Statement of
Dr. Suzette Kimball, Acting Director
U.S. Geological Survey
Department of the Interior
before the
Committee on Natural Resources,
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Good afternoon, Mr. Chairman and Members of the Subcommittee. Thank you for the opportunity to appear before you today to discuss the Administration's FY 2016 budget request for the U.S. Geological Survey (USGS). This budget request builds on increases for research and development in the enacted appropriations for 2014 and 2015. The 2016 request recognizes the vital role that USGS science plays in addressing Interior's mission, key Administration priorities, and the needs of the American people.

The 2016 request for the USGS is $1.2 billion, which is $149.8 million or 14.3 percent above the 2015 enacted level. Investments in research and development (R&D) promote economic growth and innovation. R&D is at the core of the USGS mission and fuels advancement in areas such as preparing for natural disasters and understanding the U.S. energy and mineral resource endowment. As one of the Nation's premier water, earth, and biological science and civilian mapping agencies, the USGS collects and analyzes data about natural resource conditions, issues, and challenges in support of its mission: to provide reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect the quality of life. The 2016 budget request for the USGS supports this continued legacy of world-class science to support decisionmaking.

Before I discuss the Budget request for 2016, I want to briefly share with you some key accomplishments from the past year. USGS scientists and technicians responded to a number of *natural hazard events* throughout 2014, including landslides in Washington and California, the ongoing volcanic eruption in Hawaii, and a damaging earthquake in South Napa, California. In July, USGS scientists released the updated National Seismic Hazard Maps, which are used to establish building codes, develop emergency preparedness plans, and analyze seismic risk for key structures. The new maps indicate that more than 142 million Americans in 42 States and Territories are exposed to earthquake hazards.

Published just last month, new data on changes in *Alaska's land cover* from 2001 to 2011 show that the largest change has been the conversion of forests to shrub and grasslands, primarily as a

result of wildland fire. As the Arctic becomes more accessible to human endeavors, mapping and understanding changes in land cover are critical to using and preserving Alaska's wealth of natural resources. The extensive National Land Cover Dataset (NLCD) continues to add to our understanding of where land cover change has occurred across the Nation over time. Derived from carefully calibrated, long-term observations of Landsat satellites, NLCD data are essential to thousands of users, enabling managers of public and private lands, urban planners, agricultural experts, and scientists with many different interests to identify critical characteristics of the land and patterns of land cover change.

Last year, the USGS published the first-ever, geologically based *global assessment of undiscovered copper resources*, estimating that 3.5 billion metric tons of copper may exist worldwide. This amount of undiscovered global copper would be enough to satisfy current world demand for more than 150 years. Copper, one of the building blocks of civilization, is used in almost every aspect of modern life including plumbing, electrical wiring, cars, cell phones, and energy systems such as wind turbines. Also last year, the USGS published the first-ever inventory and geological assessment of known and undiscovered *platinum-group element* resources, estimating that more than 150,000 metric tons of these vital metals may exist primarily in two southern African countries, nearly double what had previously been known. Platinum-group elements are essential for cleaning automobile exhaust and for manufacturing high-octane fuel and could play a crucial role in fuel cell technology to produce clean energy for cars, homes, and businesses.

Harmful non-native species cause more than $100 billion in damage each year to the U.S. economy, from crop damage, clogged waterways and water infrastructure, threats to commercial, native, and farmed fisheries, transmission of human and wildlife disease, increased fire vulnerability, adverse effects for ranchers and farmers, and other challenges. As the Nation battles to control the economic, ecological, and health threats these invaders pose, the USGS is providing vital scientific information to detect, contain, and control invasive species such as Asian and black carp, snakehead, cheatgrass, buffelgrass, and leafy spurge. In the Great Lakes region, USGS scientists are developing and improving molecular methods to detect Asian carp; testing the use of water guns and carbon dioxide barriers to prevent further spread; and developing fish toxins that target Asian carp to reduce their numbers without affecting native species. These and other methods are also being applied to zebra and quagga mussels, which continue to spread from the Great Lakes across North America, from the Hudson River in the East to Lake Mead in the West.

These are just a few of the accomplishments of USGS scientists over the past year. Our Nation faces difficult challenges, but our unique capabilities for multi-disciplinary earth science research and the dedication of our more than 8,000 employees will allow the USGS to meet the needs of our Nation now and in the future.

The 2016 budget request includes increases that ensure the USGS continues to be at the leading edge of earth science research. It includes robust funding for science to inform land and resource management decisions, advance a landscape-level understanding of ecosystems, and develop new information and strategies to support communities in responding to climate change, historic drought, water use and availability issues, and natural hazards. The budget also funds science to support the Nation's energy strategy, help identify critical mineral resources, and address the impacts of energy and mineral development on the environment.

Budget Highlights

In my statement today, I would like to highlight several priority areas that provide significant public benefits and allow the USGS to build on collaborative relationships with other Federal agencies. Another priority area, water science, was described in a hearing before the Water, Power, and Oceans Subcommittee scheduled for earlier today, so I will touch only lightly on water topics today.

The key areas I will highlight are earthquake early warning, enhanced elevation data through the 3DEP program, energy development, the Landsat ground system, and supporting community resilience in the face of a changing climate.

Earthquake early warning (EEW) was the subject of a hearing before this subcommittee last June, and we greatly appreciate your interest in this promising effort. USGS R&D efforts in EEW began in 2004, and a pre-prototype EEW system called ShakeAlert has been operating in California since January 2012. While this system is not yet public, it serves dozens of test users and was made possible by recent investments in the California Integrated Seismic Network within the USGS Advanced National Seismic System (ANSS). In 2015, Congress enacted an increase in funding to the USGS "to transition the earthquake early warning demonstration project into an operational capability on the West Coast." In 2016, the USGS will work with the partners to further the development effort, with the goal of implementing a limited public warning system by 2018. These efforts will also serve to improve the ANSS to support emergency management and response by leveraging existing investments to create new capabilities, partnering with end users to create the products they need, and building the support structure for rapid emergency response. The USGS maintains a $5.0 million investment for EEW in 2016.

Updated, accurate *elevation data* are constantly in demand for Interior and national priorities, to advance landscape-level understanding and support hundreds of other mission-critical activities of Federal and State agencies. For hazards response, elevation data are used to identify faults and landslide areas, mitigate the effects of coastal erosion and storm surges, and map subsidence. Elevation data are fundamental to understanding flood risk and inundation mapping, and to understanding water availability, storage, and quality, to support Interior's collaborative

WaterSMART initiative. A host of resource management applications that support the national economy and improve the lives of Native Americans depend on elevation data, including biodiversity and habitat protection, fire fuel load mapping for wildland fire mitigation, precision agriculture and forestry inventories, and fisheries management. Through the 3D Elevation Program (3DEP) initiative, 3D elevation data are collected using lidar (light detection and ranging) over most of the United States, and using ifsar (interferometric synthetic aperture radar) in Alaska. The USGS requests an increase of $4.5 million for 3DEP in 2016.

The USGS requests an increase of $8.6 million for the *All-of-the-Above Energy* initiative, which includes funding for research related to unconventional oil and gas and renewable energy, as well as studies on the environmental impact of uranium mining.

In 2012, the President issued an Executive Order establishing an interagency working group to support responsible development of unconventional domestic natural gas resources. Interior and the USGS, working with the Environmental Protection Agency and the Department of Energy, partnered to develop the 2014 *Federal Multiagency Collaboration on Unconventional Oil and Gas (UOG) Research Strategy ("Strategy"; available online at http://unconventional.energy.gov/pdf/Multiagency_UOG_Research_Strateg.pdf)* to address priority research questions and to identify new technological opportunities. Together with its Federal partners, the USGS is conducting UOG research that supports sound management and policy decisions and produces decision-ready information for Federal, State, Tribal, and local entities. The USGS request includes an increase of $5.3 million for this effort.

A funding increase of $1.4 million requested in 2016 would allow the USGS to conduct research to identify likely areas of potential geothermal resource exploration and development, an area of renewable energy with substantial resource potential. The proposed funding increase would also allow for additional support for researching induced seismicity related to geothermal development on Federal lands and help to determine the risks and potential mitigation plans, should development be proposed.

Requested funding increases in 2016 would also allow the USGS to enhance support for Interior's permitting of alternative energy on Federal lands and expand research on the causes and impacts of wildlife mortality from wind and solar energy development. This research will directly support the goals of State, Tribal, and Federal agencies and energy managers to develop mitigation strategies to reduce negative impacts to wildlife, including bird and bat fatalities. Other funds would be used to provide information to inform decisions regarding uranium extraction.

Funding of $77.6 million is requested for the *Landsat satellite program*, $24.3 million above the 2015 enacted level. This request includes continued funding for the maintenance and operation

of ground systems and satellite operations as well as investment in a sustained land imaging effort over the next several decades. The successful launch of the Landsat 8 satellite in 2013 enables the continuation of the 42-year Landsat record and its tremendous benefits to the U.S. and global economies. In 2014 alone, more than 9 million Landsat satellite scenes were downloaded from the USGS archive by a wide range of users.

Following extensive study, the Administration has established a plan for a long-term Sustainable Land Imaging Program that would extend the four-decade long Landsat series of measurements of the Earth's land surfaces for another two decades. The plan includes three simultaneous activities. The first is the initiation of a new U.S.-built small satellite with a thermal imager that would launch as soon as feasible, likely in 2019, and would operate in conjunction with either a European Sentinel-2 satellite or Landsat 8. The second activity is the initiation of Landsat 9, as a rebuild of Landsat 8, with a target launch date in early 2023. The third activity is an ongoing investment in technology development and systems innovation to reduce risk in next-generation missions, including Landsat 10. In 2016, the USGS will work with NASA to support the Administration's plan for a Sustainable Land Imaging Program.

The USGS plays an important role in conducting research, providing data on the Earth's systems, and developing information and tools to support communities and Federal, State, Tribal, local, and international partners in understanding, preparing for, and responding to the impacts of *global change*. For example, a proposed increase of $3.2 million will support efforts to understand long-term and medium-term patterns of drought and water availability in the Western and Southeastern United States, and to increase the understanding of thresholds and tipping points caused by droughts, which is critical in providing managers with early-action options.

Summary by Budget Activity

Climate and Land Use Change – The 2016 budget provides a total of $191.8 million for Climate and Land Use Change, an increase of $55.9 million above the 2015 enacted level. The request includes a program increase of $8.7 million for biological carbon sequestration research, tools, and demonstration projects, to support continued improvements in the understanding of this vital carbon sink. Other requested increases will support the Department's Climate Science Centers, tribal science partnerships, drought research, and the Landsat effort described above.

Core Science Systems - The 2016 budget provides $127.0 million for Core Science Systems, $19.7 million above the 2015 enacted level. This activity provides the Nation with access to science, information, data, and geospatial frameworks used to manage natural resources and plan for and respond to natural hazards. Biologic and geologic data archives and geospatial data in The National Map provide critical data about the Earth, its complex processes, and its natural resources. A proposed increase of $11.0 million will enable the USGS to provide communities

with robust geospatial tools for resilience planning, preparedness, and response. Other proposed increases will support 3DEP acquisition for the Nation with a special focus on Alaska, as described above.

Ecosystems – The 2016 budget includes $176.3 million for Ecosystems, $19.3 million above the 2015 enacted level. These funds support USGS research and monitoring to better understand how ecosystems function and to improve management of the Nation's natural resources. Areas of particular focus for 2016 are the Arctic, Columbia River, Puget Sound, and sage steppe landscapes. The Ecosystems budget request includes increases to address native pollinator issues, Great Lakes fisheries, invasive species, and other significant wildlife diseases.

Energy, Minerals, and Environmental Health – The 2016 budget includes $103.3 million for Energy, Minerals, and Environmental Health, $11.0 million above the 2015 enacted level. The requested funding supports research on and assessments of the location, quantity, and quality of the Nation's and world's mineral and energy resources, as well as research to support the safe and environmentally responsible development of domestic resources. An increase of $2.4 million will enhance support for research on critical minerals including rare-earth elements. Increased funding is also requested for studies of unconventional gas resources, environmental impacts of uranium mining, resilient coastal landscapes and communities in the Northeast, and impacts of endocrine-disrupting chemicals on fish and wildlife, particularly in the Columbia River region.

Natural Hazards – The 2016 budget provides $146.4 million for Natural Hazards, $11.2 million above the 2015 enacted level. This activity provides scientific information and tools to help understand and respond to hazards such as earthquakes, tsunamis, landslides, volcanic eruptions, and geomagnetic storms. This activity also includes efforts to characterize and assess coastal and marine processes, conditions, vulnerability, and change. In addition to the support for earthquake early warning described earlier, the budget requests an increase of $4.9 million for the Global Seismic Network, to enable deployment of sensors that were procured by the Department of Energy for unclassified seismic data, in support of its nuclear monitoring research program. Other requested increases will support improved response to landslides and volcanic eruptions, as well as science and tools to support vulnerable Arctic and island coastal communities.

Water Resources – The 2016 budget request for the USGS Water Resources Mission Area is $222.9 million, an increase of $11.6 million. This supports science investments to promote understanding of freshwater availability and use; enhance groundwater monitoring; support the National Streamflow Information Program; and continue monitoring and assessing the quality of the Nation's water, including the outcomes of the investments the Nation is making in water-quality improvements.

Science Support and Facilities – The 2016 budget request includes $112.8 million for Science Support, $7.2 million above the 2015 enacted level, and $114.3 million for Facilities, $13.9 million above the 2015 enacted level. The Facilities request includes funding to consolidate space and real property, which will continue to reduce the USGS rental footprint nation-wide and support sustainable operation and maintenance of owned facilities. These investments are critical to the sound management and maintenance of the infrastructure that underpins all USGS science. Without funding to address facilities issues, the USGS will continue to face significant rent shortfalls and be unable to improve science facilities.

Conclusion

For more than 136 years, the USGS has provided reliable scientific information to decisionmakers and the public. The 2016 budget reflects the vital role the USGS plays in advancing the President's ongoing commitment to scientific discovery and innovation to support a robust economy, sustainable economic growth, natural resource management, and science-based decision-making for critical societal needs. This budget request allows the USGS to strongly position itself to meet future societal needs, Congressional and Administration priorities, and Interior's growing decisionmaking challenges. And it allows the USGS to further initiatives that are important to the American people.

This concludes my statement, Mr. Chairman. I will be happy to answer the questions you and other Members have.