U.S. House of Representatives
Committee on Science, Space, and Technology
Subcommittee on Research and Technology
Testimony of Dr. G. Wayne Clough
Secretary, Smithsonian Institution
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Mr. Chairman and Members of the Committee, it is my privilege to again appear before the Subcommittee on Research and Technology to testify about the science research and education programs at the Smithsonian Institution. I am pleased to have this opportunity to update the Subcommittee on our progress in focusing and advancing our efforts since I testified in 2010. I am also eager to share with the new members of the Subcommittee how Smithsonian scientists are working to better understand the world around us and the ways the Smithsonian is sharing that knowledge with the American people and scholars around the world—as it has since its creation.

In August 1846, Congress passed legislation that founded the Smithsonian Institution as an establishment dedicated to the "increase and diffusion of knowledge." The legislation established the Smithsonian as a repository for the U.S. government's collections of "all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens." Indeed, the first objects donated to the Smithsonian were scientific apparatus.

Today the Smithsonian is the world's largest museum and research complex with 19 museums and galleries, the National Zoo, and nine research centers. Smithsonian Institution Libraries, which unites 20 libraries, is the most comprehensive museum library system in the world, supporting the vital research of the Smithsonian, as well as the work of scientists and scholars from around the world. Smithsonian collections total 137 million objects and specimens, including 127 million scientific specimens and more than 2,000 live animals at the National Zoo, more than 8.7 million historical artifacts, and more than 340,000 works of art, as well as 1.8 million library volumes and 164,000 cubic feet of archival material. We are home to 6,500 dedicated employees and 6,200 loyal volunteers. We are active in more than 130 countries. Last year we had more than 31 million visits as well as 3.8 million social media followers on Facebook and Twitter alone. The Smithsonian, with the support of the Administration, the Congress, the American people and generous donors, is a public-private partnership that is working incredibly well.

Seeking answers has always been in the Smithsonian's DNA. We look to the recent and ancient past, geological, anthropological, botanical, and zoological. We peer into the outer reaches of the universe and the most extreme depths of the oceans. We look at cultures across the globe and here at home. We examine brush strokes on canvas, clay on armatures, and pixels on screens. Through it all, our experts use our collections to ask questions and find answers to some of the world's most complex and pressing problems.

The Strategic Plan Focus on Grand Challenges for Science

When I last appeared before the committee, the Smithsonian had just begun implementing a new strategic plan, the first in its history, formulated with the input of many people inside and outside the Institution. It called for us to develop a new cross-disciplinary approach to the way we do our work, to seek greater levels of collaboration within the federal government and without, and to focus our efforts on four grand challenges, two of which focus on the sciences: Unlocking the Mysteries of the Universe and Understanding and Sustaining a Biodiverse Planet.

Unlocking the Mysteries of the Universe

Since the late 1800s, the Smithsonian has played a lead role in understanding the fundamental nature of the universe, dark matter, and galaxy formation. The Smithsonian, particularly the Smithsonian Astrophysical Observatory (SAO), the National Air and Space Museum (NASM), and the National Museum of Natural History (NMNH), focuses on applying the integrative research of our scientists to today's big questions regarding the origin and evolution of the Earth, planets, stars, galaxies, and the universe. We have long-standing partnerships in our efforts with universities like Harvard, MIT, and Cal Tech as well as with the National Aeronautics and Space Administration (NASA) and other federal agencies.

Areas of focus include the study of the origin and evolution of the Earth and solar system, the effects of geologic and meteoric phenomena on Earth's atmosphere and biosphere, and discovery and characterization of exo-planets, particularly those that might sustain life systems. We are charged with maintaining the National Meteorite Collection which is used by our scientists and hundreds of others in understanding the composition of bodies from our solar system and beyond. We also are among the leaders in developing the next generation of ground- and space-based astronomical telescope mirrors and instrumentation that will enable the next generation of research. To cite one important example, our Solar Wind Electrons Alphas and Protons (SWEAP) program is a SAO-based investigation that will directly measure the properties of plasma in the solar atmosphere on the NASA mission "Solar Probe Plus," which will go into the Sun's atmosphere for the first time in 2018.

Understanding and Sustaining a Biodiverse Planet

Building from our strengths found at NMNH and in its world-class collections, the National Zoo and its Smithsonian Conservation Biology Institute (SCBI), the Smithsonian Tropical Research Institute (STRI), and the Smithsonian Environmental Research Center (SERC), we bring resources that allow us to understand biodiversity in a broad context. Our research investigates questions like: how to sustain a biologically diverse Earth in the face of growing populations; how does the earth's biodiversity change across geography and through time; and how do we understand the life-sustaining services of ecosystems and best sustain their contributions to human well-being locally

and globally?

While there are others who contribute research in developing answers to important questions, the Smithsonian is unique in providing access to the largest scientific collection in the world and being proficient in making long-term observations that help provide information needed to understand biodiversity in a changing world. The collections, developed over more than 150 years, have found a new life as new scientific tools like genomics have been introduced. Not only our scientists, but thousands of others have access to the collections.

Our ability to undertake large scale long-term observations is enhanced because our science is respected around the world, allowing us to form partnerships with scientists in universities, other agencies, and other nations. Our Forest Global Earth Observatory (ForestGEO) is a global network of forest research plots and scientists that have been dedicated to the study of tropical and temperate forest function and diversity for more than three decades. The multi-institutional network comprises 53 forest research plots in 23 countries across Africa, Asia, Europe, and the Americas, like the Lilly-Dickey Woods in Nashville, Indiana, in total monitoring the growth and survival of more than 4.5 million trees and more than 8,500 species. ForestGEO increases scientific understanding of forest ecosystems, guides sustainable forest management and natural-resource policy, monitors changes impacting forests across the globe, and builds capacity in forest science. The Smithsonian serves as the lead in the work, providing a host site for all of the data that are shared with partner institutions and nations.

In conjunction with the ForestGEO program, the Smithsonian has been funded by the National Science Foundation (NSF) to establish another long-term observation site located at the Zoo's Conservation Biology Institute in Front Royal, VA. NSF recently made a large investment in NEON, the National Ecological Observation Network, to create a continental observatory network aimed at understanding environmental patterns and processes in a coordinated and comparative long-term fashion.

Using the impetus of our strategic plan we have recently launched a marine version of the ForestGEO concept. Known as the Tennenbaum Marine Observatories Network (TMON), it will be the first worldwide network of coastal ecological field sites to comprehensively study marine biodiversity in a changing planet. TMON is unique among existing ocean observing efforts in several ways: it is a global network; it has standardized protocols; and it is focused on biodiversity and coastal regions—where people interact most intensively with the ocean. Each observatory will regularly sample local habitats for environmental drivers, habitat structure, biodiversity and community structure, and ecosystem processes. This information will give us a comprehensive, real time understanding of the complex relationships among the oceans and the life within and surrounding them.

Complementing the TMON initiative, Smithsonian scientists are among the leaders in the world in studying the dwindling population of coral reefs. These reefs are critical to sustaining life in the oceans as well as a significant economic driver for many tropical

economies. Our scientists have developed a conservation program for coral species, using cryopreservation to freeze sperm and embryos in a genetic bank to preserve them for future use to replenish this endangered species.

Our work in biodiversity also serves other practical ends, including understanding causes of the spread of zoonotic diseases, the source of 75% of diseases that afflict humans. We work with our armed forces and civilian air transport agencies to avoid damages to aircraft due to bird strikes, help agricultural experts develop defenses against invasive insects, monitor the movement of invasive marine species, and provide expertise regarding the impact of volcanic eruptions on human and animal populations.

Then there are times when our scientists provide us with a new look at our world. Using our collections and painstaking fieldwork, a team of our scientists from NMNH has discovered over 100 new species in the past fifteen years. Most recently, and announced to wide acclaim, the team identified the first new carnivorous mammal species discovered in the Americas in the last 35 years, the olinguito, a creature that lives in the cloud forests of the Andes. Their work illustrates the importance of continuing the endeavor to understand the true nature of the biodiversity of our world.

The Strategic Plan: Technology, Education and Access

In addition to our goal to discover new knowledge through research, we seek to share what we learn with as many people as possible.

Visitation to our museums and galleries is up by five million, exceeding 31 million last year, the highest attendance in a decade. This is not an accident, but the result of hard work by dedicated professionals to mount nearly 100 new educational exhibitions a year. If you cannot come to the nation's capital, we come to you through our loans of iconic national treasures to our network of affiliate museums, as well as our Smithsonian Institution Traveling Exhibition Service, which reaches nearly 5 million Americans every year in communities around the nation.

Digital technology has allowed the Smithsonian to reach new, diverse audiences and more people than ever before. We have more than 270 Smithsonian websites that last year attracted more than 140 million unique visitors, more than 3.8 million social media followers on Facebook and Twitter and many more on nearly 600 other social media sites, and more than 50 mobile apps that allow us to engage the public. We are committed to opening access to our collections. Today more than 8.5 million records and nearly one million images are available to the public through our main website's Collections Search.

Our digital badging program (similar to merit badges in scouting) is called Smithsonian Quests. More than 15 of our units are participating in this exciting new digital tool to motivate young learners and give them credentials for material they mastered. With the help of a MacArthur Foundation grant we now have nearly 3,000 registered users from all 50 states and more than 50 countries. For example, our recent conference series "Water Matters" looked at water from all of the Smithsonian's perspectives—science,

history, art, and culture—and the students' badging work reflected this interdisciplinary approach. A third-grader in Florida earned an "Oral Historian" badge by interviewing her longshoreman grandfather about his life on the Philadelphia docks. An eighth-grader in North Carolina earned an "Arts Advocate" badge for work that included writing a song about water conservation, "We Are Never Ever Wasting Water," and a classmate earned the "Invasion Investigator" badge through original species research and producing a podcast about the human role in species invasion. And, as one teacher noted, "I was teaching STEM courses and having a difficult time coming up with lessons that would be fun and interactive, but also rigorous and relevant. After using Smithsonian Quests for just two weeks, I noticed a substantial change in the way my students were learning. By putting them in charge of their education, they are able to choose assignments that best fit their skill set."

We, too, are expanding our skill set. Through our Digitization Office, we are becoming leaders in the field of 3D scanning, allowing our treasures and specimens to be seen in an entirely new light. We recently unveiled our new Smithsonian X 3D Explorer which currently features twenty items from the collection, including Lincoln's life masks, the Wright Flyer, fossil whales, and a remnant of the CasA supernova. Not only can each object be explored from every angle on the Internet, but they also can be printed out via 3D printer for scientific research or use in the classroom. I recently had the honor of becoming the first Secretary of the Smithsonian to be scanned and printed—it is a strange sensation to hold a tiny version of yourself in your hands. Soon, students everywhere will be able to do the same. This technology is another step in our efforts to bring the Smithsonian to the nearly 300 million Americans unable to come to us every year.

We now deliver educational materials to students and teachers in all 50 states. More than 2,000 learning resources, all tied to state standards and including K-12 science materials, are available online for free.

Smithsonian Science Education Center

For 28 years, the Smithsonian Science Education Center (SSEC) has been addressing science education, and we want to scale up our efforts to reach more students and teachers. The Smithsonian Science Education Center's LASER (Leadership and Assistance for Science Education) Program is an innovative STEM program, internationally recognized for its work to improve K-12 science education. The LASER model has been implemented successfully in school districts including Alabama, southern California, Delaware, regions of New Jersey, Pennsylvania, northern New Mexico, Rhode Island, and Washington State since 1985. To date, 3 million students in classrooms around the country and online have taken part.

SSEC won a highly competitive i3 grant from the U.S. Department of Education, now serving thousands of children in underserved areas. In addition to the $26 million in federal grant funding, SSEC was able to raise $7.5 million for this effort in matching funds from the private sector. The study involves approximately 90,000 students in elementary and middle schools from districts in three locations—New Mexico, Houston,

from Texas and North Carolina. Approximately 70% of the students in the i3 regions are characterized as under-resourced. SSEC is currently beginning the fourth year of the i3 grant.

Last month, the Smithsonian Science Education Center launched its new workforce development initiative, developing programs in partnership with key stakeholders, such as community leaders, corporations, universities, private foundations, and community colleges to create and sustain a viable workforce. These programs will be delivered through formal and informal means that are designed to enhance the skills of people to gain and maintain good jobs by eliminating the barriers to employment. We will focus on:

- Sustainable Education Platforms
- Increased investment from public and private sectors
- Serving Community Needs
- Assessment

We have a pilot program in New Orleans and another in the works for Chattanooga, Tennessee.

Our expertise and experience as a research institution and as an educational institution, coupled with our global reach and ability to convene stakeholders, uniquely position us to take this workforce development initiative to scale.

Our partnership with the ePals global community enables us to offer our lesson plans and resources to more than one million schools. The Smithsonian Learning Center within ePals has had more than 3.3 million visitors and 8.2 million page views, including more than 410,000 downloads of classroom work based on Smithsonian content.

Federal Government and University Partnerships

To avoid duplication of effort and facilities and bring teams together, we have developed and strengthened partnerships with many federal entities, including NASA, the National Oceanic and Atmospheric Administration (NOAA), the National Institutes of Health (NIH), the U.S. Patent and Trademark Office (PTO), the Department of Education, the Department of Defense (DoD), the Department of Education, the Department of Interior (DoI), the Department of Agriculture (USDA), the State Department, the National Park Service (NPS), the National Archives, the Library of Congress, and the Office of Science and Technology Policy (OSTP). In August, we signed an MOU with the U.S. Agency for International Development (USAID) that will better enable us to work together on conservation research, wildlife management, and cultural preservation in support of the objectives of USAID and our nation. Working together, we can solve issues in ways that would not otherwise be the case.

The Smithsonian is an active partner in the broader efforts to coordinate STEM efforts across the federal government. We have worked closely with agencies such as NASA,

NIH, NOAA and the U.S. Forest Service to improve programming at our own museums, better inform their outreach, and on joint initiatives such as Waterways, a project that increases individual awareness about the environment and eco-stewardship.

We have also built collaborations with more than 60 universities across the country on a wide variety of issues: Harvard, Yale, MIT, Columbia, Carnegie-Mellon, Tulane, UCLA, Michigan, UNC, Virginia Tech, LSU, and many others. We have put significant effort into science with many of these, including our seed grant programs with the University of Maryland at College Park and The George Washington University. With George Mason University we created the Smithsonian-Mason School of Conservation at the National Zoo's Smithsonian Conservation Biology Institute in Front Royal, Virginia. This groundbreaking program is one of the premier destinations in the world for students who aspire to understand the complexities of biodiversity and become leaders in the burgeoning field of conservation biology.

Award-winning Scientists Tackling Practical Problems

More than 500 Smithsonian staff scientists, augmented by an equal number of fellows and hundreds of international collaborators, conduct research in field stations and laboratories on all seven continents, and serve as national and international experts in a wide range of disciplines. Our award-winning scientists include 19 members of the National Academy of Sciences, 47 American Association for the Advancement of Science Fellows, and, in the three years we have participated in the program, three Presidential Early Career Awards for Scientists and Engineers (PECASE) awardees. This is the highest honor the United States government bestows on science and engineering professionals in the early stages of their independent research careers. In the past 10 years, our scientists have published more than 500 articles in the major science journals including 120 in *Nature*, 178 in the *Proceedings of the National Academy of Sciences* (PNAS—including two cover stories in 2013), and 214 in *Science* (including two cover stories in 2013).

More than 1,300 students interned with us last year, working with our scholars and learning by visiting our field stations, museums, galleries, libraries, and the National Zoo. They come to take part in our exciting scientific discovery; we welcome the opportunity to help them grow to be the nation's next generation of scientists.

Smithsonian scientists are based in a group of key facilities and units, many with long and distinguished histories.

Museums

The Smithsonian is home to the National Museum of Natural History (NMNH), the National Air and Space Museum (NASM) on the National Mall and the Steven F. Udvar-Hazy Center at Dulles International Airport, the National Zoological Park in Washington, D.C., and the Zoo's Smithsonian Conservation Biology Institute (SCBI) in Front Royal, Virginia.

NMNH is not only the most visited science museum in the world; it is also home to first-class science in botany, biology, zoology, paleontology, anthropology, archaeology, ornithology, earth sciences, and volcanology. Its collections, with more than 127 million specimens and objects, are the largest on the globe. Digital access is increasingly bringing these assets to scholars and citizens worldwide.

NMNH also houses the Consortium for the Barcode of Life (CBOL), an international initiative devoted to developing DNA barcoding as a global standard for the identification of biological species. The new technique uses a short DNA sequence from a standardized position in the genome as a molecular diagnostic for species identification. As the recognized U.S. leader in DNA barcoding, the Smithsonian seeks to increase its research and training capacity. These activities directly support the biodiversity theme of our Strategic Plan, and also link to access initiatives such as ForestGEO and the Encyclopedia of Life.

The Encyclopedia of Life (EOL), another global partnership based at NMNH, is an ambitious project that will become the world's most comprehensive repository of information about every form of life on Earth. It is expected to encompass the 1.9 million known species of animals, plants, and other life forms in about 10 years. The EOL website is designed to provide free, open access to scientists, educators and students alike. Last year 4.6 million people visited EOL.org from every corner of the globe, making it one of the most popular Smithsonian websites.

In an effort to excite young people about science, last month NMNH opened Q?rius, a new, interactive education center aimed at our teenage visitors. By offering them the opportunity to engage with our scientists, examine specimens, and learn about the world around them, Q?rius will help inspire young people to seriously consider careers in science.

Combined, our science museums and the National Zoo host more than 18 million visitors annually, offering the largest single opportunity in the world to educate the public about science. The scientific research done by the Smithsonian informs exhibits at museums and the Zoo. It provides advanced, up-to-the-minute data that drive our extensive educational outreach to schools across the country.

Smithsonian Centers of Research

The nature and scope of Smithsonian science is global, involving activities on every continent. In addition to the museums, Smithsonian science is driven by a group of leading research centers. They take on collaborative projects that cross disciplines and build on physical platforms not found in the museums.

Smithsonian Environmental Research Center (SERC), Edgewater, MD

SERC is the leading national research center for understanding environmental issues in

the coastal zone. Its scientists engage in interdisciplinary studies that address issues such as global change, watershed pollution, the maintenance of productive fisheries, the changes wrought by invasive species, and the ecology of fragile wetlands and woodlands. Thanks to the support of the Congress, scientists at SERC this year will fully occupy the expanded and remodeled Mathias Laboratory, named after former U.S. Senator from Maryland, Charles "Mac" Mathias. This new 69,000 square foot lab built to meet LEED Platinum standards reduces its environmental impact on all fronts—from where it gets its power to where it gets its materials. It is estimated that the Mathias Laboratory will consume at least 37 percent less energy and emit 37 percent less carbon dioxide than a similar building that meets baseline LEED certification standards. The reach of SERC science on land and water ecosystems extends beyond its home on the Chesapeake Bay to the Atlantic, Gulf of Mexico, and Pacific coasts, and the Mathias Laboratory will strengthen those efforts.

Smithsonian Tropical Research Institute (STRI), Panama

STRI is the world's premier tropical biology research institute. What began in 1910 as an effort by the Smithsonian to survey flora and fauna before the completion of the Panama Canal, STRI has grown to become a world leader in preserving tropical forests and the ecosystems found there. Dedicated to increasing our understanding of the past, present, and future of tropical biodiversity, and its relevance to human welfare through studies in marine biology, terrestrial ecology, and paleontology, STRI's facilities provide a unique opportunity for long-term ecological studies in the tropics. The facilities are used extensively by both Smithsonian scientists and hundreds of visiting scientists from around the world. In 2014, STRI's 35,000-square-foot, green-certified research complex in Gamboa will open, enhancing the ability of scientists there to study and preserve tropical ecosystems.

Smithsonian Astrophysical Observatory (SAO), Cambridge, MA

SAO is one of the largest and most diverse astrophysical institutions in the world; scientists there carry out a broad program of research in astronomy, astrophysics, earth and space sciences, and science education. The Observatory's mission is to advance our knowledge and understanding of the universe through research and education. Boasting some of the world's finest scientists, SAO operates large land- and space-based telescopes that reveal the universe and also builds the remarkable instruments needed to make it possible. SAO operates Chandra, NASA's flagship mission for X-Ray astronomy, and has been selected by the space agency to build the Tropospheric Emissions: Monitoring of Pollution (TEMPO) instrument, the first space-based instrument to monitor major air pollutants across North America. In June, several SAO researchers took their place among the most creative and respected thinkers in the country at the Aspen Ideas Festival in Colorado.

National Zoological Park (NZP)/Smithsonian Conservation Biology Institute (SCBI), Washington, D.C. and Front Royal, VA

National Zoo scientists are based at the Zoo in Washington, D.C., the Smithsonian Conservation Biology Institute in Front Royal, VA, and at field sites around the world. They conduct research to aid in the survival and recovery of species and their habitats, and ensure the health and well-being of animals in captivity and in the wild. During the past 31 years, nearly 6,000 people from 116 countries have been trained through the Zoo's professional programs in conservation biology and zoological medicine. In addition, the Zoo cares for more than 2,000 animals representing 400 different species.

In 2013, the Zoo received its five-year accreditation from the Association of Zoos and Aquariums which certified that the National Zoo has met or exceeded the AZA's standards for animal care, veterinary programs, conservation, education, and safety. The Zoo also celebrated the birth of the Giant Panda cub Bao Bao, two Sumatran Tiger cubs, and fifteen cheetah cubs—all significant births as their species are considered critically endangered, endangered, or vulnerable.

In December, the Zoo launched "Partners in the Sky," a partnership with the aerospace industry to use the latest satellite technology to track any animal, anywhere in the world, at any time. At the event, they issued the "One-Gram Challenge" to develop an ultra-lightweight tracking device that could be affixed to the smallest of birds.

National Air and Space Museum (NASM), Washington, D.C.

Scientists at NASM's Center for Earth and Planetary Studies, a NASA-supported program, study a variety of geological processes, such as volcanism, floods, crater formation, tectonics, and sand movement. Many of the studies also address topics of concern for understanding changes to the planet's climate. The scope of research activities includes work on Mercury, Venus, the Moon, Mars, asteroids, and satellites of the outer solar system.

A NASM geologist was selected by NASA in November 2012 to be a Participating Scientist on the Mars Science Laboratory Curiosity mission. Our "Long Term Planner" works to establish the strategic goals and plans for the science team and rover, and uses data from Curiosity to understand the processes responsible for shaping the landing site in Gale crater.

Museum Conservation Institute (MCI), Suitland, MD

Researchers use state-of-the-art instrumentation and scientific techniques to provide technical research studies and interpretation of art, as well as anthropological and historical objects. Their work assists scientists, art historians, and conservators as they place objects within a culture and a time period, look for new cultural influences within societies, and compare cultural and technological change across different periods and geographic areas.

National Collections

Scientific collections are an essential component of the national scientific infrastructure, as documented in the 2009 report of the Interagency Working Group on Scientific Collections (OSTP, 2009). Irreplaceable and comprehensive, the Smithsonian has the richest, largest, and most-used natural history collection on Earth. Tens of millions of artifacts and specimens, some as old as the Earth itself, serve as a baseline against which to measure change; they are a reference for Smithsonian scientists and those in other federal agencies as well as scientists around the world who study processes that have modified Earth and shaped the human environment. They reflect a legacy of more than 150 years of research, exploration, discovery, and conservation, and they inform Smithsonian publication, education, and exhibition. Universities have researchers, but not extensive collections. Our collections set us apart from all other research and scholarly institutions.

New technologies in genomics and biochemistry allow new layers of information to be extracted from old museum specimens, but they also raise new challenges regarding storage that we are addressing through our cryo-preservation initiative.

Our collections are used by novices and experts alike. For example, NMNH collections are used to support invasive species identification, and National Zoo collections are used to support research on wildlife health and epizootic disease. The Natural History building on the National Mall permanently hosts personnel from four federal agencies, including USDA, who identify and research invasive species. The next invasive pest can be anything from anywhere in the world, so a comprehensive global collection and library are vital to rapid identification, thus empowering informed and effective management. USDA shares the costs of development and curation of the NMNH insect collection, and both staffs use the robust collection to identify more than 15,000 lots of insects annually in support of border protection and agriculture research.

To cite one example, the Emerald Ash Borer, a green beetle, is one of the most damaging invasive species in the United States (and Canada). It is responsible for killing tens of millions of trees and its economic impact has been significant. Based at NMNH and using our collections, a USDA biocontrol program is working on the taxonomy of parasitic wasps that might serve as biocontrol agents. The Emerald Ash Borer (EAB) Program works to prevent the spread of EAB and mitigate the damage it causes to America’s ash trees. The native range of the Emerald Ash Borer includes China, Mongolia, North Korea, South Korea, Japan, Taiwan, and the Russian Far East. The EAB was unknown in North America until its discovery in southeast Michigan in 2002. Today, EAB infestations have been detected in 20 states; Connecticut, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin.

Four federal agencies (U.S. Geological Survey, DoD, USDA, and DoI) spend roughly $6 million annually to base 100 people in our natural history collections to fulfill their agency missions. In addition, the FAA and DoD work closely with NMNH to carry out bird-strike identifications using collections-based studies.

It is important to again underscore that our collections are national collections, in fact *the* national collections. They are made available to answer questions raised by scientists and researchers from across the country and around the world. We measure those individuals unaffiliated with the Smithsonian who come to visit our non-exhibited collections for the purpose of research or education in terms of visitor days. Last year, we had over 45,000 visitor days. In fiscal year 2012, we loaned more than 2.2 million objects and specimens to qualified recipient institutions and individuals.

The Future

With the help of our 6,500 employees, more than 6,200 volunteers, and extensive collections, and through internal and external collaborations, the Smithsonian is focused on addressing important issues in science today, working to improve scientific literacy, and aiming to ensure a brighter future for us all.

To maintain its cutting-edge research, educational outreach, and groundbreaking discoveries in the years to come, the Smithsonian relies on both public and private support and is grateful for both.

You may have heard of high school sophomore Jack Andraka, who devised an inexpensive and quick test for pancreatic cancer. For that, in 2012 the Smithsonian presented him the Smithsonian American Ingenuity Award for youth achievement. As a young boy, Jack was inspired by going to the National Museum of Natural History with his parents. On awards night, he inspired all of us when he said, “Instead of taking pictures of your food tonight and posting them on Instagram, how about instead—change the world with your ideas.”

That is the true power of science—to change the world with ideas and make it a better place. At the Smithsonian, that is what we strive for every day.

Thank you for this opportunity to share with you some of the unique aspects of the Smithsonian Institution’s science efforts.

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