



# U.S. GEOLOGICAL SURVEY

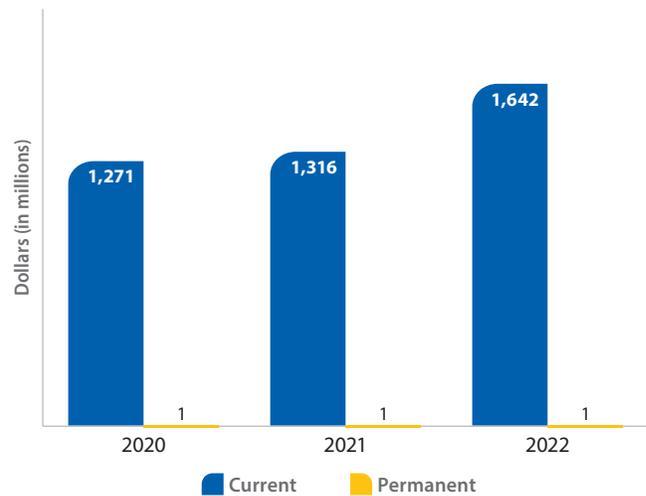
**Mission**—The U.S. Geological Survey (USGS) monitors, analyzes, and predicts current and evolving Earth-system interactions and delivers actionable intelligence at scales and timeframes relevant to decision makers. USGS provides science about natural hazards, natural resources, ecosystems and environmental health, and the effects of climate and land-use change.

**Budget Overview**—The 2022 USGS budget is \$1.6 billion, an increase of \$326.9 million above the 2021 enacted level. USGS estimates that staffing is 8,196 full-time equivalents (FTEs), an increase of 475 FTEs from 2021. The budget commits to science addressing climate change and invests in research and development to support economic growth, inform balanced decisions regarding resources, and ensure the well-being of the Nation.

**Promoting Climate Resilience and Conservation**—In line with President Biden’s Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, the budget includes investments to address climate change while laying the foundation for economic growth, creation of good-paying jobs, and ensuring that those benefits accrue to marginalized and overburdened communities. The budget addresses climate change with \$205.0 million in new climate science investments.

The new investments include \$42.5 million for Climate Adaptation Science Centers and Tribal climate science, \$25.0 million to support Interior bureaus with applied conservation science and research to support adaptive management of Interior lands, and \$10.0 million to understand and quantify ecosystem services. The budget also includes \$5.0

## USGS Funding



million split between the Climate Adaptation Science Centers and Science Synthesis, Analysis, and Research programs to study the effects of climate change on biodiversity, \$5.0 million for research on climate-driven biological threats and invasive species, \$10.0 million to improve resilience to coastal hazards, and \$10.0 million to improve water prediction and water availability assessments.

The budget also invests \$60.0 million in collaborative research with the new Advanced Research Projects Agency for Climate (ARPA-C) within the Department of Energy. The ARPA-C collaboration invests in high-risk, accelerated research to achieve transformational advancement in climate adaptation and resilience. USGS will deliver actionable science products that reduce barriers between science and user application. USGS science will focus on five initial areas: planning tools to understand and predict habitat and biodiversity changes,

- The U.S. Geological Survey was founded by an Act of Congress in 1879.
- It is the Nation's largest water, earth, and biological science and civilian mapping agency.
- USGS employs more than 8,000 scientists, technicians, and support staff working in more than 400 locations throughout the United States.
- USGS is a primary Federal source of science-based information available to the public, providing data about ecosystem science, energy and mineral resources, natural hazards, water use and availability, and updated maps and images of the Earth's features.
- For nearly 50 years, USGS has collected almost 10 million Landsat images, which were used for agriculture, water management, wildfire risk and response, resource management, and planning, as well as informing efforts to reduce hunger globally.

models for drought prediction, predictive tools for fire and post-fire risk management, coastal change and vulnerability forecasts to support planning and disaster response, and models to assess the potential and risks associated with geologic storage of hydrogen relevant to the potential of clean energy options.

As part of tackling the climate crisis, the 2022 budget supports the Administration's commitment to a cleaner energy future. A \$20.0 million increase to research biologic, geologic, and coastal blue carbon sequestration will help reduce the legacy impact of fossil fuels and mitigate the effects of ongoing use as the world transitions to cleaner energy sources. A \$20.0 million increase supports the inventory of greenhouse gases on Federal lands, develops scenario analysis tools to reduce those gases, and monitors progress to achieve reduction targets and goals. An additional \$5.0 million increase will provide decision tools to support clean energy deployment on Federal lands and waters.

**Advancing Science and Expanding Research and Development**—The budget reflects the Administration's strong commitment to USGS research and development with a mission-driven investment of \$83.0 million. These use-inspired research and development investments provide actionable and accessible information and decision support tools to Interior bureaus, other agencies, and the public.

The budget strengthens natural hazard science with a \$13.0 million increase, which includes support for subduction zone science, modernizing infrastructure in support of earthquake analysis, improvements to the National Volcano Early Warning System, actionable landslide hazard science, and geomagnetism observatories to improve warnings of catastrophic space weather events. The budget continues to support the ShakeAlert® earthquake early warning system with \$25.7 million. As of this year, ShakeAlert® is available across the entire West Coast.

An increase of \$25.0 million will help to secure America's competitiveness by locating domestic reserves of critical minerals, researching materials supply chains for green technologies, and supporting mine reclamation with research to determine those with valuable supplies of critical minerals. An increase of \$5.0 million supports geospatial data collection on Tribal lands to ensure that Tribes can participate in the benefits that elevation data (3DEP) and geologic research provide. An increase of \$10.0 million will improve surface water monitoring through the Next Generation Water Observing System and Federal priority streamgages.

The 2022 budget supports the Administration's 30x30 vision for conservation with an increase of \$15.0 million for tools that allow Interior and others to target conservation investments accurately and cost effectively. Many of those tools are

possible through imagery from satellites of the Landsat program. The program’s next satellite, Landsat 9, launches in calendar year 2021, and USGS and NASA have begun development on next-generation space-based land imaging. Satellite Operations is funded at \$84.8 million.

The budget includes an increase of \$15.0 million to address inequities in the sciences, support scientific integrity, and strengthen the information systems and other enterprises that support research and development.

**Ecosystems Programs**—The 2022 budget includes \$358.2 million for Ecosystems programs, \$99.1 million above the 2021 enacted level. Ecosystems programs examine the consequences of climate and environmental change; the effects of management actions on communities, land, and species; and the risks of and solutions to harmful invasive species, wildlife disease, contaminants in the environment, and the impacts of wildfires. The 2022 budget

includes \$25.7 million for contaminant biology and toxic substance hydrology research within the Environmental Health program. Species Management Research is funded at \$66.9 million, with increases to support land management conservation and adaptation and decision support research for clean energy development. Land Management Research is funded at \$75.3 million, with increases supporting conservation and climate adaptation as well as research to understand and quantify ecosystems services. The Biological Threats and Invasive Species Research program is funded at \$44.0 million, with an expanded focus on climate-driven invasive species, wildlife disease, and pests. The Climate Adaptation Science Center and Land Change Science programs are funded at \$120.8 million, with increases to invest in collaboration and investigation through the regional centers, facilitate synthesis of regional findings to the national level, build Tribal climate science capacity, research biological carbon sequestration, monitor greenhouse gas reductions, and provide for other research on climate effects. Cooperative Research Units are funded at \$25.5 million.

**Energy and Mineral Resources Programs**—The 2022 budget includes \$140.0 million for Energy and Mineral Resources programs, \$49.9 million above the 2021 enacted level. These programs conduct research and assessments on the location, quantity, and quality of the Nation’s energy and mineral resources and produce science to support the safe and environmentally responsible development of these resources. The budget for Energy Resources is \$53.7 million, which supports multi-resource assessments that include wind, solar, and geologic energy sources, including geothermal. Increases of \$23.6 million support geologic carbon sequestration, greenhouse gas inventory and analysis, and tools for greenhouse gas reduction on Federal lands. The budget for

**LCMAP: Land Change Monitoring, Assessment, and Projection**  
*National Land Imaging, Land Change Science Programs*

**Why does this matter?**

The Land Change Monitoring, Assessment, and Projection (LCMAP) project is monitoring long-term land surface change and projecting future land surface states and conditions using satellite-based remote sensing data and climate-sensitive modeling. LCMAP provides a long-term record of landscape change unmatched by other monitoring frameworks and facilitates analyses of change processes.

**What is the return on investment?**

Long-term and high-frequency monitoring of past and present landscape change are the basis for assessing feedbacks among climate, water, land use, management actions, and various socioeconomic and ecologic processes. Models of future landscape change are used to project and visualize feedbacks among human and natural systems to help inform decision making.

the Mineral Resources program is \$86.2 million, providing \$26.4 million in increases to support supply chain research related to the critical minerals needed for green technologies, mine waste research and assessment in support of reclamation and potential mineral recovery, and research and assessments of potential new sources of critical minerals. By determining whether reclamation sites have valuable mineral waste resources that can be extracted and reclaimed, USGS can help identify a potentially valuable domestic source of critical materials and help create good-paying jobs.

**Natural Hazards Programs**—The 2022 budget provides \$207.7 million for Natural Hazards, \$32.3 million above the 2021 enacted level. These programs provide information and tools to understand and respond to hazards such as volcanoes, earthquakes, solar flares, and landslides, with a goal of increasing community resilience and reducing potential fatalities, injuries, property damage, and other negative social and economic effects. This budget activity also includes efforts to characterize and assess coastal and marine processes, conditions, vulnerability, and change. Within the \$92.6 million proposed for the Earthquakes Hazards Program, the budget continues to fund Shake-Alert® development and deployment, includes increases for research into induced seismicity from geothermal development and carbon sequestration, subduction zone science to research the largest and most catastrophic of earthquakes, and earthquake analysis and risk reduction. The Volcano Hazards Program is funded at \$33.5 million, with increases to improve hazard assessments and support the National Volcano Early Warning System. The budget also funds the Global Seismographic Network at \$7.2 million and the Geomagnetism program at \$5.7 million, including a \$1.5 million increase for expansion of magnetometer observatories to support the Nation’s preparedness for space weather events. The Landslide Hazards program is funded at \$11.2 million, including a \$3.0 million increase for actionable science to reduce landslide risks. Within the \$57.5 million included for Coastal/Marine Hazards and Resources, an increase of \$10.0 million supports science for climate-driven coastal hazards and improve coastal resilience, an increase

of \$4.0 million for research on coastal blue carbon will improve understanding of this valuable source of greenhouse gas mitigation, and an increase of \$2.0 million supports risk reduction and efforts to improve community resilience.

**Water Resources Programs**—The 2022 budget includes \$288.4 million for Water Resources, \$25.3 million above the 2021 enacted level. Water Resources programs collect and deliver hydrologic data, model and analyze hydrologic systems, and conduct research and development leading to new understanding of and methods for gathering water data. A national network of streamgages, wells, and other monitoring sites supports program activities aimed at understanding the quantity, quality, and use components of water availability. The \$69.5 million budget for Water Availability and Use Science includes increases for integrated water prediction and integrated water availability assessments. The Groundwater and Streamflow Information program is funded at \$112.7 million, including increases to build out the Next Generation Water Observing System and expand operation of Federal priority streamgages that meet one or more strategic, long-term Federal information needs. The National Water Quality Program and Water Resources Research Act Program are funded at \$95.2 million and \$11.0 million, respectively. Cooperative matching funds are funded at \$64.5 million across the Water Resources mission area and will be leveraged with funding from State, Tribal, and local partners to support cooperative water projects.

**Core Science Systems Programs**—The 2022 budget provides \$341.9 million for Core Science Systems, \$89.2 million above the 2021 enacted level. This activity provides the Nation with access to science, information, data, imagery, and geospatial frameworks to better manage natural resources, support new infrastructure planning, and plan for and respond to natural hazards. The National Geospatial Program is funded at \$85.6 million, with a program increase of \$5.0 million for targeted data collection and research on Tribal lands coordinated with the priorities of the Tribes. The budget provides \$40.6 million for the National

Cooperative Geologic Mapping program. Science Synthesis, Analysis, and Research is funded at \$98.8 million, with increases of \$60.0 million for collaborative research in climate adaptation and resilience as part of the Department of Energy’s ARPA-C effort; \$9.6 million to improve tools supporting conservation planning, coordination, and tracking, such as the Protected Areas Database of the United States; and \$2.5 million for research to address the threats of climate change on biodiversity. The budget also provides \$116.9 million for the National Land Imaging program, which includes \$32.0 million to support the launch of Landsat 9 and continue developing sustainable land imaging with Landsat Next; and increases of \$4.0 million for biologic carbon sequestration and \$5.4 million for Land Change Monitoring, Assessment, and Projection and other tools to support targeting of conservation, land-use planning, and development.

**Science Support Programs**—The 2022 budget includes \$121.4 million for Science Support, \$25.7 million above the 2021 amount. These programs provide the necessary business services and information technology management to operate USGS science programs. The budget includes program increases of \$7.0 million in Administration and Management to strengthen scientific integrity efforts across Interior, ensuring that quality science underpins important resource decisions; increases scientific diversity; and ensures compliance with laws and regulations without creating an additional direct financial burden on USGS science. The budget also includes \$7.2 million to begin transitioning the USGS fleet to zero emission vehicles. An increase of \$8.0 million in Information Services ensures that the bureau’s science is supported, delivered, and protected with improved

## USGS Protected Areas Database of the U.S.

Science Synthesis, Analysis, and Research

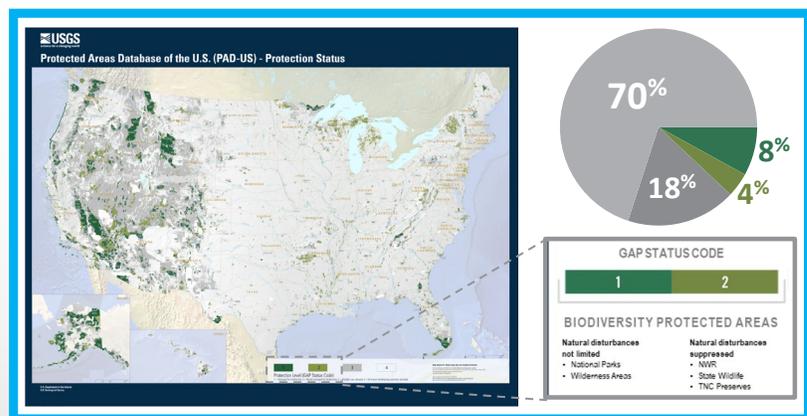


### Why does this matter?

PAD-US provides an aggregation of protected and conserved lands and waters to inform the 30x30 conservation priority.

### What is the return on investment?

A comprehensive inventory of our shared investments in public land and protected areas supports many uses: biodiversity protection assessments, climate change mitigation, recreation planning, emergency management, and more.



PAD-US Protection – Status 1, 2 All Lands. Credit: U.S. Geological Survey

information security products and services, cloud access, and other information technology to support the data-intensive needs of a modern science organization.

The USGS budget includes \$800,000 as part of a Departmentwide Diversity, Equity, Inclusion, and Accessibility budget initiative to address identified high-priority needs in support of Executive Order 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government, and Executive Order 13988, Preventing and Combating Discrimination on the Basis of Gender Identity and Sexual Orientation. As part of this initiative, the Department, bureaus, and offices will jointly conduct a review of the Diversity, Equity, Inclusion, and Accessibility program across Interior to identify gaps, challenges, and best practices and to examine Department and bureau roles, responsibilities, and governance.

**Facilities**—The 2022 budget provides \$184.8 million for Facilities, \$5.4 million above the 2021 enacted level. Funding includes \$110.1 million for Rental Payment and Operations and Maintenance and \$74.7 million for Deferred Maintenance and Capital Improvements. These programs ensure that safe, functional laboratories and other workspaces are available to accomplish the USGS scientific mission. The budget continues to support the USGS Menlo-to-Moffett relocation, which is expected to be completed in 2023. In 2022, the relocation is supported by both a rent rebate from the General Services Administration and approximately

\$30.0 million within the deferred maintenance and capital improvement program for laboratory and other capital improvements at Moffett Field. In addition, approximately \$28.5 million within the deferred maintenance and capital improvement program is the first phase of funding necessary to begin transitioning USGS energy and minerals labs at the Denver Federal Center from aging facilities unsuitable to support modern science to new space.

**Fixed Costs**—Fixed costs of \$26.0 million are fully funded.

**SUMMARY OF BUREAU APPROPRIATIONS**  
(all dollar amounts in thousands)

*Comparison of 2022 Request with 2021 Enacted*

	2021 Enacted		2022 Request		Change	
	FTE	Amount	FTE	Amount	FTE	Amount
<b>Current</b>						
Surveys, Investigations, and Research .....	4,667	1,315,527	5,142	1,642,437	+475	+326,910
Subtotal, Current .....	4,667	1,315,527	5,142	1,642,437	+475	+326,910
<b>Permanent</b>						
Surveys, Investigations, and Research .....	0	80	0	80	0	0
Contributed Funds .....	4	956	4	956	0	0
Subtotal, Permanent .....	4	1,036	4	1,036	0	0
<b>Reimbursable and Allocation</b>						
Reimbursable .....	3,033	0	3,033	0	0	0
Allocation .....	17	0	17	0	0	0
Subtotal, Reimbursable and Allocation.....	3,050	0	3,050	0	0	0
<b>TOTAL, U.S. GEOLOGICAL SURVEY .....</b>	<b>7,721</b>	<b>1,316,563</b>	<b>8,196</b>	<b>1,643,473</b>	<b>+475</b>	<b>+326,910</b>

## HIGHLIGHTS OF BUDGET CHANGES

*By Appropriation Activity/Subactivity*

### APPROPRIATION: Surveys, Investigations, and Research

	2020 Actual	2021 Enacted	2022 Request	Change
Ecosystems				
Environmental Health				
Contaminant Biology .....	10,397	10,397	11,100	+703
Toxic Substances Hydrology .....	13,098	14,348	14,639	+291
Species Management Research.....	53,714	53,914	66,918	+13,004
Land Management Research .....	56,681	56,681	75,303	+18,622
Biological Threats and				
Invasive Species Research .....	36,149	38,249	43,951	+5,702
Cooperative Research Units.....	24,000	25,000	25,506	+506
Climate Adaptation Science Center and Land Change Science				
Climate Adaptation Science Center .....	38,335	41,335	84,403	+43,068
Land Change Science .....	19,153	19,153	36,397	+17,244
Subtotal, Ecosystems.....	251,527	259,077	358,217	+99,140
Energy and Mineral Resources				
Mineral Resources .....	59,869	59,869	86,237	+26,368
Energy Resources .....	30,172	30,172	53,736	+23,564
Subtotal, Energy and Mineral Resources .....	90,041	90,041	139,973	+49,932
Natural Hazards				
Earthquake Hazards .....	84,903	85,403	92,637	+7,234
Volcano Hazards .....	30,266	30,266	33,532	+3,266
Landslide Hazards .....	4,038	8,038	11,179	+3,141
Global Seismographic Network.....	7,153	7,153	7,212	+59
Geomagnetism .....	4,000	4,114	5,673	+1,559
Coastal/Marine Hazards and Resources...	40,510	40,510	57,515	+17,005
Subtotal, Natural Hazards .....	170,870	175,484	207,748	+32,264
Water Resources				
Water Availability and Use Science Program.....	47,487	57,987	69,501	+11,514
Groundwater and Streamflow Information Program .....	84,173	100,673	112,651	+11,978
National Water Quality Program.....	92,460	93,460	95,242	+1,782
Water Resources Research Act Program...	10,000	11,000	11,000	0
Subtotal, Water Resources.....	234,120	263,120	288,394	+25,274
Core Science Systems				
National Land Imaging Program.....	106,865	106,865	116,892	+10,027
Science Synthesis, Analysis, and Research Program.....	25,972	25,972	98,803	+72,831
National Cooperative Geologic Mapping Program .....	34,397	40,397	40,581	+184
National Geospatial Program.....	79,454	79,454	85,598	+6,144
Subtotal, Core Science Systems .....	246,688	252,688	341,874	+89,186

**APPROPRIATION: Surveys, Investigations, and Research** (continued)

	2020 Actual	2021 Enacted	2022 Request	Change
Science Support				
Information Services .....	21,947	21,947	30,216	+8,269
Administration and Management .....	74,881	73,787	91,205	+17,418
Subtotal, Science Support .....	96,828	95,734	121,421	+25,687
Facilities				
Rental Payments and Operations Maintenance .....	104,719	104,719	110,146	+5,427
Deferred Maintenance and Capital Improvements .....	76,164	74,664	74,664	0
Subtotal, Facilities.....	180,883	179,383	184,810	+5,427
<b>TOTAL APPROPRIATION .....</b>	<b>1,270,957</b>	<b>1,315,527</b>	<b>1,642,437</b>	<b>+326,910</b>

*Detail of Budget Changes*

	2022 Change from 2021 Enacted		2022 Change from 2021 Enacted
TOTAL APPROPRIATION	+326,910	Fish, Wildlife, and Habitat Effects.....	+10,000
Surveys, Investigations, and Research.....	+326,910	Fixed Costs .....	+244
Ecosystems .....	+99,140	National and Regional Climate Adaptation Science Centers.....	+43,068
Environmental Health .....	+994	Climate Science	
Transfer		Expanded Center Support .....	+25,000
Integrated Sensor Grants .....	+500	Tribal Climate Adaptation .....	+10,000
Fixed Costs.....	+494	Synthesis of Regional Findings to National Level .....	+5,000
Species Management Research.....	+13,004	Biodiversity .....	+2,500
Transfer		Fixed Costs.....	+568
Integrated Sensor Grants .....	-500	Cooperative Research Units .....	+506
Climate Science		Fixed Costs.....	+506
Conservation and Adaptation.....	+7,500	Mineral and Energy Resources.....	+49,932
Clean Energy		Mineral Resources .....	+26,368
Decision Support.....	+5,000	R&D Investments	
Fixed Costs.....	+1,004	Mine Waste Research and Assessments.....	+15,000
Land Management Research.....	+18,622	Critical Minerals Mapping and Location.....	+5,000
Climate Science		Supply Chain Research for Green Technologies .....	+5,000
Ecosystem Services .....	+10,000	Fixed Costs.....	+1,368
Conservation and Adaptation.....	+7,500	Energy Resources.....	+23,564
Fixed Costs.....	+1,122	Climate Science	
Biological Threats and Invasive Species Research .....	+5,702	Federal Lands Greenhouse Gas Inventory .....	+10,000
Climate Science		Scenario Analysis Tools .....	+5,000
Climate-Driven Threats.....	+5,000	Geologic Carbon Sequestration Research.....	+4,500
Fixed Costs.....	+702	Geophysical Data.....	+3,500
Climate Adaptation Science Centers and Land Change Science.....	+60,312	Fixed Costs.....	+564
Land Change Science .....	+17,244		
Climate Science			
Biological Carbon Sequestration.....	+2,000		
Greenhouse Gas Monitoring .....	+5,000		

**APPROPRIATION: Surveys, Investigations, and Research** (continued)

	2022 Change from 2021 Enacted		2022 Change from 2021 Enacted
Natural Hazards .....	+32,264	Core Science Systems .....	+89,186
Earthquake Hazards.....	+7,234	National Land Imaging.....	+10,027
Climate Science		Climate Science	
Induced Seismicity .....	+2,000	Biologic Carbon Sequestration ...	+4,000
R&D Investments		R&D Investments	
Subduction Zone Science .....	+2,000	Tools Supporting Conservation Planning, Monitoring, and Projection .....	+5,400
Earthquake Analysis Infrastructure .....	+2,000	Fixed Costs.....	+627
Fixed Costs.....	+1,234	Science Synthesis, Analysis, and Research.....	+72,831
Volcano Hazards.....	+3,266	Transfer	
R&D Investments		National Geological and Geophysical Data Preservation Program .....	+350
Hazards Assessment.....	+1,000	Climate Science	
Data Delivery .....	+1,500	Assessment of Biodiversity.....	+2,500
Fixed Costs.....	+766	Transformational Climate Research.....	+60,000
Landslide Hazards.....	+3,141	R&D Investments	
R&D Investments		Tools Supporting Conservation Planning, Monitoring, and Projection .....	+9,600
Actionable Data .....	+3,000	Fixed Costs.....	+381
Fixed Costs.....	+141	National Cooperative Geologic Mapping .....	+184
Global Seismographic Network .....	+59	Transfer	
Fixed Costs.....	+59	National Geological and Geophysical Data Preservation Program .....	-350
Geomagnetism .....	+1,559	Fixed Costs.....	+534
R&D Investments		National Geospatial Program .....	+6,144
Expand Magnetometer Observatories .....	+1,500	R&D Investments	
Fixed Costs.....	+59	Geospatial and Geologic Research and Collection on Tribal Lands.....	+5,000
Coastal/Marine Hazards and Resources.....	+17,005	Fixed Costs.....	+1,144
Climate Science		Science Support.....	+25,687
Coastal Blue Carbon .....	+4,000	Administration and Management.....	+17,418
Coastal Hazards .....	+10,000	R&D Investments	
R&D Investments		Scientific Integrity, Diversity, and Enterprise Support .....	+7,000
Risk Reduction and Resilience ....	+2,000	Diversity, Equity, Inclusion, and Accessibility .....	+800
Fixed Costs.....	+1,005	Federal Zero Emission Vehicles.....	+7,150
Water Resources.....	+25,274	Fixed Costs.....	+2,468
Water Availability and Use Science....	+11,514	Information Services.....	+8,269
Climate Science		R&D Investments	
Integrated Water Availability Assessments .....	+6,000	Support for Science, including Information Security and Cloud .....	+8,000
Integrated Water Prediction .....	+4,000	Fixed Costs.....	+269
Fixed Costs.....	+1,514		
Groundwater and Streamflow Information .....	+11,978		
R&D Investments			
Next Generation Water Observing System.....	+6,400		
Fixed Costs.....	+1,978		
National Water Quality Program .....	+1,782		
Fixed Costs.....	+1,782		

**APPROPRIATION: Surveys, Investigations, and Research** *(continued)*

*Detail of Budget Changes*

	2022 Change from 2021 Enacted
Facilities .....	+5,427
Rental Payments and Operations and Maintenance .....	+5,427
Fixed Costs .....	+5,427
Subtotals for Changes Across Multiple Subactivities	
Fixed Costs .....	[+25,960]