Statement of
Dr. Jim Reilly
Director of the U.S. Geological Survey
before the
House Natural Resources Committee
Subcommittee on Energy and Mineral Resources
on
March 10, 2020

Chairman Lowenthal, Ranking Member Gosar, Members of the Subcommittee, thank you for inviting me to testify today on the priorities of the U.S. Geological Survey (USGS). The President's Budget for Fiscal Year 2021 provides for the USGS's mission to study the Earth. That's been USGS's mission for 141 years, but in the future, our science will need to be faster, more efficient, and more effective at reaching the communities that need it. We call this our 21st century science initiative, and it is a challenge that we must meet.

Since its founding, the USGS has mapped the Western reaches of our nation, has helped confirm the theory of plate tectonics, and continues to assess the natural resources of the national domain and many other regions. We are justifiably proud of our contribution to America's history and our future.

Today, we are a premier Federal Earth science agency, with partnerships across the nation and the world. We map the nation for topography and geology, we assess mineral resources critical for our economy across the nation and globe, we measure and forecast water quantities and qualities, we seek to understand our complex ecosystems, and we assess and warn for geological hazards to protect lives and property. We also operate satellites that have given us an almost 42-year continuous record of land surface data critical to understanding our constantly changing world.

In the future, we will harness the emergent power of artificial intelligence, machine learning, and distributed, or cloud, computing so that we can integrate and deliver our critical knowledge faster and better than we can today. These technologies will allow the USGS to make current capabilities more robust, enable new and better ways of conducting science, and they will ensure our scientists can focus on unanswered questions and unexplored ideas. In the next 141 years, the USGS will provide us all new insights into Earth processes that humans never before had.

The President's FY 2021 budget request, at $971 million, makes strategic investments in science, facilities, and infrastructure to help us meet tomorrow's challenges. Our budget provides $91 million for energy and mineral resource science, including critical minerals, which I will discuss further. Our budget also provides $138 million for scientific information and tools to understand and respond to natural hazards. This includes $28 million to monitor the nation's volcanoes. Lastly, our budget also provides $212 million for important mapping and imaging work, including $22 million for our National Cooperative Geologic Mapping Program with the States and $80 million for our National Geospatial Program, which expects to achieve the first-ever

baseline of national lidar data coverage by 2025. This budget will support the operation of over 8,400 streamgages, 3,000 earthquake sensors, and two satellites: Landsat 7 and 8. Our budget also supports important management and organizational reforms, such as the ongoing move from Menlo Park to Moffett Field in California, and our partnership with the Colorado School of Mines to co-locate certain laboratories and personnel. A very important priority is the consolidation of our Mission Areas from seven to five. This change will better align our science and will position our strategic initiatives to ensure that USGS science can be focused on the fundamental questions we face in the future, one of which is how to find the resources we need and how to develop them sustainably.

There are three science priorities I want to call your attention to. The first is the Earth Mapping Resources Initiative, or Earth MRI. We initiated this proposal as part of our FY 2019 budget, but the idea goes back to the very founding of the USGS. The Organic Act directs the USGS to "classify the public lands and examine […] geologic structure[s], mineral resources, and products" both domestically and abroad. Early on, the USGS identified that mapping both the surface and the subsurface would be crucial to fulfilling this mission and thus was born our peerless mapping legacy. Our examinations of geologic structures gave us unique insights into natural hazards such as earthquakes and volcanoes, and energy and mineral systems.

In the past we conducted these surveys on foot with rock hammers. Rock hammers are still in the tool kit, but we also use the latest technology in lidar, magnetic surveys, satellites, and unmanned aerial vehicles to deliver capabilities that would amaze John Wesley Powell. We have combined these efforts together into Earth MRI which, as the name suggests, will give us a new and higher-resolution view of the surface and subsurface of our planet, and we will make those data available to everyone. Of course, one of the important uses of Earth MRI data will be the identification of domestic supplies of critical minerals. Our economy and national security are dependent on the 35 minerals currently on the Department's Critical Minerals list, and today each of those minerals faces a potential disruption in supply. Expanding our capabilities, the higher-resolution Earth MRI when data coupled with high performance computing, cloud hosted solutions, artificial intelligence and machine learning applications will allow us to identify undiscovered faults, unmapped mineral resources, quantify our water resources, and help inventory and model our complex ecosystems. All of this is the essential first step to building safer infrastructure, safer communities, and better management of our resources.

Speaking of safer communities, I would also like to highlight a landmark accomplishment of the USGS and our partners: ShakeAlert. While other countries have developed earthquake alarm systems, on the West Coast of the United States we are rolling out cutting-edge earthquake early warning systems that will give municipalities, businesses, and citizens seconds to minutes of warning of damaging ground motions during an earthquake event. ShakeAlert produces warnings which are then communicated to the public by State and local authorities, such as the City of Los Angeles ShakeAlertLA app. Warnings are issued for earthquakes that are likely to cause damage and geolocation allows the warnings to go primarily to those who are most likely to feel damaging shaking. Distributing warnings to the general public through wireless carriers may be accomplished within the next year. A successful test of this approach was conducted in Northern

California just a few weeks ago. These accomplishments would not be possible without advancements in AI, high-speed telemetry, and IT infrastructure. Also, I would like to recognize the Bureau of Land Management for working closely with our Earthquake Science Center to facilitate the installation of additional seismic sensors that were necessary to make ShakeAlert fully functional in Southern California.

While the USGS is renowned for studying what is happening inside the Earth, we also use sensors deployed above the Earth – 438 miles above the Earth, to be precise. Since the launch of the Earth Resources Technology Satellite in 1972, the USGS and NASA have been partners in the design and operation of imaging sensors used to observe natural processes at a regional scale. Today known as Landsat, the data from these satellites have revolutionized water use in the West, tracked changes in our ecosystems, monitored crop health and yields, and led the world in mid-resolution remote sensing science applicable to virtually every aspect of our sciences.

Landsats 7 and 8 are in orbit right now. Landsat 7 will reach the end of its useful life soon and Landsat 9 will replace it. We are working closely with NASA to develop the next Landsat missions that will continue collecting important data. Examples of new applications for Landsat data are mapping wildfire burned areas and recovery, and monitoring the spread of harmful algal blooms, or HABs. Distributing these large volumes of image data requires extensive IT infrastructure, and the almost five decades of Landsat data we have archived will be of great value to our future Earth MRI work.

You can see how USGS science dynamically feeds back into itself and provides many users across the country and the world with vital information. You will also notice that all our work depends on computer technology. The need to invest in cutting edge technology will only grow, and 21st century science will be, in my scientific opinion, driven by advanced AI and machine learning. This is a daunting challenge, but I foresee that before this century is done the USGS will have created a system-of-systems that gives us – and the public – the remarkable capacity to "forecast" the Earth system nearly in real time.

From monitoring lahars on volcanoes, to building comprehensive nationwide water models, to tracking the nexus of human-livestock-wildlife diseases, each of these are tasks the USGS already undertakes. But with the incredible application of AI and distributed computing, new insights and innovations can be found in all these robust datastreams. More importantly, the next generation of Earth scientists will focus their talents on building new types of data and producing new types of information that decisionmakers, like Congress, can use to guide our nation. They will learn things about the Earth that I can only dream of and which my predecessors, like John Wesley Powell, could not even imagine.

On behalf of the approximately 8,000 employees of the USGS, thank you for inviting me here today. I would be happy to answer any questions you may have.