



AERC Mission:

Advancing an understanding and appreciation of ecosystem research and environmental science in the search for solutions to complex, large-scale problems. The goal of the AERC is to promote the optimal use of limited scientific resources in the search for solutions to complex, large-scale environmental problems.





Open Science in Ecosystem Research

Congressional Briefing

September 18, 2024 | 10:00 - 11:00 AM

FIU in Washington, D.C. / Zoom

Hosted By:



Supported By:



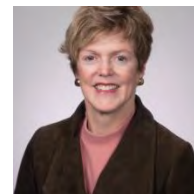
SPEAKERS:



Ms. Natalie Ward

Policy Analyst at the White House Office of Science and Technology Policy (former)

"Implementation of Open Science Across Federal Agencies"



Dr. Paula Mabee

Chief Scientist & Observatory Director, National Ecological Observatory Network (NEON)

"Open Science Data Generation: NSF's NEON"



Dr. Kimberly Kirkpatrick

Associate Vice President for Research and Innovation, University of Minnesota

"Open Science from the Academic Perspective"



Dr. Brian Pellerin

Program Manager, Next Generation Water Observing Systems and Water Hazards, U.S. Geological Survey

"Open Science to Meet Agency Missions"

Implementation of Open Science Across Federal Agencies

Natalie Ward

Policy Analyst, White House Office of Science and Technology Policy (former)

THE U.S. GOVERNMENT DEFINES OPEN SCIENCE AS

The principle and practice of making research products and processes available to all, while respecting diverse cultures, maintaining security and privacy, and fostering collaborations, reproducibility, and equity.



OPEN SCIENCE POLICY DEVELOPMENT



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20502

August 25, 2022

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Dr. Alondra Nelson 
Deputy Assistant to the President and Deputy Director for Science and Society
Performing the Duties of Director
Office of Science and Technology Policy (OSTP)

SUBJECT: Ensuring Free, Immediate, and Equitable Access to Federally Funded Research

This memorandum provides policy guidance to federal agencies with research and development expenditures on updating their public access policies. In accordance with this memorandum, OSTP recommends that federal agencies, to the extent consistent with applicable law:



[Administration](#) [Priorities](#) [The Record](#)

AUGUST 25, 2022

Breakthroughs for All: Delivering Equitable Access to America's Research

 [OSTP](#) [NEWS & UPDATES](#) [OSTP BLOG](#)



YEAR OF OPEN SCIENCE

Centers for Disease Control and Prevention

Department of Agriculture

Department of Commerce

Department of Energy

Department of State

Department of Transportation

Environmental Protection Agency

National Aeronautics and Space Administration

National Endowment for the Humanities

National Institutes of Health

National Institute of Standards and Technology

National Oceanic and Atmospheric Administration

National Science Foundation

Smithsonian Institution

U.S. Geological Survey

U.S. General Services Administration

White House Office of Science and Technology Policy



Year of Open Science activities centered around 5 key themes:

- Strengthening Open Science Policies
- Investing in Open Science Infrastructures
- Supporting the Research Community in Building Open Science Skills
- Engaging Communities to Broaden Participation in Open Science
- Promoting Incentives for Open Research Practices



Engaging Communities to Broaden Participation in Open Science

THE WHITE HOUSE



[Administration](#) [Priorities](#) [The Record](#) [Briefing Room](#) [Español](#) [MENU](#)

JULY 11, 2023

Readout of OSTP Open Science Listening Sessions with Early Career Researchers

 [OSTP](#) [NEWS & UPDATES](#) [PRESS RELEASES](#)



YEAR OF OPEN SCIENCE RECOGNITION CHALLENGE



OPEN SCIENCE CHAMPIONS

- **Serving communities: ELOKA**
 - Federal funding support from NSF
- **Advancing global solutions: Pediatric Data Commons**
 - Federal funding support from NIH
- **Technical advancements: Project Jupyter**
 - Federal funding support from NSF and DOE
- **Advancing innovation: Zooniverse**
 - Federal funding support from NSF, NASA, NOAA, NIH, the National Endowment for the Humanities, and the Institute of Museum and Library Services
- **Advancing education: FoodMASTER**
 - Federal funding support from NIH and USDA

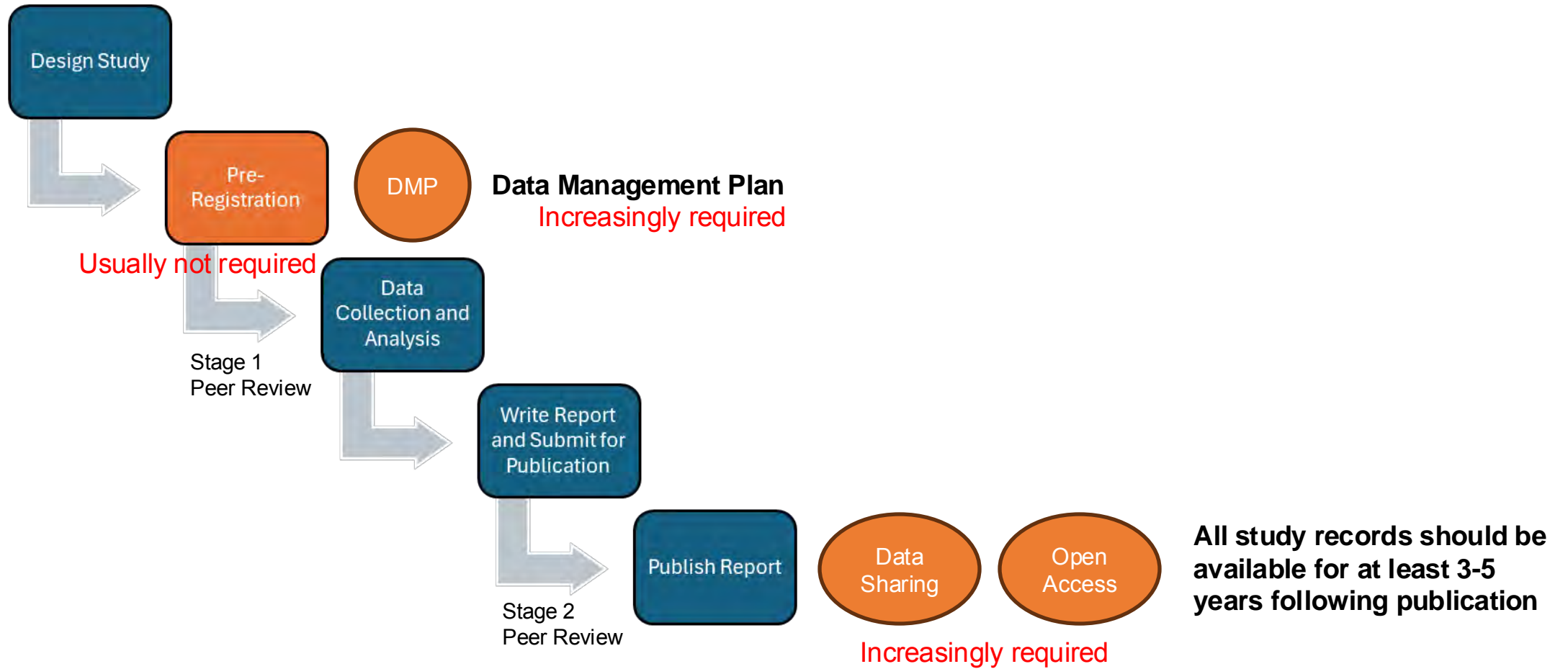


Thank you

Open Science from the Academic Perspective

Kimberly Kirkpatrick
Associate Vice President
Research and Innovation Office
University of Minnesota

Open Science across the Research Project Life Cycle



Benefits of Open Science



Exploratory analysis
Modeling



Advance knowledge
Spark collaborations

Repetition
Repetition
Repetition
Repetition

Reduce repetition



Increase accessibility



Reduce bias



Meta-analysis



Increase
transparency

Gold Standard
Research Integrity



Open data
Open code
Pre-registration
Version control

Questionable Research
Practices



P-hacking
Sloppy statistics
Peer review abuse
Inappropriate research design
Not answering to replicators
Lying about authorships

Scientific
Misconduct

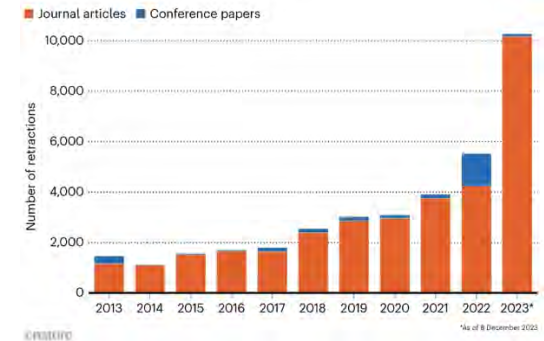


Fabrication
Falsification
Plagiarism



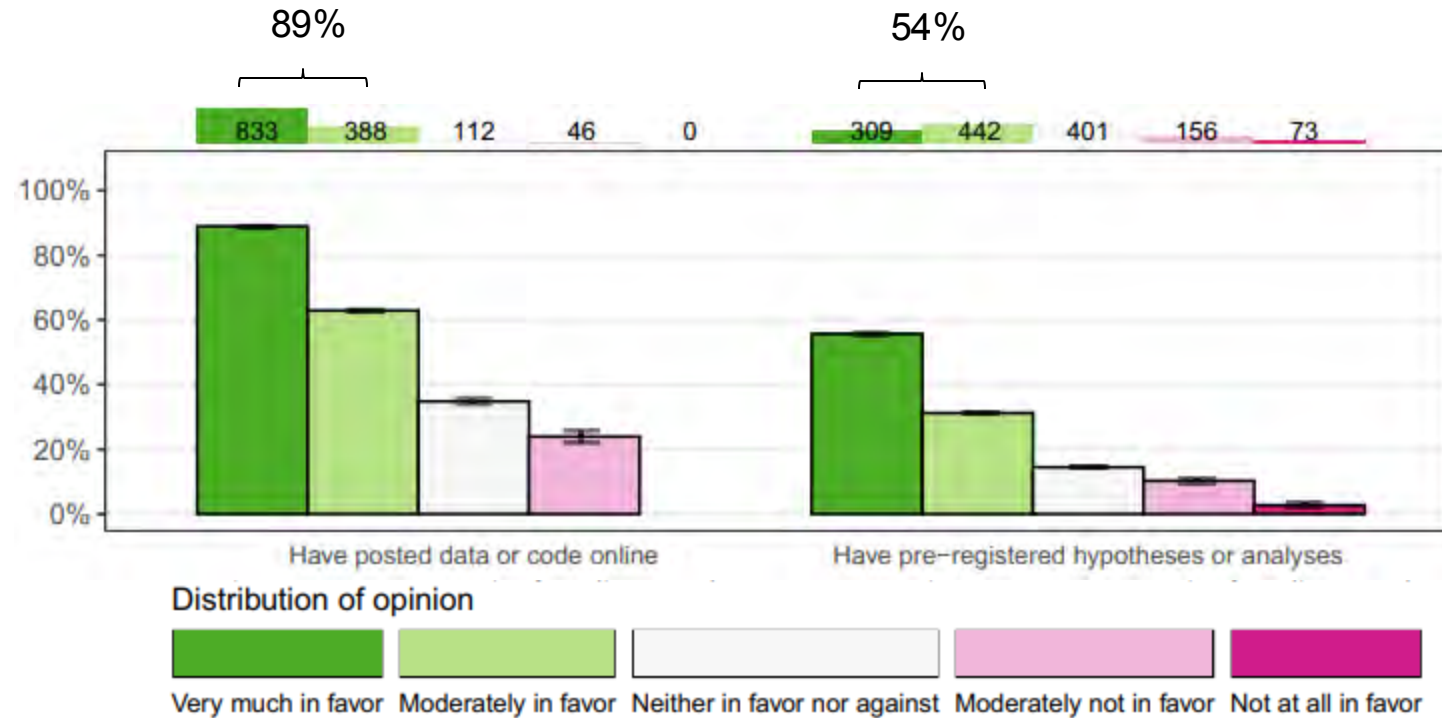
Data secrecy

Increase integrity, reputation and recognition



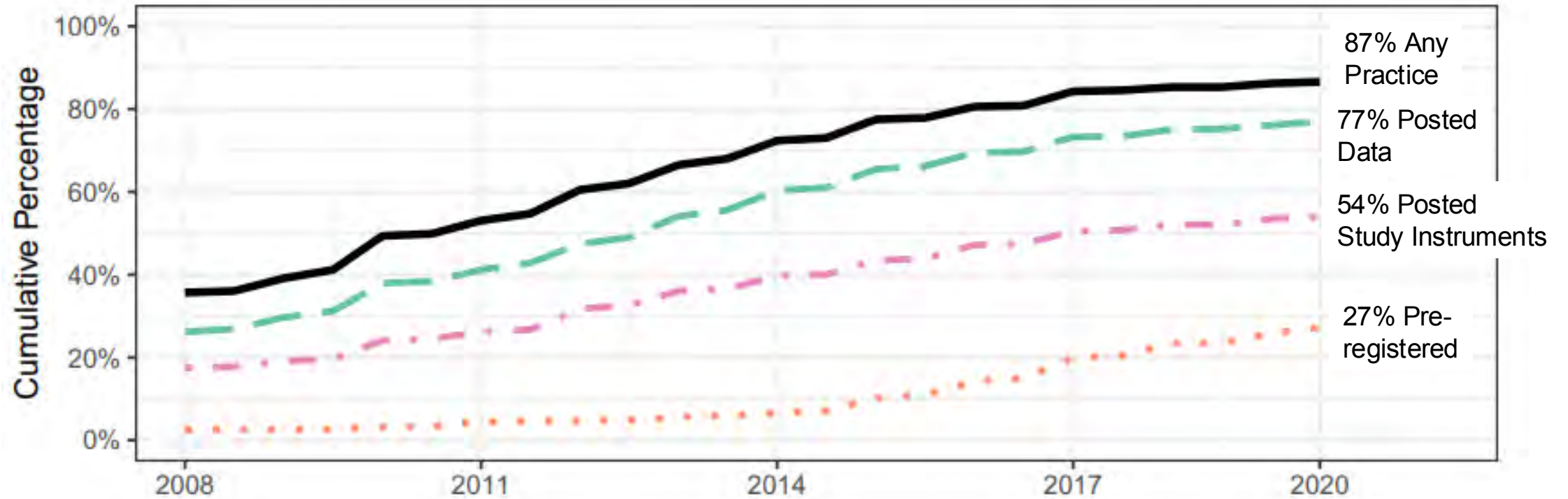
Noorden (2023). Nature

Open Science: Behavior and Attitudes



Ferguson and colleagues (2023). Nature Communications.

Changes in Open Science Practices



Ferguson and colleagues (2023). Nature Communications.

Open Science Liabilities

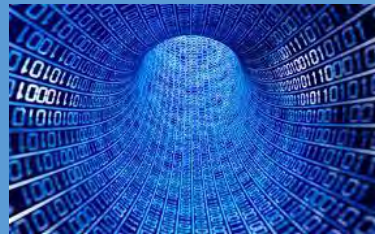
Research Community



Typical cost: \$3,000



Increased administrative burden



Rapid increase in size of data sets



Rapidly evolving data privacy requirements



Intellectual property challenges

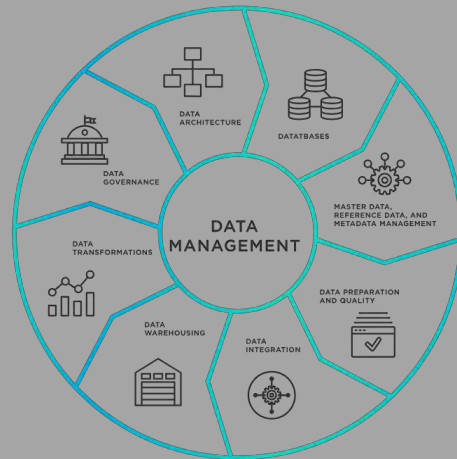
Data as an Asset

Data as a Liability → Data as an Asset

- Open access publishing funds
- Data management support (including security, privacy, intellectual property, etc.)
- Increased support for data archiving
- Incentivize and embrace open science and data sharing

Open Science Liabilities

Universities



Significant facilities
and administration
costs

Unfunded Mandate

26%

26% administrative
cap since 1991!

172%

172% increase in
regulations (2013-
2023)

Summary and Conclusions

- Researchers are generally favorable toward Open Science practices
 - Data sharing is becoming increasingly common (even before mandate)
- Researchers face numerous and complex liabilities that can impede Open Science
- Universities should strive to transform data as a liability into data as an asset
- However, universities are under resourced
 - Due in part to the stagnant support for research administration costs in the face of rapidly increasing federal regulations

Paula Mabee, Ph.D.
Chief Scientist & Observatory Director
National Ecological Observatory Network (NEON)
September 18, 2024



neon
Operated by Battelle

Open Science Data Generation: NSF's NEON

Congressional Briefing: Open Science in Ecosystem Research

Association of Ecosystem Research Centers



NEON's Mission 2030

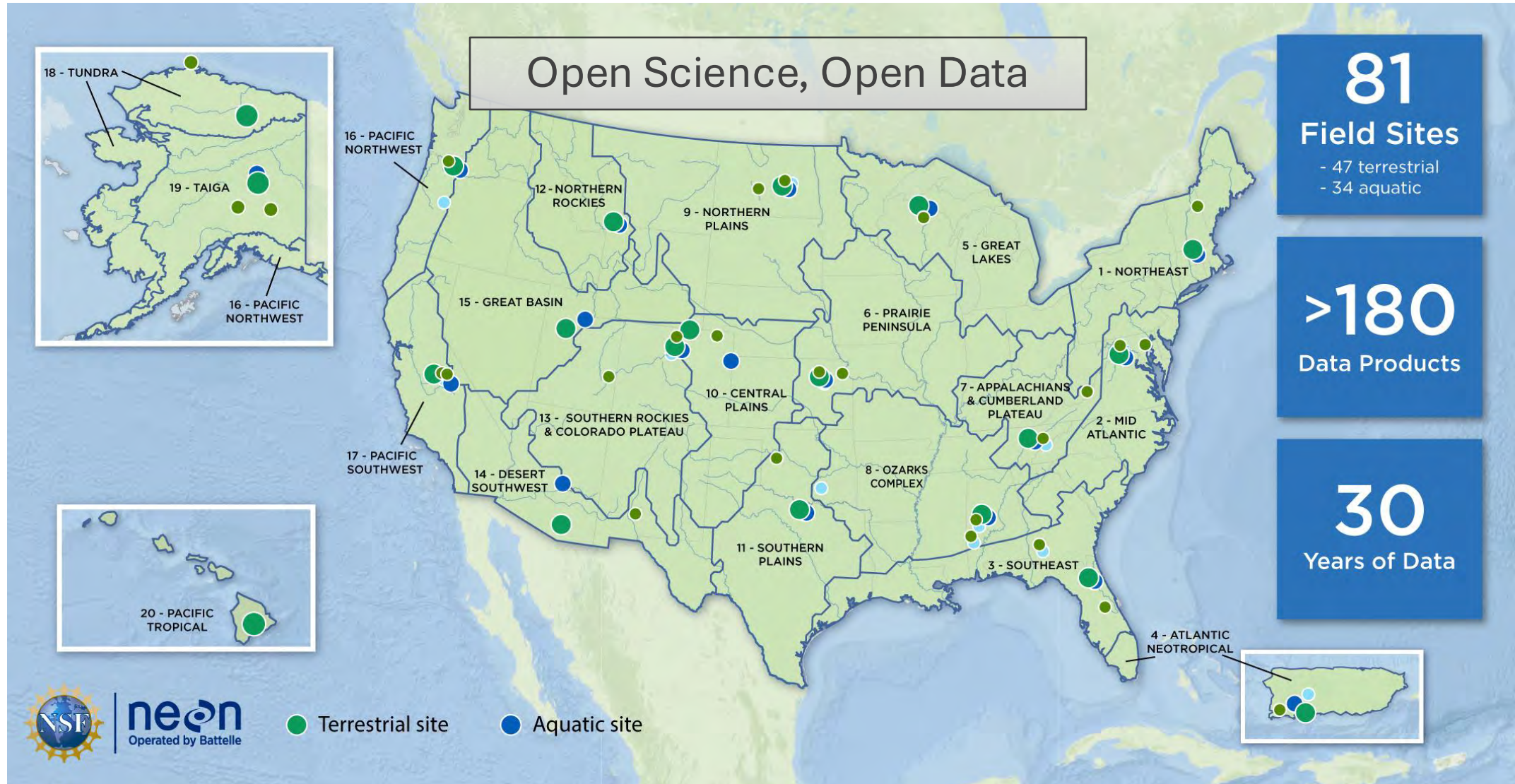
To collect and freely share critical ecological data, samples, and infrastructure with researchers and the public to advance understanding of ecological processes and inform the sustainable management of U.S. ecosystems.



neon
Operated by Battelle

<https://www.neonscience.org/about/visionandmanagement>

What is the National Ecological Observatory Network?

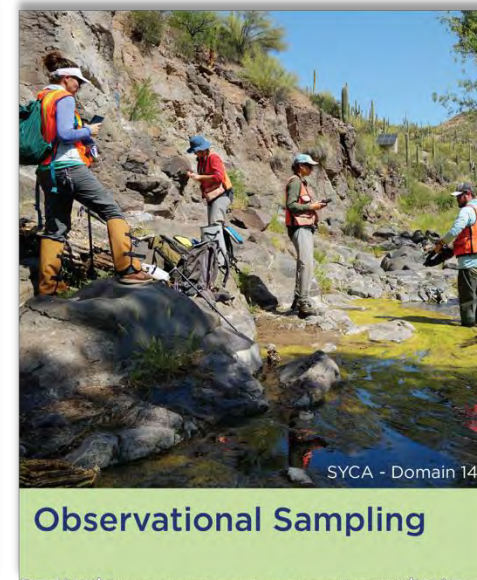
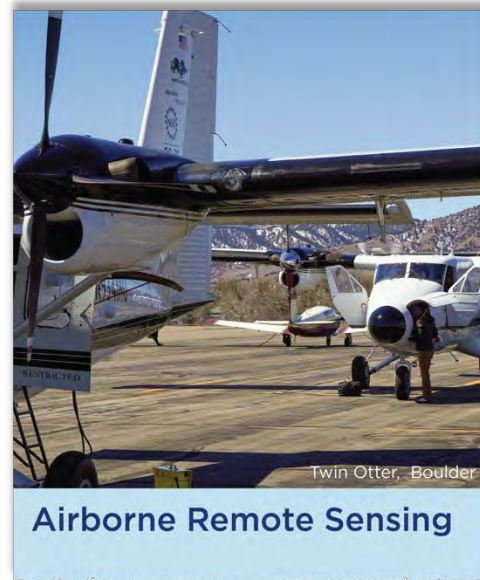
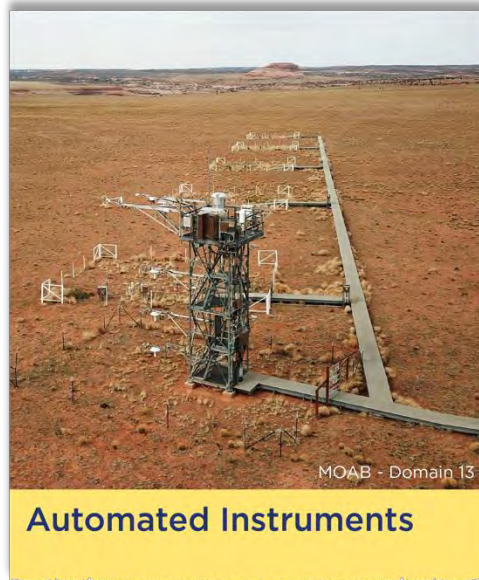


National Ecological Observatory Network (NEON)

...a continental-scale, long-term (30 year) Observatory, funded by NSF and operated by Battelle

Enables:

- Analysis: Free and open data and samples on the drivers of and responses to environmental change
- Comparison: Standardized and reliable framework for research and experiments
- Interoperability: Integration with other national and international network science projects



Investing in Open Data for...

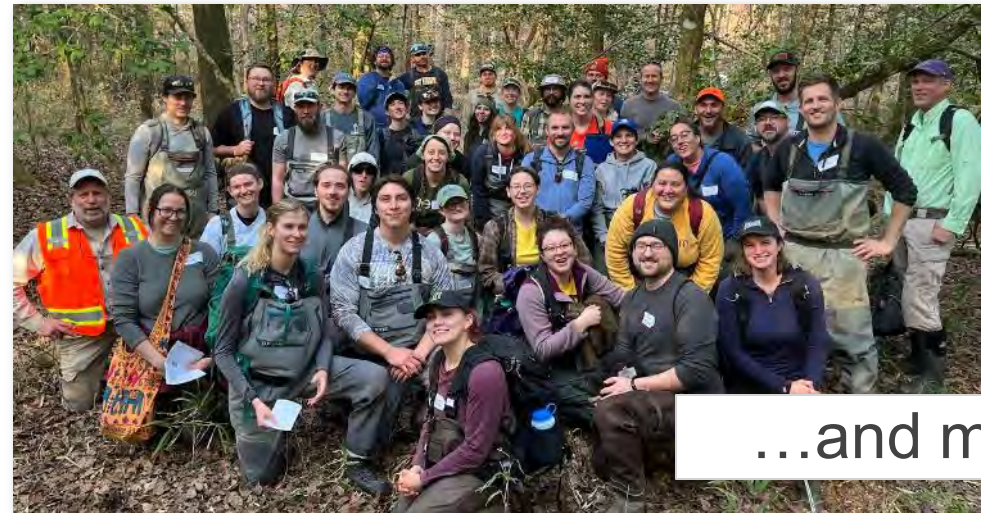


Natural disaster monitoring

Land use management



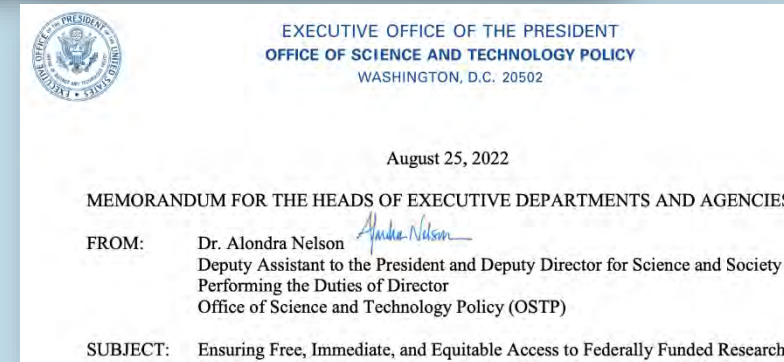
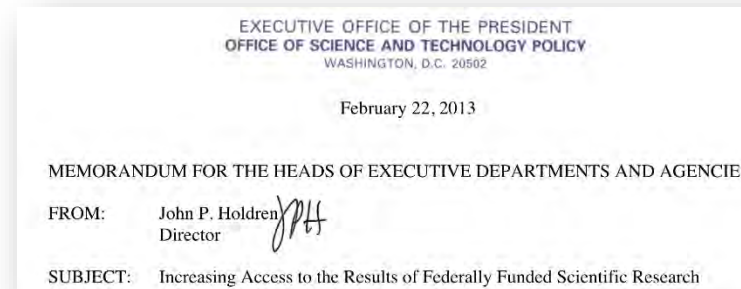
Climate change research



...and more

Open Science landscape

- NEON was designed to be an open data provider
- Historical open science initiatives
 - 2013 OSTP “Holdren” Memo
 - 2022 OSTP “Nelson” Memo
 - 2023 OSTP “Year of Open Science”
 - Agency Data Management Plans



Science 27 Jan 2023

NEON's commitment to FAIR principles

- **Findable** through globally unique persistent identifiers and rich metadata which is indexed in a searchable resource.
- **Accessible** through standardized communication protocols. Metadata preserved even when data are no longer available.
- **Interoperable** through the use of broadly accessible language with shared vocabularies and qualified references to other metadata.
- **Reusable** through prescribed data usage criteria, documentation of provenance, and defined domain-relevant community standards.

Wilkinson, M. et al. The FAIR Guiding Principles for scientific data management and stewardship. Sci Data 3, 160018 (2016). <https://doi.org/10.1038/sdata.2016.18>

FAIR data implementation partners evolving best practices with NEON



COPDESS

Coalition for Publishing Data in the Earth and Space Sciences

COMMITMENT STATEMENT IN THE EARTH, SPACE, AND ENVIRONMENTAL SCIENCES

27 additional FAIR Data partners and NEON community bodies (e.g., Data Standards TWG)

Findable: Identifiers promote data discovery

Data

- NEON-minted UUIDs for each data record
- Digital Object Identifiers (**DOIs**) for each data product release (annual)



Samples

- International Generic Sample Numbers (**IGSNs**) for each sample in NEON Biorepository (and NEON-specific identifier(s); Biorepository UID)



People

- **ORCID** ID(s) of NEON field staff is embedded in data



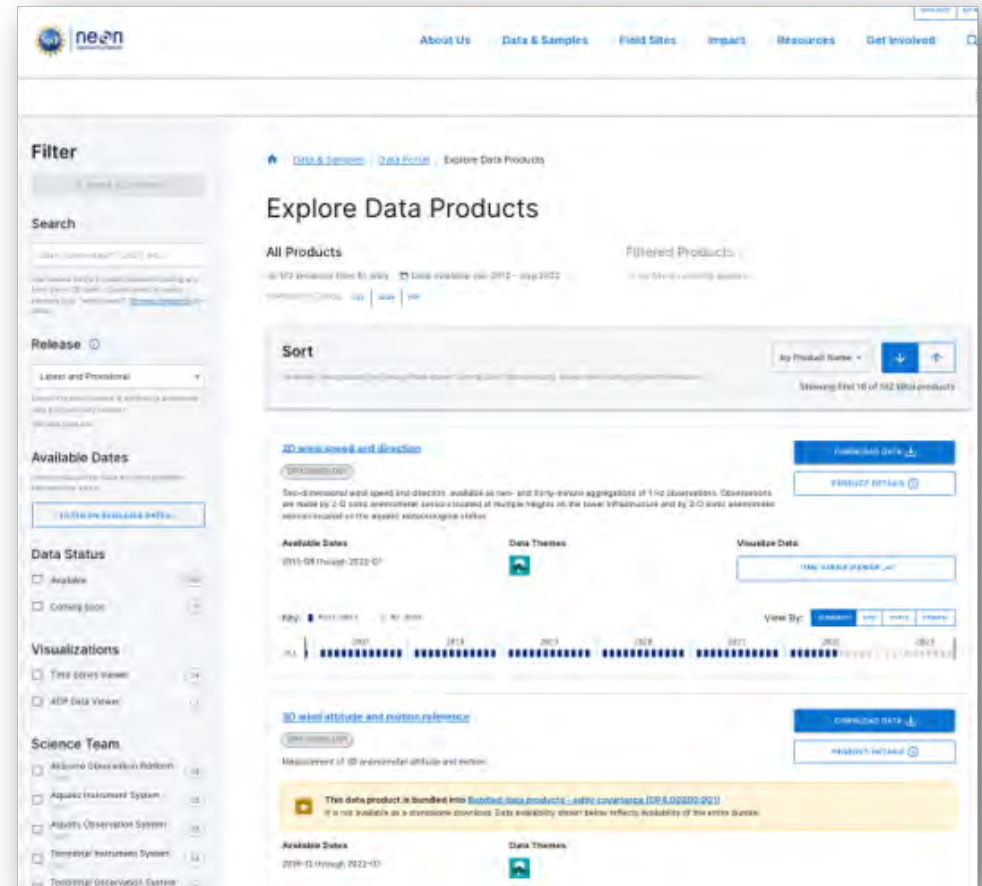
Accessibility: NEON's open data and specimens

- Accessible Data Portal and API
- Cloud access tools: Google Earth Engine
- Tutorials, Code repository
- NEON Biorepository samples



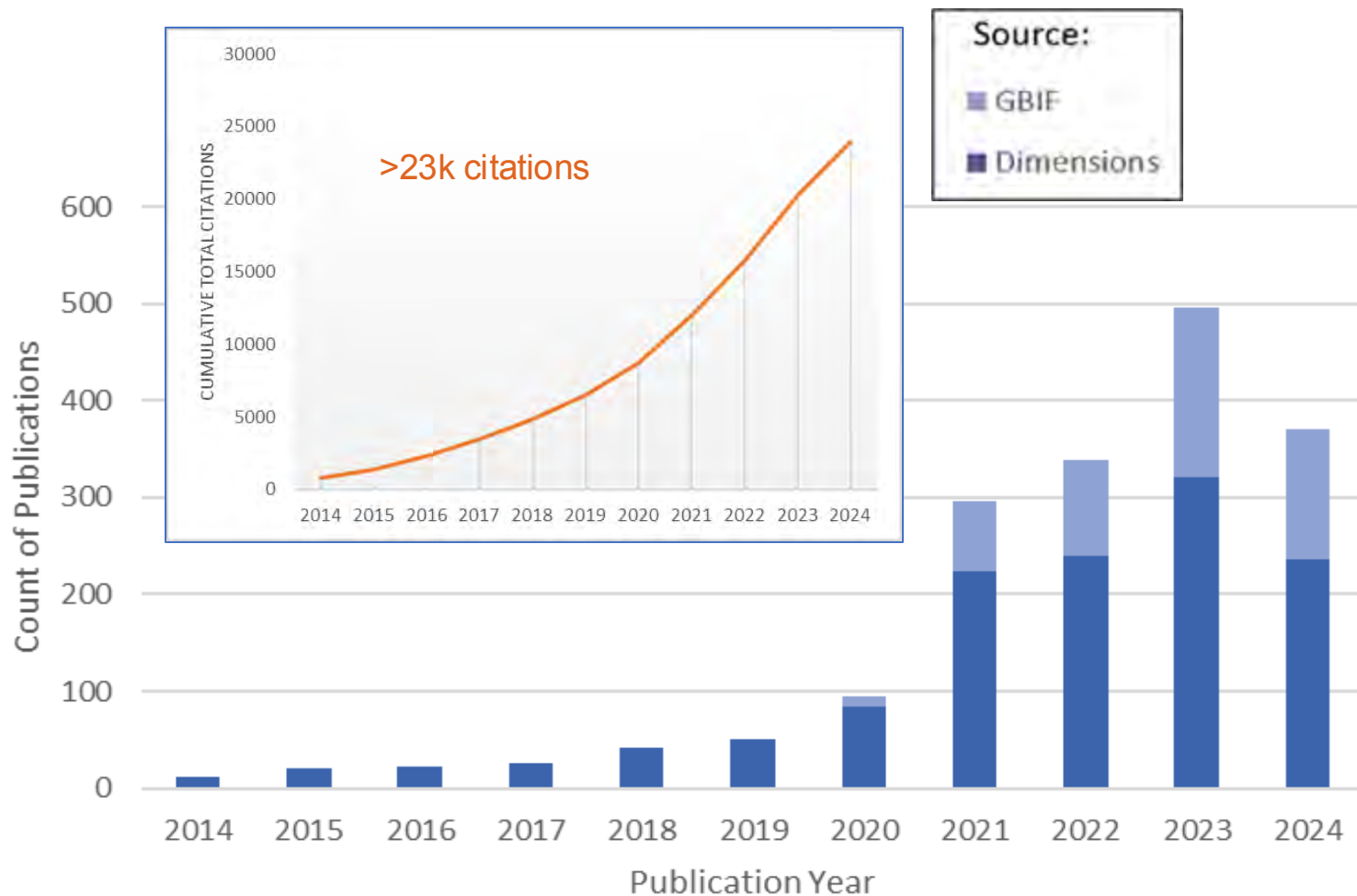
Over 500,000 specimens & samples of 70 types are freely available in the NEON Biorepository

<https://biorepo.neonscience.org/portal/>



NEON Data Portal;

Identifiers enable tracking of NEON research: 1,300+ pubs



Data from 2 Jul 2024

Interoperability: NEON data hosted by external repositories

Partner repositories:

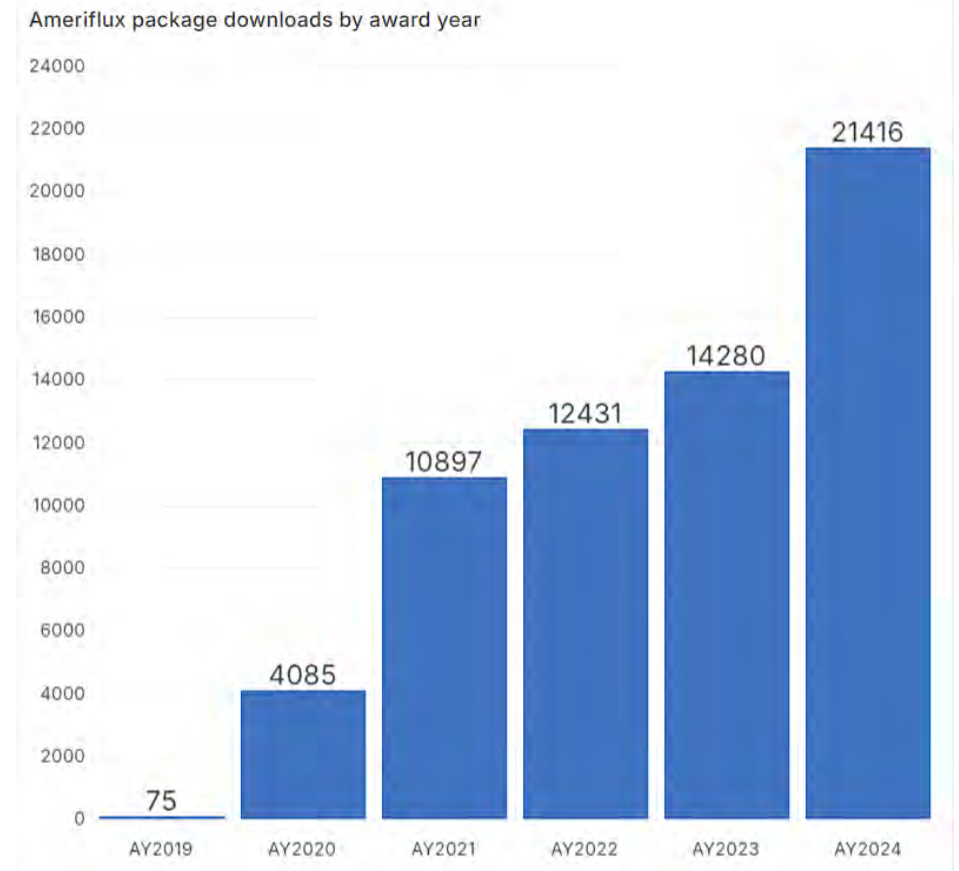
- Greatly amplify discoverability and use of NEON data
- Experts in related research domains
- Technical infrastructure to support NEON data
- FAIR minded



NEON data via DOE AmeriFlux



>63,184 downloads of NEON data from AmeriFlux



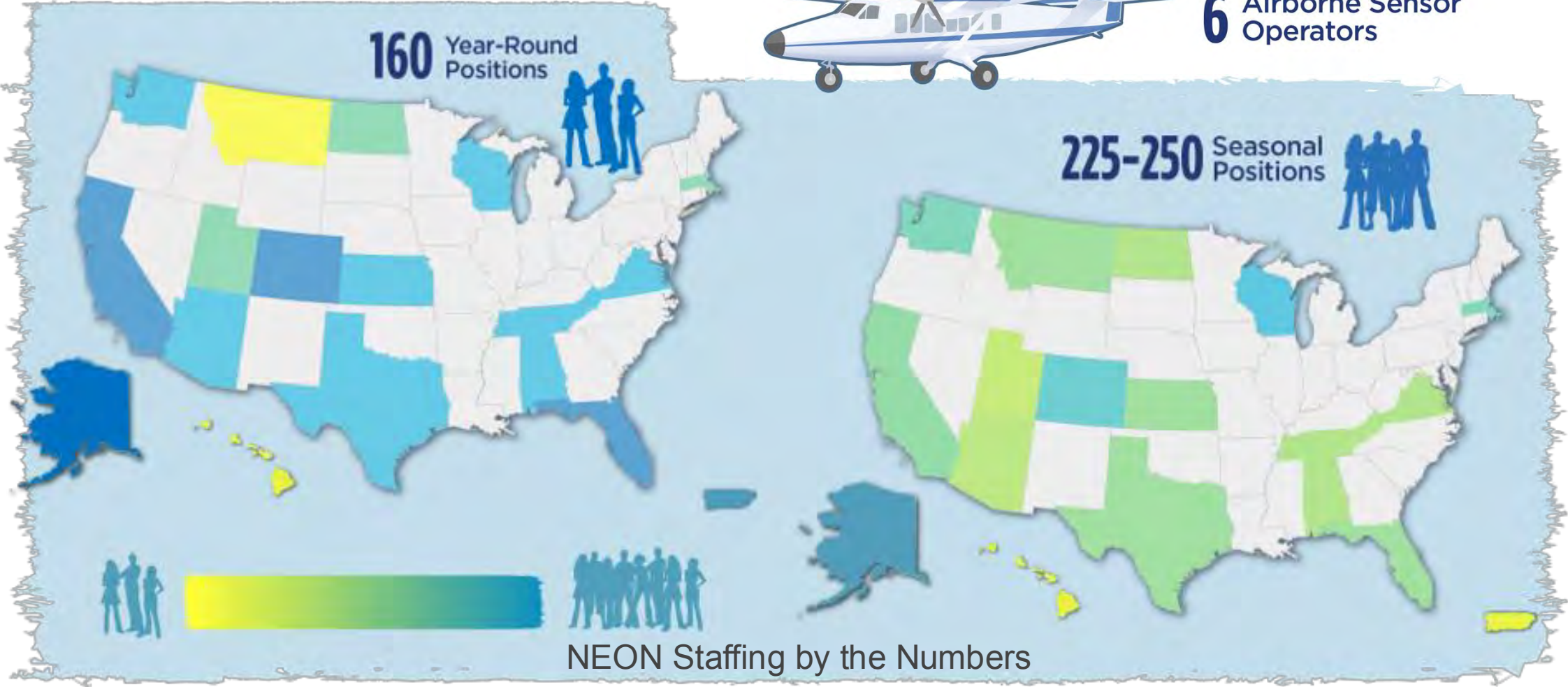
NEON data package downloads/ year from AmeriFlux

16 Sept 2024

NEON workforce: open data culture



6 Airborne Sensor Operators





neon
Operated by Battelle

720.746.4844 | neonscience@battelleecology.org | neonscience.org

Open Science to Meet Agency Missions

Dr. Brian Pellerin

Science Program Manager, US Geological Survey Water Mission Area

bpeller@usgs.gov

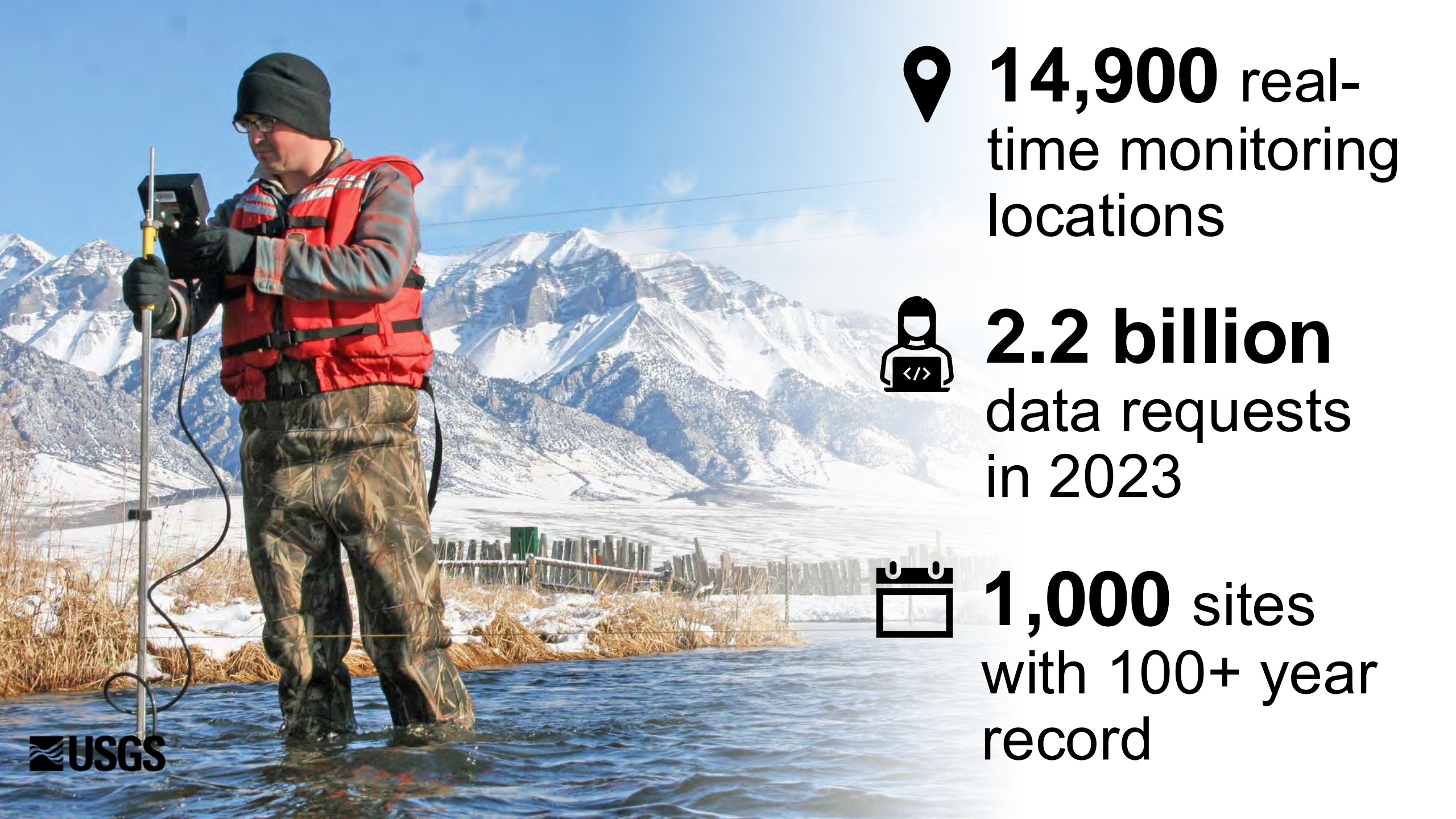


Vanadium
50.9415

FUTURE OF OPEN SCIENCE



- **Federal Data Strategy**
- **USGS Fundamental Science Practices**
- **USGS Public Access Plan**
- **USGS Data Strategy**



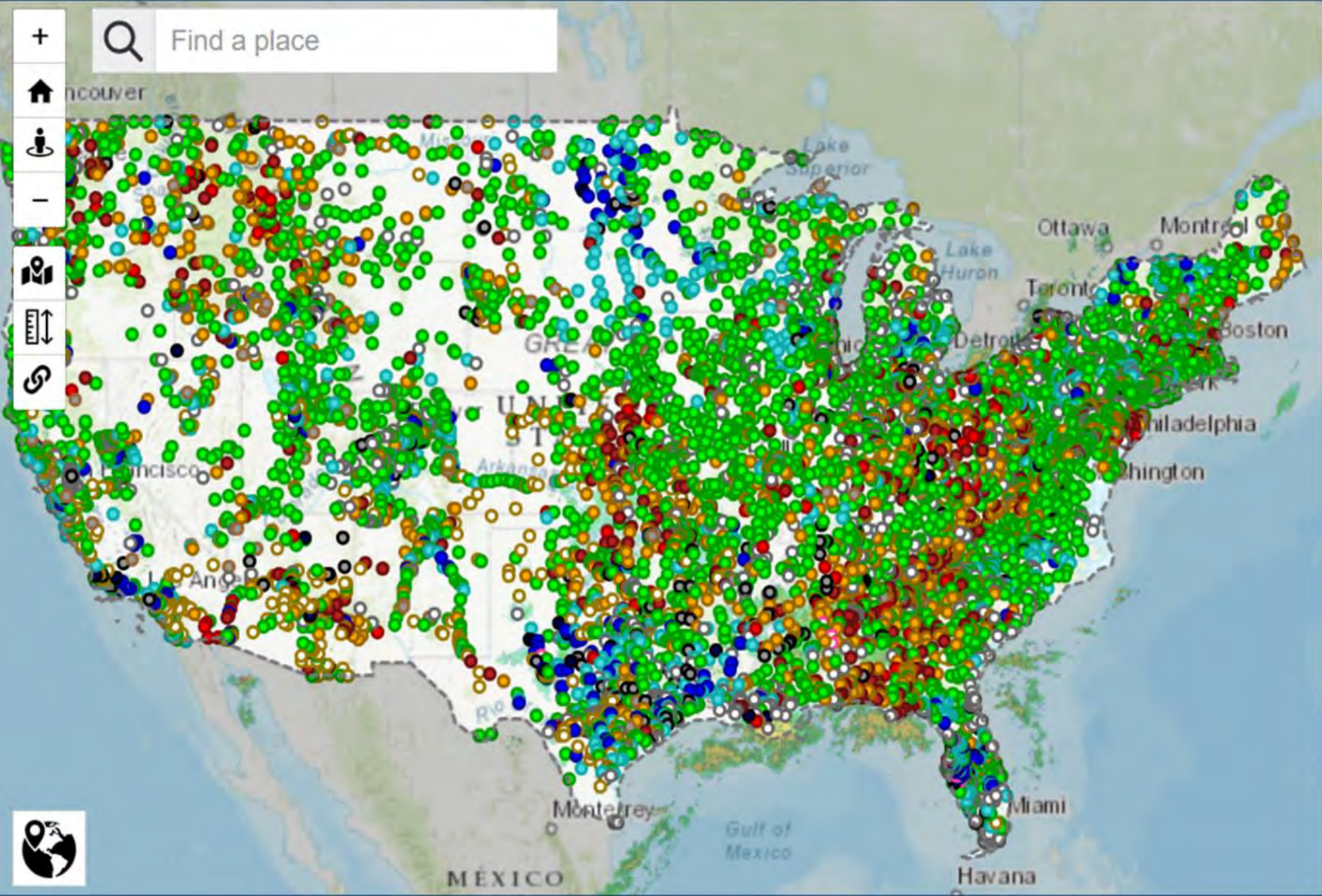
14,900 real-time monitoring locations



2.2 billion data requests in 2023



1,000 sites with 100+ year record



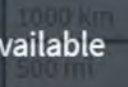
Close

Legend

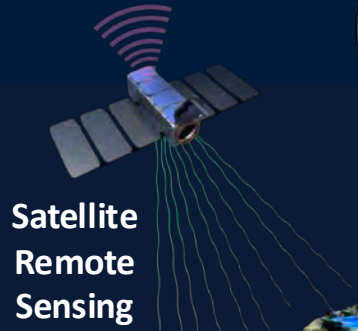
Streamflow: Status

- Above flood stage
- All-time high for this day 100th percentile (maximum)
- Much above normal >90th percentile
- Above normal 76th – 90th percentile
- Normal 25th – 75th percentile
- Below normal 10th – 24th percentile
- Much below normal <10th percentile
- All-time low for this day 0th percentile (minimum)
- Not flowing
- Not ranked
- Measurement flag
- Recent measurement unavailable

Scale 33,280,737 Lat 50.3772 Lon -58.8796



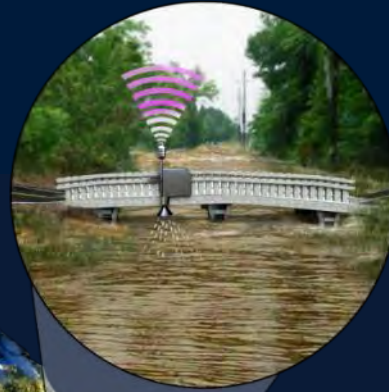
NGWOS



Satellite Remote Sensing



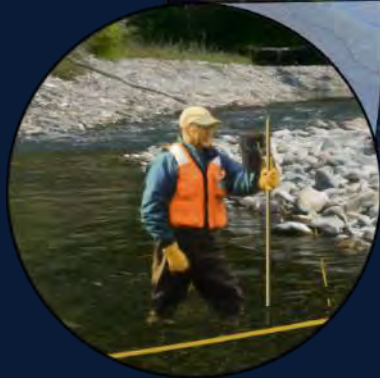
Water Budget Monitoring



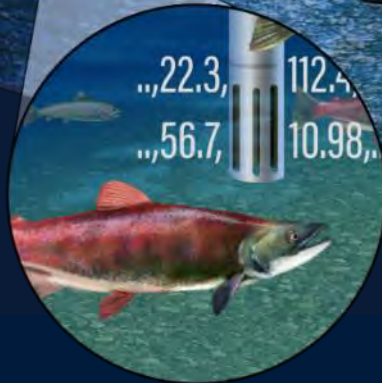
Water Hazard Monitoring



Soil Moisture & Groundwater Monitoring



Streamflow Monitoring



Water Quality Monitoring

Next Generation Water Observing System

Willamette River Basin



Upper Colorado River Basin



Illinois River Basin



Delaware River Basin



Trinity-San Jacinto River Basin



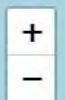
HIVIS

Hydrologic Imagery Visualization and Information System

State ▾

Text Search

752 Cameras



9/13/2024, 12:00:22 PM EDT

St John River at Dickey

USGS Site: 01010500

St. John River at Dickey, Maine

[DETAILS & DOWNLOADS](#)



9/13/2024, 11:00:03 AM CDT

Platte River near Grand Island

USGS Site: 06770500

Platte River near Grand Island, Nebr.

[DETAILS & DOWNLOADS](#)



Merced River at Happy Isles Bridge
2024-09-13 09:00:03 PDT

9/13/2024, 9:00:03 AM PDT

Merced River at Happy Isles Bridge
Yosemite

USGS Site: 11264500

Merced River at Happy Isles Bridge,
Yosemite, CA

[DETAILS & DOWNLOADS](#)



9/13/2024, 12:00:03 PM EDT

Middle Brook at Burnt Mills

USGS Site: 01399100

Middle Brook at Burnt Mills



9/13/2024, 11:00:29 AM CDT

Menomonee River at 16th Street at
Milwaukee

USGS Site: 04087142

Menomonee River at 16th Street at



Thank you!

