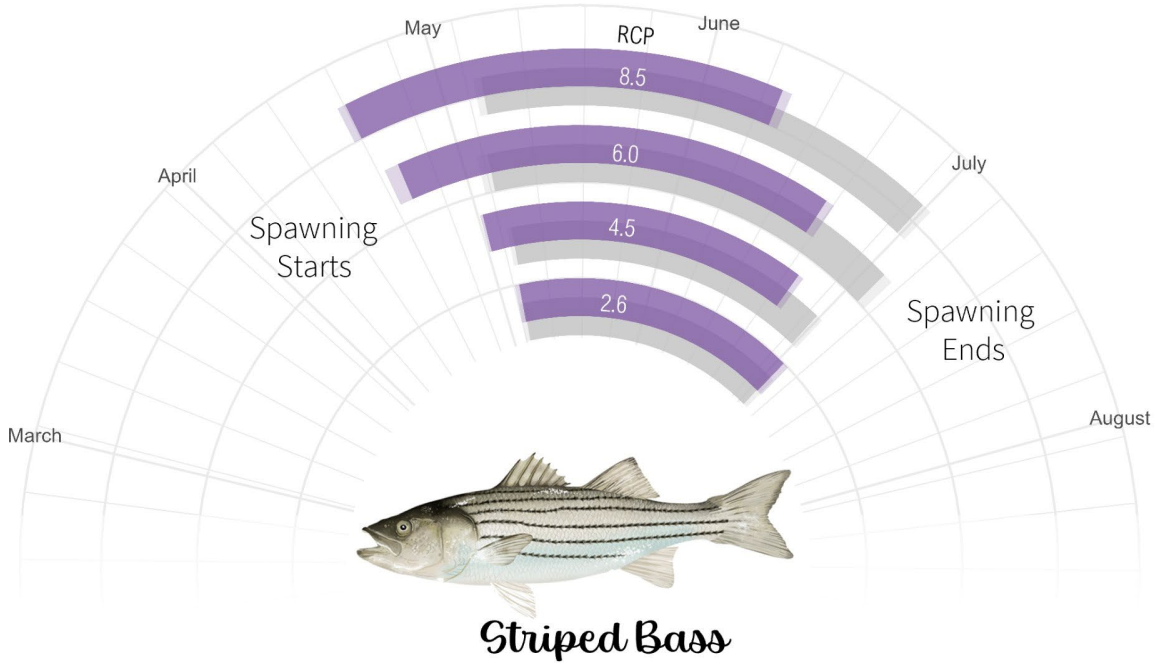
FISH IN HOT WATER

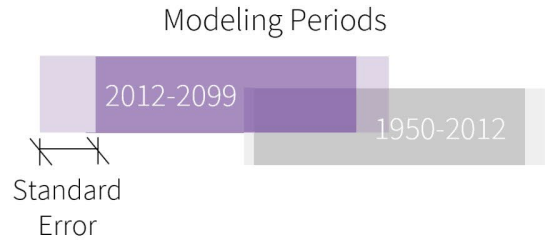
Under projected climate change scenarios, the American Shad and Striped Bass of the Hudson River Estuary are predicted to spawn 15 days earlier on average.





HOW TO READ THE PLOT

Representative Concentration Pathways (RCP) are future scenarios constructed to represent how well we are able to curb and contain greenhouse gas emissions with RCP 2.6 implementing the most aggressive strategies and RCP 8.5 being "business-as-usual." Their position on the y-axis of the plot above is ordered from RCP 2.6 to RCP 8.5 but their distance from the center of the circle is not significant.



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Data Source: Nack, C. et. al. (2019). https://doi.org/10.1002/mcf2.10076
Fish images from www.takemefishing.org and NOAA Fisheries
Plot made by Ellie White, ewhite@usgs.gov 04/08/2023

Communications (plans) to the rescue

Communications Goals	What change do you want to see by communicating about your work? (increase awareness, change behavior, improve decision making…)
Target Audiences	Who do you want to reach? Be as specific as possible.
Style, Tone, Language	How can you communicate in a way that is understandable to your target audience and earns their confidence and trust?
Key Messages	What are the 1-3 key takeaways about your work? Focus on the “so what.”
Tools	What communication channels will be most effective for reaching your target audience? (social media, web content, newsletters, webinars…)
Assessing Success	How will you evaluate if you communicated about your work effectively?

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Example plan for Puerto Rican shoreline change

Communications Goals	Increase awareness of risk and improve preparedness of Puerto Rican coastal communities
Target Audiences	Puerto Rican residents living in coastal areas, local groups who issue weather alerts, decision makers for infrastructure development
Style, Tone, Language	Spanish and English, not technical, warm but with authority
Key Messages	More than two million Puerto Ricans live in coastal municipalities, with 50,000 people at risk of storm surge during a 100-year flood.
Tools	Data portal for decision makers, storytelling website for residents with internet access, townhall meetings, flyers
Assessing Success	Number of visits to data portal and website, attendance at meetings, feedback from residents and decision makers

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https://geonarrative.usgs.gov/cambioscosterospuertorico/

What's your communications plan?

Communications Goals	What change do you want to see by communicating about your work? (increase awareness, change behavior, improve decision making…)
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JAMES MONTGOMERY FLAGG
I WANT YOU
to be a
science communicator!

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Where to learn more about USGS Water

Web	https://www.usgs.gov/wma	
Blog	https://waterdata.usgs.gov/blog/	
Social media	https://www.usgs.gov/mission-areas/water-resources/connect/social	
Data visualizations	https://labs.waterdata.usgs.gov/visualizations/vizlab-home	
Water Science School	https://www.usgs.gov/special-topics/water-science-school	

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Thank you!

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