United Southern and Eastern Tribes Impact Week 2024 *Natural Resources Committee*

Introduction to U.S. Geological Survey Program

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Tribal Liaison, DOI Northeast Region
March 27, 2024

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

USGS Mission and Vision

The **USGS mission** is to monitor, analyze and predict current and evolving dynamics of complex human and natural Earth system interactions and to deliver actionable information at scales and timeframes relevant to decision makers.

Vision Statement: Lead the Nation in 21st-century integrated research, assessments, and prediction of natural resources and processes to meet society's needs.

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USGS Science: Interdisciplinary and Transdisciplinary

Disciplines in Water, Ecosystems, Energy and Mineral Resources, Core Science Systems, Natural Hazards Mission Areas

Hydrology

Geology

Ecology

Biology

GIS

Energy/mineral resources

Geophysics

Remote sensing

Microbiology

Geochemistry

Wildlife health

Geologic hazards

Environmental science

Climate science

Botany

Soil science

Statistics

Analytical chemistry

Key disciplines used in smaller numbers to help "bridge the gap"

Global climate model downscaling

Public health

Planetary Sciences

Fire science

Engineering

Information Technology

Economics

Risk Communication

Structured decision-making

External disciplines we engage via our many partners

Global climate modeling

Infrastructure planning

Human epidemiology, toxicology, immunology ….

Meteorology

Other social sciences

Urban planning

Landscape architecture

Indigenous and community knowledge

Community partners (full co-design, co-production)

Many others…

USGS "by the Numbers"

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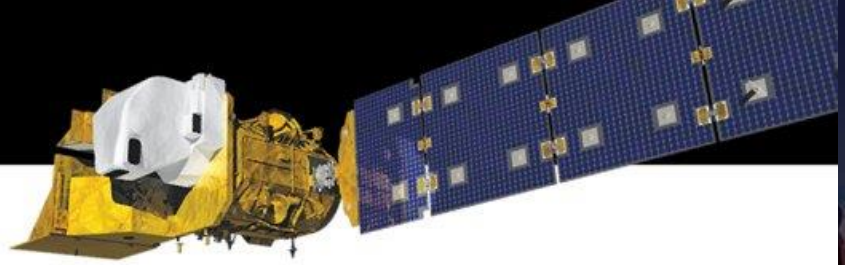

People

8,190 Employees

1,356 Contractors

564 Emeriti

257 Volunteers

Facilities

487 Laboratories

In **400 locations** in all 50 states and 2 territories (Guam and Puerto Rico)

68 Science Centers *(7 Regions)*

23 Programs *(5 Mission Areas)*

10 Climate Adaptation Science Centers

40 Cooperative Research Units

54 Water Resource Research Institutes

Science and Monitoring

165,000+ Publications (since 1879)

54,000 7.5-minute Quadrangles (Topographic Maps)

200 Threatened/Endangered Species Studied

32 Active Patents

1 TRIGA Research Reactor

18,000+ Groundwater Wells (1,850 Real-time)

11,300 Streamgages

3,400 USGS-operated Earthquake Sensors in U.S.

161 Volcanoes Monitored

14 Geomagnetic Observatories

2 Satellites

155M Landsat Scene Downloads

100% IfSAR Coverage over Alaska

86% Conterminous U.S. Coverage of 3DEP High-resolution Elevation Data

54% U.S. Coverage of Geologic Maps (Detailed to Intermediate Scale)

170 Oil and Gas Basins Assessed Worldwide

100 Mineral Commodities Analyzed (for 180 Countries)

Partnerships

4,300 Partners/Cooperators

4,675 Contracts (FY21)

USGS Organizational Structure

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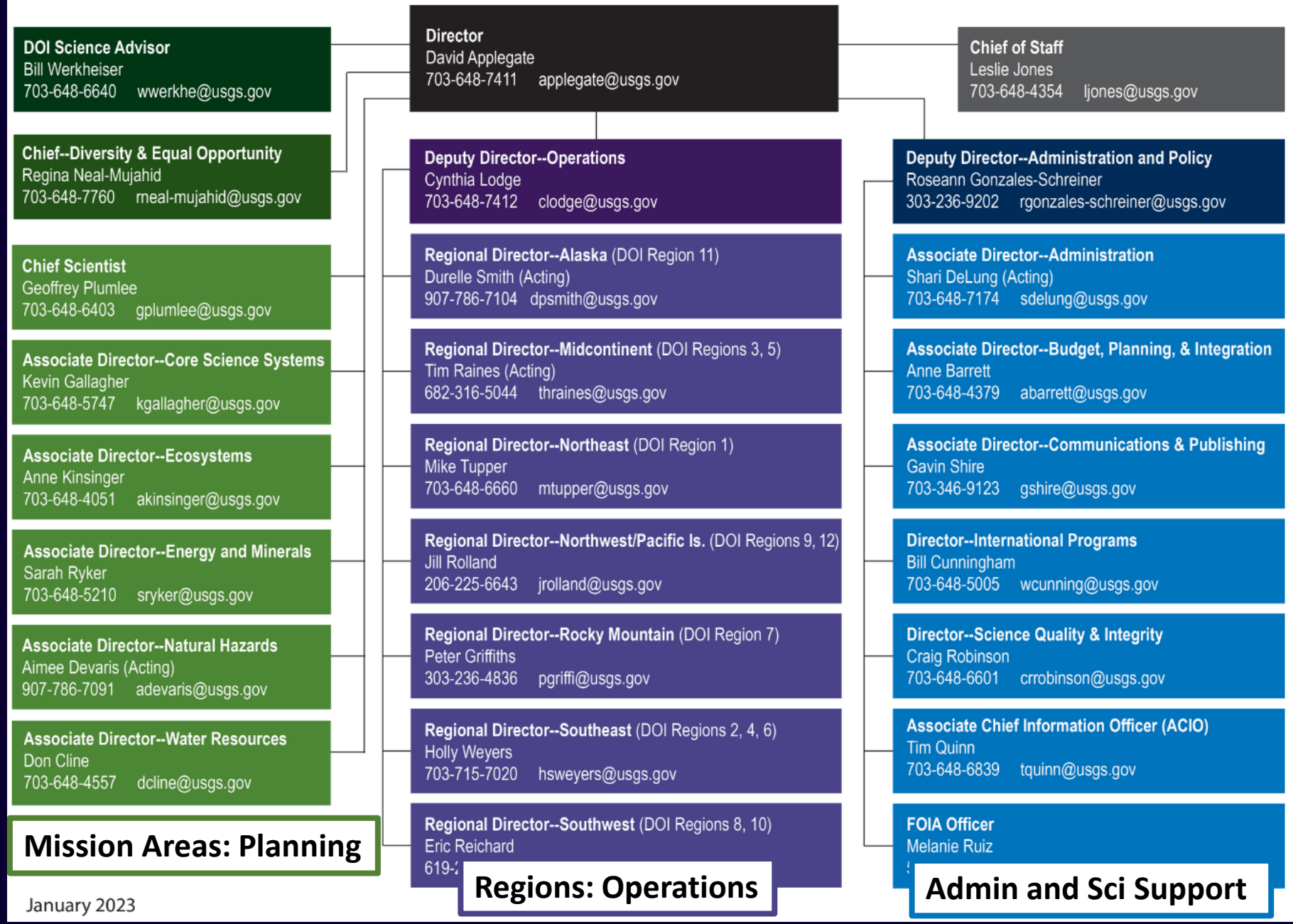
USGS Organizational Chart - Key Officials

By Office of the Director JANUARY 18, 2023



January 2023

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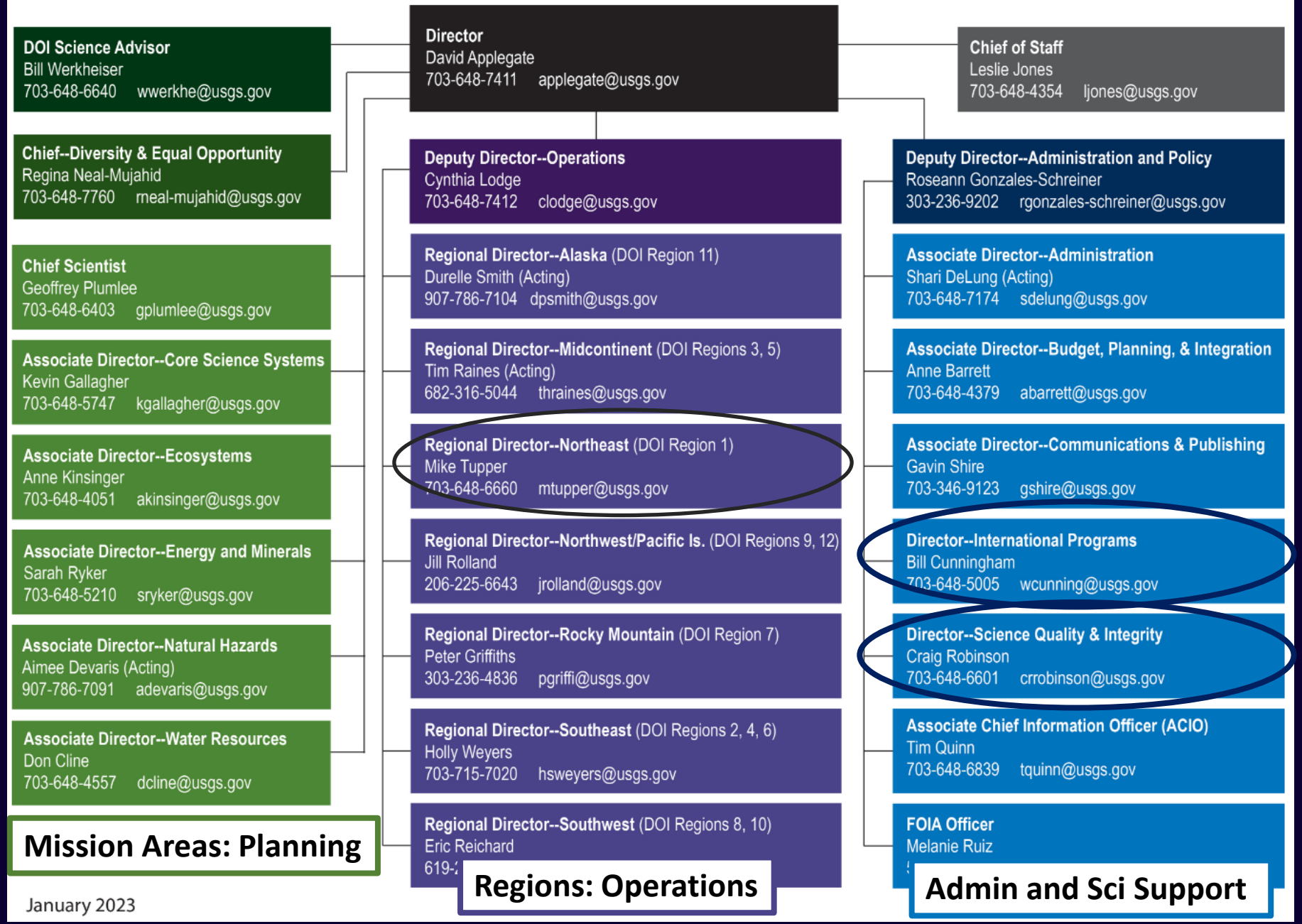

January 2023

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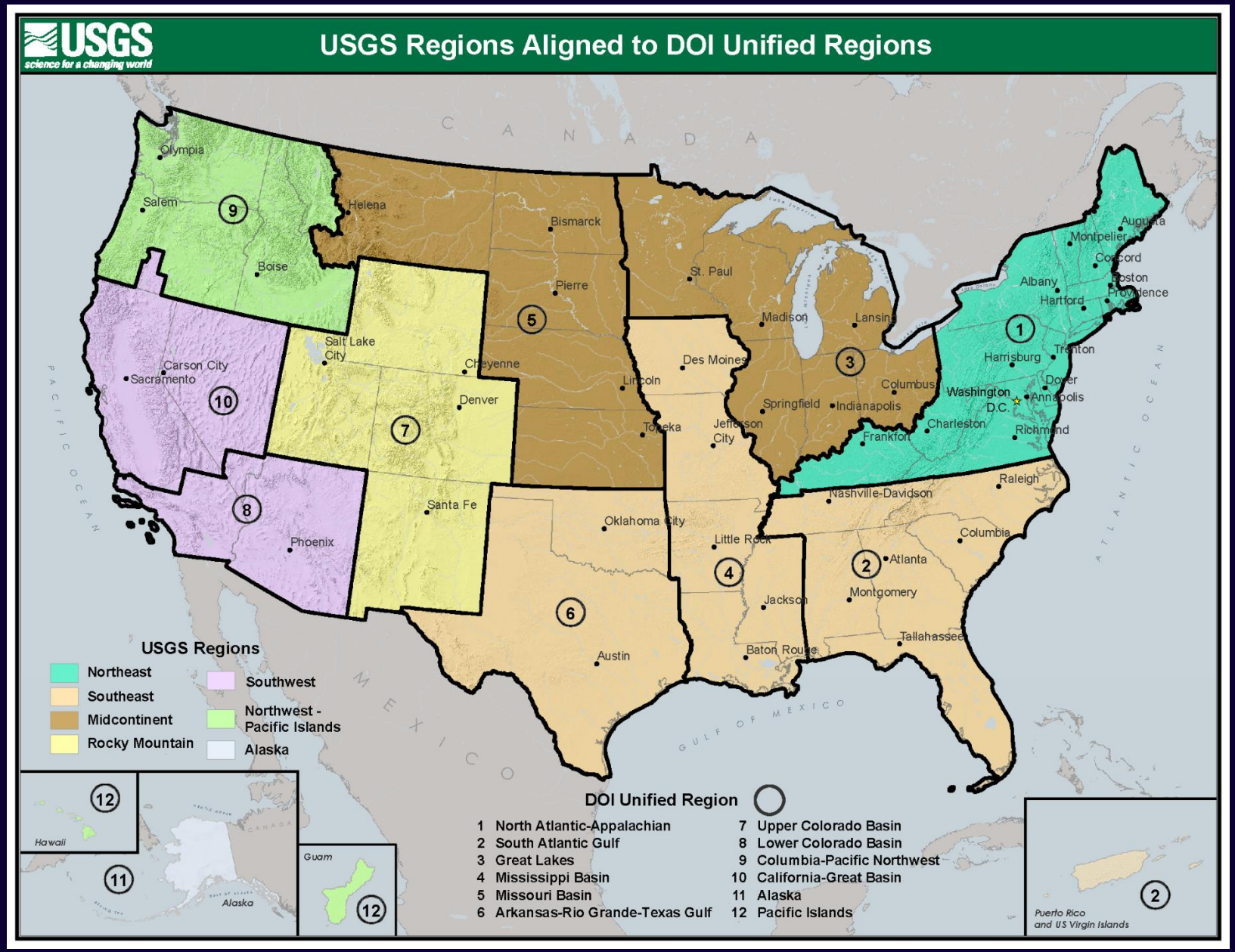
USGS Regions



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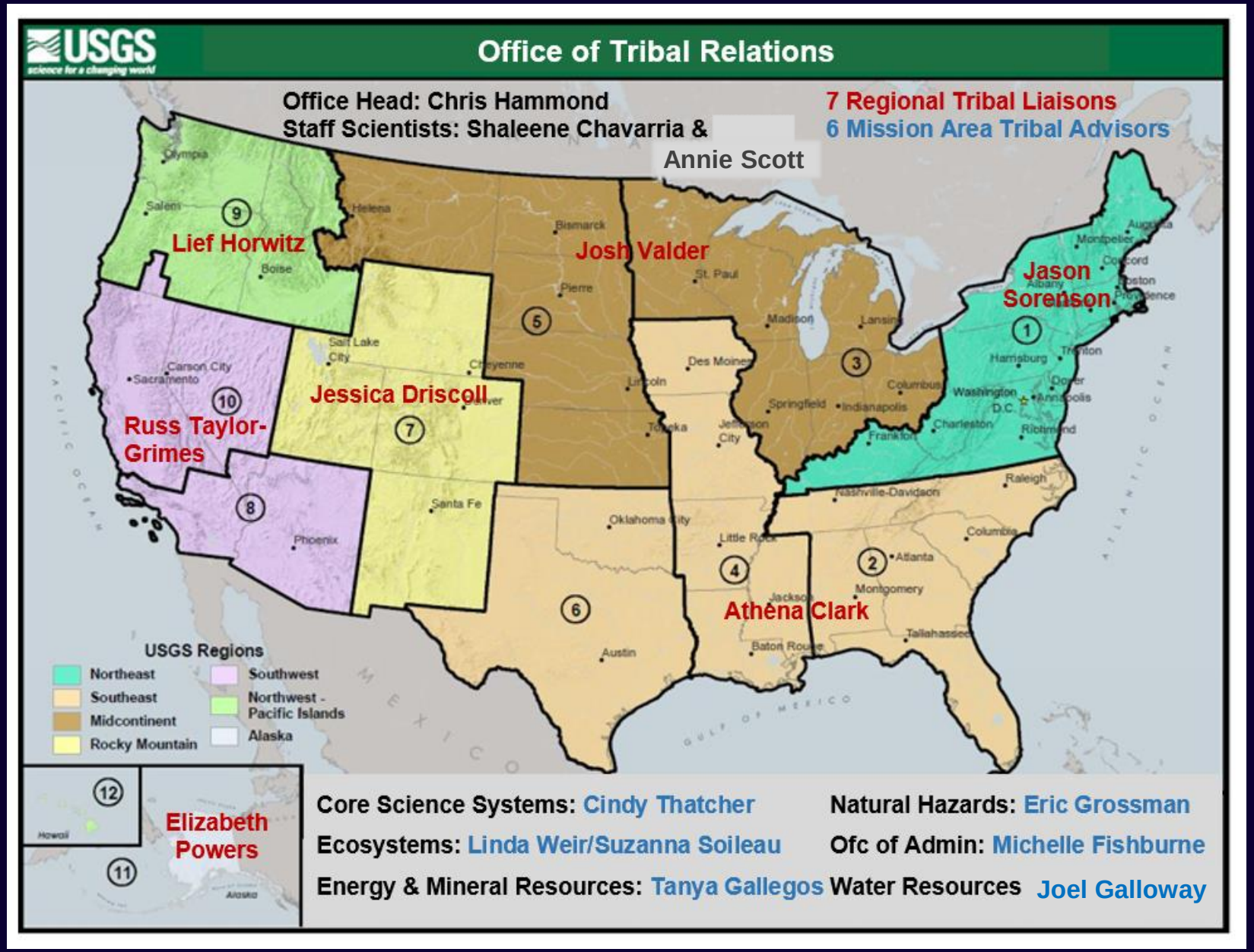
USGS Office of Tribal Relations

- Three full-time OTR staff and 13 Liaisons
- Formal consultation
- NEPA training/NHPA (Section 106)
- Tribal Land Locator Toolkit
- TESNAR
- Tribal Relations CoP



Office of Tribal Relations | U.S. Geological Survey (usgs.gov)

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NORTH ATLANTIC-APPALACHIAN CENTERS

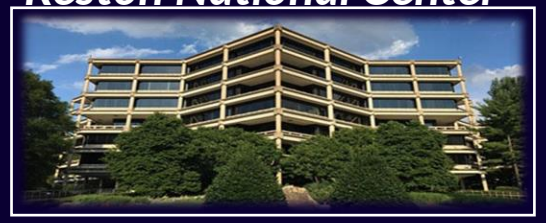
Water Science Centers (WSCs)

- New England WSC
- New York WSC
- New Jersey WSC
- Pennsylvania WSC
- Maryland-Delaware-D.C. WSC
- Virginia-West Virginia WSC
- Kentucky portion of the Ohio-Kentucky-Indiana WSC

Others

- Eastern Ecological Science Center
- Woods Hole Coastal and Marine Science Center
- Florence Bascom Geoscience Center
- Science and Decisions Center
- Geology Energy and Minerals Science Center
- National Minerals Information Center

Reston National Center



https://www.usgs.gov/unified-interior-regions/region-1/

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SOUTH ATLANTIC and ARKANSAS-RIO GRANDE-TEXAS GULF CENTERS

Water Science Centers (WSCs)

- South Atlantic WSC *(GA, NC, SC)*
- Caribbean-Florida WSC *(FL, PR)*
- Lower Mississippi–Gulf WSC *(AL, TN)*
- Oklahoma-Texas WSC

Others

- Wetland and Aquatic Research Science Center
- St. Petersburg Coastal and Marine Science Center
- Northern Rocky Mountain Science Center (Appalachian Station)

https://www.usgs.gov/regions/southeast/

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Focus areas and other USGS entities within geographic footprint of USET:

Focus areas

- Chesapeake Bay
- Delaware River Basin
- Long Island Sound
- Great Lakes
- Gulf of Maine
- Lake Champlain
- Mississippi River
- Gulf of Mexico

Other USGS entities

- Great Lakes Science Center
- Northeast Climate Adaptation Science Center (CASC)
- Southeast CASC
- South-Central CASC
- Cooperative Research Units (CRUs)

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How Do We Ensure Our Information and Data are Useful in Decision Making and are reaching people who need it most?

We can bridge the gap between science providers and science users through…

- Stakeholder and end-user engagement, especially underserved communities
- Participatory research - "co-production"
- Partnering with other disciplines: social and economic sciences, environmental justice, human-centered design thinking, usability, and communication as well as behavioral psychology and anthropology

USGS has set strategic goals to:

- Enhance Tribal engagement
- Weave IK with our science as guided by Tribal Nations
- Provide our science to underserved communities
- Enrich the value of our science through increased participatory research
- Broaden inclusion of expertise from other fields

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Indigenous Knowledge (IK) and Data Sovereignty

- USGS has recognized the importance of respectfully incorporating Indigenous Knowledge (IK) as a complement to USGS Fundamental Science Practices (FSPs) and overall mission.

- USGS is committed to preventing the unauthorized release or publication of data or material that a Tribal government(s) has deemed sensitive, proprietary, or culturally important.

[Indigenous Knowledge: Providing Insight into Climate Change | U.S. Geological Survey (usgs.gov)]

[The Impact of Climate Change on Culturally Significant Wetland Plants and Their Habitat in the Meduxnekeag River Watershed in Maine | U.S. Geological Survey (usgs.gov)]

How to work with the USGS

Funding mechanisms:

- Interagency Agreements (IAs)
- Direct Funding Agreements (DFAs)
- Joint Funding Agreements (JFAs)
- Technical Service Agreement (TSAs)

Hiring/internship Programs:

- USAJobs postings
- Pathways positions
- Intergovernmental Personnel Act (IPA) positions
- Hydrologic Field Assistant (HFAs)
- NSF-USGS internships
- Volunteer for Science
- Direct hire for Veterans

https://www.usgs.gov/special-topics/national-science-foundation/usgs-internship-opportunities

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Youth Outreach and Professional Training Opportunities

Youth Outreach:

- Virtual Classroom Visits (VcVs)
- On-site visits by USGS staff
- Boys and Girls Clubs *(after school and summer programs)*
- Tribal Nation summer programs
- STEP-UP program
- Veterans outreach: Transitory Assistance Program (TAP)
- Fishing Program for Veterans and Groups Leetown, WV

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Training:

- USGS training courses
- TESNAR
- Tribal Climate Adaptation Workshop (CASCs)
- Native American Research Assistantship program (NARA)
- Collaborative training with other agencies
- Routine site visits at USGS infrastructure on or near Tribal Nation

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Examples of Youth Outreach and Native Youth in STEM

Poarch Band of Creek Indians Environmental Education Day (AL)

- ~250 Tribal member students ages 5 to 17
- USGS co-presents with EPA and USDA

https://pci-nsn.gov/about/

Native Youth in Science, Preserve Our Homeland, Mashpee Wampanoag (MA)

- 17 to 30 campers between 5th and 8th grade
- Topics include: glacial geology, topo maps, watersheds, surface and groundwater flow, water and sediment quality, HABs, PFAS, and fisheries

https://www.usgs.gov/media/videos/native-youth-science-preserving-our-homelands

Houlton Band of Maliseets – Skitkomiq Camp (ME)

- Rural area camp for 6 to 12 campers between 5th and 8th grade

http://naturalresources.maliseets.com/skitkomiq-culture-in-science-camp/

Native Youth Climate Adaptation Leadership Congress (NYCALC)

- June 25-30, 2023 at the National Conservation Training Center, Shepherdstown, WV
- ~80 high school students, 12 junior faculty, community mentors, training team, faculty
- 44 Tribes/Tribal Organizations represented
- Others involved: USFWS, CASCs, BIA, NPS, BLM, USFS, NOAA, Smithsonian

- Big Question for the week: “What does an intergenerational approach to climate justice look like?”

- Impact: mentoring, career fair, workshops, intertribal teambuilding, cultural event

http://www.nycalc.org/

American Indian Science and Engineering Society National Conference (AISES) Advancing Indigenous People in STEM

- October 18, 2023
- Spokane, WA
- 200-300 middle and high school students (free for WA residents), Four hours
- Washington Water Science Center
- OSQI-OTR and EROS

- 2024: Oct. 3-5 in San Antonio, TX
- 2025: Oct. 2-4 in Minneapolis, MN

https://conference.aises.org/agenda/session-proposals

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TEchnical training in Support of Native American Relations (TESNAR)

- Funding to support USGS employees to design and conduct training to build technical capacity of Tribal Nations
- Subject(s) determines by Tribes and First Nations

Examples:

I. *Field methods:*
   - *Surface water quality monitoring/sampling*
   - *Groundwater monitoring/sampling*
   - *Streamgaging*

II. *Data analysis, data management, and Quality Assurance Project Plans (QAPPs)*

III. *GIS/mapping*

IV. *Harmful Algal Bloom (HAB) monitoring*

- Internal calls for proposals each Spring

TESNAR Program: CSAs | U.S. Geological Survey (usgs.gov)

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Native American Research Assistantship (NARA)

- Annual summer research assistantships for Native undergraduate or graduate students in partnership with The Wildlife Society (TWS) since 2014
- USGS pilot year projects in 2023:

1. Hyperspectral Identification of Harmful Algal Blooms in the Klamath Basin and Beyond *(MD-DE-DC Water Science Center)*

2. Identifying the Potential Socio-Economic Effects of Chronic Wasting Disease (CWD) on Native Americans *(Science and Decisions Center)*

3. Tribal Data-Network Infrastructure Plan – Transfer of US Geological Technology to Tribal Nations *(New York and New England Water Science Centers)*

[Native American Research Assistantship Program | U.S. Geological Survey (usgs.gov)]

EPA-USGS-Tribal Nation Collaboration

- Existing RTOC communities
- Shared CWA training events
- Collaborative monitoring and research

[Tribal and First Nation Partners from New England and New York Participate in a Clean Water Act Training | U.S. Geological Survey (usgs.gov)]

Examples of USGS collaboration with Tribal Nations

Pamunkey Water Resource Characterization

- Compile information about water and water-dependent resources of interest to Pamunkey Nation
  - *Indigenous Knowledge, oral histories, Tribal documents, and interviews*
  - *Published data and scientific studies*
- Publish compendium of information accessible to Pamunkey Nation managers and citizens
  - *Formal, citable report (in review)*
  - *Online StoryMap*
- Facilitate discussion of water-resource threat prioritization to inform Pamunkey training and science needs

Understanding the Pamunkey River: (arcgis.com)

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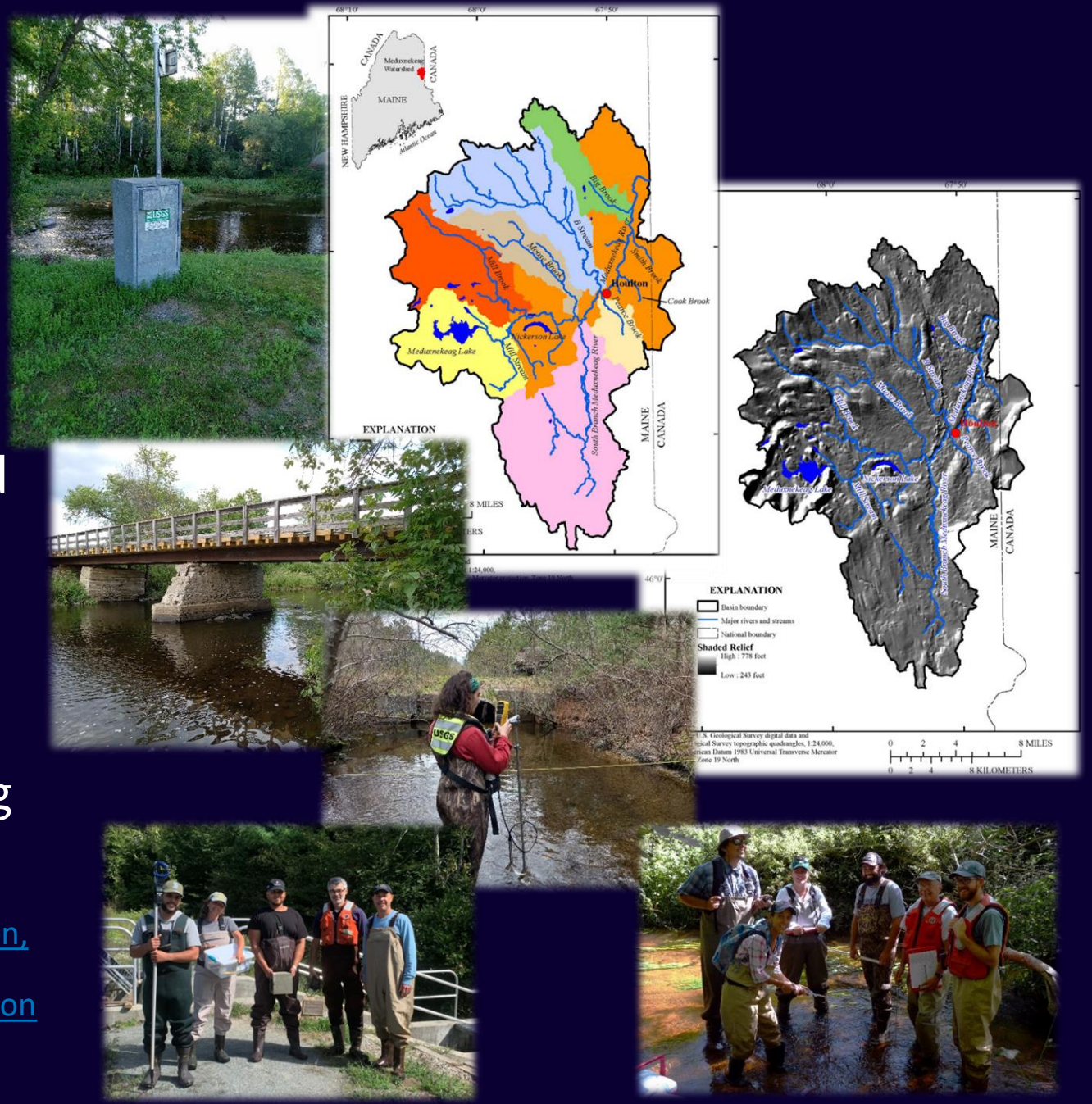
Thermal Refugia

- Maine: previous IR flyovers in the Meduxnekeag basin; existing model and supporting data
- Mass: 50+ years of data on Cape Cod
- “Seepage runs” to define GW influence
- Temperature monitoring support and training
- Existing USGS streamflow monitoring network



[Evaluation of Aerial Thermal Infrared Remote Sensing to Identify Groundwater-Discharge Zones in the Meduxnekeag River, Houlton, Maine (usgs.gov)]

[Data for Simulating the Effects of Air Temperature and Precipitation Changes on Streamflow and Water Temperature in the Meduxnekeag River Watershed, Maine - ScienceBase-Catalog]

Harmful Algal Blooms

- Sample events in Connecticut River and other large US rivers, and 2 Tribal Nations
- Multiple sampling approaches:
  I. SPATTs cyanotoxins (*anatoxins, cylindrospermopsins, microcystins , and saxitoxins*)
  II. Discrete samples *(cyanotoxins, chl a, cyanotoxin, synthetase genes, phytoplankton, community composition)*
- HAB research for NARA student

[Cyanotoxin occurrence in large rivers of the United States (tandfonline.com)]

[sir20215121.pdf - Cyanobacteria, Cyanotoxin Synthetase Gene, and Cyanotoxin Occurrence Among Selected Large River Sites of the Conterminous United States, 2017–18 (usgs.gov)]

[Native American Research Assistantship Program | U.S. Geological Survey (usgs.gov)]

INLAND WATERS
2020, VOL. 10, NO. 1, 109–117
https://doi.org/10.1080/20442041.2019.1700749

RESEARCH BRIEF

OPEN ACCESS

Cyanotoxin occurrence in large rivers of the United States

Jennifer L. Graham [a], Neil M. Dubrovsky [b], Guy M. Foster [a], Lindsey R. King [c§], Keith A. Loftin [c], Barry H. Rosen [d‡] and Erin A. Stelzer [e]

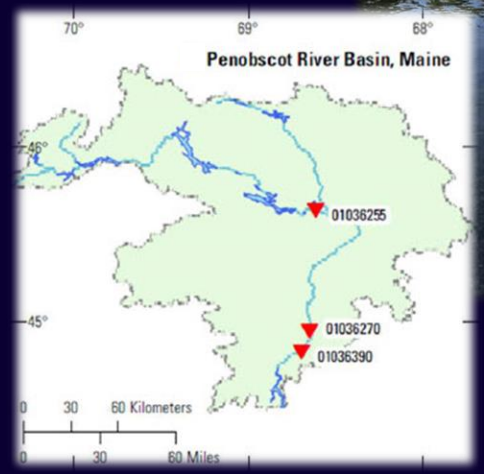
[a]New York Water Science Center, United States Geological Survey, Troy, NY, USA; [b]Water Mission Area, United States Geological Survey, Sacramento, CA, USA; [c]United States Geological Survey, Kansas Water Science Center, Lawrence, KS, USA; [d]Emeritus, United States Geological Survey, Orlando, FL, USA; [e]Ohio-Kentucky-Indiana Water Science Center, United States Geological Survey, Columbus, OH, USA

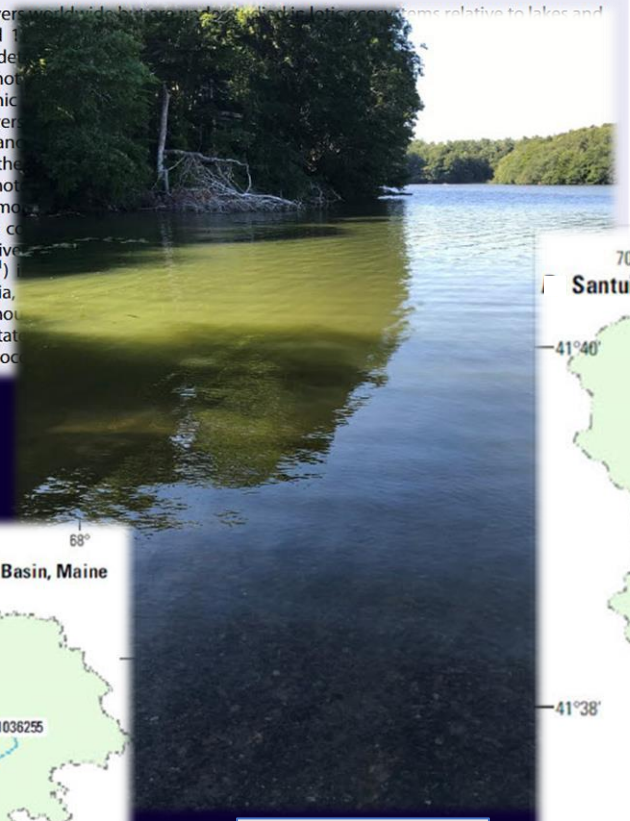
ABSTRACT

Cyanotoxins occur in river… reservoirs. We sampled … September 2017 to de… producing strains, cyanot… ranged from oligotrophic… communities of all river… (0–52% of total abundan… and many (64%) of the… producing strains. Cyanot… genes were most commo… The *cyrA* gene was less c… was detected in one riv… levels (0.10–0.38 µg L^{-1}) … detected. Cyanobacteria, … concentrations throughou… region of the United Stat… genes, and cyanotoxin oc…

ARTICLE HISTORY
Received 16 May 2019
Accepted 1 December 2019

KEYWORDS
cyanobacteria; cyanotoxins; cyanotoxin synthetase genes; rivers; United States





Santuit Pond

Great Lakes Science Center Initiatives

- Collaboratively working with the St Regis Mohawk Tribe (SMRT) for more than 20 years on science support activities, mostly centered around fisheries, fish habitat, and native species restoration activities.
- The SMRT helped the GLSC reach out to other Tribal Nations in New York State to explore possibility of meeting USGS science staff/scientists and exploring Tribal science priorities (water, fish, wildlife, etc).
- Proposed fisheries science training in 2024 and Tribal space at Tunison lab

Fiddlehead PFAS

Analysis of PFAS in fiddlehead ferns and corresponding soil samples from Northeastern Tribes

Dr. Sara Thomas, Dr. Sara Nason, and Dr. Nubia Zuverza-Mena
Connecticut Agricultural Experiment Station

- Culturally important food source
- Pilot study with 4 Tribal Nations in Maine (2022)
- Connecticut Agricultural Experiment Station developed protocols for plant tissue and soils
- USGS provided logistics, technical support and analytical standards
- No PFAS were detected in fiddlehead fern samples (MDL 8 times lower than soils)
- Expand to other Tribal Nations in future

Backstory

A community based PFAS phytoremediation project at the former Loring Airforce Base

Sara L. Nason,[1,*] Chelli J. Stanley,[2] Chief E. PeterPaul,[3] Maggie F. Blumenthal,[2] Nubia Zuverza-Mena,[1] and Richard J. Silliboy[2,3]

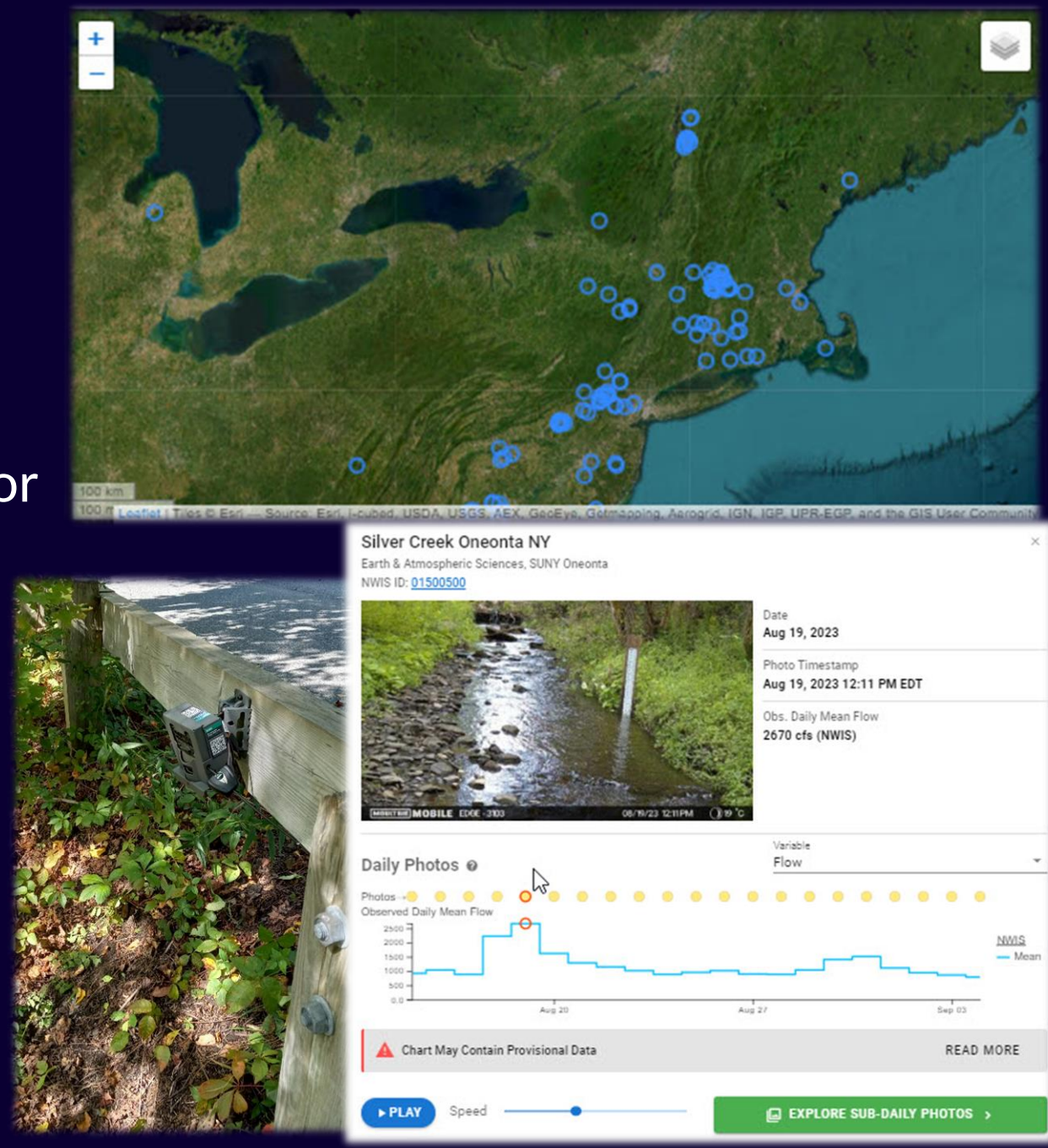
gettyimages

[Connecticut Agricultural Experiment Station]

[A community based PFAS phytoremediation project at the former Loring Airforce Base (cell.com)]

AI/ML Flow Photo Explorer

- Web-based data portal for uploading, storing, and exploring streamflow photos and data.
- Develop ML models to estimate flow (or stage) directly from timelapse imagery using the collected photos and data.
- Pilot effort with a Tribal Nation
- STEP-UP students manage camera locations



[Flow Photo Explorer | USGS]

[STEP-UP: Secondary Transition to Employment Program – USGS Partnership | U.S. Geological Survey]

Fish Ladder retrofits

- Osprey and heron deaths reported over many years
- Negative toxicology results
- Work with Mashpee Wampanoag NRD, Town of Mashpee and USGS EESC/WSCs
- Designed retrofits to prevent bird entrapment, improve fish passage, and not block Tribal fishing access

Other examples of USGS work in New York

Developing a More Representative Sampling Method for the Identification of Microplastics in Low Flow Stream Samples

Per- and polyfluoroalkyl substances (PFAS) in Throughfall at the Bronx Botanical Gardens

Fate and Transport of PFAS Through Decentralized Treatment Plants, Long Island, NY

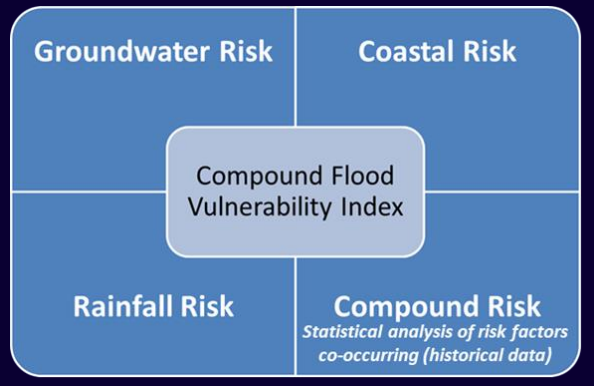
Developing Living Numerical Models for Groundwater Flow and Transport on Long Island

Assessment of Natural Carbon Stocks, Fluxes, and Quality

HAB SmartScope: Cell Phone Imaging & AI Identification *and* LSPIV: Velocimetry for Network Modernization

Compound Flooding

Science Applications of Extended Reality



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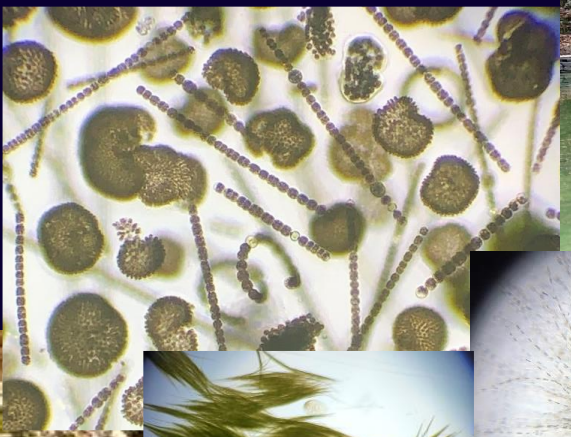





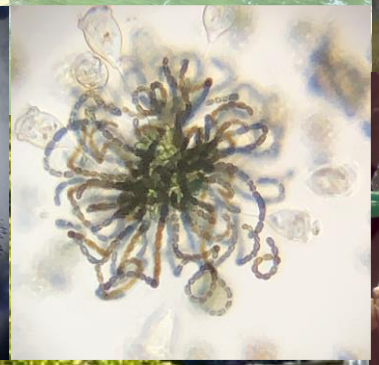


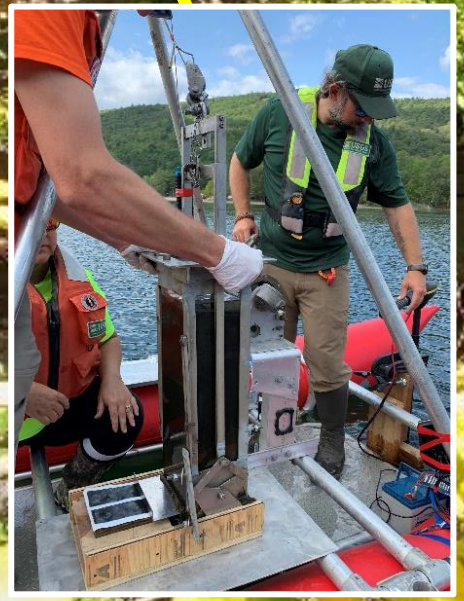

Questions?